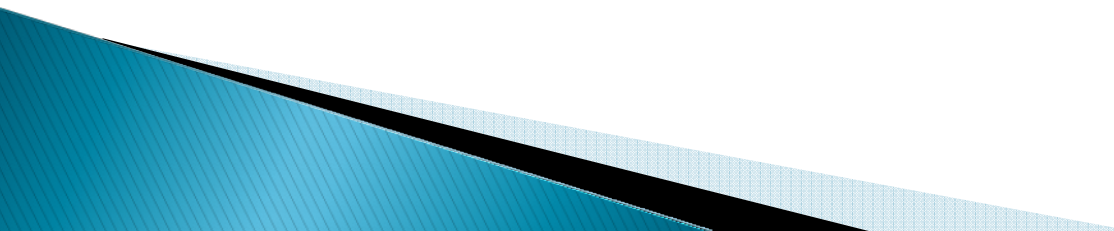


Lecture 15

Analysis of Covariance
ANCOVA

What is ANCOVA?

- ▶ This refers to the situation when the explanatory variables are both categorical and quantitative.
 - ▶ The response variable however is always quantitative.
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Recall:



We have data on 78 seventh grade high school students in a rural Midwestern school. The researcher was interested in the relationship between “self-concept” (as measured by a test designed by himself) and the performance of the student. The data for each student include:

- GPA (not specified the period) (y , response variable)
 - OBS – an observation number (if an observation number misses it means that the corresponding student dropped the study)
 - IQ – score at a standard IQ test (IQ, explanatory variable)
 - Gender – self explanatory
 - Concept – score at the self designed test (CONCEPT, explanatory variable)
- We analyzed this data with multiple regression. We did not look at the gender variable. We will correct this oversight.

ANCOVA – the model.

- ▶ The model fitted for the example shown is:

$$Y_{ij} = \mu + \tau_i + \beta_1 X_{ij}^1 + \beta_2 X_{ij}^2 + \varepsilon_{ij}$$

- ▶ Where: μ – an overall constant
- τ_i – the effect due to categorical var (gender)
- β_1, β_2 – the regression coefficients
- X_{ij}^1, X_{ij}^2 – the explanatory variables
- Y_{ij} – the response variable
- ε_{ij} – the errors assumed to be normal and constant variance

- ▶ The model is quite complex to describe in the case of two or more categorical variables but the software gives you answers regardless.
 - ▶ The important issue is to be able to understand the answers and to make sure that the hypotheses under which these numbers were obtained are satisfied.
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