

15. *Writing about Multivariate Models*

SUGGESTED COURSE EXTENSIONS

A. Reviewing

1. Find a journal article about an application of multivariate analysis to a research question in your field. Critique the methods and results sections, using the principles in chapter 15 of *Writing about Multivariate Analysis, 2nd Edition* to check for the following:
 - a. An explanation of why a multivariate model is needed for this research question and data;
 - b. Topic sentences that introduce the purpose of each table, chart, or quantitative comparison;
 - c. Identification of the role of each independent variable (e.g., key predictor, mediator, confounder, control variable);
 - d. Descriptions of direction, magnitude, and statistical significance of the association between the key independent variable and the dependent variable;
 - e. Explanations of how specific numeric findings address the questions under study;
 - f. Transition sentences that explain how one paragraph follows from the previous paragraph.
2. Find a journal article about an application of multivariate analysis to a topic in your field that involves a series of nested models. Critique the description of the nested model results, using the criteria described under “Comparing a Series of Nested Models” and “GEE Revisited” on pp. 332–34 and 337–38, respectively. Rewrite it to correct the flaws you identified.
3. Find a journal article about an application of multivariate analysis to a topic in your field that involves a set of stratified models, such as the same model estimated separately by gender, region, or time period. Critique the description of the stratified model results, using the criteria described under “GEE Revisited” on pp. 337–38. Rewrite the description to correct the flaws you identified.

B. Applying Statistics and Writing

1. Using the same variables as in question B.1 of the suggested course extension for chapter 9, estimate an OLS model with a quadratic specification of X_1 : $Y_1 = \beta_0 + \beta_1 X_1 + \beta_2 X_1^2$.
 - a. Use the F -statistic to test whether the quadratic specification of X_1 statistically significantly improves the fit of the model compared to a linear specification of X_1 (without the quadratic term; from the results of your analysis for question B.1 of chapter 9). Contrast your conclusions from that test this that based on the test statistic for β_2 .
 - b. Use the BIC statistic to test whether the quadratic specification of X_1 statistically significantly improves the fit of the model compared to a linear specification of X_1 .

2. Using the output from questions B.1, B.2, and B.3 from the suggested course extensions for chapter 9
 - a. Create a table to present the results of the three models, following the guidelines in chapters 5 and 15 of *Writing about Multivariate Analysis, 2nd Edition* to report the estimated coefficients, standard errors, F -statistics, and BIC statistics for each model.

$$Y_1 = \beta_0 + \beta_1 X_1$$

$$Y_1 = \beta_0 + \beta_1 DUMMY$$

$$Y_1 = \beta_0 + \beta_1 X_1 + \beta_2 DUMMY$$
 - b. Write a sentence interpreting how the coefficient on *DUMMY* changes with the introduction of controls for X_1 , following the guidelines on pp. 332–34 for writing about results of nested models.
 - c. Identify which models are nested, and which are non-nested.
 - d. Use the F -statistic to test whether
 - i. the addition of X_1 statistically significantly improves the fit of the model compared to the model with *DUMMY* only.
 - ii. the addition of *DUMMY* statistically significantly improves the fit of the model compared to the model with X_1 only.
 - e. Use the BIC statistic to identify the best-fitting model among those three specifications, using the criteria on p. 335 for contrasting non-nested models.

3. Write a description of one or more tables of bivariate results from your own data, using the criteria on pp. 317–25.

4. Write a description of results of one multivariate model for the same research question as in the preceding question, using the criteria listed under question A.1.

5. Write a description of a series of nested models for the same research question as in question B.3, using the criteria described under “Com-

paring a Series of Nested Models” and “GEE Revisited” on pp. 332–34 and 337–38, respectively.

6. Write a description of a set of stratified models for the same research question as in question B.3, using the criteria described under “GEE Revisited” on pp. 337–38.

C. Revising

1. Evaluate a description of a single multivariate model from the results section of a paper you have written previously, using the criteria listed under question A.1. Rewrite that description to rectify any problems you identified.
2. Evaluate a description of a series of nested models from the results section of a paper you have written previously, using the criteria described under “Comparing a Series of Nested Models” and “GEE Revisited” on pp. 332–34 and 337–38 of *Writing about Multivariate Analysis, 2nd Edition*. Rewrite that description to rectify any problems you identified.
3. Evaluate a description of a set of stratified models from the results section of a paper you have written previously, using the criteria described under “GEE Revisited” on pp. 337–38. Rewrite that description to rectify any problems you identified.