

PAUP 803: Multivariate Quantitative Analysis

OLD DOMINION UNIVERSITY

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Pre-Requisites

The student will have had PADM 695/752, CHP 640, FOUN 722 or equivalent bivariate statistics class. Student should be familiar with descriptive statistics, tests of association and correlation, t-tests, one-way ANOVA, linear regression, and hypothesis testing. Stata software will be used for analysis, but you are not required to have knowledge of the software before you take the class. However, the course will not be oriented toward teaching you how to use the Stata software.

Course Overview

The course focuses on the practical use of multivariate analytical tools to address research questions. The approach does not focus on statistical formulas, but instead emphasizes what the techniques could do, how to select the correct method to achieve a particular research objective, and how to properly apply and interpret each technique. This course provides instruction in the application, interpretation, and communication of multivariate statistics. The course will focus on multivariate tools for the analysis of interdependence and analysis of dependence. The primary emphasis will be on regression in its various forms.

The primary objective of the course is to enable you to undertake multivariate research carried out from a wide array of methodological perspectives by ensuring in conducting your research. The guiding philosophy of the course is not to simply rack up multivariate techniques or jargon. The lectures and discussion will not consist of a laundry list of tests for this and indicators for that. Nor will we delve into statistical theory – while I appreciate the matrix algebra and math I also understand that not everyone shares such appreciation. Rather, the goal will be to explore the multivariate techniques commonly used in the discipline.

I believe the best way for you to understand multivariate analysis is to encourage you to do your own research. Reading about abstract techniques in a textbook and reading journal articles that apply the techniques is useful, but is no replacement for dirtying your hands by applying the techniques to real questions. Much of the grade therefore derives from a research paper that you will develop over the course of the semester, from initial proposal to publishable-quality draft. You will be graded on how well you apply the multivariate technique(s), but also on how well you integrate the analysis into your research.

Course Outcomes

Upon completion of this course, students should:

1. Be able to explain the purpose of multivariate statistical analysis and identify available multivariate statistical tools.
2. Be familiar with terminology and language of multivariate analysis to be conversant in discussing and presenting research using multivariate tools and approaches.
3. Be familiar with the academic journals in the field of public administration and policy.
4. Be able to develop a complete analysis plan including: selecting the appropriate multivariate approach and model, evaluating the model, and validating the model.
5. Understand the conceptual framework for the different multivariate analysis and be able to identify steps in the analysis.
6. Be able to present, interpret, and communicate statistical results in a format appropriate for professional presentation and peer-reviewed publication.

Texts and Software

There are three required texts.

- Miller, Jane E. (2005). *Writing about Multivariate Analysis*. Chicago: University of Chicago Press. ISBN: 0226-27832
- Hair, Jr., J. F., Black, W.C., Babin, B. J., Anderson, R. E., & Tatham, R.L. (2010). *Multivariate Data Analysis (7th ed)*. Upper Saddle River, NJ: Pearson Prentice Hall. ISBN: 9780138132637
Note: This text is available in the international edition, BUT the international edition does not have the same content as the domestic edition. Also, the 7th edition involved extensive revisions, so while an earlier edition may cover most of the material, the coverage will be different.
- Borooah, V.K. (2001), *Logit and Probit: Ordered and Multinomial Models*. Thousand Oaks, CA: Sage Publications. ISBN: 0-7619-2242-3.

The following books are not required but are recommended:

- Schroeder, Larry D., David Sjoquist & Paula E. Stephan. (1986). *Understanding Regression Analysis: An Introductory Guide*. Newbury Park, CA: Sage Publications. ISBN: 978-0-8039-2758-2
- Aldrich, J.H. & Nelson, F.D. (1995), *Linear Probability, Logit, and Probit Models*. Newbury Park, CA: Sage Publications. ISBN: 978-0-8039-2133-7

This course will also use Stata to perform the analysis. You will need to have access to the Stata software.

Grading

The grading scheme is as follows:

Prospectus	15%
Data report	20%
Findings draft	20%
Final paper	30%
Presentation	15%

Research project

You will undertake a complete research project using the 'Life in Hampton Roads' data set. The research project will provide the opportunity to identify and compile secondary data, convert the data into an appropriate analyzable form, run the analysis, diagnose the results, and interpret the findings.

Completion of the research project will be in stages, with each stage having a graded deliverable.

- **Prospectus (15%)**
A proposal describing your research project, including the substantive question being addressed (positioning your contribution within the existent scholarly literature), and a rough description of the data you intend to bring to bear. You must identify the data set or data source you will be using. You can think of this assignment as a trial run at the literature review for your final paper, the purpose of which is to convince both of us that you have a feasible, valuable project. Approximate length: 5-7 pgs.
- **Data Report (20%)**
You should have collected all data for the research project by this point, unless extenuating circumstances force me to grant you an explicit extension. You also must have made whatever basic transformations the data require before they may be used. The written part of this assignment should be a brief lab report familiarizing readings with the data you intent to use: how they were collected and coded, how you transformed them for use in the research, why they appropriately measure the concepts discussed in your Prospectus, how they will be combined into the analysis, plus some descriptive statistics. Think of this assignment as a trial run at the data and model section of your paper, the purpose of which is to convince us that you are ready to begin with analyses. Approximate length: 3-5 pages, not counting visuals.
- **Findings Draft (20%)**
An initial draft of the finding and interpretation section(s) of your research paper. This should represent *actual empirical analysis* of the data using multivariate linear regression (plus any of useful methods), one that tests the ideas introduced in your earlier submissions and provides detailed analysis of the data. Clarity and depth are both important, and you may want to include details that you otherwise would remove from a journal submission (e.g., test of this or that). Make sure that you interpret the findings substantively; it is not enough just to report Stata output. Approximate length: 5-7 pages.
- **Final Project (30%)**
A version of your project that you would present at a conference or to your dissertation committee. The paper will be graded according to how publishable it is overall, not as a statistical exercise alone. It should incorporate the suggestions provided through the process of developing the Prospectus, Data Report, and Findings Draft. It also should reflect a polished effort at presenting what you have found: tables rather than raw output to show the regression results, interpretation of the substantive meaning of coefficients rather than simply hypotheses tests, comparison of models to determine the relative impact of variables in your study, etc.

- Presentation (15%)
Presentation of your research following the format of an academic conference: 20 minute presentation (using PowerPoint) with 5 minutes question and answer.

Course Preparation and Success Strategies

You must read the assigned chapters and articles. Just reading the chapters once is not sufficient. It usually takes two to three readings of the chapters before you begin to grasp the material. It is a good idea to study the definitions of key terms at the beginning of the chapters.

As you read about the different multivariate techniques, ask and answer:

- What is the technique and how is it similar to and different from other techniques?
- When is this technique used and what research questions can it address?
- What are the main multiplicity themes for this technique?
- What is the statistical model that is tested with this technique?
- What are the main themes needed to interpret results at a macro level?
- What are the main themes needed to interpret results at a micro level?
- What are some considerations or next steps after applying this technique?
- What is an example of applying this technique to a research question?

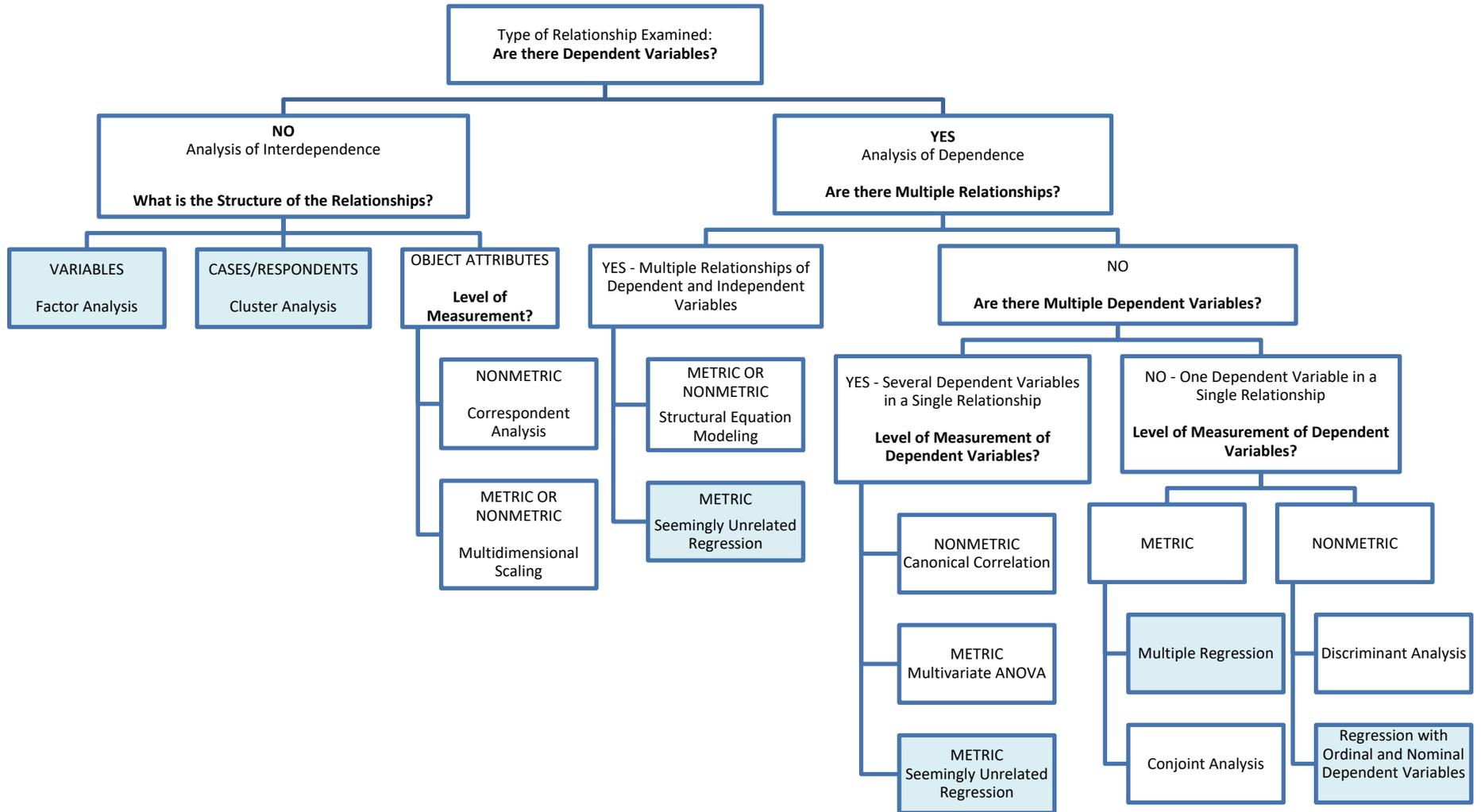
As you read the journal articles, consider the following:

- What is the research question?
- Why is it interesting? Relevant?
- What data is used and how is it applicable for measuring relevant concepts?
- Description of multivariate technique used and why it is appropriate
- Summary of findings
- Problems with the analysis. If no problems are present, why and how did it reflect the correct choices and interpretation.

Academic Honesty

Violations of the academic honesty code will be dealt with in the strictest terms. Students are advised to become familiar with the university's academic honesty code, as well as the Statement on Plagiarism for the Strome College of Business. It is the student's responsibility to ensure that both the letter and intent of this code are met in all circumstances. Ignorance of this code, or of proper rules of citation, provides no defense. My policy concerning enforcement of this code is inflexible; no exceptions will be made.

Multivariate Techniques Covered



Schedule (Class meeting dates are highlighted in yellow)

Week 1 Introduction and Overview

- Hair et al. Chapter 1
- Hair et al. Chapter 2
- Briefly review the Life in Hampton Roads Surveys 2012 through 2015

Analysis of Interdependence and Measure Quality Assessment

Week 2 Exploratory Factor Analysis: Principle Component Analysis and Common Factor Analysis

- Hair et al. Chapter 3
- Olberding, J.C. (2002), Does Regionalism Beget Regionalism? The Relationship between Norms and Regional Partnerships for Economic Development. *Public Administration Review*, 62: 480-491.
- Hall, J. (2007). Informing State Economic Development Policy in the New Economy: A Theoretical Foundation and Empirical Examination of State Innovation in the United States. *Public Administration Review*, 67(4), 630-645.

Week 3 Cluster Analysis

- Hair et al. Chapter 9
- Benito, B. and Bastida, F. (2009), Budget Transparency, Fiscal Performance, and Political Turnout: An International Approach. *Public Administration Review*, 69, 403–417.
- Yusuf, J. A Tale of Two Exits: Nascent Entrepreneur Learning Activities and Disengagement from Start-up. *Small Business Economics*, 39(3): 783-399.

Week 4 Review and Stata Application

ANALYSIS OF INTERDEPENDENCE

Weeks 5 & 6 Multiple Regression

- Hair et al. Chapter 4
- Hair et al. Advanced Regression Diagnostics Supplement
- Smith, K.B. (1999), Clean Thoughts and Dirty Minds: The Politics of Porn. *Policy Studies Journal*, 27, 723–734.
- Meier, K.J & O’Toole, L.J. (2002), Public Management and Organizational Performance: The effect of managerial quality. *Journal of Policy Analysis and Management*, 21, 629–643.
- Yusuf, J., O’Connell, L., Hackbart, M. & Liu, G. (2010), State Infrastructure Banks and Borrowing Costs for Transportation. *Public Finance Review* 38(6), 682-709.
- Davis, T.J. & Gabris, G.T. (2008), Strategic Compensation: Utilizing Efficiency Wages in the Public Sector to Achieve Desirable Organizational Outcomes. *Review of Public Personnel Administration* 28(4), 327-348.

Week 7 Review and Stata Application

Week 8 Research Day

Week 9 Spring Break

Week 10 Logistic Regression: Regression with Binary Dependent Variables

- Hair et al. Chapter 6
- Serra, G. (1995). Citizen-Initiated Contact and Satisfaction With Bureaucracy: A Multivariate Analysis. *Journal of Public Administration Research and Theory* 5(2), 175-188.
- Bradbury, M.D., Battaglio, R.P. & Crum, J.L. (2010), Continuity Amid Discontinuity? George W. Bush, Federal Employment Discrimination, and “Big Government Conservatism.” *Review of Public Personnel Administration* 20(4), 445-466.
- Recommended: Aldrich, J.H. & Nelson, F.D. (1995), *Linear Probability, Logit, and Probit Models*. Newbury Park, CA: Sage Publications. ISBN: 978-0-8039-2133-7

Week 11 Regression with Ordinal and Multinomial Dependent Variables

- Borooah, V.K. (2001), *Logit and Probit: Ordered and Multinomial Models*. Thousand Oaks, CA: Sage Publications.
- Feeney, M.K. (2008), Sector Perceptions Among State-level Public Managers. *Journal of Public Administration Research and Theory* 18(3), 465-494.
- Berry, F.S., Berry, W.B. & Foster, S.K. (1998), The Determinants of Success in Implementing an Expert System in State Government. *Public Administration Review* 58(4), 293-305.
- Simonsen, B., Robbins, M. D. & Kittredge, B. (2001), Do Debt Policies Make a Difference in Finance Officers' Perceptions of the Importance of Debt Management Factors? *Public Budgeting & Finance* 21, 87–102.

Week 12 Review and Stata Application

Week 13 Research Day

Week 14 Extensions: Moderation and Mediation Analysis

- Baron, R.M. and Kenny, D.A. 1986. The Moderator–mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations. *Journal of Personality and Social Psychology* 51(6), 1173-1182.
- Garnett, J.L., Marlowe, J. and Pandey, S.K. (2008), Penetrating the Performance Predicament: Communication as a Mediator or Moderator of Organizational Culture’s Impact on Public Organizational Performance. *Public Administration Review*, 266-281.

Week 15 Research Presentation