PSCI 5362
Multivariate Models: Applied Regression Analysis
Spring 2008
Monday 4:00-6:45, Green 3.402

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Hours: Monday Noon-1pm and Tuesday 1–3pm

Description

This is a lecture course that covers multivariate data analysis and advanced regression applications for political science students. The goal of the course is to ensure that graduate students in political science are able to interpret, implement, and employ basic regression analysis of social science data.

The course is primarily devoted to advanced regression analysis. The emphasis is on developing a rigorous understanding of ordinary least squares (OLS), violations of regression assumptions, hypothesis testing, and the general linear model. Most of the course will be spent developing basic approaches to regression analysis when the assumptions of OLS fail. Some time will be spent on estimators other than least squares when assumption violations require these methods. The main focus is regression models, since these are the basis for most other methods for analyzing multivariate data.

The emphasis of this course is on the acquisition and understanding of *analytical techniques*. It is very much an applied course, but for applications to be informed, there is a fundamental level of theoretical knowledge required. Many mistakes will be made by those who only know how to interpret findings and use "canned" computer packages. We emphasize that students know exactly what is going on when they do statistical analysis.

Student Learning Objectives

On completing this course, students will be able to:

- Apply and develop linear statistical models using political data
- Recognize the basic assumptions, as well as strengths and weaknesses, of models using multivariate analyses of political data
- Implement and interpret multivariate analysis in their own independent research project.

Required texts and course materials

Texts

Four books have been ordered. They are:

Required:

Gujarati, Damodar. 2002. *Basic Econometrics.* 4th Edition.

Namboodiri, Krishnan. 1984. *Matrix Algebra, an introduction.*

Achen, Christopher. 1982. *Interpreting and Using Regression.* Beverly Hills: Sage.

Kennedy, Peter. 2003. A Guide to Econometrics. 5th edition. Cambridge: MIT Press.

Students find the Kennedy book to be extremely helpful, so I encourage students to buy it. There will be occasions in which Kennedy will be extraordinarily helpful. I have not indicated particular readings from Kennedy; use it as you see fit. In general you should use all the books as reference materials. If I have not indicated a reading from a book it does not mean that a topic is not covered in it. Thus, use the texts as reference materials for each week and take the indicated readings as a guide. It is my expectation that you will find additional texts and resources to supplement the assigned course materials. Some sources will be indicated in course lectures and notes.

Students will be expected to use other advanced sources for data and statistical reference, including JSTOR, journal databases, Statlib, POLMETH, and other resources to which you will be directed.

WebCT

WebCT is used in this class for distributing course materials (notes, datasets, code, etc) and to check your progress in the class. If you do not have a computer at home or prefer to work on campus, you may do this at the library or in the many computer labs on campus. You can access the course WebCT page at http://webct6.utdallas.edu. Additional information

about how to use WebCT is available at this site as well. You will need a UTD net-id to access this site. WebCT is also how I will communicate with you. You are responsible for announcements made through WebCT.

Lecture notes

I will make available copies of my lecture notes / slides via WebCT. I will typically provide these in advance of covering the material.

Computing and Course Materials

A major component of applied statistics is using computers and data to implement models and test hypotheses. Toward that end, students should be expected to utilize a variety of statistical packages for their work. While no one statistical program will be used for this course, familiarity with several is important because each has their own niche. I will primarily use:

Package	Cost
S-plus	Available at UTD
R	Free
Stata	Available at UTD
SAS	Available at UTD
Rats	Available at UTD
Ox	Free console version
GAUSS	Available at UTD

Any others are acceptable, and you should *not* express reservation about learning additional programs — it is an impediment to your research and teaching.

For home use (i.e., those who hate to purchase licenses), I highly recommend R, the GNU clone of S-plus. It is free, has great graphics and is well documented. For econometric analysis and time series, I recommend Stata, Ox, or Rats.

I will not spend a great deal of time leading tutorials on statistical software in class. I am happy to have them arranged outside of class. I will also make programs an code available on an as needed basis in several statistical packages to demonstrate techniques. Note that somethings are easier to do in different packages and then convert the data to another format for analysis (I often construct variables and datasets in Stata and then move them to other software for analysis.) Your best resource for learning and implementing new methods is your peers and the voluminous manuals that come with statistical software!

Grading, Assignments, and Course Policies

Grading

There will be approximately six to eight assignments, an exam, and an original research paper. The allocation of the grade is:

- Assignments: 25%
- Exam I: 25%
- Exam II: 25%
- Paper: 25%

The first exam will be in-class, approximately during week 7. The second exam will be a take-home exam at the end of the course.

Late assignments and papers will be penalized. Late assignments and papers will be penalized 10 points per day. Papers or assignments submitted via e-mail will be considered received by the date and time stamp on the e-mail received in my e-mail inbox. The paper will be due on the last scheduled class date (April 28, 2008).

My strong preference is to not allow incompletes in this course, since you need most of the material completed for later course work. If you believe you will need to take an incomplete you 1) must follow university policy (as stated below) and 2) should contact me as soon as practicable (i.e., not the week of the final exam or the day before the final paper is due).

Grades are based on the standard grading scale: A = 100-90, B = 89-80, C = 79-70, etc.

If you have any questions about your grade on an assignment, please wait until 24 hours after receiving your assignment before discussing the grade with me. There are no exceptions to this policy.

If you wish to have an assignment re-graded, it must be returned to the me within two days of the day it was returned (if I am not available that day, ask the staff of the School of Economic, Political

and Policy Sciences to leave it in my box). Assignments to be re-graded must include a memo stating the reason why you believe they assignment should be re-graded. Finally, re-graded assignments can be graded higher, lower, or the same as the initial grade.

Assignments

Assignments and exams will cover applied and theoretical problems. Assignments should be typewritten as much as possible. I realize that may require setting mathematical text or typographical symbols. This can be done in standard word processing software. Feel free to only use Roman letters. If you are so interested, I can arrange a short tutorial on how to use LaTeX for this task.

Any statistical output or data analysis you do should be fully interpreted and presented as though it were being sent for publication to a journal. *This means that regression output from your statistical package of choice that is copied into a word processor document is unacceptable. You should take the time to typeset the results into a meaningful table or present a well documented and coherent graphical summary of any results.* If you have any questions about what to include in your data output and assignments, consult empirical work in standard journals (APSR, ISQ, AJPS, JOP, etc.) or ask. Assignments that do not meet this requirement will be returned and not graded until revised.

You may work together on assignments, but each person must turn in their own work. Working together has two benefits. First, it can help you see if you really understand the material (if you can explain it to someone else and convince them that you are right, you probably are). Second, it gets you in the habit of working with others to solve problems (and remember that most research is coauthored!) You do need to be careful about two issues in the course of working together. The first is plaigarism. The second is letting the person who "gets it" do all the work. Just because someone looks like they have solved a problem does not mean it is the correct answer. One of the things I have seen before is that working together can help on the "easy" problems, but on some of the harder problems, a "group" will often come up with the wrong answer. Beware of "groupthink"!

Finally, if you have questions about the assignments, I encourage you to come and ask me about them. Pounding your head on a desk for 6 days and then coming to get help on day seven (when the assignment is invariably due) is poor form and is not going to help you learn the material. One of the best methods I have found for asking and answering questions for this course is e-mail. The benefit of e-mail is that it forces you to compose your question(s) very specifically and to think through what you are asking logically. In addition, I can generally offer a faster response ia e-mail than if you wait for office hours.

Papers

The paper will require students to analyze and interpret regression. The paper you write should be based on your own research and interests—there is no requirement to use a particular dataset or technique. However, the paper should be original (it should not include an analysis used in previous courses, conference papers, or other writing unless we have specifically discussed it). The following are suggested models for a paper:

- A conference paper (examples can be seen on my webpage).
- A dissertation or thesis chapter (examples available upon request).
- A replication article (see the replication standard for Political Analysis or at http://gking.harvard.edu/data.shtml#repl

Before beginning your paper, you are **REQUIRED** to come and talk with me about your paper. At or prior to this meeting, please provide a ONE PAGE research design and lays out the following for your paper:

- Main research question you are addressing.
- Hypothesis (or Hypotheses) you wish to evaluate in your paper.
- Data and variables to be used in the analysis.
- Tests and methods that will be used to evaluate the hypotheses.
- Tentative listing of the techniques and models you may use.

The data you use for the analysis is something that you should already have or have easy access to. Data collection is not a topic we are covering in this course and time spent building large complex datasets will detract from your ability to complete the paper adequately.

The meeting to discuss the paper should be scheduled before the 7th week of class (Roughly February 20th).

Attendance

It should go without saying that in a class of this size your attendance is easily noted and therefore required. If you are unable to make a class or will be late, advise the instructor as far in advance as possible.

Course conduct

The following rules apply in class:

1. Turn off your cell phone. It is VERY distracting to others. "Off" means that it does not ring OR vibrate. I will ask you to leave if your phone rings. (Exceptions to this policy can be made, come to talk to me.)

2. Do not fall asleep. It is rude and distracting. Bring coffee if you need it (I do.)

3. Be polite and courteous to your fellow students.

4. Raise your hand when you want to be recognized to answer or ask a question. If you do not raise your hand I will not recognize you or your answer.

5. You are reponsible for things: therefore if you miss something I announced or fail to complete an assignment, my response will be "How is this my problem?"

6. Note that this syllabus is not a contract. It is subject to change at my discretion. While we may be studying the political science, this class is not a democracy.

7. Class starts at 4:00pm. Not 4:15. Be here on time.

8. Respect my time and I will respect yours. We are both busy.

9. *You are expected to be proactive in anticipating and planning for any absences or problems you will have in completing course work.* Make arrangements for possibly missed work prior to the due date is preferable and more likely to be successful than doing it after the due date.

Course Outline

Readings listed for each week are suggestions. My lectures and discussion will parallel these readings. The readings are listed in order of importance (from most to least important). Feel free to ignore or consult them as needed. I will regularly post or hand out lecture notes on the material we are covering.

In general, I have my own "order" to covering the material. This may differ from the texts, or what others might do. My experience is that this layout of the material works well.

Weeks 1 and 2: Introduction, Math for Social Scientists

- Namboodiri, All
- Gujarati, Appendices A and B

Week 3: Introduction: The likelihood principle and inference

- Gujarati Ch 2 and 3

Weeks 4: The least squares and maximum likelihood estimation of regression

- Gujarati Ch 4

Weeks 5 and 6: Inference in the regression model

- Gujarati Ch 5

Week 6: Specification issues; introduction to the general linear model

- Achen, all.
- Kennedy Chapters 4-5
- Gujarati Ch 6

Week 7: Exam

Week 8: Extensions and specification of the general linear model

- Gujarati Ch 9 – Dummy variables

Week 9: Multicollinearity

- Gujarati Ch 10

Week 10: Heteroscedasticity

- Gujarati Ch 11

Week 11: Time series and serial correlation

- Gujarati Ch 12 and Ch 17

Week 12: Systems of equations, identification, non-fixed regressors

- Kennedy, Chapter 10.1-3
- Gujarati Ch 13, skim Ch 18-20

Week 13: Limited Dependent Variables

- Gujarati Ch 15

Week 14: TBA based on student demands and the pace of the previously scheduled weeks.

Student Conduct & Discipline

The University of Texas System and The University of Texas at Dallas have rules and regulations for the orderly and efficient conduct of their business. It is the responsibility of each student and each student organization to be knowledgeable about the rules and regulations which govern student conduct and activities. General information on student conduct and discipline is contained in the UTD publication, A to Z Guide, which is provided to all registered students each academic year.

The University of Texas at Dallas administers student discipline within the procedures of recognized and established due process. Procedures are defined and described in the Rules and Regulations, Board of Regents, The University of Texas System, Part 1, Chapter VI, Section 3, and in Title V, Rules on Student Services and Activities of the universitys Handbook of Operating Procedures. Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations (SU 1.602, 972/883-6391).

A student at the university neither loses the rights nor escapes the responsibilities of citizenship. He or she is expected to obey federal, state, and local laws as well as the Regents Rules, university regulations, and administrative rules. Students are subject to discipline for violating the standards of conduct whether such conduct takes place on or off campus, or whether civil or criminal penalties are also imposed for such conduct.

Academic Integrity

The faculty expects from its students a high level of responsibility and academic honesty. Because the value of an academic degree depends upon the absolute integrity of the work done by the student for that degree, it is imperative that a student demonstrate a high standard of individual honor in his or her scholastic work.

Scholastic dishonesty includes, but is not limited to, statements, acts or omissions related to applications for enrollment or the award of a degree, and/or the submission as ones own work or material that is not ones own. As a general rule, scholastic dishonesty involves one of the following acts: cheating, plagiarism, collusion and/or falsifying academic records. Students suspected of academic dishonesty are subject to disciplinary proceedings.

Plagiarism, especially from the web, from portions of papers for other classes, and from any other source is unacceptable and will be dealt with under the universitys policy on plagiarism (see general catalog for details). This course will use the resources of turnitin.com, which searches the web for possible plagiarism and is over 90% effective.

Each student in this course is expected to exercise independent scholarly thought, expression and aptitude. This addendum to the course syllabus is provided to assist you in developing and maintaining academic integrity while seeking scholastic success.

General Comments:

- All academic exercises (including assignments, essays, laboratory experiments and reports, ex-

aminations, etc.) require individual, independent work. Any exception(s) will be clearly identified.

- Be sure your name or identifying number is on your paper.
- Complete and turn in academic exercises on time and in the required format (hardcopy, electronic, etc.).
- Retain confirmation of document delivery if submitted electronically.
- Retain all research notes and drafts until the project or assignment has been graded.
- Obtain written authorization from your instructor prior to submitting a portion of academic work previously submitted for any academic exercise. (This includes an individual or group project submitted for another course or at another school.)

Essays and Significant Papers:
Be prepared

- To present periodic drafts of work in process
- To correctly and completely reference all sources of information using the citation format prescribed
- To turn your completed assignment in timely and in the prescribed manner (electronic, hardcopy, etc.)

Examinations:
During examinations be prepared

- To leave all personal belonging at the front of the room or other designated location (this includes cell phones, turned off of course, and beverage containers)
- To present your UTD Comet Card
- To remove your cap or hat
- To remove the batteries from any electronic device (e.g. calculator)
- To exchange blue books or bring them early as required
- To change seating
- To sign out when exiting the testing room
- To be escorted for lavatory use

All episodes of suspected scholastic dishonesty will be reported according to University policy. Students who violate University rules on scholastic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course and/or dismissal from the University. Since such dishonesty harms the individual, all students and the University, policies on scholastic dishonesty will be strictly enforced. Penalties that may be assessed for scholastic dishonesty may be reviewed in Subchapter D. Penalties at http://www.utdallas.edu/student/slife/chapter49.html.

Email Use

University policy requires that you have a UTD netid and e-mail account. E-mail sent to me from non-UTD accounts may not arrive or may be trapped by spam filters. Please use your UTD e-mail account and clearly identify yourself by name in e-mail messages. E-mail sent from non-UTD accounts may not be answered if I suspect that it will cause problems for my computer.

The University of Texas at Dallas recognizes the value and efficiency of communication between faculty/staff and students through electronic mail. At the same time, email raises some issues concerning security and the identity of each individual in an email exchange. The university encourages all official student email correspondence be sent only to a students U.T. Dallas email address and that faculty and staff consider email from students official only if it originates from a UTD student account. This allows the university to maintain a high degree of confidence in the identity of all individual corresponding and the security of the transmitted information. UTD furnishes each student with a free email account that is to be used in all communication with university personnel. The Department of Information Resources at U.T. Dallas provides a method for students to have their U.T. Dallas mail forwarded to other accounts.

Withdrawal from Class

The administration of this institution has set deadlines for withdrawal of any college-level courses. These dates and times are published in that semester's course catalog. Administration procedures must be followed. It is the student's responsibility to handle withdrawal requirements from any class. In other words, I cannot drop or withdraw any student. You must do the proper paperwork to ensure that you will not receive a final grade of "F" in a course if you choose not to attend the class once you are enrolled.

Student Grievance Procedures

Procedures for student grievances are found in Title V, Rules on Student Services and Activities, of the university's Handbook of Operating Procedures.

In attempting to resolve any student grievance regarding grades, evaluations, or other fulfillments of academic responsibility, it is the obligation of the student first to make a serious effort to resolve the matter with the instructor, supervisor, administrator, or committee with whom the grievance originates (hereafter called the respondent). Individual faculty members retain primary responsibility for assigning grades and evaluations. If the matter cannot be resolved at that level, the grievance must be submitted in writing to the respondent with a copy of the respondents School Dean. If the matter is not resolved by the written response provided by the respondent, the student may submit a written appeal to the School Dean. If the grievance is not resolved by the School Deans decision, the student may make a written appeal to the Dean of Graduate or Undergraduate Education, and the deal will appoint and convene an Academic Appeals Panel. The decision of the Academic Appeals Panel is final. The results of the academic appeals process will be distributed to all involved parties.

Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations.

Incomplete Grade Policy

As per university policy, incomplete grades will be granted only for work unavoidably missed at the semesters end and only if 70% of the course work has been completed. An incomplete grade must be resolved within eight (8) weeks from the first day of the subsequent long semester. If the required work to complete the course and to remove the incomplete grade is not submitted by the specified deadline, the incomplete grade is changed automatically to a grade of F.

Disability Services

The goal of Disability Services is to provide students with disabilities educational opportunities equal to those of their non-disabled peers. Disability Services is located in room 1.610 in the Student Union. Office hours are Monday and Thursday, 8:30 a.m. to 6:30 p.m.; Tuesday and Wednesday, 8:30 a.m. to 7:30 p.m.; and Friday, 8:30 a.m. to 5:30 p.m. The contact information for the Office of Disability Services is:
The University of Texas at Dallas, SU 22
PO Box 830688
Richardson, Texas 75083-0688
(972) 883-2098 (voice or TTY)

Essentially, the law requires that colleges and universities make those reasonable adjustments necessary to eliminate discrimination on the basis of disability. For example, it may be necessary to remove classroom prohibitions against tape recorders or animals (in the case of dog guides) for students who are blind. Occasionally an assignment requirement may be substituted (for example, a research paper versus an oral presentation for a student who is hearing impaired). Classes enrolled students with mobility impairments may have to be rescheduled in accessible facilities. The college or university may need to provide special services such as registration, notetaking, or mobility assistance.

It is the student's responsibility to notify his or her professors of the need for such an accommodation. Disability Services provides students with letters to present to faculty members to verify that the student has a disability and needs accommodations. Individ-

uals requiring special accommodation should contact the professor after class or during office hours.

Religious Holy Days

The University of Texas at Dallas will excuse a student from class or other required activities for the travel to and observance of a religious holy day for a religion whose places of worship are exempt from property tax under Section 11.20, Tax Code, Texas Code Annotated.

The student is encouraged to notify the instructor or activity sponsor as soon as possible regarding the absence, preferably in advance of the assignment. The student, so excused, will be allowed to take the exam or complete the assignment within a reasonable time after the absence: a period equal to the length of the absence, up to a maximum of one week. A student who notifies the instructor and completes any missed exam or assignment may not be penalized for the absence. A student who fails to complete the exam or assignment within the prescribed period may receive a failing grade for that exam or assignment.

If a student or an instructor disagrees about the nature of the absence [i.e., for the purpose of observing a religious holy day] or if there is similar disagreement about whether the student has been given a reasonable time to complete any missed assignments or examinations, either the student or the instructor may request a ruling from the chief executive officer of the institution, or his or her designee. The chief executive officer or designee must take into account the legislative intent of TEC 51.911(b), and the student and instructor will abide by the decision of the chief executive officer or designee.

These descriptions and timelines are subject to change at the discretion of the Professor.