Introduction to Econometrics

Course Objectives:

Econometrics is the study of statistics as applied in economics. We are interested in answering three kinds of questions. How do we test a given scientific hypothesis? (Example: Are men paid more than women with equivalent levels of education?) How do we measure parameters of scientific interest? (Example: How much does one year of schooling raise wages?) What are good methods of forecasting the future? (Example: What will GDP be next year?) The basic tool we learn is multiple regression. We also explore a number of extensions. Class work is largely mathematics, intuition building, and examples of computer use. Homework emphasizes hands-on computer work as well as theoretical exercises.

Learning Goals

- **Be able to understand, interpret, and implement multiple regression and related statistical techniques**

- **Know the limitations and pitfalls of regression methods.**

- **Master the basic theory underlying regression estimation and be able to apply it in simple applications.**

Coursework and grades:

The course grade depends on class participation, the online preparation quiz, online homework on myEconLab, homework on GauchoSpace generally requiring empirical work, two "micro papers", two in-class quizzes, and a final exam. Please check your recorded grades on GauchoSpace.

Class participation: We will be using remote iClickers in class to make class sessions more interactive. These will be required. You may purchase your iClicker at the bookstore or rent one from Associated Students if you do not already own one. In-class iClicker participation will constitute **5 percent** of your grade. Each class is worth 3 points. You earn 1 point for each lecture if you attempt to answer the questions. The other points will be awarded based on the accuracy of your answers. I will drop your lowest two in-class performances. **Be sure to register your clicker on the class GauchSpace page-even if you've registered it before.** (The iClicker software for recording grades is not friendly about changing points after a class, so it is important that you make sure things are set up on your end.)

Online preparation quiz: You must take and pass the online preparation quiz on the class GauchoSpace site. You should already know all the material needed for this quiz from courses you've had before taking Econ 140A. You may find having scratch paper with you helpful. You're also allowed to use notes, just no human assistance. You can take this quiz as many times as you wish, taking as long as you wish at each attempt. All that matters is that you pass the quiz by the *deadline*. (We keep track of your use of the quiz system, but all that matters for your grade is that you pass it.) The quiz questions are randomly drawn from a test bank, so you will see different questions each time you take the quiz. In addition, there is a "practice quiz" that feeds you one question at a time from the same test bank.

Our recommendation is that you take the online quiz right away. The odds are good you'll pass it and be done. If you don't pass it on the first shot—or even if you do but you feel a little rusty on the material—use the

practice quiz facility. Then take the quiz again. The real purpose of the online quiz is to loosen up your math muscles so that during the course you can focus on econometrics and not get lost in details of algebra.

Passing the quiz is worth **10 percent** of your grade (remember that all that matters is your best grade). Failing is worth 0 points. Passing gets full credit. Realistically, if you can't pass the online quiz after a little brush-up, you're going to have trouble with Econ 140A. **Deadline for the online quiz is Friday, October 7 at 5:00 pm**.

Online Homework and due dates for each assignment are found on MyEconLab. You are allowed three attempts for each assignment. The online homework assignments are worth **5 percent** of the grade. By using the resources on MyEconLab you can probably get a near perfect score on most assignments.

Homework on GauchoSpace is due via GauchoSpace upload at 5:00 pm on the day assigned. Uploaded files must be either Microsoft Word documents or pdfs. (Scanned-into-pdf, legible handwritten documents are acceptable.) Possible homework grades are 3 (you pretty much aced it), 2 (solid job, mostly correct), 1 (well, at least you turned it in), 0 (you didn't turn it in, or the work was so minimal you might as well not have bothered.) The TAs are going to spend about one minute grading each homework turned-in, so it's up to you to be so clear that they'll immediately be able to see the fine job you did! (In some cases, the TAs may grade based on randomly selected questions on a given homework.) GauchoSpace Homework is worth **5 percent** of the grade. You are strongly encouraged to collaborate on the homework. Having said this, the homework is intended to be an integral part of learning the course material. Nothing replaces hands-on work for really fixing ideas in your mind.

Micro Papers:
There are two micro –papers. These call for a 1-2 page paper. *Note that it is hard to write something this short which gives a clear explanation.* Think of these as exercises in giving answers to the kind of question that arises in the real world. Each micro paper is worth **5 percent** of the grade.

Exams:
The quizzes will be given in class and the final will be given at the regularly scheduled final exam time. *(You need to bring a photo id to all exams.)* Bring a calculator. (But nothing capable of communication. You can't have a cell phone out.) You do not need to bring blue books. You may bring one 8½ by 11 sheet of notes (both sides) with whatever you feel will be helpful. Any required statistical tables will be provided. Tests (two quizzes and the final) make up a total of **70 percent** of your grade, with the final weighted twice as much as a quiz. However, in computing the final grade for this class, I will drop either your lowest quiz grade or half of the weight of the final exam and redistribute that weight to the other tests. I also drop the lowest GauchoSpace homework grade. So the system provides some insurance because the lowest GauchoSpace homework and the lowest quiz or half the weight of the final exam is dropped.

Putting the grades together: Each grading category will be standardized by subtracting the class mean and dividing by the class standard deviation. These standardized grades are then combined using the weights above.

Regrade policy: Exams are available from your teaching assistant. If you believe the grade is incorrect, you must submit a written request for a regrade explaining the grading error within one week of your exam becoming available. Grades are rarely changed, except for simple errors such as a mistake in adding up points.

I reserve the right to give extra points for class participation or other deserving contributions and to give negative points for class non-participation.

Extra Credit: The GauchoSpace site includes a list of questions for class discussion. I will randomly call on students to explain to their classmates how to think about the problem, using EViews, the blackboard, or other means. Think of this as a chance to do a little teaching!! If you do a good job you get extra credit equal to a perfect score on one additional GauchoSpace homework in the final grade. ("Good job" doesn't mean perfect, just pretty good. If you do an extremely lousy job—or don't answer when called on—you may get negative extra credit. I don't expect that to happen.) If you are lucky enough to be called on you are allowed to bring one friend to the front of the room to help with the explanation. The friend gets extra credit too. (To get the extra credit recorded you have to send me an email with your name and perm number. If you brought a friend to the front of the class, send their info too.)

Late homework isn't accepted, there aren't make-ups for the exams, no you can't have an extension. If you have a medical emergency, you must provide written documentation on letterhead from a medical professional. (If you need a disability accommodation, contact DSP.)

Grumpy things that shouldn't need to be said, but…

(1) The UCSB policy on Academic Integrity will be strictly upheld. It is your responsibility to fully comply with the letter and spirit of the policy. If you violate the standards of scholastic honesty and integrity, assume that the consequence will extraordinarily unpleasant. The last student caught cheating in this class was suspended from the university on a first offense. Remember that at UCSB allowing someone to copy your work makes you equally guilty as someone who copies your work.

(2) Class time, both during lectures and sections, should be conducted in an appropriate atmosphere. This is not the place for checking Facebook or your email, nor for reading the newspaper or chatting with a friend. Cell phones should not be in use and should not be heard. When you attend class, you are expected to conduct yourself in accord with old-fashioned norms of courtesy and politeness.

(3) Please refrain from leaving lectures before class has ended. It is disruptive to your fellow students as well as the instructor.

(4) All course materials (class lectures and discussions, handouts, examinations, web materials) and the intellectual content of the course itself are protected by United States Federal Copyright Law, the California Civil Code. The UC Policy 102.23 expressly prohibits students (and all other persons) from recording lectures or discussions and from distributing or selling lectures notes and all other course materials without the prior written permission of the instructor (See http://policy.ucop.edu/doc/2710530/PACAOS-100). Students are permitted to make notes solely for their own private educational use. Exceptions to accommodate students with disabilities may be granted with appropriate documentation. To be clear, in this class students are forbidden from completing study guides and selling them to any person or organization.
This text has been approved by UC General Counsel.

Less grumpy things I'd like you to know

(1) Reading paragraph (1) above probably (p=0.98) ticked you off. That's because you're honest and don't like to be lectured at. I don't blame you for being annoyed. Very few students cheat in this course. They'll get landed on with both feet. The rest of us will have a good time.

(2) Large classes can be soporific. You really don't want the professor at the front of the room to drone on and on and on and on…. **So ask questions!** If you're not getting something, then probably 20 other people in class aren't getting it either. Speak up!

(3) You have to turn in your own homework. But collaboration is a good idea. The trick, of course, is that in any group it's the person doing the explaining who benefits most from the collaboration. Being a passive participant is much less valuable. Now that you're warned, let me clarify the academic integrity policy on homework. So long as you create the document you turn in and *do not simply copy answers*, you are *not* violating the academic integrity policy. In other words, you mostly get to set your own limits on collaboration.

More or less nothing is going to be handed out in class. You can find assignments and other links on GauchoSpace (https://gauchospace.ucsb.edu/courses/course/view.php?id=13242). This is also the place to ask questions and arrange to meet classmates. Online homework and all sorts of expositional material can be found at MyEconLab. You need access to MyEconLab to complete the online homework. Instructions are on GauchoSpace.

Course materials:

The textbook for the course is *Introduction to Econometrics, 3rd edition updated,* by James H. Stock and Mark W. Watson. *Be sure you buy access to MyEconLab, either as part of the textbook purchase or as a separate item.* (The course ID is startz96935.) You will probably also want *EViews Illustrated,* by Richard Startz. This is a guide to using the econometrics software program EViews. The book is available for free download at http://www.eviews.com/illustrated/illustrated.html. You can find online tutorials on EViews at http://www.eviews.com/Learning/index.html. There are also a number of tutorials available on YouTube.

Illustrations in class and homework assignments will use EViews 9.5, which is available in the Collaborate instructional labs (http://www.collaborate.ucsb.edu/labs). Note that a teaching assistant will be available in the computer labs for several hours a week—see "Scheduling" below—but you can use the labs at other times as well. At some point, EViews is be available on computers in the library. Check the Interdisciplinary Research Collaboratory. You can buy your own copy of EViews by contacting sales@eviews.com and mentioning that you want to buy a copy under the UCSB site license. This is a full copy of the software, but does not include support and upgrade privileges. The price is around $100. (Do *not* buy the student version, which is too limited.) However, almost everyone finds lab access sufficient, so try that before spending money. There is also a free "student lite" version, which won't run most of the class problems but which is fine to play around with, http://www.eviews.com/EViews9/EViews9SV/evstud9.html

Useful contacts:

The GauchoSpace site includes a forum for posting questions and answering questions asked by others. It also includes a place to arrange meet-ups with classmates. Questions are generally answered more quickly there than by email, since that way the answers get shared with everyone.

After GauchoSpace, the first line of contact for course content questions is the TAs. When that doesn't work, or when there are other issues, find me in office hours or by setting up an appointment or by knocking on my door. (You might be told I'm too busy if you try the last, but no one's going to bite your head off.)

Instructor:

Professor Dick Startz, startz@ucsb.edu, office hours: Tuesday 2:00-3:00 or by appt., North Hall 3038.

Teaching assistants:

Matthew Wibbenmeyer mwibbenmeyer@umail.ucsb.edu
Juliana Helo Sarmiento   jhelosarmiento@umail.ucsb.edu
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Scheduling:

Drop–in computer lab hours: SSMS 1301/1302: Monday, 4:00-5:40, Wednesday, 12:00-1:30, Thursday, 9:00-10:30; SSMS 1303/1304: Thursday, 9:00-10:30.

In-class quizzes are on Thursday, October 13th and Thursday, November 10th

Final is Wednesday, December 7.

Approximate Lecture Schedule

Date	Lecture	Reading before lecture	What you should be able to do after this class, in brief.
Sept 22	Introduction		Find GauchoSpace page, download *EViews Illustrated*
Sept. 27	Sample Mean	Chap. 1,2,3, *Ill. 1,2,3,* Tut. EViews Basics	Derive distribution of sample mean, load dataset into EViews and find descriptive statistics
Sept. 29	Continue Sample mean; Simple regression	Chap. 4, *Ill. 3,* Tut. Workfiles	For a regression with one variable, interpret regression coefficient, derive least squares estimator
Oct. 4			For $n = 2$ show that regression coefficient is unbiased and understand what assumptions are required for unbiasedness, understand R^2
Oct. 8	Regression continued	Chap. 5, 17.1, 17.4, *Ill. 4,* Tut. Samples, Series & Groups	Derive distribution of regression coefficient and understand role of assumptions, be able to do t-tests
Oct. 11			Understand Gauss-Markov theorem and role of assumptions
Oct. 13	Quiz 1		
Oct. 18	Multiple regression	Chap. 6	Be able to execute and interpret a multiple regression
Oct. 20		Chap. 7	Be able to conduct t-tests and *F*-tests involving multiple coefficients
Oct. 25	Misspecification	Chap. 6.1,9.1, 9.2	Understand consequences of omitting a variable from a model or including an irrelevant variable
Oct. 27	Dummy variables	Chap. 5.3, Tut. Dummy Variables	Understand dummy variables, the dummy variable trap, and multiple categories.
Nov 1	Functional forms	Chap. 8	Understand various functional form assumptions, particularly logs and power series.
Nov. 3	Dynamic models and	Chap 14.1-14.4	Be able to formulate and interpret dynamic

	forecasting		models for forecasting and policy prediction
Nov. 8			
Nov. 10	Quiz 2		
Nov. 15	Heteroskedasticity	Chap. 5.4	Understand GLS and its relation to underlying assumptions. Understand weighted regressions. Be able to test for heteroskedasticity and use robust standard errors.
Nov. 17	Serial correlation	Chap 14.2-14.3	Understand serial correlation and its relation to underlying assumptions. Know how to quasi-difference equation. Be able to test for serial correlation. Caution on lagged dependent variables.
Nov. 22	Endogeneity	Chap. 9.2, 12	Understand endogeneity and be able to use 2SLS
Nov. 29	Limited Dependent variables	Chap 11.	Be able to use models predicting a discrete outcome.
Dec. 1	Summary		

Chapters refer to the text book, *Ill* refers to *EViews Illustrated,* Tut. means the online EViews tutorial.