LAB NOTES

Spring 2003

Director's Welcome

This issue of Lab Notes calls attention to several new developments: conducting lab brown bags on various computer topics, coordinating new methods lunches on quantitative topics, and including a new "Stat Corner" in Lab Notes. Stat Corner is primarily designed to increase the usefulness of Lab Notes to our readers.

Meanwhile, the Lab staff has been keeping very busy in between server crashes. James Norman has been upgrading some of the machines in PAL while ordering some new faculty computers. We've been working to facilitate uploading of material for faculty web pages, in addition to continuing to administer the human subjects pool. Details on all of these activities are presented below.

Also, I want to encourage any graduate assistants who may be interested in working in the Political Research Lab or the Center for Survey Research to contact me in the next few days. These are great jobs that provide useful practical experiences.

PRL Brownbags

Lab Staff gave three very successful brownbags during the Winter Quarter. Kevin Sweeney presented "An Introduction to Stata" to a packed house in Derby 0150, and "Duration Analysis in Stata" to students enrolled in Jan Box-Steffensmeier's ITV course on duration analysis. The latter was the first PRL Brownbag to be simulcast to other universities (Wisconsin, Illinois, and Minnesota). In addition, Brent Strathman taught a very successful class on webpage design. All three of these past presentations can be downloaded from the Lab's webpage: psweb.sbs.ohio-state.edu/prl/index.htm.

The Spring Quarter will be just as exciting. In conjunction with the Methods Lunch (see below), Kevin Sweeney will present, "Implementing and Interpreting Sample Selection Models" on April 11 in Derby 0150 from 2 to 4 PM. Those in attendance will not only get to see the math behind sample selection models, but will be able to run a few on real live data! Sweeney will also be giving a brownbag later in the Spring Quarter on programming in Stata.

Ryan Kennedy will give a brownbag on "Upgrading Your PC" on April 25 from 4 to 6 PM in the Spencer Room. Topics covered will include adding RAM, replacing motherboards, and upgrading drives. This session will be useful for all who have PCs at home, and are interested in upgrading. In addition, this presentation will be a visual spectacular with images being recorded and sent to a television monitor so all can see inside the PC.

Methods Lunch

During the Spring Quarter the Lab will coordinate a new initiative from the Theory and

Methods faculty. The Methods Lunch is designed to bring all who are interested in quantitative methods together a few times a quarter to discuss current and cutting edge methodological techniques in a laid back setting. It is our hope that this lunch will help the department develop a methods community that includes scholars with diverse substantive interests.

There will be three meetings of the Methods Lunch during the Spring Quarter. On April 11 Kevin Sweeney will present on Sample Selection models (see above). In addition, Brandon Bartels and Justin Taylor will present on the use and abuse of instrumental variables, and Brian Pollins and Omar Khesk will present on simultaneous equations. Those presentations will take place in the fifth and eighth weeks of the quarter. Keep a close eye on your email for details.

Computer Upgrades

As you may recall we had problems with the mail server at the end of last quarter. As a result we turned on several debug options that were suggested by the Tech folks at Lotus. These options would allow us to identify the source of the problem the next time the server crashed – of course, the server has not crashed since.

Also, over Spring Break the Web Server was upgraded to Solaris 9 and received a compliment software upgrades as well. This ensures our Web Server is up to current specs, including in the all-important realm of security.

Finally, as you may have noted from emails, we discovered we had a problem with our backup restore software (for the main server), this was resolved over Spring Break as well.

Webpage News

Graduate students are encouraged to link their personal webpages to the departmental webpage. This is an important way to introduce yourself to the world, and will become essential as you approach the job market. Students who do not currently have a page are encouraged to

take a look at the Strathman presentation on the Lab's webpage (see above). Once you construct your webpage see Lab Staff about linking it to the department's.

ICPSR Summer Program

The Inter University Consortium for Political and Social Research will hold its annual Summer Program in Quantitative Methods from June 23 to August 15. Some of the many courses include: Maximum Likelihood Estimation, Time Series Analysis, Bayesian Methods, and Missing Data Analysis. Many graduate students from our department have attended the program in the past, and it offers a unique opportunity to learn methods from some of the leading quantitative scholars in the social sciences.

Those interested in attending can see more detailed information on the Summer Program's website: www.icpsr.umich.edu /sumprog/. Graduate students are also eligible for funding through the Clifford C. Clogg scholarship. The deadline for that award is April 28, and information can be obtained on the summer program's website.

Experiments and Subject Pool

As you all know, one of the Lab's jobs is to stock the subject pool for those student and faculty who are conducting experiments. This quarter we have at least 3 experiments signed up, and 500 subjects. We would like to appeal to those teaching classes this quarter, and looking for a way to get their students some extra credit, to contact Ryan Kennedy about volunteering their class for inclusion in the pool.

Equipment Loans

The Lab now has two (and soon two more) laptops to be loaned out, but only one data projector. We ask that you give at least one week notice if you are going to need any equipment, particularly the projector. Demand is high, but we will do our best to accommodate all requests. Contact Kevin Sweeney with requests.

Statistics Corner

"Interpreting Interaction Terms with Continuous Variables in Ordinary Least Squares Regression."

By Kevin Sweeney

In our effort to make Lab Notes more interesting and informative to our readers, the Lab is pleased to add a new feature. In each issue one page will be dedicated to a vexing methodological topic. Our hope is that lots of folks in the department will contribute to this page on a regular basis. We encourage all to forward potential topics to Sweeney. You never know, maybe we'll write about it. Since this was my brilliant idea, I get to go first; and because of the introduction I have less than a page to work with – Yikes!

The world is not nearly as linear and additive as it seems from looking at the statistical models that get published in political science journals. A familiar looking regression model, like (1),
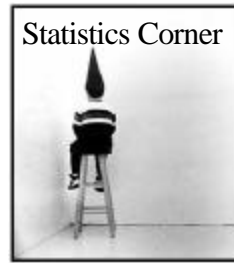
$$Y = \hat{b}_0 + \hat{b}_1 X_1 + \hat{b}_2 X_2 + e \qquad (1)$$

assumes the effect of an independent variable X_1 on the dependent variable Y is always the same, regardless of the values of the other independent variables. In the complex world of social science it often makes sense to allow for the possibility that the effects of one independent variable *vary* according to the value of another. If this were the case, we would estimate a model like (2) where the interaction between $X_1 X_2$ is

$$Y = \hat{b}_0 + \hat{b}_1 X_1 + \hat{b}_2 X_2 + \hat{b}_3 X_1 X_2 + e \qquad (2)$$

added to the model. The remainder of this page will consider this type of interaction for OLS, where both X_1 and X_2 are continuous variables. You should know that interpreting interaction terms in the case of binary independent or limited dependent variables is somewhat different.

If you specified an equation like (2) it would be *incorrect* to interpret either $\hat{b}_1$ or $\hat{b}_2$ as the marginal effect on Y for a one unit change in X_1 or X_2 respectively, unless you were only interested in the cases where X_1 and $X_2 = 0$. Your estimate of $\hat{b}_1$ (and its standard error) is only the familiar marginal effect for $X_2 = 0$, and your estimate of $\hat{b}_2$ (and its standard error) is only for $X_1 = 0$. Given that 0 may fall outside the observable range of one, or both, of these variables – this is not very useful.

The correct formulas for conditional interpretation of coefficients (and their standard errors) across the range of both covariates in the interaction are:

$$\hat{b}_1 \quad at \quad X_2 = \hat{b}_1 + \hat{b}_3 X_2$$

$$\hat{b}_2 \quad at \quad X_1 = \hat{b}_2 + \hat{b}_3 X_1$$

$$SE(\hat{b}_1 atX_2) = \left[\mathrm{var}(\hat{b}_1) + X_2^2\,\mathrm{var}(\hat{b}_3) + 2X_2\,\mathrm{cov}(\hat{b}_1, \hat{b}_3)\right]^{\frac{1}{2}}$$

$$SE(\hat{b}_2 atX_1) = \left[\mathrm{var}(\hat{b}_2) + X_1^2\,\mathrm{var}(\hat{b}_3) + 2X_1\,\mathrm{cov}(\hat{b}_2, \hat{b}_3)\right]^{\frac{1}{2}}$$

where var is variance and cov is covariance. This information is readily available post-estimation from most statistical packages - simply retrieve the variance-covariance matrix.

For an economical presentation of this rich information, it may be useful to graph each coefficient across the range of the other variable. If you do this you will notice that coefficients may switch signs and/or lose and regain statistical significance across the range of the interaction, and you will notice (if you haven't already) that your estimated coefficients for each variable are only good when the other variable in the interaction is zero.

Good References:

Friedrich, Robert J. 1982. "In Defense of Multiplicative Terms in Multiple Regression Equations." *AJPS* 26:797-834.

Jaccard, James et al. 2003. *Interaction Effects in Multiple Regression Sage* #72.

Staff Information

Title	Name	Office	Phone	Email	Hours (Spring 2003)
Director	Herb Weisberg	2022	2-6572	weisberg.1@osu.edu	
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Grad. Assistant	Ryan Kennedy	2049F	2-0511	kennedy.310@osu.edu	Weeks 1-5: MF 8:30-6:00 T 8:30-11:00, 2:00-6:00 W 2:00-3:00 R: 3:30-6:00 Weeks 6-10: M 8:30-6:00 W 2:00-3:00
Grad. Assistant	Brent Strathman	2049F	2-0511	strathman.5@osu.edu	Weeks 1-5: by appointment only. Weeks 6-10: TRF 8:30-6:00 W 2:00-4:00
Undergraduate Assistant	Kevin Newman	2049H	2-0511	newman.218@osu.edu	MW 2:30-6:00 R 8:30-10:30, 12:30-5:30
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To contact all Lab Staff simultaneously, email us at prl@polisci.sbs.ohio-state.edu

The schedule for 0150 Derby Hall is posted on our website:
http://psweb.sbs.ohio-state.edu/prl/bas_schedule.pdf