

Research Methods and Statistics
Specialty Area Exam
October 28, 2015
Part I: Statistics

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You must answer question 1.

1. Suppose that a beginning graduate student asked you about each of the terms listed below. For *four* of the following items, briefly state: (a) what it refers to as you might explain it to the student; (b) where it may apply in sociological analysis; and (c) key references where the student might look to learn more about it.

- a) Bootstrapping
- b) Propensity Score
- c) Marginal Effects at the Means (MEMs)
- d) Fixed Effects Model
- e) time-varying covariate
- f) Multiple imputation
- g) Linear Probability Model (LPM)
- h) Discrete time methods for the analysis of event histories

Now answer either question 2 or 3.

2. One of the most popular methods for analyzing ordinal dependent variables is the ordered logit model, which is estimated by Stata's ologit program and by SPSS's PLUM.

a. What is the rationale for this model? Be sure to discuss the idea of an underlying latent variable and how it is related to an observed but limited dependent variable.

b. Choose either the proportional odds assumption or the assumption that residual variances are the same for all cases (which in turn implies that residual variances do not differ across groups). What does the assumption mean? How can it be tested? What problems occur if the assumption is violated? How can violations of the assumption be dealt with?

3. A beginning graduate student compiled data on reported sexual assault at Notre Dame over the past five completed academic years. His dependent variable is the number of sexual assaults. For each assault, he also knows the residence hall in which the alleged assault occurred, the date the assault occurred, whether the perpetrator was an athlete (and what team), and whether police investigated the incident. He wants to know whether distinctive dorm and/or team cultures influence the risk of sexual assault and the likelihood that reports lead to investigations. A classmate told him that because his dependent variable is the count of assaults he should use "some sort of count model" and told him to ask you, the graduate student expert on count models, for help.

a. What are count models and when are they appropriate? Do you agree that he should use a count model?

- b. Can you explain the difference between log-linear, poisson, and negative binomial models?
- c. He has been reading about “over dispersion” and is very confused. What should he do if there is excess variation around the conditional expectations of the poisson model? How can he tell whether he omitted an important predictor, miss-specified some other aspect of the model, or should be using negative binomial regression?
- d. He’s concerned that sexual assaults which were not reported might bias his results. What, if anything, do you suggest that he do about this problem? Would a “zero inflated” model help? Why or why not?
- e. He’s unfamiliar with appropriate measures of model fit. Can you explain the BIC, AIC, and log-likelihood? What measure of model fit should he prefer? Why?

Finally answer either question 5 or 6.

- 5. Explain the gap between “statistics” and “causal inference,” including addressing the limitations of covariate adjustment of observational data as a strategy for causal inference and an overview of potential alternatives. Use the counterfactual framework to structure your answer.
- 6. Explain the logic of Bayesian analysis, including the difference between Bayesian and frequentist analyses, pros and cons of a Bayesian approach, Bayes Theorem, prior and posterior distributions, and Markov Chain Monte Carlo methods. Orient your response toward why or under what circumstances a sociologist would choose a Bayesian approach.

End of Statistics Exam

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Part II: Methods

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You must answer question 1.

1. A beginning graduate student has approached you with several questions. Provide her with brief answers to *three* of the following.

a. For a classroom paper, the student wants to examine what it was like to be a young girl growing up during World War II. She is planning to interview women (now in their 70s and 80s) who lived through those times. She wants to know what the strengths and weaknesses of such a retrospective history approach are.

b. For her Master's thesis, the student (who is heterosexual) wants to do a participant observation study of the gay and lesbian community in South Bend. Describe to the student two or three of the major challenges she will have to overcome in order to succeed with this research.

c. For her dissertation, she wants to ask students about their personal experiences with such things as abortion and sexual assault. Provide her with guidelines on how to handle such sensitive topics. What are some techniques that can be used to increase the likelihood of getting honest answers?

d. She has been warned to avoid the ecological fallacy. Explain to her what the fallacy is and what to do about it.

e. She is confused by the concepts of age, period, and cohort effects. Explain what each is and give an example of how something that appears to be an age effect might actually be a cohort effect instead.

Now answer either question 2, 3, or 4.

2. In recent years there has been growing interest in "Big Data." Explain what is meant by Big Data, and the different types and sources that are available for it. Then discuss the major strengths and weaknesses of Big Data compared to more traditional source of information, such as survey data. Be sure to discuss issues of reliability and validity and the types of questions that Big Data can and cannot answer.

3. In only a few short years, new forms of social media have radically transformed the ways that individuals interact and communicate with each other. Facebook; YouTube; texting; sexting; all terms that were virtually unknown a decade ago, are now a part of everyday life. A national foundation wants to find out how American culture and society are being affected. Are we a

nation with broader social connections, but shallower ones? Are people losing their inhibitions, and perhaps exposing too much of themselves to others? Does the rapid exchange of ideas fuel social change, or does it hinder it? The foundation feels that current quantitative studies have failed to provide an adequate understanding of this topic. It has therefore commissioned you, a noted qualitative researcher, to investigate this issue (or some specific aspect of it that you feel you can adequately focus on)

a. Discuss how you would go about doing a qualitative study on this subject. What sorts of cases would you examine, and what methods would you use? How would you go about forming and testing your theory? Do not be too generic; while there are general principles you can draw on, the nature of your problem will raise unique issues and problems you will need to be aware of.

b. Discuss the strengths and weaknesses of your approach. In your discussion, you may want to cover such topics as:

1. The generalizability of findings
2. Potential pitfalls you, as a qualitative researcher, need to be aware of
3. The depth and nature of understanding that can be gained with your approach
4. The amount and kind of information that can be collected

4. In summer 2015 the social sciences were rocked by attacks on the ethics and quality of its research. Critics claimed that Alice Goffman had lied and/or committed severe ethical breaches in her study “On the Run,” and further complained that her results were not verifiable. Michael Lacour was found to have falsified the data for a major study on the effect of direct contact on support for gay equality. Yet another study found that most of the major findings for 100 Psychology studies could not be replicated. Do you feel there is a crisis in ethics and/or replicability of social science research and findings? Elaborate on the above examples or give others that you think are relevant. What, if anything, can be done to address these problems?

Finally answer either question 5 or 6.

5. You have developed a well-deserved reputation in experimental design. A foundation has commissioned you to design two or more experimental studies with public policy implications for dealing with a major social problem of your choice. While the experiments should all deal with the same problem, their approaches should be radically different from each other. For example, some studies could be lab experiments while others are field experiments; one study might use a quasi-experimental design while another is a true experiment; one study might use small convenience samples while another involves thousands of subjects nationwide; one study might use subjects as their own controls while another involves multiple-group comparisons; the operationalization and measurement of the same concepts could dramatically differ between the experiments.

(a) Describe the substantive problem, including the general issue(s) you wish to address, the variables involved in your studies, and any other substantive or methodological information that will inform the reader about the projects that you are visualizing.

(b) Describe each of your designs and the rationale behind them. Discuss how well your experiments deal with threats to internal and external validity, and the possible tradeoffs between internal and external validity that are made. (Be sure that any threats and any other technical terms you discuss are clearly defined for the reader.) Note how the nature of each design is related to how you operationalize and measure your dependent and independent variables, e.g. a true experiment done in the lab might permit or require a different operationalization of concepts than a quasi-experiment done in the field.

(c) Note any practical problems that may keep you from conducting the experiment as you wish. For example, to what extent can you guarantee that subjects will participate? Are there dangers that your experiments might become contaminated in some ways? Will you be able to measure everything that you want to measure?

6. A foundation is interested in comparing and contrasting the beliefs and attitudes of those who support political outsiders Donald Trump and Bernie Sanders. It is soliciting proposals for either (a) a qualitative analysis based on interviews with dozens of people who are supporters of the candidates, or (b) a content analysis based on published documents. Describe to the foundation

a. how the study would be conducted. Include information on how individuals or documents would be chosen, and how their verbal or written comments would be collected, coded and analyzed

b. the strengths and weaknesses of the strategy

c. the types of findings that might result and how they would be interpreted. You might give hypothetical examples of the kinds of statements you would receive or find and what these statements could imply about the attitudes and motivations of the two groups.

End of Methods Exam