Political Methodology Comprehensive Examination, May 2018
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Instructions: *Read all questions before answering any of them. When you use substantive examples in your answers, we strongly prefer to see examples from political science. Answer all questions in part I. Answer 3 questions in part II (with the formal question counting as 2). Feel free to hand-write answers in a blue book, but carefully label those answers and note that you are using the blue book in your typed document. Good luck!*

Part I

1. Imagine that someone gave you a survey dataset where ethnicity is a numeric variable, and whites are labeled as a "1," blacks as a "2," Latinos as a "3," and other race/ethnic groups as "4." Further, imagine that you want to look at the association between ethnicity and voting behavior. Describe at least one way of including ethnicity in your empirical model that would be clearly mistaken. Describe a more valid way to test ethnicity. What are some of the potential statistical problems with testing the association between ethnicity and voting using this dataset?

2. When discussing a paper at a conference, you raise questions about the endogeneity of the main independent variable of interest (**X**) in the author's OLS model. The author dismisses your concerns, stating that he saved the residuals (**e**) and then computed the correlation of **e** and **X**. Since the correlation was only 0.11, he claimed that "if there is endogeneity there, its effects must be very small." How do you respond to that? What follow-up questions do you ask?

3. In your dissertation, one chapter looks at the effect of democracy on economic growth. You have a main outcome of interest **gdp_grow** (measured as % growth), a dichotomous treatment of interest **democracy**, and a set of five other established controls from the literature: **education** (schooling years in the population), **loggdp** (logged GDP/capita), **gini** (inequality), **ucdp_civwar** (a dichotomous civil war indicator), and the **year**. There are no country fixed or random effects. The output from a simple OLS model (using a country-year panel) is shown below.

Source	SS	df	MS
Model	2054.73167	6	342.455279
Residual	183132.797	5274	34.7237006
Total	185187.529	5280	35.0733956

Number of obs	= 5281
F(6, 5274)	= 9.86
Prob > F	= 0.0000
R-squared	= 0.0111
Adj R-squared	= 0.0100
Root MSE	= 5.8927

gdp_grow	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
democracy	.1641523	.1910718	0.86	0.390	-.2104275	.5387321
education	.050069	.0463657	1.08	0.280	-.0408269	.140965
loggdp	.1733442	.1160689	1.49	0.135	-.0541989	.4008873
gini	-.029179	.010368	-2.81	0.005	-.0495046	-.0088534
ucdp_civwar	-.5038125	.2525438	-1.99	0.046	-.9989029	-.0087222
year	-.0264924	.0064385	-4.11	0.000	-.0391146	-.0138702
_cons	54.21794	12.89089	4.21	0.000	28.94645	79.48942

a. According to the model, what is the % likelihood that the effect of **democracy** is greater than -0.21?
b. According to the model, what is the expected difference in growth between a country experiencing civil war in 1980 and a country at peace in 2000?
c. Advisor 1 worries that including **education** in the model might lead you to under-estimate the effect of **democracy**. Advisor 2 objects and says that it's always better to include too many controls rather than too few. Is this objection correct?
d. Advisor 1 points to your F statistic of 9.86 and says you're doing a great job explaining what leads to economic growth. Advisor 2 disagrees and points to a different statistic. What statistic should he or she have pointed to? What is the proper way to interpret the F statistic?
e. You're curious whether **democracy** might have a more positive effect on growth in poor countries. Advisor 1 tells you that can't be since the coefficients on **democracy** and **loggdp** are both non-significant. Is that a valid response? How would you test your theory?

After running the regression pictured above, you:

f. Save the residuals, square them, regress them on the five controls, and test for the significance of the model as a whole. Why did you do this? What should you do if you reject the null hypothesis?
g. Save the fitted values ($\widehat{gdp\_grow}$), add the square and cube of the fitted values to your original equation, run that regression, then test for the joint significance of the squared and cubed terms. Why did you do this? What should you do if you reject the null hypothesis?
h. Save the residuals and lag the residuals. You then regress the residuals on the lagged residuals, and test for the significance of the coefficient on the lagged residuals. Why did you do this? What should you do if you reject the null hypothesis?

Part II

1. Define a "placebo test" and explain (with examples) some of the ways that placebo tests can help bolster causal inference. Suppose you show that your treatment affects your main DV of interest (**Y**), but not an alternative DV (**Z**). What are the specific assumptions you need to defend for this to be a causally meaningful comparison? What are some of the strengths and weaknesses of such a comparison?

2. In designing experiments, researchers inevitably have to make trade-offs. The ideal research design from a theoretical or methodological perspective may be prohibitively expensive or simply infeasible. For instance, trade-offs affect the choice of experimental subjects, as it's usually easier and cheaper to use convenience samples (such as undergrads or workers on Amazon's Mechanical Turk) than more representative samples. Trade-offs may also affect the setting of the experiment. Discuss (with examples) how decisions about the experimental sample, setting, and other features may affect the experiment's internal and external validity.

3. What is a multilevel regression and post-stratification (MRP) model? Give two examples of research questions where an MRP model could be useful. When do MRP models perform well? When do they perform less well?

4. There has been a major push towards pre-registering experiments (and even observational studies), where researchers describe their intended tests and expectations before running the experiment. This is borne out of concerns that researchers are "p-hacking" (meaning running many tests and versions of tests to get something significant) or "harking" (hypothesizing after results are known). A different perspective is that researchers should be inductive and revise their theories in light of new and unexpected evidence. What do you think is the proper balance between these concerns? How can we allow for induction and theoretical innovation while avoiding harking and p-hacking?

5. Between 2015 and 2018, 12 states and DC authorized automatic voter registration. Advocates argue that these reforms will increase voter turnout. Some also suggest they might improve Democrats' performance by mobilizing low-propensity Democratic voters.
    a. Discuss three different research designs that you could use to assess the causal impact of these reforms on voter turnout and Democrats' two-party vote share in the 2018 and 2020 elections. What are the strengths and weaknesses of each research design? What are the assumptions necessary for causal identification using each research design and how can we evaluate the validity of those assumptions? Be specific and use concrete examples where possible.
    b. A friend suggests that you could use survey data to help evaluate these reforms. For instance, you might use the Cooperative Congressional Election Study (CCES), which surveys 50,000 Americans every two years. The CCES includes standard demographic and vote choice questions, as well as validated information about whether each respondent voted. How would you respond to your friend? What are the advantages and disadvantages of using survey data to address this research question?

6. Using survey data from the 2017 Dutch general election, you hope to analyze vote choice among Dutch voters. You make the analytic decision to lump together the parties that ended up with fewer than 10 seats in the legislature, leaving you with a choice set of the top six parties, plus a seventh "other party" category.
    a. Given the many types of multinomial models, describe how you would go about choosing which model to present as the main model in your paper.
    b. Suppose you had a particular interest in examining the effects of one of the two liberal parties (*i.e.*, the People's Party of Freedom and Democracy (VVD) or the Democrats 66 (D66)) dropping out of the election. Would that change your strategy? Why or why not?

Formal Question

Consider a model of democratic politics with three actors: an incumbent, a rival, and a representative citizen. The order of the game is as follows:

1. The incumbent decides to **break** the law or not. Only the rival sees whether this occurred.
2. The rival can decide to **challenge** at cost g, whether or not the law was broken. If the rival does not challenge, the game ends. If the rival challenges, the citizen gets a separate message (through the media) as to whether the law was broken. The message is correct with probability $q > 1/2$.
3. The citizen decides to **protest** or not, at cost c. He or she gets a payoff d for choosing correctly (*i.e.*, for protesting if the law was broken or for not protesting if the law was not broken).

The outcomes for the politicians are as follows:

- If a protest occurs, the rival gets W and the incumbent gets 0.
- If the law is broken and no protest occurs (including if the rival doesn't challenge), the incumbent is able to consolidate power. The incumbent gets W and the rival gets 0.
- If the law is unbroken and no protest occurs, the status quo remains. The incumbent gets αW and the rival gets $(1 - \alpha)W$, with $\alpha > 1/2$.

We're going to solve for a **democratic equilibrium** in which the incumbent does not break the law, the rival challenges if and only if the law is broken, and the citizen protests if and only if they get a message indicating the law was broken. Note: In a democratic equilibrium, challenges never occur on the equilibrium path. Assume that if a challenge does occur, the citizen has a q belief that the law was broken if they get this message (and correspondingly for the opposite message).

We proceed using backward induction:

(a) Find the condition under which the citizen protests if and only if they get a law-breaking message.
(b) Assuming (a), find the condition under which the rival announces if and only if the law was broken.
(c) Assuming (a) and (b), when will the incumbent choose to break the law?
(d) Putting these calculations together, what is the set of conditions for a democratic equilibrium?
(e) Describe at least two comparative statics results from the equilibrium conditions and briefly explain what the substantive implications are.
(f) Describe another perfect Bayesian equilibrium to the game and what the conditions are. (Note: Recall that you can set the off-the-equilibrium-path beliefs for the citizen as you see fit.)