

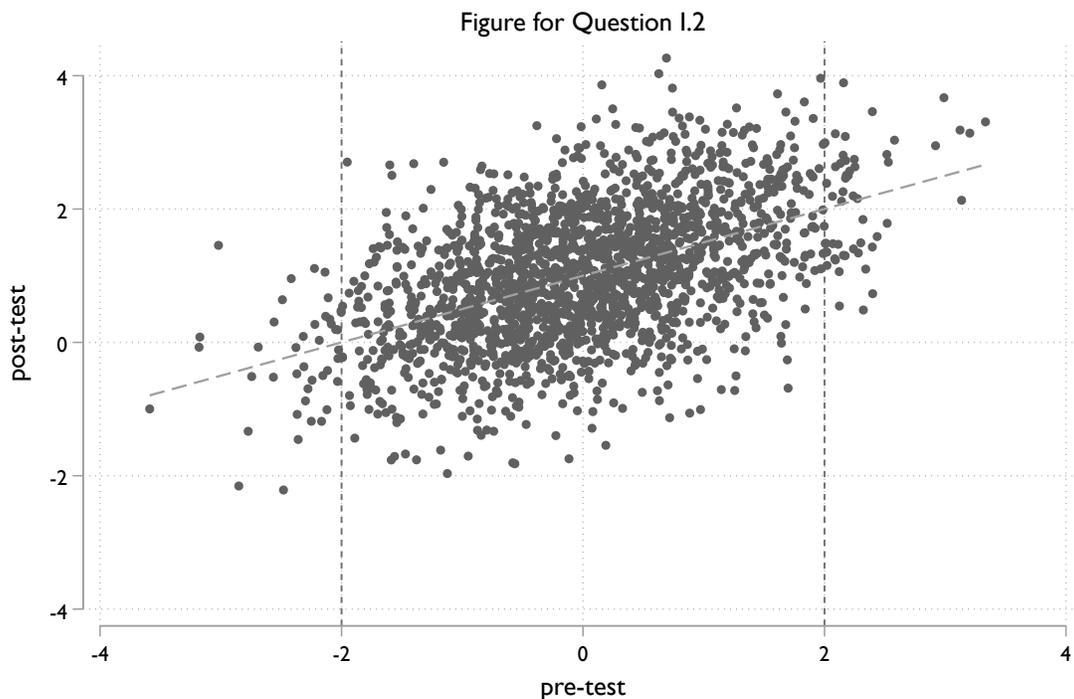
**Political Methodology Comprehensive Examination, May 2017**  
**Department of Political Science, George Washington University**

**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. Question GT in part II counts as two questions. 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. After estimating a linear regression model, you conduct some post estimation analysis and discover something you find interesting. You are so excited, in fact, that you tell your stats guru your finding—when you compute the predicted value of the dependent variable with the independent variables set at their means, you obtain the mean of dependent variable. Your stats guru responds indifferently, saying “that’s not interesting at all.” Why would the guru respond that way?

2. The graph below has the following properties. Post-test: mean = 1, standard deviation = 1. Pre-test: mean = 0, standard deviation = 1.  $N = 2000$ . Correlation = .5. Equation for regression line:  $\widehat{\text{post-test}} = 1 + 0.5 \cdot \text{pre-test}$ . RMSE = .87. Which group should you *expect* would improve more between the pre-test and the post-test, the pre-test scorers who scored below -2 or the pre-test scorers who scored above 2? Why? Of those two groups, which group *actually* improved more between the two tests? How do you know?



3. For this question, use the OLS regression output (and code) below. The data are from the *Political Data Handbook of OECD Countries* by Jan-Erik Lane, David McKay, and Kenneth Newton.

The variables used below include:

**dgovpw**: postwar-average duration of governments, in months

**psupgpw**: postwar-average party support for the government in the legislature, i.e. the percentage of (lower house) seats held by the governing party or parties

**ngovpw**: postwar-average number of parties in government (executive)

**pd**: an indicator of party discipline (1 if discipline exhibited, 0 if not)

### Regression #1

```
. reg dgovpw psupgpw ngovpw pd
```

Source	SS	df	MS	Number of obs	=	23
-----+-----				F(3, 19)	=	4.10
Model	806.117215	3	268.705738	Prob > F	=	0.0211
Residual	1244.90002	19	65.5210536	R-squared	=	0.3930
-----+-----				Adj R-squared	=	0.2972
Total	2051.01723	22	93.2280561	Root MSE	=	8.0945

dgovpw	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
-----+-----						
psupgpw	.4338356	.2105621	2.06	0.053	-.0068759	.8745471
ngovpw	-3.520692	2.001078	-1.76	0.095	-7.708997	.6676123
pd	9.242491	3.638877	2.54	0.020	1.626235	16.85875
_cons	1.24442	11.07908	0.11	0.912	-21.94436	24.4332
-----+-----						

```
. gen pd_x_psupgpw = pd* psupgpw
```

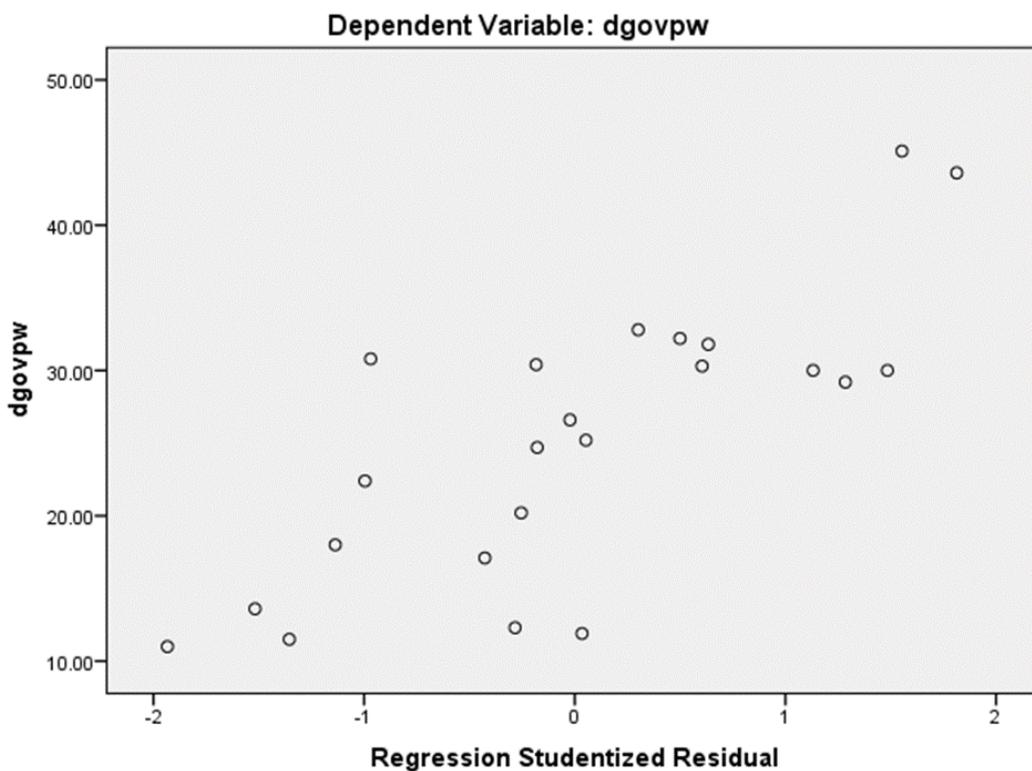
```
. gen pd_x_ngovpw = pd* ngovpw
```

### Regression #2

```
. reg dgovpw psupgpw ngovpw pd pd_x_psupgpw pd_x_ngovpw
```

Source	SS	df	MS	Number of obs	=	23
-----+-----				F(5, 17)	=	15.79
Model	1687.61693	5	337.523386	Prob > F	=	0.0000
Residual	363.400305	17	21.3764885	R-squared	=	0.8228
-----+-----				Adj R-squared	=	0.7707
Total	2051.01723	22	93.2280561	Root MSE	=	4.6235

	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
dgovpw						
psupgpw	-1.094924	.3493987	-3.13	0.006	-1.83209	-.357757
npgovpw	-1.598788	1.193083	-1.34	0.198	-4.115972	.9183966
pd	-45.03098	21.40727	-2.10	0.051	-90.19638	.1344221
pd_x_psupgpw	1.348748	.3649553	3.70	0.002	.5787594	2.118736
pd_x_npgovpw	-.9826722	.2089074	-4.70	0.000	-1.423428	-.5419162
_cons	82.20691	18.99647	4.33	0.000	42.12786	122.286



- a. After running regression #1, you produced the graph in the output as a diagnostic. What would you be looking for in such a graph, and what diagnostic conclusions might you draw from it? Describe what further steps you would take (if any) in diagnosing and/or addressing the diagnostic concerns motivating the graph.
- b. You present these results of regression #1 at a conference, and a critical audience member argues that you've missed an important substantive argument. He claims, "Party discipline doesn't really affect the duration of governments on its own. Rather, it conditions the effects on government duration of a government's parliamentary support and the number of parties in the governing

coalition.” Do you have results above that address his claim? If so, how would you interpret them? Be sure to indicate specifically what test or set of tests would speak directly to the critic’s claims, and how you would draw your inference about the validity of his argument.

- c. With the lessons learned from regressions #1 and #2, you’ve written up your results in the form of an article and sent them off to a journal. When the reviews come in, there’s an ornery reviewer that insists you’ve got it wrong, writing: “This author has missed the nuance of how the partisan underpinnings of a government affect its duration. The effect of each of these partisan factors is conditioned by each of the others.” The editor doesn’t know much about this substantive argument, but the reviewer is a big-shot in the field, so he (the editor) asks you to speak to this claim by providing the results of “the fully interactive model the reviewer is suggesting.” Specify the linear model the editor is requesting to see. Discuss whether you think there is any reason for caution in running this model on your data and how you might assess any inferential concerns it could raise. (Does the big shot have a good idea?)
- d. After working with these OECD data, you’ve decided to embark on a new project. You are writing a paper based on the results from a regression where the dependent variable is the size of the national economy in a given state-year as measured by GDP. The independent variables are a number of indicators of how democratic the state is, how open its economy is, and how much economic inequality there is within the state. The data are a single cross-section from last year from the OECD nation-states.
  - i. Write out a regression model that you might have run. (Turn those words up there into some sort of equation.)
  - ii. A reporter hears about your study and calls you about a story she is writing. She would like you to comment on what your results say about how the democratization of China should affect the growth of its economy. Would you feel comfortable commenting? Why or why not? If so, what kind of comment would you make?
  - iii. After reading your paper, a colleague suggests that the country they study is really SO different from the other OECD states that you really ought to consider adding a dummy variable to account for its difference. What do you make of this advice?
  - iv. You are chatting with another colleague about your paper over lunch, and she asks whether you’ve considered another scholar’s work on the effect of economic growth on democratization. What problem is she gently hinting at and can your model address it?

## Part II

1. A reviewer objects to your modeling choice in a journal submission. Your outcome variable is vote share, a proportion bound by 0 and 1. You estimated vote share using a linear probability model (LPM).

1. Why might the reviewer object to your model choice?
2. What alternative statistical models could you estimate, and what would their advantages be?
3. Under what circumstances can an LPM be used in a reasonable way? What steps must you take when estimating an LPM on proportional or dichotomous DVs?
4. How could you discriminate between one of the alternative models in 2 and the LPM?

2. Suppose you set up the following ambitious experiment. You randomly choose a set of cities and propose a plan to randomly select schools within these cities to implement a new teacher training program. Some cities accept and implement the proposal and some cities don't, but all schools follow assignment if their cities accept. You're interested in student test outcomes as your dependent variable and you have data on these outcomes going back a number of years prior to your experiment.

What are the proper unit comparisons that follow the experimental ideal? What comparisons are improper or at least require additional assumptions? How would you implement the test of whether the training program works? Are there multiple options?

3. There's a long-standing debate about "democratic responsiveness" in the American states. The studies examine the effect of the public's policy preferences (measured on a liberal to conservative spectrum) on state policy outputs (how liberal or conservative a state's policies are). Studies have employed different designs over time, and recent ones use time-series cross-sectional data tracking each of the 50 states over long periods of time (e.g., 1936-2014). Other studies have employed cross-sectional designs.

Discuss the implications of data type and model choice for drawing substantive conclusions about how democratically responsive state governments are to public preferences. In particular, what are the differences between "cross-sectional" effects of public preferences and "longitudinal" effects of public preferences? Does this distinction matter for testing ingrained theories of democratic responsiveness and accountability? Which types of modeling choices and data-analytic approaches do you think are ideal for testing these propositions?

4. Define SUTVA and external validity precisely and concretely. How might SUTVA and external validity concerns be problematic in experiments using (1) college sophomore type subject pools on college campuses, (2) survey experiments where respondents are selected by phone via random digit dialing (RDD), and (3) field experiments in developing countries? For each case, what steps could you take to mitigate the SUTVA violations and external validity concerns?

5. Some statisticians like Andrew Gelman advocate a wholesale abandonment of p-values when conducting applied statistical research, arguing that the focus on "statistical significance" leads to bad practice and bad science. How can the emphasis on p-values distort the research process? Do you agree that reducing the emphasis on p-values would improve science? Why or why not? What is an alternative for judging the substantive significance of research findings?

## 6. GT: counts as two questions

Suppose an autocratic regime is either Strong or Weak. The initial likelihood of it being strong is  $\alpha$ . The game is as follows:

1. The regime observes its type.
2. The regime chooses to hold an election or not at cost  $e$ .
3. If the regime chooses an election, it can decide to commit fraud or not at cost  $c$ . Strong types get vote share  $v_S$  regardless of fraud. Weak types get  $v_W$  without fraud and  $v_S$  with fraud.
4. A representative citizen then decides to protest or not. The citizen observes the vote share, but not whether fraud occurred or the regime's type directly. Assume her payoff is such that she will protest if  $P(\text{Strong}) < 1/2$ . Protest will oust Weak types and fail against Strong types. Protest also costs either type  $d$ .

The regime gets payoff  $R$  from ruling at the end of the game. Also assume  $d > e$ , meaning its worth holding an election if this eliminates protest. Also assume  $R + d > e + c$ , meaning its worth holding a fraudulent election if this avoids protest and defeat.

(a) Under what conditions will citizens protest in a separating equilibrium? Under what conditions will citizens protest in a pooling equilibrium?

(b) Is a separating equilibrium possible? If so, under what conditions?

(c) Is a pooling equilibrium possible in which both types choose an election? If so, under what conditions? Be sure to consider what happens after off-the-equilibrium path actions.

(d) Is a pooling equilibrium possible in which both types choose no election? If so, under what conditions? Be sure to consider what happens after off-the-equilibrium path actions.

(e) An international actor comes along and wants to figure out how to engineer a separating equilibrium, since this allows citizens to maximize protest success. How could they change the parameters or payoffs to allow for a separating equilibrium?