THE UNIVERSITY OF CHICAGO
Harris Public Policy

PPHA 34600: Program Evaluation
Spring 2020
Final Exam
Due: Wednesday, June 3, at 9PM to Canvas

Instructions:

This final exam consists of two files: (1) this document with instructions and questions; and (2) a dataset which you will use to answer the questions below. You must work alone. You may consult Canvas, and may post clarifying questions to Piazza (up to 24 hours before the deadline), but may not discuss the exam with each other. You should submit both written answers -- which should be parsimonious -- and a file which contains your code and results for the data analysis. You must use R. I recommend that you use RMarkdown or knitr, which will allow you to intersperse your code and written answers. Note that you are primarily being graded on your written answers. Exams must be submitted in PDF format. Exams must be turned in via Canvas; no late submissions will be considered. .

Questions:

I: In their working paper, "Default effects and follow-on behavior: Evidence from an electricity pricing program," Meredith Fowlie, Catherine Wolfram, and coauthors study energy pricing in California. (Hint: The Appendix -- attached to the PDF -- will likely be useful to you in answering the below questions).

I.A: Describe the research question in this paper in words. Explain, in words and math, the ideal experiment one might want to use to answer this question.

I.B: Explain, in words and math, what treatment parameter the authors are recovering in Equation (1). Describe each term in the estimating equation in words, including a discussion of the unit of analysis. Explain how -- if at all -- this estimate differs from the population-wide average treatment effect of time-varying electricity pricing on electricity consumption. What assumptions are required in order for Equation (1) to recover the causal effect of interest? Do you think these assumptions are likely to be satisfied in this context? Why or why not? Include references to evidence presented in the paper to support your conclusion.

I.C: Explain, in words and math, what treatment parameters the authors are recovering in Equation (2). Describe each term in the estimating equation in words, including a discussion of the unit of analysis. Explain how -- if at all -- this estimate differs from the population-wide average treatment effect of time-varying electricity pricing on electricity consumption. Describe two different procedures to estimate this treatment parameter. What assumptions are required in order for Equation (2) to recover the causal effect of interest? Do you think these assumptions

are likely to be satisfied in this context? Why or why not? Include references to evidence presented in the paper to support your conclusion.

I.D: Describe the main results of the paper. Include a discussion of (at a minimum) Tables 3 and 4, in which you interpret the estimated coefficients and describe their magnitudes. What is the main policy take-away of the paper? Describe the results in Table 6.

II: Around the world, women are under-represented in politics. A bunch of people have hypothesized that having more women in positions of political power could improve well-being. A policy advocacy group, Female Underrepresentation Negatively Affects Community Resources, Operations, and Next Years' Markets (FUNACRONYM), is interested in demonstrating the impact of women in government on local public goods provision in India. They've asked you for help with their analysis.

II.A: FUNACRONYM would like you to compare the average number of public goods (roads, schools, public buildings, et cetera) in towns with female-headed governments as compared with towns that have male-headed governments. Describe this comparison in math and words. Under what conditions would this comparison estimate the causal effect of female leaders on public goods provision? Provide two concrete examples of reasons why this comparison may be problematic.

II.B: FUNACRONYM gets it - this is not the best comparison. However, they have data on a bunch of other town characteristics: per-capita income, number of residents, year of incorporation, average population age, and share of gross city product devoted to manufacturing. Describe, using math and words, a comparison between female- and male-headed towns which leverages these administrative data. Under what conditions would this comparison estimate the causal effect of female leadership on public goods provision? Provide two concrete examples of reasons why this comparison may be problematic (different from what you described above).

II.C: FUNACRONYM understands your concerns, but has some in-house machine learning experts. They tell you that they can use this same administrative data to solve your issues. Do you agree? Why or why not? Be specific.

II.D: FUNACRONYM forgot to tell you that, in India, certain local government positions are "reserved" for women -- meaning only women can run for office to fill these seats (this is, again, a Real Thing!). They inform you that towns are selected to have reserved seats based on their political party. Towns where the party that rules the state also won the last town election are required to have female leaders, whereas other towns can elect either women or men to office. They suggest that you use an instrumental variables approach leveraging this new piece of information. Describe, in math and words, what this IV approach would look like. Under what

conditions would this approach estimate the causal effect of female leadership on local public goods provision? Provide two reasons why these conditions may not be satisfied in this setting.

II.E: In Uttar Pradesh, an Indian state, all towns are put on a list, ordered by the share of women in the population. Each election cycle, the top 500 towns on the list are required to reserve the leadership positions for women (though, be warned -- official rules aren't always perfectly followed). FUNACRONYM asks you whether you can use Uttar Pradesh as a test case. Describe, in math and words, the research design you would use to leverage this new information. Be sure to include a regression equation. Under what conditions would this approach estimate the causal effect of female leadership on public goods provision? For whom is this causal effect identified?

II.F: FUNACRONYM likes this idea, and is willing to share data with you to try this out. Use the dataset contained in *final_exam_2020.csv*. What empirical tests would you like to perform, prior to attempting to estimate the effect of female leadership on public goods provision, to provide evidence in support of the identifying assumption(s)? Perform at least two tests (hint: these should be simple graphical exercises). What do they tell you about the validity of the identifying assumption(s) in this case?

II.G: Plot the relationship between a town's position on the list and its likelihood of having a female leader. Describe what you're plotting, using a definition from the course. Plot the relationship between the probability of having a female leader and public goods provision. Describe what you're plotting, using a definition from the course. Informed by these plots, write down your preferred regression equation(s) for estimating the causal effect of female leadership on public goods provision. Defend your choice of bandwidth and any functional form choices you make.

II.H: Finally, estimate the causal effect of female leadership on public goods provision. What do you find? Interpret your results. Advise FUNACRONYM: should they expand female leadership to all towns?

BONUS: Find an example of a popular press article describing a study which would not pass muster for this class. Describe, in a few sentences, the study, and the main problem with the study, through the lens of this course. Attach the article, in PDF form, to your exam when you turn it in.