POLS6382 Quantitative Methods III: Maximum Likelihood Estimation

University of Houston
September 24, 2025

Homework Assignment 2

Instructions

- Answer the following questions and submit your answers and R code in one document. Your document should be prepared using LaTex or R-Markdown.
- Submit your report using the submission link on Canvas.
- Homework Assignment 2 is due on Friday (October 3), by noon.
- We will review Homework Assignment 2 on Wednesday, October 8.

1 Analyzing Binary Outcomes

This assignment involves assessing the relative impact of legal and "attitudinal" (read: political) factors on the Supreme Court's decision-making in cases involving habeas corpus. Legal academics' view of Supreme Court decision-making in such cases focuses on matters relating to the law of the case. For example, it is widely believed that claims based on an assertion of ineffective counsel, because they cannot be brought at the trial level, stand a better chance of a pro-petitioner outcome than other types. In contrast, political scientists view the process as driven by political ideology: law-and-order conservatives oppose habeas claims, while liberals are more open to such arguments. Other political factors are also expected to be influential, such as whether the federal government is a party to the litigation (since the U.S. wins the vast majority of the cases in which it appears, opposing the federal government in a habeas case is generally believed to be much more difficult than bringing the action against a state or local government). And it is conventional wisdom that the Court frowns on second and successive petitions for habeas, making such multiple petitions more difficult to win than those of the first instance. Your assignment is to test these competing arguments. The data (Court.dta) consists of all cases involving the issue of habeas corpus decided by the Supreme Court between 1953 and 1996 (N = 109). In each case, a variable (prophetic) is coded as 0 if the petitioner (typically an inmate in the state or federal prison) was denied habeas relief and as 1 if such relief was granted. The relevant covariates are as follows:

- `ineffcou`– coded 1 if the habeas claim was based on an assertion of ineffective counsel, 0 otherwise.
- `tcterror`– coded 1 if the habeas claim was based on an assertion of trial court error, 0 otherwise.
- `multpet`– coded 1 if the case was a second or subsequent petition for habeas, 0 if it was a first-time petition.

- `us party`–coded 1 if the United States federal government was a party to the litigation, 0 otherwise.
- `liberal`– a continuous measure of the Court's ideological orientation, liberalism, where 0 indicates the most conservative Court and 1 indicates the most liberal.

1a. Using a logit model, estimate the relative impact of "legal" and political factors on the propensity of the Supreme Court to hand down a pro-petitioner ruling in habeas corpus cases. Present your results.

1b. Interpret your findings, both statistically and substantively. Which variables are or are not important? To what degree? How do you know this?

1c. Using your model estimates, plot the predicted probabilities (and their associated confidence intervals) at different levels of Supreme Court liberalism, holding all other variables constant at their medians. Discuss your graph.

1d. Finally, assess the claim that the impact of the political preferences of the Court is different in cases in which the U.S. was a party to the litigation from those in which it is not. Specify and estimate a model to test this hypothesis, and discuss your findings substantively and statistically.

2 Analyzing Binary Outcomes with Unconstant Varience

Political scientists and commentators have long suggested a link between campaign contributions and Congressional voting. Here, we'll investigate that link. The data (SenateVote.dta)are from the 103rd Congress (specifically, the Senate), and consist of four variables:

- `esvote` is each member's vote on the Economic Stimulus Package (HR 1335), coded as 1 if the member voted for the legislation and 0 if they voted against it.
- `srvote` is each member's vote on the bill banning permanent striker replacements (SR 55), coded as 1 if the member voted for the bill and 0 if s/he voted against it. The total number of observations is 98 due to missing data on two senators. You will undertake two separate analyses using the contributions/voting link.
- `buspacs` is the percentage of all political action committee (PAC) money donated to that senator in the previous two years that came from businesses or corporations.
- `labpacs` is the percentage of all PAC money donated to that senator in the previous two years that came from labor organizations or unions.

2a. Money, Votes, and Variance. When groups give money to members of Congress, an obvious goal is to influence votes. With respect to the legislation on striker replacement and the economic stimulus package, labor groups favored both bills, while business groups strongly opposed them. Yet, one might imagine that a second goal of giving votes would be to make members' votes more certain and predictable to groups and their members. Conversely, senators receiving large contributions from one side ought to take that as a stronger signal to vote in a particular direction, one that may counter pressure from other quarters. In short, we might imagine that campaign

contributions would affect both the mean expected probability of voting for or against some measure, but also the variance of that probability. Your assignment is to test the hypothesis that the two contribution variables above had effects on the mean and/or the variance of the votes of the senators in the two bills examined, using a heteroscedastic probit model. Estimate separate models for the two votes on the economic stimulus package and the striker replacement bill.

2b. Briefly discuss the findings from the two heteroskedastic probit models.

2c. For both vote variables, compare your results to those obtained via a standard (homoscedastic) probit model. Do the results differ? If so, how, and why?

3 Tranlating Your Research Ideas to a Feasible Data Collection Plan

In this exercise, you will build on your proposed research ideas in HW1 and focus more on developing details on your data collection plan.

3a Update the hypothesis (or hypotheses) that you propose to test from HW1 if needed. If not, skip 3a and work on 3b and 3c.

3b Make a code book for your empirical dataset. In the codebook, you should include information on:

- The scope of your research data.
- How do you measure the dependent variable(s). What are the coding rules for the dependent variable(s).
- For each hypothesis, what is the key explanatory variable, and what are the coding rules for the independent variable?
- The list of control variables and their corresponding coding rules.
- For each variable, what is the specific datasource?

3c Present descriptive statistics and/or visuals of the dependent variable(s) and the key explanatory variables. Depending on your progress in data collection, you can either present descriptive analysis based on the full dataset or based on the pilot version of your dataset.