Robustness Check

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Goals for Today

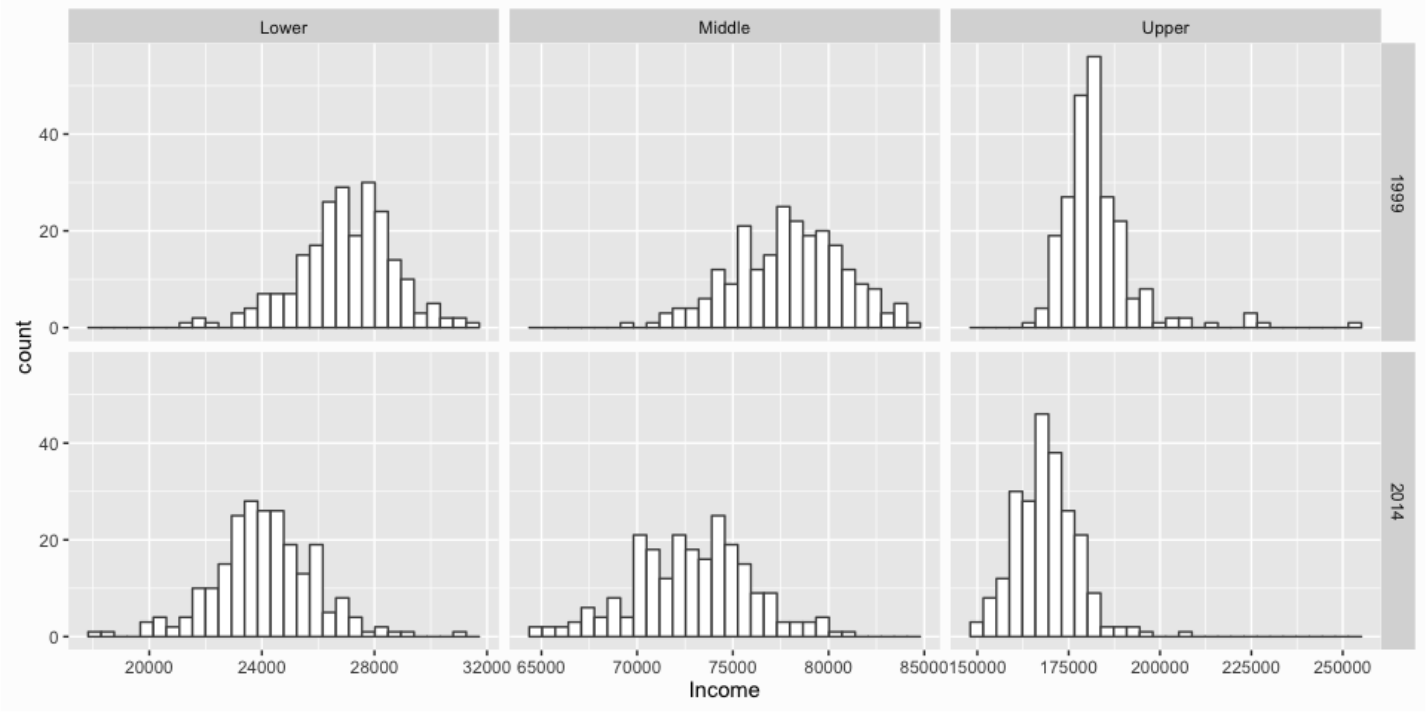
- Checklist and Visualization
- Robustness Check
- Other Tips…

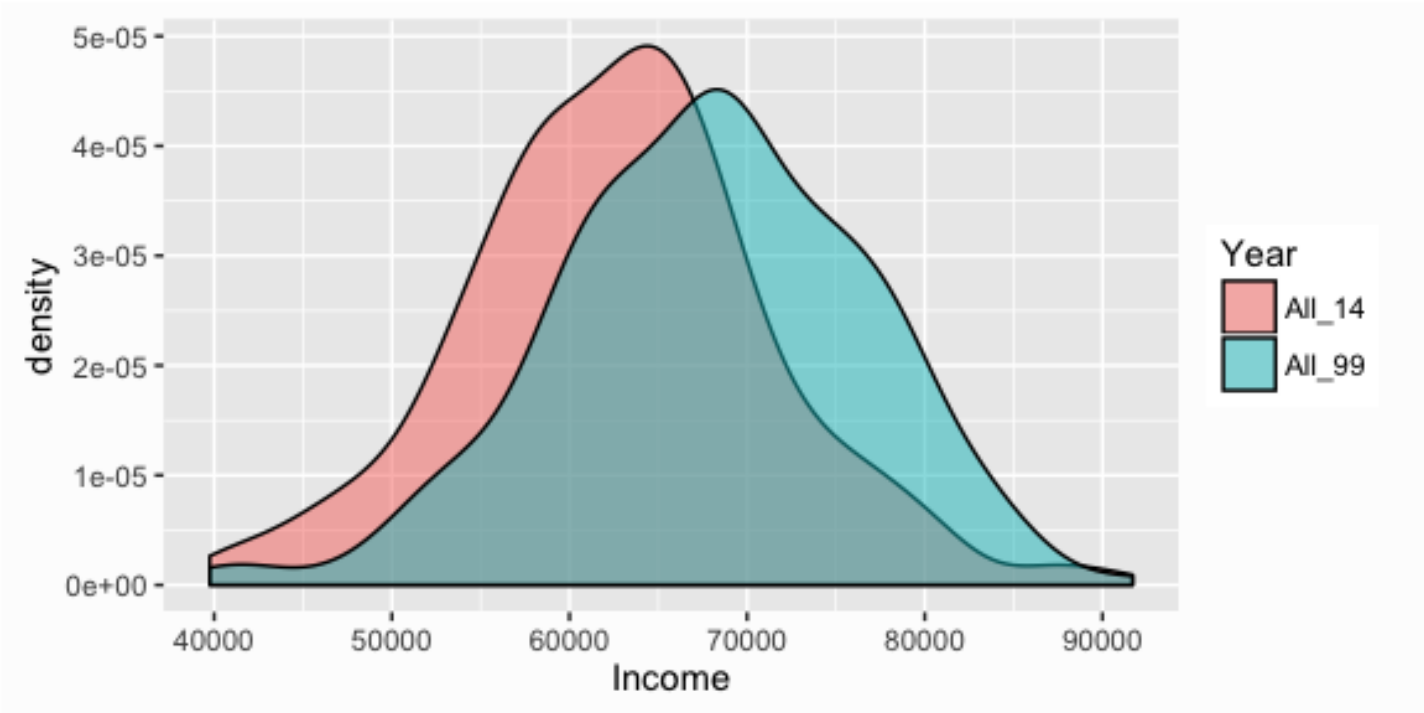
Checklist #1 Before data analysis

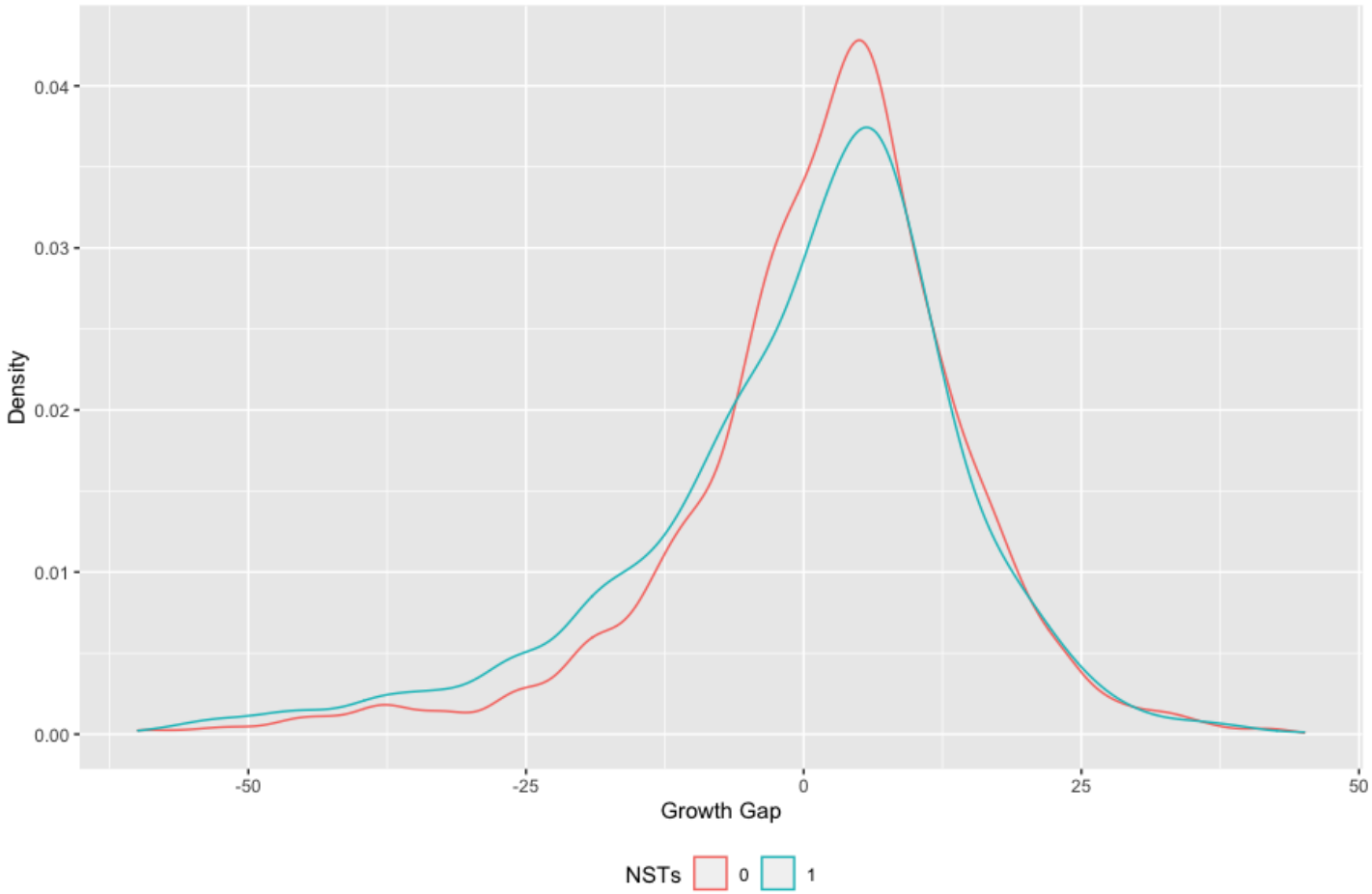
Adopted from A Basic Checklist for Observational Studies in Political Science (https://yiqingxu.org/public/checklist.pdf) by Yiqing Xu

Recommended reference: Schwabish, AER 2014, An Economist's Guide to Visualizing Data (https://pubs.aeaweb.org/doi/pdf/10.1257/jep.28.1.209)

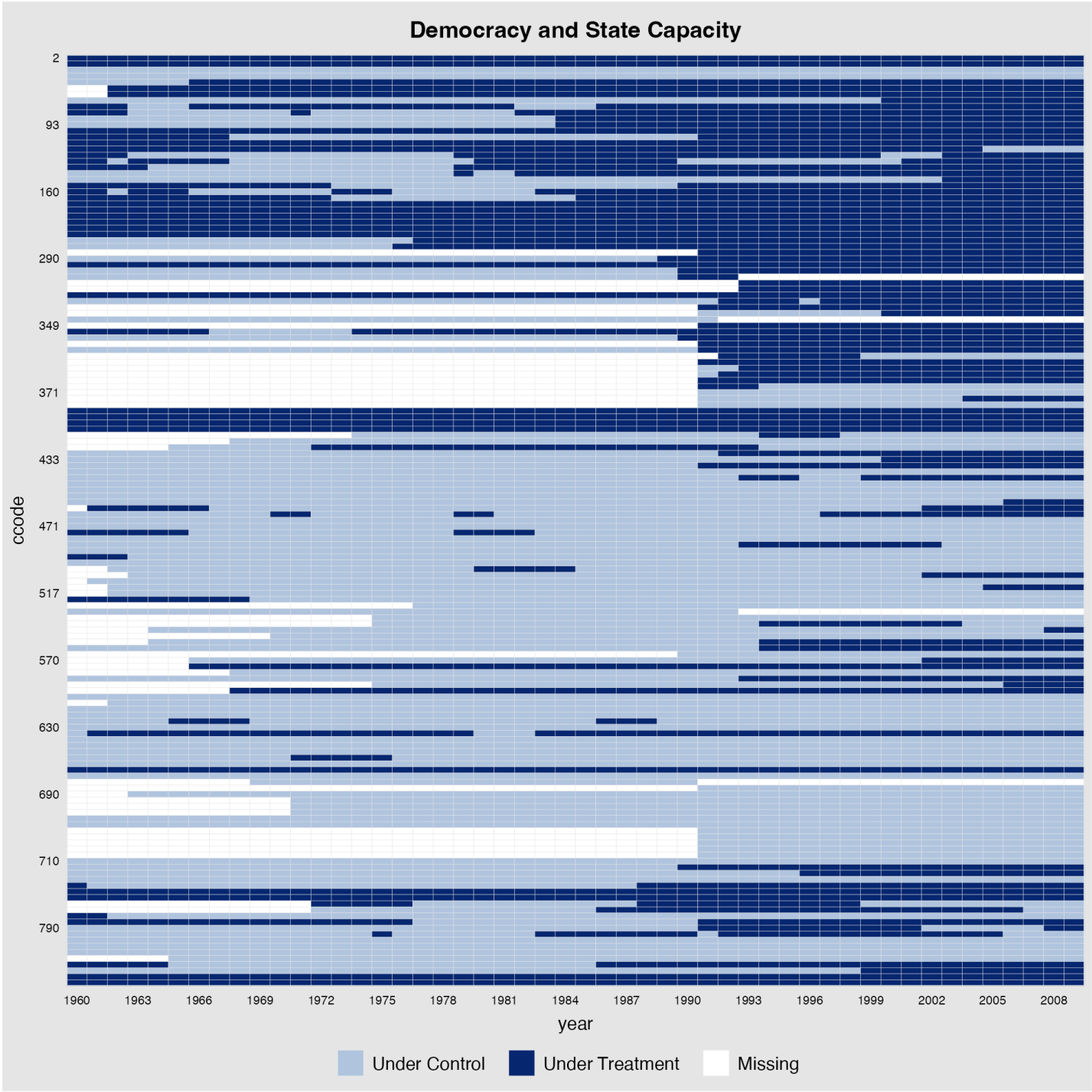
- Plot your Treatment and Outcomes separately
- Things to check
    - Highly skewed?
    - Systematic missing values?
    - Treatment status (0011 or 0101)?
    - Outliers / Coding erorrs?
    - N of treated groups (especially in DID)
- Histogram/Density plots (source:https://afit-r.github.io/histograms (https://afit-r.github.io/histograms))





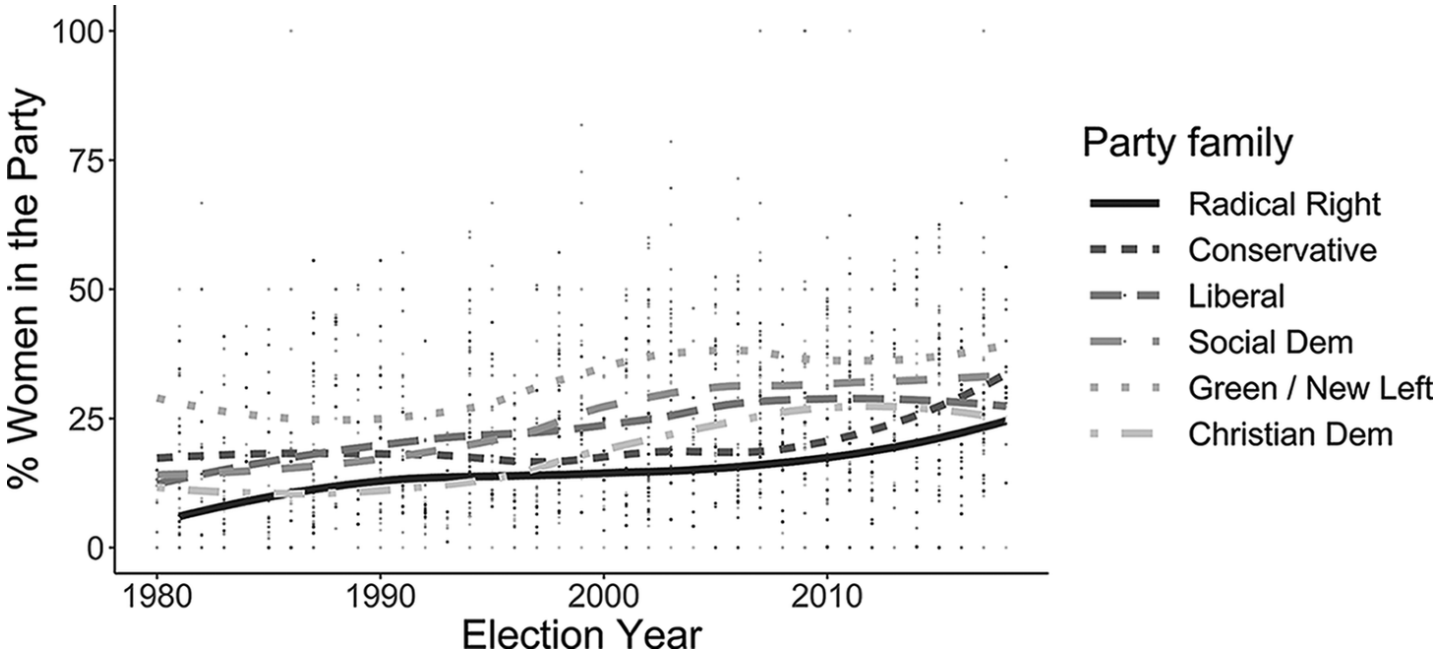


- panelView (source: https://yiqingxu.org/packages/panelview/articles/tutorial.html (https://yiqingxu.org/packages/panelview/articles/tutorial.html))



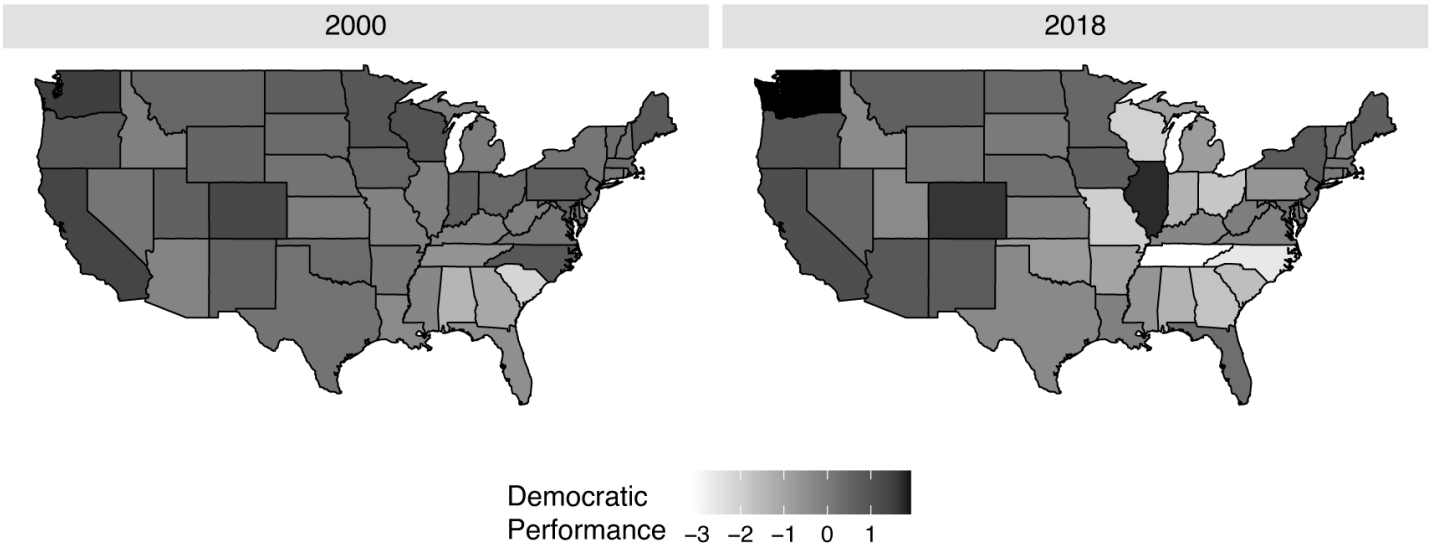
Checklist #2 Plot your Treatment and Outcomes together

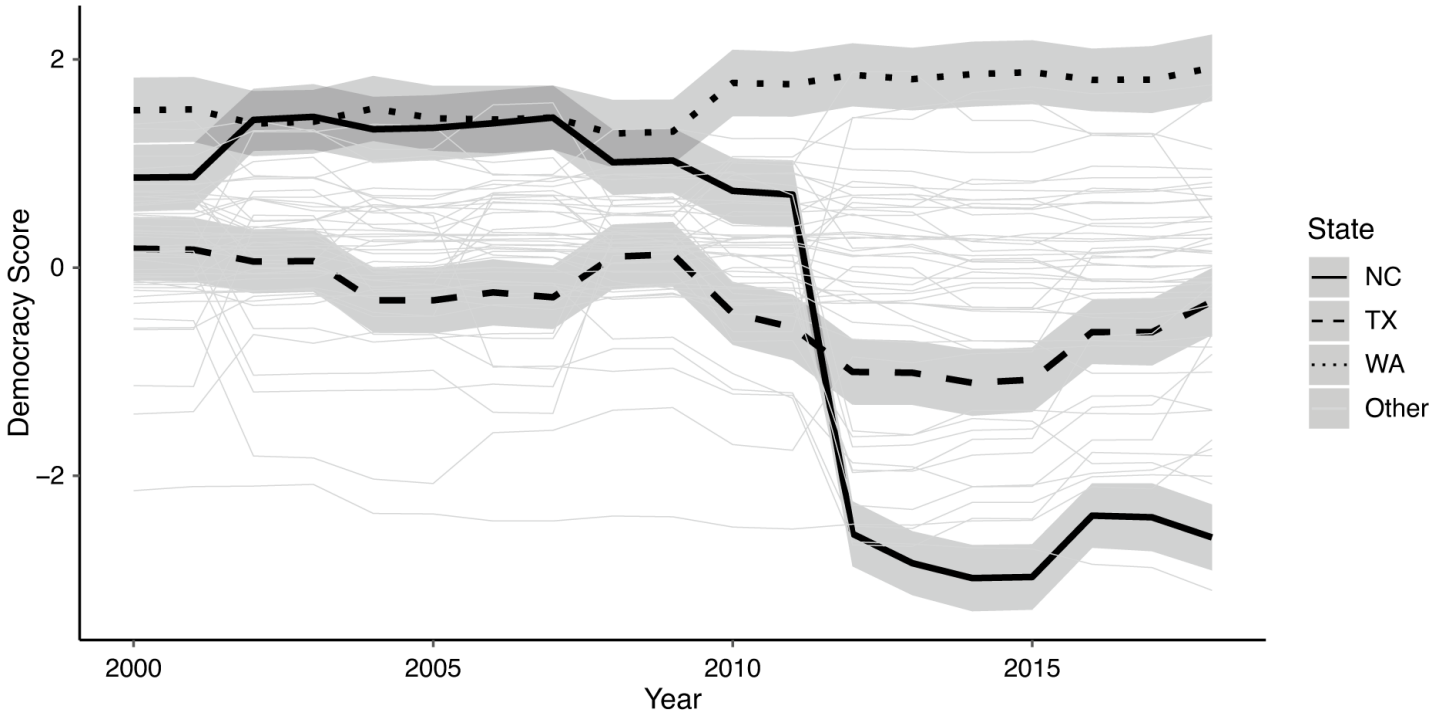
- Scatter plot of raw data + fitted lines/locally estimated scatterplot smoothing (loess)



(source: Weeks et al., APSR 2022) (https://www.cambridge.org/core/journals/american-political-science-review/article/when-do-mannerparteien-elect-women-radical-right-populist-parties-and-strategic-descriptive-representation/3ADE9B2719A34CD423E2D2A6D9ABCE5F#figures)

- Monthly average/map + changes over time

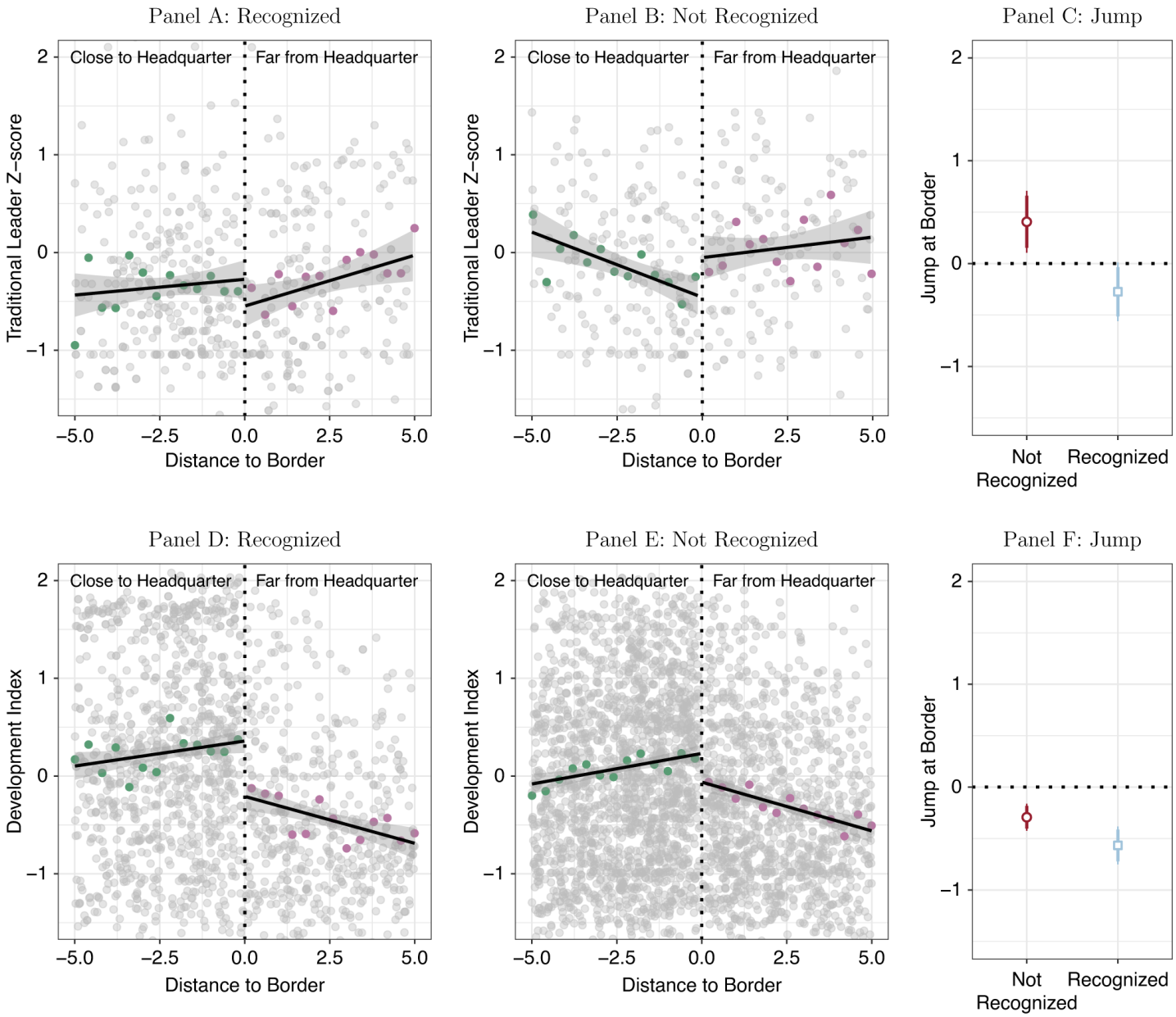




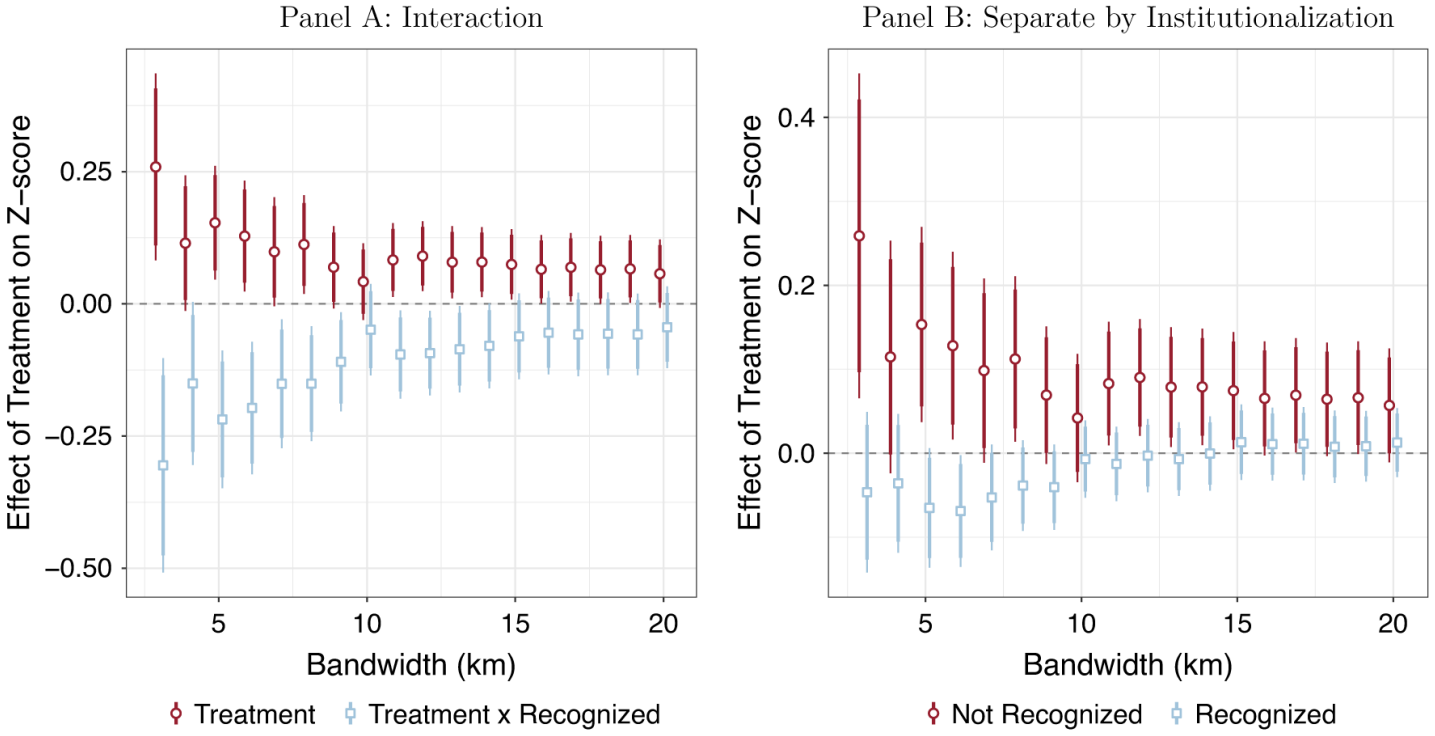
Source: Grumbach APSR 2022 (https://www.cambridge.org/core/journals/american-political-science-review/article/laboratories-of-democratic-backsliding/0742F08306EFDD8612539F089853E4FE#article)

Method specific plots

- RD (Example: Henn 2022 (https://www.cambridge.org/core/journals/american-political-science-review/article/complements-or-substitutes-how-institutional-arrangements-bind-traditional-authorities-and-the-state-in-africa/01216C0A1B14465B11122451B558DE3A#article)):
- RD plot



- Coefficient plots with changing bandwidth



- DID/TWFE: Dynamic Treatment Effect plot

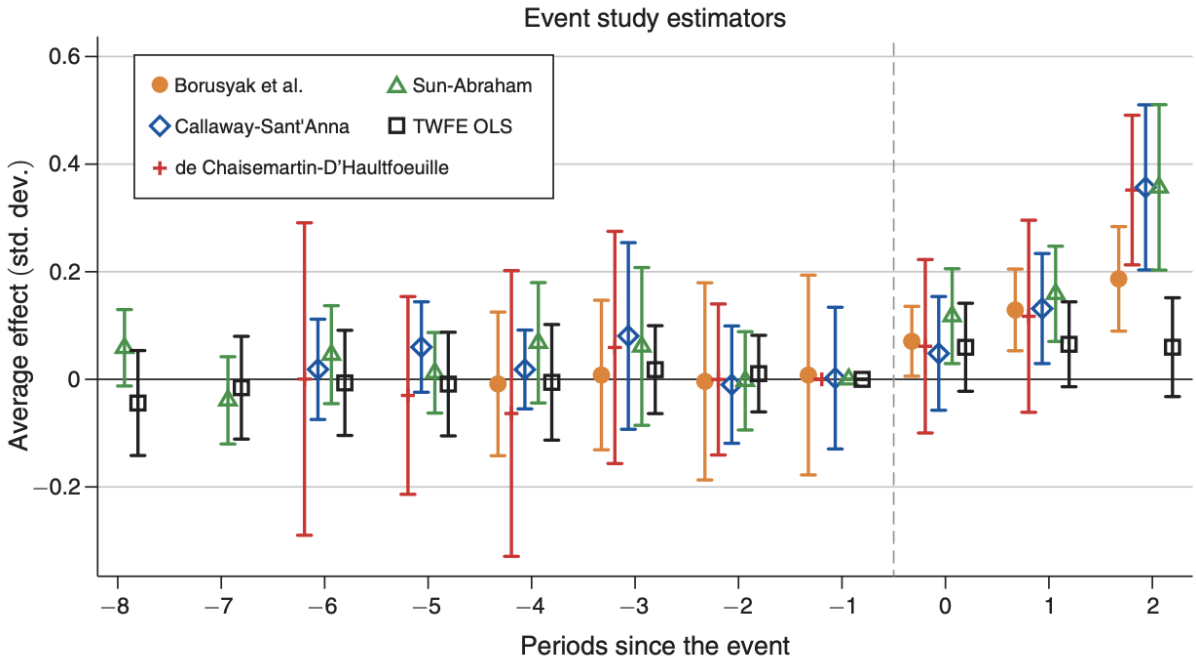
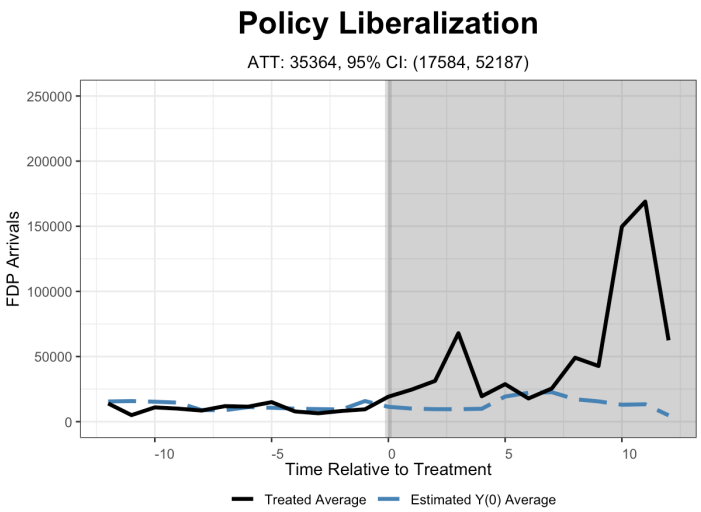
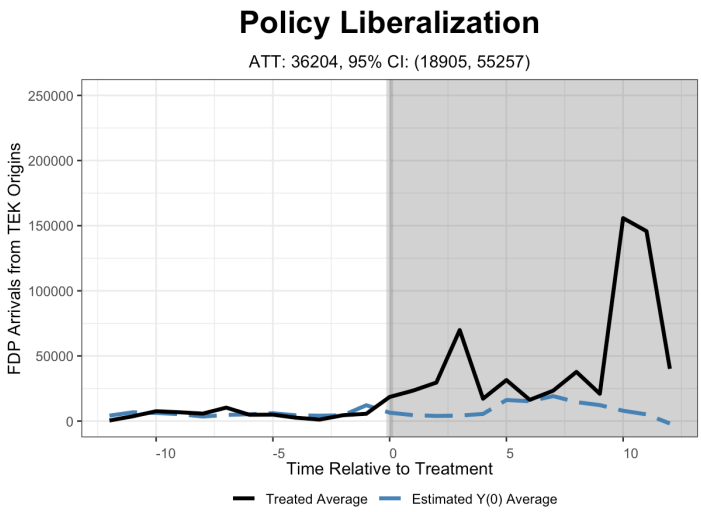


FIGURE 2. EFFECTS OF FACEBOOK ON THE INDEX OF POOR MENTAL HEALTH BASED ON DISTANCE TO/FROM FACEBOOK INTRODUCTION

Source: Braghieri, Levy, Makarin, AER 2022 (https://www.aeaweb.org/articles?id=10.1257/aer.20211218)

- Synthetic control: Raw + Synthetic + Treated (source: Blair, Grossman, Weinstein APSR 2021 (https://www.cambridge.org/core/journals/american-political-science-review/article/liberal-displacement-policies-attract-forced-migrants-in-the-global-south/F6872E76FBB27F61B96B90193BDE9A1D)





Robustness Check

Adopted from Robustness Tests for Quantitative Research (http://www.polsci.org/robustness/robustness.pdf) by Neumayer and Plümper

- Model variation (robustness test of model specifications)
  - changes in regressors (covariates)
  - changes in links (OLS, ordinal, logit…)
  - changes in measurements of treatments and outcomes (countinous->binary)
  - changes in samples (subsample, excluding suspious groups, time span, imputation)
  - changes in other model specifications (fixed effects, clustered SE)
- Placebo tests (robustness of research design)
  - A fake treatment should have no impact
  - RD: alternative cutoff, DID: alternative treatment groups/timing
- Permutation Tests
  - Sensitivity Analysis (threats of unobserved confounders)
    - Example: https://cran.r-project.org/web/packages/sensemakr/vignettes/sensemakr.html (https://cran.r-project.org/web/packages/sensemakr/vignettes/sensemakr.html)
  - Jackknife Test (dropping some variables/groups)
    - Example: Meng and Paine APSR 2022 (https://www.cambridge.org/core/journals/american-political-science-review/article/power-sharing-and-authoritarian-stability-how-rebel-regimes-solve-the-guardianship-dilemma/6217FEA0557C585F886C3268D03B260C)

How you might be challenged

- IV: Exclusiveness Restriction (untestable but justifiable)
  - Qualitative/Historical evidence
  - Address alternative channels (and prove it does not work)
- RD:
  - Self-sorting behavior (density plots might help)
  - Bandwidth selection -> coefficient plots with changing bandwidth
  - External validity
- DID
  - Parallel trend
  - Multiple treatment

- Selection bias (unobserved confounders)
- Time-variant factors within units
- Feedback effects
- Heterogeneity of treatment
- Missing values
- Changes in measurements overtime
- Changes in data quality overtime

Other Tips

- R output .tex + Github + Overleaf
- Personal website (source: https://hollina.github.io/make-a-job-market-website.html (https://hollina.github.io/make-a-job-market-website.html))

Finally…

- Course evaluation!