README file for replication code and data accompanying Barber, Andrew, and Jeremy West. “Conditional Cash Lotteries Increase COVID-19 Vaccination Rates.” *Journal of Health Economics.*

Overview

All data used in this analysis is provided by public sources. We provide archived versions of the raw data along with all R-code programs (scripts) used to reproduce the study data preparation and the exhibits in the paper, including reproduction of all figures and tables in the paper and accompanying appendix.

Data sources

1) State COVID-19 vaccination data by date from the Centers for Disease Control and Prevention (CDC)
https://covid.cdc.gov/covid-data-tracker
https://data.cdc.gov/Vaccinations/COVID-19-Vaccinations-in-the-United-States-Jurisdi/unsk-b7fc

2) State COVID-19 cases and deaths by date from the Centers for Disease Control and Prevention (CDC)
https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/cases-in-us.html

3) State COVID-19 hospitalizations by date from the Department of Health & Human Services
https://healthdata.gov/Hospital/COVID-19-Reported-Patient-Impact-and-Hospital-Capa/g62h-syeh

4) State population and population density for 2020 from the Census Bureau
https://www.census.gov/data/tables/time-series/dec/density-data-text.html

5) Census Block Group centers of population from the Census Bureau
https://www.census.gov/geographies/reference-files/time-series/geo/centers-population.html

6) State Gross Domestic Product for 2020 from the Bureau of Economic Analysis
https://apps.bea.gov/regional/downloadzip.cfm

7) State presidential elections results for 2020 from Tony McGovern
https://github.com/tonmcg/US_County_Level_Election_Results_08-20

8) State community mobility indexes by date from Google Community Mobility Reports
https://www.google.com/covid19/mobility/

9) State names to abbreviations and FIPS codes crosswalk from Danton Noriega

https://gist.github.com/dantonnoriega/bf1acd2290e15b91e6710b6fd3be0a53

10) State influenza vaccination rates for 2019 from the Centers for Medicare and Medicaid Services
https://data.cms.gov/mapping-medicare-disparities

11) All COVID-19 vaccination site locations from
www.vaccinatethestates.com

12) Surveyed COVID-19 vaccination hesitancy by state from the Census Bureau's Household Pulse Survey responses during Weeks 25-29 (February 17 to May 10, 2021) available at:
https://www.census.gov/programs-surveys/household-pulse-survey/data.html

Statement about Rights

The manuscript authors certify that we have legitimate access to and permission to use all data included in this study because it is publicly available as described above.

Description of Data Preparation and Analysis code

Below we provide a description of the R-code program files used to prepare the data and used in the analysis. We describe what each code file does and provide a list of output files saved by each R program. Each code file has a descriptive title that includes a number. The data preparation code (numbered 1) should be run first, although this is optional as the resulting prepared data is also included in the provided data archive. The remainder of the R-code files (numbered 2 through 6) prepare and export the full set of figures and tables included in the paper and appendix. These files can be run in any numerical order. The specific exhibits generated by each code file are listed below.

Computational requirements

Hardware: The authors executed the R-code on a 64-bit desktop computer running a Linux operating system, but any current desktop or laptop computer with at least 8GB of RAM should be adequate to run all code files, using either Windows, MacOS, or Linux.

Software: R version 4.1 was used to conduct this analysis, although other versions of the software might also function properly with the provided code files.

In addition, the code files make use of the following user-added libraries/packages:

- ☐ R package augsynth version 0.2.0
- ☐ R package data.table version 1.14.2

- ☐ R package dplyr version 1.0.7
- ☐ R package ggplot2 version 3.3.5
- ☐ R package huxtable version 5.4.0
- ☐ R package RANN version 2.6.1
- ☐ R package usmap version 0.5.2
- ☐ R package zoo version 1.8-9

Run-time: approximately 2 hours from start to finish for all code used in the study, although the runtime will vary greatly with CPU performance of the hardware used to execute the code files.

Code for data preparation

This file should be run first if reproducing the data preparation as well as the exhibits. Users who are only interested in reproducing one or more of the figures and tables do not need to run this data preparation file, as the output "analysis_panel.csv" file is also included in the data archive.

1_Compile_Data.R

Description: downloads (if necessary) most of the raw data input files from public sources, and compiles all input data files into the panel of data for the study analysis. The input file data sources are listed above and also described in the R-code file. The code also outputs a base file for the data dictionary, which was manually augmented into the "State panel data dictionary.xls"

Input files:

- ☐ [multiple] see code description section and/or data source list above. Archived versions of all raw input data are also provided in this code/data archive.

Output files:

- ☐ analysis_panel.csv
- ☐ base_data_dictionary_columns.csv

Code for reproducing all figures and tables

These files reproduce all figures and tables included in the paper, and may be run in any order.

2_Surveyed_Vaccine_Hesitancy_Map.R

Description: inputs raw data on Household Pulse Survey state-level vaccine hesitancy by week to form into the map shown in Figure 1.

Input file:

- ☐ hesitancy_rates.csv

Output file:

- ☐ **Figure 1:** Map_State_Vaccination_Hesitancy.pdf

3_Synthetic_Control_Figures_Tables.R

Description: inputs the compiled data panel, conducts the primary synthetic control estimations, and produces most of the figures and tables showing the study results.

Input file:

- ☐ analysis_panel.csv

Output files:

- ☐ **Table 1:** Synthetic_Unit_Weights_Top5.tex
- ☐ **Table 2:** Summary_Statistics.tex
- ☐ **Figure 2(a):** Population_Share_Any_Vaccination.pdf
- ☐ **Figure 2(b):** Population_Share_Any_Vaccination_Difference.pdf
- ☐ **Figure 3(a):** COVID19_Cases_Per_100k.pdf
- ☐ **Figure 3(b):** COVID19_Cases_Per_100k_Difference.pdf
- ☐ **Figure 4(a):** COVID19_ICU_Patient_Days_Per_100k.pdf
- ☐ **Figure 4(b):** COVID19_ICU_Patient_Days_Per_100k_Difference.pdf
- ☐ **Table 3:** Synthetic_Control_Estimation_Results.tex
- ☐ **Table 4:** Ohio_Aggregate_Results.tex
- ☐ **Appendix Table A2:** Synthetic_Unit_Weights_All.tex
- ☐ **Appendix Figure A1(a):** Population_Share_Any_Vaccination_18Older.pdf
- ☐ **Appendix Figure A1(b):** Population_Share_Any_Vaccination_Difference_18Older.pdf
- ☐ **Appendix Figure A2:** Effects_By_Days_Post_Treatment_All_Outcomes.pdf

4_Robustness_Placebo_Figures.R

Description: inputs the compiled data panel, conducts some robustness exercises for the synthetic control estimations, as well as alternative forms of statistical inference, and produces the figures showing these specific study results.

Input file:

- ☐ analysis_panel.csv

Output files:

- ☐ **Figure 5:** Robustness_Population_Share_Any_Vaccination.pdf
- ☐ **Appendix Figure A3:** Robustness_COVID19_Cases_Per_100k.pdf
- ☐ **Appendix Figure A4:** Robustness_COVID19_ICU_Patient_Days_Per_100k.pdf
- ☐ **Appendix Figure A5:** Synthetic_Control_Placebo_Results.pdf
- ☐ **Appendix Figure A6(a):** Synthetic_Control_Placebo_Results_Conformal.pdf
- ☐ **Appendix Figure A6(b):** Synthetic_Control_Placebo_Results_Conformal_Sub10X.pdf

5_State_Vaccination_Incentives_Table.R

Description: inputs manually compiled data on state-level vaccine incentive programs to form into the table shown in Appendix Table A1.

Input file:

- ☐ Conditional_cash_lotteries_COVID19_vaccinations.csv

Output file:

- ☐ **Appendix Table A1:** State_Vaccination_Incentives.tex

6_Manufacturers_Market_Shares_Figures.R

Description: inputs the compiled data panel and computes the market shares of vaccine manufacturers over time, plotting the results.

Input file:

- ☐ analysis_panel.csv

Output files:

- ☐ **Appendix Figure A7(a):** Daily_Market_Share_Dose1_Ohio_National_Janssen.pdf
- ☐ **Appendix Figure A7(b):** Daily_Market_Share_Dose1_Ohio_National_Moderna.pdf
- ☐ **Appendix Figure A7(c):** Daily_Market_Share_Dose1_Ohio_National_Pfizer.pdf