ReadMe for Replicating

How Much Should We Trust Instrumental Variable Estimates in Political Science? Practical Advice Based on 67 Replicated Studies[1]

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Computational platforms:
We tested our code on a 2021 Mac Studio Ultra with an M1 20-core processor and 128G RAM. The operation system is MacOS 14.0 (Sonoma). The R version is 4.3.0.

Installing packages
By running the "master.R" script in the root folder, all the required packages for the replication will be automatically installed, either from CRAN or Github.

Folders and their functionalities

code	Stores code files required to simulate and plot data, and summarize results
estimate	Intended for storing estimates from each replicated study
graphs	Intended for storing graphs generated from code files
markdown	Storing files useful to knit the markdown file (RMD)
metadata	Stores meta data for the replicated studies.
rawdata	Stores cleaned, minimal data from each replicated study
tables	Intended for storing tables (csv files) generated from code files

Files in "metadata"
- "universe.xlsx": information of all IV studies from 2010-2022; the keybook is stored in the second spreadsheet
- "replicated.xlsx": metatdata for all 70 replicated designs; see the last page for the keybook
- "ltp1F.dta" and "ltp1F.dta": data files for the zero-first-stage example.

Notes
1. Please make sure to set path to the root replication folder in *R*.
2. Please run "markdown/replication.rmd" first.
3. We also provide separate rmarkdown files for each paper; they are stored in the "markdown/separate" folder.
4. Please then execute the code files sequentially based on the name order.
5. All the intermediate files are saved in the "estimate" folder. When you run the markdown file, existing files in these folders will be overwritten.
6. All graphics are saved in the "graphs" folder. When you run the scripts, existing files in these folders will be overwritten.
7. Figure A10 and Tables A2 in the Supplementary Materials involve no estimation and do not require replication.
8. Certain results (e.g., bootstrap confidence intervals) may not be exactly republicated due to randomness of the simulation processes.
9. The markdown file takes the longest time to run (a few hours) and needs monitoring. To speed things up, you can use the intermediate files stored "estimate" folder.

[1] Please email Yiqing Xu (yiqingxu@stanford.edu) if you have any questions related to replication.

Code files

Please execute scripts in the following order.

Filename	Description	Output	Execution Time
replications.RMD	Execute all replications	• replications.pdf • Files in the "estimate" folder	~ 2-3 hours
	Note: When executing the markdown file, you might come across the error mentioned below. If this occurs, simply shut down R Studio (to turn off all connections) and reopen it. Afterward, you can rerun the script. Don't worry; the previous results have been saved, allowing you to pick up where you left off. This process might need to be repeated 4-5 times to ensure the code runs entirely. *Error:* ! Cannot create 15 parallel PSOCK nodes. Each node needs one connection, but there are only 3 connections left out of the maximum 128 available on this R installation Backtrace: 1. ivDiag::ivDiag(...) 2. future::makeClusterPSOCK(cores, verbose = FALSE) 3. parallelly:::stopf(...) There were 50 or more warnings (use warnings() to see the first 50) Execution halted		
master.R	Install R packages; running all code files		
0_merge.R	Merge data	• metadata/iv_replicate.rds	< 1 Minute
1_stats.R	Produce summary statistics and an example plot	• Tables 1, 2, 3 • Figures 1, 6	< 1 Minute
2_Fstats.R	Produce results related to F statistics	• Figures 2a-2b • Figures A1, A3 • Figures A4a-A4d	< 1 Minute
3_inference.R	Produce results related to inference	• Figures 3a-3b • Figures 4a-4d	< 1 Minute
4_discrepancy.R	Produce results related to 2SLS/OLS discrepancy	• Figure 5a-5d • Figure A2	< 1 Minute
5_sim_continous.R	Conduct simulations with a continuous instrument and a continuous treatment	• Figure A6a-A6b • Figure A7a • Figure A8a-A8b	Minutes
6_sim_binary.R	Conduct simulations with a binary instrument and a binary treatment	• Figure A6c-A6d • Figure A7b • Figure A8c-A8d	Minutes
7_sim_Fstats.R	Conduct simulations regarding different F statistics	• Figures A5a-A5b	Minutes
8_zfs_sims.R	Conduct simulations regarding zero-first-stage correction	• Figure A9	< 1 Minute
9_zfs_application.R	Illustrate the zero-first-stage method with an empirical example	• Table A1 • Figure A11a-A11b	< 1 Minute

Keybook for “replicated.csv”

Variable	Definition
name	Key for the article
authors	Authors
year	Year of publication
journal	Journal name
title	Article title
outcome	Outcome variables
treat	Treatment variables
iv	Instrumental variables
unit_of_analysis	Unit of analysis
multiple_cases	Whether the article has more than one IV
iv_type	Instrumental variable types
iv_subtype	Subtypes of instrumental variables
experimental	Whether the article is an experimental study
ols_report_coef	OLS coefficient reported in the main texts
ols_report_se	OLS coefficient standard errors reported in the main texts
f_report	F statistics reported in the main texts
original_estimation_f_type	F statistics types reported in the main texts
iv_report_coef	IV coefficient reported in the main texts
iv_report_se	IV coefficient standard errors reported in the main texts
iv_report_t	T statistics of IV estimations
expected_ols_upward_bias	Whether the authors expected upward bias of OLS estimations compared to IV estimations
late_defense	Whether the article provided justification for local average treatment effect
late_framework_possible	Whether the article satisfied a local average treatment effect framework
justify_magnitude	Whether the article justified the magnitude differences between IV and OLS
ols_in_main	Whether the OLS results in the main texts were considered as main results
boot_se	Bootstrapped standard errors of IV estimations
original_code	Original codes in authors' replication files
iv_model	Which IV model we replicated from the main texts
ols_model	Which OLS model we replicated from the main texts
selling_null	Whether the paper highlights a null finding