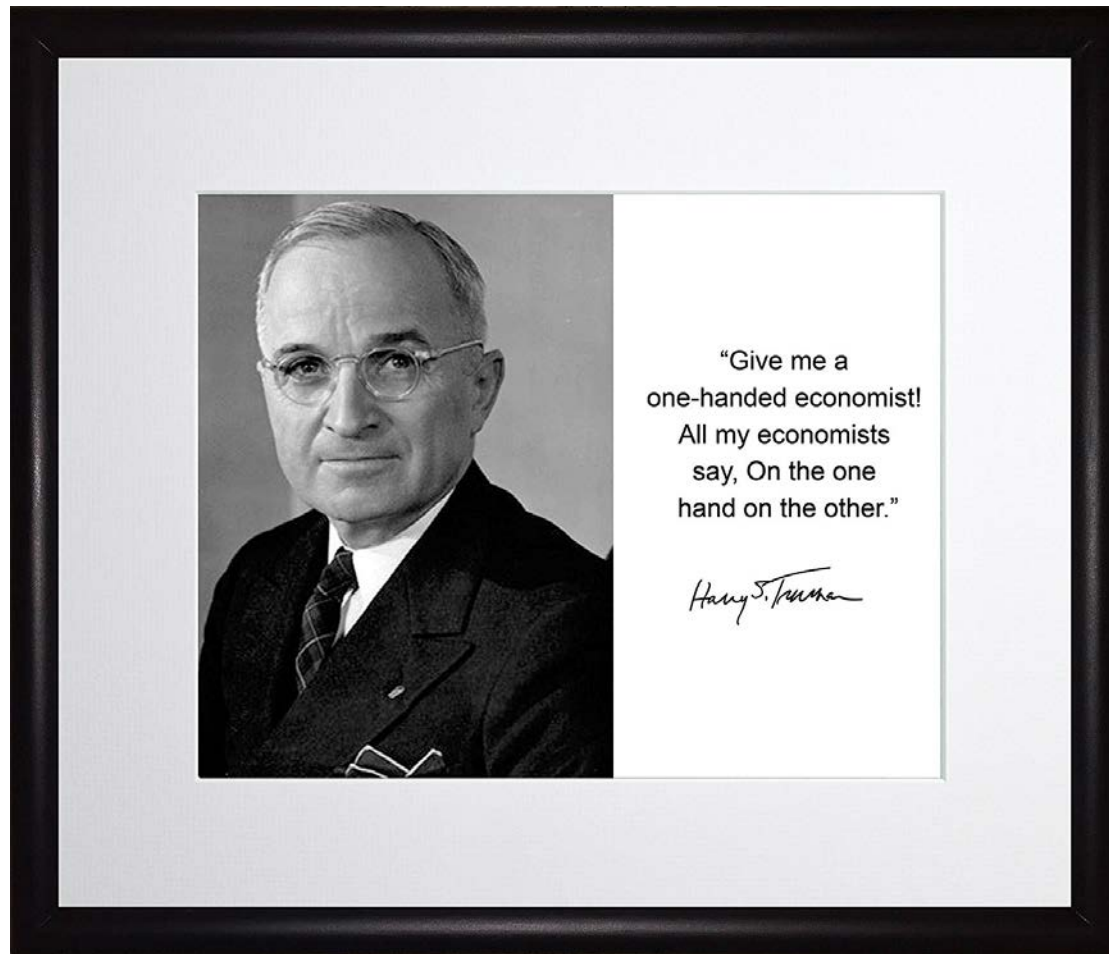




Reproducibility and Replicability in Economic Science

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Is reproducibility a problem in economics?



Evidence of irreproducibility

- Dewald et al, *AER* 1986
 - *Journal of Money, Credit and Banking* Project
 - 2/3 of requests for data not successful; most data provided had problems
 - 9 articles re-estimated. 2 replicated
 - Errors in coding, differences in software and data
- McCullough and Vinod, *AER* 2003
 - More studies that don't replicate, largely challenges with statistical software
- Duvendack et al, *EJW* 2015
 - 27 of 333 economics journals regularly share data and code
- Camerer et al, *Science* 2016
 - Evaluation of experimental results in *AER* and *QJE* found 2/3 were replicable
- Cornell team, 2017
 - Despite requirement for sharing, 40% could not be replicated because code failed or data were not available (*AEJ: Applied*)
 - With no requirement, results are worse: fewer than 10% of authors provided materials necessary for replication on request, despite promise
- Chang and Li, AEA 2018 meetings
 - 67 macroeconomics papers from 13 journals: 49% of results replicated

Efforts to increase reproducibility

- Four journals requiring data sharing in 2003
- AEA changed policy in 2003
 - After publishing McCullough and Vinod article
- 27 journals required sharing in 2015
 - Out of > 300 journals in economics
 - All the most prestigious journals
 - Lower ranked journals afraid that data sharing requirements will discourage submissions
- Professional associations and top-ranked journals critical to changing norms

Efforts to increase reproducibility

- American Economic Association
 - Appointed a data editor to improve and implement practices at all of its nine journals
 - Launching effort to improve access to and reproducibility of research using commercial data
 - Large fraction of articles received waiver under current policy because of restrictions on sharing
 - To protect IP as well as confidentiality
 - Legal prohibitions on sharing or access
 - European privacy regulation likely to require data destruction
 - New initiative joint with ICPSR

Support for replication studies

- 2015: Ten journals encourage publication of replication studies (Duvendack et al.)
- Every journal encourages robustness checks for empirical analyses
- A number of responses to important empirical papers have been published that identify data or computational errors
- Availability of more data, more detailed data, more computational power has transformed economics
 - Allows questioning of results
- Still, very little replication, except as a training exercise

Differences across fields

- Several studies focus on macroeconomics
 - Macroeconomic data tend to be
 - Public
 - Disseminated by statistical agencies or central banks
 - Applied microeconomic studies (labor, education, criminal justice)
 - Rely on confidential administrative data
 - Lots of decisions made to turn admin data into research data
 - Data are often confidential

Resistance to reproducibility

- Takes effort and resources
 - Authors
 - Journals
 - Need repositories that can support re-usable data and code
 - Replicating results in new computing environment introduces another dimension of variation
 - Better yet, code that points to data in certified archives
- Both personal interest and ideological belief
 - IP rights rather than scientific progress

Recommendations

- Commercial data and administrative data
 - Access and versioning
 - Not just open, but safe and FAIR
 - Findable, Accessible, Interoperable and Re-usable
- Give credit for data and code sharing
 - Require data citation as well as data sharing
 - Data and code sharing increases citations
- Technological solutions
 - Storing notebooks with code and data
- Social solutions
 - Learning from mistakes rather than moving on to new topic
 - Acknowledging interaction of theory and empirical analysis in economic estimation
 - Rewarding production and sharing of data as intellectual contribution in tenure and promotion decisions



Questions to address

- Within economics, what is the level of awareness, interest, concern, and involvement in reproducibility and replicability (R&R) of research results?
- Are there specific areas within economics that are more likely to have issues with reproducing scientific results?
- What reproducibility challenges does economics face with cross disciplinary research?