Replication Project

University of Oxford

Module Convener: Charles Rahal

Location: Department of Sociology Meeting Room

Time: Fridays 1-4pm MT

Academic Year 2019-2020

1 Objectives

While scepticism remains regarding whether we are truly deep within the realms of a 'Replication Crisis', it is certainly worth considering just how many empirical social science papers with statistically important results are really just some version of publication bias and/or specification searching. There exists considerable evidence that several important research findings cannot be replicated, casting a shadow of doubt on the credence and value of social science as a body of scientific study. This module aims to introduce students to the realities of empirical research through the mediums of replication and open science, with the objective being the replication of a piece of recently published academic work (or closely related).

2 Content and Structure

2.1 Michaelmas Term

During Michaelmas term, we will usually meet weekly both as a group and individually. The first meeting of the module (Week One) will be a more conventional lecture which will introduce open source i.) version control systems (Git), ii.) high-quality typesetting systems (LaTeX), and iii.) high-level statistical and general-purpose programming tools (R and Python).

Weeks Two through Six inclusive will be discussion/reading group style sessions which will briefly cover three things each week: i.) Parts of the core text (Christensen *et al.* 2019, detailed below), which the module convenor uses to introduce a concept more generally, ii.) Key readings related to sections of the

core text (indicative readings detailed below), where each class member will be expected to summarize one of the papers for up to three to five minutes each followed by a broader group discussion, and iii.) a paper (or type of paper) which might be replicated as part of the student's projects (relative to the appropriate part of the core text), with the discussion led by the module convenor.[1] Each week each class member is expected to read the core textbook chapter (they are relatively short and extremely accessible), skim the potential replication paper, and prepare a three to five minute discussion on the paper randomly assigned to them.

There will be no meeting in Week Seven in order to give students more time to focus on their projects.

Week Eight will be students presenting their progress on their individual project.

The individual sessions each week (following the group sessions) will be reserved for discussing issues related to students progress on their own individual replication projects (see below). The paper to be summarized in the following week, and the time slot for the individual meeting will be determined each week by a randomiser function. Note: the current course design is predicated on there being **four** students taking this class.

2.2 Hilary Term

Hilary term will feature three weeks of contact. The first two weeks will be compulsory individual meetings to discuss progress (taking place on the Friday afternoon of each week, times to be assigned by email in advance and are flexible). The Friday of Week 3 (HT) will again feature a presentation from each student (ideally with slides), with the intention of (ten days in advance of project submission) obtaining feedback from peers. HT will also require the submission of a draft in advance of this presentation (or on the same day as).

3 Learning outcomes

Students will appreciate the emerging cynicism surrounding much social science research through a critical approach which examines issues such as publication bias and specification searching. They will also learn best practice in terms of open science and reproducibility for their own ensuing research at both the postgraduate level and beyond.

[1] The module convenor will also act as an 'insurer' who is prepared to discuss each paper in the event of the absence of any group member.

4 Teaching arrangement

Seven group meetings (1hr, Weeks 1-6, 8) and five individual project meetings (0.5 hours, Weeks 2-6) in MT. Two individual group meetings (0.5 hours, Weeks 1-2) and one group meeting in HT (Week 3).

5 Course Assessment

Assessment is through a replication project (100%) which can be one of the five discussed potential projects or another paper of the candidates choosing (potentially relevant to their MPhil or a future DPhil thesis). The project should be 7,000-10,000 words in length in the form of an article which is suitable for submission to an academic journal either independently or as part of a longer part of analysis (i.e. a section within a bigger paper being submitted). The objective of the project should involve first a discussion of the steps taken to 'verify' the results of the paper(s) being considered, a small and natural 're-analysis', followed by a comprehensive analysis of the researcher degrees of freedom (such as, perhaps, in the form of a specification curve).

Submission is due Monday of Week 5 in Hilary Term at midday, with one hard copy and one copy via email being submitted to the Graduate Studies Administratior in Sociology. Note: picking an appropriate topic for replication is going to be one of the hardest parts of this module, and will likely take up the bulk of our first few individual meetings. A soft requirement is that you use open source tools (i.e. LaTeX, GitHub and an open source statistical analysis toolbox such as found in Python or R) for the completion of the Course Assessment, although some flexibility is available subject to discussion.

6 Key Text

Garret Christensen, Jeremy Freese, Edward Miguel (2019), *'Transparent and Reproducible Social Science Research'*, 1st Edition, University of California Press, ISBN: 9780520296954.[2]

This should be, or will shortly be available in the Bodleian Social Science Library.

[2]Ironically, there is no legal 'open source' .pdf version of this book available... So you will unfortunately have to find a hard copy in a library or buy the Kindle version!

7 Schedule of Proceedings

7.1 Michaelmas Term, 2019

7.1.1 Week One: Friday, October 18, 2019: An Introduction to Reproducible Workflow

1. **Git and GitHub**: Blischak J.D., Davenport E.R., Wilson, G., (2016) *A Quick Introduction to Version Control with Git and GitHub*, PLoS Comput Biol 12(1).

2. **Python**: Swaroop, H., (2013), *A Byte of Python*, Electronic document available at `python.swaroopch.com`.

3. **R**: Venables, W.N., Smith, D.M. and R Development Core Team, (2009), *An introduction to R*, Electronic document available at `cran.r-project.org/doc/manuals/r-release/R-intro.pdf`.

4. **LaTeX**: Oetiker, T., Partl, H., Hyna, I. and Schlegl, E., (1995), *The not so short introduction to LaTeX*, Electronic document available at `tex.ac.uk/tex-archive/info/lshort`.

- **Bonus:** Be sure to check out Michael Biggs' seminar talk ('Thoughts on Replication with a Case Study') on Monday the 21st of October!

7.1.2 Week Two: Friday, October 25, 2019: Publication Bias

- **Core Reading**: Chapters 1-3, Christensen *et al.* (2019).

- **Reading List Article One**: Ioannidis, J. P. (2005), *Why most published research findings are false*. PLoS medicine, 2(8).

- **Reading List Article Two**: Merton, R. K., (1942), *A note on science and democracy* J. Legal & Pol. Soc., 1, 115.

- **Reading List Article Three**: Anderson, M. S., Martinson, B. C., & De Vries, R., (2007), *Normative dissonance in science: Results from a national survey of US scientists*, Journal of Empirical Research on Human Research Ethics, 2(4), pp. 3-14.

- **Reading List Article Four**: Brodeur, A., Le, M., Sagnier, M., and & Zylberberg, Y., (2007), *Star wars: the empirics strike back*, American Economic Journal: Applied Economics, 8(1), pp. 1-32.

- **Potential Replication Topic Paper**: Gerber, A.S. and Malhotra, N., (2008), *Publication bias in empirical sociological research: Do arbitrary significance levels distort published results?* Sociological Methods & Research, 37(1), pp. 3-30.

- **Bonus:** Be sure to check out Ed Leamer's EconTalk episode from May 10, 2010 entitled 'Leamer on the State of Econometrics'.

7.1.3 Week Three: Friday, November 1, 2019: Specification Searching

- **Core Reading**: Chapter 4, Christensen *et al.* (2019).
- **Reading List Article One**: Gelman, A. and Loken, E., (2013), *The garden of forking paths: Why multiple comparisons can be a problem, even when there is no "fishing expedition" or "p-hacking" and the research hypothesis was posited ahead of time.* Department of Statistics, Columbia University.
- **Reading List Article Two**: Leamer, E., (1983), *Let's Take the Con Out of Econometrics*, The American Economic Review, 73(1), pp. 31-43.
- **Reading List Article Three**: Leamer, E., (2010), *Tantalus on the road to Asymptopia*, Journal of Economic Perspectives, 24(2), pp. 31-46.
- **Reading List Article Four**: Simmonsohn, U., Nelson, L.D. and Simmons, J.P. (2014), *P-curve: a key to the file-drawer*, Journal of Expermental Pyschological Science, 9(6), pp. 666-681.
- **Potential Replication Topic Paper**: Rahal, C., (2018), *A Grid Based Approach to Analysing Spatial Weighting Matrix Specification.* Available at `https://github.com/crahal/SpatialGrid`.
- **Bonus:** Be sure to check out Jeremy Freese at the Nuffield Sociology Seminar on Nov. 6th!

7.1.4 Week Four: Friday, November 8, 2019: Registration, Pre-analysis plans and Meta-Analysis

- **Core Reading**: Chapters 5-6, Christensen *et al.* (2019).
- **Reading List Article One**: Turner, E.H., Matthews, A.M., Linardatos, E., Tell, R.A., & Rosenthal, R., (2008), *Selective publication of antidepressant trails and its influence on apparent efficacy*, New England Journal of Medicine, 358 (3), pp. 252-260.
- **Reading List Article Two**: Stanley, T.D. and Doucouliagos, H. (2010), *Picture this: a simple graph that reveals much ado about research*, Journal of Economic Surveys, 24(1), pp. 170-191.
- **Reading List Article Three**: Easterbrook, P. J., Gopalan, R., Berlin, J.A and Mathews, D.R. (1991), *Publication bias in clinical research*, The Lancet, 337, pp. 867-872.

- **Reading List Article Four**: Olken, B.A. (2015), *Promises and perils of pre-analysis plans*, Journal of Economic Perspectives, 29(3), pp. 61-80.

- **Potential Replication Topic Paper**: Beltran, A., Maddison, D., and Elliot, R.J., (2018), 'Is flood risk capitalised into property values?', Ecological Economics, 146, pp. 668-685.

7.1.5 Week Five: Friday, November 15, 2019: Sensitivity Analysis and Other Solutions

- **Core Reading**: Chapter 7, Christensen *et al.* (2019).

- **Reading List Article One**: Benjamin, D. *et al.* (2018), *Redefine Statistical Significance*, Nature Human Behaviour, 2(1), pp. 1-5.

- **Reading List Article Two**: Simonsohn, U., Nelson, L.D. and Simmons J.P., (2015), *Specification curve: descriptive and inferential statistics on all reasonable specifications.* Unpublished mimeo (available on SSRN).

- **Reading List Article Three**: Steegan, S., Tuerlinckx, F., Gelman, A. and Vanpaemel, W. (2016), *Increasing transparency through a multiverse analysis*, Perspectives on Psychological Science, 11(5), pp. 702-712.

- **Reading List Article Four**: Sala-i-Martin, X. (1997), *I just ran two-million regressions*, American Economic Review, 87(2), pp.178-183.

- **Potential Replication Topic Paper**: Young,. C. and Holsteen, K. (2017), *Model uncertainty and robustness: a computational framework for multimodal analysis*, Sociological Methods & Research, 46(1), pp. 3-40.

7.1.6 Week Six: Friday, November 22, 2019: Replication

- **Core Reading**: Chapter 9, Christensen *et al.* (2019).

- **Reading List Article One**: Clemens, M.A. (2017), *The meaning of failed replications: a review and proposal*, Journal of Economic Surveys, 31(1), 326-342.

- **Reading List Article Two**: Open Science Collaboration (2015), *Estimating the reproducibility of psychological science*, Science, 349, 6251.

- **Reading List Article Three**: Cramerer, C.F. *et al.* (2016), *Evaluating the replicability of laboratory experiments in economics*, Science, 351, pp. 1433-1436.

- **Reading List Article Four**: Silberzhan, E.L. *et al.* (2018), *Many analysts, one dataset: Making transparent how variations in analytical choices affect results*, Advances in Methods and Practices in Psychological Science, 1(3), pp.337-356.

- **Potential Replication Topic Paper**: Broockman, D and Kalla, J. (2016), *Durably reducing transphobia: A field experiment on door-to-door canvassing*, Science, 8, 352, pp. 220-224.

7.1.7 Week Seven: Friday, November 29, 2019

No meetings. Focus on your projects!

7.1.8 Week Eight: Friday, December 06, 2019

Student presentations on their replication project progress: choice of paper, and endeavours so far.

7.2 Hilary Term, 2020

7.2.1 Week One: Friday 24th January, 2020

Individual project meetings.

7.2.2 Week Two: Friday 31th January, 2020

Individual project meetings.

7.2.3 Week Three: Friday 7th Friday, 2020

Group meeting and final project presentations. Deadling for submitting project drafts for comments on this day also, with comments returned by the following Monday (Monday 10th).

7.2.4 Week Five: Monday 17th February

Project Submission Date!