

Do Pre-Analysis Plans Hamper Publication?

By GEORGE K. OFOSU AND DANIEL N. POSNER*

Pre-analysis plans (PAPs) have been criticized for the time they take to prepare, the obstacles they create for learning from one’s data, and for the lack of clarity about how to best take advantage of the policing they make possible. An additional critique is that PAPs generate dull, lab report-style papers that are disfavored by reviewers and journal editors, and hence hampered in the publication process. Fifty-one percent of researchers in a recent survey said they thought the existence of a PAP made it at least somewhat more difficult to write a theoretically interesting paper.¹ “Editors want a good story,” one PAP user lamented, “and the PAP nearly never delivers a good read—it only delivers a boring, mechanical read with no surprises or new insights.” Another researcher suggested that “papers without a strong coherent narrative are customarily rejected by journals, and a PAP nearly never produces a strong narrative.” Another echoed this point, noting that “I almost always deviate from the PAP in order to make a paper that makes sense.”

To the extent that scholars who register and adhere to PAPs are disadvantaged in publishing their papers, researchers may be

disincentivized from pre-registration. This risks undermining the benefits for research credibility that the broader adoption of PAPs is thought to offer (Humphreys, De la Sierra and Van der Windt, 2013; Miguel et al., 2014).

An examination of papers published in the top-five economics journals in recent years provides at least surface plausibility for such concerns.² Of the 1,554 papers published in these journals between 2015 and 2018, just 10 (0.6%) mention having pre-registered a PAP.³ If we limit the accounting to experimental articles—a sample that better approximates the population of studies that are considered by most scholars to be “PAP-appropriate”—the share rises considerably, but only to 11%.⁴ Given the breadth of support in economics and allied social science disciplines for the “pre-registration revolution” (Nosek et al., 2018), these numbers are somewhat surprising. They would appear to underscore the challenge of publishing research based on pre-specified analyses—at least in the top-most journals.

Of course, absent information about the prevalence of pre-registered analyses in the universe of papers that were submitted for review, it is difficult to know how to interpret these findings. A more informative conclusion about whether PAPs ham-

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¹Anonymous survey of PAP users sent to affiliated researchers in the Innovations for Poverty Action (IPA) and Evidence in Governance and Politics (EGAP) research networks (N=664; response rate=23%). The quotes in this paragraph are from responses to open-ended questions in this survey. See Ofosu and Posner (2019) for further details.

²In keeping with common understandings in the discipline, the top-5 journals are defined as the *American Economic Review*, *Quarterly Journal of Economics*, *Econometrica*, *Journal of Political Economy*, and *Review of Economic Studies*.

³Articles with PAPs were identified by searching their text for the terms analysis plan, pre-analysis plan, preanalysis plan, and PAP.

⁴Further details are provided in Online Appendix Table A1. Although proponents of PAPs insist that they are suitable for all social science research, the usefulness of pre-registration for observational studies is debated. Helpful discussions of the challenges of pre-registering non-experimental research are provided in Burlig (2018) and Christensen, Freese and Miguel (2019).

per publication requires analyzing a set of papers that have not yet been submitted, with some reporting the results of analyses that were pre-specified in a PAP and some presenting results that were not pre-registered. The NBER working paper series provides just such a source of data.

I. Publication Outcomes of NBER Working Papers with and without PAPs

We analyze papers issued as NBER working papers between 2011 and 2018, the period corresponding with the rise of pre-registration in the economics discipline. During this time span, NBER issued 8,706 working papers, of which 973 (11%) were experimental, and thus plausible candidates for pre-registration.⁵ Fifty-three percent of these experimental working papers were subsequently published in peer-reviewed journals, with 13% landing in top-5 outlets.

To assess whether PAPs affect the likelihood of publication, we coded whether each of these papers mentioned a PAP.⁶ This was the case for 82 papers (8.4% of all experimental NBER working papers during this period).⁷ We then calculated the publication rates of papers with and without PAPs. Our findings are consistent with the fears of researchers who are concerned that writing and adhering to a PAP will handicap them in the publication process. Papers report-

⁵To identify papers as experimental, we searched their full text, not including the bibliography, for the following terms: field experiment, laboratory experiment, field experiments, laboratory experiments, survey experiment, survey experiments, randomized controlled trial, lab experiment, experiment, randomly assigned, and random assignment. Breakdowns of experimental NBER working papers by year are provided in Online Appendix Table A2.

⁶NBER working papers with PAPs were identified by searching their text for a slightly broader set of terms than were used in the analysis of top-5 journals reported above: pre-analysis plan, egap registry, aea rct registry, aea registry, preanalysis plan, rct registry, analysis plan, preregistration, pre-registration, pre-registered, and preregistered. We then manually checked that these articles indeed had PAPs, and corrected the few cases that were misclassified.

⁷Breakdowns by year are provided in Online Appendix Table A3. For comparison, among the 7,733 non-experimental NBER working papers in our sample, PAPs were mentioned in only four papers.

ing the results of studies that followed PAPs were 10 percentage points less likely to be published by December 2019 than papers that did not mention a PAP (44% versus 54%, $p < 0.1$). However, conditional on being published, papers with PAPs were 39 percentage points more likely to land in a top-5 journal (61% versus 22%, $p < 0.01$). These results are displayed graphically in Figure 1.⁸

Several objections might be raised to this simple analysis. The first is that it fails to control for selection into pre-registration by different types of researchers.⁹ Christensen et al. (2019) speculate that “elite” scholars may be more supportive than other researchers of open science practices such as pre-registration. To the extent that such “elite” scholars are also advantaged in the review process, there may be an in-built bias toward better publication outcomes for those who pre-register a PAP. This would not account for the lower overall publication rates of papers with PAPs, but it might explain the higher publication rate of papers with PAPs at the more prestigious journals.

While we cannot completely rule out this possibility, the fact that our analysis is based on a set of papers published in a prestigious, invitation only working paper series suggests that there may be less heterogeneity in elite status in our data than in the broader universe of papers submitted to economics journals. Furthermore, recent work by Card and DellaVigna (2018) suggests that scholars from elite institutions may not in fact be as advantaged in the review process as is often assumed.

A second objection is that the analysis fails to control for whether or not the working papers report statistically significant results. It is well-known that papers reporting null findings are less likely to be pub-

⁸Annualized breakdowns of publication rates for NBER working papers with and without PAPs are provided in Online Appendix Table A4.

⁹An analogous issue is the selection into pre-registration by different types of studies. Large-scale, multi-year field experiments may be more likely to have PAPs and also more likely to be published in top journals. We acknowledge, but are unable to control for, this potential confound.

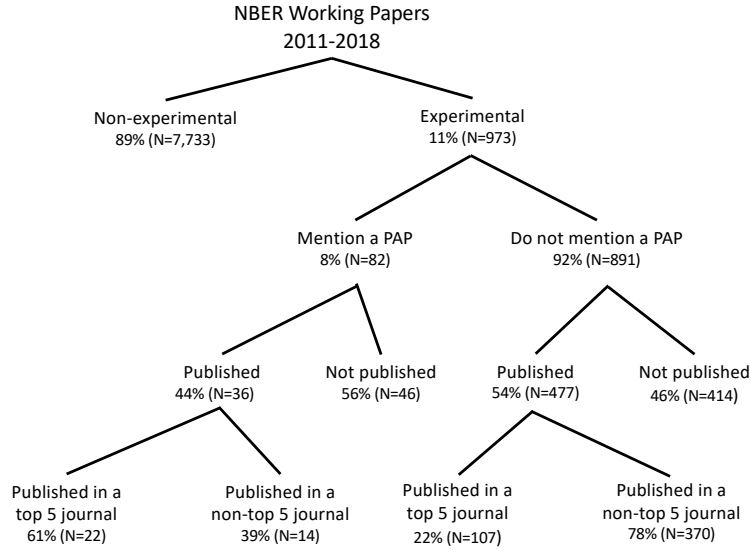


FIGURE 1. PUBLICATION OUTCOMES OF EXPERIMENTAL NBER WORKING PAPERS WITH AND WITHOUT PAPs

lished (Franco, Malhotra and Simonovits, 2014). To the extent that registering a PAP reduces researchers’ latitude to “fish” for specifications that overturn initially null results and/or makes it impossible for authors to focus their write-ups on the subset of hypotheses that happen to find support in their data, papers with PAPs are more likely to be handicapped in the review process. The negative association we find between PAPs and publication outcomes could thus be driven by the nature of the reported findings—more likely null than significant—rather than by the absence of a compelling narrative.

Although we are unable to examine directly whether PAP-based NBER working papers are more likely to report null results than their non-PAP-based counterparts, we can address the concern that null results are less likely to be published by exploiting data collected for a separate project. In Ofosu and Posner (2019), we examine a representative sample of PAPs registered on the AEA and EGAP registries with the goal of assessing whether they are sufficiently clear and comprehensive to meaningfully limit the scope for fishing and post-hoc hypothesis adjustment. Among the PAPs that had resulted in journal articles or unpub-

lished working papers, we coded whether any of the primary hypotheses that were pre-specified in the PAP were supported by the research findings presented in the paper. This allows us to compare the share of studies reporting null findings across the published and unpublished papers. When we do, we find almost no differences: among studies in which at least one of the main hypotheses was supported by the research findings, the publication rate (as of December, 2019) was 59%; among studies in which none of the primary hypotheses were supported, the publication rate was 58%. If we limit the analysis to publication in top-5 journals, papers in which none of the primary hypotheses were supported by the research findings were slightly *more* likely to be published (16% versus 13%), although the numbers of such studies are small. Since the data collected for Ofosu and Posner (2019) did not include papers without PAPs, we cannot assess whether papers with PAPs are more likely to report null results. But these findings suggest that null findings are not unduly penalized in the publication process—at least when they are generated by studies that follow PAPs.

TABLE 1—ASSOCIATION BETWEEN WRITING A PAP AND THE NUMBER OF CITATIONS

	<i>Dependent variable:</i>	
	Number of citations	
	(1)	(2)
PAP mentioned	14.27 (8.11)	19.23 (8.42)
Years since issued as NBER working paper	18.06 (1.97)	18.52 (2.06)
Published	14.94 (8.69)	39.95 (7.55)
Published in top-5 journal	54.10 (10.47)	
Constant	-23.12 (8.64)	-26.13 (9.01)
Observations	280	280
R ²	0.36	0.30
Adjusted R ²	0.35	0.29

Note: Citation counts are from Google Scholar and include citations both to the published article and to earlier versions of the paper. Sample includes all NBER working papers issued between 2011 and 2018 that mention a PAP, along with a random sample of 100 published and 100 unpublished NBER working papers that do not mention a PAP, with matching to the set mentioning a PAP by year issued as a working paper and, in the case of published papers, publication in a top-5 journal.

II. Do Studies with PAPs Generate More Citations?

To the extent that the presence of a PAP increases the likelihood of publishing a null result, it may be because the PAP makes the results more credible. This enhanced credibility may also lead to more citations.

To test whether this is the case, we collected data from Google Scholar on the number of citations to the 82 experimental NBER working papers that mentioned a PAP and a sample of 100 of the 477 published and 100 of the 414 unpublished experimental NBER working papers that do not mention a PAP.¹⁰ Controlling for the number of years since being issued as an NBER working paper, whether the paper was published, and whether it was

published in a top-5 outlet (all of which are strongly positively associated with citations), we estimate that having a PAP is associated with 14 additional citations (see Table 1). This represents more than a 40% increase over the 32 citations achieved by the median NBER working paper in our sample.

Given our earlier results suggesting a positive association between the presence of a PAP and publication in a top-5 journal, we might be concerned about multicollinearity. When we drop the *published in top-5 journal* control, the point estimate on having a PAP increases to 19 citations.¹¹

III. Conclusion

In keeping with the concerns of some PAP critics, who worry that fidelity to a PAP

¹⁰Citation counts included citations of both the published version of the paper and earlier versions. Papers without PAPs are matched to the papers with PAPs by the year the working paper was issued and, in the case of published papers, whether they were published in a top-5 journal.

¹¹The analysis drops two outlier cases with 1,107 and 1,272 citations, nearly three times the number of the next most cited paper. If these cases are included, the association between having a PAP and citations increases in the two models to 21 and 29 citations, respectively.

will lead to an uninteresting, mechanical paper that will be disadvantaged in the review process, we find that papers with PAPs are in fact slightly less likely to be published. However, we also find that, conditional on being published, papers with PAPs are more likely to land in top-5 journals and are more likely to be cited.

Although our findings capture only a snapshot of emerging trends—and, even then, must be taken as only suggestive given the challenges of selection noted above—they suggest that the alleged trade-off between career concerns and the scientific credibility that comes from registering and adhering to a PAP may be less stark than is sometimes alleged, and may even tilt in favor of pre-registration for researchers most concerned about publishing in the most prestigious journals and maximizing citations to their work.

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ONLINE APPENDIX

TABLE A1—PAP UPTAKE IN TOP-5 ECONOMICS JOURNALS, BY YEAR

Year	# of articles	# of experimental articles	# of articles with PAP	% of experimental articles	% of all articles
2015	386	30	0	0	0.00
2016	412	18	4	22	0.97
2017	416	22	3	14	0.72
2018	340	21	3	14	0.88

Note: Table presents the annual number and percentage of articles mentioning a PAP published in the *American Economic Review*, *Quarterly Journal of Economics*, *Econometrica*, *Journal of Political Economy*, and *Review of Economic Studies*.

TABLE A2—PROPORTION OF NBER WORKING PAPERS THAT USE EXPERIMENTS, BY YEAR

Year	# of working papers	% that use experiments
2011	1,064	8.1
2012	944	10.1
2013	1,110	9.7
2014	994	11.8
2015	1,020	12.5
2016	1,175	11.7
2017	1,163	11.3
2018	1,236	13.7

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TABLE A3—PROPORTION OF NBER WORKING PAPERS WITH PAPs, BY YEAR

Year	# of working papers	% with PAP
<i>Experimental work</i>		
2011	86	2.3
2012	95	1.1
2013	108	2.8
2014	117	5.1
2015	128	8.6
2016	138	11.6
2017	132	19.7
2018	169	10.1
<i>Non-experimental work</i>		
2011	978	0
2012	849	0
2013	1,002	0
2014	877	0
2015	892	0
2016	1,037	0
2017	1,031	0.2
2018	1,067	0.2

TABLE A4—PUBLICATION RATES OF NBER EXPERIMENTAL WORKING PAPERS WITH AND WITHOUT PAPs, BY YEAR

Year	N	% published	% published in top-5 journals
<i>Working papers with PAPs</i>			
2011	2	100	100
2012	1	100	0
2013	3	66.7	0
2014	6	66.7	50.0
2015	11	54.5	83.3
2016	16	37.5	50.0
2017	26	38.5	60.0
2018	17	29.4	80.0
<i>Working papers without PAPs</i>			
2011	84	66.7	26.8
2012	94	77.7	23.3
2013	105	73.3	24.7
2014	111	68.5	22.4
2015	117	59.8	25.7
2016	122	51.6	14.3
2017	106	31.1	15.2
2018	152	19.1	24.1