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IMPROVING THE TRANSPARENCY AND CREDIBILITY OF ECONOMICS RESEARCH[‡]

Research Transparency Is on the Rise in Economics[†]

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In recent years the credibility of empirical research has been questioned as the social sciences have witnessed controversies related to unavailable data, publication bias, a failure to replicate results, and outright fraud (Christensen, Freese, and Miguel 2019). At least partly to shore up trust in the veracity of research, there has been a movement toward research transparency across many fields, featuring the promotion of open science practices including posting data, code, and study materials online and preregistering studies, hypotheses, and analyses prior to a research study (Miguel et al. 2014). These practices have the potential to mitigate some of the aforementioned problems, and more broadly may bolster the credibility of research findings. For instance, study registration could increase the visibility of results, improving meta-analysis and reporting of null results, and data sharing could facilitate replications and increase later data reuse. Yet there remains debate about the usefulness of these approaches (Coffman and Niederle 2015).

Despite the promise of recent transparency proposals, there exists little representative data on researchers' attitudes toward and use of open science practices. This short paper begins to address this gap in knowledge for economics by specifically asking how many economists are adopting open science practices and what perceptions of these practices are held in the discipline. Previous attempts to quantify adoption of research transparency practices tend to be based on small convenience samples of survey respondents, for example, Baker (2016).

The present research, based on the State of Social Science (3S) Survey, generates a more robust estimate of the adoption of open science practices over time, and of support for and perceived norms regarding research transparency across four major social science disciplines: economics, political science, psychology, and sociology (Christensen ⓡ al. 2019). Here we focus on 3S data collected from economists.

I. Sample and Data

The 3S survey draws from the complete set of authors who had published during 2014 to 2016 in 10 of the most cited economics journals and from all PhD students enrolled in the top 20 North American economics departments

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during the first half of 2018; see Christensen et al. (2019) for details. The 3S survey queried respondents on awareness of, attitudes toward, perceived norms regarding, and adoption of open science practices (a pre-analysis plan and study materials can be found on the Open Science Framework at https://osf.io/zn8u2/). The survey, which had a median length of 15 minutes, was monetarily incentivized: published authors were randomly assigned to be compensated either $75 or $100 and graduate students $25 or $40; response rates did not differ significantly by payment level. Given the generous incentives, the response rate arguably represents a bound on what can be achieved with a typical research budget.

We achieved a completed survey response rate of 44 percent among economists ($N = 657$ surveys), implying that the sample is at least somewhat representative of active published authors and PhD students in the field. Among respondents with North American email addresses, the response rate is 47 percent. The response rate for authors who had published in macroeconomics journals is somewhat lower than the rate from other economics journals, possibly due to the greater share of articles based on theoretical or simulation approaches, rather than econometric analysis, in those journals.

To our knowledge the current sample is the largest and most representative attempt to assess open science attitudes and practices among economists to date. Despite this, two key concerns about the validity of the study design remain. First, our survey results are self-reported, and one might be concerned that individuals could misstate their behavior due to surveyor demand effects, for instance. Second, it remains possible that scholars who responded to the survey are nonrandomly selected from economics researchers along important dimensions. Indeed, we find that the response rate among published authors was significantly higher for those with more publications in leading journals and for those at institutions in North America; see Christensen et al. (2019).

To better understand these concerns we audited open science behavior for a random sample of the survey's published author respondents and nonrespondents, checking publicly available repositories and each author's website to determine whether they had previously preregistered a study or posted data. The audit activity yielded three insights. First, there is a high rate of agreement between self-reports and actual behavior: despite only checking relatively few online sources, we validated over 70 percent of responses regarding adoption of open science practices, allaying some concerns about demand effects and misreporting behavior. Second, selection into the sample appears to be driven by scholars with a more empirical orientation: response rates are lower at 27 percent for self-identified theory-, macroeconomics-, and finance-focused published authors, versus 50 percent for others. Third, scholars with a more empirical orientation do not appear to be selecting into the survey based on their previous open science behaviors that we were able to validate. Together, this suggests that the results are broadly accurate and representative of the behaviors and views of empirically oriented published authors in economics.

II. Retrospective Behavior

Our first finding is that the adoption of open science practices has increased dramatically in economics in the last decade. Figure 1, panel A presents the cumulative proportion of published authors who report having adopted open science practices over time. We focus on economists who received their PhD by 2009, as they had the opportunity to engage in these practices over the last decade. Ninety-three percent of published authors reported adopting an open science practice by 2017 (the last complete year for which we collected data), nearly tripling from 33 percent in 2007. Posting data or code online is the most common transparency practice adopted by economists, followed by posting study instruments online, and then preregistration.

The timing of increases in the reported adoption of transparent practices coincides with key changes to the technological and institutional frameworks regarding open science practices in economics. The sharing of data, code, and survey instruments shows a rapid increase starting after 2005, when the American Economic Association (AEA) strengthened its journal data-sharing policies, while the use of preregistration increased dramatically since 2013, when the AEA launched its RCT registry. Moreover, we find that the adoption of these practices tends to be persistent: those who previously reported adopting an open science practice

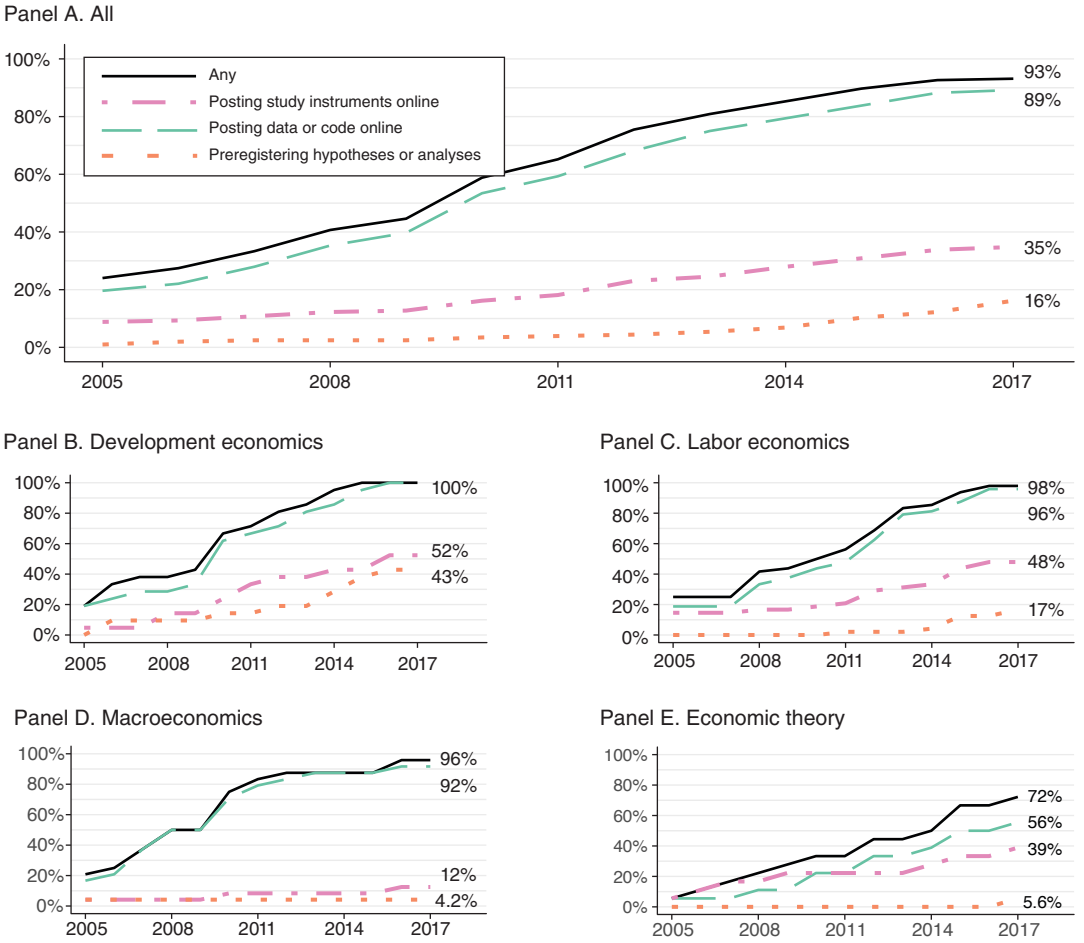

FIGURE 1. YEAR OF ADOPTION OF OPEN SCIENCE PRACTICES IN ECONOMICS AND FOUR SUBFIELDS

Notes: The chart shows for a given year the proportion of published authors who report having first completed an open science practice in that year or previously. The solid black line shows the proportion of published authors who had completed any open science practice by that year. The dashed green line shows the proportion who had posted data or code online by that year. The dash-dotted purple line shows the proportion of published authors who had posted study instruments online by that year. The dotted orange line shows the proportion who had preregistered an analysis or hypothesis by that year. Posting study instruments online is the response to the question, "Approximately when was the first time you publicly posted study instruments online?" Posting data or code online is the response to the question, "Approximately when was the first time you publicly posted data or code online?" Preregistering hypotheses or analyses is the response to the question, "Approximately when was the first time you preregistered hypotheses or analyses in advance of a study?" The sample is restricted to published authors who completed their PhDs by 2009 ($N = 204$). Panel A contains all published authors in economics, panel B those who report primarily working in development economics ($N = 21$), panel C labor economics ($N = 48$), panel D macroeconomics ($N = 24$), and panel E economic theory ($N = 18$).

are overwhelmingly likely to report employing it in their most recent research project.

Figure 1 also shows notable heterogeneity in the extent and timing of the adoption across subfields, suggesting an important role for different norms within research communities. The timing of adoption is shown for the four subfields with the largest number of responses among published authors in our sample, namely development, labor, macroeconomics, and theory.

In all four subfields, posting data and code online has increased substantially over time: in all fields except economic theory, over 90 percent of published authors had published data and code online. However, the timing of this shift appears to differ somewhat, with the increase in adoption in labor economics appearing to slightly lag that in development. There is also heterogeneity in the rising adoption of the other transparency practices across subfields. While posting study instruments online and preregistration have witnessed large increases in adoption in labor and especially development economics, they remain almost unused in macroeconomics. By 2017, 43 percent of development economists had preregistered a study, a figure likely driven by their widespread use of experimental methods. While theory is something of an outlier, presumably due to its different and less data-oriented research process, transparency practices have increased even among scholars self-identifying with this subfield. Taken together, the figures suggest that major economics subfields have increased adoption of several transparency practices and that for some practices, such as preregistration, there may be subfield-specific norms that lead to key differences in adoption.

III. Current Practices and Beliefs

The data indicate that research transparency practices are on the rise in economics, but how supportive of these practices are economists today, and what do they believe about their colleagues' preferences?

We find that economists are generally aware of open science practices (for instance, respondents were asked, "Have you ever heard of the practice of publicly posting data and code online for a completed study?"), and they are favorably inclined toward them (e.g., "To what extent do you believe that publicly posting data or code online is important for progress in [discipline]?"). In contrast to our prior expectation, we see no evidence for a generational shift at work: published authors (who tend to be faculty) and PhD students show similar levels of awareness of and support for open science practices. While open science practices are actually higher among published authors, we believe it would be a mistake to overinterpret this result, as it is likely attributable to the fact that many PhD students have not yet had the opportunity to apply them in their own work.

Is the economics research community aware of the high levels of support and adoption revealed by our survey? To answer this question, we measured respondents' perceptions of norms in the discipline and compared these perceptions of field-wide preferences and behavior to the average measured preferences and behavior reported by survey respondents. To assess perceived norms, we asked respondents to estimate how supportive others in their field are of (i) posting code and data online and (ii) preregistering hypotheses or analyses. Respondents estimated the percentage of people in their field who fall into each of five opinion categories, ranging from "not at all in favor" to "very much in favor" using a dynamic histogram. To measure behavioral norms, we asked respondents to estimate what percentage of economic researchers actually engage in each of these practices.

We find that individuals in our sample underestimate support for research transparency practices in the discipline. The perception of support (either very much or moderately in favor) among our sample is far smaller (64 percent) than actual stated support (97 percent) when considering preferences regarding posting data or code online. For preregistration, the perception of support is again far lower (at 34 percent) than actual stated support (52 percent).

We also find that survey-estimated rates of support for posting data and code and preregistration are substantially higher than the rates of actual behavioral adoption, particularly when taking into account those who were either "very much" or "moderately" in favor. This pattern is consistent with the existence of substantial latent support for transparency practices in economics that may contribute to further adoption in the near future.

There are several reasons why respondents appear to be more in favor of data posting and preregistration than they believe other economists to be. One possibility is that the survey sample is unrepresentative in important ways. For one, we selected respondents based on their publication history in top journals; of course, this "elite" subgroup may be particularly influential in driving changes to disciplinary norms. Moreover, those who chose to respond to the survey may be more supportive of open science than nonrespondents, although the

evidence from the audit activity suggests this is not a major bias. Another explanation is that respondents are overstating their preferences for open science for reasons of self or social image. However, admitting some social desirability toward responding favorably in an anonymous survey supports the idea that a norm in favor of transparency has already developed, even if behavior lags behind attitudes.

IV. Discussion

Analyses from an original survey of economists carried out in 2018 strongly suggest that economics is undergoing a transition toward the adoption of research transparency practices, a shift that our respondents appear only partially attuned to. Contrary to our expectations, we do not find evidence for the movement being led by the next generation of scholars: open science preferences are remarkably similar among both PhD students and published authors. We document notable heterogeneity in the adoption of research transparency practices across economics subfields, likely due at least in part to the disparate nature of the research methods they use. The high levels of expressed support for open science practices indicate that the classic scientific ethos famously articulated by Merton (1979) still resonates in economics today.

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