

Feature

New Evidence on Diversity in Environmental and Resource Economics

Nicolai V. Kuminoff^{*}, Katherine E. Ciaramello[†], Hanna M. Dooley[‡],
Martin D. Heintzelman[§], Neha Khanna^{||}, Lea-Rachel Kosnik[#],
Lynne Y. Lewis^{**}, and Eric Trimble^{††}

Introduction

In 2019, the Association of Environmental and Resource Economists (AERE) issued a public statement to express its commitment to diversity, equity, and inclusion (DEI), and in 2020 it created a standing DEI committee.¹ By taking these actions, AERE joined numerous professional and scientific associations that have recently made DEI commitments in response to concerns about discrimination in the labor force. While the intention of DEI commitments is clear, there is little existing basis to evaluate their impact. Data on diversity in academia can be scarce, especially regarding journal publication—an important indicator of professional achievement (Wu 2020). The small literature on diversity in economics has focused almost exclusively on the status of women in the profession (e.g., Bhattacharjee, Herriges, and Kling 2007; Abrevaya and Hamermesh 2012; Bayer and Rouse 2016; Card et al. 2020). This literature offers many insights on the productivity and constraints faced by women relative to men but does not address most other DEI characteristics, such as race, age, national origin, professional position, and academic background.

In this article, we contribute to knowledge on diversity in the economics profession in three ways. First, we provide an update on the status of women in environmental and resource economics relative to an earlier report in this journal by Bhattacharjee, Herriges, and Kling

^{*}Department of Economics, Arizona State University, and NBER (kuminoff@asu.edu); [†]Arizona State University (kciaramel@asu.edu); [‡]Arizona State University (hdooley@asu.edu); [§]Department of Applied Economics and Statistics, University of Delaware (mheintze@udel.edu); ^{||}Department of Economics, Binghamton University (nkhanna@binghamton.edu); [#]Department of Economics, University of Missouri–St. Louis (kosnikl@umsl.edu); ^{**}Department of Economics, Bates College (llewis@bates.edu); ^{††}Arizona State University (emtrimbl@asu.edu)

We are grateful to the AERE officers and board of directors for providing data support and helpful comments and suggestions. We also thank the editor and four anonymous referees for their constructive feedback on earlier drafts.

¹AERE's public statement is provided in the appendix (available online).

Online enhancements: appendix, supplemental figures, and supplemental table.

Electronically published December 6, 2022

Review of Environmental Economics and Policy, volume 17, number 1, winter 2023.

© 2022 Association of Environmental and Resource Economists. All rights reserved. Published by The University of Chicago Press for AERE. <https://doi.org/10.1086/722907>

(2007). Second, we extend the scope of diversity measures by describing new data on the professional position, employer, graduate and undergraduate alma mater, degree year, and degree country of authors who published in the *Journal of the Association of Environmental and Resource Economists* (JAERE) from its inception in 2014 through the end of 2020.² Focusing on JAERE authorship is important because of the pivotal role that publications in AERE's flagship journal can play in professional advancement. The breadth of these diversity measures and our focus on publication also complement findings from a recent study of diversity in professional meeting attendance (Frey, Caviglia-Harris, and Walsh 2020). Finally, we suggest areas where empirical analyses could yield further insights on diversity in the economics profession.

We find that AERE's female membership share was approximately 29 percent in 2020, nearly the same as in the year 2000. Compared with membership, women served in AERE leadership roles at higher rates and accounted for a smaller share of JAERE authors. In terms of international diversity, 72 percent of JAERE authors were employed in the United States, 78 percent of authors with PhDs earned their degrees from US schools, and 15 percent of authors obtained their undergraduate degrees from schools outside the United States, Canada, and the European Union. We also show that 25 percent of JAERE authors were affiliated with 10 employers and that 40 percent of authors obtained their highest degrees from 10 schools. These statistics and the data that we describe establish a set of year-2020 benchmarks for diversity within the field of environmental and resource economics and a baseline against which to measure future progress.

Data

We developed two databases describing diversity in environmental and resource economics. The first describes the universe of JAERE authors through 2020. The second database describes the universe of AERE membership records from 2000 through 2020. The AERE membership data are confidential, but the JAERE author database was compiled from public information.

JAERE Author Data

We collected data on the authors of every article published in JAERE from the first issue in 2014 through the end of 2020, including special issues. These data describe 507 total authors of 213 articles.³ We collected information describing each author's gender, employer, and professional position at the time their article was first submitted to JAERE, the years they obtained undergraduate and doctoral degrees, and the names and countries of their alma maters. We obtained most of this information from JAERE article metadata, author CVs, author web pages, and employer web pages. In rare cases, we used ancillary social media sources, such as LinkedIn. Finally, we recorded each article's publication history (dates received and accepted), JEL codes, and number of citations in Google Scholar as of October 2020.

²We did not collect historical data from AERE's previous flagship journal—the *Journal of Environmental Economics and Management* (JEEM)—for two reasons. First, JEEM and JAERE operated under different editorial practices (e.g., single-blind vs. double-blind reviewing). Second, Bhattacharjee, Herriges, and Kling (2007) previously analyzed JEEM authorship data from 1990 to 2005.

³The number of unique authors is 421 because several authors published multiple articles. We use total authors in our analysis.

Three undergraduate research assistants collected these data, dividing labor and working independently after an initial training session and supervised trials. If one research assistant was unable to find an author's information, then the others performed an ancillary search.⁴

Gender is unique among the variables collected because it required the research assistants to make judgments about gender expression. These subjective judgments were based on personal pronouns provided on author and employer web pages, along with names and web page photos. A caveat to this subjective and binary classification is that it may result in some measurement errors relative to self-assessed gender. For example, among the registrants at AERE's summer conference in 2021 who responded to a voluntary demographic questionnaire, 1 percent identified their gender as nonbinary.⁵

AERE Membership Data

We obtained AERE's confidential membership database under a data use agreement with the association. These data include each member's name, contact information, and professional affiliation; the information is mostly self-reported and often incomplete. AERE did not systematically collect data on gender prior to 2021. However, a person's first name and nationality can be used to predict their gender. We followed protocols similar to those of Card et al. (2020) to predict each member's gender on the basis of their first name and country of residence on file in the AERE database as of August 2020. Specifically, for each unique combination of first name and country of residence, we purchased data from <http://www.Gender-API.com> describing whether the majority of people with that first name are registered as female in their country of residence. These data are based primarily on biological sex recorded in birth records obtained from government databases, such as the US Social Security Administration's database on name and sex. We compared these name- and country-based predictions of gender to the variable that we subjectively coded for *JAERE* authors using personal pronouns, names, and web page photos. The <http://www.Gender-API.com> predictions covered 99 percent of the *JAERE* author names, and for these matched authors, the algorithm's gender prediction matched the research assistants' coding for 95 percent of authors.⁶ Differences appeared to be driven by gender-neutral names and/or different naming conventions among countries. In rare cases where our coding differed from the <http://www.Gender-API.com> prediction, we used our subjective coding.

Measures of Diversity

Figure 1 summarizes female representation in AERE from 2000 through 2020 by reporting the fractions of AERE members, leaders, and authors who were female. A person is defined as

⁴In rare cases where the undergraduate team was unable to find an online presence for a *JAERE* author, Kuminoff performed a final search.

⁵Of the 91 percent of attendees who responded, another 58 percent identified as male, and 41 percent identified as female.

⁶The appendix describes a robustness check in which we wrote our own code to predict gender based on first names and biological sex ratios in the United States, China, and India. Our code matched fewer *JAERE* author names (92 percent), but for those matched authors, we had a 95 percent match rate with the research assistants' subjective coding. Figure A1 (figures A1, A2 are available online) compares our predictions with those from <http://www.Gender-API.com>.

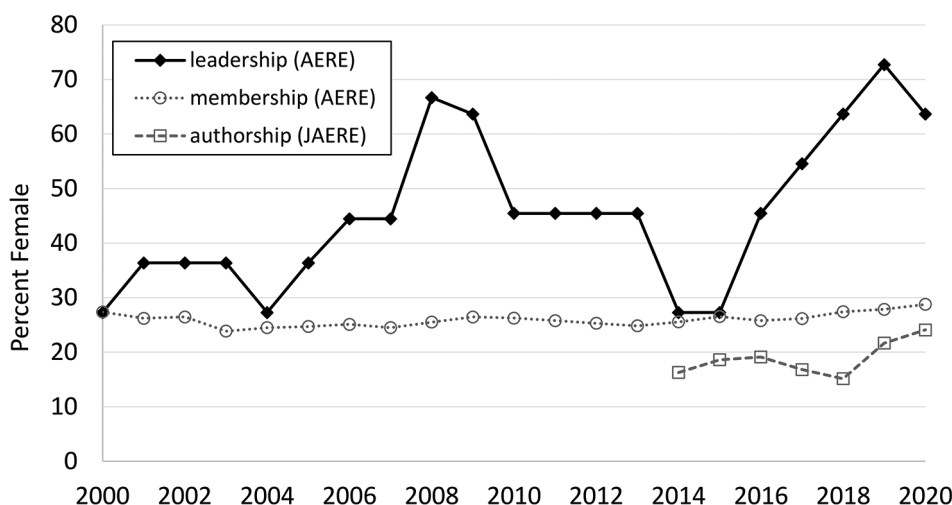


Figure 1 Female representation in AERE: 2000–2020. A color version of this figure is available online.

an AERE member in year t if the membership database indicates that they joined AERE before the end of year t and their membership expired after year t . Leadership is based on the annual composition of AERE's officers and board of directors as recorded in the AERE (2018) handbook kept by the AERE secretary. Specifically, this 11-person group includes the president, immediate past president (or president-elect), vice president, treasurer, secretary, and six elected board members.⁷ Authorship is based on the annual fraction of all author-article combinations that are female.

In 2020, approximately 29 percent of AERE members were female, nearly identical to the female share of economics PhDs that were granted in 2020 (28 percent) but nearly double the female share of economics department tenure-track faculty (16 percent; Chevalier 2021). AERE's female membership share was relatively stable between 2000 and 2020, increasing by just a few percentage points amid annual fluctuation (figure 1). This slight increase matches trends in the female shares of new economics PhDs and tenure-track faculty throughout the economics discipline over the same period (shown in figure A2).

Figure 1 shows that, compared with membership, women account for a smaller proportion of *JAERE* authors. During *JAERE*'s first year, 16.3 percent of its authors were female. This statistic is nearly the same as the 16.8 percent of female *JEEM* authors from 1990 to 2005 (Bhattacharjee, Herriges, and Kling 2007). Over time, the share of female *JAERE* authors has trended slightly upward. Between 2014 and 2020, the aggregate female authorship share was 18.8 percent. We also observe that men and women have similar rates of sole authorship (9 percent for men and 11 percent for women) and that mixed-gender teams are common, with 28 percent of all articles having at least one female author and one male author. Author order is mostly alphabetical. Among the 60 articles written by mixed-gender teams, only five

⁷This was a nine-member group in 2006, 2007, and 2008, when there were only four elected board members. Also, the 11-member group excludes three ex officio members: the *JAERE* editor in chief, the *Review of Environmental Economics and Policy* editor, and the AERE executive director.

deviated from alphabetical order in a way that altered the gender of the lead author (three resulting in a male lead author and two resulting in a female lead author).

Studies of the peer review process in economics have concluded that male and female referees do not differ in how they treat female authors (Blank 1991; Abrevaya and Hamermesh 2012; Card et al. 2020)—but that female-authored submissions receive about 25 percent more citations than male-authored submissions conditional on other article features, such as field and the authors' prior publication record (Card et al. 2020). In the closest comparison our data allow, we find that female *JAERE* authors received about 5 percent more citations than male authors, with a 95 percent confidence interval from −16 to 32 percent. This estimate is from a regression that controls for PhD year, professional position, publication year, two-digit JEL codes, and three-digit JEL codes within the two-digit “environmental economics” classification, with errors clustered by article.⁸ While the confidence interval on our estimate is not sufficiently narrow to rule out a null effect or a 25 percent differential in favor of female authors, it does exclude the 40 percent differential in favor of male authors that Bhattacharjee, Herriges, and Kling (2007) reported for *JEEM* articles published from 1990 to 2005.

Figure 1 also shows that, compared with membership, women have served in AERE leadership roles at higher rates than men, on average. Prior studies have reported similar evidence in academia in general (Guarino and Borden 2017) and in the economics discipline specifically. For example, Bhattacharjee, Herriges, and Kling (2007) reported that women held approximately 33 percent of AERE leadership roles from 1990 to 2005, and Donald and Hamermesh (2006) reported that women accounted for approximately 35 percent of elected officers in the American Economic Association (AEA) from 1995 to 2004.⁹ The share of female leadership in the AEA remained nearly constant at around 34 percent between 2000 to 2020, whereas the female share of AERE leadership increased to 46 percent (or approximately 5 of 11 members).

We next turn to other aspects of diversity among *JAERE* authors. Figure 2 shows the fractions of authors by gender and professional position. The total numbers of observations used to construct the figure are as follows: chaired professor (47), professor (107), associate professor (78), assistant professor (119), student (48), and researcher (87).¹⁰ The first six categories reflect rank, but the researcher category is not rank based. It includes all nonfaculty positions, combining people who list their primary affiliation with a research institute, a government agency, or a private firm.

Female economists make up relatively larger shares of lower-ranked academic positions. If long-term cohort effects and recent attrition trends in the economics discipline are equally applicable to prospective *JAERE* authors, then we should expect a substantial increase in the share of female authors in higher-ranked positions over the next 20 years. For example, Chevalier (2021) reports that the female shares of full professors, associate professors, and assistant professors in surveyed economics departments increased from 6, 15, and 25 percent, respectively, in 2000 to 15, 27, and 30 percent, respectively, in 2020. By contrast, the female shares of undergraduate economics students (32 percent in 2000; 34 percent in 2020) and

⁸These results are described in the appendix and summarized in table A1 (available online).

⁹In February 2022, 24 percent of *JAERE*'s editorial board members (editors and coeditors) were women.

¹⁰We were unable to determine rank for 6 of 507 author-article pairs. Figure 2 also excludes the female share of postdocs (40 percent) because the number of observations is relatively small (15).

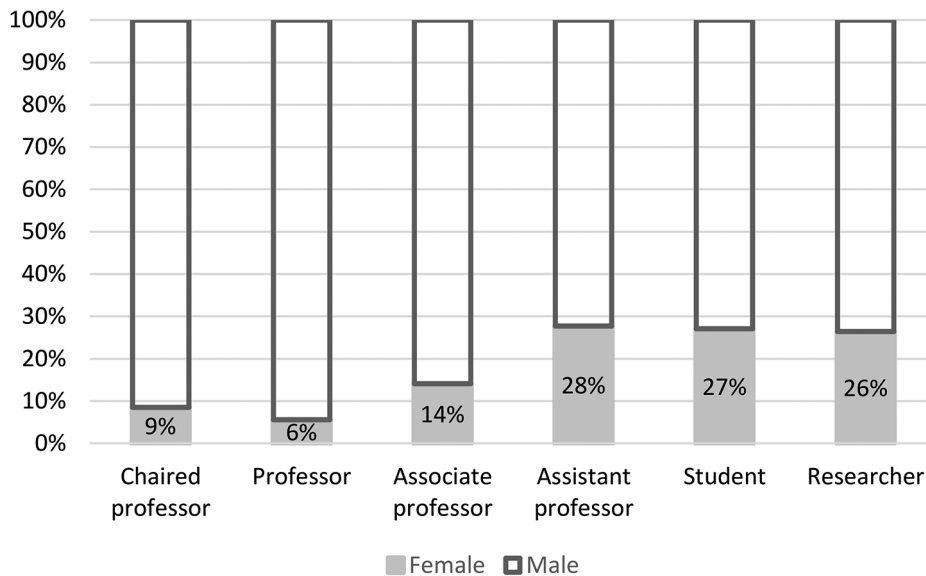


Figure 2 JAERE authorship, 2014–2020, by position and gender. A color version of this figure is available online.

first-year PhD students (34 percent in 2000; 36 percent in 2020) were relatively stable, suggesting that we may expect relatively smaller changes in the shares of prospective female authors in lower-ranked positions.

In terms of international diversity, 72 percent of *JAERE* authors were employed in the United States, and 78 percent of authors with PhDs earned their degrees from US schools. If we combine the United States with Canada and the European Union, their aggregate employment share of *JAERE* authors increases to 95 percent, and the PhD alma mater share increases to 99 percent. The composition of authors by national origin appears to be more diverse. While we do not observe national origin directly, we find that approximately 15 percent of *JAERE* authors obtained their undergraduate degrees from schools outside the United States, Canada, and the European Union.¹¹

As a final measure of diversity, figure 3 summarizes the annual shares of *JAERE* authors who were employed by the most prolific employers and the shares who obtained their doctorates from the most prolific universities. Specifically, we first define “top five” and “top 10” lists of authors’ employers (at the time they submitted their paper to *JAERE*) and universities (where authors received their PhDs) on the basis of the total numbers of author-article observations in the *JAERE* database. The idea behind these lists is to provide a crude characterization of academic networks and intellectual diversity. These lists are not meant to characterize economists’ productivity, the quality of their research, or the quality of their PhD training. By construction, these lists favor academic departments that train and employ more *JAERE* authors as well as universities that have multiple academic departments that engage with environmental and resource economics.

¹¹We were unable to determine undergraduate country for 8 percent of author-article observations.

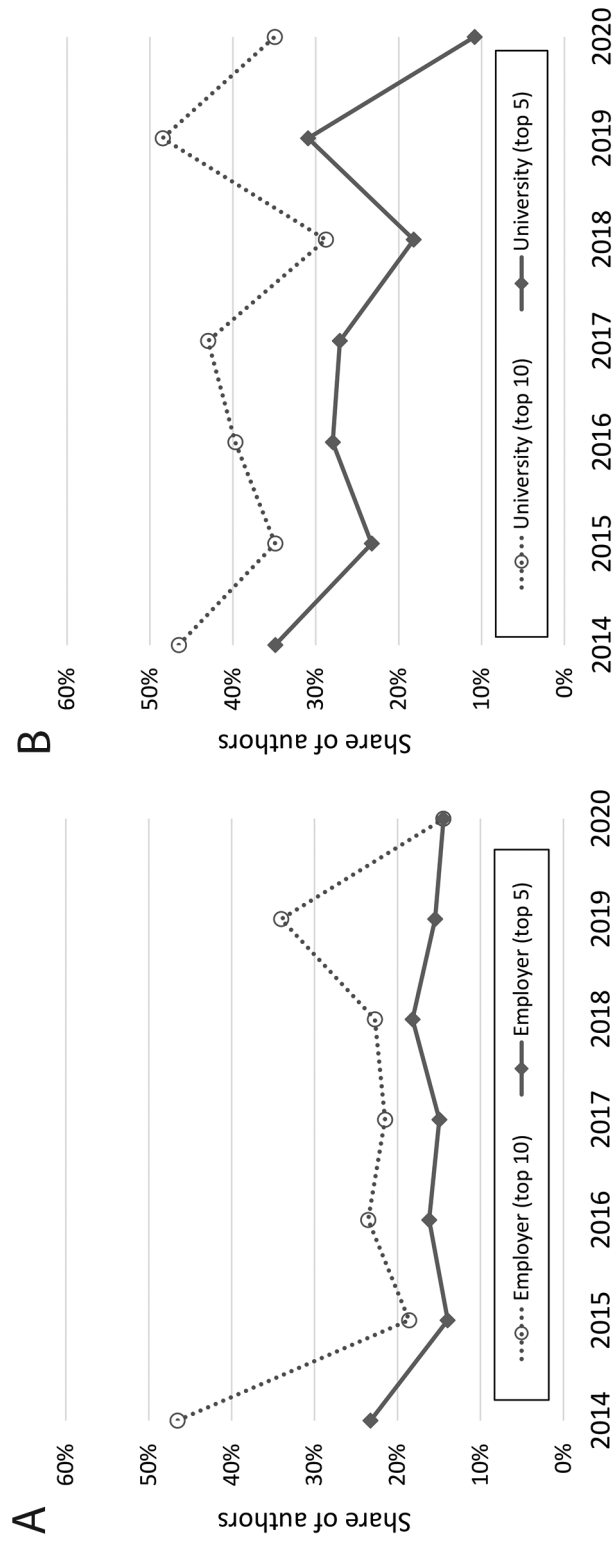


Figure 3 Annual share of all JAERE authors by employer and PhD program. A color version of this figure is available online.

Of 226 employers in the database, the top 10 most prolific (in order, starting from the most prolific) are University of California–Berkeley, Yale, Resources for the Future, Duke, University of California–Davis, University of Maryland, University of Illinois, the US Environmental Protection Agency, Arizona State University, and University of Michigan. Of 130 PhD-granting universities in the database, the top 10 producers of *JAERE* authors (starting with the most prolific) are University of California–Berkeley, University of California–Davis, Yale, MIT, University of Maryland, University of Minnesota, Harvard, Cornell, University of California–San Diego, and Duke.

We find that 25 percent of all author-article observations during *JAERE*’s first seven years were affiliated with the top 10 employers and 16 percent were affiliated with the top five. Figure 3A shows that these fractions vary from year to year, but the most prolific employers are consistently prolific. Figure 3B shows a greater concentration among the universities where authors earned their doctorates. The top 10 universities accounted for 40 percent of all author-article observations in the *JAERE* database, and the top five accounted for 24 percent.¹² As another measure of the extent of the influence of the top PhD-granting universities, we note that 92 different employers have at least one *JAERE* author who received their doctorate from one of the top 10 universities.

Discussion and Suggestions for Further Research on Diversity

The statistics we reported in the previous section can serve multiple purposes. First, they establish 2020 as a reference year for tracking diversity in environmental and resource economics. They provide a template that can be regularly updated, revised, and extended to evaluate the long-term impacts of the statements and efforts focused on DEI in professional and scientific associations. For example, it would be useful to collect data on self-assessed demographics that can be hard to observe from individuals’ public profiles, such as their race and national origin.

AERE moved in this direction in 2021 by asking its members to self-report their race and Hispanic origin when they renew memberships or submit abstracts for AERE conferences. AERE’s virtual 2021 summer conference provided the first opportunity to collect these data from a large sample of scholars engaged in an AERE activity. Of the 682 conference registrants, 88 percent responded to voluntary questions about race, and 56 percent answered whether they were of Hispanic origin.¹³ Of these, 62 percent reported that they were White, 31 percent Asian, and 2 percent Black or African American, with 5 percent of registrants selecting multiple races or indicating that their race was not provided as an option on the questionnaire.¹⁴ Additionally, 13 percent of registrants identified as being of Hispanic, Latinx, or Spanish origin. Analyzing comparable data for AERE membership, conference presentations, and the universe of *JAERE* submissions in the future would help to provide a more complete assessment of diversity within the field of environmental and resource economics.

¹²These statistics are not driven by the number of authors per paper. Authors who are affiliated with the top universities and employers have approximately 0.1 fewer coauthors per paper.

¹³Self-reported demographic data were not visible to abstract reviewers or the program committee.

¹⁴The breadth of categories such as “White” and “Asian” is a limitation. Future survey-based work could usefully expand on these categories.

Importantly, this ongoing data collection effort will make it possible to see the long-run evolution of diversity among AERE members in terms of gender, race, and national origin.

Second, some of the statistics we reported suggest that further research on diversity could yield new insights on public goods provision in academia. The persistent gender gap in leadership service to AERE and AEA raises broader questions about the costs and benefits of service provision in academia. Does the gender gap in leadership signal that voting members of AERE and AEA tend to prefer female leaders? Or is it evidence that women are more willing to constrain their private productivity by agreeing to devote more of their time to producing public goods? While these explanations are not mutually exclusive, Flinn, Todd, and Zhang (2020) find that agreeableness—one of the “big five” personality traits associated with a willingness to help others—is both more prevalent among women and a contributing factor to the gender wage gap. It would be interesting to study how various forms of professional service to the academic community differ by economists’ demographic characteristics and how engaging in professional service affects their productivity, promotions, salaries, and utility.

Finally, the citation data we summarized can help to motivate further research on how diversity intersects with the publication process. It would be interesting to perform an analysis similar to the one in Card et al. (2020) for the universe of submissions to *JAERE* and other field journals to examine whether the effects of diversity on publication differ by field. It also would be interesting to build on Card et al. (2020) and Koffi (2021) to extend the scope of research on how demographics influence publications and citations to investigate the effects of race, rank, national origin, and networks that may arise through connections to universities, coauthors, and mentors.

References

- Abrevaya, J., and D. S. Hamermesh. 2012. Charity and favoritism in the field: Are female economists nicer (to each other)? *Review of Economics and Statistics* 94 (1): 202–7.
- AERE (Association of Environmental and Resource Economists). 2018. *Membership handbook*. Altamonte Springs, FL: AERE Membership Office. <https://aere.memberclicks.net/assets/docs/Handbook%202018.pdf>.
- Bayer, A., and C. E. Rouse. 2016. Diversity in the economics profession: A new attack on an old problem. *Journal of Economic Perspectives* 30 (4): 221–42.
- Bhattacharjee, S., J. A. Herriges, and C. L. Kling. 2007. The status of women in environmental economics. *Review of Environmental Economics and Policy* 1 (2): 212–27.
- Blank, R. M. 1991. The effects of double-blind versus single-blind reviewing: Experimental evidence from the *American Economic Review*. *American Economic Review* 81 (5): 1041–67.
- Card, D., S. DellaVigna, P. Funk, and N. Iriberri. 2020. Are referees and editors in economics gender neutral? *Quarterly Journal of Economics* 135 (1): 269–327.
- Chevalier, J. 2021. Report: Committee on the Status of Women in the Economics Profession (CSWEP). *AEA Papers and Proceedings* 111: 742–63.
- Donald, S. G., and D. S. Hamermesh. 2006. What is discrimination? Gender in the American Economic Association, 1935–2004. *American Economic Review* 96 (4): 1283–92.
- Flinn, C., P. Todd, and W. Zhang. 2020. Personality traits, job search and the gender wage gap. Working Paper 2020-010, Human Capital and Economic Opportunity Global Working Group, University of Chicago,

- Chicago. <https://hceconomics.uchicago.edu/research/working-paper/personality-traits-job-search-and-gender-wage-gap>.
- Frey, E. F., J. L. Caviglia-Harris, and P. Walsh. 2020. Increasing participation and access to economic associations and their services. *Agricultural and Resource Economics Review* 50 (1): 1–21.
- Guarino, C. M., and V. M. H. Borden. 2017. Faculty service loads and gender: Are women taking care of the academic family? *Research in Higher Education* 58 (6): 672–94.
- Koffi, M. 2021. Innovative ideas and gender inequality. Working Paper 35, Canadian Labour Economics Forum, Waterloo. <https://clef.uwaterloo.ca/wp-content/uploads/2021/05/CLEF-035-2021-Koffi.pdf>.
- Wu, K. J. 2020. Scientific journals commit to diversity but lack the data. *New York Times*, October 30.