HCEO WORKING PAPER SERIES

The Gender Gap in Citations: Lessons from Demographic Economics Journals

Shoshana Grossbard
Tansel Yilmazer
Lingrui Zhang

Working Paper

2018-078

10/2018

HUMAN CAPITAL AND
ECONOMIC OPPORTUNITY
GLOBAL WORKING GROUP

The University of Chicago
1126 E. 59th Street Box 107
Chicago IL 60637

www.hceconomics.org

The Gender Gap in Citations: Lessons from Demographic Economics Journals

Shoshana Grossbard
Department of Economics, San Diego State University, IZA and CESifo, shosh@mail.sdsu.edu
Tansel Yilmazer
Department of Human Sciences, Ohio State University, yilmazer.2@osu.edu.
and
Lingrui Zhang
Department of Economics, University of Waterloo, zlingrui@udel.edu

October 22, 2018

Abstract

This paper investigates gender differentials in citations of articles published in two journals specialized in Demographic Economics, a field that has traditionally attracted relatively large numbers of women researchers. In contrast to findings based on citations of top economics journals, we find a gender gap in citations favoring women among articles published in the *Journal of Population Economics* (JPOP) or the *Review of Economics of the Household* (REHO) between 2003 and 2014. If the corresponding author is male, having at least one female co-author boosts citations. Across subfields of demographic economics, citations of female authors increase as female representation in the subfield increases. The gender gap in citations favoring women is not found for authors with limited experience past graduate school, which supports an explanation for the gender gap based on authors' prior experience with economics journals of higher rank.

Acknowledgments: We thank Andrea Beller, Erin Hengel, and Michael Grossman for helpful comments; David Sun for research assistance. An earlier version of this research was presented at the January 2018 meetings of the Allied Social Science Meetings in Philadelphia.

JEL Classifications: A14, I23, D10, J10 and J16

Keywords: citations, gender gap.

"I have no doubt that one of [discrimination's] results has been that those women who do manage to make their mark are much abler than their male colleagues." –Milton Friedman [1]

I. Introduction.

An important criterion by which the value-added of research is assessed for promotion and tenure is the number of citations of scholarly publications. There is evidence that a woman's publications may not contribute as much to promotion or tenure relative to a man's and that a woman's career advancement may vary with the number and gender of her co-authors more than a man's.[2] While it is not explicit, the gender difference in the value-added of publications may be related to gender differences in the likelihood that the publications are cited. Our goal here is to assess whether authors' and co-authors' gender affects the number of citations of economics articles.

Two recent studies report gender neutrality in citations of economics articles. According to Bransch and Kvasnicka (2017) and Hamermesh (2018) articles published in the top 5 economics journals were equally likely to be cited, regardless of whether they were authored by men or women.[3] These top journals tend to be 'general' journals, not limited to particular special fields within economics. We examine whether such gender neutrality in citations also applies to articles published in *Journal of Population Economics* (JPOP) and *Review of Economics of the Household* (REHO), two journals

[1] Thanks to Erin Hengel for introducing us to this quote. She got it from Beatrice Cherrier's blog (https://beatricecherrier.wordpress.com/2018/03/06/a-game-of-mirrors-economists-models-of-the-labor-market-and-the-1970s-gender-reckoning/)

[2] According to Sarsons (2017) an additional paper co-authored with a man is correlated with an 8% increase in tenure probability for men but only a 2% increase in tenure probability for women. Men's co-authored and solo-authored articles are equally valuable to tenure or promotion, but for women solo-authored ones contribute more to career advancement.

[3] Ferber (1988) reported that in the 1980s articles authored by men got cited more than female-authored articles in labor and population journals as well as general journals. However, her analysis did not control for experience and other variables that need to be included in a model testing for gender differences. Laband (1987) reported no gender differences in number of citations controlling for the author's total citations in the period preceding the data collection period. However, authors' past citations could be function of gender-based differentials in acceptance of previous papers.

specialized in the study of labor supply, wages, health, family, marriage, and fertility. For simplicity JPOP and REHO will be called Demographic Economics journals in the rest of this paper. Even though economics has generally attracted relatively few female researchers, Demographic Economics has attracted relatively more women and therefore can be considered as a 'female field'. For instance, in 2005 in the top 50 economics departments in the world for all fields of expertise 15% of almost 1900 researchers were women but in the fields of labor supply, wages, demographics and health the percentage female hovered around 24% (Dolado et al, 2012).

An article's number of citations can be a function of (1) its intrinsic quality; (2) the match between author and readers (including homophily); or (3) discrimination against the author (Hamermesh 2018). Therefore, these factors could generate gender gaps in citations. The applicability of each of these potential explanations may vary by field of specialization. For instance, gender homophily will vary by field's gender ratio and there may be more gender discrimination in some fields than in others. Even though the journals in our sample specialize in population economics and economics of the household, two overlapping and loosely defined categories, a more detailed examination of JEL codes reveals that our sample includes articles on the economics of education, demography (defined in a stricter sense), labor markets, wages, health, consumption, economic development, social choice and a few other JEL codes. Our analyses for separate subfields with varying proportions of women help us disentangle possible explanations for gender gaps in citations. Potential explanations also vary by authors' experience, leading us to present separate estimates for junior and senior economists.

We find that articles published in Demographic Economics journals from 2003 to 2014 whose corresponding author (hence 'author' is defined as 'corresponding author' unless specified otherwise) was female received more citations than the articles authored by men. We also find that

citations of articles by male authors who had at least one female co-author were more likely to be cited. However, having a male co-author is not associated with citations of male-authored articles and may even be associated with fewer citations of female-authored articles. When we subdivide our sample into relatively male and female fields, higher female citations are mostly found in relatively more female fields. The gender citation gap favoring women also increases by authors' experience.

Some of our findings are compatible with the existence of past discrimination against women at top journals or top universities. We offer some suggestions for further research that could help clarify whether such discrimination exists and the extent of its impact.

This paper is organized as follows: Section II examines why gender would possibly influence citations in economics. Section III discusses data and methods. Results are presented and discussed in Section IV. Section V concludes.

II. Why would gender affect citations?

An article's number of citations can be a function of (1) its intrinsic quality; (2) the match between author and readers; or (3) discrimination against the author (Hamermesh 2018).

Article Quality. If citations indicate article quality, higher citations of female (male)-authored articles would indicate higher quality of female (male)-authored manuscripts. Gender differentials in the quality of the articles in our sample (two Demographic Economics journals) are expected to depend on whether the article had first been submitted to a top Economics journal or not. Most authors prefer to publish in top general economics journals or top field journals, but these journals have very high rejection rates (in the case of five general journals, rejection rates gravitated around 92% at *AER* and *Econometrica*, 95% at *JPE* and *Review of Economic Studies*, and 97% at *QJE*). Articles first submitted to top general journals are likely to be of higher quality than those that were not to the extent that the paper submitted to a top journal was not desk-rejected and benefited from

comments from top journals' editors and referees of a quality not available to authors of other articles.

Preliminary research by Card, DellaVigna, Funk, and Iriberri suggests that female-authored (FA) papers submitted to four top journals are more likely to be rejected than male-authored (MA) papers.[4] If FA articles are more likely to have been submitted and rejected by top journals than MA articles it follows that FA papers submitted to REHO or JPOP are likely to be of higher quality than MA papers. Some findings in the economic literature suggest that FA papers submitted to four top journals are more likely to be rejected by these journals than MA papers. First, Ferber and Teiman (1980) examined likelihood of rejection at economics journals at a time when many of them used a double-blind process, but some did not. [5] They find a relatively lower rejection rate of FA manuscripts at double-blind journals than at journals where referees know the authors' names. This suggests a bias against female authors at the economics journals in their sample, which included some top journals.[6] Second, Erin Hengel (2018) finds that FA papers submitted to top economics journals are held to higher standards than MA papers. She finds a gender readability gap in abstracts published in these journals, with a large portion of this gap originating in peer review: editors and referees are relatively more critical of papers submitted by female authors. Moreover, she finds that women improve their writing as they publish more papers while men do not, suggesting female

[4] The research by Card et al. was mentioned in comments by Heidi Williams that were photographed and posted on twitter by Claudia Sahm.(https://twitter.com/Claudia_Sahm/status/1019301781854179336). The journals covered by Card et al. are the *Journal of the European Economic Association (*JEEA), the *Quarterly Journal of Economics,* the *Review of Economics and Statistics,* and the *Review of Economic Studies*. An analysis of rejection rates by *Energy Economics*, a field journal outside of the top 5, reveals that female-authored submissions are more likely to be rejected than male-authored ones (Tol 2018).

[5] Blank (1991) did not find evidence of a gender gap in rejections as a result of whether a journal has a double-blind review process or not. The *American Economic Review*, one of the top journals, stopped double-blind reviews in 2011. Also see Budden et al. (2008).

[6] This interpretation is based on certain assumptions about submission strategies and review process at journals, as pointed out by Lott (1983). Ferber and Teiman's study cannot be replicated with recent data as it is now very easy to identify authors and most journals don't have a double-blind review process.

authors gradually learn about referees' expectations and adapt their writing style accordingly. Third, editors of top journals give preference to authors with whom they share an academic history (Colussi 2018). If relative to men, women may have (had) fewer opportunities to work and be promoted at prestigious universities, it follows that women's articles are more likely to have been previously rejected by top journals than men's.[7] Even if FA and MA submissions to Demographic Economics journals are equally likely to have been previously rejected by top journals, previous experience with top journals would have led to more improvements in paper's quality on the part of female authors (Hengel 2018). Experienced female authors submitting to Demographic Economics journals may also have learned to write better articles by the time they submit to JPOP or REHO.

Match between author and readers. Citations may also indicate quality of the match between author and reader, in part due to homophily: readers may prefer to read and cite authors who think more like they do. Such homophily includes gender homophily.[8] The ultimate form of homophily is self-citation, a well-documented phenomenon (Woolley 2005, Hamermesh 2018). The more there are potential readers with characteristics similar to those of the author, the more an article is likely to be cited. Given that a majority of economists are men, the gender homophily argument implies an inherent bias in favor of citations of MA articles. The opposite would hold for fields in which women are a majority (not the case in economics). To the extent that relative to top journals

[7] The presence of CSWEP, the Committee on the Status of Women in the Economics Profession, may be related to gender discrimination at top journals. The American Economic Association (AEA) established CSWEP in 1971 as a response to women's otherwise limited opportunities to present a paper at the annual meetings of the association and to have the paper published in the meetings' proceedings. Anecdotal reports of discrimination against women in the economics profession in the 1970s and before can be found in Olson and Zohreh (2002). The volume includes interviews with Barbara Bergmann and Myra Strober who were two of the members of the first CSWEP board in which they provide anecdotal evidence of discrimination against women in the economics profession. Such discrimination seems to be consistent with other forms of discrimination in the workplace Berdahl (2007)

[8] Woolley's (2005) analysis of citations of articles published in *Feminist Economics* strengthens the case for the homophily line of reasoning: people who cite *Feminist Economics* are often people who publish in the journal and are involved with the journal as associate editors. A preference for own gender (gender homophily) is hard to distinguish from a tendency to discriminate against articles authored by the other gender.

Demographic Economics journals cover more sub-fields of interest to female readers, a gender gap in citations favoring women is more likely to be found for articles published in Demographic Economics journals than for articles published in general economics journals.

Gender homophily is difficult to distinguish from *discrimination* against the other gender, as has been pointed out by Hamermesh (2018). A citation gap favoring women (men) could also be explained by discrimination against men (women). It is possible that in predominantly male subfields there is more discrimination against women, and that in predominantly female subfields there is more discrimination against men. Gender-based networking may exacerbate gender homophily in citations or it may intensify discrimination against the other gender in a particular field or geographic area, strengthening men's tendency to cite other men and women's tendency to cite other women (see Van den brink and Benschop 2014 on male networking in academia in the Netherlands).

In sum, given that so many factors may influence the gender gap in citations we don't have an a-priori prediction as to whether our empirical study will reveal a gender gap in citations or not, and if a gender gap is found, whether it will favor men or women. However, the gender homophily (or discrimination) argument leads to the following testable proposition:

> *Proposition 1. The higher the proportion female in a field of specialization, the more a gender gap in citations favoring women is likely to be found (or the smaller the gender gap favoring men).*

This has been stated before, e.g. by Ferber (2002), who wrote that "men are more inclined to cite men" and "the difference between the number of citations of men and women was significantly smaller as the proportion of women in the field increased." The homophily argument assumes that articles of the same quality are cited more by authors who are of the same gender as the cited article's author. We may not find more of a gender gap in citations favoring women in relatively female fields if the women specialized in such fields write articles of lesser quality than their

counterparts specialized in male fields, and the negative association between proportion female and article quality is sufficiently large in absolute terms to cancel out a positive association due to homophily or discrimination.

Historic trends in how certain fields became relatively female fields can help establish whether women entered those fields because they were not sufficiently good at other fields (and thus the fields in which they entered may attract more low-quality articles) or due to their intrinsic interest in certain topics. The latter explanation accounts better for why the field of household economics has historically attracted women more than men, starting with the pioneering work of Hazel Kyrk and Margaret Reid, [9] and including the relatively high proportions of female researchers who participated in The New Home Economics (Grossbard-Shechtman 2001). A subfield of demographic economics that has attracted relatively more female economists is the economics of marriage, including Charlotte Phelps (1972) that preceded Becker's (1973) theory of marriage. The proportion of women who write articles on "family and household" is also high compared to their proportions in other fields of demography (Krapf et al. (2016) and sociology (Healy 2018).

Gender differences in citations and article quality could also be a function of discrimination against women and such bias could vary by field of specialization. Women may perceive that fields with a majority of women are less prone to discrimination against women (Ganley et al. 2017). This argument is not very applicable to economics, where men have tended to be a majority in all subfields. It is also possible that the more female a field of specialization the more the men in this field try to erect barriers to women's entry.[10] The barriers may not be overt but rationalized in terms

[9] See Beller and Kiss (2008) for more on Kyrk and Yi (2006) for more on Reid.

[10] An attempt to exclude women in a relatively female field of economics may help explain why the *Handbook of Population and Family Economics*, part of the prestigious economics handbooks series published by North Holland Publishers and edited by two men, has no women among its 26 authors (Rosenzweig and Stark 1997).

of preference for certain theories or methodologies that are more popular among men.[11] If there is more of a bias against women in subfields of economics such as family economics it is possible that in these fields FA articles are more likely to be rejected by top journals than in other fields of specialization. It follows that the gender gap in quality favoring FA articles in these fields published in Demographic Economics journals would be larger than in fields with lower proportion female.

Gender and the value of co-authors. We also examine whether having a male (female) co-author is valuable to women's (men's) citations. Sarsons (2017) found that having a male co-author increases a woman's tenure probability, in contrast to solo-authored papers or papers co-authored with women. Can this difference possibly be the result of differences in citations of the various types of articles? To the extent that we will find that FA articles get cited more than MA ones, or that the presence of a male co-author does not add to citations of articles with a female author, this may weaken women's motivation to find male co-authors as they plan their career.

Gender and experience. As mentioned above gender gaps in citations may also originate from gender variation in the quality of articles. Women's submissions to Demographic Economics journals may be of higher quality than those of men to the extent that they have a higher likelihood of having been previously rejected by top journals or that their authors may have learned to become better writers as a result of more critical comments on previous submissions to top journals (Hengel 2018). Such article-quality argument implies variation over the cycle of an academic career. Submissions to Demographic Economics journals by PhDs freshly out of graduate school are less

[11] Examples are the case of biological assumptions in population and family economics, assumptions used by men (e.g. Becker 1976, 1981; Jack Hirshleifer 1977) more than women, and assumptions about the role of household members' individual resources in explaining behavior that are relatively more likely to be used by women (e.g. Grossbard 1976, Manser and Brown 1980, McElroy and Horney 1981, Apps and Rees 1988, and Lundberg and Pollak 1993).

likely to have first gone through a review process at a top journal and their authors are less likely to have been exposed to critical reviews on previous papers.

The second testable prediction follows:

> *Proposition 2. Gender gaps in citations favoring women (or smaller gender gaps favoring men) are more likely to be found for authors with some experience after graduate school than for inexperienced authors.*

Since experience may have a quadratic relationship with citations (an extra year of experience may contribute more to submission's quality after two years out of graduate school than many years after the author was tenured) the cutting point between senior and non-senior economists may just be a few years after completion of graduate school.

III. Data and Descriptive Statistics

The data includes 816 articles published in REHO or JPOP between 2003 (the first year of REHO) and 2014 and was collected from the Springerlink website on Nov 6, 2017 for REHO and on Nov 15, 2017 for JPOP. We stop with 2014, to give recent articles a chance to be cited by November 2017, when we collected the data. Springer only counts citations in journals and a limited number of volumes in the Web of Science. Therefore, our citations count is significantly lower than that of Google Scholar.[12]

We collected information on the following characteristics of an article's author: gender, experience, region of residence, and deceased status (to the best of our knowledge). Experience was defined as the difference between year of publication and PhD graduation.[13] We established an

[12] For instance, according to Springer the most cited JPOP article, Mayda (2010), had 179 citations as of November 2017. However, according to Goggle Scholar, it had 600 citations. Similarly, the most cited REHO article, Taylor and Adelman (2003), had 92 citations according to Springer and 384 citations according to Google Scholar.

[13] We collected information on year that authors completed their PhD by reading their CVs.

author's gender manually. Wherever we had doubts we located the author's homepage connected with their current institutional affiliation or IZA and looked for feminine/masculine pronouns, profile pictures or any other material that possibly signals gender. In some cases we also examined the author's online profile on RePEc, Google Scholar, or Linkedin and consulted with people familiar with the author or the author's country's language. We were able to collect gender information for all authors in our REHO and JPOP sample except for three that were dropped.

Article characteristics include indicator variables for journal (indicator for REHO), at least one male co-author, at least one female co-author, field according to JEL code, whether the article appeared after the journal received an impact factor[14], and 'first appeared online'. We also have data on number of authors and take account of duration since publication. We collected information on whether an article had an additional JEL code with little relation to the dominant JEL code that was used to define the subfield. This may indicate a wider potential interest in the article, possibly adding to its impact.

Subfield. We assigned each article to a subfield of economics based on the article's primary JEL code and the categories used by Econphd.net and Dolado et al. (2012). The subfields are listed in Appendix A. Dolado et al. (2012) calculated the proportion of female researchers in each of these subfields using data from more than 1,900 researchers affiliated with the top-50 economics departments in the world in 2005. They found that on average, for all research fields, the proportion female stood at 15 percent. We matched each article with its subfield's proportion of female researchers according to Dolado et al. (2012).

[14] REHO received its impact factor in 2008, whereas JPOP had already obtained its impact factor by 2003.

Summary statistics are presented for both Demographic Economics journals in Table 1, and separately for JPOP and REHO in Appendix B. Table 1 also describes four subsamples used in the analysis: articles with a high and low proportion female and articles authored by senior and junior authors. As can be seen from Table 1 (Full Sample) about one third of the articles published in the combined sample of 816 observations has a female author. The proportion of JPOP articles with female authors is significantly lower than that of REHO articles (27% in JPOP versus 43% in REHO, Appendix B). Not surprisingly the author is more likely to be a woman for articles in fields with relatively high proportion female according to Dolado et al (2012), i.e. with 20% or more of women. Proportion with female author is the same for junior and senior authors, when senior is defined as having 7 or more years of experience since completion of doctorate.

About one-quarter of the published articles in the combined sample have at least one female co-author (34% in REHO and 21% in JPOP), and almost half have at least one male co-author (Table 1). Presence of at least one female co-author does not vary much according to field's proportion female, but author's seniority makes a big difference: relative to junior authors, senior authors are almost twice as likely to have at least one female co-author (31% versus 16%). Non-reported statistics indicate that both female and male authors are more likely to co-author with men than with women. Relative to female authors, however, male authors are considerably more likely to team up with a man: male authors are more than twice as likely to have a male rather than a female co-author, whereas female authors are slightly more likely to have a male rather than a female co-author.

Figure 1A displays the distribution of citations for the articles in our sample. The distribution is skewed to the right, with a large number of articles having zero citations (69 out of 816) or only one citation (42 out of 816). A smaller number of articles (33) obtained more than 50 citations. The

distribution of log of citations, displayed in Figure 1B, is closer to a normal distribution. We therefore use a log transformation of citations as our dependent variable. In order to include the articles that obtained zero citations in our estimations we added "one" to number of citations. Consistent with the skewness of the distribution of citations in Figure 1, Table 1 indicates that the average number of citations (13) was much higher than the median (7). On average, JPOP articles received more citations than REHO articles (Appendix B).

The average and median citation counts for articles published by female authors (15.4 and 9, respectively) were higher than those for articles published by male authors (11.8 and 7, respectively). Figure 2 illustrates the cumulative distribution of citations, separately for female and male authors. Starting from the bottom quintile, articles published by female authors had more citations than articles published by male authors.[15]

The average concentration of women for all subfields is 21.7 percent (Table 1). This average is based on proportion female in each of the subfield categories in Dolado et al (2012). It is higher than the average of 15% female reported by Dolado et al., reflecting the high percentage of articles that Demographic Economics journals publish in relatively female fields.

Table 2 presents some descriptive statistics for eight subfields containing more than 1 percent of the published articles in REHO and JPOP. The remaining articles (15.8 percent of the total) are grouped into the "Other" category. The table is organized according to the categories in Dolado et al. (2012), except that they merged Health and Demographics (narrowly defined, with a focus on studies of marriage, fertility and population composition) into one subfield, while we separate those two. Column 1 indicates that more than one quarter of the 816 articles in our sample are in

[15] The 20th, 40th, 60th and 80th quintiles of citations were 3(2), 6(5), 11(10), and 22(17) for manuscripts that have a female (male) corresponding author.

Demographics (narrowly defined), and another 21 percent focus on Labor Markets. These are also the principal subfields of each journal separately (Appendix C). Appendix C also shows that JPOP covers relatively more articles on wages and education, whereas REHO published more on health and consumption.

Column 2 in Table 2 reports the percentage of articles with a female author for each of the nine subfields. It ranged from 46.4 percent (Economics of Education) to 20.9 percent (Other fields).[16] This percentage deviates from the respective subfields' proportion female as calculated in Dolado et al. (2012), which is reported in column 4. The Dolado proportions vary within a narrower range, from 24.7 percent (Wages) to 13.7 percent (Other fields), reflecting gender differences in the selectivity of authors submitting to the two journals as well as in representation in the top departments of economics included in the Dolado sample. The last two columns in Table 2 present mean and median number of citations for the nine subfields. The number of median citations ranged from 13 (Economic Development, with only 10 articles categorized as such) to 6 (Health Economics, Consumer Economics, Social Choice and Other fields). Median citations varied more by subfield in the case of JPOP than in that of REHO (Appendix C).

IV. Methodology

We estimate the following four models of log citations to estimate whether there are gender gaps in citations. Model 1 includes an indicator variable for author being a woman and X, a vector of controls. The control variables include demographic traits of the *author* (experience, region of residence, and an indicator for deceased), an indicator variable for *journal* (indicator for REHO), and the following characteristics of the *manuscript*: number of authors, duration since publication, additional JEL code, appeared after the journal received an impact factor, and first appeared online.

[16] The proportion of articles with a female corresponding author varied by field and by journal (Appendix C).

Experience is defined as the difference between the year of publication and PhD graduation. REHO received its impact factor in 2008, whereas JPOP had already obtained its impact factor by 2003, the first year for which we collect data.

Model 2 adds two more gender-related indicator variables to Model 1: 'at least one female co-author' and 'at least one male co-author'. Model 3 adds two interaction terms to Model 2: 'author female * at least one female co-author' and 'author female * at least one male co-author'. The first three models include subfield indicator variables as controls.

Model 1 log citations = a + b*author female + z*X + ε.

Model 2 log citations = a + b* author female + c*at least one female co-author + d*at least one male co-author + z* X + ε.

Model 3 log citations = a + b* author female + c*at least one female co-author + d*at least one male co-author + e* author female * at least one female co-author + f* author female * at least one male co-author + z*X+ ε.

Model 4 serves to test whether citations are a function of the percent female in the subfield of economics (Proposition 1). Instead of subfield dummies Model 4 includes a continuous variable: proportion of females in the subfield.

Model 4 log citations = a + b* author female + c*at least one female co-author + d*at least one male co-author + e* author female* at least one female co-author + f* author female* at least one male co-author + g*proportion of females in the subfield + z*X+ ε

We use OLS since the dependent variable is continuous. The letters *a* to *g* correspond to the estimated coefficients and z is the vector of the estimated coefficients, and ε is the error terms.

These four models are estimated for the whole sample of JPOP and REHO articles; they are also estimated separately for each journal.

To test for Proposition 1 we split the sample according to whether the field to which the article belongs falls in one of the following two categories: high proportion female (more than 20% female according to Dolado et al. 2012) or low proportion female. We use the Dolado results and not the proportion female in our own sample so that the variable is exogeneous to our analysis.

To test for whether the association between gender and citations varies with experience (Proposition 2) we divide the sample into those with and without experience. We set the cutout at seven years after Ph.D.: experienced economist have 7 years of experience or more; inexperienced ones have 6 years or less.

Sensitivity analysis. We test for sensitivity of the results to various assumptions, as discussed in the last part of the next section. We estimate quantile regressions using the actual number of citations rather than log of citations as dependent variable to see how sensitive our results are to presence of star authors with large numbers of citations.

V. Findings

We first present estimations of the four basic models outlined in the previous section for the entire sample of articles. In Table 3 the dependent variable is log of citations. Marginal effects for indicator variables are calculated as *exp* (coefficient) – 1. The first three models include dummies for subfields of economics. Model 4 does not, and instead it includes 'proportion female in the field'. We begin by discussing the results related to gender gap in citations.

FA versus MA articles. We obtain two major results that both imply a gender gap in citations favoring women. First, articles with a female (corresponding) author receive 23.7 percent more

citations than articles with a male author according to Model 1. This is also apparent from the other three models reported in the Table. Second, having a female co-author is associated with a 28.9 percent increase in number of citations, while having a male co-author is not significantly associated with number of citations (Model 2 of Table 3). The coefficient of the gender of the co-authors varies by the gender of the author, as shown in Models 3 and 4 that include interaction terms between female author and the presence of at least one co-author of each gender. [17] The positive coefficient of at least one female co-author is larger for male authors: based on Model 3 we find that articles by a male author obtain 48.1 percent more citations if they have at least one female co-author than if they do not. The increase in the number of citations with a female co-author for the articles that are published by a female author is positive, but smaller (7.0 percent) and not significant.[18] Having a male co-author is not associated significantly with number of citations of articles written by male authors, while having a male co-author is associated with a 17.2 percent drop in citations of articles by female authors. [19]

This gender gap in citations favoring women is not limited to one of the journals in our data: separate estimations of Models 1-3 for REHO and JPOP presented in Appendix D show that articles with a female author receive more citations in the case of both journals. MA articles in REHO obtain more citations if they have a female co-author. FA articles in JPOP obtain lower citations if they have a male co-author.

[17] The interaction terms divide the sample into six groups: i) single authored articles with FA corresponding authors, (b), ii) single authored articles with MA (reference group), iii) MA with female co-authors (c), iv) MA with male co-authors (d), v) FA with female co-authors (b+c+e) and vi) FA with male co-authors (b+d+f).

[18] The marginal effect is calculated as difference between groups v) FA with female co-authors (b+c+e) and i) single authored articles with FA corresponding authors (b), so *exp* (c+e)-1= *exp*(0.393-0.325)-1.

[19] The marginal effect is calculated as difference between groups v) FA with male co-authors (b+d+f) and i) single authored articles with FA corresponding authors (b), so *exp* (d+f)-1= *exp*(0.167-0.356)-1.

The finding of a gender gap favoring women surprised us, given that the recent literature on citations of economics articles covered in Section I, including a recent survey article by Hamermesh (2018), had not found a gender gap in citations. This is discussed at the end of this section. Less surprising are our findings on the associations between citations, gender, and the presence of male and female co-authors. The results in Table 3 (Model 4) indicate that women get cited more if they are sole author than if they have at least one co-author (male).[20] In contrast, this is not the case for men. This finding could be related to Sarson's (2017) finding that for women at the top 30 U.S. PhD-granting universities in the period 1985 to 2014 solo-authored articles of women contributed more to career advancement than for men.

Subfield. Another result is that citations vary by field of specialty. Models 1 to 3 in Table 3 include dummies for field of specialty (results available upon request). We find that compared to articles in all other subfields of economics covered by the two journals articles in the following four sub-fields generated relatively more citations: economic development, wages, demographic economics in a restricted sense (marriage, fertility, population composition), and labor markets. Three of these four sub-fields count among the more 'female' sub-fields according to Dolado et al. (2012). Model 4 of Table 3 includes a continuous variable measuring the subfield's proportion female. The estimated coefficient indicates that a one percentage point increase in the subfield's proportion of women is associated with a 2.33 percent increase in an article's citations count.

To test Proposition 1--how FA articles fared compared to MA articles in the same subfields--we grouped the articles into two categories: those with a relatively high concentration of female researchers (more than 20 percent female according to Dolado et al. 2012) and those from subfields with a relatively low proportion of female researchers (20 percent or less). Results are presented in

[20] Female co-authors do not significantly affect the citations of FA articles.

Table 4, where we report estimations for the first three models (Model 4 was removed given that field's proportion female is the criteria for sample division). It can be seen from Panel 4A that in the subfields that have an above-average concentration of female researchers (demographic economics, labor markets studies, education, wages, and health), FA articles receive more citations according to all three models, and the number of citations of MA articles increases when they have a female co-author. For the subsample of articles in fields with low proportion female (Panel 4B) the only significant finding is that FA articles are cited more if there are no co-authors, and only in Model 3 controlling for gender of co-authors and the interaction of gender of author and co-authors. This is a further indication that women get cited more in more female fields.

The only significant finding in the sample of 'male' fields in panel 4B is that FA articles are cited more if there are no co-authors suggests that the premium for women's solo authorship may be larger in traditionally male fields than in more female fields. In male fields it may take more of a splash for women to get their colleagues' citations or support for promotion or tenure. Again, this could be related to Sarsons' (2017) research on gender gaps in promotion and tenure at top universities.

To help us distinguish between the various possible interpretations of the gender gap in citations that we uncovered we also tested for the effect of experience on gender gaps in citations (Proposition 2). Proposition 2 can be simplified to "*Gender gaps in citations favoring women are more likely to be found for authors with some experience after graduate school relative to those without experience.*" We estimate Models 1 through 4 for two subsamples: authors with 7 years of experience or more since graduate school and authors with less than seven years of experience. Results are found in Table 5. Models 1 and 2 indicate a gender gap in citations favoring women for the senior sample (Panel 5A), but there is no such gap for the low-seniority sample (Panel 5B). Likewise, the indicator variable 'at least one

female co-author' is only significant and positive for the experienced sample. It can be assumed that the experience of the author and the female co-author(s) is correlated so that this may also indicate that experienced women are cited more than experienced men. However, this is not the case for junior economists (with less than seven years of experience). These findings are consistent with Proposition 2.

The results in Table 5 also show an interesting contrast between the two samples when it comes to the association between field's proportion female and citations (Model 4): that variable matters only for the inexperienced sample, not for the experienced one. The impact of author's gender and field's proportion female thus depends on the author's experience. In the case of authors with little experience it is the field's average gender that helps explain citations, but not the gender of the individual author; in the case of authors with seven or more years of experience it is the author's gender that is associated with citations and not the field's average gender.

We verified the robustness of our estimates with quantile regressions using the actual number of citations rather than log of citations. Percentiles are defined in terms of where an article falls in terms of its number of citations. The estimates of models 2, 3 and 4 for the 25^{th}, 50^{th} and 75^{th} percentiles are provided in Table 6. At the 50^{th} percentile, FA articles receive 1.5 extra citations according to Model 1. Both at the 25^{th} and 50^{th} percentile, MA articles obtain around 3 more citations if they have at least one female co-author. Citations do not vary significantly by female authorship at the 75^{th} percentile, possibly the result of high standard errors.

Discussion. Our main finding is that FA articles are cited more than MA ones. As discussed in Section II there are at least three potential explanations for gender gaps in citations: gender homophily, gender discrimination, and a gender gap in article quality. A vast majority (68%) of articles in our sample had male authors and only one quarter of all articles had at least one female

co-author. We don't know the gender of those who cite the articles or of those who read and potentially cite it. We can make some assumptions, such as the proportion of readers who are female is similar to that proportion (1) among the authors in our sample (32%), or (2) for the fields of economics covered by the two journals in 2005 according to Dolado et al. (2012): between 14% and 25% (see Table 2). Both assumptions imply a majority of male readers and potential citers, which makes it difficult to reconcile our finding of a gender gap favoring women with the homophily argument. There are more citations in female subfields, but that is controlled for in the regressions of Table 3.

Homophily helps explain why the gender gap in citations favoring women is only apparent in the more female fields of economics, even though in our combined sample the proportion female in these subfields ranged from 22% to 25% according to the Dolado et al. criteria, a clear male majority. Our results are only compatible with homophily if the readership is more than 50% female and/or women are more likely to cite than men. We don't have data to test this. What if readership and citation potential are segmented by gender following the gender distribution in the 18 subfield/journal combinations reported in Appendix Table C? Even then, with one exception, in every cell with more than 2% of the articles at least half of the authors are male.

Gender citation gaps could also originate due to discrimination based on the authors' gender. It is possible but not very likely that scholars reading articles published in these two journals discriminate against men and thus cite FA articles more. Again, we don't have the data to explore this.

The third possible explanation mentioned in Section II is that FA articles in Demographic Economics are cited more because they are of higher quality than MA ones. In turn, this may be due to discrimination against women at top journals where the articles may have been submitted prior to

their submission to JPOP or REHO. Section II mentioned some facts consistent with the existence of such discrimination. It also mentioned that FA papers published by top economics journals may be of higher quality because they were held to higher standards than MA papers (Hengel 2018). This explanation could also help explain why the gender gap in citations favoring women is only apparent in the more female fields. It is possible that FA articles in female fields are of higher quality than FA articles in other fields to extent that they are more likely to have been previously rejected by highly ranked journals.

The homophily and discrimination arguments can't easily explain why the gender gap favoring women is a function of experience in academia. That finding is more consistent with the following interpretation: relative to fresh PhDs more experienced women are more likely to have experienced rejection and criticism from other journals (possibly some top journals, including the journals analyzed by Hengel 2018) prior to submitting to JPOP or REHO and therefore their article's quality is likely to be higher than that of their male counterparts. This can't be the case with authors who only recently completed their PhD at the time their article was published.

Further tests. We performed a number of further tests. We find that (a) results are similar whether the method of estimation was OLS or Tobit. Results did not change much when (b) we reran our regressions of log citations after removing all cases of zero citations, and (c) used log citations plus 'one' or constants smaller than one. We also estimated how sensitive our tests of Proposition 2 are to the cutting point between experienced and inexperienced authors. In Table 5 discussed above we compared authors with seven or more years of experience at time of article's publication with those with less than seven years of experience since the year they obtained their doctorate. We examined the sensitivity of these results to the cutting point between experienced authors and those lacking experience. When we defined 'experienced' as six or more years since the

Ph.D results were similar to those reported in Table 5. In contrast, results do not differ much by experience if we define experience as 8 or more years of experience. This makes sense: authors with less than 8 years of experience may also include a high percentage who first tried the top journals before submitting to the Demographic Economics journals. The optimal cutting point between the two samples may be related to whether authors already obtained tenure or not.

VI. Conclusions and suggestions for further research

We have examined whether citations of articles published in two Demographic Economics journals, the *Journal of Population Economics* (JPOP) and *the Review of Economics of the Household* (REHO), vary by authors' gender. The following measures of authors' gender were used: corresponding author's gender, presence of at least one female co-author, presence of at least one male co-author, and interactions between author's gender and that of co-authors. We found that for our entire sample and for a sample of articles in fields with a relatively high proportion of female economists, female authors are cited more than male authors, and that articles with at least one female co-author are cited more than articles without a female co-author. Relative to female authors, male authors benefited more from having a female co-author on board. For most samples we examined having a male co-author did not add to citations, regardless of whether the author was male or female. These results contrast with those reported by recent studies of citations of articles published by top general journals reporting no gender gap in citations.

The difference in gender citation gap between fields that are relatively more male and more female indicates some degree of gender homophily and suggests that articles in Demographic Economics are read by women more than by men, especially in more 'female' fields. However, if the gender distribution of readers is reminiscent of the gender distribution among the authors we

studied, the majority of readers are men and the homophily argument can't account for the higher gender gap in citations that we uncovered.

An alternative explanation for our major results is in line with Milton Friedman's statement opening this article: "one of [discrimination's] results has been that those women who do manage to make their mark are much abler than their male colleagues". This would imply that on average women's articles published in the two Demographic Economics journals are of higher quality than male-authored ones. In turn, this may be due to a higher likelihood of rejection by top journals, including rejection after articles were reviewed. In case articles were reviewed and rejected they may have benefited from more helpful criticism that contributed to the higher quality of female-authored articles. In turn, the gender gap in prior experience at top journals may be related to discrimination against women or against the fields of specialization of more interest to women.

The discrimination explanation is strengthened by our finding that a gender gap in citations favoring women is limited to senior economists with at least six or seven years of experience after the doctorate. If discrimination operates via the review and rejection process at top journals it does not apply to authors fresh out of graduate school.

It is hoped that further research will throw more light on this topic by examining larger samples of economics articles. Is the gender gap in citations favoring women found for other journals? Is the gender gap going in opposite direction for journals specializing in 'male' fields? Such research will help disentangle between explanations based on homophily and discrimination. It will also be valuable to have more research on citations including information on the identity of the authors who cite articles, and on whether there is discrimination against women at top general and field journals.

References:

Apps, Patricia and Ray Rees (1988), "Taxation and the Household." *Journal of Public Economics*, 35, 355-369.

Becker, Gary S. (1973). "A theory of marriage: Part I." *Journal of Political Economy, 81*, 813-846.

____ (1976), "Altruism, Egoism, and Genetic Fitness: Economics and Sociobiology." *Journal of Economic Literature,* 14, 817-826

____ (1981), *A Treatise on the Family*. Cambridge, Mass.: Harvard University Press.

Beller, Andrea and D. Elizabeth Kiss (2008), "On the Contribution of Hazel Kyrk to Family Economics." Paper presented at the International Association for Feminist Economics Annual Conference, Torino, Italy, June.

Berdahl, Jennifer L. (2007), "Harassment Based on Sex: Protecting Social Status in the Context of Gender Hierarchy." *Academy of Management Review*, 32(2), 641-658.

Blank, Rebecca M. (1991), "The Effects of Double-Blind versus Single-Blind Reviewing: Experimental Evidence from The American Economic Review." *The American Economic Review*, 81(5), 1041-67.

Bransch, Felix and Michael Kvasnicka (2017). "Male Gatekeepers -- Gender Bias in the Publishing Process?" IZA DP 11089, October.

Budden, Amber E., Tom Tregenza , Lonnie W. Aarssen , Julia Koricheva , Roosa Leimu and Christopher J. Lortie (2008). *"*Double-blind Review Favours Increased Representation of Female Authors*." Trends in Ecology and Evolution.* 23, 4–6.

Colussi, Tommaso (2015). "Social Ties in Academia: a Friend is a Treasure." *The Review of Economics and Statistics*, 100, 45-50.

Dolado, Juan J., Florentino Felgueroso, and Miguel Almunia (2012). "Are Men and Women-Economists Evenly Distributed across Research Fields? Some New Empirical Evidence." SERIEs: *Journal of the Spanish Economic Association*, 3, 367-393.

Ferber, Marianne (1988). "Citations and Networking." *Gender and Society*, 2, 82-89.

Ferber, Marianne (2002). "Marianne Abeles Ferber" in Olson, Paulette and Emami Zohreh, eds. *Engendering Economics: Conversations with women economists in the United States*. London: Routledge.

Ferber, Marianne and M. Teiman (1980). "Are Women Economists at a Disadvantage in Publishing Journal Articles?" *Eastern Economic Journal*, 6(3/4), 189-193.

Ganley, Colleen M., Casey E. George, Joseph R. Cimpian, Martha B. Makowski (2017) "Gender Equity in College Majors: Looking Beyond the STEM/Non-STEM Dichotomy for Answers Regarding Female Participation." *American Educational Research Journal*, 55, 453-487

Grossbard, Amyra (1976). "An Economic Analysis of Polygamy: The Case of Maiduguri." *Current Anthropology*, 17, 701-707.

Grossbard-Shechtman, Shoshana Amyra (2001). "The New Home Economics at Columbia and Chicago." *Feminist Economics*, 7, 103-130.

Hamermesh Daniel S. (2018). "Citations in Economics: Measurement, Uses and Impacts." *Journal of Economic Literature*, 56, 115-156.

Healy, Kieran (2018). https://kieranhealy.org/blog/archives/2018/09/12/asa-section-demographics/

Hengel, Erin (2018). "Publishing while Female: Are Women Held to Higher Standards? Evidence from Peer Review." Mimeo, University of Liverpool.

Hirshleifer, Jack (1977). "Economics from a Biological Viewpoint." *Journal of Law and Economics*, 20, 1-52.

Krapf, Sandra, Michalea Kreyenfeld, and Katharina Wolf (2016). "Gendered Authorship and Demographic Research: an Analysis of 50 years of *Demography*." *Demography,* 53, 1169-1184.

Laband, David. (1987). "A Qualitative Test of Journal Discrimination against Women." *Eastern Economic Journal*, 13(2), 149-53.

Lott, W.F. (1983). "Are Women Economists at a Disadvantage in Publishing Journal Articles: a Methodological Comment." *Eastern Economic Journal*, 9(2), 133-138.

Lundberg, Shelly and Robert A. Pollak (1993), "Separate Sphere Bargaining and the Marriage Market." *Journal of Political Economy*, 101, 988-1010.

Manser, Marilyn and Murray Brown (1980), "Marriage and Household Decision Making: a Bargaining Analysis." *International Economic Review*, 21, 31-44.

Mayda, Anna Maria (2010). "International Migration: a Panel Data Analysis of the Determinants of Bilateral Flows." *Journal of Population Economics,* 23, 1249-1274.

McElroy, Marjorie B. and M.J. Horney (1981). "Nash Bargained Household Decisions: Toward a Generalization of the Theory of Demand." *International Economic Review*, 22, 333-49.

Olson, Paulette and Emami Zohreh (2002). *Engendering Economics: Conversations with Women Economists in the United States*. London: Routledge.

Phelps, Charlotte D. (1972). "Is the Household Obsolete?" *The American Economic Review Papers and Proceedings* 62(1/2): 167–174.

Rosenzweig, Mark and Oded Stark (1997). *Handbook of Population and Family Economics*. Amsterdam: North Holland.

Sarsons, Heather. 2017. "Recognition for Group Work: Gender Differences in Academia." *American Economic Review*, 107 (5), 141-45.

Taylor, J. and Irma Adelman (2003). "Agricultural Household Models: Genesis, Evolution, and Extensions." *Review of Economics of the Household,* 1, 33-58.

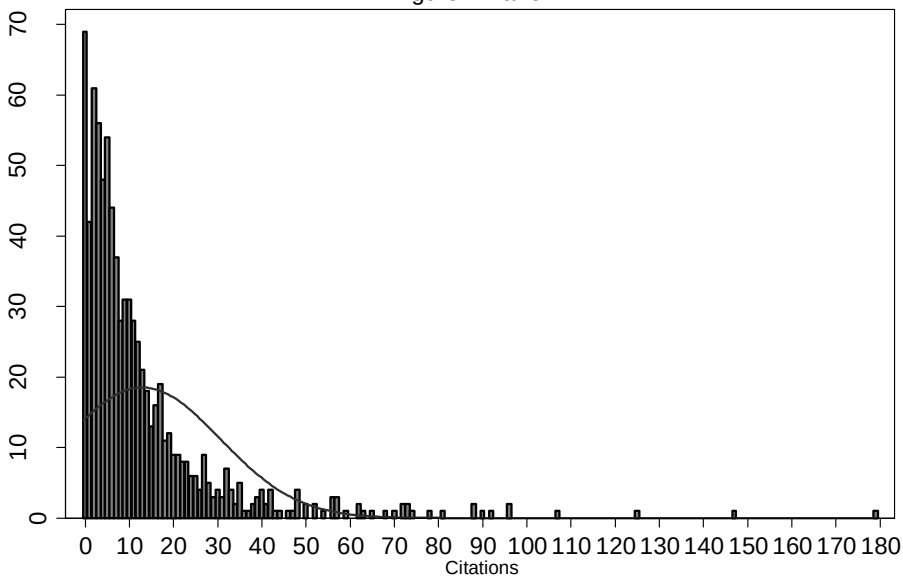
Tol, Richard S.J. (2018). "Gender at *Energy Economics*." *Energy Economics*, 72, 558–559.

Van den Brink, Marieke and Yvonne Benschop (2014). "Gender in Academic Networking: The Role of Gatekeepers in Professorial Recruitment." *Journal of Management Studies*, 51, 460–492.

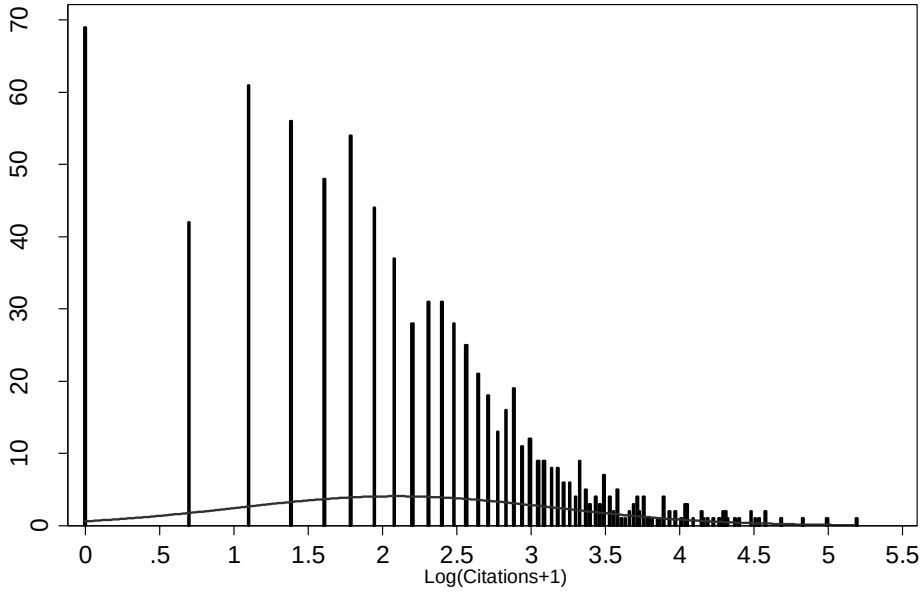
Woolley, Frances (2005). "The Citation Impact of *Feminist Economics*." *Feminist Economics,* 11, 85–106.

Yi, Yun-Ae (1996). "Margaret G. Reid: Life and Achievements". *Feminist Economics*, 2, 17–36.

Distribution of Citations
Figure 1 Panel A



Distribution of Log(Citations+1)
Figure 1 Panel B



Cumulative Distribution of Citations, by gender

Figure 2: JPOP and REHO: 2003 - 2014

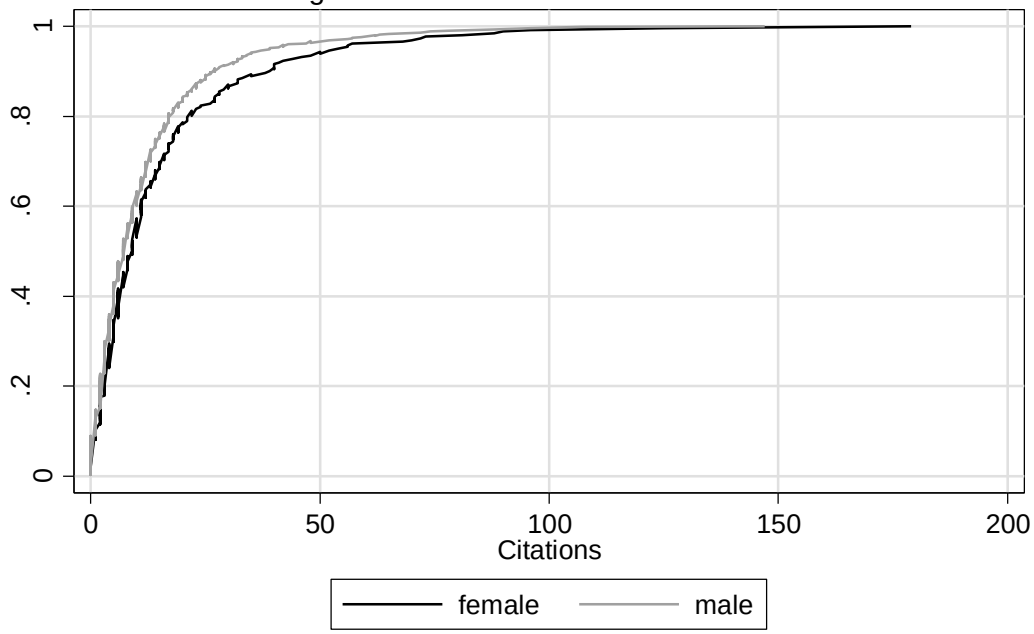


Table 1: Summary statistics for articles published in JPOP or REHO (2003-2014)										
	Full Sample		High Proportion Female*		Low Proportion Female+		Senior‡		Non-Senior§	
VARIABLES	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean
Corresponding author female	816	0.321	623	0.340	193	0.259	539	0.321	277	0.321
At least one female coauthor	816	0.255	623	0.268	193	0.212	539	0.306	277	0.155
At least one male coauthor	816	0.458	623	0.446	193	0.497	539	0.505	277	0.368
Number of citations	816	12.99	623	13.53	193	11.24	539	13.51	277	11.97
Number of citations (median)	816	7	623	8	193	6	539	8	277	7
Proportion of females in the subfield	816	0.217	623	0.235	193	0.155	539	0.216	277	0.217
Number of authors	816	1.885	623	1.886	193	1.881	539	2.006	277	1.650
Experience – years after graduation when the article was published	816	12.43	623	12.59	193	11.91	539	17.24	277	3.073
Additional JEL code (=1)	816	0.589	623	0.538	193	0.756	539	0.571	277	0.625
Duration – years since publication	816	8.238	623	8.194	193	8.381	539	8.368	277	7.984
Appeared after the journal received an impact factor	816	0.850	623	0.841	193	0.881	539	0.844	277	0.863
First appeared online (=1)	816	0.788	623	0.791	193	0.777	539	0.787	277	0.791
Corresponding author resides in North America	816	0.375	623	0.413	193	0.254	539	0.423	277	0.282
Corresponding author resides in Europe (=1)	816	0.512	623	0.485	193	0.601	539	0.481	277	0.574
Deceased (=1)	816	0.005	623	0.005	193	0.005	539	0.006	277	0.004

Notes: *Education, Demographics, Labor markets, Wages, and Health, subfields with higher (>0.20) proportion of females
+Consumer Economics, Economic Development, Social Choice and Other Fields, subfields with lower (≤.20) proportion of females
‡Authors with seven years of experience or more
§Authors with less than seven years of experience

Table 2: Subfield's characteristics and citations for 816 articles published in JPOP or REHO (2003 to 2014)							
Subfield	Number of articles	Percent of articles	Proportion with "Corresponding author female"	Proportion with "At least one female coauthor"	Proportion female in subfield *	Citations (mean)	Citations (median)
		(1)	(2)	(3)	(4)	(5)	(6)
Demographics	213	26.10	0.371	0.272	0.238	13.0	7.0
Labor Markets	172	21.08	0.326	0.279	0.221	14.2	10.0
Other+	129	15.81	0.209	0.178	0.137	11.1	6.0
Wages	85	10.42	0.224	0.247	0.247	15.9	8.0
Health Economics	84	10.29	0.310	0.310	0.238	10.6	6.0
Economics of Education	69	8.46	0.464	0.203	0.240	14.3	9.0
Consumer Economics	39	4.78	0.359	0.308	0.195	8.8	6.0
Social Choice	15	1.84	0.333	0.200	0.200	8.7	6.0
Economic Development	10	1.23	0.400	0.300	0.197	25.9	13.0
Total	816	100					
Average for all articles			0.321	0.255	0.217	12.99	7.0
* Proportion female in subfields as defined in Dolado et al. (2012) were linked to each article. + See Appendix A for definitions of the subfields included in Other.							

Table 3. OLS results for log of citations				
Model	Model 1	Model 2	Model 3	Model 4
Variables				
Corresponding author female (=1)	0.213***	0.200**	0.429***	0.443***
	(0.0795)	(0.0796)	(0.118)	(0.117)
At least one female coauthor (=1)		0.254*	0.366**	0.393***
		(0.135)	(0.147)	(0.147)
At least one male coauthor (=1)		0.0479	0.159	0.167
		(0.135)	(0.145)	(0.145)
Corresponding author female (=1)*At least one female coauthor (=1)			-0.304*	-0.325*
			(0.174)	(0.174)
Corresponding author female (=1)*At least one male coauthor (=1)			-0.342**	-0.356**
			(0.157)	(0.157)
Proportion of females in the subfield				1.738*
				(0.960)
Controls				
Corresponding author	yes	yes	yes	yes
Journal	yes	yes	yes	yes
Manuscript	yes	yes	yes	yes
Subfields	yes	yes	yes	no
Observations	816	816	816	816
R-squared	0.125	0.131	0.138	0.123

Notes: * p<0.05, ** p<0.01, *** p<0.001. We present the estimated coefficients. Standard errors are provided in parentheses. Corresponding author controls include experience, region and an indicator for 'deceased'. Journal control is an indicator variable for REHO. Manuscript controls include the number of authors and duration, and additional JEL code, appeared after the journal received an impact factor, and first-appeared-online indicator variables. Subfields are indicator variables for Demographics, Labor Markets, Wages, Health Economics, Economics of Education, Consumer Economics, Social Choice, Economic Development and Other.

Table 4. OLS results for log citations for subfields with high (>0.20) and low proportion (≤.20) female (according to EconPhD)						
	Panel 4A			Panel 4B		
	High Proportion Female *			Low Proportion Female +		
Models	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Variables						
Corresponding author female (=1)	0.230***	0.218**	0.421***	0.235	0.219	0.540*
	(0.0884)	(0.0886)	(0.130)	(0.179)	(0.182)	(0.288)
At least one female coauthor (=1)		0.305**	0.404**		0.229	0.371
		(0.150)	(0.162)		(0.318)	(0.358)
At least one male coauthor (=1)		0.0754	0.168		0.0339	0.204
		(0.153)	(0.164)		(0.298)	(0.321)
Corresponding author female (=1)*At least one female coauthor (=1)			-0.286			-0.366
			(0.194)			(0.449)
Corresponding author female (=1)*At least one male coauthor (=1)			-0.304*			-0.496
			(0.177)			(0.371)
Controls						
Corresponding author	yes	yes	yes	yes	yes	yes
Journal	yes	yes	yes	yes	yes	yes
Manuscript	yes	yes	yes	yes	yes	yes
Subfields	yes	yes	yes	yes	yes	yes
Observations	623	623	623	193	193	193
R squared	0.117	0.126	0.132	0.111	0.116	0.126
Notes: See Table 3. *Education, Demographics, Labor markets, Wages, and Health +Consumer Economics, Economic Development, Social Choice and Other Fields						

Table 5. OLS results for log citations for senior authors (seven years of experience or more) and non-senior authors (less than seven years)

	Panel 5A				Panel 5B			
	Senior				Non-senior			
Models	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Variables								
Corresponding author female (=1)	0.246**	0.229**	0.526***	0.516***	0.158	0.143	0.340**	0.353**
	(0.102)	(0.102)	(0.169)	(0.168)	(0.134)	(0.134)	(0.171)	(0.168)
At least one female coauthor (=1)		0.354**	0.477***	0.507***		0.009	0.169	0.138
		(0.164)	(0.179)	(0.178)		(0.262)	(0.283)	(0.280)
At least one male coauthor (=1)		0.148	0.272	0.286		-0.256	-0.153	-0.177
		(0.166)	(0.179)	(0.179)		(0.248)	(0.266)	(0.260)
Corresponding author female (=1)*At least one female coauthor (=1)			-0.338	-0.335			-0.485	-0.505
			(0.215)	(0.214)			(0.354)	(0.346)
Corresponding author female (=1)*At least one male coauthor (=1)			-0.380*	-0.386*			-0.369	-0.382
			(0.202)	(0.201)			(0.286)	(0.282)
Proportion Female				1.004				2.896*
				(1.228)				(1.587)
Controls								
Corresponding author	yes	yes	yes	yes	yes	yes	yes	yes
Journal	yes	yes	yes	yes	yes	yes	yes	yes
Manuscript	yes	yes	yes	yes	yes	yes	yes	yes
Subfield dummies	yes	yes	yes	no	yes	yes	yes	no
Observations	539	539	539	539	277	277	277	277
R squared	0.125	0.135	0.143	0.123	0.158	0.163	0.175	0.158

Notes: See Table 3.

Table 6. Quantile regression results for citations									
	Q25 Reg			**Q50 Reg**			**Q75 Reg**		
Model	Model 2	Model 3	Model 4	Model 2	Model 3	Model 4	Model 2	Model 3	Model 4
Variables									
Corresponding author female (=1)	0.597	1.905*	1.964**	1.487*	3.523***	3.466***	2.703	4.018	5.234
	(0.613)	(1.056)	(0.914)	(0.860)	(1.361)	(1.292)	(2.039)	(3.083)	(3.384)
At least one female coauthor (=1)	1.753*	2.257*	2.228*	2.203	2.716	3.385**	1.304	2.074	4.924
	(1.041)	(1.310)	(1.145)	(1.461)	(1.688)	(1.619)	(3.464)	(3.823)	(4.242)
At least one male coauthor (=1)	0.758	1.526	1.442	0.161	0.783	1.125	-2.637	-1.422	0.274
	(1.036)	(1.290)	(1.126)	(1.454)	(1.663)	(1.591)	(3.448)	(3.766)	(4.169)
Corresponding author female (=1)*At least one female coauthor (=1)		-1.193	-0.864		-3.000	-3.321*		-0.568	-2.756
		(1.552)	(1.353)		(2.001)	(1.912)		(4.531)	(5.010)
Corresponding author female (=1)*At least one male coauthor (=1)		-2.150	-2.272*		-2.610	-2.694		-2.379	-2.435
		(1.404)	(1.223)		(1.811)	(1.730)		(4.100)	(4.531)
Proportion of females in the subfield			11.71			11.18			28.49
			(7.476)			(10.57)			(27.69)
Controls									
Corresponding author	yes	yes	yes	yes	yes	yes	yes	yes	yes
Journal	yes	yes	yes	yes	yes	yes	yes	yes	yes
Manuscript	yes	yes	yes	yes	yes	yes	yes	yes	yes
Subfields	yes	yes	no	yes	yes	no	yes	yes	no
Observations	816	816	816	816	816	816	816	816	816
Pseudo R squared	0.033	0.036	0.030	0.074	0.077	0.067	0.106	0.107	0.093
Notes: See Table 3. The results of Model 1 are not included in this Table.									

Appendix A Subfields according to Econphd.net categories and JEL codes

1. Health Care/Demographics/Social Security (I00, I10–I12, I18–I19, I30–I32, I38–I39, J00, J10–J14, J17–J19, J26). We divided this group into Health economics (I10–I12, I18–I19) and Demographics (the remaining).
2. Labor Markets & Unemployment/Working Conditions/Industrial Relations (D13, J20–J23, J28–J29, J32–J33, J40–J45, J48–J49, J50–J54, J58–J59, J60– J65, J68–J69, J80–J83, J88–J89, M50–M55, M59)
3. Wages/Income Distribution (D30–D31, D33, D39, J15–J16, J30–J31, J38–J39, J70–J71, J78–J79)
4. Economics of Education (I20–I22, I28–I29, J24)
5. Consumer Economics (D10–D12, D14, D18–D19, Z00, Z10–Z13)
6. Social Choice Theory/Allocative Efficiency/Public Goods (D60–D64, D69, D70–D71, H00, H40–H43, H49)
7. Economic Development/Country Studies (O00, O10–O19, O20–O24, O29, O50–O57)

OTHER includes

8. Economic History & Method (A, B00–B49,N)
9. Alternative Approaches/Comparative Systems (B50–B59, P00–P59)
10. Statistics/Theory of Estimation (C00, C10–C16, C19, C20, C30, C40–C41, C44– C45, C49)
11. Cross Section, Panel, Qualitative Choice Models (C21, C23–C29, C31, C33– C39, C42–C43, C50–C52, C59, C80–C89)
12. Time Series/Forecasting (C22, C32, C53)
13. General Equilibrium Theory/Cooperative Games/Mathematical & Comp. Economics (C60–C63, C65, C67–C69, C71, D50–D52, D57–D59, D84)
14. Non-cooperative Games/Bargaining & Matching (C70, C72–C73, C78–C79, D83)
15. Decision Theory/Experiments/Information Economics (C90–C93, C99, D00, D80–D82, D89)
16. Theory of the Firm/Management (D20–D21, D23, D29, L20–L25, L29, L30– L33, L39, M00, M10–M14, M19, M20–M21, M29, M30–M31, M37, M39, M40–M42, M49)
17. Industry Studies/Productivity Analysis (D24, L60–L69, L70–L74, L79, L80– L86, L89, L90–L99)
18. Industrial Organization (D40–D46, D49, L00, L10–L16, L19, L40–L44, L49, L50–L52, L59)
19. Innovation/Technological Change (O30–O34, O38–O39)
20. Political Economy (D72–D74, D78–D79, H10–H11, H19)
21. Theory of Taxation (H20–H26, H29, H30–H32, H39)
21. Law & Economics (K00, K10–K14, K19, K20–K23, K29, K30–K34, K39, K40– K42, K49)
22. Intertemporal Choice /Economic Growth (D90–D92, D99, E20–E21, F40, F43, F47, F49, O40–O42, O47, O49)
23. Fluctuations/Business Cycles (E00, E10–E13, E17, E19, E22–25, E27, E29, E30–32, E37, E39)
24. Monetary Economics (E40–E44, E47, E49, E50–E53, E58–E59)
25. Public Finance (E60–E66, E69, H50–H57, H59, H60–H63, H69, H70–H74, H77, H79, H80–H82, H87, H89)
26. International Finance (F30–F36, F39, F41–F42)
27. International Trade/Factor Movements (F00–F02, F10–F19, F20–F23, F299
28. Spatial, Urban Economics (R00, R10–R15, R19, R20–R23, R29, R30–R34, R38–R39, R40–R42, R48–R49, R50–R53, R58–R59)

29. Financial Markets & Institutions (G00, G10, G14–G15, G18–G19, G20–G24, G28–G29)
30. Portfolio Choice/Asset Pricing (G11–G13)
31. Corporate Finance (G30–G35, G38–G39)
32. Resource & Environmental Economics (Q00–Q01, Q20–Q21, Q24–Q26, Q28– Q29, Q30–Q33, Q38–Q39, Q40–Q43, Q48–Q49)
33. Agricultural Economics (Q10–Q19, Q22–Q23)

Appendix B. Separate Summary Statistics for JPOP and REHO Articles (2003-2014)		
	JPOP (N=542)	**REHO** (N=274)
VARIABLES	Mean	Mean
Corresponding author female (=1)	0.268	0.427
At least one female coauthor (=1)	0.214	0.336
At least one male coauthor (=1)	0.489	0.398
Number of citations	14.32	10.35
Number of citations (Median)	9	6
Proportion of females in the subfield	0.212	0.225
Number of authors	1.869	1.916
Experience – years after graduation when it was published	11.56	14.15
Additional JEL code (=1)	0.703	0.365
Duration – years since publication	8.442	7.833
Appeared after the journal received an impact factor (=1)	1	0.555
First appeared online (=1)	0.819	0.726
Corresponding author resides in North America (=1)	0.282	0.558
Corresponding author resides in Europe (=1)	0.594	0.350
Deceased (=1)	0.006	0.004

Appendix C: Citations by subfield and journal												
	JPOP (N=542)						**REHO** (N=274)					
	Number of articles	%	Corresponding author female (=1)	At least one female coauthor (=1)	Citations	Citations (median)	Number of articles	%	Corresponding author female (=1)	At least one female coauthor (=1)	Citations	Citations (median)
All Fields	542	100	0.268	0.214	14.3	9	274	100	0.427	0.336	10.4	6
Demographics	128	23.6	0.273	0.127	13.8	8.0	85	31.0	0.518	0.146	11.7	6.0
Labor Markets	112	20.7	0.259	0.172	16.7	11.5	60	21.9	0.450	0.105	9.5	6.0
Wages	66	12.2	0.242	0.212	18.2	8.0	19	6.9	0.158	0.035	7.7	7.0
Health Economics	39	7.2	0.205	0.095	12.2	7.0	45	16.	0.400	0.214	9.2	5.0
Economics of Education	55	10.2	0.418	0.145	15.6	10.0	14	5.11	0.643	0.058	9.2	6.0
Consumer Economics	7	1.3	0.714	0.026	3.3	4.0	32	11.7	0.281	0.282	10.0	7.0
Social Choice	12	2.2	0.250	0.133	8.9	3.5	3	1.1	0.667	0.067	8.0	6.0
Economic Development	8	1.5	0.500	0.200	19.4	13.5	2	0.7	0.000	0.100	52.0	52.0
Other	115	21.2	0.191	0.142	11.3	7.0	14	5.1	0.357	0.039	9.4	6.0
Notes: See notes to Table 3.												

Appendix D. OLS results for log citations by journal								
	JPOP				**REHO**			
Variables	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Corresponding author female (=1)	0.193*	0.186*	0.429***	0.429***	0.284**	0.268**	0.491***	0.487***
	(0.107)	(0.107)	(0.161)	(0.159)	(0.120)	(0.120)	(0.173)	(0.169)
At least one female coauthor (=1)		0.204	0.261	0.279		0.297	0.537**	0.567**
		(0.175)	(0.187)	(0.187)		(0.215)	(0.237)	(0.234)
At least one male coauthor (=1)		0.00385	0.125	0.116		0.100	0.116	0.146
		(0.176)	(0.185)	(0.185)		(0.211)	(0.241)	(0.238)
Corresponding author female (=1)*At least one female coauthor (=1)			-0.178	-0.192			-0.558**	-0.550**
			(0.255)	(0.255)			(0.238)	(0.235)
Corresponding author female (=1)*At least one male coauthor (=1)			-0.449**	-0.474**			-0.0935	-0.127
			(0.215)	(0.215)			(0.234)	(0.230)
Proportion female in the subfield				2.706**				-2.018
				(1.139)				(1.895)
Controls								
Corresponding author	yes	yes	yes	yes	yes	yes	yes	yes
Journal	no	no	no	no	no	no	no	no
Manuscript	yes	yes	yes	yes	yes	yes	yes	yes
Subfields	yes	yes	yes	no	yes	yes	yes	no
Observations	542	542	542	542	274	274	274	274
R squared	0.125	0.130	0.137	0.116	0.180	0.188	0.205	0.187
Notes: See Table 3.								