Gender Gaps among Scholars in Economics: Analysis Across Cohorts*

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17th April 2024

Abstract

We study the evolution of gender gaps, both in terms of representation and research output, among cohorts of scholars in economics over the past 9 decades (1933-2019) using a sample of economists who have published at least once in any of the 36 high-impact journals (Card et al., 2022). With respect to representation, there has been a clear increase of the female share among scholars, but we find evidence of both vertical segregation based on prominence and horizontal segregation based on research fields. With respect to gender gaps in output, women publish fewer articles than men, and more concerningly, the negative gender gap showed no sign of convergence since the 1940s, although there is substantial heterogeneity in the *type* of publication. The negative gender gap in publications is mostly explained by women having *shorter* active academic careers.

JEL Classification: J16, J24, J44, C83
Keywords: gender gaps, scholars in economics, cohorts, publications, citations

*We thank Patricia Funk and Margarita Machelett for helpful comments. Alaitz Ayarza acknowledges funding from Eusko Jaurlaritza (IT1697-22). Nagore Iriberri acknowledges funding from PID2019-106146GB-I00 by MCIN/AEI/10.13039/501100011033 and by "ERDF A way of making Europe" and Eusko Jaurlaritza (IT1697-22).

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1 Introduction

Men and women obtain different outcomes in labor markets. Gender gaps in labor market participation and salaries have been documented in many countries and over time, as in for example, Olivetti and Petrongolo (2016), Blau and Kahn (2017) and Petrongolo and Ronchi (2020). Gender gaps in representation and labor market outcomes have also been studied when focusing on particular fields and industries: among top corporate jobs and CEOs by Bertrand and Hallock (2001) and Bertrand (2009), among young professionals in finance by Bertrand et al. (2010), among lawyers by Azmat and Ferrer (2017) and among scholars by Iaria et al. (2022) and Kim and Moser (2024). However, a present limitation when studying labor market outcomes is the difficulty in accessing individual level performance data, which are often observed only imperfectly or indirectly as noted by Altonji and Blank (1999) and Ichino and Moretti (2009).

In this paper we focus on scholars in economics and document the evolution of female representation and gender gaps in academic performance or output over the past 9 decades (1933-2019). A considerable advantage of studying scholars in economics is that the most relevant performance variables are quantifiable and observable: accumulated publications and citations. We use the dataset created by Card et al. (2022), which includes any active researcher publishing at least once in any of the 36 high-impact journals in the field of economics (see Table A1 in the Appendix for all journals included in this list), his or her publication record in these journals and accumulated citations of publications in the so called top-5 journals (*Quarterly Journal of Economics*, *Journal of Political Economy*, *American Economic Review*, *Review of Economic Studies* and *Econometrica*). Although the original dataset is a panel of scholars, we reshape it to include a cross-section of scholars, where our unit of observation is scholars who belong to a unique cohort. We define cohorts of scholars in economics as those authors who share the same year of their first publication and we count their publications and citations over a career of at most 24 years.

First, we find that female representation clearly improved over the past 9 decades. Female representation was below 10% since the beginning of the 20th century until the 1980s, when a clear increasing trend reached 25% by 2019. We also find clear evidence of horizontal segregation across subfields in economics, as well as vertical segregation based on prominence or excellence in publishing in economics, both of which persist today. To study the former we categorize scholars as working in *masculine* or *feminine* fields, depending on whether their set of publications shows a greater proportion in the masculine top field journals (*Journal of Finance*, *Journal of Economic Theory*, *Journal of Econometrics* and *Journal of Monetary Economics*) or in the feminine top field journals (*Journal of Public Economics*,

Journal of Development Economics, *Journal of Health Economics* and *Journal of Labour Economics*). We find that by 2019, female representation among scholars working in masculine fields was 15 percentage points lower (20%) than female representation among scholars working in feminine fields (35%). To study vertical segregation, we analyze two samples of scholars —all active scholars and the top-5 scholars—defined as those who have at least 1 publication in the so called top-5 journals. We find that female representation is consistently lower among the top-5 scholars than among all active scholars, overall and also when separated between those working in masculine and feminine fields.

Second, women produce fewer publications than men during their academic careers of at most 24 years, but we find no evidence for a differential gender gap in citations per publication in the top-5 publications. While in the 1930s women had approximately 2.6 fewer publications during their academic careers, by the 1940s this gap decreased to 1.5 fewer publications. Probably more concerning, since the 1940s, we see no clear sign of convergence in the gender gap in publications, up to the cohorts in the 1990s. When we study gender gaps in publications among different types of scholars, we find the same pattern and lack of convergence found for the sample of all scholars among the top-5 scholars and among scholars working in masculine fields. The exception is given by all scholars and the top-5 scholars working in feminine fields, who do not show significant gender gaps in publications. Interestingly, we also found important heterogeneity with respect to the publication *type*.

Third, the negative gender gap is mostly explained by women having shorter *active* academic careers over time. In the 1930s, 81% of women stopped publishing in the set of 36 high-impact journals by their third year, while only 41% of men did. By the 1980s, instead, more similar proportions of men and women stop being active by year of career (close to 40% for men and close to 50% for women by their third year). Interestingly, unlike in the 1930s, where all active scholars and top-5 scholars showed careers of similar length, by this time the largest gap emerged between these two groups (the latter having much higher survival rates). For example, in the 1990s, by their third year only 57% of men and 49% of women were still publishing among all active scholars, but 86% and 82% were among the top-5 scholars, respectively.

Documenting female representation among scholars in economics has been an object of interest among economists for some time, although the challenge has been to find reliable databases. The first studies measured female representation between the 1970s and 2010s in the USA using databases on earned PhDs and through surveys contacting most important PhD granting departments in economics (Kahn, 1995; Ginther and Kahn, 2004;

Lundberg and Stearns, 2019). See also Bateman and Hengel (2023) for a similar study in the UK, dating back to the period between 1996 and 2018. These studies show important gains in female representation, although the representation is lower among full professors than among PhDs. Dolado et al. (2012) show important variation in female representation across research fields in economics based on a dataset of almost 1,900 researchers affiliated with the top 50 economic departments in 2005 according to the Econphd.net website. In topics under the JEL codes J (health, education and welfare) and I (labor and demographic economics) women have greater representation (35% in 2005) than in the JEL codes C1 (Mathematical and Quantitative Economics) and G (financial economics) (slightly above 10% in 2005). Chari and Goldsmith-Pinkham (2017) use papers at the NBER Summer Institute Conferences from 2001-2018 and confirm important variation in female representation across different subfields within economics. Beneito et al. (2021) also confirm the existence of important gender differences in representation across subfields at the annual American Economic Association meetings and show that these gender differences might be rooted in gender differences in academic performance across subfields emerging as early as the undergraduate level. More recently, Auriol et al. (2022) measured female representation in the year 2020 using webs-craped data from the top 300 research institutions in Repec and compares those female representations across Europe and the USA and across job titles. Our contribution to existing studies lies in documenting the evolution of female representation over the past 9 decades, from 1933 to 2019, using a sample of active researchers publishing in 36 high-impact journals in economics, as well as documenting the evolution of female shares across masculine and feminine fields within economics and across prominence levels.

Closer to our study, Ductor et al. (2023) studied female representation and gender gaps in research output between 1970 and 2017. They constructed a panel dataset using the same approach as that used by Card et al. (2022) but included a much larger set of journals. Their database consists of a panel of scholars actively publishing at least once in any of the 1,990 journals from EconLit. In terms of female representation, while they study the female share among the total pool of academics each year and we study the female share among new academic entrants (i.e. across cohorts), both of our studies conclude that there have been important gains over recent decades. In terms of gender gaps in publications, consistent with our findings, they document significant negative gender gaps in research output, but in contrast to our findings, they find that the negative gender gap increased between 1970 and 2017. We underscore that there is large heterogeneity in gender gaps in publications by *type* over time, as we replicate their results on the increasing gender gap in publications *only* if we focus on publications in the lowest-tier journals among our

set of 36 journals. In contrast, the gender gaps in top-5 publications show a clear sign of convergence, and the gaps in the next-10 journals have remained constant over the last 4 decades. In addition, we expand on their work in the following dimensions. First, we use a longer time horizon, dating back to 1933. Second and more importantly, we perform a cohort analysis, such that we study the evolution of female representation and gender gaps over time but use a cross-section of authors (each author belongs to a cohort defined by their first publication), while they analyze dynamic panel data. This approach allows us to also study the evolution of gender gaps in publishing activity during academic careers over time, which we find is the main source of explanation for the negative gender gap in publications, especially among the earliest cohorts.

Finally, our paper contributes to a small but growing body of literature investigating the role of gender in various domains in the academic field of economics: in the publication process (Card et al., 2020; Alexander et al., 2021; Hengel, 2022), in conference acceptance (Chari and Goldsmith-Pinkham, 2017; Hospido and Sanz, 2021), in the recognition of coauthored work (Sarsons et al., 2021), in job applications and promotions (Casarico and Rizzica, 2022; Eberhardt et al., 2023), in teaching evaluations (Boring, 2017; Mengel et al., 2019) in the general climate during seminars and in the profession (Wu, 2020; Dupas et al., 2021; Handlan and Sheng, 2023; Seré, 2023); in citation patterns (Koffi, 2021), in peer recognition (Card et al., 2022, 2023), in visibility such as on Wikipedia (Venus, 2024) and in editorial roles (Funk et al., 2024).

The paper is structured as follows. Section 2 describes the features of the data in detail. Section 3 explains the evolution of female representation among cohorts of scholars in economics from 1933 to 2019. Section 4 documents the evolution of the gender gap in the most important academic outputs (publications and citations), as well as in the publishing activity during their academic careers, by cohorts of scholars in economics from 1933 to 1996. Finally, Section 5 summarizes the main findings and concludes the paper.

2 Data: 1933-2019

We use the dataset generated by Card et al. (2022). This dataset includes all scholars in economics who have published at least once in any of the 36 high-impact journals since the inception of the journal through 2019. Each of the 36 journals used for the data creation and their inception years are listed in Table A1 in the Appendix.

Most relevant economic journals are included. The so-called top-5 journals are among the oldest journals: *Quarterly Journal of Economics* (1886), *Journal of Political Economy* (1892),

American Economic Review (1911) and *Review of Economic Studies* and *Econometrica*, both starting in 1933. Other important general interest journals are also included: *Economic Journal* (1891), *Review of Economics and Statistics* (1919), *International Economic Review* (1960) and the more recent *Journal of the European Economic Association* (2003). Finally, we also make use of the most relevant field journals to identify *masculine* and *feminine* fields within economics: *Journal of Finance* (1946), *Journal of Economic Theory* (1969), *Journal of Public Economics* (1972), *Journal of Econometrics* (1973), *Journal of Monetary Economics* (1975), *Journal of Development Economics* (1974), *Journal of Health Economics* (1982) and *Journal of Labor Economics* (1983). All field journals, except the *Journal of Finance*, are younger journals than the general interest journals, as most of them were created in the 1970s.

For the analysis of female representation, we use a sample of scholars starting in 1933, when all the top-5 journals existed, and ending in 2019. For the period of 1933-2019, the dataset consists of a cross-section of 38,641 unique scholars (6,782 of whom were women, 17%). For the analysis of gender gaps in academic output, we study the cohort of economic scholars starting in 1933 and ending with the cohort in 1996 to leave enough years (at least a time span of 24 years) to develop an academic career.[1] A cohort is defined as the group of scholars who share their year of first publication. That is, all scholars who had their first publication of their academic career in 1996 belong to the 1996 cohort. We therefore measure publications and citations over their entire careers or over their first 24 years of their career (for careers longer than 24 years). The dataset consists of 16,939 unique scholars, of whom 1,609 are women (9.5%), along with their publication records in the 36 journals during their academic careers (from first to last publication) and their accumulated citation counts since publication year until the end of their academic careers (only for publications in the top-5 journals). We refer to the overall sample of scholars in economics as the sample of *all active scholars*.

We define two additional subsamples of scholars, based on prominence and the share of female scholars in their field of specialization.

First, we define *top-5 scholars* as those scholars who have published at least once in any of the top-5 journals during their academic career. Between 1933 and 2019 we had a sample of 11,469 scholars, of whom 1,352 were women (12% female share), and between 1933 and 1996 we had a sample of 7,226 scholars, among whom 534 were women (7.4%).

Second, to obtain a more complete picture of female representation in economics, we acknowledge that there can be important differences among subfields of study. To see this,

[1] In the 1933-1975 cohorts, for whom we can observe a career of at least 45 years, 80% of male scholars had a career of at most 24 years. This number is much smaller —only of 13 years—for female scholars.

we plot the female share of scholars publishing in each of the 8 top field journals we identified in Table A1 in the Appendix. This is shown in Figure A2 in the Appendix. The oldest journal is the *Journal of Finance* (1946) and the newest are the *Journal of Health Economics* (1982) and the *Journal of Labor Economics* (1983). This figure shows that, although all journals show important gains in female representation, this has been quite unequal across journals in different fields. The journals in the fields of health, labor, public and development show a greater female share (above 15% in the last 20 years) than journals in the fields of finance, monetary, econometrics and economic theory (roughly less than 15% in the past 7 decades). Hereafter, we refer to the former as feminine fields and the latter as masculine fields, even though no field reached equal female representation. Thus, we categorize authors into samples of scholars working in feminine or masculine fields, where the authors who specialize in a feminine (masculine) field are defined as those who have a strictly greater number of publications in top field journals categorized as feminine (masculine). Between 1983 and 2019, there were 8,035 authors in masculine fields, of whom 1,140 were women (14%), while there were 7,786 authors working in feminine fields, of whom 2,094 were women (27%). Between 1983 and 1996, there were 2,423 authors working in masculine fields, of whom 198 were women (8.2%), while there were 1,859 authors working in feminine fields, of whom 319 were women (17.2%). Notice that we can only make such comparisons only for the time during which all 8 field journals exist, that is, from 1983 onward.

Clearly, the overall field of economics includes a larger set of journals than the 36 listed in this sample. Therefore, studying gender gaps in female representation and gender gaps in academic output using this dataset offers a picture of gender gaps among scholars who are actively publishing in a selected set of high-impact journals.

3 Evolution of the Share of Female Scholars in Economics across Cohorts: 1933-2019

We start documenting the share of female scholars publishing in economics over time, across cohorts. The first cohort that we studied was the 1933 cohort, which was the first cohort for which data from all of the top-5 journals were available when starting their academic careers, and we ended with the 2019 cohort, the last cohort for which we obtained female share data.

Figure 1 shows the evolution of the female share for all active scholars, top-5 scholars and scholars in feminine and masculine fields. For all active scholars, the solid black line shows

that the percentage of women was less than 10% until 1985. In 1965, it reached one of the lowest values, close to 5%, as the entry of male authors was greater than the entry of female authors (as shown in Figure A3 in the Appendix). Afterward, it showed a consistent and increasing trend, reaching 25% by 2019. Among the top-5 scholars, the dashed line in Figure 1 shows that the percentage of women was usually less than the percentage of women among all active researchers, particularly since 1950. Moreover, since 2005, this gap between the solid and dashed lines becomes, if anything, larger, reaching up to 5 percentage points. Therefore, the stricter the prominence criteria are the lower the female share, a clear sign of vertical segregation, which is also found in many other sectors.

Compared to our findings, Ductor et al. (2023) find very similar percentages in 1970, approximately 5%. For the year 2017, our female share of 25% is lower than their share of 30%. This difference is consistent with vertical segregation, as their larger set of journals includes many more lower-ranked journals. Additionally, we study the female share among new academic entrants (i.e. across cohorts), while they study the female share among the total pool of scholars each year. Indeed, if we calculate the female share among the total pool of academics —as they do—the female share drops from 25% to 20%. This difference stems from men having longer academic careers than women (discussed at length in Section 4.3), which affects the gender composition of the pool of active scholars each year.

With respect to female representation among all active scholars in masculine/feminine fields (solid blue/red lines in Figure 1), although female shares are always increasing, we find important differences. By definition, female representation in masculine fields will be lower than female representation in feminine fields. However, documenting the evolution of the gap between the blue and red lines is informative. The gap was 7 percentage points in 1983, and by 2019, the gap had doubled, reaching 14 percentage points, such that the gains in female representation were greater in feminine than in masculine fields. By 2019, the female share in feminine fields reached almost 35% and it was just approximately 20% in masculine fields. For top-5 scholars in masculine and feminine fields, the female share was less than among all active scholars, which is consistent with previous findings. The vertical segregation is particularly strong and increasing in feminine fields.

We therefore conclude that the female share has shown important gains in representation in economics over the past 9 decades, reaching up to 25% among all active scholars, although still far from parity. However, important differences by prominence of authors and fields of study are found, both of which persist today.

4 Gender Gaps in Academic Output by Cohort: Publications and Citations (1933-1996)

We document gender gaps across cohorts in two outputs over scholars' active research careers of at most 24 years. It is important to compare gender gaps in academic outputs allowing for the same number of academic years across cohorts. The outputs are: (1) the total number of publications and (2) the total number of citations in papers published in top-5 journals.

To study the evolution of the gender gaps in the two outputs across cohorts, we run the following regression:

$$\text{Output}_i = \sum_{g=1933-39}^{1990-96} \beta_g \text{Female}_i * \mathbb{1}[i=g] + \sum_{g=1933-39}^{1990-96} \alpha_g \mathbb{1}[i=g] + \epsilon_i \quad (1)$$

Our coefficient of interest in equation (1) is $\hat{\beta}_g$, which estimates the gender gap in a given output for each group of cohorts g. For this, we interact the female dummy with indicators for groups of cohorts. We distinguished 7 groups, each including cohorts belonging to the same decade: 1933-39, 40-49, 50-59, 60-69, 70-79, 80-89, and 90-96. We pooled the female coefficient over cohorts within a decade to obtain more power in the estimation. When the output of interest is the total number of citations of papers published in top-5 journals, we control for scholar i's total number of publications in top-5 journals over his or her career, interacted with the group g of scholar i. As with the female representation, we start with the sample of all active researchers, but also show results for the top-5 scholar sample, as well as for scholars working in masculine and feminine fields.

The graphs presented in the next sections plot the 7 $\hat{\beta}_g$ coefficients from equation (1), one for each group between 1933 and 1996, and the corresponding 95% confidence intervals.

4.1 Gender Gaps in Publications across Cohorts (1933-1996)

We start with the most important output for scholars: the number of publications.

Figure 2a plots the female coefficient for each of the 7 decades for all active scholars (solid black line) and for the top-5 scholars (dashed line). The estimated coefficients for both samples show that the gender gap in publications is significantly negative for all the decades we study. On average, female scholars in the overall sample published between 2.6 (in the 1933-1939 decade) and 1.2 fewer publications (in the 1990-96 decade) in their academic

career of at most 24 years. The gap is even more negative among the top-5 scholars, with between 3.3 (in the first decade) and 2.2 fewer publications (in the last decade). More concerning, although we observe some convergence in the negative gender gap from the 1930s to the 1940s, since then we see no sign of convergence. These findings are very similar for all active scholars and for the top-5 scholars.

The plot in Figure 2b contains the further split by scholars working in masculine and feminine fields. On the one hand, on the positive side, for scholars working in feminine fields, we find no significant negative gender gaps and this finding is the same for all scholars and the top-5 scholars. On the other hand, and on the negative side, we see a clear and even more negative gender gap and no sign of convergence for all types of scholars (prominent or not) working in masculine fields.

To summarize, women in economics publish fewer papers than men in their academic careers, and this negative gap has shown no sign of convergence since the 1940s. The exception is given by scholars working in feminine fields, whose number of publications is not significantly different from the number of publications by men, both in the 1980s and 1990s.

4.2 Heterogeneity in Gender Gaps in Publications across Cohorts by *Type* of Publication

We performed heterogeneity analysis based on the type of publication. We distinguish between 3 types of publications based on the prominence or prestige of the journals in the set of 36 high-impact journals. First, we counted only the top-5 publications. Second, we counted only publications in the two general interest journals (*Economic Journal* and *Review of Economics and Statistics*) and the 8 top field journals. We refer to publications in this group of journals as "next-10 publications". Third, we counted only publications in the 10 lowest-tier journals within the set of 36 high-impact journals.[2] Figure 3 shows the gender gaps over time for all scholars and for top-5 scholars for the three types of publications.

On the positive side, we find a clear sign of convergence on the negative gender gap in publications over time when we focused on top-5 publications (see Figure 3a). Less positive, we find no sign of convergence when we focus on the next 10 publications (see Figure 3b). Notice that when we consider this set of publications, most of the top field journals were created in the 1960s, so we should focus on the analyses beginning in the 1960s. However,

[2]This set of journals consists of the following journals: *Economica*, *Journal of Economic History*, *International Economic Review*, *Rand*, *International Journal of Game Theory*, *Journal of International Economics*, *Journal of Mathematical Economics*, *Econometric Theory*, *Games and Economic Behavior* and *Economic Theory*.

when we study the evolution of the gender gap in terms of the number of publications in the 10 lowest-tier journals, we find no sign of convergence and even an increase in the gender gap in publications over time (see Figure 3c).

With this analysis by publication type we can reconcile our results with the result of Ductor et al. (2023). They find that the negative gender gap has increased over time in their sample. First, they also find signs of convergence in only the top-5 journals(see their Figure 2 (c)), which is clearly consistent with our findings. Second, as Ductor et al. (2023) consider up to 1,990 journals, their set of journals shows great variation including many more lower-tier journals than in our sample. With our heterogeneity analysis by type of publication counting only the top-5 journals, only the next 10 and only the 10 lowest-tier journal publications, we document that the evolution of the gender gap in the number of publications shows important differences by type of publications, and that the increase in the gender gap over time is driven by publications in lower-tier journals.

4.3 Understanding the Gender Gaps in Publications across Cohorts: Less Productive or Shorter Active Research Careers?

We found an important gender gap in the number of publications: men accumulate more publications than women over their academic careers. This negative gender gap is present both in the overall sample and in the top-5 scholars, with the gap being even more negative among the latter, and in particular, among scholars in masculine fields. In this section, we exploit the panel structure of the dataset by Card et al. (2022) to determine whether the lower number of publications is explained by less productive academic careers (a similar number of active years but fewer publications per year) or, on the contrary, by shorter academic careers (a similar number of published papers per year but fewer active years).

For each cohort, we calculated survival rates by year. In the beginning of each scholar's academic career, the year of their first publication, by construction, takes the value of one and must be the same for male and female scholars. For subsequent years, some scholars continue to actively publish in this set of 36 high-impact journals, while others stop doing so. Therefore, from the second year on, we compute the fraction of scholars who are still active that year (either because they have a publication that same year or because they have it in any future year), repeating this exercise until the 24th year.

Figure 4 shows the survival rates for men (blue line) and women (red line) and for all active researchers (solid line) and top-5 scholars (dashed line). In the first decade, men's and women's active research careers had very different lengths. Eighty-one percent of

women stopped publishing in this set of high-impact journals by their third year, while only 41% of men did. Interestingly, for this earliest cohorts, the large differences in survival rates by gender —as high as 40 percentage points—contrast with the small differences in survival rates between all scholars and the top-5 scholars —of at most 10 percentage points—. The latter effect is explained by the set of existing journals being mostly the top-5 journals during this period.

Across decades, we see clear signs of convergence between men's and women's active career lengths. At the same time, this convergence is accompanied by clear signs of separation between all active scholars and the top-5 scholars.

Thus, in the last decade studied, the picture is quite different. Currently, men and women have more similar survival rates, even though the survival rate of men is always higher than that of women. However, the gaps between the survival rates of the top-5 scholars and those of all active researchers greatly differ. For example, in the 1990s, among all active researchers, 57% of men and 49% of women were still active in the third year of their careers, and 17% of men and 12% of women were still active in the 24th year. These survival rates contrast with the survival rates of the top-5 scholars in the 1990s, which are much higher for every year of the academic careers of both men and women. Within this sample, 86% of men and 82% of women were still publishing by the third year and 39% of men and 31% of women were still publishing by the 24th year. Thus, for this latest group of cohorts, the small differences in survival rates by gender —of less than 10 percentage points—contrast with the large differences in survival rates by prominence —of approximately 30 percentage points at the beginning of the careers—.

Given these survival rates, one may worry that the observed evolution of gender gaps in publications, as shown in the previous subsection and Figure 2, as well as the evolution of survival rates, as shown in this subsection and Figure 4, are mainly artifacts of including scholars who are active for one unique year (and publication). First, the existence or even high frequency of scholars who publish just once in their academic careers has been found to be regular in many diverse fields (Ruiz-Castillo and Costas, 2018), so it is not specific to the field of economics. Second, we replicate both Figures 2 and 4 by dropping scholars who are present for only one year or publication. Online Appendix Figures A4 and A5 show the results, confirming the same patterns. In summary, the evolution of the gender gap in research output and survival rates is not an artifact of having included authors who are present for a unique year or publication.

Next, we plot the gender gap in publications, as in Figure 2, but controlling for academic career length. This is shown in Figure 5. We can see that in the first four decades, 33-39

and until 60-69, all of the gender gaps in publications are explained by women having *shorter* academic careers. However, in the last three decades, for all active researchers and the top-5 scholars, we also find that, the gender gap is negative even after controlling for their academic career length. In contrast, when we split the sample by field of study, the negative gender gaps are fully explained by women having shorter academic careers. We further split by publication type and control for academic career length, as shown in Figure A6 in the Online Appendix. We see that the effects of controlling for academic career are very similar for all types of publications, especially in the first or fourth decades.

We therefore conclude that the most important underlying reason for the negative gender gaps in publications in high-impact journals is that women have shorter academic careers than men. Our dataset does not allow us to identify whether women stop publishing altogether, devoting their time to other academic tasks such as teaching or student supervision, or keep publishing working papers or in lower-tier journals that are not considered in the set of 36 high-impact journals.

As a final insight, we study the composition of the types of publications over individuals' academic careers by cohort. Does the share of top-5 publications remain constant as one grows older or does it decrease increasing the share of lower-tier publications? Figure A7 in the Online Appendix clearly shows that the latter was clearly the case for men in the first decade (1933-39). However, this pattern is not stable over time and it is not present in the last decade (1990-96), as the share of each type of publication is rather constant over this group's academic careers. With respect to the gender gap, the most notable finding is that in the last decade women have shown a slightly greater share of the next-10 publications while men have a greater share of publications in lowest-tier journals. Other than that, the patterns of publications on the academic careers of men and women look very similar in the last decade.

4.4 Gender Gaps in Citations across Cohorts (1933-1996)

Finally, we look at the second output: citations. We measure if men and women have accumulated different numbers of citations over their academic careers of at most 24 years. Given that we have only accumulated citations for publications in the top-5 journals, we will focus only on the top-5 scholars. We add the additional control of the number of top-5 publications and its interaction with decade, as the gender gap in publications varies across cohorts and publications from older/younger cohorts behave quite differently in terms of citation accumulation.

Figures A8a and A8b in the Online Appendix show gender gaps in citations for the top-5

scholars over the 7 decades and those split by masculine and feminine fields, respectively. Female scholars tend to accumulate, if anything, more citations per published paper than men, as the female coefficients usually take a positive sign, even when scholars are split by their field of specialization, although this coefficient is hardly ever significant. We can think of two possible explanations for the sign of the gender gap in citations. First, women tend to be more concentrated on applied work than on theoretical work even within fields, and the latter accumulates fewer citations. Second, this could also be a result of women facing a greater burden of publishing in top-5 journals (Card et al., 2020; Hengel, 2022).

In summary, we do not find strong evidence that men and women accumulate different numbers of citations per published paper.

5 Conclusions

In this paper we study economics scholars over academic careers of at most 24 years and document the evolution of female representation and the gender gaps in academic performance or output over the past few decades.

Female representation has shown important gains over the past 9 decades, reaching up to 25%. However, we find evidence of both horizontal segregation by field and vertical segregation by prominence, both of which still persist. By 2019, female representation reached 35% in public-development-labour-health economics, while female representation was as low as 20% in econometrics-finance-macroeconomics-theory. Among the top-5 scholars, those who published at least once in any of the top-5 journals, female representation is always below the female share in the overall sample of scholars.

With respect to gender gaps in academic output, the most notable finding is that women publish fewer papers than men. More concerning, when comparing cohorts over time, we find no sign of convergence among all scholars and the top-5 scholars. On the positive side, men and women are most comparable in their number of publications if we consider only scholars working inn feminine fields (80s and 90s). In addition, we also see some important heterogeneity by type of publication: if we count the number of top-5 publications, we see a clear sign of convergence over time in the negative gender gap in publications. However, this is not the case if we focus on the lowest-tier journal publications, where we even see an increase in the gender gap over time. The negative gender gap is explained mostly by women having shorter active careers in publishing than men. That is, women stop publishing in the set of 36 high-impact journals sooner than men.

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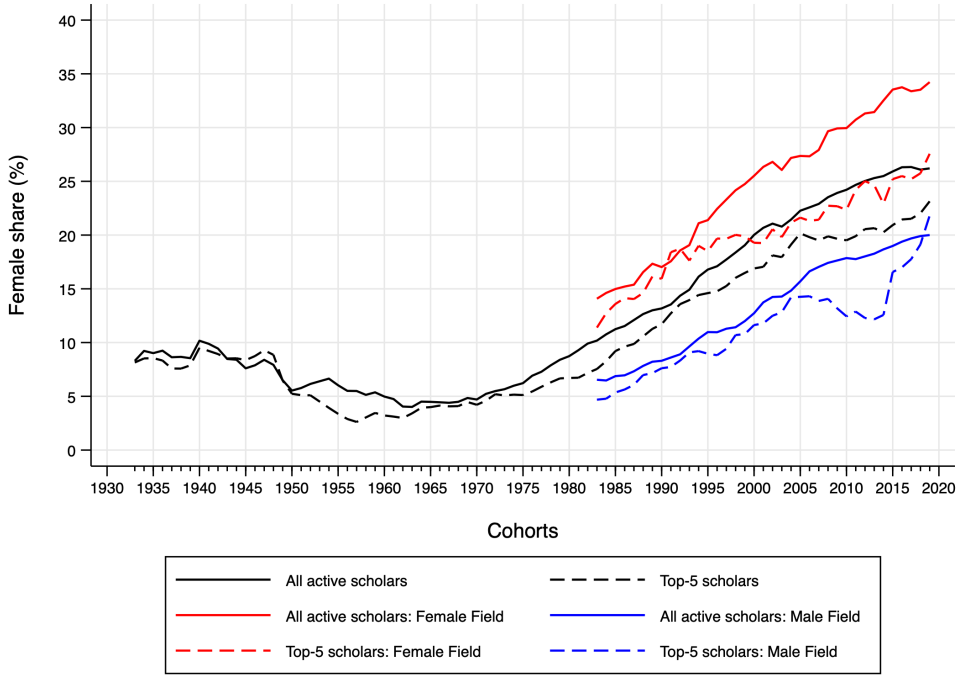
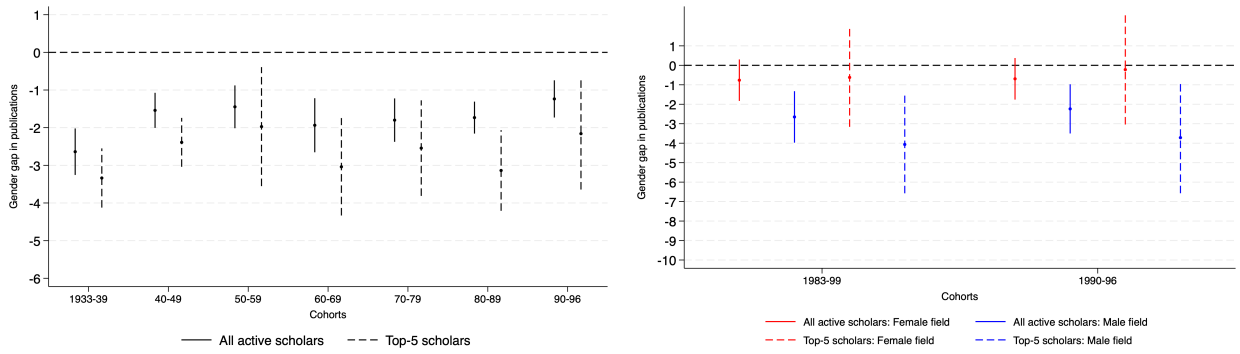
Figures and Tables

Figure 1: Share of Female Scholars by Cohort



Notes: The graph shows the share of female scholars by cohort using 9 year moving averages for two different samples according to author prominence: 1) *all active scholars* (continuous line) and 2) *top-5 scholars* (dashed line): authors who have published at least once in any of the top-5 journals, and according to field: 1) *scholars in feminine fields* (in red): scholars who have a strictly higher number of publications in top-field journals categorized as female (JPubE, JDE, JHE, JOLE) and 2) *scholars in masculine fields* (in blue): scholars who have a strictly higher number of publications in top-field journals categorized as male (JF, JET, JE, JME).

Figure 2: Gender Gaps in Publications

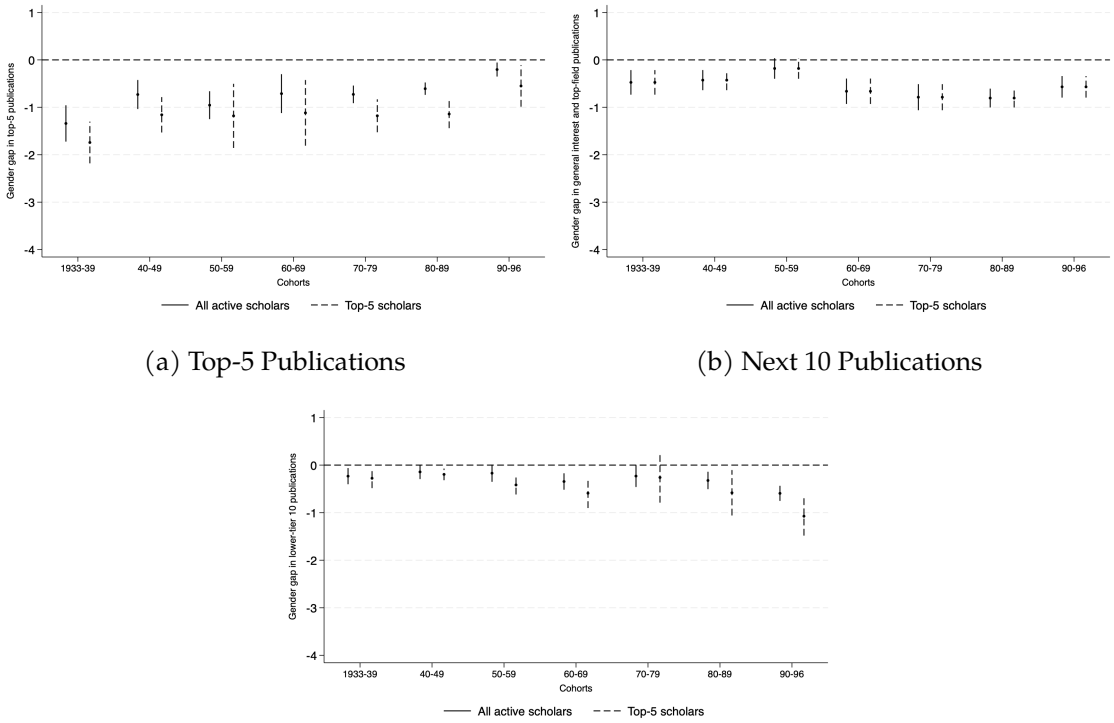


(a) All Active and Top-5 Scholars

(b) All Active and Top-5 Scholars: By Field

Notes: The graph (a) shows the gender gap in the number of publications over an academic career of at most 24 years by cohort for two different samples according to author prominence: 1) *all active scholars* (continuous line) and 2) *top-5 scholars* (discontinuous line): authors who have published at least once in any of the top-5 journals. The graph (b) shows the gender gap in the number of publications over an academic career of at most 24 years by cohort for two different samples according to prominence and by field: 1) *scholars in feminine fields* (in red): scholars who have a strictly higher number of publications in top-field journals categorized as female (JPubE, JDE, JHE, JOLE) and 2) *scholars in masculine fields* (in blue): scholars who have a strictly higher number of publications in top-field journals categorized as male (JF, JET, JE, JME). We stop in year 1996 to allow for an academic career of 24 years.

Figure 3: Gender Gaps in Publications: By Type of Publications



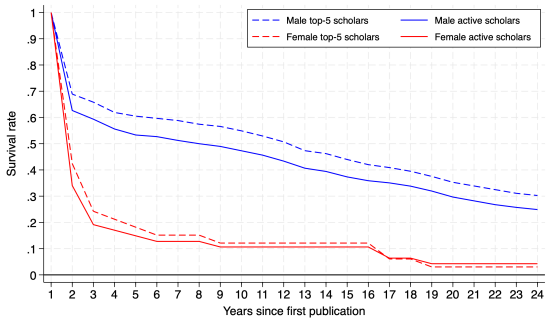
(a) Top-5 Publications

(b) Next 10 Publications

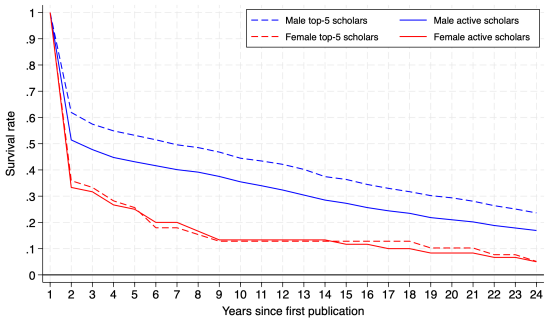
(c) 10 Most Lower-Tier Publications

Notes: The graph (a) shows the gender gap in the number of top-5 publications over an academic career of at most 24 years by cohort for two different samples according to author prominence: 1) *all active scholars* (continuous line) and 2) *top-5 scholars* (discontinuous line): authors who have published at least once in any of the top-5 journals. The graph (b) shows the gender gap in the number of next 10 publications over an academic career of at most 24 years by cohort for two different samples according to author prominence: 1) *all active scholars* (continuous line) and 2) *top-5 scholars* (discontinuous line): authors who have published at least once in any of the top-5 journals. The graph (c) shows the gender gap in the number of 10 most lower-tier publications over an academic career of at most 24 years by cohort for two different samples according to author prominence: 1) *all active scholars* (continuous line) and 2) *top-5 scholars* (discontinuous line): authors who have published at least once in any of the top-5 journals.

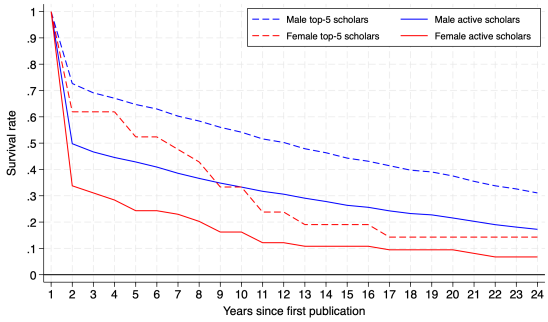
Figure 4: Survival Rates by Decade and Gender



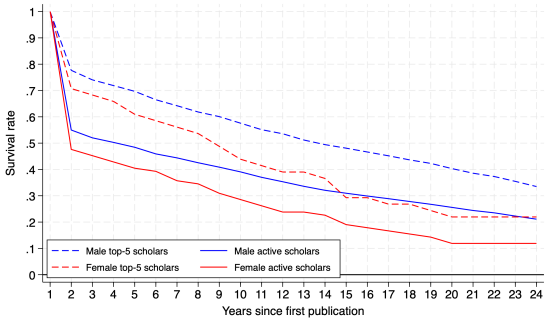
(a) Cohorts: 1933-1939



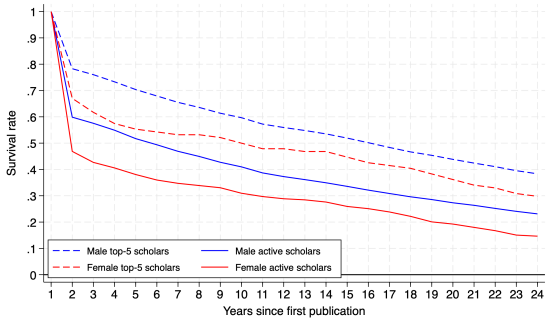
(b) Cohorts: 1940-1949



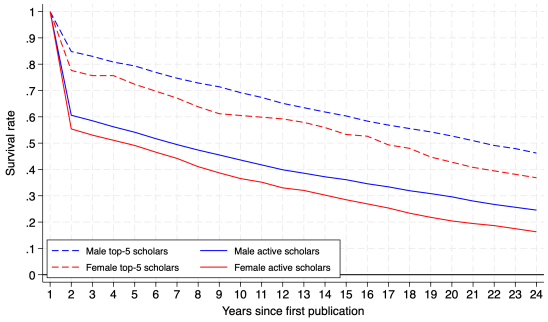
(c) Cohorts: 1950-1959



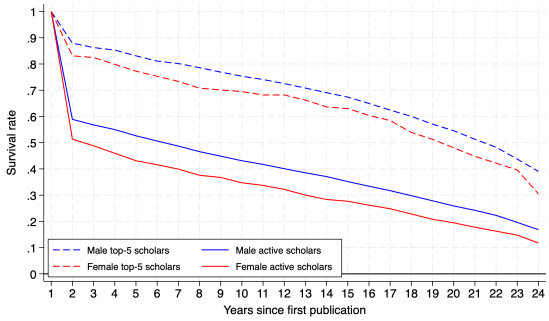
(d) Cohorts: 1960-1969



(e) Cohorts: 1970-1979



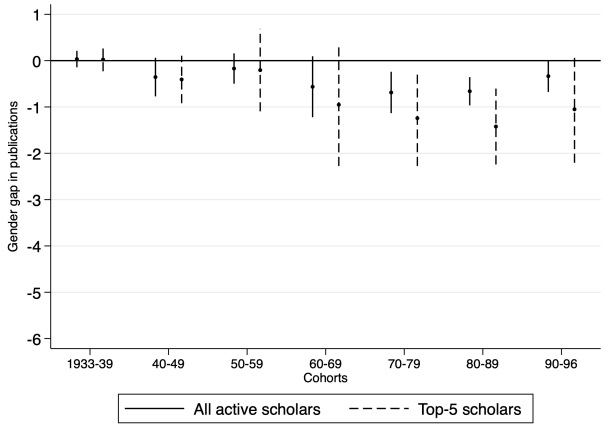
(f) Cohorts: 1980-1989



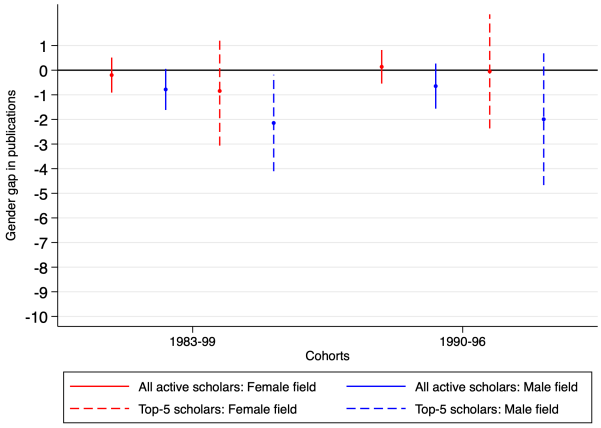
(g) Cohorts: 1990-1996

Notes: The graphs show the proportion of authors who are actively publishing per year over an academic career of 24 years, by gender (blue for men and red for women) and by prominence (solid line for all active scholars and dashed line for top-5 scholars). Each graph shows cohorts belonging to a particular decade. We stop in year 1996 to allow for an academic career of 24 years.

Figure 5: Gender Gaps in Publications Controlling for Active Career Length



(a) All Active and Top-5 Scholars



(b) All Active and Top-5 Scholars: By Field

Notes: The graph (a) shows the gender gap in the number of publications over an academic career of at most 24 years by cohort for two different samples according to author prominence controlling for active career length: 1) *all active scholars* (continuous line) and 2) *top-5 scholars* (discontinuous line): authors who have published at least once in any of the top-5 journals. The graph (b) shows the gender gap in the number of publications over an academic career of at most 24 years by cohort for two different samples according to prominence and by field controlling for active career length: 1) *scholars in feminine fields* (in red): scholars who have a strictly higher number of publications in top-field journals categorized as female (JPubE, JDE, JHE, JOLE) and 2) *scholars in masculine fields* (in blue): scholars who have a strictly higher number of publications in top-field journals categorized as male (JF, JET, JE, JME). We stop in year 1996 to allow for an academic career of 24 years.

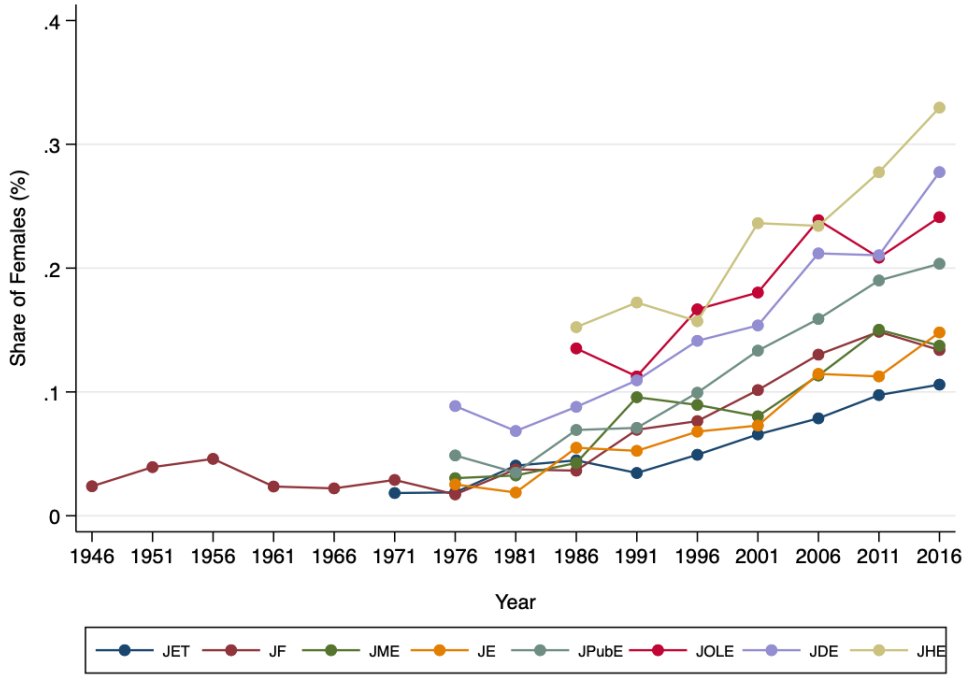
Appendix: Additional Figures and Tables

Figure A1: List of 36 Journals by Year of Inception

1886	**1972**
***Quarterly Journal of Economics* (QJE)**	*Journal of Public Economics* (JPubE)
1888	**1973**
Journal of the American Statistical Association (JASA)	*Journal of Econometrics* (JE)
1891	**1974**
Economic Journal (EJ)	*Journal of Development Economics* (JDE)
1892	*Journal of Mathematical Economics* (JMath)
***Journal of Political Economy* (JPE)**	**1975**
1911	*Journal of Monetary Economics* (JME)
***American Economic Review* (AER)**	**1982**
1912	*Journal of Health Economics* (JHE)
American Economic Review: Papers and Proceedings (AERPP)	**1983**
1919	*Journal of Labor Economics* (JOLE)
Review of Economics and Statistics (REStat)	**1985**
1933	*Econometric Theory* (EcT)
***Review of Economic Studies* (REStud)**	**1987**
***Econometrica* (ECTA)**	*Journal of Economic Perspective* (JEP)
1934	**1989**
Economica (ECA)	*Games and Economic Behavior* (GEB)
1941	**1991**
Journal of Economic History (JEH)	*Economic Theory* (ET)
1946	**2003**
Journal of Finance (JF)	*Journal of the European Economic Association* (JEEA)
1960	**2006**
International Economic Review (IER)	*Theoretical Economics* (TE)
1969	**2009**
Journal of Economic Theory (JET)	*American Economic Journal: Policy* (AEJ: Policy)
Journal of Economic Literature (JEL)	*American Economic Journal: Microeconomics* (AEJ: Micro)
1970	*American Economic Journal: Macroeconomics* (AEJ: Macro)
The Rand Journal of Economics (RAND)	*American Economic Journal: Applied Economics* (AEJ: Applied)
1971	**2010**
International Journal of Game Theory (IJGT)	*Quantitative Economics* (QE)
Journal of International Economics (JIE)	

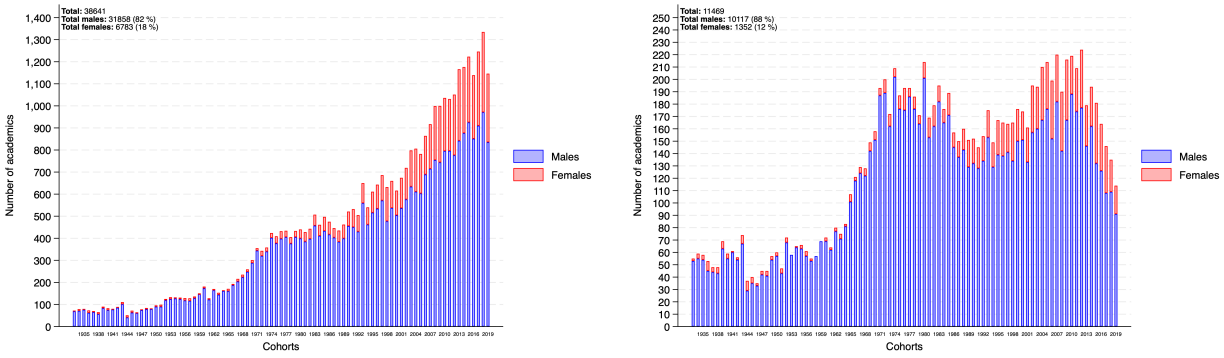
Notes: The figure shows all the 36 high-impact journals and their abbreviations, ordered by their inception year. The top-5 journals are shown in bold and grey. The most relevant field journals are shown in blue.

Figure A2: Share of Female Scholars Publishing in each of the 8 Top-Field Journals



Notes: The figure shows 5-year moving averages for the share of female scholars among the published scholars in each of the most relevant top-field journal, from inception until 2019. The top-field journals are: *Journal of Finance* (1946), *Journal of Economic Theory* (1969), *Journal of Public Economics* (1972), *Journal of Econometrics* (1973), *Journal of Development Economics* (1974), *Journal of Monetary Economics* (1975), *Journal of Health Economics* (1982), *Journal of Labor Economics* (1983).

Figure A3: Number of Male and Female Scholars in each Cohort by Prominence

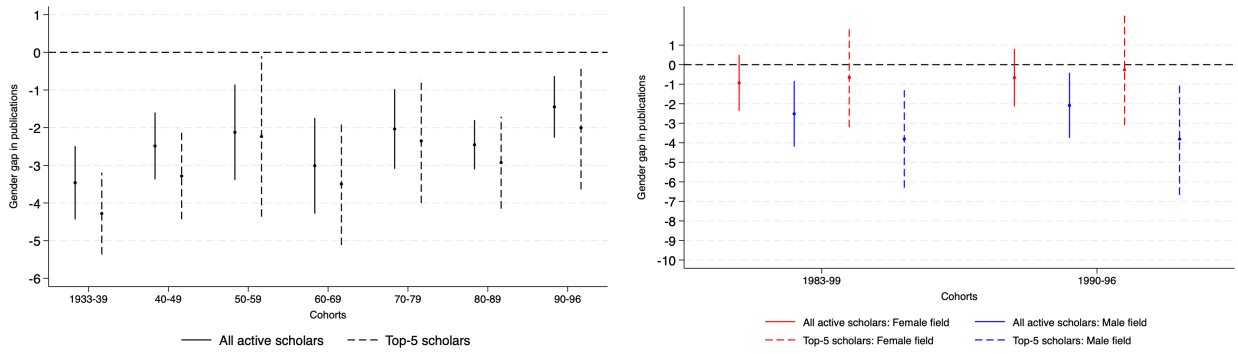


(a) All active scholars

(b) Top-5 scholars

Notes: The histogram (a) shows the number of male and female scholars by year. The histogram (b) shows the number of male and female scholars who have published at least once in any of the top-5 journals per year.

Figure A4: Gender Gaps in Publications: Active for at least 2 Years

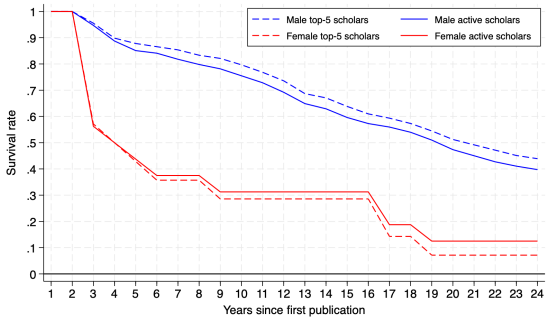


(a) All Active and Top-5 Scholars

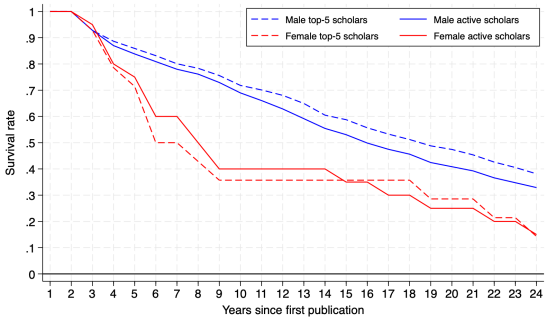
(b) All Active and Top-5 Scholars: By Field

Notes: The graph (a) shows the gender gap in the number of publications over an academic career of at most 24 years by cohort for two different samples according to author prominence: 1) *all active scholars* (continuous line) and 2) *top-5 scholars* (discontinuous line): authors who have published at least once in any of the top-5 journals. The graph (b) shows the gender gap in the number of publications over an academic career of at most 24 years by cohort for two different samples according to prominence and by field: 1) *scholars in feminine fields* (in red): scholars who have strictly higher publications in top-field journals categorized as female (JPubE, JDE, JHE, JOLE) and 2) *scholars in masculine fields* (in blue): scholars who have strictly higher publications in top-field journals categorized as male (JF, JET, JE, JME). We restrict the sample of scholars to those who have been actively publishing during at least 2 years.

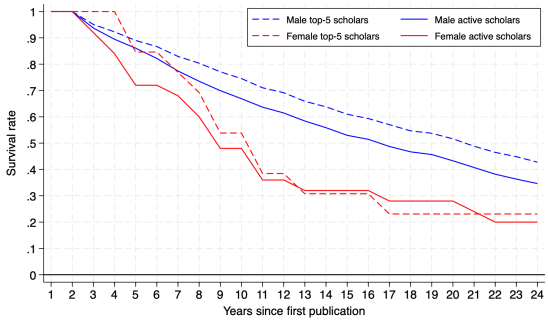
Figure A5: Survival Rates by Decade and Gender: Active for at least 2 Years



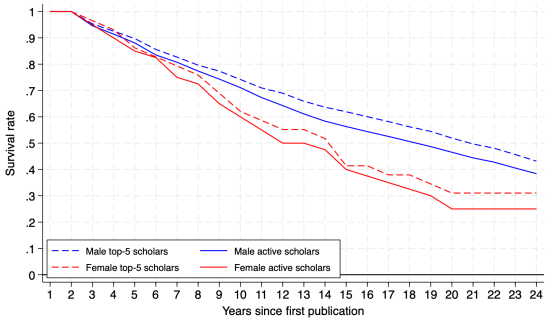
(a) Cohorts: 1933-1939



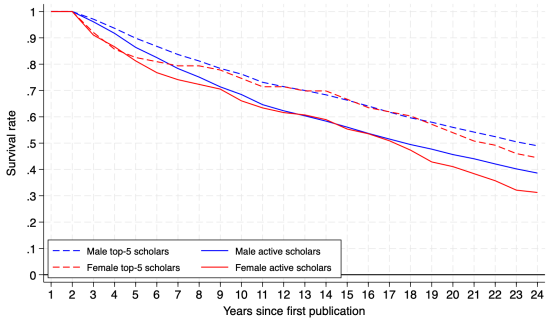
(b) Cohorts: 1940-1949



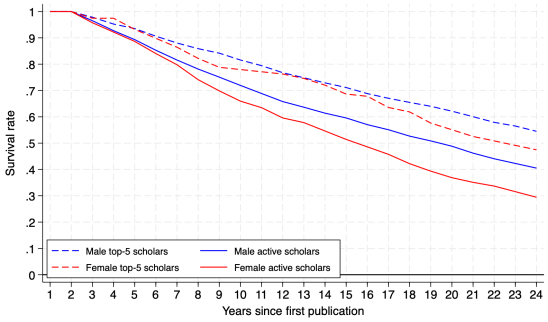
(c) Cohorts: 1950-1959



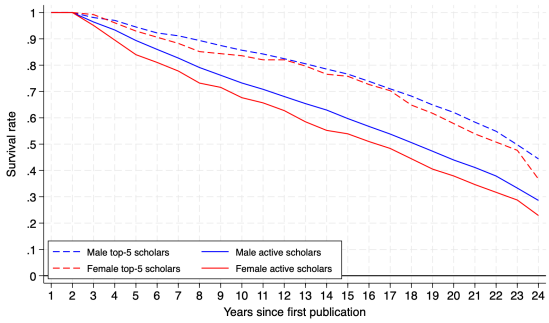
(d) Cohorts: 1960-1969



(e) Cohorts: 1970-1979



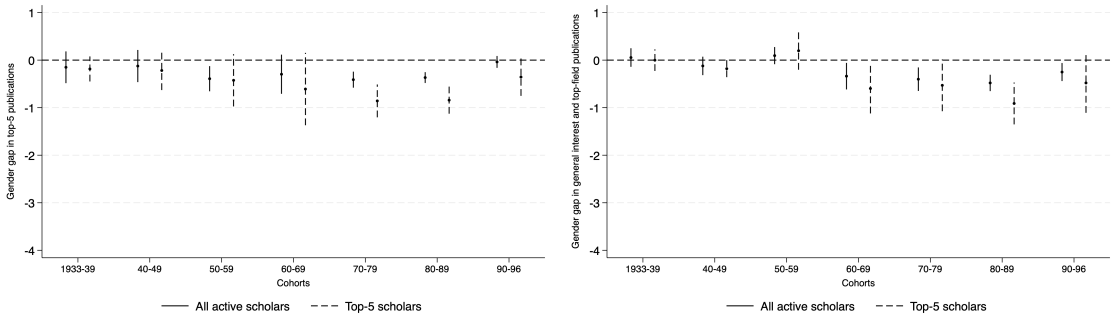
(f) Cohorts: 1980-1989



(g) Cohorts: 1990-1996

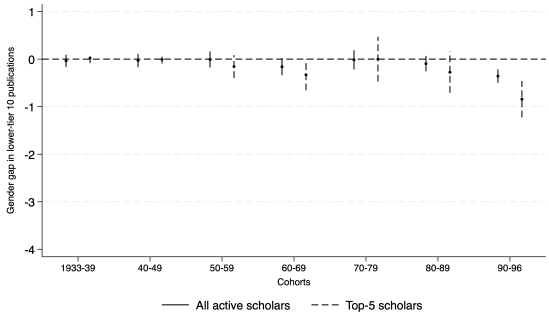
Notes: The graphs show the proportion of authors who are actively publishing per year over an academic career of 24 years, by gender (blue for men and red for women) and by prominence (dashed line for top-5 scholars and solid line for average scholars). Each graph shows cohorts belonging to particular decades. We stop in year 1996 to allow for an academic career of 24 years. We restrict the sample of scholars to those who have been actively publishing during at least 2 years.

Figure A6: Gender Gaps in Publications Controlling for Active Career Length, By Type of Publication



(a) Top-5 Publications

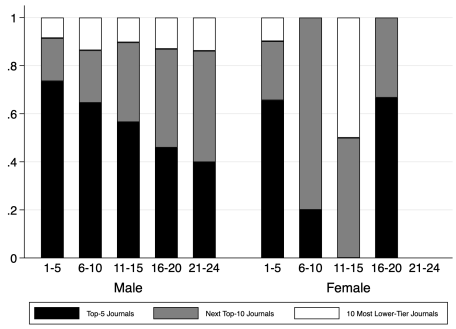
(b) Next 10 Publications



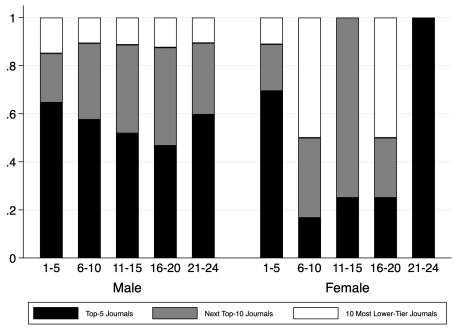
(c) 10 Most Lower-Tier Publications

Notes: The graph (a) shows the gender gap in the number of top-5 publications over an academic career of at most 24 years by cohort for two different samples according to author prominence controlling for active career length: 1) *all active scholars* (continuous line) and 2) *top-5 scholars* (discontinuous line): authors who have published at least once in any of the top-5 journals. The graph (b) shows the gender gap in the number of next 10 publications over an academic career of at most 24 years by cohort for two different samples according to author prominence controlling for active career length: 1) *all active scholars* (continuous line) and 2) *top-5 scholars* (discontinuous line): authors who have published at least once in any of the top-5 journals. The graph (c) shows the gender gap in the number of 10 most lower-tier publications over an academic career of at most 24 years by cohort for two different samples according to author prominence controlling for active career length: 1) *all active scholars* (continuous line) and 2) *top-5 scholars* (discontinuous line): authors who have published at least once in any of the top-5 journals..

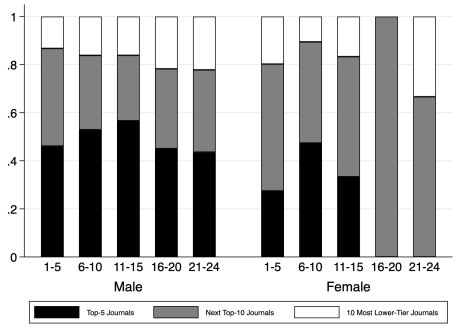
Figure A7: Share of Publications by Journal Type over Academic Careers by Gender and Cohort



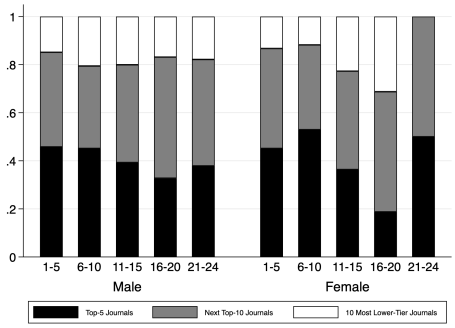
(a) Cohorts: 1933-1939



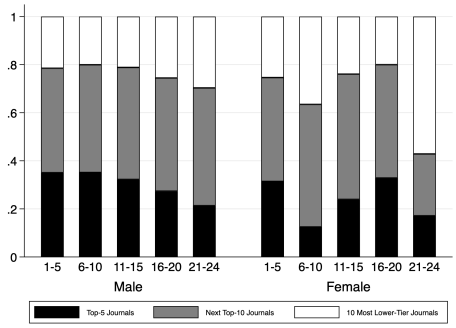
(b) Cohorts: 1940-1949



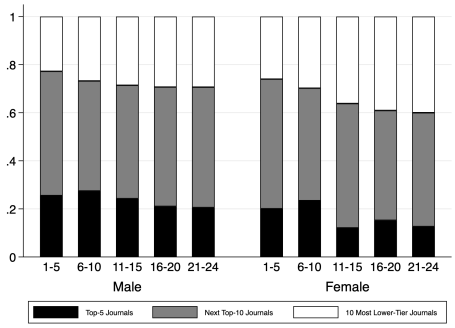
(c) Cohorts: 1950-1959



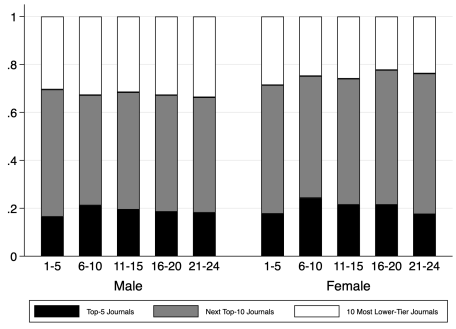
(d) Cohorts: 1960-1969



(e) Cohorts: 1970-1979



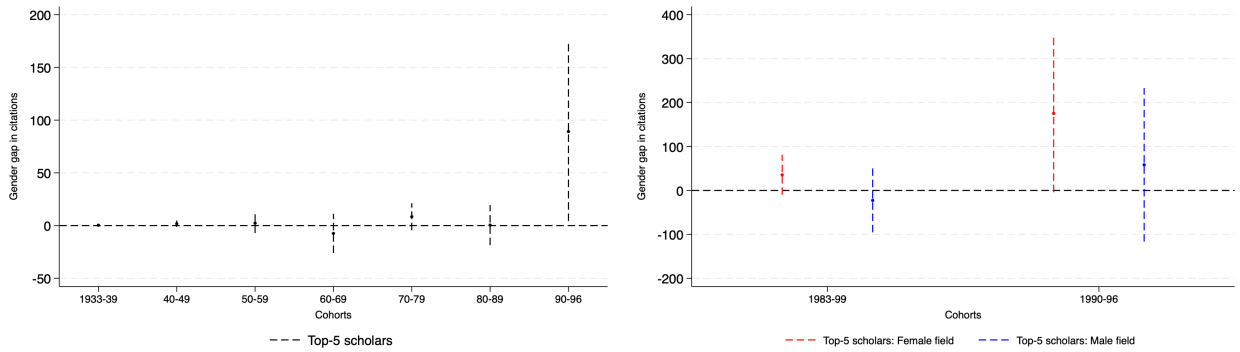
(f) Cohorts: 1980-1989



(g) Cohorts: 1990-1996

Notes: The graphs show the distribution of publication types across journal categories (top-5 publications, next 1o publications and 10 most lower-tier publications) over the academic careers, by gender and cohort. Each bar represents a 5-year window in academic careers of at most 24 years, and shows the share of each publication type relative to the total number of publications within a given window, for men and women separately. Each graph shows cohorts belonging to particular decades. We stop in year 1996 to allow for an academic career of 24 years.

Figure A8: Gender Gaps in Citations



(a) Top-5 Scholars

(b) Top-5 Scholars: By Field

Notes: The graph (a) shows the gender gap in the number of citations per published paper over an academic career of at most 24 years by cohort for the *top-5 scholars* (dashed line): authors who have published at least once in any of the top-5 journals. The graph (b) shows the gender gap in the number of citations per published paper over an academic career of at most 24 years by cohort for *top-5 scholars* by field: 1) *scholars in feminine fields* (in red): scholars who have a strictly higher number of publications in top-field journals categorized as female (JPubE, JDE, JHE, JOLE) and 2) *scholars in masculine fields* (in blue): scholars who have a strictly higher number of publications in top-field journals categorized as male (JF, JET, JE, JME).