Gender Gaps among Scholars in Economics: Analysis Across Cohorts*

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August 2025

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 in 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 do, and more concerningly, the negative gender gap has shown no sign of convergence since the 1940s, although there is substantial heterogeneity in the *type* of publication. The negative gender gap in publications is significantly reduced when we control for the length of authors' active academic careers, as women's careers tend to be *shorter*.

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 and Nagore Iriberri acknowledge funding from PID2023-147817NB-I00 funded 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, one limitation when studying labor market outcomes is the difficulty of 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 a 90-year period (1933–2019). A considerable advantage of studying scholars in economics is that the most relevant performance variables – accumulated publications and citations – are quantifiable and observable. We use the dataset created by Card et al. (2022), which includes any active researcher who has published at least once in any of the 36 high-impact journals in the field of economics (see Table A1 in the Appendix for all the 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 collapse 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 as those 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, particularly starting with the cohort of 1970. Female representation was approximately 5% in this cohort, after which a clear upward trend began, reaching 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 classify researchers as working in *more* or in *less* male-dominated fields, because female representation is less than 50% in all areas of economics. The classification is based on the distribution of each author's publication record across eight top field journals, which differ in their gender composition. Authors with a

higher share of publications in journals with a higher proportion of male authors – i.e., *Journal of Finance*, *Journal of Economic Theory*, *Journal of Econometrics* and *Journal of Monetary Economics* – are classified as working in more male-dominated fields. Those publishing more research articles in journals with a relatively lower share of male authors – i.e., *Journal of Public Economics*, *Journal of Development Economics*, *Journal of Health Economics* and *Journal of Labour Economics* – are classified as working in less male-dominated fields. We find that the gap in female representation between less and more male-dominated fields has doubled over time – from 7 percentage points in the 1983 cohort to 14 percentage points in the 2019 cohort. This suggests that horizontal segregation has increased across successive cohorts. To study vertical segregation, we analyze two samples of scholars, namely, all active scholars and the top-5 scholars, which is defined as those who have at least one publication in the so-called top-5 journals. We find clear evidence of vertical segregation, as female representation is consistently lower among the top-5 scholars than among all active scholars and when separated between those working in more and in less male-dominated fields. This could be in part due to the top-5 journals having a preference for topics in more male-dominated fields. For further insight, we test the importance of the field in the probability of being a top-5 scholar. We find that scholars working in less male-dominated fields are less likely to be top-5 scholars. However, even after controlling for the field in which scholars work, we find that women are less likely to be top-5 scholars.

Second, women produce fewer publications than men do over 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 journals. 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. Even more concerningly, since the 1940s, we see no clear signs of convergence in the gender gap in publications, until 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 for the sample of all scholars among the top-5 scholars and among scholars working in more male-dominated fields. The exception is when comparing the group of all scholars and the top-5 scholars in less male-dominated fields, which do not show significant gender gaps in publications. Interestingly, we also found important heterogeneity with respect to publication *type*.

Third, the differences in active career lengths across subgroups in the set of 36 high-impact journals reveal interesting patterns over time. In particular, we observe a clear convergence between men's and women's active career lengths across cohorts, along with a widening gap between the career lengths of all active scholars and top-5 scholars. In the 1930s, 50% of women stopped publishing in the set of 36 high-impact journals by their third year

compared to only 11% of men. By the 1980s, the gap between the proportions of men and women who stopped publishing in this set of journals by their third year narrowed, becoming close to 7% for both. Interestingly, unlike in the 1930s, when the careers of all active scholars and top-5 scholars were very similar in length comparing by gender, by the 1980s, the survival rates of the top-5 scholars were considerably higher than those of all active scholars. For example, in the 1990s, by their eighth year, 76% of men and 72% of women were still publishing among all active scholars, while among top-5 scholars, significantly larger shares – 87% of men and 84% of women – continued to publish.

Finally, we show that once career length is accounted for, the estimated gender gap in publications is no longer statistically significant for all cohorts up to the 1960s. Moreover, despite the clear convergence in career lengths between men and women over time, controlling for career length still reduces the estimated gender gap in publication counts by 50–70% for cohorts from the past four decades (1960–1996).

Documenting female representation among scholars in economics has been an object of interest among economists for some time, although finding reliable databases has been challenging. The first studies measured female representation between the 1970s and 2010s in the United States using databases on completed PhDs and surveys contacting the most important PhD-granting departments in economics (Kahn, 1995; Ginther and Kahn, 2004; Lundberg and Stearns, 2019; Ginther and Kahn, 2021). 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 considerable 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 I (health, education and welfare) and J (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 the subfields of 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 may be rooted in gender differences in academic performance across subfields that emerge as early as the undergraduate level. More recently, Auriol et al. (2022) measured female representation in the year 2020 using web-scraped data from the top 300 research institutions in Repec and compared those female representations across Europe and

the United States and across job titles. Our contribution to existing studies lies in documenting the evolution of female representation over a 90-year period (1933 to 2019) using a sample of active researchers publishing in 36 high-impact journals in economics, as well as the evolution of the share of women in more and less male-dominated fields within economics and across prominence levels.

Closer to our study, Hengel and Phythian-Adams (2022) studied female representation between 1940 and 2020, and 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 the former included a smaller set of journals (top-5 and *The Economic Journal*), while the latter included a larger set of journals. Ductor et al. (2023) 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 but we study the female share among new academic entrants (i.e. across cohorts), all three studies conclude that important gains have been made over recent decades. Additionally, consistent with Hengel and Phythian-Adams (2022), we also find a U-shaped pattern in female representation between the start of the 20th century and 1970. In terms of gender gaps in publications, consistent with our findings, Ductor et al. (2023) 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 the top-5 publications clearly show signs of convergence, and the gaps in the next 10 journals have remained constant over the past 4 decades. In addition, we expand on their work in the following dimensions. First, we use a longer time horizon, that dates back to 1933. This longer view allows us to interpret recent trends in female representation and gender gaps in publications more critically, which is of vital importance. Second and more importantly, whereas they analyze dynamic panel data, we perform a cohort analysis to study the evolution of female representation and gender gaps over time using a cross-section of authors – where we define cohorts by the year of an author's first publication. Our approach allows us to gain insights into the evolution of a key variable across cohorts: scholars' career length. As explained above, our results show that the significant negative gender gap in the total number of publications over careers narrows substantially – and disappears in earlier cohorts – once we account for career length. Third, we provide a more comprehensive picture by analyzing not only the overall sample of authors but also authors working in more and less

male-dominated fields, and authors of different levels of prominence.

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 of seminars and within the broader 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 data in detail. Section 3 examines the evolution of female representation among cohorts of economics scholars from 1933 to 2019. Section 4 analyzes the gender gap in key academic outputs (publications and citations) as well as in publishing activity over academic careers for cohorts 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. Table A1 in the Appendix lists all 36 journals used to create the dataset, along with their inception years.

The most relevant economic journals are included. The so-called top-5 journals are among the oldest ones: *Quarterly Journal of Economics* (1886), *Journal of Political Economy* (1892), *American Economic Review* (1911) and *Review of Economic Studies* and *Econometrica*, both of which started in 1933. Other important general interest journals include *The Economic Journal* (1891), *Review of Economics and Statistics* (1919), *International Economic Review* (1960) and the more recent *Journal of the European Economic Association* (2003). The most relevant field journals allow us to identify more and less male-dominated 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). The eight field journals, except the *Journal of Finance*, are newer journals compared with the general interest journals, as most of them were created in the 1970s.

Our study analyzes the evolution of cohorts over time, where a cohort is defined as the group of scholars who share the year of their first publication. For example, all scholars who had their first publication of their academic career in 1990 belong to the 1990 cohort.

One may wonder whether our cohort definition – which is based on the year of first publication in the set of 36 high-impact journals – includes male and female economists who differ systematically in the number of years since attaining their PhD. For example, if women tend to publish their first paper later than men do in these journals, then we could be comparing relatively older women to younger men. Because our dataset lacks information on the year of graduation, we use the dataset assembled by Sarsons et al. (2021), which includes economists who came up for tenure between 1985 and 2014 at one of the top 35 US PhD-granting universities, to assess whether such gender differences exist. The economists in Sarsons et al. (2021) – which include those hired for tenure-track positions at top US departments – are arguably among those with better publication prospects and therefore most likely to publish in our set of 36 high-impact journals. Nevertheless, to ensure comparability, we restrict their sample to authors whose publication quality is at least as high as the lowest-ranked journal in our list, using their dataset's "average quality of publications" measure from first publication to tenure. This measure is based on the journal in which each paper is published and employs the "AER-equivalent" ranking developed by Kalaitzidakis et al. (2003).[1]

Using this restricted sample, we test whether men and women differ in the time from graduation to first publication. Our test fails to reject the null hypothesis that men and women spend the same number of years between graduation and first publication, both in the overall sample (p-value = 0.47) and within each graduation cohort from approximately 1979 to 2008.[2] We interpret this as evidence that our cohort definition includes men and women of similar academic age. Note, nevertheless, that those researchers in top US departments, as well as our sample of economists (i.e., those who publish at least once in the set of 36 economic journals), represent authors among the most well published economists. In other words, we focus our analysis on a selected set of highly published academic scholars in economics, a point that we will revisit at the end of this section.

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 or 17% of whom are

[1] To apply this restriction, we assign each journal in our dataset an "AER-equivalent" score based on Column 5 of Table 1 in Kalaitzidakis et al. (2003). Approximately 85% of individuals in the Sarsons et al. (2021) dataset meet this threshold.

[2] This conclusion also holds under alternative quality cutoffs and when using the full sample.

women). To analyze gender gaps in academic output, we study the cohort of scholars in economics 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.[3] We then measure publications and citations over their entire careers or over their first 24 years of 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 from the year of their first publication 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 have a sample of 11,469 scholars, of whom 1,352 (12%) are women, and between 1933 and 1996 we have a sample of 7,226 scholars, among whom 534 are 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. Most studies using published academic articles have used JEL codes to analyze female representation across subfields in various domains (see, for example, Dolado et al., 2012 and Hengel and Eunyoung, 2023). Given that we do not have JEL codes, we follow a different approach and categorize scholars based on the field journals in which they publish. We therefore look at a more basic level of segregation, as each journal publishes more than one JEL code. Our interest lies in documenting the *evolution* of female representation in published articles by the field of specialization over time, and our dataset allows us to analyze the interaction between horizontal and vertical segregation. Note that we can make such comparisons only for the time during which all eight field journals exist, which is, from 1983 onward.

Our approach begins by plotting in Figure 1 the female share of scholars publishing in each of the eight top field journals we identified in Table A1 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). The figure shows that, although all journals show important gains in female representation, the share of women who published in these journals has remained very unequal over the past 7 decades.

[3] 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 13 years – for female scholars.

The journals in the fields of health, labor, public economics and development – i.e., *Journal of Health Economics, Journal of Labor Economics, Journal of Public Economics* and *Journal of Development Economics* – consistently show a greater share of women, above 15% in the last 20 years, than those in the fields of finance, monetary economics, econometrics, and economic theory – i.e., *Journal of Finance, Journal of Monetary Economics, Journal of Econometrics and Journal of Economic Theory* – which have remained below 15% over the same period. Given that women represent well below 50% of authors in all journals over the studied period, we refer to the former group as representing less male-dominated fields and the latter as more male-dominated fields. Importantly, the ranking of field journals by female representation has remained stable over time. Therefore, our classification of journals into more and less male-dominated fields is stable throughout the entire 1946–2019 period.

Based on this classification of field journals, we categorize authors by field specialization. Specifically, we define authors as working in a more (or less) male-dominated field if they have a strictly greater number of publications in top field journals from the corresponding group. Between 1983 and 2019, 8,035 authors specialized in more male-dominated fields, of whom 1,140 were women (14%). In contrast, 7,786 authors worked in less male-dominated fields, of whom 2,094 were women (27%). Between 1983 and 1996, there were 2,423 authors in more male-dominated fields (198 women, or 8%) and 1,859 in less male-dominated fields (319 women, or 17%). The rest of the authors during those periods were not assigned a field and are thus excluded from this classification (45%, in the 1983–2019 period, and 41% in the 1983–1996 period). This can occur for two reasons: either the author published an equal number of papers in journals from both field groups, or the author never published in any of the eight top field journals. The vast majority of authors belong to the second subgroup, with more than 94% in either of the two samples.

Clearly, the overall field of economics includes a larger set of journals than the 36 listed in this sample. In fact, the authors who publish in these 36 high-impact journals represent approximately 2% of the authors publishing in a much more extensive list of 1,990 journals.[4] Nevertheless, articles in these journals receive the majority of citations in economics (Kalaitzidakis et al., 2003), and their authors often hold influential positions, such as editorial roles (Funk et al., 2024) or recognition from prestigious institutions such as the Econometric Society (Card et al., 2022) and the American Academy of Arts and Sciences (Card et al., 2023).[5] This makes the study of gender dynamics within this selected sample

[4]We count the number of authors between cohorts from 1970–2017 in our sample and compare it to the sample size of Ductor et al. (2023), whose sample includes authors publishing between 1970 and 2017 in 1,990 journals.

[5]Of the 29 journals on our list established before 2003, 20 are included in the top 30 according to the ranking developed by (Kalaitzidakis et al., 2003), which includes 159 journals created before 2003. These

highly relevant. We therefore acknowledge that our analysis reflects female representation and gender gaps in academic output among the best-published authors—a group of particular importance—and that any extrapolation to the broader population of economists is not warranted.

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 their academic careers started, and we ended with the 2019 cohort, the last cohort for which we obtained female share data.

Figure 2 shows the evolution of the share of women among all active scholars, top-5 scholars and scholars in less and more male-dominated fields.[6] The figure shows clear evidence of both vertical and horizontal segregation. More precisely, our interest lies in analyzing how these forms of segregation, and their interactions, have evolved over time, which reveals interesting results.

First, the solid black line in Figure 2, which represents the share of women among all active scholars, shows a clear turning point around the 1970s cohort, after which female representation steadily increased: women comprised approximately 5% of the 1970s cohort and more than 25% of the 2019 cohort.

Ductor et al. (2023), whose dataset begins with publications in the year 1970, found very similar figures in 1970, approximately 5%, and Hengel and Phythian-Adams (2022), whose dataset begins with publications in the year 1940, found a very similar share of slightly above 5%. For the 2020 cohort, our female share of 25% is lower than the share of 30% in Ductor et al. (2023) and higher than the share of 20% in Hengel and Phythian-Adams (2022). These differences are consistent with the vertical segregation in economics that we document below, as their larger and smaller sets of journals include many more and fewer lower-ranked journals, respectively. Additionally, we study the female share among new academic entrants (i.e. across cohorts), while they study that among the total pool of

top 30 journals account for more than 90% of all citations in the list.

[6] Figure A2 in the Appendix shows the equivalent female shares taking a more dynamic definition of top-journals throughout the history. In particular, *The Economic Journal* and *Economica* were among the top journals up to 1995. The main patterns remain, although vertical segregation between 1950 and 1965 is no longer present.

scholars each year. When compared to Ductor et al. (2023), if we calculate the female share among the total pool of academics – as they do – then the female share drops from 25% to 20%. Thus, focusing on the evolution of female shares across cohorts rather than over time leads to more optimistic results, as men having longer academic careers than women do (a fact discussed at length in Section 4.3) has spillover effects over the years, thereby affecting the gender composition of the pool of active scholars each year.

Our dataset goes four decades further back than that of Ductor et al. (2023), allowing us to document, as shown in Figure 2, that the increasing trend described above was preceded by a U-shaped in female representation between 1945 and 1970. This U shape arises because the number of women entrants remained relatively constant across cohorts from 1945 to 1970, while the number of men in each new cohort increased drastically during this quarter-century.[7] Afterward, between the 1970 and 1980 cohorts, the total number of women in each cohort increased at an average annual rate of 233% (see Figure A3 in the Appendix). By 1980, female representation eventually reached levels similar to those seen in the 1934–1945 cohorts, approximately 10%, thereby closing the U-shape. The turning point in the year 1970 coincided with the establishment of many new journals, as between the end of the 1960s and the beginning of the 1980s 14 new journals were introduced, including all top field journals except for the *Journal of Finance*, which was established in 1946.

The same U-shaped pattern is also found in the study by Hengel and Phythian-Adams (2022). This is expected, as during the earlier period (between 1933 and 1970), the set of journals that existed (see the list of journals and year of inception in Table A1) is more limited; and therefore, our set of journals is closer to the set of journals considered in their study (top-5 and *The Economic Journal*). More surprising, the U shape that we document may also align with the U shape documented by Iaria et al. (2022) in the negative gender gaps in publications over the same period in the sciences (mathematics, biochemistry, and chemistry). Iaria et al. (2022), whose measure of representation is not publication-based, show that the negative gender gap in publications increased between 1938 and 1969 and experienced a significant decrease after 1970. This pattern corresponds with the notable increase in the number of women in each new cohort after 1970 who started publishing in our list of journals. Therefore, our results suggest that similar patterns observed globally in fields such as mathematics, biochemistry, or chemistry were also present in the field of economics.

[7] The number of women per cohort grew by 18% annually between 1945 and 1970 and that of men brew by 917%.

The second interesting result revealed in Figure 2 is the existence of vertical segregation over decades in economics. This is clearly seen in the fact that the dashed black line in Figure 2 is below the solid black line across cohorts over time, particularly after 1950, as more journals are established, indicating that the stricter the prominence criteria are, the lower the share of women. Moreover, since 2005, this gap between the solid and dashed lines becomes, if anything, larger, reaching 5 percentage points. Note that at least until the 2015 cohort, this result is not driven by female top-5 scholars having their first top-5 publication later in their career than their male counterparts, which would mechanically lower the share of female top-5 scholars in the most recent cohorts, as these are truncated (the average number of male and female top-5 scholars have their first top-5 publication 4 years after their first publication).[8]

Third, with respect to horizontal segregation Figure 2 also shows that it has intensified over time. In particular, the difference between the solid red and blue lines – which represent the female share in less male-dominated and more male-dominated fields among all scholars, respectively—doubled from 7 percentage points in the cohort of 1983 to 14 percentage points in the 2019 cohort. With women in new cohorts being increasingly concentrated in less male-dominated fields, by 2019 the female share in these fields reached almost 35%, while it was just approximately 20% in more male-dominated fields. Figure A4 in the Appendix shows the increasing popularity of less male-dominated fields relative to more male-dominated fields among female scholars over the past 4 decades. While the annual growth rate in the number of women by cohort between the 1983 and 2005 cohorts was 218% within less male-dominated fields and 139% within more male-dominated fields, after 2006, the annual growth rate of females in more male-dominated fields stagnated (at an annual average rate of 7%), in contrast to the growth rate in less male-dominated fields, which continued its previous growth path. Men, on the other hand, who were once much less likely to work in less male-dominated fields, have become as likely to work in both more and less male-dominated fields, indicating a shift in the profession.

Fourth and finally, Figure 2 shows that the share of women among top-5 scholars in both more and less male-dominated fields is lower than that among all active scholars, which is consistent with previous findings. Additionally, the figure shows that vertical segregation is particularly strong and increasing in less male-dominated fields. The interaction between vertical and horizontal segregation suggests a trade-off: fields with a higher presence of women tend to have a lower share of prominent women.

[8]To obtain these statistics, we use the latest cohorts for whom we observe career lengths of at least 24 years, i.e., 1990–1996.

Could it be that part of the observed vertical segregation is due to the top-5 journals being less likely to publish work in fields that are less male-dominated? Given that women are more likely to work in less male-dominated fields, if scholars working in less male-dominated fields are less likely to be top-5 scholars, then this could partly be an underlying mechanism. To test for this, we first use the classification of scholars working in more and less male-dominated fields and estimate the gap by field (less to more male-dominated) in the probability of being a top-5 scholar. This is shown in Figure A5 in the Appendix, overall and by male and female scholars. The field gap is statistically significant and negative, both overall and by gender, although it decreases over time. This can be interpreted as authors working in less male-dominated fields (compared with more male-dominated fields) being correlated with a lower probability of being a top-5 scholar. Next, we estimate the gender gap in the probability of being a top-5 scholar, which directly measures vertical segregation, first without and second after controlling for the field classification, as shown in Figure A6 in the Appendix. This gap is negative and significant in both cases, when not including and when controlling for field, which shows that the vertical segregation is not entirely driven by the group of top-5 scholars having a higher share of scholars working in more male-dominated fields.[9]

We conclude that the female share among economists publishing in high-impact journals has been less than 10% since the 1930s and that although important gains have been made starting with the 1970s cohort, it is still far from parity. Additionally, important differences in the prominence of authors (vertical segregation) and fields of study (horizontal segregation) are found, both of which persist today.

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

In this section, we document gender gaps across cohorts in terms of two outputs over scholars' active research careers of at most 24 years. To make the results comparable, 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 the top-5 journals.

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

[9]We present a complementary analysis based on Oaxaca decomposition in Table A1 in the Appendix. This decomposition analysis shows that men and women having different field compositions only account for 8 to 22% (depending on the cohort) of the difference in the probability of being a top-5 scholar.

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

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. To do so, we interact the female dummy with indicators for groups of cohorts. We created 7 groups, grouping the cohorts by decade: 1933-39, 40-49, 50-59, 60-69, 70-79, 80-89, and 90-96. We pooled the female coefficient across 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, and interact with the group g of scholar i. As with the female representation, we start with the sample of all active researchers, but also show the results for the top-5 scholar sample, as well as for scholars working in more and less male-dominated fields.

The graphs presented in the next sections plot the seven $\hat{\beta}_g$ 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.

Table A2 in the Appendix shows the descriptive statistics on the number of publications by cohort for all scholars (panel A) and top-5 scholars (panel B) and by field. A few interesting patterns emerge. On average, for all the scholars, male scholars publish between 3.3 and 5 publications, while female scholars publish between 1.7 and 3.7 publications. Compared with all the scholars, the top-5 scholars are, regardless of gender, as expected more prolific than all scholars. Top-5 male scholars accumulate between 5.2 and 10.5 publications and the top-5 female scholars accumulate between 1.9 and 8.3 publications over their careers. Over time, more recent cohorts are even more prolific than prior cohorts. Finally, scholars working inn more male-dominated fields have more publications than authors working in less male-dominated fields do.

Figure 3a 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 1990–1996 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 concerningly, 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 top-5 scholars.

The plot in Figure 3b displays the data further split by scholars working in more and less male-dominated fields. On the one hand, for scholars working in less male-dominated fields, we find no significant negative gender gaps and this finding is the same for all scholars and top-5 scholars. On the other hand, 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 more male-dominated fields. While the figure shows differences by field within each cohort, we formally test whether these differences are statistically significant and find that they indeed are. Specifically, we find that for the overall sample of scholars, for the 1983–1989 cohort the gap in publications differs significantly across the more and less male-dominated fields at the 5% level (p-value = 0.029), and that for the 1990–1996 cohort, the difference is significant at the 10% level (p-value = 0.067). Among the top-5 scholars, the 1983–1989 cohort shows a marginally significant difference at the 5% level (p-value = 0.058), and the difference in the 1990–1996 cohort is significant at the 10% level (p-value = 0.087).

Note that these results are not mechanically driven by our classification of authors into less and more male-dominated fields, as we count all the publications in the 36 journals (and not only the publications in the eight top-field journals). As a robustness test, we also estimated the number of publications excluding those in the eight top field journals and the same result remained (these results are available upon request).

A complementary analysis of the gender gaps by field is estimating gender gaps separately within each of the top-field journals. In particular, we examine publication gaps among scholars in the 1983–1986 and 1990–1996 cohorts within each journal. This approach considers that each top-field journal comprises authors who publish in that specific field (without classifying them into more or less male-dominated fields). Descriptive statistics are shown in Table A3 and gender gaps are shown in Figure A7, of the Appendix. Two patterns emerge. First, women have improved on their publications over time (when comparing later with earlier cohorts) across all the fields except finance and theory, whereas men improved only in terms of their publications over time in development, theory and finance (see Table A3). Second, consistent with the findings in Figure 3b, Figure A7 shows that in less male-dominated fields, gender gaps are not statistically significant in any of

the two cohorts (with the exception of health economics, where it is negative), whereas in more male-dominated fields, theory and finance show a significant and negative gender gap. Theory and finance seem to be two fields in which women are not only less represented but also publish significantly fewer research papers than men are.

To summarize, over their academic careers, women in economics publish fewer papers than men do, and this negative gap has shown no sign of convergence since the 1940s. The only exception is scholars working in less male-dominated 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 (*The Economic Journal* and *Review of Economics and Statistics*) and the eight 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.[10] Figure 4 shows the gender gaps over time for all scholars and for the top-5 scholars for the three types of publications.

On the positive note, we find a clear sign of convergence on the negative gender gap in publications over time when we focus on the top-5 publications (see Figure 4a). Less positively, we find no sign of convergence when we focus on the next 10 publications (see Figure 4b). Note that when we consider this set of publications, most of the top field journals were created in the 1960s; thus, we should focus on analyses beginning in the 1960s. However, 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 4c).

With this analysis by publication type we can reconcile our results with the results 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

[10]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*.

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 publication 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 do 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 more male-dominated 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 driven 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).[11]

For each cohort, we estimate the Kaplan–Meier survival functions separately for men and women, both for the overall sample of scholars and for the top-5 scholars. The year of their first publication takes, by construction, the value of one and must be the same for male and female scholars. For subsequent years, some scholars continued to actively publish in this set of 36 high-impact journals, while others stopped doing so. Survival in the second year means that a scholar published either that year or in any later year.[12] Because the Kaplan–Meier estimator is a step function, we have linearly interpolated between steps for smoother visualization.

Figure 5 presents plots of the linearly interpolated point estimates of the survival functions for men (blue line) women (red line) and for all active researchers (solid line) and top-5 scholars (dashed line) along with 95% confidence intervals. In the first decade, men's

[11] In the estimation of survival functions we restrict our analysis to all scholars and top-5 scholars, but we do not pursue further analysis by authors working in more and less male-dominated fields, as we do not have enough power for such analysis.

[12] The estimation of the Kaplan–Meier functions accounts for the right-censoring of individuals still active in 2019. Although the plots report survival rates only up to 24 years after the first publication for readability, the estimates themselves are based on the full observed career lengths in the data.

and women's active research careers had very different lengths. Fifty percent of women stopped publishing in this set of high-impact journals by their third year, while only 11% of men did. Interestingly, for these earliest cohorts, the large differences in survival rates by gender – which were as high as 38 percentage points – contrast with virtually nonexistent differences in survival rates among all scholars and the top-5 scholars. This is mostly because the set of existing journals during this period consisted predominantly of the top-5 journals.

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

Thus, in the last decade studied, the picture is quite different. By the 1990s, men and women had more similar survival rates, even though the survival rate of men was 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, 76% of men and 72% of women were still active in the eighth year of their careers, and 24% of men and 18% 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 considerably higher for every year of the academic careers of both men and women. Within this sample, 87% of the men and 84% of the women were still publishing by the eighth year, and 38% of the men and 30% of the 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 4% – contrast with the larger differences in survival rates by prominence – of approximately 12 percentage points early in their careers. Given that the emergence of these differences is observable early in academic careers, we repeated the analysis, focusing on shorter career lengths, to examine more recent cohorts. For example, we considered career lengths of 15 years and included the more recent 2000–2005 cohorts. The results are quantitatively the same as those observed in the 1990–1996 cohorts.

To elucidate the underlying mechanisms that could be behind women having shorter active academic careers, we performed a series of robustness tests.

First, given these survival rates, one may worry that the observed evolution of gender gaps in publications, as shown in the previous subsection and Figure 3, as well as the evolution of survival rates, as shown in this subsection and Figure 5, are mainly artifacts of including scholars who were active for one unique year (and publication). The existence or even high frequency of scholars who publish just once in their academic careers is common in a variety of fields (Ruiz-Castillo and Costas, 2018), so is not unique to the field of economics.

To address this concern, we replicate both Figures 3 and 5 by dropping scholars who are present for only one year or publication. The results are shown in Figures A8 and A9 in the Appendix, confirming the same patterns with the exception of the first cohort, which is mostly driven by the high frequency of female scholars who were present for only one publication/year. 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.

Second, could it be that women are less likely to obtain tenure in a time-span of 6–8 years after their first publication, as shown by Ginther and Kahn (2021), such that this is when their academic careers become radically different from those of men? In Figures 5b and 5c (as well as in Figures A8b and A8c in the Appendix) we find some evidence that, among the group of all scholars, the drop in survival functions significantly differs by gender around the time window of 6–8 years after the first publication, which may suggest that women are less likely to obtain tenure. For further testing, we also estimate gender gaps in publications but restrict the sample to authors who survive for at least 6 years and who publish at least 3 publications. The results reported in Figure A10 show that the gender gap in publications is negative for all cohorts from 1933 to 1996, both for all active scholars and for top-5 scholars, and that over time some convergence has occurred. This latter result is consistent with the gender gap in publications narrowing when we focus on the top-5 publications (shown in Figure 4a). This similarity makes sense, as the scholars in these selected samples, those with careers longer than 6 years and those with at least 3 publications, are more likely to publish in the top-5 journals. Thus, part of the mechanism could be women having a lower probability of obtaining tenure.

Finally, we plot the gender gap in publications, as showin in Figure 3, but control for academic career length by including both career length and its interaction with the decade-cohort. We include the interaction because, as shown in the survival function figures, the distribution of career length varies systematically across cohorts. The results are shown in Figure 6. For both the sample of all scholars and the top-5 scholars, we observe that for cohorts in the first three decades, 1933–1939 and until 1950–1959, our coefficient of interest stops being statistically significant at conventional levels after career length is controlled for (for the sample of all scholars, the coefficient on the 1940–1949 cohorts remains only marginally significant p-value=0.086). This pattern suggests that the gender gap in publications among earlier cohorts is associated with women having *shorter* academic careers rather than with differences in productivity. For cohorts in later decades – i.e., 1960–69, 1970–79, 1980–1989, and 1990–96 – the coefficient remains negative and statistically significant after controlling for academic career length. While gender differences in career

length do not fully account for the gender gaps in publications among the most recent cohorts, we nevertheless stress that they account for a large part of the observed gaps. For the sample of all scholars, the gender gap in publications drops between 51% and 57% in the 1960-69, 1970-79 and 1980-1989 decades, and by approximately 67% in the 1990-1996 decade after controlling for career length. For the sample of top-5 scholars, the coefficients decrease between 40% and 50% across cohorts. These results complement other channels explaining gender disparities in publications in economics.

We perform a similar analysis for researchers working in more and less male-dominated fields. As shown in Figure 3b, compared with their male counterparts, women in less male-dominated fields did not accumulate fewer publications over their careers. In contrast, women in more male-dominated fields had approximately 2.5 fewer publications than men in the same fields for both the 1983-–1989 and 1990-–1996 cohorts did (and approximately 4 fewer publications for the top-5 scholars). Figure 6b presents the results after controlling for career length, following the approach described above. Among scholars working in more male-dominated fields, after controlling for career length, the gender gap in publications for the 1983–1989 cohort remains statistically significant, although the coefficient decreases by 45% for the full sample and 16% for the top-5 scholars. For the 1990–1996 cohort, accounting for career length leads to a substantially greater reduction in the coefficient—63% for the full sample and 39% for the top-5 scholars—and the gap is only marginally significant, with a p-value of 0.09 for both groups.

For completeness, we also present results on gender gaps by type of publication after accounting for career length (Figure A11 in the Appendix). The findings closely mirror those based on total publication counts: for the first three cohorts, controlling for academic career length largely accounts for the entire gender gap in publications. This pattern holds consistently across all publication types considered – including top-5 publications, next-10 publications, and lower-tier publications.

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? The data in Figure A12 in the Appendix clearly show that the latter was the case for men in the first decade (1933–1939). However, this pattern is not stable over time and is not present in the last decade (1990–1996), 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, whereas men have a greater share of publications in lowest-tier journals. Aside from that,

the patterns of publications on the academic careers of men and women have looked very similar in the past decade.

We therefore conclude that the observed negative gender gaps in publications in the set of 36 high-impact journals are strongly associated with women having shorter academic careers than men. Our dataset does not allow us to identify whether women stop publishing altogether, such as by leaving academia or devoting their time to other academic tasks such as teaching or advising students, or that they keep publishing working papers or in lower-tier journals that are not considered in the set of 36 high-impact journals. In addition, our dataset does not allow us to measure how much of this negative gender gap in research output is due to existing barriers for women in the academic profession (see, for example, work by Card et al., 2020, Alexander et al., 2021 and Hengel, 2022).

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

Finally, we look at the second output: citations. We measure whether men and women have accumulated different numbers of citations over their academic careers of at most 24 years. Given that we only focus on accumulated citations for publications in the top-5 journals, we focus only on the scholars who have published in these journals (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 A13a and A13b in the 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 publication.

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 started as low as 10% and even dropped to 5% in the 60-70s. Since then, important gains have been made over the past 5 decades reaching 25% by 2019. 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% among authors working in public, development, labour or health economics, whereas female representation was as low as 20% among authors working in econometrics, finance, macroeconomics or theory. Among the top-5 scholars, those who published at least once in any of the top-5 journals, female representation is consistently less than the share of women in the overall sample of scholars.

With respect to gender gaps in academic output, the most notable finding is that women publish fewer articles than men do. More concerningly, when comparing cohorts over time, we find no sign of convergence among all scholars and the top-5 scholars. On a positive note, men and women are most comparable in terms of number of publications if we consider only scholars working in less male-dominated fields (for the 80s and 90s cohorts). In addition, we also see some considerable heterogeneity by type of publication: counting 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 see a widening in the gender gap over time. The negative gender gap in publications is highly correlated with women having shorter actively publishing careers within our set of 36 high-impact journals than men do. Indeed, when comparing women and men with similar academic career lengths, the gender gap in publication output narrows considerably. More precisely, we find that gender differences in career length account for the entire gender gap in publications up until the 1960 cohort (1933–1959) and account for between 50% and 70% of the gap for the subsequent cohorts (1960–1996).

Further research should focus on understanding the underlying reasons for the negative gender gap in publications, including women having shorter careers than men, as well as on the study of initiatives that may help narrow this gap for current and future cohorts.

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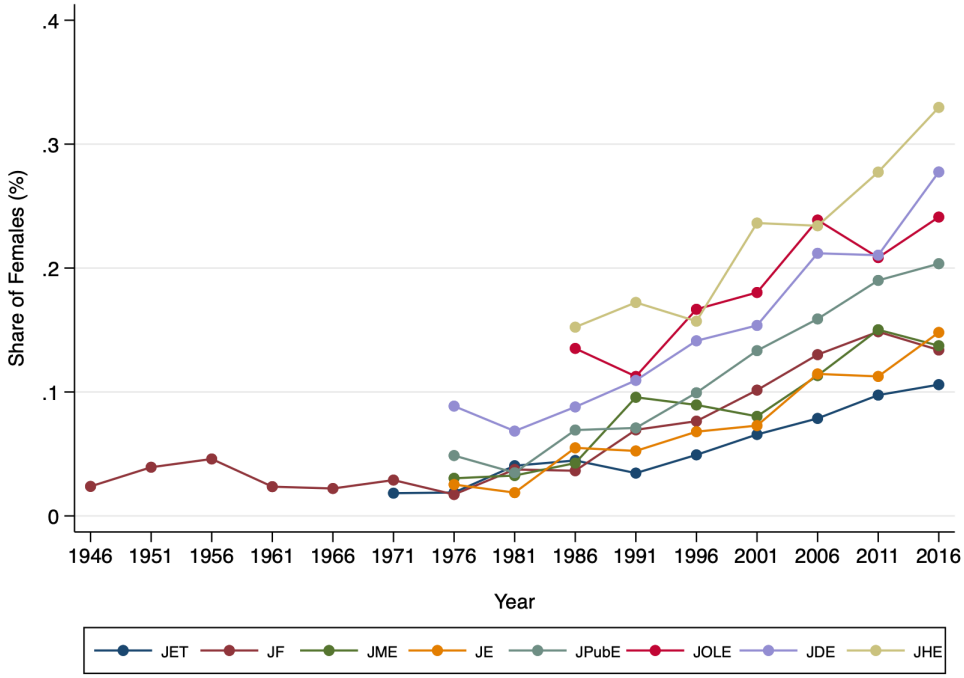
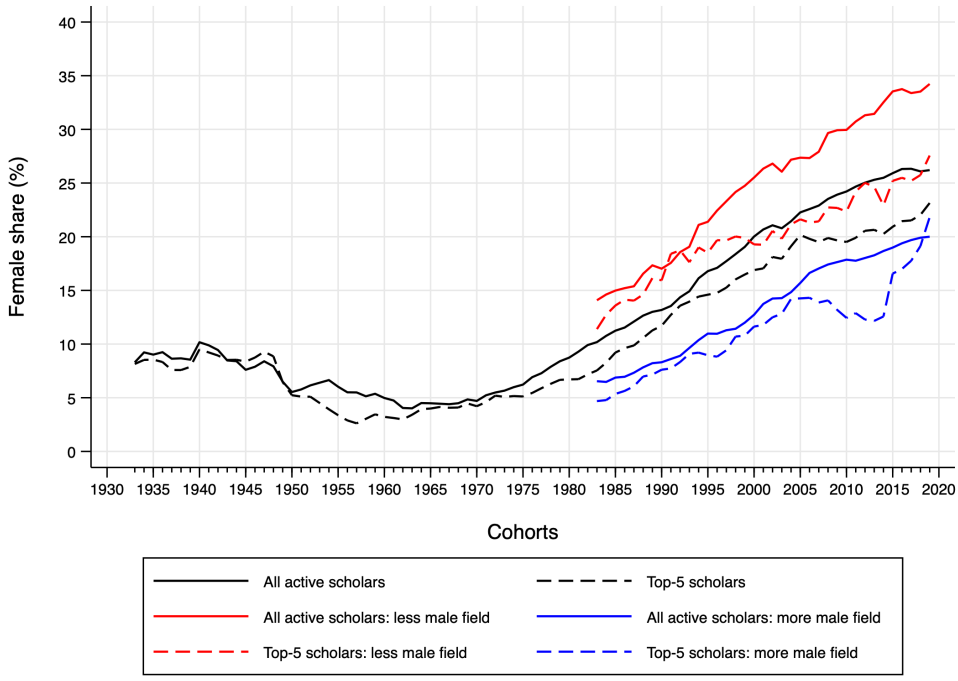
Figures and Tables

Figure 1: Share of Female Scholars Publishing in each of the 8 Top Field Journals



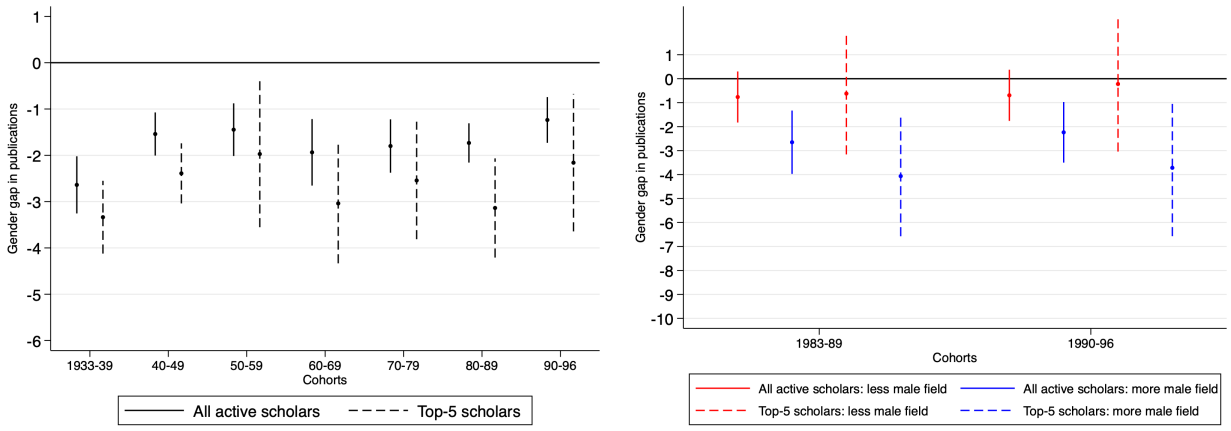
Notes: The figure shows 5-year moving averages for the share of female scholars among the published scholars in each of the most relevant top field journal, from inception until 2019. The top field journals are: *Journal of Finance* (1946), *Journal of Economic Theory* (1969), *Journal of Public Economics* (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 2: 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 less male-dominated fields* (in red): scholars who have a strictly higher number of publications in top-field journals categorized as less male (JPubE, JDE, JHE, JOLE) and 2) *scholars in more male-dominated fields* (in blue): scholars who have a strictly higher number of publications in top-field journals categorized as more male (JF, JET, JE, JME).

Figure 3: Gender Gaps in Publications

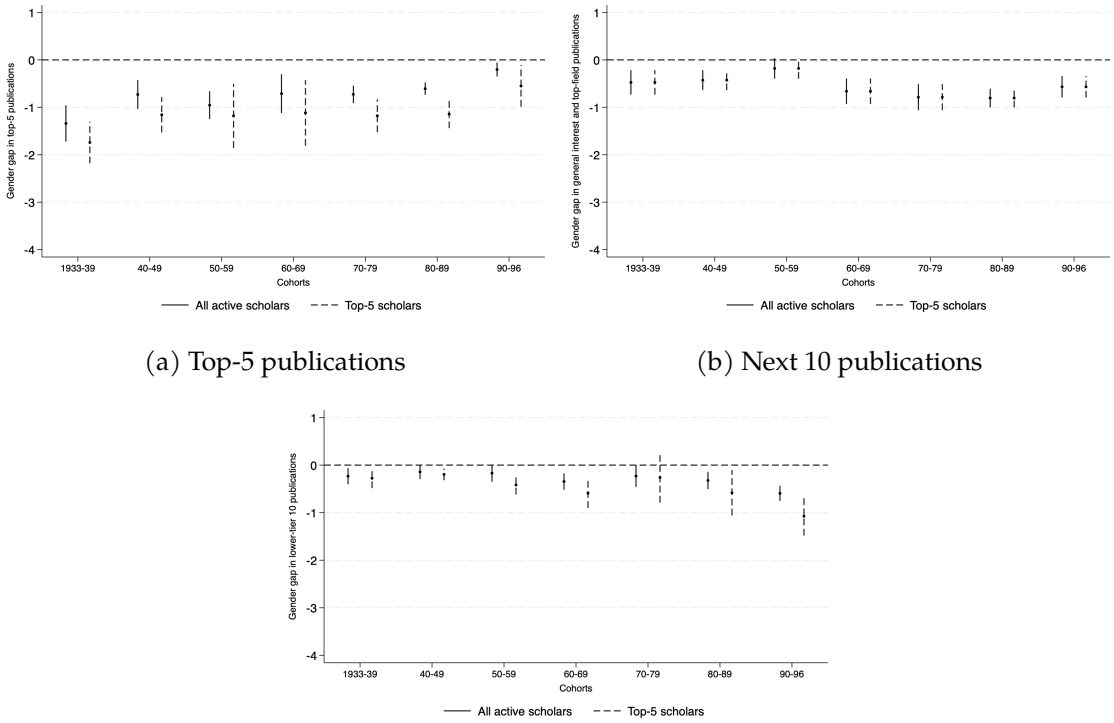


(a) All scholars and top-5 scholars

(b) All scholars 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 less male-dominated fields* (in red): scholars who have a strictly higher number of publications in top-field journals categorized as less male (JPubE, JDE, JHE, JOLE) and 2) *scholars in more male-dominated fields* (in blue): scholars who have a strictly higher number of publications in top-field journals categorized as more male (JF, JET, JE, JME). We stop in year 1996 to allow for an academic career of 24 years.

Figure 4: Gender Gaps in Publications: By Type of Publications



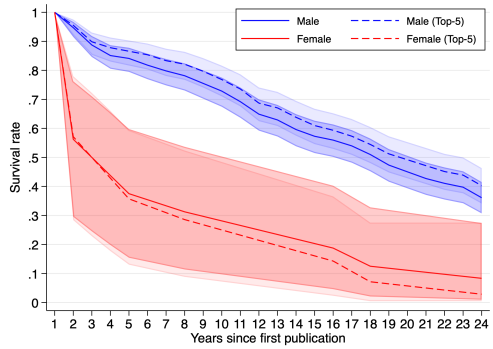
(a) Top-5 publications

(b) Next 10 publications

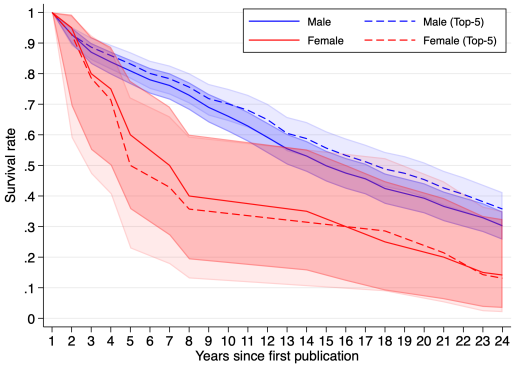
(c) 10 Most lower-tier publications

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 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 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 scholars* (continuous line) and 2) *top-5 scholars* (discontinuous line): authors who have published at least once in any of the top-5 journals.

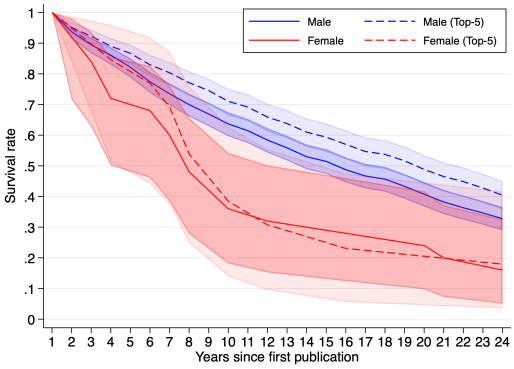
Figure 5: Survival Functions by Decade and Gender



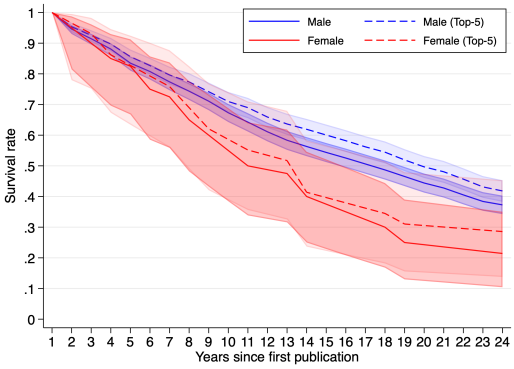
(a) Cohorts: 1933–1939



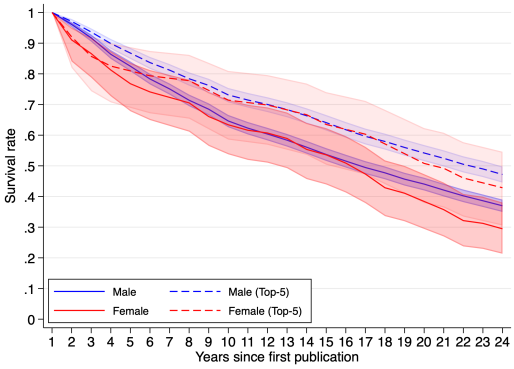
(b) Cohorts: 1940–1949



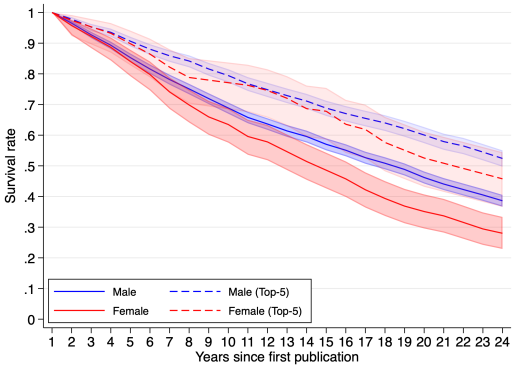
(c) Cohorts: 1950–1959



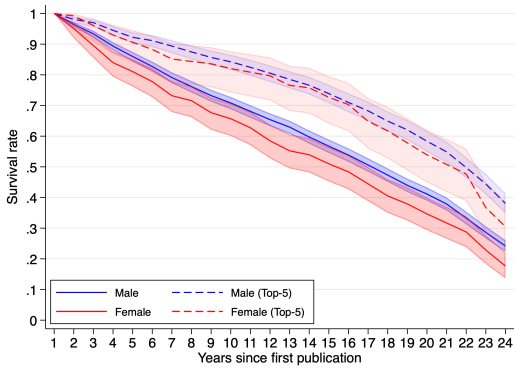
(d) Cohorts: 1960–1969



(e) Cohorts: 1970–1979



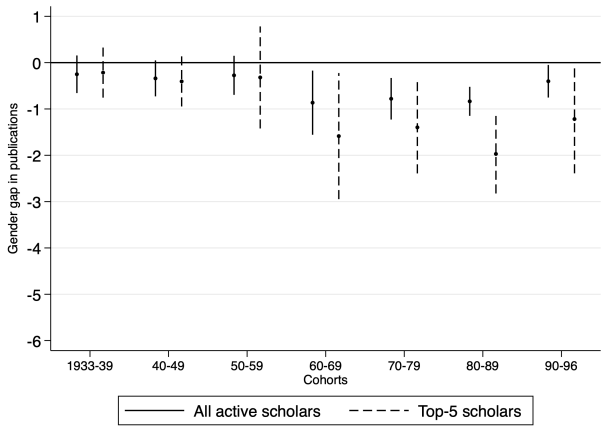
(f) Cohorts: 1980–1989



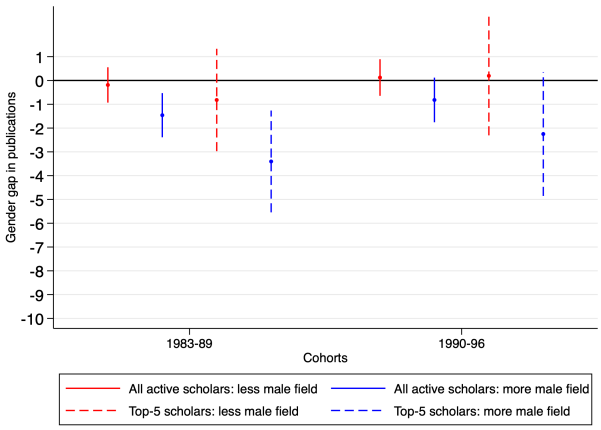
(g) Cohorts: 1990–1996

Notes: The graph displays linearly interpolated Kaplan–Meier survival estimates of academic careers up to 24 years since first publication, where survival is defined as remaining active (i.e., not exiting) t years after first publication. Individuals contribute to the estimates until they exit or until they are censored at the end of the observation window (2019). Estimates are shown separately by gender (blue for men and red for women) and by prominence (dashed line for top-5 scholars and solid line for all scholars). Shaded areas represent 95% confidence intervals.

Figure 6: 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 by including both career length and its interaction with decade-cohort: 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 less male-dominated fields* (in red): scholars who have a strictly higher number of publications in top field journals categorized as less male (JPubE, JDE, JHE, JOLE) and 2) *scholars in more male-dominated fields* (in blue): scholars who have a strictly higher number of publications in top field journals categorized as more male (JF, JET, JE, JME). We stop in year 1996 to allow for an academic career of 24 years.

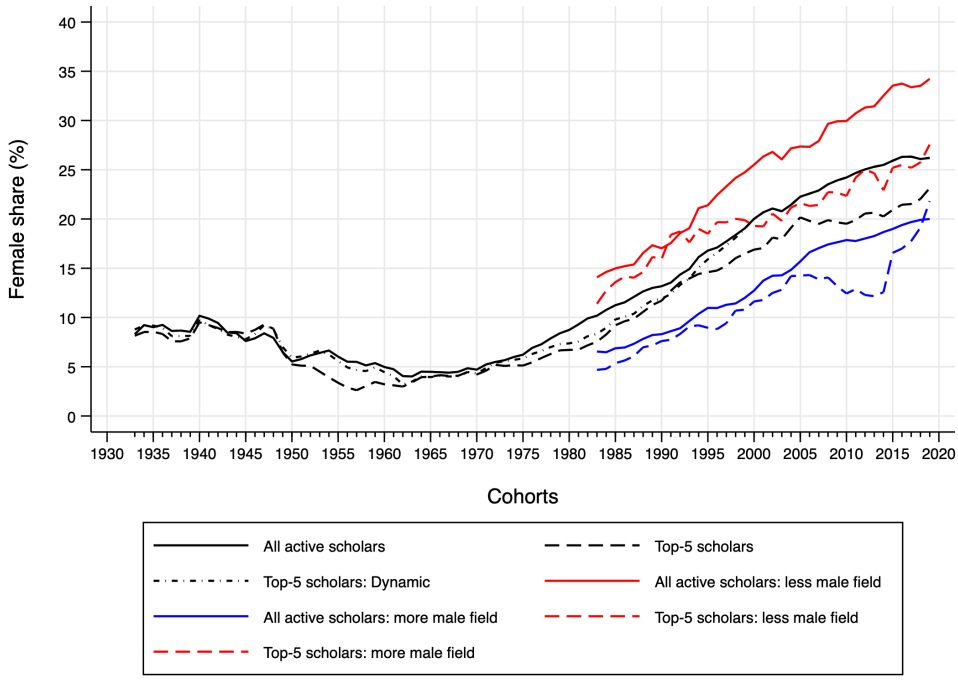
Appendix: Additional Figures and Tables

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)	

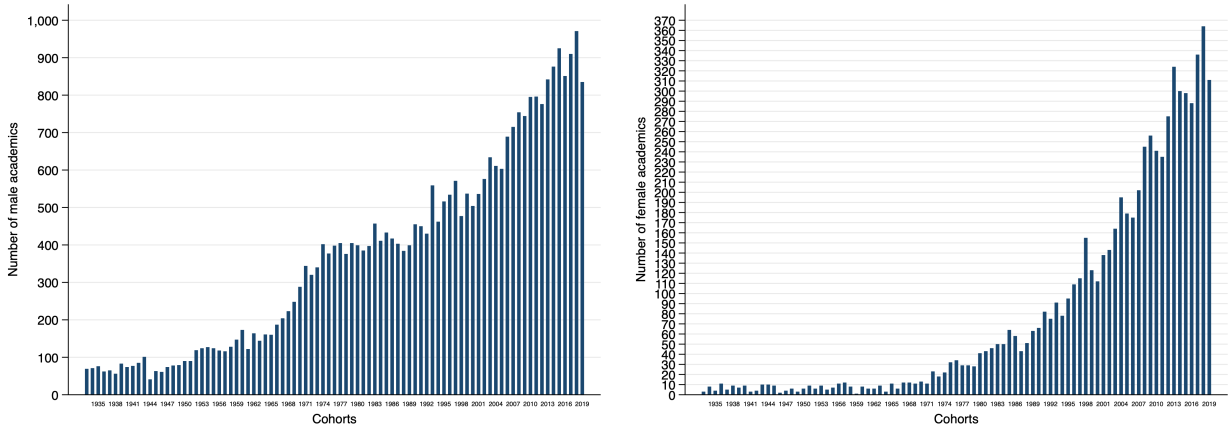
Notes: The figure shows all the 36 high-impact journals and their abbreviations, ordered by their inception year. The top-5 journals are shown in bold and grey. The most relevant field journals are shown in blue.

Figure A2: Share of Female Scholars by Cohort: Alternative Definition of Top-5 Scholar



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 less male-dominated fields* (in red): scholars who have a strictly higher number of publications in top-field journals categorized as less male (JPubE, JDE, JHE, JOLE) and 2) *scholars in more male-dominated fields* (in blue): scholars who have a strictly higher number of publications in top-field journals categorized as more male (JF, JET, JE, JME). Top-5 scholars: dynamic definition includes *the Economic Journal* and *Economica* as top-5 journals up until the 1995 cohort. Ductor et al. (2020) show that by the year 1995 the commonly known as top-5 journals had acquired a major lead.

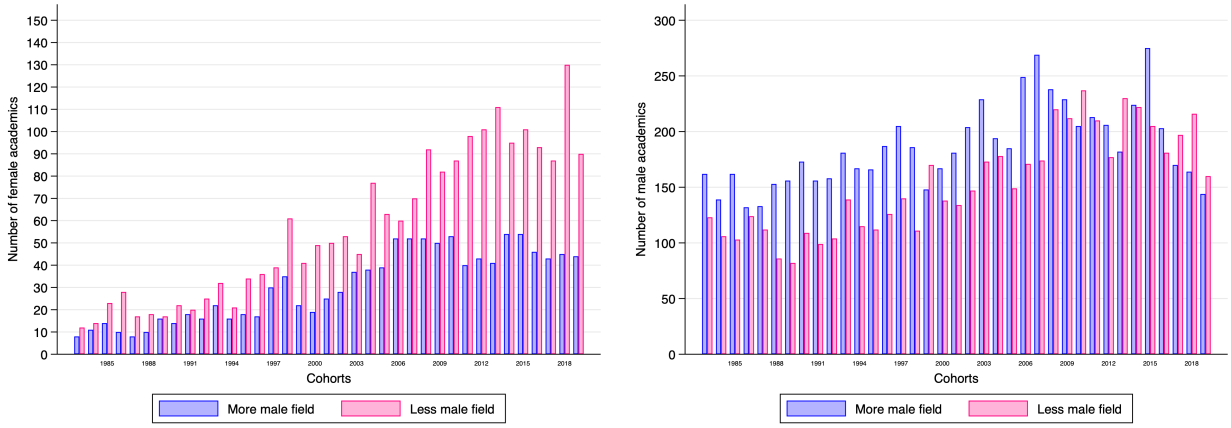
Figure A3: Number of Male and Female Scholars in each Cohort



(a) Male scholars (b) Female scholars

Notes: Figures (a) and (b) show the number of male and female scholars among all scholars by cohort, respectively.

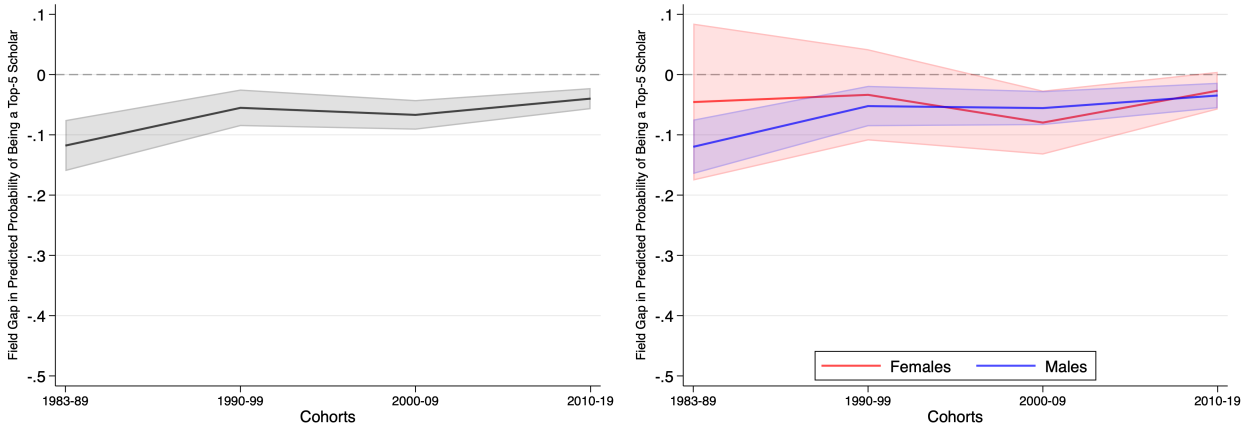
Figure A4: Number of Male and Female Scholars in each Cohort by Field



(a) Female scholars in less and more male fields (b) Male scholars in less and more male fields

Notes: Figures (a) and (b) show the number of female and male scholars in more male and less male-dominated fields by cohort, respectively.

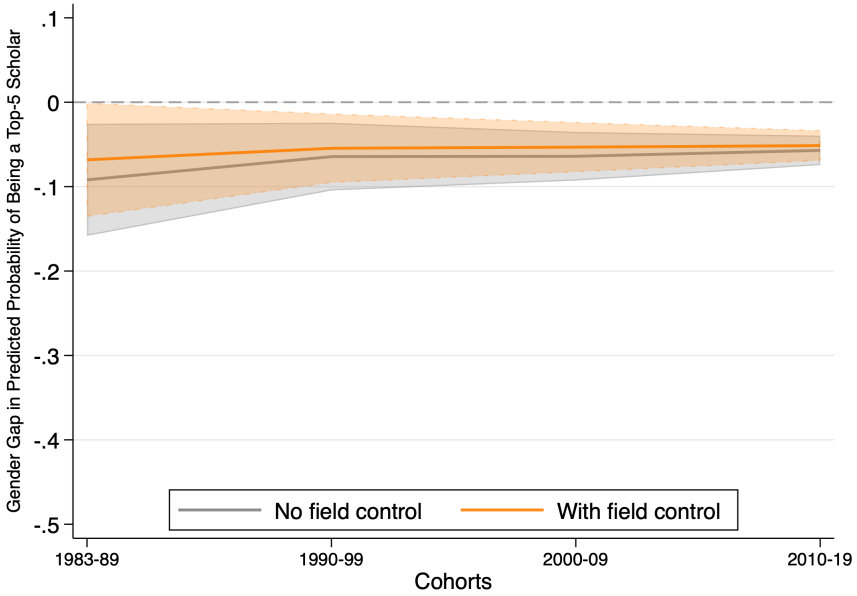
Figure A5: Field Gap (Less relative to More Male-Dominated Fields) in Predicted Probability of Being a Top-5 Scholar by Cohorts



(a) Everyone (b) By Gender

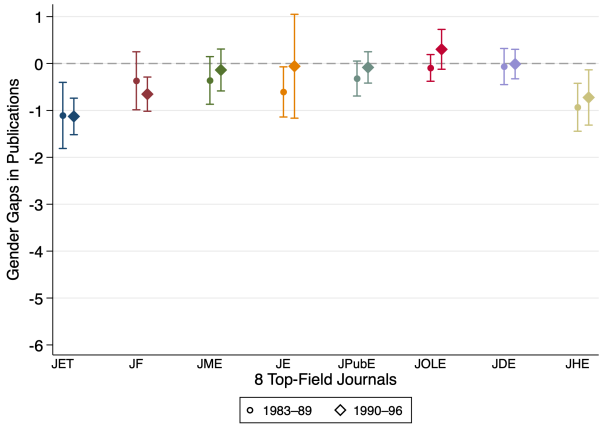
Notes: The graph shows the field gap (less male-dominated field relative to more male-dominated field) in the predicted probability of being a top-5 scholar by cohort. Estimates are from a linear probability model. Graph (a) reports results for everyone and graph (b) reports results from two separate regressions, one for male scholars (blue line) and one for female scholars (red line). The graphs report 95% confidence intervals around the point estimates. The sample is restricted to cohorts between 1983-2019 as the fields of study are only assigned starting in 1983 cohort.

Figure A6: Gender Gap in Predicted Probability of Being a Top-5 Scholar Controlling for Field, by Cohort



Notes: The graph shows the gender gap (females relative to males) in the predicted probability of being a top-5 scholar by cohort. Estimates are from a linear probability model. The gray line presents estimates without additional controls; the orange line controls for field by including both a field dummy and its interaction with decade-cohort. The field dummy takes value 1 if the author works in less male-dominated fields. The graph reports 95% confidence intervals around the point estimates. The sample is restricted to cohorts between 1983-2019 as the fields of study are only assigned starting in 1983 cohort.

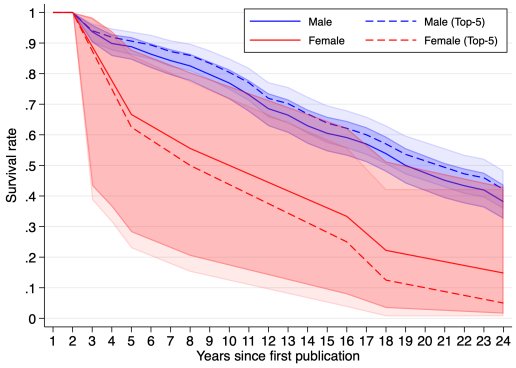
Figure A7: Gender Gaps in Publications by Top Field Journal and Cohort



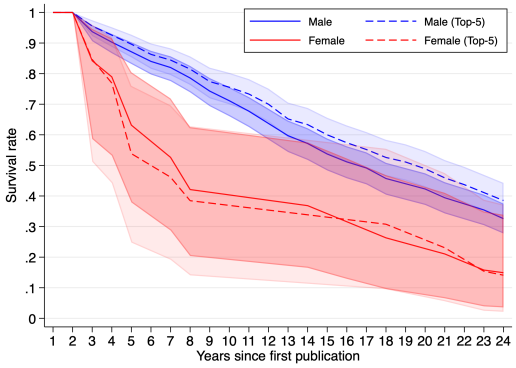
(a) Gender Gaps by Journal for Top Field Journals

Notes: The graph shows gender gaps in the number of publications over an academic career of up to 24 years, by journal and cohort, for each of the 8 top field journals. The sample is restricted to cohorts 1983–1996, as all 8 journals have existed only since 1983, when the most recent one was established. We stop at 1996 to allow observation of a full 24-year career. For each journal, we run a separate regression including only authors with at least one publication in that journal.

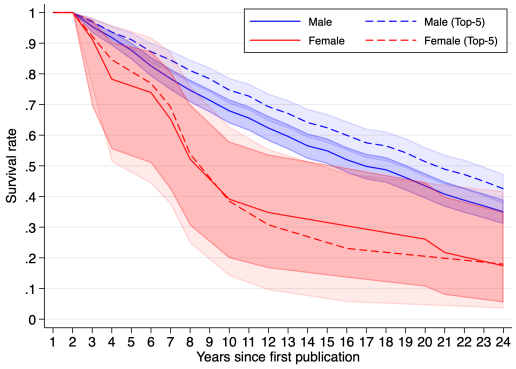
Figure A8: Survival Rates by Decade and Gender: Active for at least 2 Years



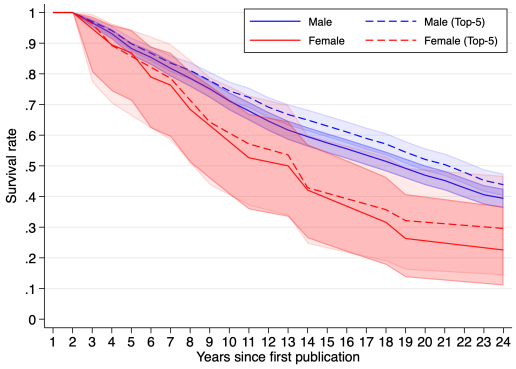
(a) Cohorts: 1933–1939



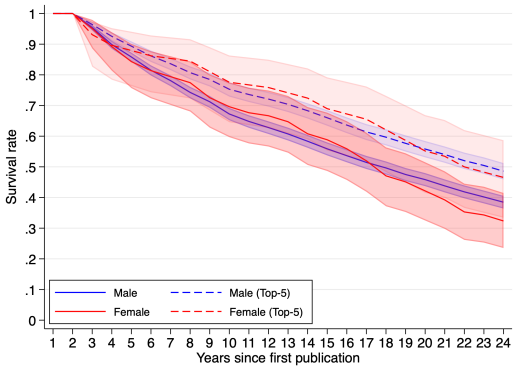
(b) Cohorts: 1940–1949



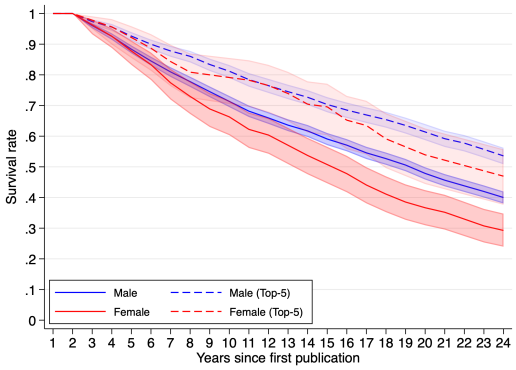
(c) Cohorts: 1950–1959



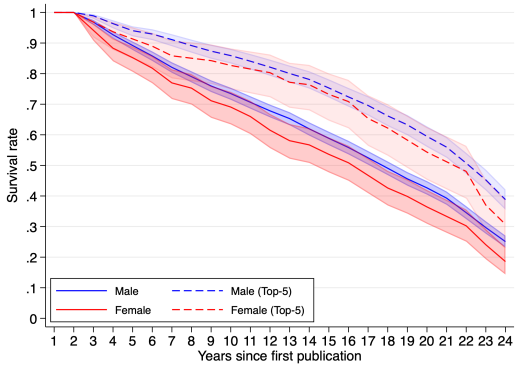
(d) Cohorts: 1960–1969



(e) Cohorts: 1970–1979



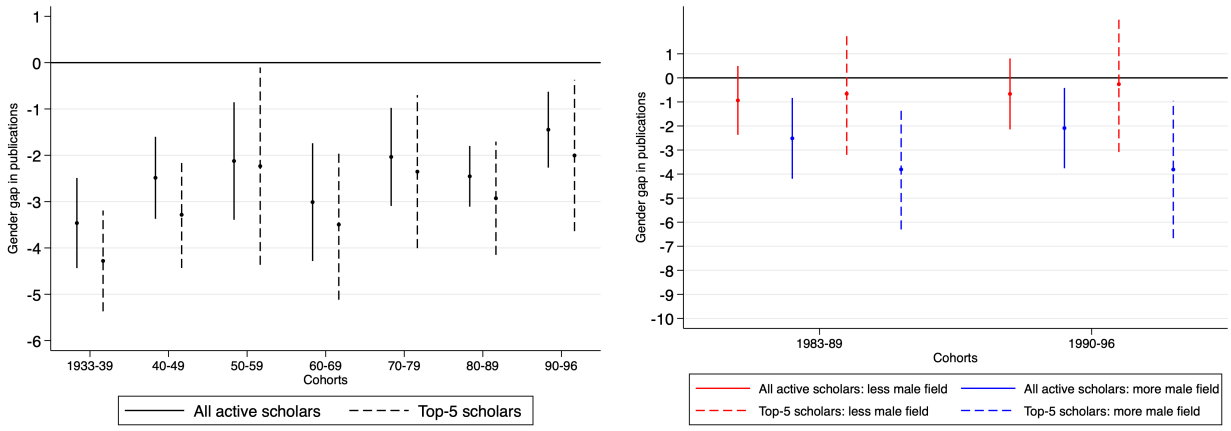
(f) Cohorts: 1980–1989



(g) Cohorts: 1990–1996

Notes: The graph displays linearly interpolated Kaplan–Meier survival estimates of academic careers up to 24 years since first publication, where survival is defined as remaining active (i.e., not exiting) t years after first publication. Individuals contribute to the estimates until they exit or until they are censored at the end of the observation window (2019). Estimates are shown separately by gender (blue for men and red for women) and by prominence (dashed line for top-5 scholars and solid line for all scholars). Shaded areas represent 95% confidence intervals. We restrict the sample of scholars to those who have been actively publishing during at least 2 years.

Figure A9: Gender Gaps in Publications: Active for at least 2 Years

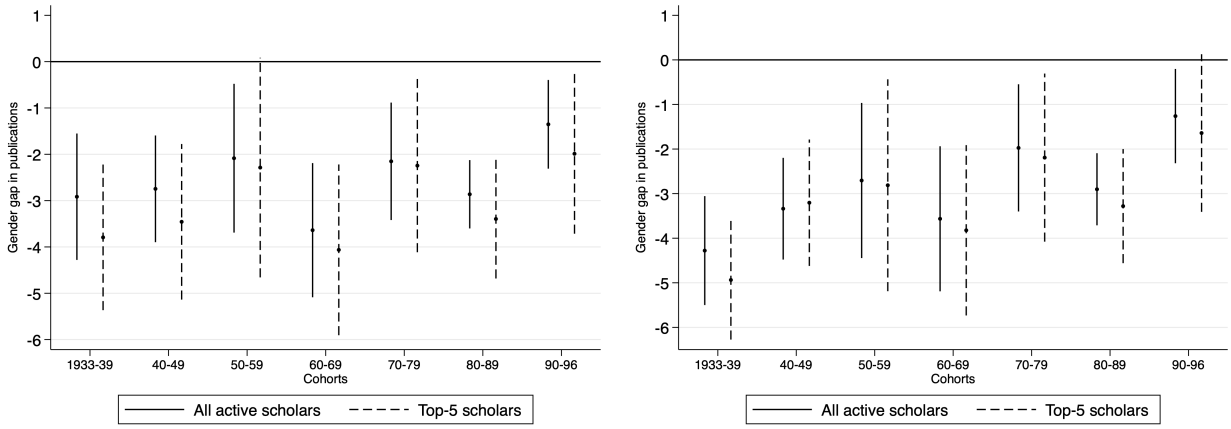


(a) All and Top-5 scholars

(b) All 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 less male (JPubE, JDE, JHE, JOLE) and 2) *scholars in masculine fields* (in blue): scholars who have strictly higher publications in top-field journals categorized as more male (JF, JET, JE, JME). We restrict the sample of scholars to those who have been actively publishing during at least 2 years.

Figure A10: Gender Gaps in Publications Among Scholars With at Least 6 Years of Career or at Least 3 Publications

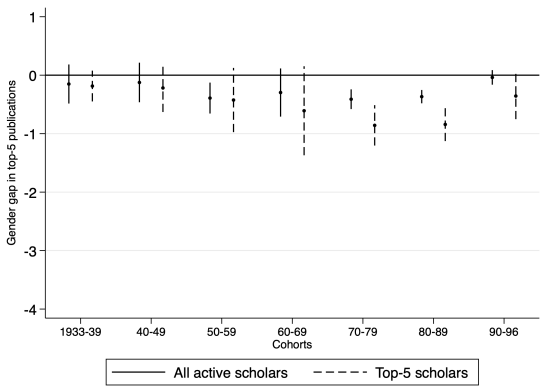


(a) Scholars with at least 6 years of career

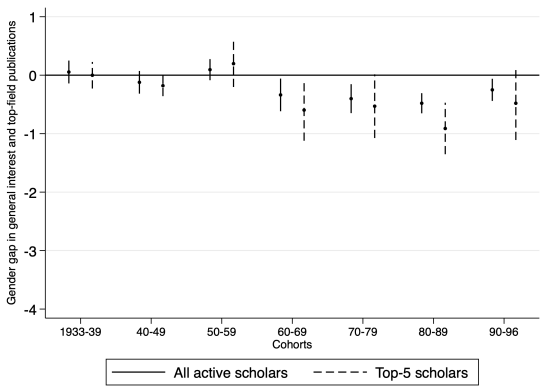
(b) Scholars with at least 3 publications

Notes: The graphs show 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. Graph (a) restricts the sample to scholars who have at least 6 years of career length and graph (b) to scholars who have at least 3 publications over their careers.

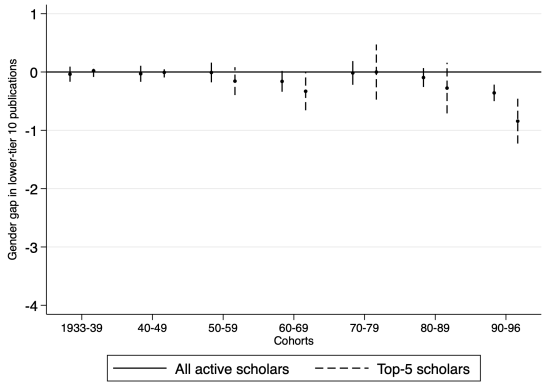
Figure A11: Gender Gaps in Publications Controlling for Active Career Length, By Type of Publication



(a) Top-5 publications



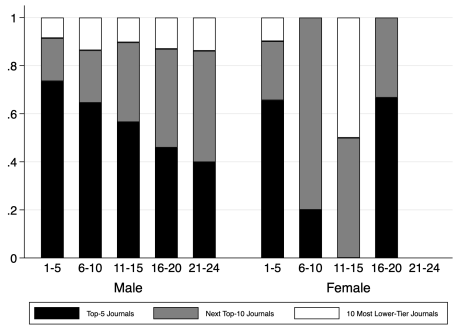
(b) Next 10 publications



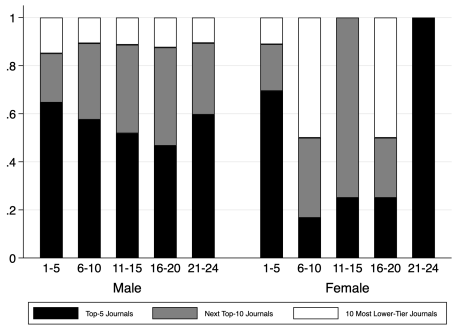
(c) 10 most lower-tier publications

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 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 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 scholars* (continuous line) and 2) *top-5 scholars* (discontinuous line): authors who have published at least once in any of the top-5 journals.

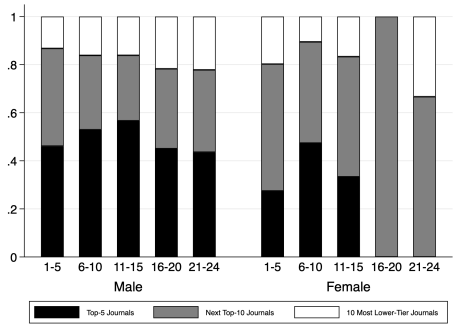
Figure A12: Share of Publications by Journal Type over Academic Careers by Gender and Cohort



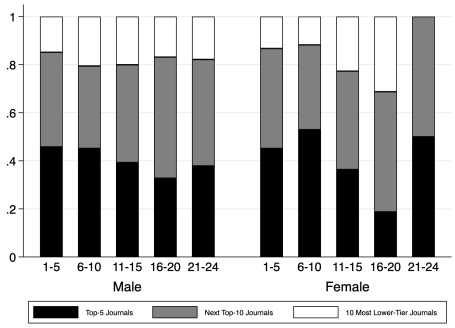
(a) Cohorts: 1933-1939



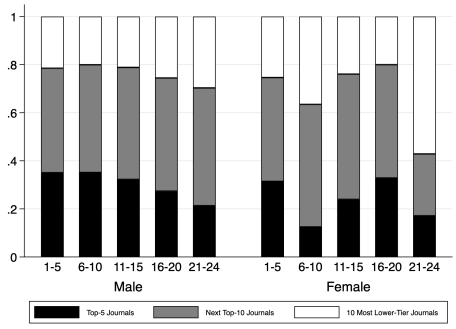
(b) Cohorts: 1940-1949



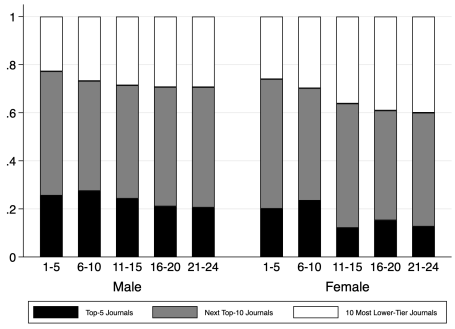
(c) Cohorts: 1950-1959



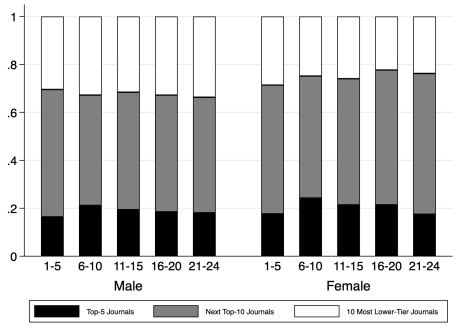
(d) Cohorts: 1960-1969



(e) Cohorts: 1970-1979



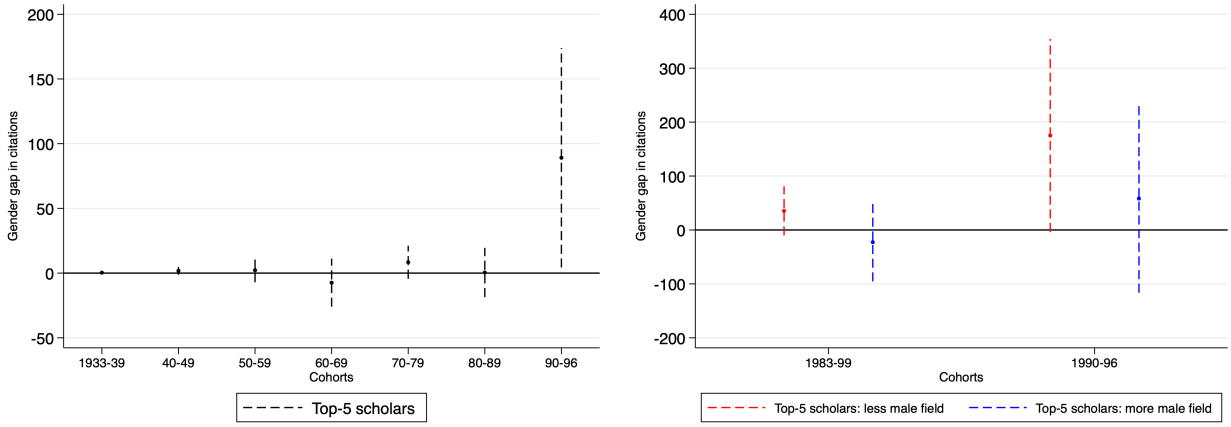
(f) Cohorts: 1980-1989



(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 A13: 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 less male-dominated fields* (in red): scholars who have a strictly higher number of publications in top field journals categorized as less male (JPubE, JDE, JHE, JOLE) and 2) *scholars in more male-dominated fields* (in blue): scholars who have a strictly higher number of publications in top-field journals categorized as more male (JF, JET, JE, JME).

Table A1: Oaxaca Decomposition of Gender Gaps in the Predicted Probability of Ever Being a Top-5 Scholar, by Cohort

	Cohort: 1983-89		Cohort: 1990-99		Cohort: 2000-09		Cohort: 2010-19	
Difference	0.092***		0.064***		0.064***		0.057***	
(s.e.)	(0.034)		(0.021)		(0.015)		(0.009)	
Endowments	0.010	10.47%	0.007	10.38%	0.014***	22.28%	0.005*	8.23%
(s.e.)	(0.014)		(0.008)		(0.005)		(0.003)	
Coefficients	0.067*	72.47%	0.054***	83.85%	0.054***	84.45%	0.051***	89.31%
(s.e.)	(0.034)		(0.021)		(0.015)		(0.009)	
Interaction	0.016	17.05%	0.004	5.77%	-0.004	-6.73%	0.001	2.45%
(s.e.)	(0.015)		(0.008)		(0.006)		(0.003)	

Notes: The table reports regression results from Oaxaca decompositions based on four separate regressions, one for each decade. The outcome variable is a dummy equal to 1 if the author has ever published in a top-5 journal. The first row reports the difference, in absolute value,top in the predicted probability of being a top-5 scholar between women and men (e.g., women in the 1983-89 cohort have a 9.2 percentage point lower probability of being a top-5 scholar). The next three rows decompose this gap into three components. *Endowments* reflects the average increase in women's predicted probability of being a top-5 scholar if they had the same field distribution as men, where field is a dummy variable indicating whether the author works in a more or less male-dominated field (e.g., in the 1983-89 cohort this increase would be equal to 1 percentage points, which corresponds to 10% of the initial gap). *Coefficients* quantifies the increase in women's predicted probability when applying the men's coefficients to the women's field distribution (e.g., in the 1983-89 cohort this increase would be equal to 6.7 percentage points, which corresponds to 72% of the initial gap). *Interaction* captures the simultaneous effect of differences in endowments and coefficients. Standard errors are shown in parentheses. *** p<0.01, ** p<0.05, * p<0.10 statistically significant at the 1%, 5%, and 10% levels, respectively. The sample is restricted to authors in cohorts from 1983 to 2019, as fields of study are only assigned starting with the 1983 cohort. Authors without an assigned field are excluded.

Table A2: Summary Statistics

	All Scholars			Less Male-Dominated			More Male-Dominated		
	Male	Female	Diff.	Male	Female	Diff.	Male	Female	Diff.
	A. All Scholars								
Cohort 1 (1933-39)	4.34	1.70	-2.64***						
Cohort 2 (1940-49)	3.32	1.78	-1.54***						
Cohort 3 (1950-59)	3.43	1.99	-1.45***						
Cohort 4 (1960-69)	4.52	2.58	-1.94**						
Cohort 5 (1970-79)	4.79	2.99	-1.80***						
Cohort 6 (1980-89)	5.15	3.41	-1.73***	5.36	4.60	-0.76	7.81	5.16	-2.65**
Cohort 7 (1990-96)	4.95	3.71	-1.24***	5.60	4.91	-0.69	7.54	5.31	-2.24***
	B. Top-5 Scholars								
Cohort 1 (1933-39)	5.18	1.85	-3.34***						
Cohort 2 (1940-49)	4.26	1.87	-2.39***						
Cohort 3 (1950-59)	5.40	3.43	-1.97						
Cohort 4 (1960-69)	6.89	3.85	-3.04**						
Cohort 5 (1970-79)	7.66	5.12	-2.54***						
Cohort 6 (1980-89)	9.49	6.36	-3.14***	11.03	10.41	-0.62	14.24	10.17	-4.07*
Cohort 7 (1990-96)	10.48	8.32	-2.16**	11.71	11.49	-0.22	14.46	10.74	-3.72**

Notes: Cohort 1 is comprised by academics who had their first publication between 1933 and 1939. Total articles refers to the total number of articles published by all male (female) academics within each given cohort over their entire careers. Total articles over individual careers is the total number of articles published by the average male (female) researcher within each given cohort over her entire career. Diff. reports the difference between females and males, with corresponding significance levels from a two-sided t-test. *** $p<0.01$, ** $p<0.05$. Average articles over individual careers is the average yearly number of articles published by the average male (female) researcher within each given cohort over her career.

Table A3: Summary Statistics by only Top Field Journals

	Male Scholars			Female Scholars		
	Cohort: 1983-89	Cohort: 1990-96	Δ	Cohort: 1983-89	Cohort: 1990-96	Δ
JHE	2.39	2.33	-0.06	1.46	1.61	0.15
JOLE	1.56	1.51	-0.05	1.46	1.81	0.35
JDE	1.52	1.58	0.06	1.46	1.57	0.11
JPubE	1.86	1.71	-0.14	1.54	1.63	0.09
JET	2.92	2.55	-0.37	1.81	1.42	-0.39
JF	2.26	2.28	0.02	1.89	1.62	-0.26
JE	2.32	2.62	0.29	1.72	2.56	0.84
JME	2.05	2.00	-0.05	1.69	1.86	0.17

Notes: Average total number of publications in each journal over a career of at most 24 years by cohort and gender, conditional on having at least one publication in that given journal.