

# How do Women Respond to Gender Biases in Recognition for Teamwork?

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March 14, 2025

## Abstract

This paper examines the responses of women to learning about gender biases in the labor market. We study how coauthorships and productivity of female economists changed following a widely-publicized study in 2015 that demonstrated women receive little credit for coauthorships with men in tenure evaluations. Comparing the publication histories of economists to other social scientists in a difference-in-difference design, we find that the dissemination of the 2015 study caused junior female economists to reduce the number of working papers coauthored exclusively with men. The decrease in male coauthorships was not offset through other forms of collaborations, leading to a net decrease in working papers and peer-reviewed publications. In comparison, we find no effects on the coauthorship patterns of either male or tenured female economists. While the decrease in women's early-career collaborations with men did not persist later into their careers, the 2015 study had a long-run impact on the collaboration strategies of future generations of young female economists.

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# 1 Introduction

On average, women earn less than men in the labor market. Various factors contribute to this phenomenon, ranging from employer discrimination to heterogeneous work preferences by gender.<sup>1</sup> While a large literature has documented the causes of the gender pay gap, less is known about how women adapt once they learn of these factors. In principle, women can change multiple life choices such as their college major, fertility decision, and type of occupation in response to new research on gender disparities in the labor market. The extent to which women update their beliefs and adjust their strategies after learning about the causes of the gender pay gap can thus have broad economic consequences. However, there remains few empirical studies exploring how women react to new information on gender disparities in a real-world setting.

In this paper, we study the response of women to learning about bias in the way recognition for group work is allocated across genders. As a natural experiment, we leverage the initial dissemination of [Sarsons \(2015\)](#), which found evidence of gender disparity in the way coauthored publications are evaluated during tenure decisions. Strikingly, she shows that papers coauthored exclusively with men have zero impact on the tenure prospect of junior female economists at the top 30 US economic departments. In contrast, men are not penalized for collaborations with either men or women. These novel results were widely publicized in outlets such as the *The New York Times* in January 2016. The initial solo-authored study by Sarsons evolved over time, incorporating additional collaborators, and was ultimately published in the *Journal of Political Economy* in 2021 ([Sarsons et al. 2021](#)), where it has accumulated over 400 citations. Given that tenure is a pivotal milestone in an academic career, and considering the broad media coverage and subsequent successful publication of [Sarsons \(2015\)](#), our paper tests whether the results of the study reduced the likelihood that women in economics coauthor with men.

To identify the causal impact of [Sarsons \(2015\)](#) on coauthorship decisions, we employ a difference-in-differences approach along with detailed data on individuals' publication records. Since Sarsons' paper specifically focuses on faculty in economics departments, the study received more attention by economists than other disciplines. Leveraging this variation in exposure, we compare the research collaboration patterns between economists (treated group) and other social scientists (control group), before and after the study's initial publicity in late-2015. Although researchers from other fields may potentially also pay attention to Sarsons' work, this would likely bias our estimation towards zero, resulting in a more conservative estimate of the impact on economists. Our analysis leverages a database

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<sup>1</sup>For a review, see [Blau and Kahn \(2017\)](#).

of all papers posted on the Social Science Research Network (SSRN) from 2012 to 2023. A key advantage of this dataset is that we observe studies when they are still in the working paper stage, so we can approximate when a project began relative to the release of [Sarsons \(2015\)](#). We also link SSRN working papers with data from peer reviewed journals to measure the realized outcome of papers.

We document three sets of results. First, following a panel of junior female economists over time, we find that the number of SSRN preprints coauthored exclusively with men dropped by 55% (s.e. 26%) in the three years following 2016. To validate our empirical strategy, we implement a series of falsification and robustness checks. To start, we show that the publication history of female economists and non-economists were trending similarly prior to 2016. Moreover, the drop in male-only coauthorships starts in 2016 and is largest in 2017, suggesting that the results are not driven by heterogeneous responses to the #MeToo movement, which started at the end of 2017 and peaked in 2018. We also show that our results are robust to comparing researchers within the same college and same academic-cohorts. Finally, as a placebo check, we observe no significant effects on the number of male-coauthored papers among senior female economists who no longer have to worry about tenure, nor among male economists who are not penalized for coauthorships with other men. Overall, our estimates suggest that junior female economists engaged in fewer projects with male-only teams after learning that women are not rewarded for such coauthorships in tenure decisions.

Second, we find that the decrease in male coauthorships is not compensated by an increase in other types of collaborations. While it may be individually optimal for junior female economists to avoid coauthoring on male-dominated teams, this may not be socially efficient if it leads to a reduction in research output and innovation. As evidence of this social cost, we observe no increase in the number of solo-authored, mixed-gender coauthored, or all-female coauthored projects. Rather, we document that junior female economists had fewer working papers overall after 2016. Moreover, they did not simply forgo projects with low expected impact nor did they trade off quantity for quality. Instead, the number of peer-reviewed publications that started out as a SSRN working paper fell after 2016. Together, our estimates indicate that the reduction in working papers with only male collaborators resulted in a net decrease in the number of publications by junior female economists.

Third, the impact on incumbents' publication records is temporary and does not persist later into their careers. In principle, changes in the gender composition of coauthors early in women's careers could have long-run impacts on their networks, specialization, or preferences that lead to a persistent impact on their future publications. On the contrary, our panel analysis finds that the decrease in male coauthorships fully recovers by 2020. This suggests

that female economists either re-optimized after experimenting with fewer male collaborations, or they simply passed the stage of their career where they need to worry about tenure evaluations. We rule out the former explanation by examining repeated cohorts of new economists. If female economists are discovering that they are better off from collaborating in male dominated teams, then we would expect them to pass this knowledge to subsequent cohorts of women they advise.

In contrast to the temporary effect on incumbents, new cohorts of female economists continue to exhibit fewer coauthorships with exclusively men even 8 years after Sarsons 2015 was first posted. To study the impact on future generations, we employ a repeated cross-section design where we define each author’s cohort to be the first time that they post a paper on SSRN. We restrict the sample to only authors with no prior peer-reviewed publications. Comparing authors who post an economics paper for their first SSRN submission relative to those in other disciplines, we find that female economists reduced the share of papers with all male coauthors, and increased the share of single-author projects from 13% to 28%. This suggests a marked shift towards more independent research among new female entrants to send a clearer signal of their ability. Conversely, there is no statistically significant change observed in other collaboration styles.

Our paper makes multiple contributions to the existing literature. First, we add to a growing body of research that investigates the impact of information interventions on women’s labor market outcomes. Similar to our work, prior studies have also found that new information can significantly impact the labor market outcomes of women. Previous randomized control trials have shown that providing students graduating from college with information on the gender gap in wage negotiations (Cortés et al. 2024) and information about the returns to working in a male-dominated sector (Lee 2022) can influence their real job market behaviors. In a more natural setting, Roussille (2024) finds that the gender pay gap on an online job platform closed after job seekers were shown the median salary expectation of similar candidates. We add to this literature by exploring a new type of information - gender biases in recognition for group work. Moreover, by leveraging a natural experiment and rich data, we can examine outcomes over a longer horizon than previous studies, allowing us to study the dynamic effects of the information shock both within-individuals and across successive cohorts.

Second, our paper relates to the literature on gender disparities within academia and the economics profession (Lundberg and Stearns 2019). Recent studies have shown that female economists experience different treatment from male economists in promotions (Sarsons et al. 2021; Ginther and Kahn 2021; Kleemans and Thornton 2023), peer review (Card et al. 2020; Hengel 2022), honor societies (Card et al. 2022; Card et al. 2023), citations (Koffi 2021),

seminars (Dupas et al. 2021), coauthor selection (Boschini and Sjögren 2007; Ductor et al. 2023; Ductor and Prummer 2024) and online forums (Wu 2020). Rather than documenting another source of gender disparity, our paper complements the current literature by exploring the reaction of female economists to unequal treatment. We show that gender biases lead to social inefficiencies, namely through a reduction in academic publications.

Third, we contribute to the literature on the labor market impacts of discrimination. Prior research has likewise found that discrimination has a negative impact on workers’ labor supply and productivity. Research on racial discrimination finds that pitchers in baseball adjust their pitch in response to racial bias by the umpire (Parsons et al. 2011). Relatedly, Glover et al. (2017) show that the performance of minority cashiers falls when scheduled to work with a racially biased manager. As for gender discrimination, Gagnon et al. (2022) show in an online experiment that gender discrimination in wages leads to a reduction in labor supply, even more so than general income inequality. We add to this literature by examining the labor market effects of gender discrimination in a real-world high stakes environment.

Lastly, this paper contributes to a literature that examines the impact of economics research on people’s beliefs and decisions. Multiple studies has shown that policymakers update their beliefs and incorporate results from economic research into their policies (Hjort et al. 2021; Vivalt and Coville 2023; DellaVigna et al. 2024). Similarly, learning economics can affect the language and rulings of judges (Ash et al. 2022). Building on this literature, we show that economic research influences not only high-level decision makers in government, but also the behavior of workers for whom the research is relevant.

The remainder of the paper is organized as follows. Section 2 provides the background behind our natural experiment. Section 3 describes the data and the construction of our sample. Section 4 reports our results for the impact of the information disclosure on incumbent female economists. Section 5 analyzes the impact on future generations. Section 6 concludes.

## 2 Institutional Setting

Our paper leverages the initial posting of Sarsons (2015) as an information shock to the economics profession. The paper was posted on December 3, 2015 and featured three main insights that are vital to our paper. First, the paper showed that women incur a penalty in their tenure evaluations when they coauthor with men, but not when they coauthor with other women. Second, men do not experience similar penalties. Third, the penalty for coauthorship diminishes as the number of women on the paper increases. We highlight these three results in the abstract of Sarsons’ paper in Panel A of Figure 1. We also present the

main table of [Sarsons \(2015\)](#), which essentially showed that a paper with only male coauthors increases the probability of tenure for male economists by 7%, but has *zero* impact on female economists' probability of receiving tenure. Through a series of tests, [Sarsons \(2015\)](#) shows that the difference in credit for coauthored work is likely due to employer bias, and not the quality of the publications, the seniority of coauthors, women not claiming credit for their work, or taste-based discrimination.

For the paper to change individuals' behavior, it must have been both new knowledge and widely disseminated. We find evidence that both conditions are satisfied. As evidence that researchers were unaware of the gender penalty for coauthorships, [Sarsons \(2015\)](#) conducted a survey of 389 economists and found that men and women had similar beliefs about the returns to coauthored work. Thus, the findings of [Sarsons \(2015\)](#) did not merely confirm a widely recognized fact among economists. While we do not have survey evidence on beliefs after the papers' dissemination, we do know that the paper received significant attention after it was posted. For instance, Panel B of figure 1 shows an article in the New York Times (NYT) published January 6, 2016 that specifically discusses Sarsons' paper. Although Sarsons was a PhD Candidate at Harvard at the time, the NYT article was written by Justin Wolfers who was a professor at the University of Michigan, suggesting that her paper circulated among economists outside of Harvard.

Given that economists were initially unaware of the gender gap in returns to coauthorship, we predict that the new information would reduce the propensity for female economists to coauthor with men. In fact, the published version of Sarsons' paper notes that "the coauthorship choices documented in this paper are not a (long-run) equilibrium" and that once women know the biases of tenure committees, they could "either choose not to coauthor or contribute relatively little to coauthored papers" ([Sarsons et al. 2021](#)).

The results of [Sarsons \(2015\)](#) offers several useful sources of heterogeneity with which we construct our empirical design. First, the table in Panel A of Figure 1 shows that the penalty for coauthorships shrinks as more women are included on the paper. Thus, we expect the largest margin of response to be on the number of papers that are coauthored with exclusively men. Second, men do not experience a penalty for coauthorships, so we expect the results of Sarsons' paper to have no impact on male economists. Third, the focus of Sarsons' paper is on tenure decisions, so we predict changes in coauthorship compositions to be greater among junior female economists than senior ones. Given these predictions, our main analysis focuses on junior female economists, and uses male and senior female economists as placebo tests.

Our empirical approach compares the evolution of publication records of economists to other social scientists before and after 2015. Although Sarsons' paper may have influenced

coauthorship patterns in other academic fields (e.g. Ross et al. 2022), this would only serve to bias our estimates towards zero. Moreover, even if other professions learned about gender bias within economics, they may not feel that it is as prominent an issue in their field. This would be especially true if the discipline follows a convention where credit is assigned by the order of authors’ names. Strictly speaking though, our analysis should be interpreted as measuring the effect of greater *exposure* to information about the gender gap in credit attribution, rather than the effects of a direct information treatment like one would implement in an experimental setting.

One potential confounding factor in our analysis is the influence of the #MeToo movement, which gained prominence starting in late 2017. This movement might have also reduced collaborations between men and women. We address this issue in two ways. To start, our control group of non-economists captures any effects of #MeToo that were uniform across disciplines.<sup>2</sup> However, although both the treated and control groups of social scientists were affected by #MeToo, there is a concern that economists may have been more influenced by the campaign. To address this issue, we rely on the relative timing of events. In Appendix Figure A1, we compare the Google Search Trends for the terms “Heather Sarsons” and “#MeToo”. While there was a surge in Google Searches for “Heather Sarsons” in January 2016, #MeToo did not become relevant until October 2017. Thus, if we see responses starting in 2016 and peaking in 2017, it is unlikely due to the #MeToo movement.

## 3 Data and Summary Statistics

### 3.1 Dimensions Data: Social Science Research Network (SSRN)

In order to trace authors’ publication history over time, we leverage data from the Dimensions platform (<https://www.dimensions.ai/>). Dimensions extracts bibliographic information from multiple online sources, culminating in a database of over 140 million peer-reviewed publications and 4.3 million working papers over a wide range of fields. This extensive database provides metadata that includes authors’ names, affiliations, publications, preprints, and citation counts. Importantly, Dimensions offers a unique author identifier for each person in its database. That way, we can unambiguously track an author’s publication history even when two different authors have the same name or if one author switches names over time. Previous works, such as Jia et al. (2024) and Yin et al. (2021), have demonstrated the accuracy and reliability of the information in Dimensions for research.

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<sup>2</sup>Our approach thus differs from previous work by Gertsberg (2022), which examines the impact of #MeToo on coauthorships using only data within economics.



Using Dimensions, we retrieve data on all SSRN publication records from 2012 to 2023. SSRN is a widely-used repository for preprints, designed to facilitate the rapid dissemination of scholarly research in the social sciences. Utilizing SSRN to investigate the impact of [Sarsons \(2015\)](#) on coauthorship patterns offers three main benefits. First, SSRN is one of the most popular platforms for economists to submit their working papers.<sup>3</sup> Second, the non-economists on SSRN often hail from other social science disciplines, such as law and finance, who serve as a more comparable control group for economists compared with researchers in the natural sciences and humanities. Third, the ability to identify papers before they are published is crucial for our analysis because it allows us to approximate the start date of each project relative to the release of Sarsons’ paper in 2015. This timeliness is advantageous over using actual publications as outcomes, where the delay from initial conception of a paper to its publication can span several years, thereby obscuring the precise timing of behavioral changes in response to the new information.

## 3.2 Sample Construction

To evaluate the impact of [Sarsons \(2015\)](#) on researchers’ collaborations, we focus our analysis on individuals for whom research output, rather than teaching, is the primary determinant of their tenure review. Specifically, we restrict the sample to social scientists affiliated with the top 50 U.S. universities in economics according to the December 2015 department rankings on RePEc (Research Papers in Economics). This is also the sample for which the results of [Sarsons \(2015\)](#) is most relevant, since her analysis similarly restricts the data to the top 30 universities.

We construct two datasets using the Dimensions database: an author-level panel and a repeated cross-section of new entrants. To construct the panel, we query Dimensions for all authors who uploaded at least one paper to SSRN between 2012 and 2015 while affiliated with a top 50 U.S. university. We then follow the publication history of these individuals from 2012 to 2023 as our event window. This approach provides us with a list of 5,664 researchers who use SSRN to post their papers. To build the sample of new researchers, we restrict authors to the first year that they posted a paper on SSRN and only keep individuals who have no peer-review publications prior to that year. Therefore each individual appears only once in our dataset and each year of the data represents a new cohort of researchers.

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<sup>3</sup>We also try to examine another popular repository, arXiv. However, we found that very few junior female economists submit their works to arXiv during our study period, as it is a more common platform for preprints in mathematics, physics, electrical engineering, and computer science.



### 3.3 Defining Outcome Variables

The key outcomes in our analysis will be the number of SSRN working papers, broken down by the gender composition of coauthors. In other words, for each author-year, we measure the total number of their SSRN publications as well as the number of papers that are solo-authored, coauthored with only women, coauthored with only men, and coauthored with both men and women. These outcomes naturally follow from the main results of Sarsons’ 2015 paper (see panel A of figure 1).

In addition to measuring outcomes at the working paper stage, we also examine whether [Sarsons \(2015\)](#) had an effect on peer-reviewed publications and citations. To track the subsequent publication of SSRN preprints, we conduct an exact match between the titles of SSRN papers and their published articles in peer-reviewed journals by the same authors. We successfully matched 18% of the preprints in our sample with a future publication. There are two reasons why a SSRN working paper may not match with a published article. First, the authors have not yet published their preprints in any peer-reviewed journals. Second, authors may change the titles of preprints upon publication. We will show via a placebo test that this potential source of measurement error is similar between the treatment and control groups over time, and thus unlikely to bias our estimates.

### 3.4 Defining Treatment Variables

We define three variables to partition our sample into treatment, control, and placebo groups. Recall that not all researchers are equally likely to adjust their collaboration strategies in response to Sarsons’ 2015 paper. The results of her study would likely have the greatest effect on 1) economists since they are more exposed to the paper than other social sciences, 2) women since they are the ones who bear the penalty of coauthorships, and 3) junior faculty who are preparing for their tenure evaluation. To identify the most impacted authors within our sample, we use a combination of methods to characterize authors as “junior”, “female”, and “economists”. This approach allows us to pinpoint the specific subset of researchers most likely to be influenced by [Sarsons \(2015\)](#), as well as their comparable controls. We describe how we define these three key variables next.

**Economists** - We define economists as those individuals who had at least one SSRN working paper categorized under the field of “economics” prior to 2016. Dimensions utilizes a machine learning tool to classify research according to the Australian and New Zealand Standard Research Classification (ANZSRC) system. Conversely, we define non-economics social scientists as those who had no papers classified under economics before 2016. To ensure the control group comprises of social scientists comparable to the treatment group,

we exclude those who have published a paper in the natural sciences.

**Gender** - We classify the genders of authors based on their first names using the Python package *gender-guesser*. This tool categorizes names into five possible groups: “unknown” (name not found), “andy” (androgynous), “male”, “female”, “mostly male”, or “mostly female”. For our analysis, we classify an author as female if her name is categorized as either “female” or “mostly female”, and similarly for male authors. *Gender-guesser* successfully identified the gender for 84% of the researchers’ names in our dataset.<sup>4</sup> We also use this program to identify the gender of the coauthors of our sampled researchers. To validate the accuracy of the Python package, we manually compare the genders of female researchers as determined by *gender-guesser* with those inferred from images on their websites. We find that only 5.7% of the authors identified as female by gender-guesser were actually male according to their website images, which we then correct by hand.

**Seniority** - Since Dimensions does not provide the academic title of researchers, we manually look up all 1,403 female researchers in our sample and collect four pieces of information for each person: field of PhD, actual gender, seniority, department and university at the end of 2015.<sup>5</sup> Appendix Table A1 describes how we use this information to construct our final analysis sample of “junior female researchers”. First, as previously described, we manually correct any misspecified genders by the *gender-guesser* package. Second, we restrict the sample to individuals still employed at a top 50 U.S. university in 2015. This drops many researchers who work in industry or government. Third, we drop teaching faculty, non-tenure track positions, and PhD students. Finally, among the tenure track researchers, we distinguish between 200 assistant professors and 555 tenured professors. For our main analysis, the treated group consists of 146 junior female economists, while the control group comprises of 54 junior female non-economics researchers.

## 3.5 Descriptive Statistics

### 3.5.1 Fields of the Treatment and Control Groups

In order to understand the composition of the authors in our treatment and control groups, Table 1 provides a detailed breakdown of their research area and academic degrees in 2015. Panel A shows that “Applied Economics” emerges as the most frequent topic in the treated group, accounting for 29.44% of their SSRN papers. In contrast, the control group, which

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<sup>4</sup>A majority of the names with undefined gender are in languages where the English pronunciation is gender-ambiguous, such as Chinese names.

<sup>5</sup>Given that there are over 3 times as many men as women in the data, we only manually collect data for female researchers. This has little consequence for our analysis since the behavior of men only serves as a placebo test, and we are primarily interested in the response by female economists.

comprises of social scientists with no publications in economics, mostly focuses on “Strategy, Management, and Organizational Behavior”, “Accounting”, and “Banking”. Thus, our difference-in-difference design can be intuitively interpreted as a comparison between researchers in economics departments to academics in business schools and law schools. Consistent with that interpretation, Panel B shows that the most common degree among the treated group is a PhD in Economics, whereas the most prevalent degree among the control group is a PhD in Business, followed by a law degree.

It is important to note that not all individuals in our treatment group have a PhD in economics because we include in the treatment group anyone who posted a paper related to economics between 2012 and 2016. This allows us to capture all individuals who might be exposed to Sarsons’ 2015 paper, regardless of their actual field of research. Our analysis would be akin to the many empirical studies that compare groups based on their exposure to a treatment (Goldsmith-Pinkham et al. 2020). As a robustness check, we will show that our main results hold for alternative definitions for economists.

### 3.5.2 Percentage of Women in the Profession

One potential confounding factor in our analysis is the possibility of a coincidental increase in the number of female authors in the economics profession concurrent with the publicity of Sarsons’ study. For instance, there may be a push by economics departments to hire more women. If such a trend exists, it would increase the pool of women in the profession and might lead female economists to collaborate less frequently with men, independent of any response to the disclosed information about gender differences in credit attribution.

To address this concern, we analyzed the percent of female authors across all SSRN papers posted by researchers at the top 50 U.S. universities over time. As shown in Figure 2, the percentage of unique female authors in economics papers has remained relatively flat throughout our study period, consistently around 20%. In contrast, there is an increase in the percentage of female authors in non-economics papers on SSRN during the same period. These trends thus run counter to our initial concern. Women in the control professions are the ones experiencing a growing pool of female colleagues, which may potentially lead to a decrease in the number papers coauthored with men. Such a trend would actually bias our estimates *against* our hypothesis that women in economics would choose to not coauthor with men after learning that they receive less credit for their work.

### 3.5.3 Publication History of the Treatment and Control Groups

Table 2 compares how junior female economists and non-economists differ in terms of their SSRN publication records prior to 2016. In general, there are four distinct styles of research collaborations: male-coauthored projects, single-authored projects, female-coauthored projects, and mixed-gender collaborations. Single-author projects are publications authored by one individual without any coauthors. To classify a project as having only male coauthors, all involved collaborators’ first names must be identified as male by *gender-guesser*. We identify projects with exclusively female coauthors in a similar manner. For publications involving both female and male authors, we require the presence of at least one individual from each gender. Publications in the mixed-gender category may include coauthors whose genders are unknown.

Since the algorithm cannot perfectly tell the gender of all researchers by their names, an additional scenario involves projects where at least one coauthor has an unknown gender, and it is unclear in which of the other four categories the paper belongs. For instance, a paper with 1 male and 1 female coauthor will always be a mixed-gender collaboration regardless of the gender of the remaining coauthors. However, a project involving a female coauthor and another author whose gender is unidentified could be either a female-coauthor only or a mixed-gender collaboration. We classify ambiguous cases such as these as unknown-gender coauthored publications.

We note four key comparisons between our treatment and control group. First, we find that junior female economists tend to have more working papers than non-economists between 2012 and 2015. Second, among the working papers by economists, about 36% (i.e.  $\frac{0.2397}{0.6610}$ ) of them are coauthored with only men, whereas 30% of non-economists’ publications are with only male coauthors. One possible reason for this difference in gender composition of coauthors is that there are simply fewer women in economics relative to other fields (see Figure 2). Third, junior economists posted their first working paper a year earlier than non-economists. Our analysis will account for this difference in career progression by controlling for year of first working paper interacted with time fixed effects, to compare individuals within the same “cohort”. Lastly, our sample of economists are slightly more likely to be affiliated with a top 30 university. We will also account for this by showing that our results are robust to comparing researchers within the same school.

It is perhaps surprising that there are more junior women in economics than there are in all other social sciences outside economics. To check whether the relative sample sizes are reasonable within the universe of SSRN users, Appendix Figure A2 reports the number of papers uploaded to SSRN by field, scraped directly off the SSRN website in September 2024. We find that of the 2.5 million papers in the social sciences, 33% are classified in the

“economics research network” or the “financial economics network”. These two fields are among the four largest on SSRN, along with legal scholarship and political science. Given that practicing lawyers can post papers and economics is a growing field relative to political science (see [National Science Foundation 2022](#)), it is not unreasonable that the majority of our junior female sample consists of economists. While this small sample size has limited statistical power for heterogeneity analyses, it does not affect the representativeness of our results since there simply are not many junior female academics in the top 50 institutions.

## 4 Impact on Incumbent Junior Female Economists

### 4.1 Main Specification

Despite some baseline differences between economists and non-economists, we show in our analysis that the sample of non-economists make for a reasonable counterfactual control group. Our empirical strategy does not require that the two groups are identical at baseline, but rather, that their outcomes are evolving at the same rate over time, which we will validate in the data. To evaluate the impacts of learning about gender bias in receiving credit for coauthorships, we estimate the following difference-in-difference regression:

$$y_{it} = \sum_{\substack{t=2012 \\ t \neq 2015}}^{2023} \beta_t \cdot Econ_i \times D_t + \alpha_i + \gamma_t \times age_i + \epsilon_{it} \quad (1)$$

where  $y_{it}$  is an outcome of interest for researcher  $i$  in year  $t$ , such as the number of projects with only male coauthors. We measure all outcomes in levels rather than logs to avoid issues with log-zeros.  $Econ_i$  is an indicator that equals one if researcher  $i$  is an economist.  $D_t$  equals one at year  $t$ . We control for author ( $\alpha_i$ ) and year-age ( $\gamma_t \times age_i$ ) fixed effects, where age is defined as the first year an author posted a SSRN working paper. It is common in the economics of science literature to compare researchers within the same “publication age” or cohort so that the results are not confounded by the stage of individuals’ careers ([Azoulay et al. 2019](#)). We also present the main results with the vanilla two-way fixed effect model and the year interacted with university affiliation fixed effects.

### 4.2 Working Papers with Only Male Coauthors

Figure 3 presents the event-study estimates (i.e.  $\beta_t$ ) for our first outcome: the number of SSRN projects coauthored with only men. This is the outcome where we expect to see the largest impact given the results of Sarsons’ paper. We explore other types of coauthorships

in section 4.3. Panel A plots the estimates for both the junior and senior female samples. We note four results. First, prior to 2016, we find that the number of working papers with only male coauthors are trending similarly between economists and non-economists. This provides empirical support for our parallel trends assumption that absent Sarsons’ 2015 paper, the publication records of both groups would have evolved the same over time. Second, for junior female economists, we observe a dip in the number of male-coauthored projects starting in 2016 that peaks in 2017 and 2018. This is consistent with our hypothesis that junior women choose to avoid coauthoring with only men after learning about the gender gap in recognition for group work. Third, we find that the drop in male coauthorships disappears by 2020. This could partly be driven by a Covid-related shock, but there already appears to be a recovery prior to 2020. Instead, we provide suggestive evidence in section 5 that the patterns are consistent with women changing their coauthorship decisions after obtaining tenure. Fourth, as a placebo check, we find no decrease in male coauthored projects among senior female economists who do not have to worry about tenure. Similarly, Panel B shows that male economists also do not significantly change their patterns of publishing papers with male coauthors. Although the post-treatment estimates are negative for men, they do not differ from the pre-2016 estimates aside from 2015, which seems like an outlier year.

The number of projects coauthored exclusively with men among junior female economists shows a notable decrease beginning before 2018. This timing suggests that the decline in such collaborations started prior to the significant rise of the #MeToo movement. Furthermore, an observable recovery in the number of male-only coauthorships occurs after 2018. Together, the timing of the responses indicate that our estimates are not driven by #MeToo. Instead, our estimates suggest that there was a shock around 2016 that specifically targeted junior women in economics, did not affect men or tenured women, and ended up reducing the number of male coauthored papers. Given the timing and targeted nature of the response, we attribute this shock to Sarsons 2015.

Table 3 tests the robustness of our result to alternative specifications. Given that the bulk of the decrease in male-only coauthorships occurs before 2020, we average the estimates from equation 1 over two time periods: 2017-2019 and 2020-2023.<sup>6</sup> This aggregation also helps us avoid potential confounding issues related to changes in academic cooperation during the COVID-19 pandemic and maintains a clear focus on the period immediately following the dissemination of Sarsons’ study. Column (1) uses a basic two-way fixed effects model without any additional controls. Column (2) compares junior female researchers within the same academic cohort, defined by their first year of posting a paper on SSRN. Column (3)

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<sup>6</sup>We omit year 2016 because many SSRN projects from that year likely commenced before the publicity of Sarsons’ study in late 2015.

adds controls for authors’ 2015 academic affiliation to compare individuals within the same university, thereby accounting for changes in institutional culture and dynamics.

The results across all three specifications consistently show a significant decrease in the number of projects with exclusively male coauthors, with estimates ranging from  $-0.11$  to  $-0.18$  papers per year. In our preferred specification in column (2), this reduction translates to an economically significant 55% decrease in male collaborations relative to baseline (i.e. 2012-2015). We find similar results in columns (4), where we show that the probability that a junior female economist posts at least one paper with only male coauthors in a given year falls by 8.5 percentage points from a base of 19%. Since we are using count data, we also show in column (5) that our estimates are robust to using a Poisson regression. Taken together, the findings suggest that the dissemination of Sarsons’ paper, which highlighted the low contribution of all-male coauthored papers to female economists’ tenure prospects, led these researchers to reevaluate and modify their collaboration strategies. However, the treatment effects shrink over time and are no longer statistically different from zero in post-2020, suggesting that the decrease in collaborations with men did not persist over the long run.

We also verify that our results are robust to the way we define “economists” in our sample. Our main specification defines economists as anyone who posted an SSRN working paper in economics. An advantage of this approach is that the same criteria can be used to define economists for both men and women. However, given that we manually collected detailed data for women, we can use more precise information to define their treatment group. Appendix Figure A3 presents the event-study estimates using two alternative definitions of economists. Panel (A) restricts the treatment group to only individuals with PhDs in economics, and Panel (B) defines economists as researchers working in an economics department in 2015. In both cases, we continue to observe a drop in the number of male coauthored papers in 2017. This effect is particularly pronounced in the second case, where we see the decrease in male coauthorships persist to 2019 and then fluctuate between 0 and negative effects afterwards.

### 4.3 Total Number of Projects and Other Collaborations

The previous section showed that junior female economists reduced the number of projects coauthored exclusively with men in response to new findings that such collaborations contribute little to their tenure evaluations. This strategic adjustment raises an important question: Do these researchers compensate for the reduction in male coauthored projects by increasing their involvement in other collaborations? Specifically, can they offset this



reduction through single-author projects, female-only coauthored projects, or mixed-gender projects?

Figure 4 shows how each collaboration type changed over time. Panel A finds that the total number of SSRN working papers followed a similar trend to the patterns for male coauthorships: after a period of no pre-trends, there is a decline in total projects beginning in 2016, followed by a recovery starting in 2019. This suggests that the decrease in the male-only coauthorships is not offset by other types of collaborations. Consistent with this view, panels B to E find no increase in the number of single-author, female-only, mixed-gender, or unknown-gender publications. Moreover, the absence of an increase in mixed-gender collaborations suggests that the decrease in male-only coauthorships is not simply driven by an increase in teamsize.<sup>7</sup> Together, these results indicate that learning about the gender bias in credit attribution had a net negative impact on junior female economists’ research output.

Table 4 aggregates the difference-in-difference estimates over 2017-2019 and 2020-2023 for each of the coauthorship types. Column (1) indicates that the total number of SSRN publications decreased by 0.2 papers per year during 2017-2019, which corresponds to a 31 percent reduction from baseline. Columns (2) to (5) find that there was no significant impact on the number of papers with female coauthors, mixed gender coauthors, or unknown gender coauthors. In fact, there appears to be a persistent decrease in solo authored projects, possibly due to a learning mechanism whereby a decrease in coauthored work decreases individuals’ human capital on solo projects. Regardless of the mechanism, the observed drop in collaborations with only male coauthors is not offset by other types of collaborations.

In contrast, we provide some suggestive evidence in Appendix B that the withdrawal of junior female researchers from collaborations with men did not have strong impacts on men’s productivity. Restricting the sample to only male economists, we find that researchers who initially collaborated with junior female economists prior to 2016 had fewer papers with only female coauthors after the release of [Sarsons \(2015\)](#), relative to other researchers with no junior female collaborators at baseline. However, we find no effect on the total number of working papers posted by male economists who had junior female coauthors.

## 4.4 Heterogeneity by Collaborator Networks

A key factor in determining researchers’ collaboration structure is their existing coauthorship networks. There are at least three reasons why junior female economists who more frequently

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<sup>7</sup>Since the number of authors on economics papers is growing over our study period ([Jones 2021](#)), the likelihood of coauthors being from only one gender would naturally decrease. However, if that was the only mechanism, then we would expect an increase in mixed-gender projects.

coauthor with men may experience a more pronounced reaction to Sarsons’ findings. First, they mechanically have more room for adjustment - women with no male coauthors simply cannot reduce the number of papers with male coauthors below zero. However, even if they had no male coauthors to begin with, they could still accept fewer future coauthorships with men relative to the control group of non-economists. Second, junior female researchers who heavily collaborate with men may feel a stronger impetus to reduce the number of projects with male coauthors because they have fewer solo or female-coauthored projects to signal their productivity. Third, women who primarily coauthor with men might initially be less aware of the gender differences in credit attribution before the publicity of Sarsons’ paper in 2015. In that case, the dissemination of Sarsons’ study would have a stronger effect on their beliefs and subsequent decisions.

We test whether the initial gender composition of women’s networks is correlated with their response to learning that women receive less credit for coauthorships with men. In columns (1) and (2) of Table 5, we introduce an interaction term of  $Treatment \times Post$  with a dummy variable that equals one if the author’s baseline share of coauthors who are male is below the median among junior female researchers. Column (1) shows that the decline in male-coauthored projects is driven solely by economists with above-median male coauthors before 2015. Junior female economists who have a higher-than-median percentage of male coauthors experience a significant decrease of 0.22 male-coauthored papers. On the other hand, individuals who typically collaborate less with men show no change in male coauthorships (i.e.  $-0.22 + 0.23 = -0.01$ ). This outcome suggests that there is minimal effect in the behavior of researchers who already engage more frequently with female coauthors.

Given that the decrease in male coauthorships is driven solely by women with many male coauthors at baseline, we expect this group to experience a greater decrease in total publications. Column (2) of Table 5 shows the heterogeneous impacts on the total number of SSRN projects by the baseline gender composition of researchers’ collaborators. Consistent with our prediction, we find that researchers who have a higher-than-median percentage of male coauthors experienced a net decrease of 0.23 working papers, which is about the same as the decrease in male coauthored collaborations. In contrast, women who tend to coauthor less with men actually experienced a smaller decrease in the total number of papers. These heterogeneous responses, although imprecise, reaffirm our finding that the decrease in male coauthorships was not compensated through other types of collaboration and led to a net decrease in productivity.

Besides existing coauthorship networks, researchers’ response may also depend on the gender composition of their field of study. For example, women may be more willing to reduce their male coauthorships if there are many other women in their discipline with

whom they can coauthor. In columns (3) and (4), we explore heterogeneity by whether the researcher is an applied micro economist, relative to being in macro, econometrics, or theory. Our estimate in columns (3) and (4) indicate that junior female economists in applied micro experience a smaller decrease in male coauthorships relative to their peers, but the estimates are fairly noisy and statistically insignificant. Overall, while junior women’s existing networks seem to predict their response to [Sarsons \(2015\)](#), the number of women in their field more broadly does not appear to generate strong heterogeneous responses.

## 4.5 Realization of SSRN Preprints in Scholarly Journals

In the previous sections, we found evidence that Sarsons’ study reduced the production of working papers by junior female economists. Next, we test whether this effect extends to peer-reviewed publications and citations. In principle, a decrease in SSRN working papers may not translate to a decrease in actual publications or citations if female economists only abandoned low-quality projects. Moreover, by reducing the number of projects, women could also devote more effort to their remaining papers, which would have positive downstream impacts on the publication and citation potential of those projects. To determine whether the decrease in SSRN working papers ultimately led to less research output, we estimate equation 1 using the number of peer-reviewed publications and the number of citations as the outcome variables. Since the year that a paper is published is a poor indicator of whether the project was started before or after 2016, we focus our analysis on solely papers that began as SSRN working papers. By linking realized publications to their original SSRN working paper, the year in our regression is defined by the date that the paper was first posted on SSRN.

Figure 5 plots the impact of Sarsons’ 2015 study on junior female economists’ realized research output. In Panel A, we observe a noticeable decline in the number of peer-reviewed publications coauthored exclusively with men between 2017 and 2019. However, Panel B finds that the effect on the total number of citations across all male coauthored publications is less clear. While the post treatment estimates are negative, that appears to be driven more by 2015 being an outlier than a true change in trends. Mirroring the impact on male coauthored papers, Panels C and D likewise find a net decrease in the total number of peer-reviewed publications, but nuanced impacts on citations.

We validate our empirical strategy in two ways. First, we repeat our analysis for two placebo groups: senior female and junior male researchers. The estimates, as presented in Appendix Figure A4, show no change in the number of realized publications or citations for either total SSRN projects or only those with solely male coauthors. The lack of response

among senior women or men suggests that our results cannot be explained by a shock to the entire economics profession, but is instead due to an event that particularly affected junior women in 2016. Second, we extend our analysis to other types of coauthorship projects, including single-author, female coauthor only, mixed-gender coauthor, and unknown-gender coauthor projects. As shown in Appendix Figure A5, there were no significant and persistent changes in either the number or citation of these projects. The null effect along these other dimensions suggest that the decrease in peer-reviewed publications and citations is not driven by changes in the match rate between the SSRN data and the data on journal publications. Instead, the evidence is consistent with a shock to specifically junior female economists, that primarily affected their propensity to coauthor with men.

Table 6 aggregates the difference-in-differences estimates for the impact on junior female economists’ realized publications and citations of SSRN projects. In column (1), we observe an 80% decrease in the number of peer-reviewed publications coauthored exclusively with men during the 2017-2019 period. Column (2) likewise finds a decrease in the total number of publications. Although the effect is imprecisely estimated, the total decrease in publications can be fully explained by the decline in male coauthored publications. Relative to Table 3, where we showed a 45% reduction in SSRN preprints with only male coauthors during the 2017-2019 period, we note a more pronounced percentage decline in peer-reviewed publications that started as SSRN preprints. This discrepancy suggests that junior female economists are reducing their involvement not only in male coauthored projects with low prospects of publication but also in those with high publication potential. Albeit the estimates are fairly noisy, Columns (3) and (4) provide suggestive evidence that citations fell as well, which indicates that the shift away from male-coauthored projects was not fully compensated by an increase in the quality of remaining project either. Thus, the response to Sarsons 2015 led to a net decrease in overall academic output and innovation. The social cost could be even more pronounced if we consider evidence from the literature that mixed-gender teams typically produce higher-quality studies with broader perspectives (Yang et al. 2022).

## 5 Impact on Future Generations of Female Economists

In the panel regression (1), we investigated changes in the collaboration patterns of incumbent female scholars before and after the exposure to new information on gender biases in credit for group work. That analysis allows us to follow the same individuals over time to see how researchers’ response evolves over their careers. In this section, we examine the impact of the information shock on future generations of female economists.

## 5.1 Empirical Strategy

To explore how collaboration change over different cohorts of new female economists, we restrict the data to the first time that each author posts a paper on SSRN and implement a repeated cross-section difference-in-difference analysis:

$$y_{it} = \sum_{\substack{t=2012 \\ t \neq 2015}}^{2023} \beta_t \cdot Econ_i \times D_t + \alpha \cdot Econ_i + \gamma_t \times Org_i + \epsilon_{it} \quad (2)$$

where  $y_{it}$  represents an outcome of interest for researcher  $i$  in year  $t$ , such as an indicator for whether their first working paper is with only male coauthors.  $Econ_i$  is an indicator that equals 1 if researcher  $i$  is an economist. We classify a researcher as an economist if their first paper is in the field of economics.  $D_t$  is a dummy that equals one at year  $t$ . Unlike the panel analysis, we do not control for cohort fixed effects because we only keep each author’s first working paper. To control for potential confounding factors such as school-specific policies regarding gender, we include an interaction term between year and organization fixed effects:  $\gamma_t \times Org_i$ . This interaction allows us to control for any time-varying effects that are specific to each university, ensuring that our comparisons between treated and control researchers are within the same institutional context.

One inherent limitation of a repeated cross-section analysis is that it only includes observations for authors who actually post on SSRN. Specifically, this approach does not account for composition changes that may arise from researchers choosing to leave academia due to discouragement stemming from gender disparities in the profession. This selective omission from the data affects some of the interpretation of our results. Namely, a decrease in the share of papers coauthored with men can either reflect an intensive margin response where new generation of women are choosing a different coauthorship strategy than working with men, or an unobserved extensive margin effect where the women who would have otherwise coauthored with men are leaving the profession altogether.<sup>8</sup> The results from the panel analysis suggests that the intensive margin effect is at least one of the mechanisms at play, but we are unable to directly measure the extensive margin response with our data. Instead, we interpret the estimates of equation 2 as the causal impact of Sarsons’ 2015 study on the average outcome of new cohorts of economists, with the understanding that the effect may be driven by both changes in behavior and composition.

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<sup>8</sup>A third possibility, which we assume to be highly unlikely, is that awareness of gender bias in credit attribution *increases* the likelihood that women who would otherwise have left the profession to remain and these individuals choose to work independently.

## 5.2 Impact On Coauthorship Patterns

Figure 6 plots the estimates of equation 2 for four different outcomes: the share of papers that are solo-authored, coauthored with only men, coauthored with only women, or coauthored with both men and women.<sup>9</sup> Panel A plots the effect on the probability that a paper is solo-authored. We highlight three observations. First, leading up to 2016, we find no differences in pre-trends between each successive generation of female economists and non-economists. This validates the parallel trends assumption needed for our identification strategy. Second, starting in 2016, new cohorts of junior female economists became more likely to solo-author their first paper. Third, unlike the panel analysis, the change in male coauthorships does not appear to converge back to zero in 2020.

Given that the estimates of equation 2 represent changes in probability, the increase in solo-authorships must mechanically be offset by a decrease in a different authorship type. Panels B to C shows that the increase in solo-authorships is driven by a decrease in collaborations with only men. Panel B finds that the probability of male coauthorships was rising prior to 2016 and then starts reversing trends. In comparison, Panel C finds no impact on the probability of papers with only female coauthors. Similarly, Panel D likewise finds no effect on the share of mixed gender collaborations, albeit the estimates are fairly noisy. The observation that only male coauthorships fall indicates that the rise in solo-authored papers is not simply due to a general shrinking of team sizes. Instead, the change is related to the gender composition of the teams.<sup>10</sup> This suggests that future generations of female economists are opting to work independently than with men after learning that they would receive less credit for group work.

The persistent decrease in male coauthorships over successive generations rules out three potential explanations for why the impact in the panel analysis was only temporary: forgetfulness, re-optimization, and changes in tenure review practices. First, if incumbent junior economists simply forgot the results of Sarsons' study, then they would not pass on this knowledge to the next generation of economists. Second, if incumbents discovered that they are more productive collaborating with men, then they would advise their PhD students against selecting coauthors based on gender. Third, if universities corrected the bias in their review decisions, then incumbent junior female economists would be more willing to coauthor with men over time. In all three cases, we would expect there to be no long-run decrease in coauthorships with men for future generations of female economists. This distinction

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<sup>9</sup>By construction, an observation is defined as the first paper that an author posts on SSRN, so the outcome is an indicator for the type of coauthorship rather than the number of publications.

<sup>10</sup>Appendix Figure A6 shows that there was also no impact on the probability that the gender composition of the team is unknown due to gender-ambiguous first names.

between the panel and repeated cohort analysis, as well as the timing of the convergence in the panel analysis, suggests that incumbent women may have simply obtained tenure and no longer had to worry about the gender of their collaborators.<sup>11</sup>

As a placebo test, Appendix Figure A7 repeats our analysis for new cohorts of male economists. In this case, we observe no trend break in the probability of male coauthorships around 2015. While we do see some changes in the rate of solo-authorships, this appears to be driven by a decline in specifically the year 2015, rather than a change in long-run trends. Overall, there appears to be limited impact on male coauthorship patterns. The null effect for men rules out explanations that rely on shocks affecting the entire economics profession. Instead, it suggests that the change in the coauthorship patterns of new generations of female economists must be due to a female-specific shock to economics that happened around 2016, such as the release of Sarsons (2015).

Table 7 summarizes our results for the response of future generations of female economists to learning about the gender bias in tenure evaluations for coauthored work. Column (1) shows that women are approximately 15 percentage points more likely to solo author after 2016. The remaining columns are statistically insignificant, but the magnitude of the estimates suggest that the most of the shift is away from paper with ambiguous gender authors. However, Appendix Figure A6 shows that the change in the share of papers with coauthors of unknown gender is driven primarily by the 2012 and 2013 cohorts, rather than a trend break after 2015.

To examine deviations from pre-trends, Appendix Figure A8 present estimates using the “honest difference-in-difference” approach developed by Rambachan and Roth (2023). The figure confirms that the change in the share of papers with undefined gender compositions is not statistically different from pre-trends. Instead, only the share of collaborations with all male coauthors experienced a statistically significant decrease in the 8 years following the release of Sarsons (2015). Together, we interpret the results to suggest that the findings of Sarsons’ 2015 paper shifted future generations of female economists away from male coauthorships towards solo authored work.

## 6 Conclusion

While a large literature has documented the many biases that women face in their careers, few papers have studied the way women respond after learning of these biases. We use the public disclosure of an academic paper in 2015 as a natural experiment to examine how female

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<sup>11</sup>The persistent impact on the repeated cohorts also provides evidence against Covid differentially impacting economists relative to other academics.



economists strategically respond to previously unrecognized information about gender biases in the tenure review process for coauthored papers. Our analysis of the publication records of junior incumbent female researchers reveals that they reduce their involvement in projects coauthored exclusively with men. Despite the reduction in male-coauthored projects, these researchers do not compensate through other forms of collaboration, translating to a net decrease in peer-reviewed publications and citations. Although coauthorships with men recover later in women’s careers, aversion to male coauthorships still persists among future generations of young female economists. Together, our paper suggests that while reducing involvement in projects that contribute minimally to tenure is a rational response from the perspective of junior female economists, it can also lead to less innovation and scientific progress. The results of our study thus highlight that gender biases not only impose costs on the women directly affected by them, but also on the firms that hire these women and on society due to an inefficient allocation of effort.

A limitation of our study is that it focuses exclusively on the supply side response to gender bias, specifically the reactions of female economists. Although we provide some indirect evidence that there were no changes in tenure evaluations, we encourage more research on this topic. Many organizations, both within academia and in the broader labor market, may not be fully aware of their own biases when evaluating group work. Future research could explore whether these institutions implement reforms to promote gender equality upon becoming aware of their own biases. This research would provide a more comprehensive understanding of how both supply and demand forces interact in response to gender discrimination in the labor market.

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# Figures & Tables

Figure 1: Results and Media Coverage of Sarsons (2015)

Panel A: The Abstract and Main Results of Sarsons (2015)

## Gender Differences in Recognition for Group Work

Heather Sarsons\*  
December 3, 2015

### Abstract

This paper explores whether bias arising from group work helps explain the gender promotion gap. Using data from economists' CVs, I test whether coauthored publications matter differently for tenure by gender. While solo-authored papers send a clear signal about one's ability, coauthored papers do not provide specific information about each contributor's skills. I find that women incur a penalty when they coauthor that men do not experience. This is most pronounced for women coauthoring with men and less pronounced the more women there are on a paper. A model shows that the bias documented here departs from traditional discrimination models.

Table 4: Coauthor gender and tenure		
	(1)	
	Probit	
	x Female	
Solo-authored	0.063*** (0.008)	0.009 (0.015)
CA with only fem CAs	0.062*** (0.017)	0.024 (0.027)
CA with only male CAs	0.068*** (0.009)	-0.068*** (0.018)
CA with m and f CAs	0.080** (0.028)	-0.045** (0.036)
Female	0.049 (0.099)	
Observations	542	

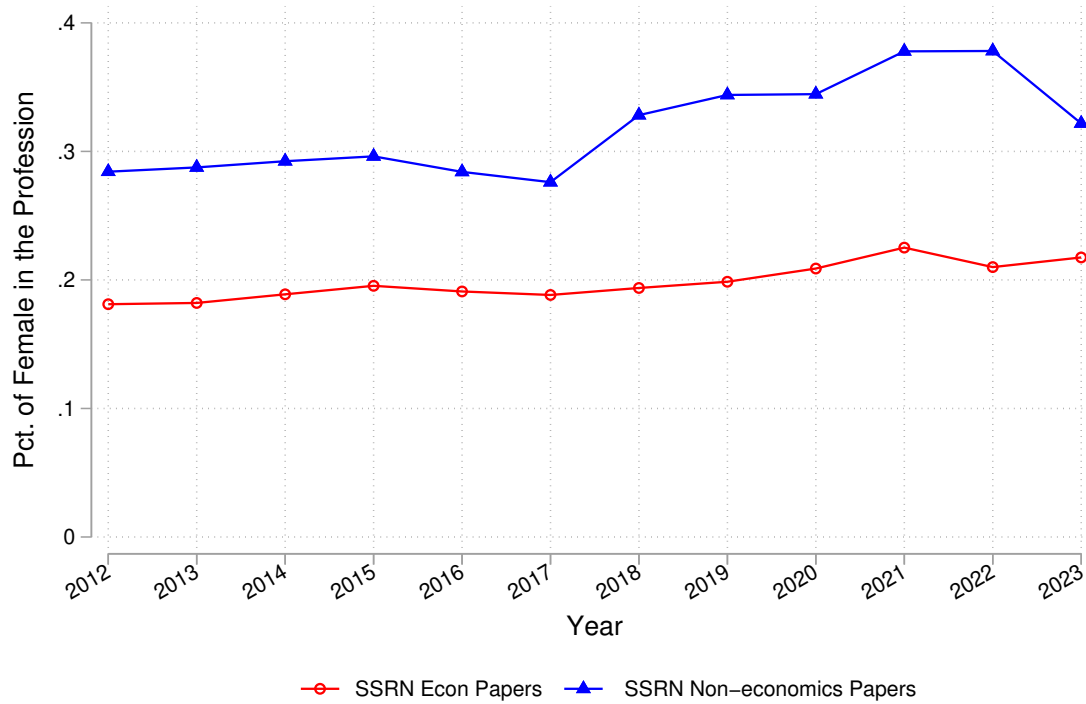
This table presents the results from a single regression. The Y var. is the probability of receiving tenure. "CA with only fem CAs" is the number of papers an individual has in which all coauthors are female excluding the person up for tenure. "CA with only male CAs" is defined similarly but with male coauthors. "CA with m and f CAs" are papers with both male and female coauthors. All regression control for average journal rank and include tenure year, tenure institution, and field fixed effects.

Panel B: Media Coverage of Sarsons' 2015 Paper (New York Times, Jan 2016)



Note: Panel A shows the abstract and the main regression estimates from Sarsons (2015). Both the abstract and the regression table suggest that projects with only male coauthors contribute little to female economists' tenure. Panel B shows media coverage of the study from a New York Times article published Jan 6, 2016.

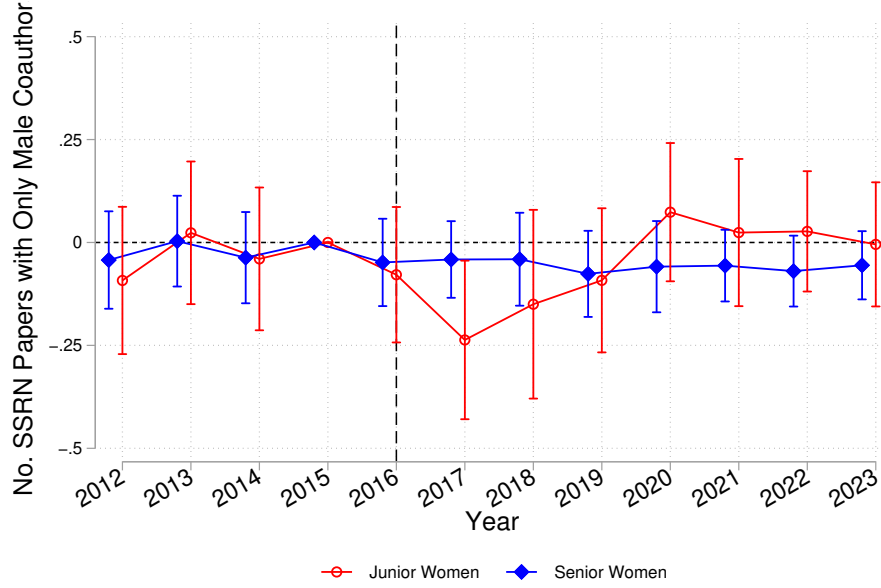
Figure 2: Share of Women in the Profession from 2012 to 2023



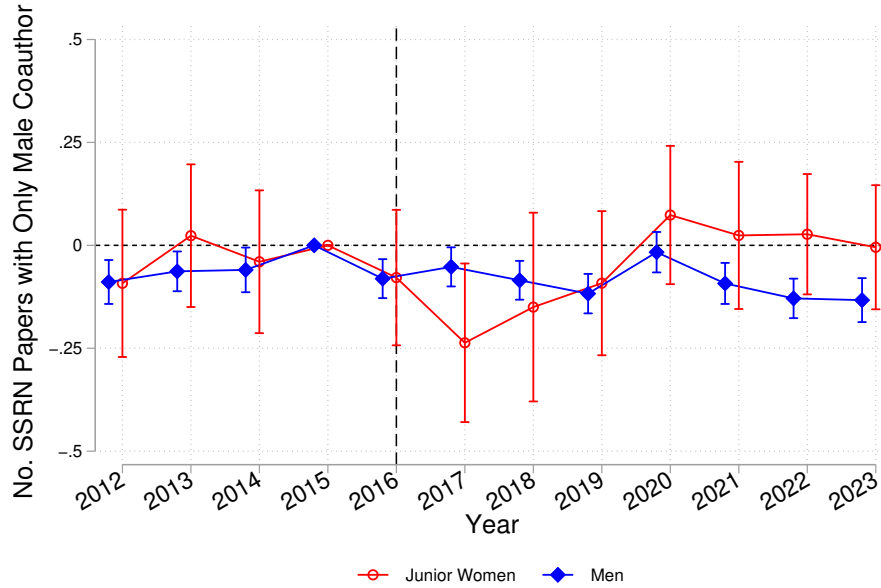
Note: This figure presents the share of women among researchers at the top 100 universities who post on SSRN, separately for economics papers and non-economics papers from 2012 to 2023.

Figure 3: Impact on the Number of SSRN Papers with Only Male Coauthors

Panel A: Junior Female and Senior Female



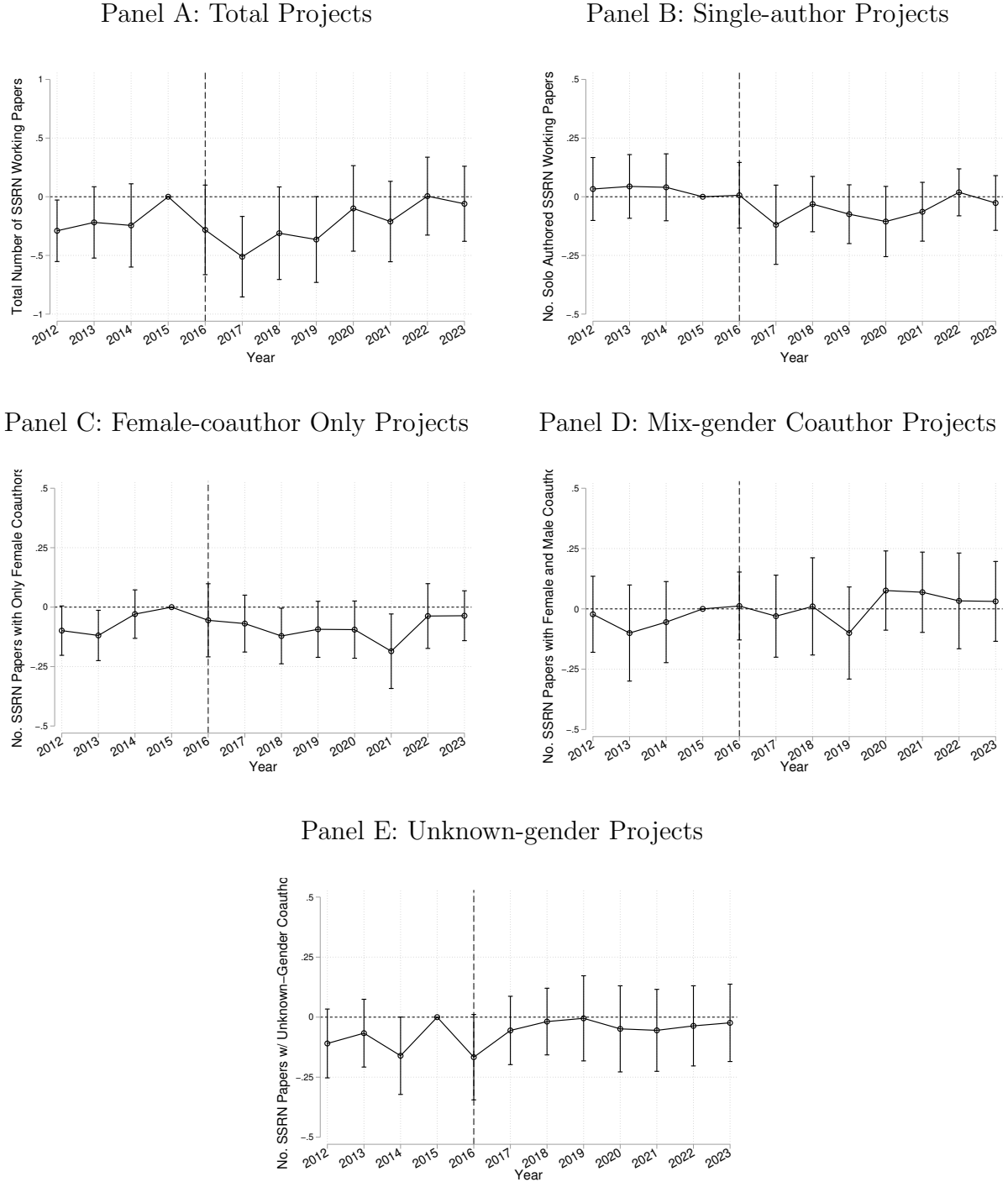
Panel B: Junior Female and Male



Note: This figure shows the event study estimates from equation 1 where the outcome is the number of SSRN publications with only male coauthors. All models control for individual fixed effects and year interacted with cohort fixed effects. Panel A displays the results for junior female economists (red) and senior female (blue) economists. Panel B compares the event study for junior female (red) and male (blue) economists. Standard errors are clustered at the author level. Each vertical bar represents the 95% confidence interval of the estimate.



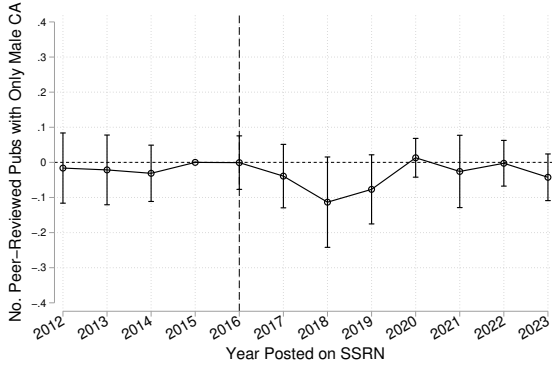
Figure 4: Impact on the Number of SSRN Papers by Coauthorship Type



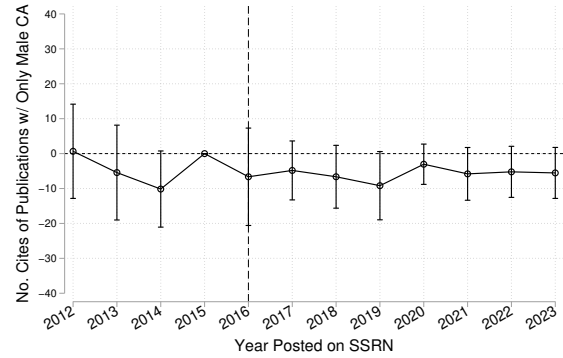
Note: This figure shows the event study estimates from equation 1 for junior female economists across five different outcomes. Panels A to E present the effect on total, single-author, female-coauthor only, mixed-gender, and unknown-gender coauthored SSRN projects, respectively. All models control for individual fixed effects and year interacted with publication age fixed effects. Standard errors are clustered at the author level. Each vertical bar represents the 95% confidence interval of the estimate.

Figure 5: Impact on Number of Realized Publications and Citations of SSRN Papers

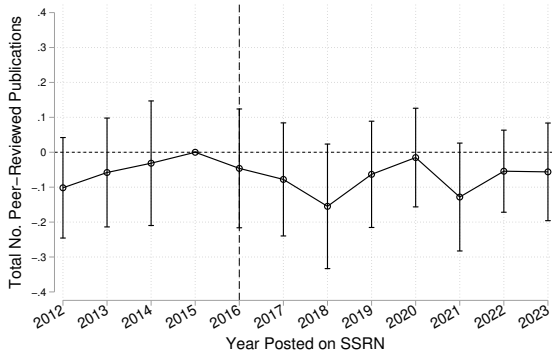
Panel A: Publications with Male CA Only



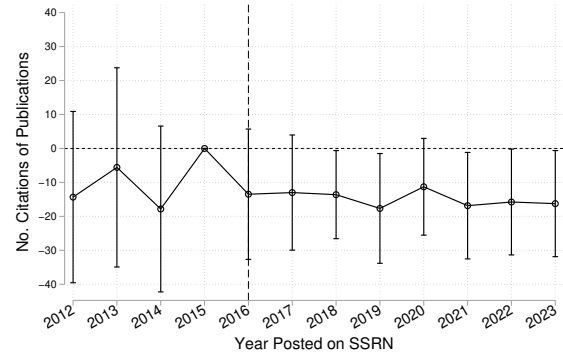
Panel B: Citations with Male CA Only



Panel C: Publications of All SSRN Papers

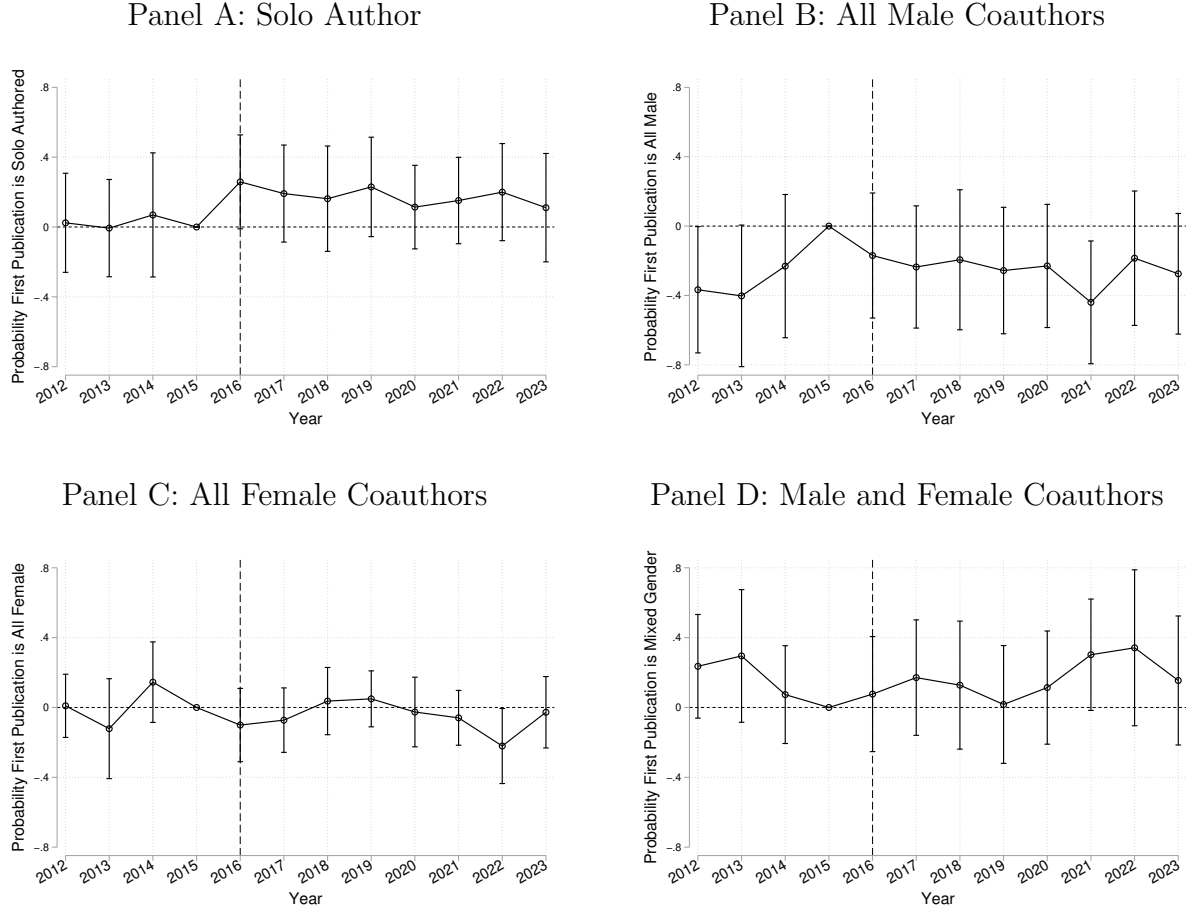


Panel D: Citations of All SSRN Papers



Note: This figure shows the event study estimates from equation 1 for junior female economists across four different outcomes. Panels A-B presents the estimate on the number of peer-reviewed publications and citations of SSRN projects with only male coauthors. Panels C-D presents the estimate on the number of peer-reviewed publications and citations of all SSRN projects. All models control for individual fixed effects and year interacted with publication age fixed effects. Standard errors are clustered at the author level. Each vertical bar represents the 95% confidence interval of the estimate.

Figure 6: Impact on the Types of Coauthorship in Repeated Cohorts of Female Economists



Note: This figure shows repeated cross-section difference-in-difference estimates from equation 2. Panels A-D present the effects on the share of projects that are solo-authored, coauthored with only men, coauthored with only women, and coauthored with both men and women, respectively. The sample is restricted to junior female researchers in their first post on SSRN. All models control for individual fixed effects and year interacted with school fixed effects. Each vertical bar represents the 95% confidence interval of the estimate.

Table 1: Area of Research of the Treatment and Control Groups

Ranking	Treatment		Control	
	Category	Pct.	Category	Pct.
<i>Panel A: Publication Field</i>				
1	Applied Economics	29.44%	Strategy, Management and Organizational Behavior	18.50%
2	Banking, Finance and Investment	18.82%	Accounting, Auditing and Accountability	14.50%
3	Accounting, Auditing and Accountability	9.01%	Banking, Finance and Investment	11.00%
4	Strategy, Management and Organizational Behavior	8.47%	Political Science	6.00%
5	Economic Theory	5.65%	Transportation, Logistics and Supply Chains	5.00%
<i>Panel B: Academic Degree</i>				
1	PhD. in Economics	39.03%	PhD. in Business	37.04%
2	PhD. in Business	24.66%	JD	12.96%
3	PhD. in Political Science	9.59%	PhD. in Sociology	11.11%
4	PhD. in Policy	4.11%	PhD. in Political Science	11.11%
5	PhD. in Psychology	3.42%	PhD. in Accounting	7.41%

Note: This table details the academic background of the treated and control researchers in the sample of junior female authors. Panel A shows the distribution of topics among researchers' SSRN papers. Panel B shows the researcher's highest academic degrees.

Table 2: Summary Statistics

Baseline (2012-2015)	Economists		Non-Economists		T – C
	Mean	St. Dev.	Mean	St. Dev.	Difference
No. Working Papers per Year	0.6610	0.4946	0.4630	0.3273	0.1980***
Male-coauthor Only WP	0.2397	0.3092	0.1435	0.1918	0.0962**
Solo-authored WP	0.0959	0.1931	0.0648	0.1208	0.0311
Female-coauthor Only WP	0.0788	0.1680	0.0417	0.0940	0.0371
Female and Male Coauthor WP	0.1062	0.1966	0.1343	0.2101	−0.0281
Unknown-gender Coauthor WP	0.1404	0.2816	0.0787	0.1739	0.0617
Pct. of Male Coauthors	0.5335	0.3594	0.5137	0.3725	0.0198
First SSRN Year	2011.1712	2.6297	2012.4444	2.0982	−1.2732***
Top 30	0.6986	0.4604	0.5741	0.4991	0.1246*
Number of obs	146		54		

Note: This table provides a summary of baseline characteristics for treated and control female researchers during the pre-treatment period (2012 – 2015). The first six rows count the number of SSRN working papers within each coauthorship type. Row (7) is the share of coauthors across all papers who are men. Row (8) is the first year that an author publishes in a peer-reviewed journal. Row (9) is the share of authors affiliated with a top-30 university. The sample is restricted to junior female researchers. Column (5) is the difference between the treatment and the control. Statistical significance: \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .

Table 3: Impact on Number of SSRN Working Papers with Only Male Coauthors

	Publications with Only Male Coauthors				
	(1)	(2)	(3)	(4)	(5)
	OLS	OLS	OLS	Extensive	Poisson
Treatment $\times \mathbb{1}[2017-2019]$	-0.1139 (0.0699)	-0.1324** (0.0622)	-0.1752** (0.0759)	-0.0847** (0.0412)	-0.7766** (0.3296)
Treatment $\times \mathbb{1}[2020-2023]$	0.0426 (0.0497)	0.0572 (0.0547)	0.0390 (0.0725)	0.0436 (0.0395)	0.6703 (0.4959)
Baseline Mean	0.2397	0.2397	0.2397	0.1884	0.2397
Individual FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	No	No	No	No
Year $\times$ Age FE	No	Yes	Yes	Yes	Yes
Year $\times$ School FE	No	No	Yes	No	No
Number of Obs	2200	2189	2079	2189	1287

Note: This table shows difference-in-difference estimates of the effect of Sarsons' 2015 paper on the number of SSRN papers with only male coauthors. The treatment group is junior female economists and the control group is junior female non-economists. Column (1) controls for individual and year fixed effects. Column (2) compares researchers within the same academic cohort over time. Column (3) further compares researchers within the same university. Column (4) replaces the outcome variable to be a dummy variable for posting at least one paper with only male coauthors. Column (5) estimates the same specification as column (2), but as a Poisson regression. The post-treatment period spans from 2017 to 2019 in row (1) and from 2020 to 2023 in row (2). Standard errors are clustered at the author level and shown in the parentheses. Statistical significance: \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .

Table 4: Effect on the Number of SSRN Publications by Coauthorship Types

	(1)	(2)	(3)	(4)	(5)
	Total	Single Author	Female	Female and Male	Unknown-gender
Treatment $\times \mathbb{1}[2017-2019]$	-0.2072* (0.1201)	-0.1043*** (0.0400)	-0.0328 (0.0379)	0.0043 (0.0558)	0.0580 (0.0383)
Treatment $\times \mathbb{1}[2020-2023]$	0.0969 (0.1142)	-0.0736** (0.0340)	-0.0266 (0.0362)	0.0966** (0.0417)	0.0433 (0.0465)
Baseline Mean	0.6610	0.0959	0.0788	0.1062	0.1404
Individual FE	Yes	Yes	Yes	Yes	Yes
Year $\times$ Age FE	Yes	Yes	Yes	Yes	Yes
Number of Obs	2189	2189	2189	2189	2189

Note: This table shows difference-in-difference estimates of the effect of Sarsons' 2015 paper on the number of SSRN working papers by the type of coauthorships. Columns (1) shows the effect on the total number of SSRN working paper. Columns (2) to (5) decomposes the effect into the change in solo-authored, female-coauthored, mix-gendered, and unknown-gender coauthorships. The post-treatment period spans from 2017 to 2019 in row (1) and from 2020 to 2023 in row (2). Standard errors are clustered at the author level and shown in the parentheses. Statistical significance: \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .



Table 5: Heterogeneous Impact on Number of SSRN Working Papers

	(1)	(2)	(3)	(4)
	Male CA Only Pub	Total Pub	Male CA Only Pub	Total Pub
Treatment $\times \mathbb{1}[2017-2019]$	-0.2242** (0.0978)	-0.2320 (0.1536)	-0.2033** (0.0959)	-0.1680 (0.1843)
Treatment $\times \mathbb{1}[2017-2019] \times \mathbb{1}[\text{Low Male CA}]$	0.2344* (0.1222)	0.0628 (0.2342)		
Treatment $\times \mathbb{1}[2017-2019] \times \mathbb{1}[\text{Applied}]$			0.0865 (0.0903)	-0.0479 (0.1655)
Baseline Mean	0.2397	0.6610	0.2397	0.6610
Individual FE	Yes	Yes	Yes	Yes
Year $\times$ Age FE	Yes	Yes	Yes	Yes
Number of Obs	1393	1393	1393	1393

Note: This table reports heterogeneous treatment effects of Sarsons' 2015 paper on the number of SSRN working papers with only male coauthors and the total number of SSRN papers written by junior female economists. Row (2) interacts the treatment indicator with the post-treatment period (2017-2019) and a dummy variable representing economists whose share of coauthors who are male is below median. Row (3) interacts the treatment indicator with the post-treatment period (2017-2019) and a dummy variable representing applied micro economists. Standard errors are clustered at the author level and shown in the parentheses. Statistical significance: \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .

Table 6: Impact on Number of Peer-Reviewed Publications and Citations of SSRN Projects

	(1)	(2)	(3)	(4)
	Realized Male CA Only Pub	Realized Total Pub	Realized Male CA Only Citation	Realized Total Citation
Treatment $\times \mathbb{1}[2017-2019]$	-0.0592* (0.0305)	-0.0508 (0.0452)	-3.1507 (3.0664)	-5.3167 (5.9603)
Treatment $\times \mathbb{1}[2020-2023]$	0.0028 (0.0249)	-0.0157 (0.0411)	-1.1707 (2.5158)	-5.6013 (5.7140)
Baseline Mean	0.0753	0.1832	8.0274	23.3442
Number of Obs	2189	2189	2189	2189
Individual FE	Yes	Yes	Yes	Yes
Year $\times$ Age FE	Yes	Yes	Yes	Yes

Note: This table shows difference-in-difference estimates for the effect of Sarsons' 2015 paper on the outcome of junior female economists' SSRN projects in peer-reviewed journals. Columns (1) and (3) show the impacts on the number of realized publications and citations, respectively, for projects that started as SSRN working papers with only male coauthors. Columns (2) and (4) show the impacts on the number of realized publications and citations for all SSRN projects. The post-treatment period spans from 2017 to 2019 in row (1) and from 2020 to 2023 in row (2). Standard errors are clustered at the author level and shown in the parentheses. Statistical significance: \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .

Table 7: Impact on the Share of Publications by Coauthorship Types, Cohort Analysis

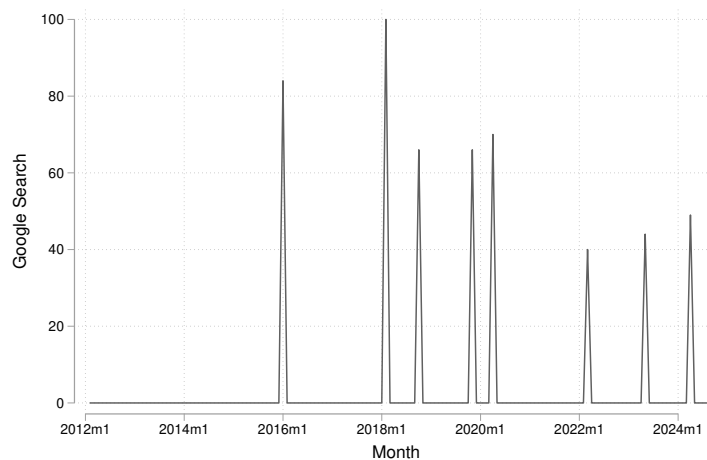
	(1)	(2)	(3)	(4)	(5)
	Pct. of	Pct. of	Pct. of	Pct. of	Pct. of
	Single Author	Male Only	Female Only	Female and Male	Unknown Gender
Treatment $\times$ Post	0.1497** (0.0610)	-0.0012 (0.0830)	-0.0555 (0.0505)	0.0011 (0.0711)	-0.0941 (0.0602)
Baseline Mean	0.1333	0.4750	0.0833	0.1583	0.1500
Number of Obs	968	968	968	968	968
Economics FE	Yes	Yes	Yes	Yes	Yes
Year $\times$ School FE	Yes	Yes	Yes	Yes	Yes

Note: This table shows the estimates from the repeated cross-section regression in equation 2. The sample is restricted to junior female researchers in their first working paper on SSRN. Columns (1) to (5) show the estimated effect on the percentage of working papers that are single-authored, with only male coauthors, with only female coauthors, with both male and female coauthors, and with unknown gender coauthors, respectively. The post-treatment period spans from 2016 to 2023. Robust standard errors are shown in the parentheses. Statistical significance: \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .

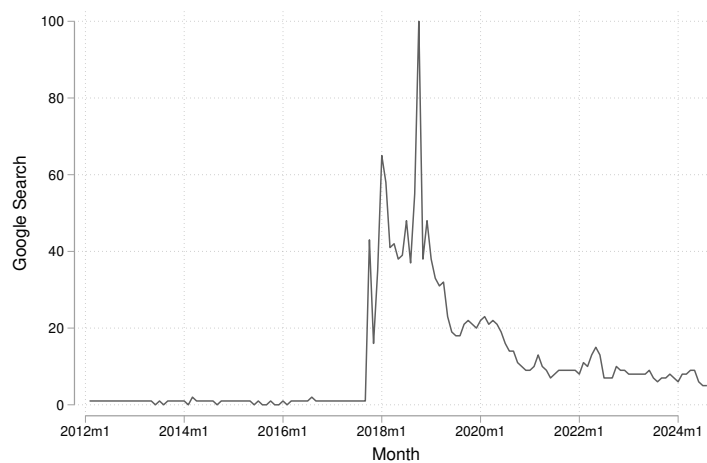
## Appendix A Additional Figures & Tables

Figure A1: Google Search Trends

Panel A: Search for “Heather Sarsons”



Panel B: Search for “#MeToo”



Note: This figure plots Google Search trends for the terms “Heather Sarsons” and “#MeToo”, respectively. The y-axis is scaled so that 100 represents the month when the term was most popular.

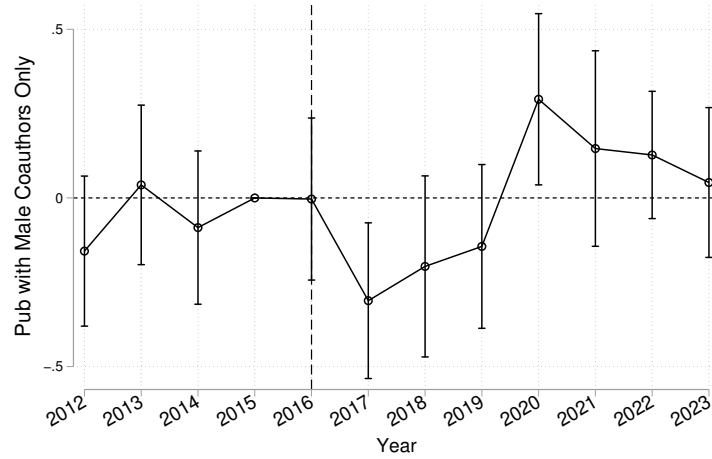
Figure A2: All Social Sciences in SSRN



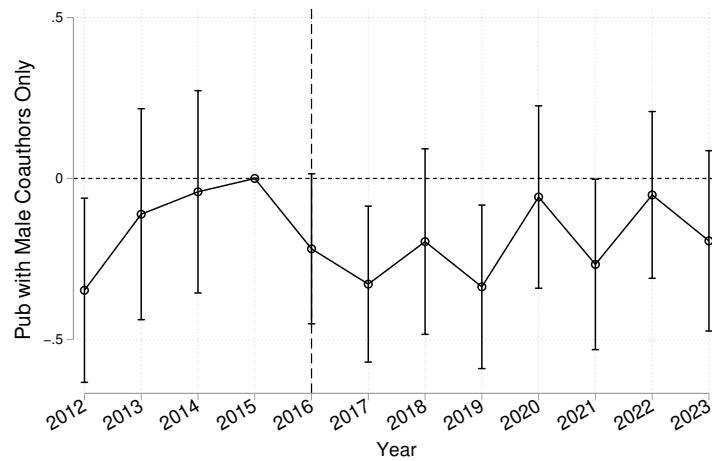
Note: This figure lists all fields classified under “Social Sciences” in SSRN, and the number of papers posted in each field as of September 2024. Circled are the four fields with the largest number of submissions.

Figure A3: Impact on the Number of SSRN Papers with Only Male Coauthors: Robustness to Definition of Economist

Panel A: PhD in Economics



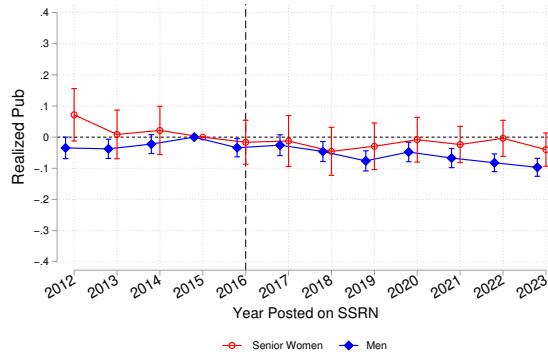
Panel B: Works in Economics Department



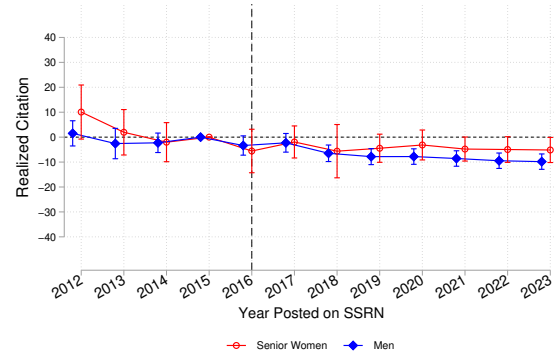
Note: This figure shows robustness of the event study estimates from equation 1 to alternative definitions of “economist”, where the outcome is the number of publications with only male coauthors. In Panel A, economists are those with an economics PhD and economics paper, and the control are researchers who published no economics paper. In Panel B, economists are individuals working in an economics department in 2015. All models control for individual fixed effects and year interacted with cohort fixed effects. Each vertical bar represents the 95% confidence interval of the estimate.

Figure A4: Impact on Realized Publications and Citations of SSRN Papers (Senior Women and Men)

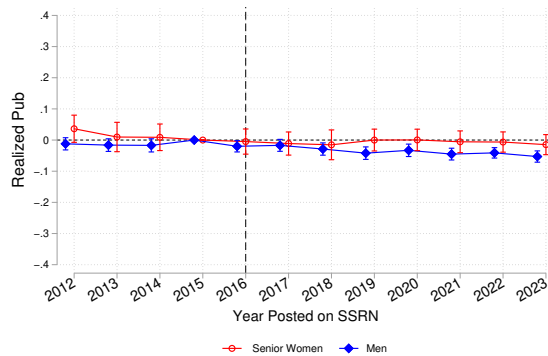
Panel A: Realized Pub of SSRN Papers



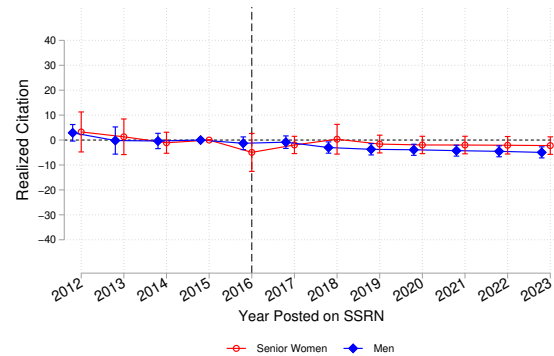
Panel B: Realized Citations of SSRN Papers



Panel C: Realized Publications of SSRN Projects with Male CA Only



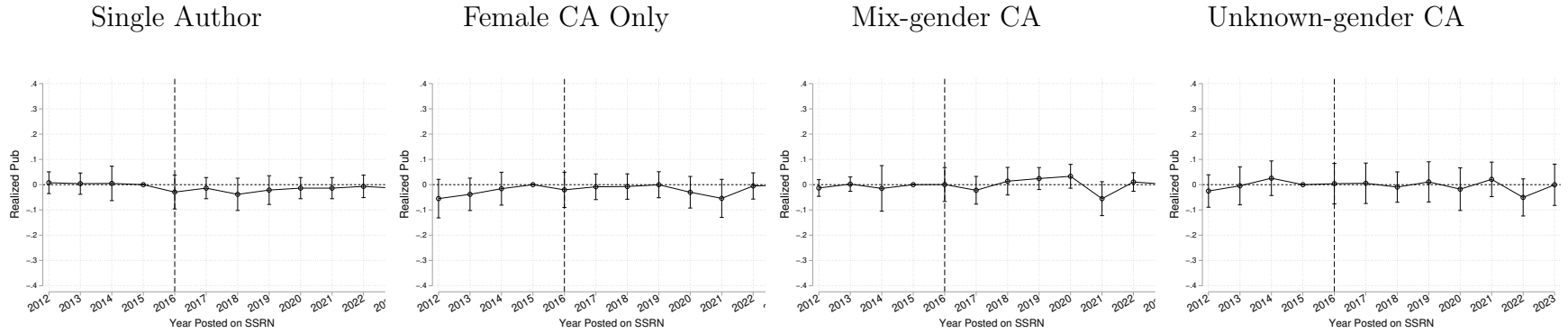
Panel D: Realized Citations of SSRN Projects with Male CA Only



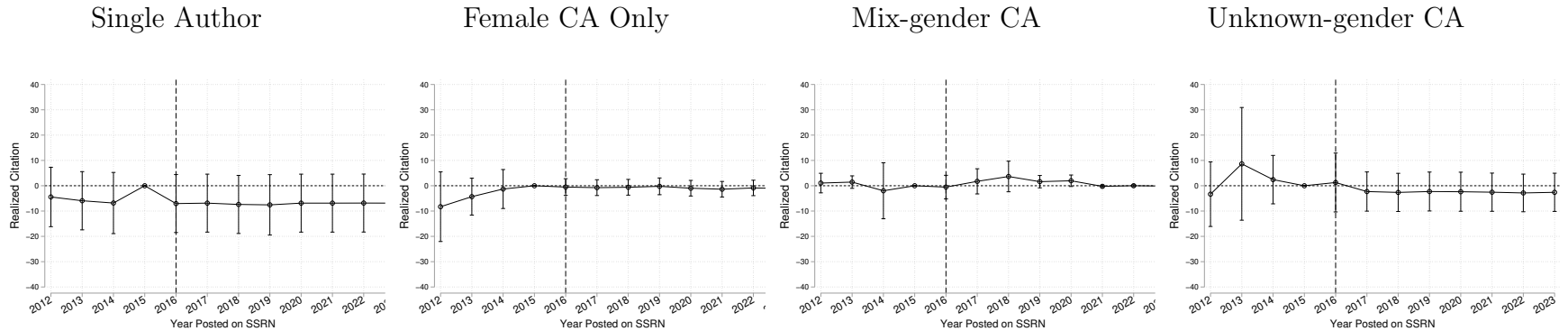
Note: This figure shows the event study estimates from equation 1 for four different outcomes. Panels A-B present the effect on the number of realized publications and citations of all SSRN projects later published in peer-review journals. Panels C-D present the effect on the number of actual publications and citations of SSRN projects with only male coauthors. The red line represents the the sample of senior female researchers and the blue line represents the sample of male researchers. Standard errors are clustered at the author level. Each vertical bar represents the 95% confidence interval of the estimate.

Figure A5: Impact on Realized Publications and Citations of SSRN Projects

Panel A: Realized Publications of SSRN Projects



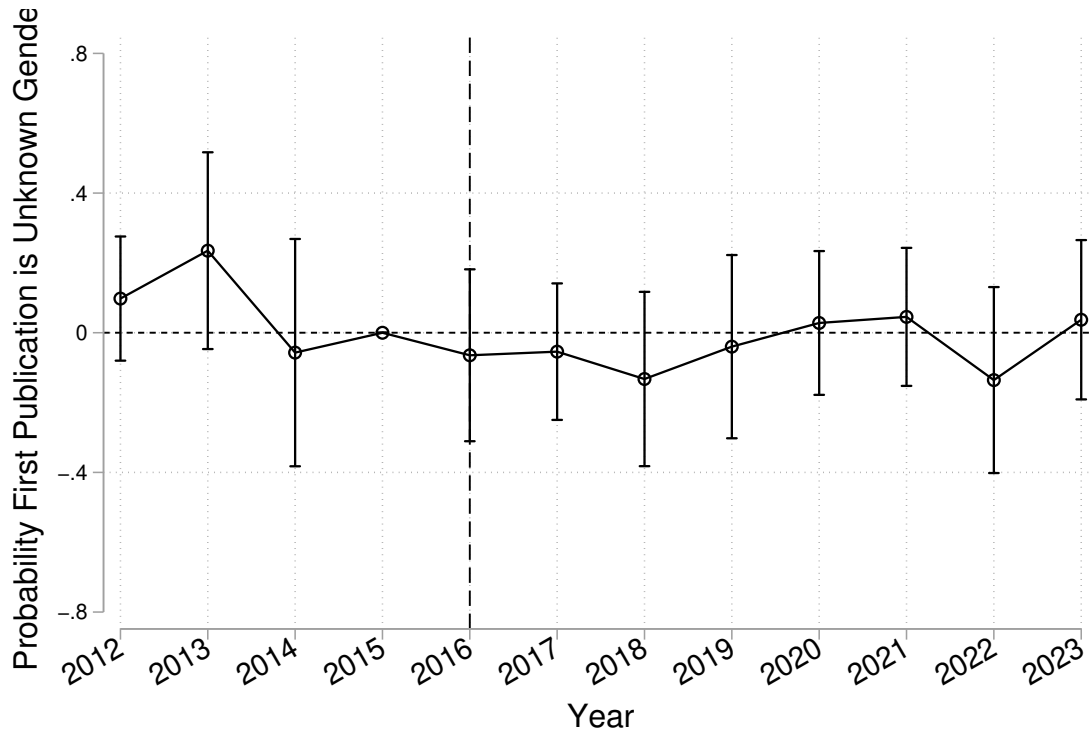
Panel B: Realized Citations of SSRN Projects



Note: This figure shows the event study estimates from equation 1 for the sample of junior female researchers across eight different outcomes. Panel A presents the effect on the number of peer-reviewed publications for different coauthorships of SSRN projects (from left to right: single author, female coauthors only, mix-gender coauthors and unknown-gender coauthor projects). Panel B presents the effect on the number of realized citations in peer review journals for the same coauthorship patterns in panel A. Standard errors are clustered at the author level. Each vertical bar represents the 95% confidence interval of the estimate.

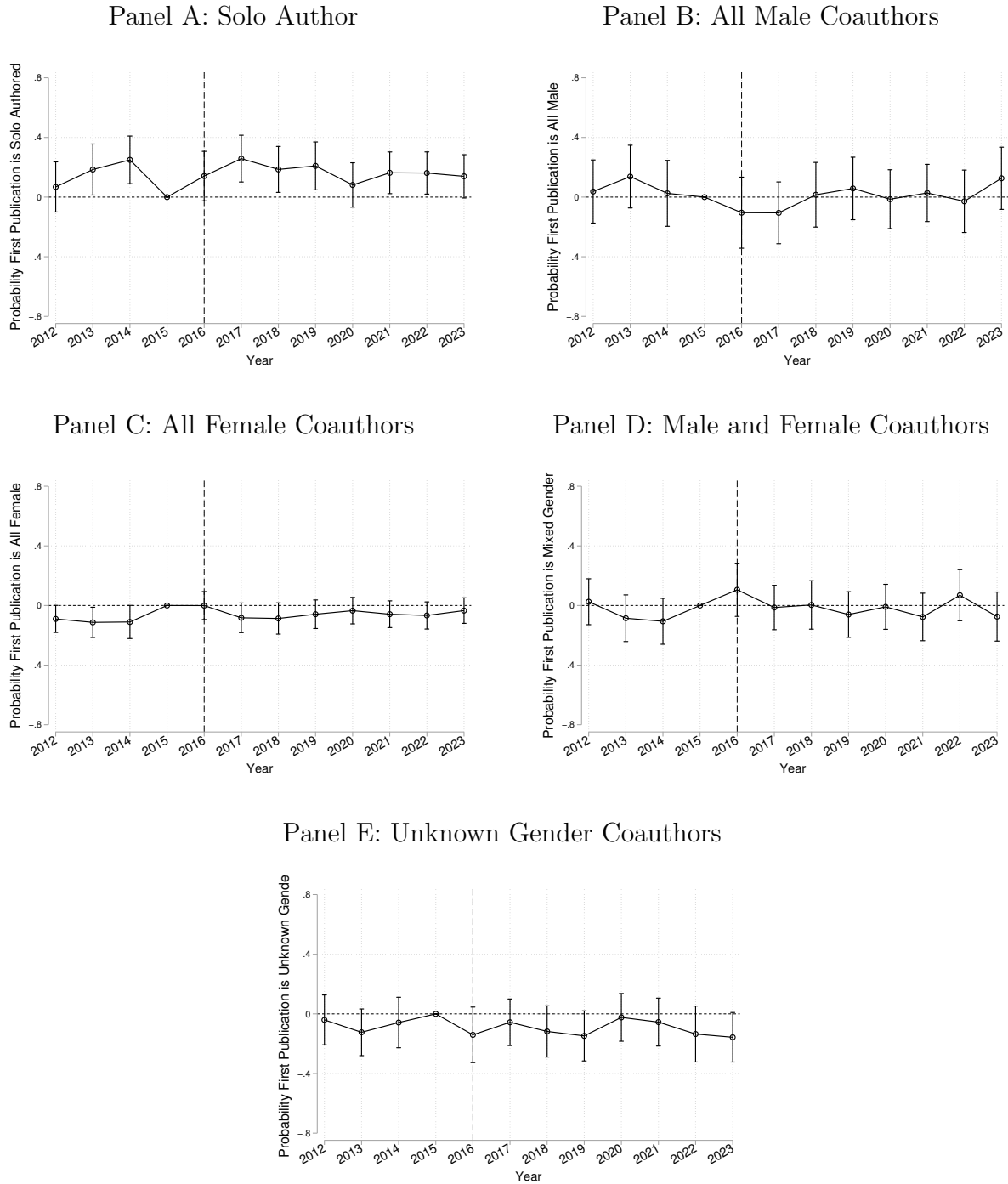


Figure A6: Impact on the Share of Coauthorships with Unknown Genders for New Cohorts of Female Economists



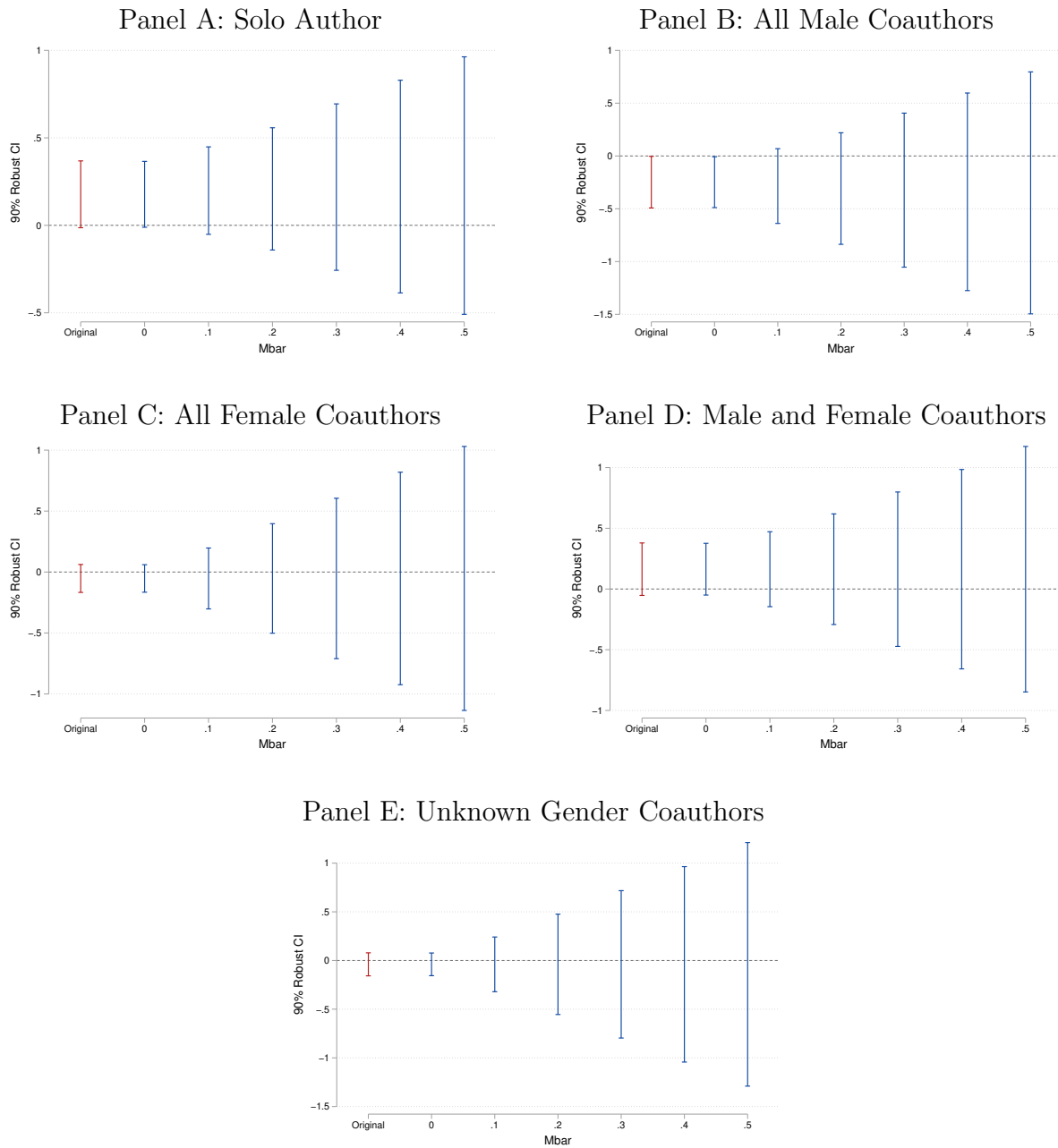
Note: This figure shows repeated cross-section difference-in-difference estimates from equation 2. The sample is restricted to junior female researchers in the first year they posted a SSRN paper. The outcome variable is an indicator for whether the gender composition of the coauthors on the paper is unknown. All models control for individual fixed effects and year interacted with school fixed effects. Each vertical bar represents the 95% confidence interval of the estimate.

Figure A7: Impact on the Types of Coauthorships by Future Cohorts of Male Economists



Note: This figure shows repeated cross-section difference-in-difference estimates from equation 2. Panels A-E present the effects on the share of projects that are solo-authored, coauthored with only men, coauthored with only women, coauthored with both men and women, and unknown gender composition respectively. The sample is restricted to male researchers in their first post on SSRN. All models control for individual fixed effects and year interacted with school fixed effects. Each vertical bar represents the 95% confidence interval of the estimate.

Figure A8: Honest DiD Test for Deviations from Pre-trends in Repeated Cohorts of Female Economists



Note: This figure presents Honest Difference-in-Difference estimates (Rambachan and Roth 2023) showing the degree to which changes in coauthorship patterns in repeated cross-sections of female economists deviate from pre-trends. The x-axis shows the maximum deviation from pre-trends and the y-axis shows 90% confidence intervals given that deviation.

Table A1: Sample Construction

Sample	Description	N
Full Sample	Posted SSRN working paper 2008-2015 while affiliated with top 50 school	5664
+ Probable Female	Gender-guesser package identifies first name as female	1403
+ Definite Female	Profile picture on website is female	1323
+ Within Top 50	Affiliation in 2015 is a top 50 school	830
+ Tenure Track	Tenure-track in 2015	755
+ Assistant Professor	Not tenured in 2015	200

Note: This table shows how the main analysis sample is constructed from the raw Dimensions data. Probable women are identified using the Python package *gender-guesser*, and all subsequent sample restrictions are from manually collected data.

## Appendix B Effect on the Coauthors of Junior Female Economists

In this section, we examine the spillover effects of Sarsons’ study on the male coauthors of junior female economists. We restrict the sample to only male economists who posted a working paper on SSRN between 2012 and 2015. To identify the impacts of Sarsons (2015), we compare individuals who coauthored with a junior female economist prior to 2016 and those with no such coauthorships. Specifically, we estimate a difference-in-difference of the form

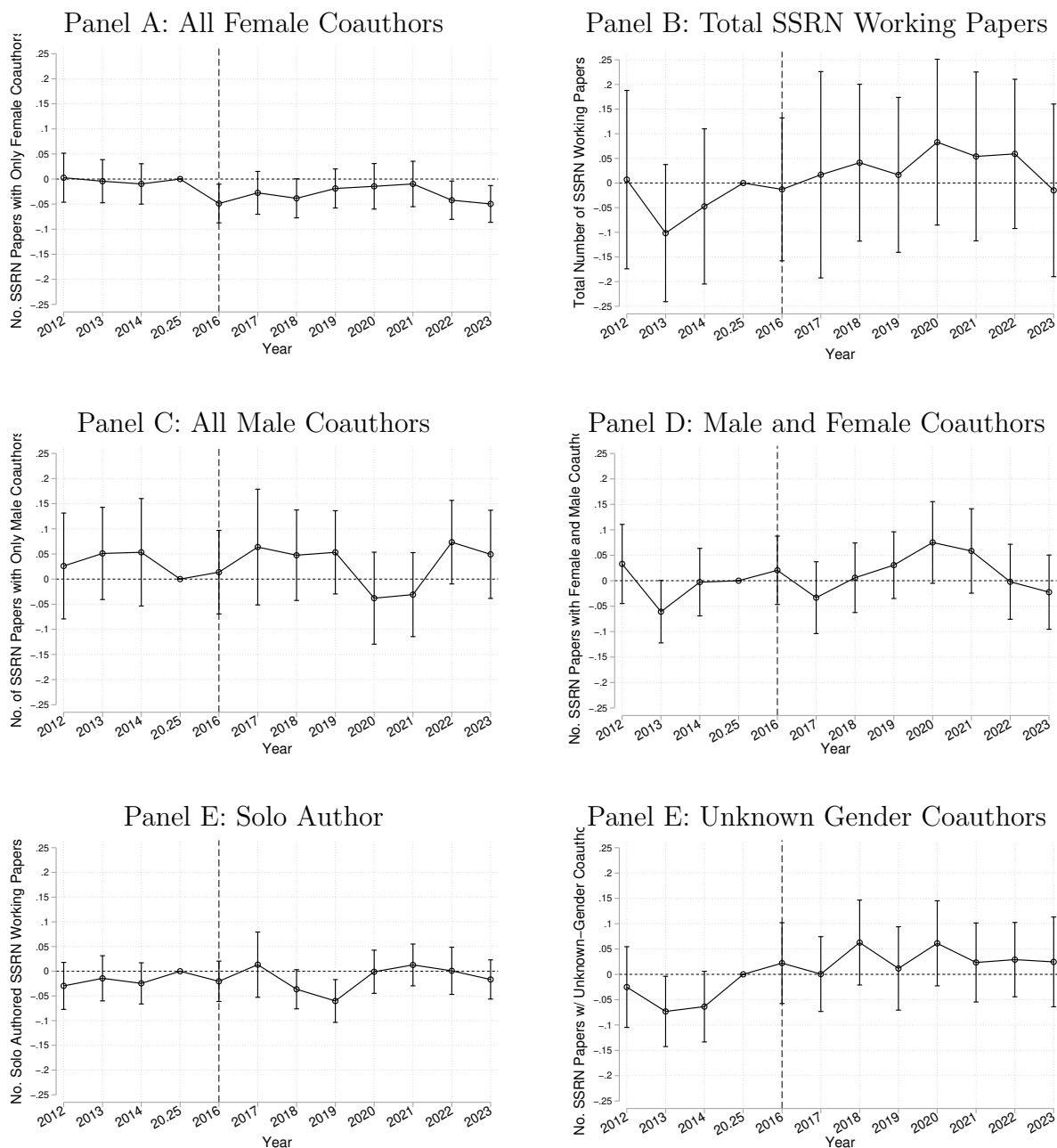
$$y_{it} = \sum_{\substack{t=2012 \\ t \neq 2015}}^{2023} \beta_t \cdot Coauthor_i \times D_t + \alpha_i + \gamma_t \times age_i + \epsilon_{it} \quad (3)$$

where all variables are similarly defined as in equation 1, except the treatment variable  $Coauthor_i$  is an indicator for having at least one junior female coauthor prior to 2016.

Appendix Figure B9 plots the event study estimates over time for six outcome variables. Panel A indicates that leading up to 2016, there was no differential pre-trends in the number of papers with only female coauthors, supporting the parallel trends assumption of our analysis. However, researchers who work with junior female economists experienced a decrease in female coauthorships after 2016 that never fully recovers. This persistent decline is consistent with the result of section 5 that future cohorts of junior female economists become less likely to work with men after the release of Sarsons (2015). Panel B finds that the decrease in papers with only female coauthors had no impact on the aggregate number of working papers, but the estimates are fairly noisy. There is also no clear pattern in the other graphs of how other collaboration styles are changing, except for perhaps a temporary drop in solo authorships in 2018-2019.

Table B2 summarizes estimates from equation 3 over the post-treatment period. Consistent with the figures, Column (1) finds no impact on the total number of working papers. The point estimate actually implies a 6% increase in papers from 2017-2019, but the confidence interval also cannot reject a null effect. In contrast, Column (2) shows that the number of female coauthorships decreased by around 44%. This negative effect was largely offset by an increase in the number of working papers with unknown-gender composition, but Panel E of Appendix Figure B9 suggests that there was already an upward pre-trend. Overall, the analysis provide additional evidence that Sarsons (2015) decreased the number of collaborations between men and women in economics, with some suggestive evidence of zero impact on the total number of papers by men.

Figure B9: Diff-in-Diff Comparing Male Economists who Do and Do Not Have Coauthored Papers with Junior Female Economists



Note: This figure presents difference-in-difference estimates that compares men with and without junior female coauthors before 2016. The sample is restricted to only male economists. Each panel shows the effect on the number of SSRN working papers of each type.

Table B2: Effect on the Number of SSRN Publications by Coauthorship Types (Men)

	(1)	(2)	(3)	(4)	(5)	(6)
	Total	Female	Male	Female and Male	Single Author	Unknown-gender
Coauthor with Junior Women $\times$ 1[2017-2019]	0.0552 (0.0592)	-0.0233** (0.0116)	0.0103 (0.0315)	0.0127 (0.0198)	-0.0102 (0.0167)	0.0658** (0.0280)
Coauthor with Junior Women $\times$ 1[2020-2023]	0.0799 (0.0596)	-0.0256** (0.0121)	-0.0350 (0.0296)	0.0366 (0.0231)	0.0317 (0.0210)	0.0722*** (0.0265)
Baseline Mean	0.8636	0.0533	0.1298	0.1094	0.3831	0.1879
Number of Obs	39853	39853	39853	39853	39853	39853
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table shows difference-in-difference estimates of the effect of Sarsons' 2015 paper on the number of SSRN working papers from male economists by different coauthorship types. Columns (1) to (6) show the estimates on the number of total publications, female-coauthor only, male-coauthor only, mix-gender, single-author, and unknown-gender publications, respectively. The post-treatment period spans 2017-2019 in row (1) and 2020-2023 in row (2). Standard errors are clustered at the author level and shown in the parentheses. Statistical significance: \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .