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Gender Discrimination against Pre-PhD Students: A Field Experiment*

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Abstract

We conduct a field experiment on gender discrimination against pre-PhD students in academic economics and business administration. We invite the universe of postdocs and professors at German, Austrian, and Swiss universities to a survey on AI in teaching. Invitations are randomly sent by nine male and nine female Master's students. Each student also randomly varies whether their email mentions a PhD intention. Male researchers provide more answers to female students, while female researchers show no average gender difference. PhD intention increases male researchers' responses to male students. It reduces female researchers' responses to female students, driven mainly by tenured researchers.

Keywords: Gender, Behavior, Discrimination, Academia, Field Experiment
JEL Codes: C93, J16

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1 Introduction

The share of women in academic economics and business administration remains low. Women represented only 21.1% of all full professors in 2025 (up from 6.7% in 1994–1997) and 29.7% of associate professors (up from 13.3% in 1994–1997) in PhD-granting economics departments in the US. The share of female assistant professors increased from 23.6% in 1994–1997 to 34% in 2025 (Tesar, 2026). In Germany, the largest country in our study, the representation of women in academic economics and business administration is similarly low. In 2024, only about 24% of all tenured university professors in economics and business administration were women (Federal Statistical Office, 2025b).[1]

These persistent gender gaps raise the question of whether discrimination contributes to the underrepresentation of women in academic economics and business administration. However, isolating causal relationships is particularly challenging in the context of discrimination, and causal evidence on discrimination in academic research remains scarce (references below). An understudied dimension is discrimination against young students at the pre-PhD level, before they make the decision to enter the academic profession. This lack of evidence is notable given that women are already underrepresented at the PhD level. Women represented only about 36.5% of first-year economics PhD students in the US in 2025 (Tesar, 2026). In Germany, women accounted for about 37% of all economics and 41% of all business administration PhD students in 2024 (Federal Statistical Office, 2025a). This underrepresentation of women in PhD programs suggests that discrimination experienced before the decision to pursue a PhD may potentially constitute an important dimension of discrimination in academia.[2]

One potential source of this underrepresentation already at the PhD level is discrimination experienced before the decision to pursue a PhD. It has been shown that seemingly minor instances of discrimination – often referred to as "everyday" discrimination – can have important consequences along various dimensions and therefore deserve attention (see Small and Pager (2020) for an overview of everyday discrimination and its consequences). In an academic context, such type of discrimination by current researchers in the profession, and in particular senior researchers, may affect young students' perceptions of academia and, ultimately, their decisions to pursue a PhD (see for example Jones et al. (2014) and Hausknecht et al. (2004) who show that anticipated and experienced treatment are linked to applicants' attraction to employers). Beyond being plainly unfair and contributing to underrepresentation of women, discrimination against young students may thereby generate an inefficient allocation of talent: some high-potential students with good outside options may choose careers in industry or public administration rather than pursuing a career in academic economics and business administration. The pool of young students who select into the profes-

[1] In their 2019 overview article, Lundberg and Stearns (2019) conclude (for the US) that, "over the past two decades, women's progress in academic economics has slowed, with virtually no improvement in the female share of junior faculty or graduate students in decades." Data from other countries and disciplines also show that women are underrepresented (particularly in quantitative, technical, and science-related fields) and discriminated against in academic research; see e.g., Ceci and Williams (2011), Moss-Racusin et al. (2012), Sheltzer and Smith (2014), Gaule and Piacentini (2018), Bukstein and Gandelman (2019), National Center for Science and Engineering Statistics (NCSES) (2025), and Iaria et al. (2026) (more related literature further below throughout the Introduction).

[2] The share of women among doctoral students is similar in other disciplines. For example, in 2024 women constitute about a third of doctoral recipients in physical sciences and mathematics and a quarter of those in engineering and computer and information sciences in the US (National Center for Science and Engineering Statistics (NCSES), 2025).

sion would consequently be inferior to that in a counterfactual world without gender discrimination at the pre-PhD stage. Everyday discrimination against young prospective researchers may thus be an important determinant of who initially enters the profession, with implications not only for the representation of women in academia but also for the overall quality of the pool of professional researchers.[3]

Against this background, the objective of our study is to investigate whether professional researchers treat pre-PhD-level students differently depending on the students' gender. Our setting focuses on researchers' willingness to exert a small amount of effort to support the research project of a Master's student – measured by their participation in a survey (see below) –, and examines whether this willingness depends on the gender of the student requesting the effort exertion. We thus examine gender-based discrimination at a potentially important point of entry into the academic profession, when students have not yet decided whether to pursue a PhD, whereas the literature typically studies discrimination against researchers who have already entered the profession (see further below in the Introduction for literature on discrimination in academic contexts). While seeking effort provision from professional researchers does not occur "every day", differential responsiveness to a relatively low-stakes request such as a survey invitation represents a subtle form of differential treatment. Although a single such experience is unlikely to impact career decisions, repeated experiences of this type may accumulate and shape students' decisions about pursuing an academic career. In this sense, our setting shares an important feature with the broader concept of everyday discrimination.

To study discrimination at this early stage of the academic career path, we conducted a pre-registered, non-deceptive natural field experiment targeting researchers in economics and business administration across Germany, Austria, and Switzerland. Our population of interest comprises all university professors and postdoctoral researchers in these fields. Using a two-person verification protocol, we hand-collected contact and demographic details for the universe of researchers in our population of interest (as of May 2026) from university websites, yielding a final sample of approximately 4,500 researchers across 114 universities (with no possibility for individuals to self-select into participation in the experiment).

The researchers in this sample were contacted via email and invited to participate in a survey on the role of AI in university teaching. The survey invitations were sent out simultaneously by 18 Master's students from three different universities. All students have names associated with the German majority population. Of the 18 students, nine were male and nine were female, and the researchers were randomly assigned to receive an email from one of the 18 students. The sender's gender was signaled through the student's name, which was prominently emphasized throughout the email text, signature, and survey interface as well as the institutional email address it was sent from. The invitation email explicitly identified the sender as a Master's student and stated that the survey was part of a student research project. The use of 18 distinct female and male senders minimizes the possibility that the estimated gender effect is driven by characteristics of particular names rather than gender. To shed light on the mechanisms underlying potential gender effects,

[3] Bayer and Rouse (2016, page 221), in their overview article, state that the underrepresentation of women (and minority groups) in economics "likely hampers the discipline, constraining the range of issues addressed and limiting our collective ability to understand familiar issues from new and innovative perspectives". Using a similar argument, Stansbury and Schultz (2023) argue that the lack of socioeconomic diversity in the economics profession implies that the profession is missing out on both talent and perspectives.

we added an additional treatment variation, varied within students, in which the email sender explicitly indicated that they were interested in pursuing a PhD after completing their Master's degree.

An important feature of our experiment is that it is entirely non-deceptive: all student senders are real Master's students, the survey addresses a substantive topic relevant to university teaching, and the students will use the survey results in an actual research project. Thus, participation in the survey does not constitute a waste of resources on the part of participating researchers, something we consider essential given that our sample consists of researchers with high opportunity costs of participating in a survey. The non-deceptive nature of the experiment is distinct from commonly used correspondence and audit studies (Bertrand and Duflo, 2017; Neumark, 2018; Block et al., 2021; Evsyukova et al., 2025), in which fictitious profiles are used to study discrimination. One exception (in a non-research setting) is the recent work of Gallen and Wasserman (2026) who show that female students receive a different type of career advise from professionals than male students.

Our results show that male researchers provide more answers to female senders than to male senders. Specifically, the (unconditional) average number of questions answered (which combines effects at the extensive and intensive margins) is 35% higher among male researchers when the sender is female (8.35 answers) than when the sender is male (6.17 answers). We find no indication, on average, that female researchers respond differently to male and female senders. Given these findings, it is not surprising that, overall, female senders receive more answers than male senders, with a 26% difference.

Most critical decisions in academic research are taken by tenured (senior) professors, including hiring, tenure, promotion, and journal submission decisions. In addition, support from experienced senior researchers is likely to be particularly encouraging or discouraging for young pre-PhD students, while tenured professors might also serve as important role models. Our next set of analyses therefore explores differences in support between tenured and non-tenured researchers. First, we detect a favorable treatment of female senders among both tenured and non-tenured researchers, but the gender effect is larger and significant only among non-tenured researchers. Second, when we consider gender and tenure status of researchers together, we find the tendency that male tenured researchers provide more answers to female senders, whereas female tenured researchers provide more to male senders. However, these effects are not statistically significant.

In the next step, we investigate the treatment variation in which senders explicitly express their interest in pursuing a PhD after completing their Master's degree. This addition to the emails is intended to signal the student sender's genuine interest in conducting research and to suggest that they aspire a career path similar to that of the researcher receiving the survey invitation. First, we find that the PhD treatment has a positive effect among male researchers, regardless of whether the sender is male or female (though only statistically significant when sender is male). Second, the pattern differs among female researchers. While the PhD treatment has no statistically significant effect among female researchers when the sender is male, it has a negative effect when the sender is female. In other words, female researchers are less responsive to women expressing an interest in pursuing a PhD than to women who do not express such an interest. The effect is sizable: female researchers answer 53% more questions from female senders who do *not* express an interest in pursuing a PhD than from female senders who do express such an interest. Third, the previous effect is mainly driven by tenured female researchers, who provide 112% more answers to female researchers who

do *not* express a PhD interest than to female senders who do express the PhD interest. In contrast, the PhD treatment has no significant effect among tenured female researchers if the sender is male. Fourth, to shed more light on the previous finding, we then consider only senders who express a PhD interest. We see that tenured male researchers provide more answers to female senders than to male senders with PhD interest, whereas tenured female researchers provide more answers to male senders than to female senders with PhD interest (with the 'DiD' interaction term being statistically significant).

How should these empirical findings be rationalized and interpreted? We next consider potential theoretical explanations for the observed patterns and relate them to existing evidence on gender-based discrimination. We organize the discussion around our main findings.

First, we find same-sex discrimination among male researchers. While this finding is difficult to reconcile with the idea that individuals tend to favor members of their in-group (Tajfel and Turner, 1986), it is consistent with a variant of taste-based discrimination in which individuals reward members of groups whose company they enjoy (Bar and Zussman, 2020), as well as with the notion of intrasexual competition, whereby individuals may treat same-sex members less favorably because they perceive them as potential competitors (Hunt et al., 2009; Rosvall, 2011). More generally, finding same-sex discrimination is not unprecedented. For example, a meta-study of economic experiments finds significant same-sex discrimination in gender discrimination experiments (Lane, 2016).[4]

Second, we find evidence consistent with statistical discrimination (Arrow, 1972; Phelps, 1972) among male researchers: they provide more effort when the sender explicitly states interest in pursuing a PhD. This expression may serve as a signal of the sender's ability and motivation to seriously engage with the survey results and may increase the perceived likelihood that the resulting research will eventually be published and receive visibility. In this sense, the expected future productivity of the sender may become more predictable and researchers may use the signal to infer the expected value of responding to the survey, consistent with a statistical-discrimination mechanism. Overall, we thus find evidence consistent with both taste-based and statistical discrimination among male researchers. Notably, taste-based discrimination against male students in favor of female students is mitigated by statistical discrimination when students express an interest in pursuing a PhD: Male researchers' responsiveness is virtually identical for female students who do not express an interest in a PhD (7.4 answers) and male students who do (7.2 answers). This pattern suggests that the gender-based disadvantage faced by male students can be offset by a signal of academic ambition. In other words, male students who express an interest in pursuing a PhD can offset the disadvantage associated with their gender. This pattern suggests that male researchers may apply different thresholds to student requests by gender, consistent with evidence of gender-differentiated standards in academic careers and publication processes (Hengel, 2022; Johannesen and Muchardt, 2026).

Third, we observe the perhaps surprising finding that the PhD-expression treatment has a negative effect on effort provision among female researchers when the sender is female. This finding is difficult to reconcile with the statistical-discrimination mechanism described above and may instead suggest that fe-

[4]Rationalizing same-sex discrimination and explaining why gender is the only identity category which is associated with bias against the in-group rather than the out-group, Lane (2016) argues that there is an 'obvious intuition why gender is different from the other identity categories': sexual attraction towards the out-group (i.e., the opposite gender) and 'chivalry' (following (Eckel and Grossman, 2001)).

male researchers are less inclined to support female senders who aspire to an academic career, which would be more consistent with a taste-based discrimination mechanism. How might this finding be rationalized? Notably, the negative effect is mainly driven by tenured female researchers who may play a particularly important role for young females as role models (Bettinger and Long, 2005; Beaman et al., 2012). Moreover, tenured female researchers provide more answers to male senders expressing an interest in pursuing a PhD than to female senders expressing such an interest. These findings together are potentially consistent with the empirically documented phenomenon that women who have been successful in male-dominated environments – as the tenured female researchers in our sample – may behave in ways that hinder rather than support the advancement of junior female colleagues, sometimes referred to as the "queen bee syndrome" (Staines et al., 1974; Mathison, 1986; Ellemers et al., 2004; Garcia-Retamero and Lopez-Zafra, 2006; Parks-Stamm et al., 2008; Derks et al., 2011; Ellemers et al., 2012).[5]

In addition to the previously cited literature on discrimination more broadly, we relate to the specific literature on discrimination in academia. Our contribution to this literature is to shift the focus to an earlier stage of the academic career: the period before individuals have decided whether to pursue a PhD. In contrast, existing studies typically examine discrimination against individuals who have already entered the academic profession, such as PhD students, postdoctoral researchers, or faculty members. These existing studies focus for example on gender differences in descriptions of job market candidates in reference letters (Eberhardt et al., 2023; Baltrunaite et al., 2025) and job market related online forums (Wu, 2018), gender differences in how often presenters are interrupted in economics seminars (Dupas et al., 2026), gender differences in teaching evaluations by students (Boring, 2017; Mengel et al., 2018; Andersson et al., 2025), the publishing process (Bransch and Kvasnicka, 2022; Hengel, 2022; Bruns et al., 2026), recognition for group work relevant for tenure decisions (Sarsons, 2017; Sarsons et al., 2021), promotion decisions and related evaluations (De Paola and Scoppa, 2015; Zinovyeva and Bagues, 2015; Gërxhani et al., 2023; Iaria et al., 2026; Johannesen and Muchardt, 2026), and the role of the gender composition of hiring committees and departments for research productivity and promotions (Bagues et al., 2017; Bello et al., 2025; Stockemer et al., 2025).[6] One exception is the work of Milkman et al. (2012, 2015) who conduct a study in which US faculty members across various disciplines receive meeting requests from *fictitious* prospective doctoral students. They find that minority ethnicities and women were equally likely to get an appointment on the same day, but less likely to get an appointment in the near future, and that these effects do not depend on whether sender and recipient share the same identity.[7]

[5] In the Conclusion, we discuss the possibility that this observed behavior is subconscious (Bertrand et al., 2005; Ellemers, 2018).

[6] Card et al. (2023) show that, in the last decades, women are considerably more likely to be selected as members of the National Academy of Science and the American Academy of Arts and Science than men with similar publication and citation records, which is potentially driven by the concern that women face more barriers in the publishing process and receive less recognition for their work.

[7] In non-academia contexts, studies for example analyze gender differences in performance evaluations in male-dominated fields of study (Breda and Ly, 2015), college-admission decisions (Hanson, 2017) or in teachers' evaluations in public schools (Lavy, 2008), and analyze the role of the gender composition of recruiting committees for positions in the four main Corps of the Spanish Judiciary (Bagues and Esteve-Volart, 2010).

2 Experimental Design and Data

2.1 Experimental Design and Procedure

Population of Interest and Collection of Contact Data. We conducted a pre-registered natural field experiment to study discrimination against pre-PhD students (i.e., students enrolled in a Master's program) among researchers (RCT ID: AEARCTR-0017745). Our population of interest comprises university professors (across all academic ranks) and postdoctoral researchers in economics and business administration in the German-speaking countries of Germany, Austria, and Switzerland. We consider both economics and business administration because they are neighboring fields with strong ties to one another (often subsumed under the term "Economic Sciences" – "*Wirtschaftswissenschaften*" – in German).

To implement the experiment, we hand-collected relevant information (in particular email addresses) for the universe of researchers in our population of interest from university websites. This contact data collection involved three main steps.

First, we gathered an overview list of all universities in each of the three countries from external sources.[8] These publicly available lists are intended for prospective students seeking a comprehensive overview of potential university choices. Second, for each university in the lists, we identified, based on the university's website, if it has groups/departments in economics or business administration. We then arrive at a list of 114 universities, all of which are specified in our pre-registration.

Third, we manually identify, based on the university's websites, all professors and postdoctoral researchers (i.e., researchers who hold a PhD but do not have a professorial appointment) in the fields of economics and business administration.[9] For each identified researcher, we collected information on their name, gender, field, and tenure status (tenured researchers include full professors and associate professors, whereas non-tenured researchers include assistant professors and postdoctoral researchers). We relied on a two-person verification protocol for this step. A research assistant first reviewed the relevant university websites to identify all eligible researchers and collect the corresponding data. Subsequently, one of us co-authors manually verified the research assistant's work for each university on a researcher-by-researcher basis and made corrections where necessary. We completed data collection on May 29, 2026, such that our sample represents the population of researchers as of that date.

Overall, the data collection resulted in a sample of 4,472 researchers and enabled us to study the full population of interest, thereby eliminating any possibility for individuals to self-select into participation in the experiment.

[8] Austria: `https://www.oesterreich.gv.at/de/themen/bildung_und_ausbildung/hochschulen/universitaet/Seite.160302` [Accessed on 29th of May, 2026]; Switzerland: `https://www.swissuniversities.ch/themen/lehre-studium/akkreditierte-schweizer-hochschulen` [Accessed on 29th of May, 2026]; Germany: `https://www.hochschulkompass.de/hochschulen/downloads.html` [Accessed on 29th of May, 2026].

[9] As specified in the pre-registration, we excluded the following groups from the sample because they usually do not include the research active researchers we are interested in: honorary professors; adjunct professors; emeritus professors; lecturers; guest researchers; research fellows; researchers whose personal email address was not publicly available (10); researchers in our sample that are involved in our study, e.g. co-author of this study or PhD supervisor (8); postdoctoral researchers on a permanent position, i.e. "Akademischer Rat" in German (as far as detectable).

Real-Effort Task to Support a Student Research Project: Participation in a Survey. The researchers in our sample were contacted via email and invited to participate in a survey on the role of AI in university teaching, particularly within the field of economics and business administration. We selected this survey topic because it is important and relevant to researchers across all fields in our sample. Specifically, the survey invitation indicated that the project's objective is to understand which competencies become more important in the context of AI, whether teaching in business administration and economics needs to change, and which competencies are especially important. To ensure that the survey is meaningful and appears useful to researchers, the competences to be assessed in the survey are based on the EQUIS standards and criteria published by the EFMD accreditation for international business schools (EFMD Global, 2026), the WHO competence catalogue (World Health Organization, 2016), Bloom's taxonomy of educational objectives (Bloom, 1956), and the management and economics module handbook of the Ruhr-University Bochum (Wirtschaftswissenschaft Ruhr-Universität Bochum, 2025). The survey contained 117 questions and survey participants could stop the survey at any time.

The survey invitation stated in the second sentence that the survey is part of a student research project to make sure that recipients are aware of this.[10] Subsequently, the invitation motivates the overall topic of the survey and briefly describes what respondents can expect from the survey. The email then included a link to the online survey. The invitation email, and the survey itself, were in English language to not exclude international researchers based in a German-speaking country from participating. The original survey invitation and the questionnaire are displayed in Appendix B.

Protocol of Survey Invitations. The invitations were sent out by 18 master's students from three different German universities, each having big Master's programs in both economics and business administration (U. Mannheim, U. Cologne, U. Bochum). Of the 18 students, nine were male and nine were female, and the scholars in our sample were randomly assigned to receive an email from one of the 18 students (see below for more information on randomization). Each university contributed three male and three female students, and all 18 students had common German-sounding first and last names. The emails were simultaneously sent by all 18 students on one afternoon (June 02, 2026) in their own real name and from their own real student email accounts at their respective university (which all had the same format: firstname.lastname@[institution].de). Given their role as Master's students in big Master's programs, the students are not known in the scientific community. In addition, to avoid any familiarities between senders and recipients, student senders did not send email invitations to scholars based at their own university (also see randomization procedure below).

Experimental Manipulation. We employ a 2x2 between-subjects design in which we cross the following two dimensions: i) gender of the sender (male or female) and ii) explicit expression of interest in pursuing a PhD (yes or no information).

[10]The first sentence of the invitation introduces the student and indicates that they are a Master's student (see below); this implies that recipients knew that the email was sent by a pre-PhD student. In addition, the email stated that the survey invitation is part of a "student" research project. In contrast to the US, the term "student" (German: "Student") in the German-speaking university system clearly refers to pre-PhD level students who are enrolled in an undergraduate or Master's program. PhD students, commonly referred to as "PhD researcher" or "research employee", usually have a paid job as research assistants and are therefore perceived to be part of scientific staff rather than students.

Gender is varied using the name of the student who sends out the email. As described above, we have nine female senders and nine male senders. Half of our sample receives an email by a female sender and the other half receives an email from a male sender. To make sender gender identifiable and salient to recipients, sender gender can be inferred from: the name in the email address, the name stated in the first sentence of the email (which reads "*My name is [STUDENT NAME] and I am a Master's student at the [University of Cologne/University of Mannheim/Ruhr University Bochum] in Germany.*", see Appendix B), the signature at the end of the invitation email, the survey introduction page that recipients see when they click on the survey link, and the survey footer that is always visible while a recipient answers survey questions.

By using 18 students to send the emails – nine female and nine male, all with common German-sounding names and of similar age – we minimize the possibility that particular names confound the estimated gender effect.[11] In other words, our design allows us to distinguish between name-based discrimination (where names may, for example, signal social status) and gender-based discrimination.

To shed light on mechanisms explaining potential gender effects, we add an additional treatment variation in which the email sender explicitly indicates that they are interested in pursuing a PhD after their Master's degree. This dimension is varied within senders (the exact randomization procedure is described below). The invitation emails to receivers exposed to this treatment dimension include the following sentence: "*This project is very important to me, as I am considering doing a PhD after completing my Master's program. Therefore, your participation in the survey would be very valuable to me.*", see Appendix B. Overall, the invitation emails are identical across experimental groups except sender name and the inclusion of the expression of interest in pursuing a PhD.

Avoidance of Deception. Our experimental approach is similar in spirit to correspondence studies in labor-market contexts, in which the race, ethnicity, or gender of a job applicant is varied through the applicant's name. An important characteristic of our experiment – and a difference from most existing correspondence studies[12] – is that it is entirely non-deceptive. All 18 student senders are real students enrolled in the Master's program at the respective university, and the survey results will be used in a student-lead research report, with the goal of making the report publicly available. All 18 students who sent out the email are offered the opportunity to work on the report and add their names as authors. Moreover, the survey addresses a relevant topic, and its results can actually improve our understanding of the role of AI in university teaching. Thus, participation in the survey does not constitute a waste of resources on the part of the participating researchers. Given that our sample consists of researchers with high opportunity costs of participating in a survey, we consider the non-deceptive nature of the experiment essential in this context. Finally, the treatment variation in which senders express that they are considering a PhD after completing their Master's degree is not deceptive either, as all 18 student senders considered this possibility and agreed

[11] The female students are Cara Auernheimer, Frauke Nora Gerster, Merle Hinzen, Celine Jobst, Kathrin Kluge, Ina Partisch, Janette Reinhard, Rosanna Simonis, and Bianca Weber. The male students are Nikolas Fritz, Karsten Piepenburg, Jonathan Sattler, Felix Schmitz, Vincent Strittmatter, Dominik Teske, Leon Tewes, Malte Vanderheiden, and Leonhard Wendt. The majority of the first names are among the top 250 (300) first names in Germany for female and male children born in the 1990s and 2000s, respectively. See Table A1 in the Appendix for their exact ranking.

[12] Gallen and Wasserman (2026) is an exception that uses a non-deceptive approach to study discrimination (in a non-research context).

to send the treatment variation beforehand.

Randomization Procedure. The aim of the randomization is to create a balanced set of scholars for the four treatment conditions. Therefore, we use stratified randomization in which we build strata for scholar's key characteristics:

1. Gender of the recipient (male/female),
2. Field of work of the recipient (economics or business administration),
3. Country in which the university the recipient works at is based (Germany, Switzerland, Austria), and
4. Type of the position the recipient occupies (tenured, non-tenured).

Each of the 18 students is assigned to two groups of researchers: to one, they send invitation emails including the explicit expression of interest in pursuing a PhD; to the other, they send the same email without this addition. Six of the 18 students are based at U.Bochum, six at U. Cologne, and six at U. of Mannheim; since students cannot contact researchers from their own university, we construct each student's two groups so that they always exclude their own university's researchers while still including researchers from everywhere else.

We do this in three steps. First, we randomize all researchers except those from Bochum, Cologne, and Mannheim into 36 groups using the strata above; every student's two groups draw on this shared pool, regardless of their own affiliation. Second, we separately randomize the researchers from each of the three excluded universities into their own set of groups, again using the same strata. Third, we distribute each university's researchers only to the students not affiliated with that university: Bochum's researchers are added to the groups of Cologne and Mannheim students, Cologne's researchers to the groups of Bochum and Mannheim students, and Mannheim's researchers to the groups of Bochum and Cologne students. Combining the shared pool with these targeted additions gives every student two final groups that draw on researchers from all universities except their own, as illustrated in Figure 1.

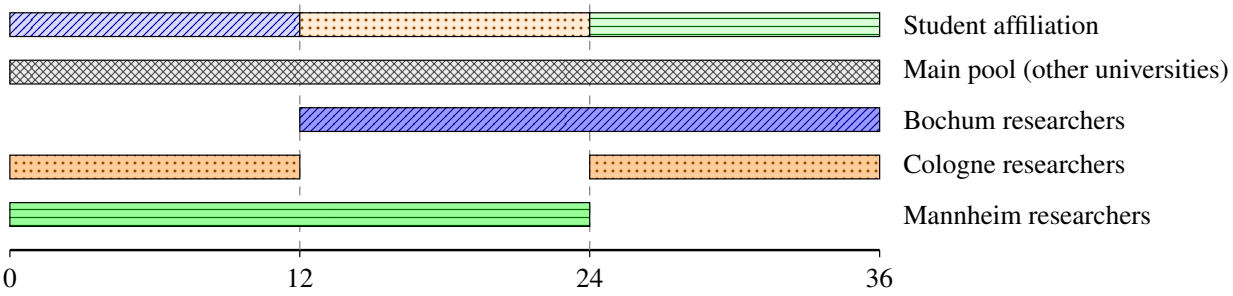


Figure 1: Randomization Procedure

Notes: Mapping of treatment indices (0–35) to student affiliation and to the researcher pools contributing to each index. The main pool (grey, cross-hatched) contributes to every index and includes researchers from all universities in our sample except the ones at the University of Cologne, the University of Mannheim, and the Ruhr-University Bochum; for these three excluded universities, each university's researcher pool is shifted so it skips exactly the index range belonging to its own students.

2.2 Data, Summary Statistics and Balance across Groups

Data and Variable Construction. Relying on the manually collected data from university webpages, we have information on the email, recipients' gender and tenure status as well as their field of work, the country they are working in, and whether the university is a private or public university. We are using information on recipients' academic title and rank to create a dummy indicating if an email recipient is tenured. Following our preregistration, we define tenured researchers as full professors and associate professors. Non-tenured researchers include assistant professors and postdoctoral researchers. We define postdoctoral researchers as individuals who have received a PhD but are not (yet) professors.

Sample Composition and Balance. Table A2 in the Appendix shows the composition of our sample of 4,471 email recipients[13]: 31% of our sample is female and 61% are tenured researchers. Among the tenured researchers, 23% are women. 39% of our sample is employed in the field of economics, 61% of the email recipients work in business administration. The majority of the sample works at a German university, and in public universities. 1.45% of emails could not be delivered and for 4.47% of the emails senders received an automatic response. Table A2 also shows that all these variables are balanced across the four types of emails (i.e., across the four experimental groups in the 2x2 design): (i) male sender - no PhD email, ii) male sender - PhD email, iii) female sender - no PhD email, and iv) female sender - PhD email. Overall, 53% of the email recipients received an email including the expression of interest in pursuing a PhD. The absolute number of emails differs across these four types. All graphs in the main text therefore control for whether the email sent was a PhD email or a non-PhD email. Tables in the Appendix show results with and without including this control variable. The results remain very similar.

Procedure and Outcome Variables. All emails were sent on the afternoon of June 02, 2026. As specified in the pre-registration, participation in the survey was possible for two weeks so that the data collection ended two weeks after the emails are sent, i.e. on June 16, 2026. Table 1 presents summary statistics for our outcome variables. The overall response rate (i.e., the extensive margin measured using a dummy indicating if the email recipient opened the survey link) was 13%. 7.5 questions were answered on average (i.e., the unconditional average combining effects on extensive and extensive margin). Those 598 recipients who opened the survey answered on average 56 questions (i.e., intensive margin). Table A3 in the Appendix shows a summary of the variables by field (economics and business administration) and Table A4 by university type (public and private). The Appendix further shows the main analyses on the preregistered sub-samples by field of work (economics vs. business administration), see Appendix C, and the type of university (public vs. private), see Appendix D.[14]

[13] We had to exclude one researcher from the preregistered number of researchers to be contacted because this researcher has received the email by a student who had been in an employment relationship with this researcher before.

[14] We do not differentiate by country because the sub-samples by country become too small to reliably estimate gender differences or further heterogeneity.

Table 1: Summary Statistics

	N	Mean	SD
Response Rate	4471	0.13	(0.34)
No. Answers	4471	7.50	(25.24)
No. Ques. Answ. (cond. on response)	598	56.10	(45.13)

Note: *Response Rate* is a dummy variable which is equal to one if the receiver has participated in the survey, i.e. clicked on the survey link in the email / opened link in the browser, and zero otherwise. *No. Answers* counts the number of answers provided in the survey ($max = 117$). *No. Ques. Answ. (cond. on response)* counts the number of answers provided in the survey conditional on participating in the survey. Values in parentheses indicate standard deviations.

3 Main Results

3.1 Average Differences

This chapter examines whether the gender of the email sender affects researchers' willingness to respond to the survey. We consider two dimensions of survey participation. First, we examine the extensive margin, measured by whether a researcher responds to the survey at all, and second, we study a combination of the extensive and intensive margin, measured by the unconditional number of questions answered by the contacted researchers. The latter is the most relevant outcome from the sender's perspective, as the sender's objective is to obtain as many answers as possible from as many researchers as possible.

The overall response rate of 13.38% is almost equally driven by male and female senders, with a response rate of 13.04% if the email sender is male and 13.71% if the email sender is female. This difference is statistically insignificant, see also Table A5 and the left panel in Figure A1 in the Appendix. The (unconditional) average number of questions answered, our second measure of interest, is 6.65 if the sender is male and 8.35 if the sender is female. This difference is statistically significant, see also Table A5 and the right panel of Figure A1 in the Appendix. Hence, on average, female senders receive 25.56% more answers than male senders $((8.35 - 6.65)/6.65)$.

While the response rate measures the extensive margin effects, the unconditional number of questions answers combines both the extensive and intensive margin effects. Since this combined measure is the most relevant outcome from the sender's perspective, we focus on it in the analyses that follow. Results on the response rate can be found in the Appendix and will be discussed in the main text when we find significant differences at this extensive margin.

3.2 Male vs Female Recipients

In a next step, we study heterogeneity with respect to the gender of the email recipient. Figure 2 presents the number of answers across experimental groups separately for female and male email recipients.[15] We see that male recipients provide on average 6.17 answers if the sender is male and 8.35 answers if the sender is

[15]Results on the response rate are insignificant and displayed in Figure A2 in the Appendix. Among the female recipients, the response rate was 14.24% (n=99) for female senders and 13.97% (n=95) for male senders. Among the male recipients, female senders reached a response rate of 13.47% (n=209) and male senders 12.63% (n=195).

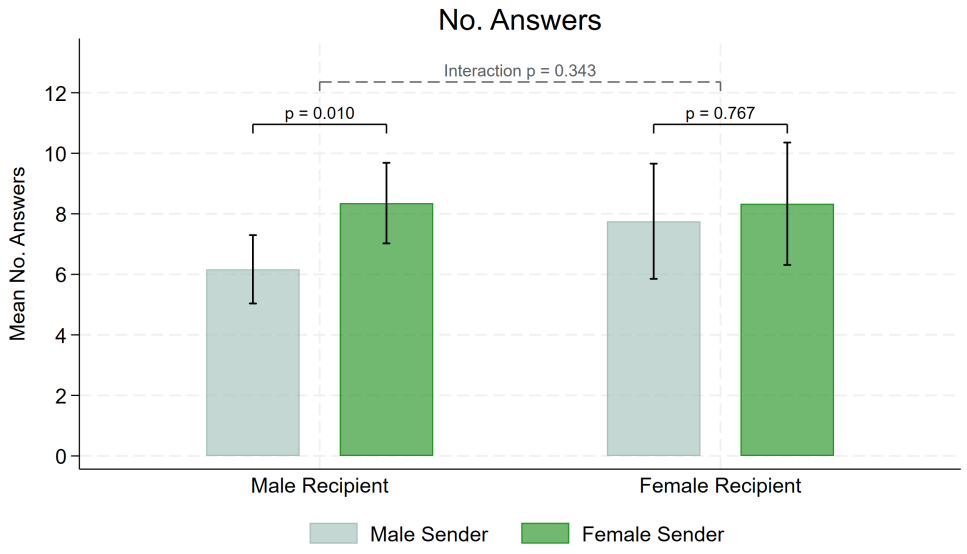


Figure 2: Number of Answers by Gender of the Recipient

Notes: Bars show mean number of questions answered in the survey, by gender of the sender and recipient. Error bars indicate 95% confidence intervals. p-values refer to p-values generated from OLS models regressing the outcome on the senders' gender, controlling for the sender's affiliation (University of Cologne, University Mannheim or Ruhr-University Bochum), the type of email sent (PhD/non-PhD email), and using robust standard errors. Regressions are run for male and female recipients separately. The p-value of the interaction stems from an OLS model regressing the outcome on the above mentioned independent variables, including an interaction of the sender's and recipient's gender. See Table A6 in the Appendix for these estimations.

female. This difference is significant at a 5% level. In relative terms, male recipients answer 35.33% more questions if the sender is female than if the sender is male $((8.35 - 6.17)/6.17)$. Female recipients provide 7.48% more answers to female senders (7.75 answers for male senders and 8.33 answers for female senders), but the difference is much smaller and statistically insignificant. Table A6 in the Appendix shows the estimation results. These estimations also show that the difference in number of questions answered between male and female senders does not differ significantly between male and female recipients. Nevertheless, the overall main effect on the intensive margin seems to be driven by male recipients who are more supportive towards women than men, as measured by their number of answered questions in the survey.

As discussed in the Introduction, the finding of same-sex discrimination among men is consistent with the utility-based model of Bar and Zussman (2020), who add gender preferences to Becker's (1957) taste-based discrimination model, as well as the concept of intrasexual competition, whereby individuals may treat same-sex members less favorably because they perceive them as potential competitors (Hunt et al., 2009; Rosvall, 2011). In addition, it aligns with other empirical findings in the literature; see for example the meta-study of economic experiments by Lane (2016).

3.3 Tenured vs. Non-Tenured Recipients

Given that tenured senior professors have a particularly relevant role in the profession, as they decide about many career relevant aspects such as applications, promotions, and publication outcomes, we further explore

if the treatment has differential effects among tenured and non-tenured email recipients. The results of this heterogeneity analysis are summarized in Figure 3, where we depict average number of questions answered by gender of the sender and tenure-status of email recipients.[16]

Overall, tenured recipients are less supportive in the survey than non-tenured recipients. On average, non-tenured recipients answer 53.71% ($p < 0.01$) more questions than tenured recipients $((9.53 - 6.20)/6.20)$. In addition, non-tenured recipients answer significantly more questions if the sender is female (10.9 answers) compared to if the sender is male (8.1 answers), see Figure 3. In relative terms, non-tenured recipients answer 34.57% questions more if the sender is female than if the sender is male $((10.9-8.1)/8.1)$. The pattern is similar but insignificant among the tenured faculty and the differences between tenured and non-tenured faculty is insignificant too, see Table A7 in the Appendix. Still, it appears that the average effect is mainly driven by non-tenured recipients.

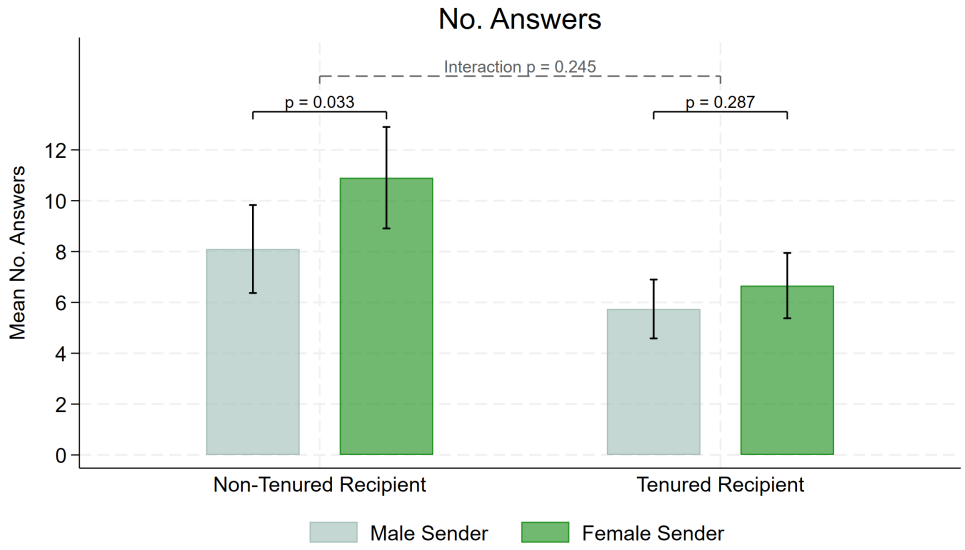


Figure 3: Number of Answers by Tenure Status of the Recipient

Notes: Bars show mean number of questions answered in the survey, by gender of the sender and tenure status of the recipient. Error bars indicate 95% confidence intervals. p-values refer to p-values generated from OLS models regressing the outcome on the recipients' tenure status, controlling for the sender's affiliation (University of Cologne, University Mannheim or Ruhr-University Bochum), the type of email sent (PhD/non-PhD email), and using robust standard errors. Regressions are run for non-tenured and tenured recipients separately. The p-value of the interaction stems from an OLS model regressing the outcome on the above mentioned independent variables, including an interaction of the sender's gender and recipient's tenure status. See Table A7 in the Appendix for these estimations.

3.4 Gender and Tenure of Recipients

We now explore the combination of gender and tenure status of recipients. Figure 4 shows the average number of answers provided by male and female recipients split by their tenure status. Among tenured researchers (i.e., right panel of Figure 4), we observe the insignificant tendency that female senders received more answers from male recipients, but less answers from female recipients as compared to male

[16]Results on the response rate are insignificant and displayed in Figure A3 in the Appendix.

senders. This interaction effect comes with a p-value of 0.198. While only suggestive, it seems as tenured male researcher favor women, whereas tenured female researcher tend to favor men. Notably, it is only among the tenured researchers that we find a tendency of same-sex discrimination among women. These observations are indicative of the pattern documented in the literature that women who have succeeded in a male-dominated environment (subconsciously) hinder rather than support other women from following their career path (see discussion in the Introduction and further below for more indications pointing in this direction).

Among the non-tenured recipients (see left panel of Figure 4), the response behavior of male and female recipients does not differ significantly from one another. However, the overall effect of more support for female senders seems to be mainly driven by non-tenured, male recipients. They provide significantly more answers to female (11.2) than to male (7.7) senders. In relative terms, non-tenured, male recipients answer 45.45% questions more if the sender is female than if the sender is male $((11.2 - 7.7)/7.7)$.

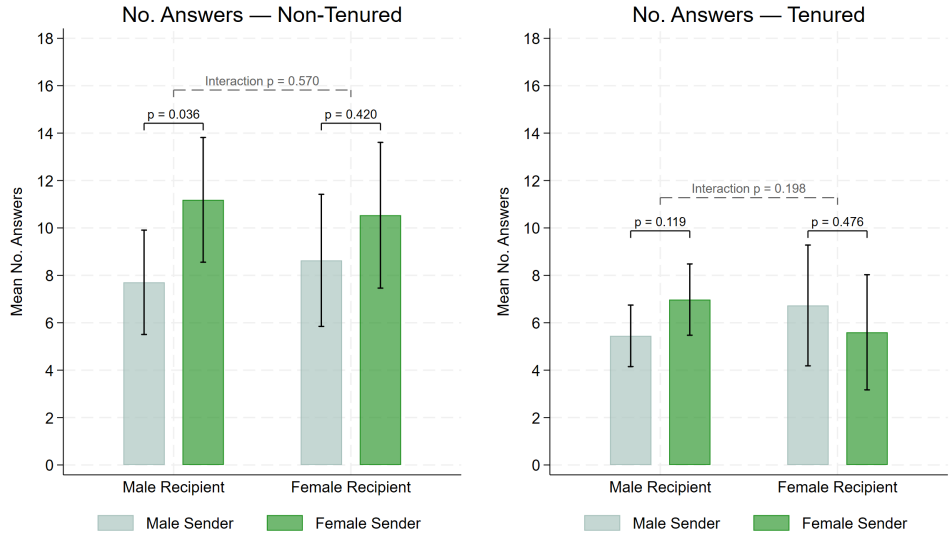


Figure 4: Number of Answers by Tenure Status and Gender of the Recipient

Notes: Bars show the mean number of questions answered in the survey by gender of the sender and recipient among non-tenured recipients (left hand side) and tenured recipients (right hand side). Error bars indicate 95% confidence intervals. p-values refer to p-values generated from OLS models regressing the outcome on the gender of the sender, controlling for the sender's affiliation (University of Cologne, University Mannheim or Ruhr-University Bochum), the type of email sent (PhD/non-PhD email), and using robust standard errors. Regressions are run for male, female, tenured and non-tenured recipients separately. See Table A8 in the Appendix for these estimations. The p-value of the interaction stems from an OLS model regressing the outcome on the above mentioned independent variables, including an interaction of the sender's and recipient's gender. See Table A9 in the Appendix for these estimations.

3.5 PhD Emails

To better understand underlying mechanisms, we included a second treatment variation in the email invitations: explicitly expressing interest in pursuing a PhD or not actively doing so. We have included this additional information on the sender with the purpose of signaling senders' genuine interest in research and

potentially serving as a competence signal for recipients. Following the idea of statistical discrimination by Arrow (1972) and Phelps (1972), this competence signal might increase engagement with the survey.

Indeed, we do see a tendency of the PhD emails achieving higher response rates (14.10% for PhD emails compared to 12.56% for non-PhD emails), but this difference is statistically insignificant, see the left panel of Figure A5 in the Appendix. Similarly, for the number of questions answered, we observe that senders of PhD emails receive on average 7.84 answers and those without the PhD statement 7.13 answers, a difference which is not statistically significant either, see the right panel of Figure A5 in the Appendix. Following the structure of the previous section, we show in the following the effects on the number of answers provided – a composite measure of the extensive and intensive margin – in the main text. Results on the response rate can be found in the Appendix and are discussed in the main text if relevant.

3.5.1 PhD Emails and Recipients' Gender

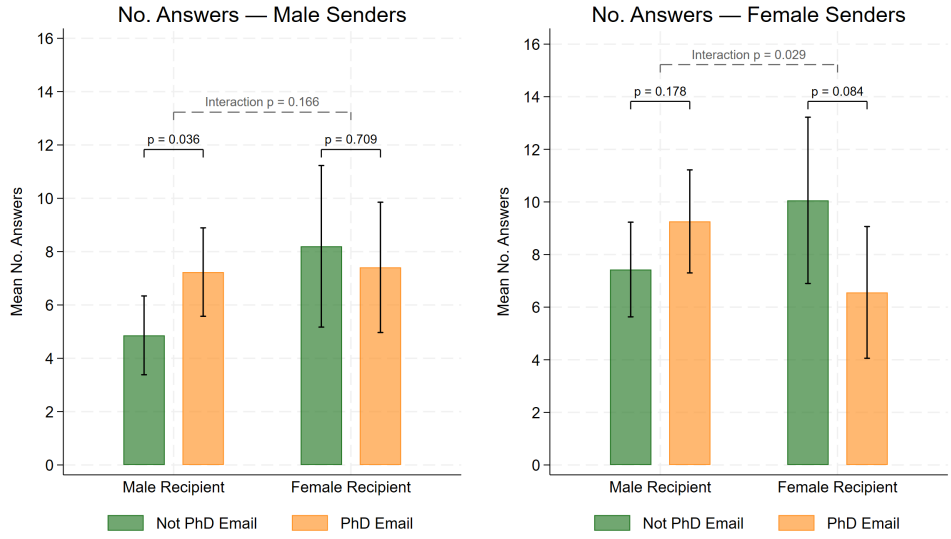


Figure 5: Number of Answers by Type of Email and Recipient Gender

Notes: Bars show the mean number of questions answered in the survey among male senders (left panel) and female senders (right panel). Error bars indicate 95% confidence intervals. p-values refer to p-values generated from OLS models regressing the outcome on whether the email contained a statement expressing interest in pursuing a PhD or not, controlling for the sender's affiliation (University of Cologne, University Mannheim or Ruhr-University Bochum), and using robust standard errors. Regressions are run for male and female senders and recipients separately. The p-value of the interaction stems from an OLS model regressing the outcome on the above mentioned independent variables, including an interaction of the recipient's gender and type of email (PhD/non-PhD email). See Table A11 in the Appendix for these estimations.

This section investigates whether there are gender differences in whether and how receivers engage in statistical discrimination, i.e. the effect of receiving a PhD email separately for male and female senders as well as recipients. Male senders (left panel of Figure 5) receive more support of male recipients if they express doing a PhD than if not: they receive 48.77% more answers from male recipients if they send a PhD email as compared to an email without this additional information $((7.23 - 4.86)/4.86)$. This pattern also

holds at the extensive margin, see Figure A6 in the Appendix. For female senders, male recipients show a similar pattern with providing more answers to PhD emails (n.s.; see right panel of Figure 5), and showing a significantly higher response rate (see Figure A6 in the Appendix).[17]

So overall, male recipients engage in behavior which is in line with statistical discrimination such that they are more supportive towards students who signal interest in pursuing a PhD. Notably, their survey-response behavior in the presence of a PhD interest mitigates the previously reported taste-based discrimination in which male students face a gender-based disadvantage: male recipients are almost equally supportive towards women who do not express interest in doing a PhD (7.43 answers) and men who express this interest (7.23 answers). Male students can hence offset the disadvantage associated with their gender by sending a signal about their academic career goal.

Contrarily, female recipients do not provide a significantly different number of responses for the two versions of the email if the sender is male (see the right bar graphs in the left panel of Figure 5). They even provide significantly *fewer* responses to female senders if they send an email with the PhD statement (6.56) compared to the email without the statement (10.06) (see the right bar graphs in the right panel of Figure 5).[18] In relative terms, female recipients answer 53.35% more questions to female senders if the female senders *do not* express interest in doing a PhD as compared to expressing this interest $((10.06 - 6.56/6.56)$. This pattern is hard to reconcile with statistical discrimination, but rather suggests that women are (potentially subconsciously) less supportive towards other women if those send a signal to enter their profession in the future.

3.5.2 PhD Emails: Recipients' Tenure Status

In a next step, we examine the effect of receiving a PhD email separately for male and female senders and tenured and non-tenured recipients. We only find significant differences for male senders who contact non-tenured recipients: Male senders (left panel of Figure 6) receive 48.67% more answers from non-tenured recipients if they send a PhD email (9.47 answers) as compared to sending them a non-PhD email (6.37 answers), a difference which is significant at the 10% level. The same is observed for the response rate, see Figure A7 in the Appendix. Female senders (right panel of Figure 6) neither significantly benefit from sending a PhD email to non-tenured nor to tenured recipients.

The results allow for the conclusion that non-tenured recipients engage in statistical discrimination towards male students expressing an interest in pursuing a PhD while we do not have evidence for this to happen for female students or tenured researchers. So again, similar to the subsample of female recipients above, female students do not seem to benefit from expressing their academic ambition, while men do so at least among non-tenured researchers.

[17] The response rate among male recipients and female senders with the PhD statement is 15.20% compared to 11.70% if the email comes without this statement, a difference which is significant at the 5% level.

[18] For female recipients, female senders reach a response rate of 15.91% if they send the email without the statement and only 12.54% if it contains the PhD statement. This difference in response rates is insignificant but is significantly different from the pattern among male recipients, see Figure A6 in the Appendix.

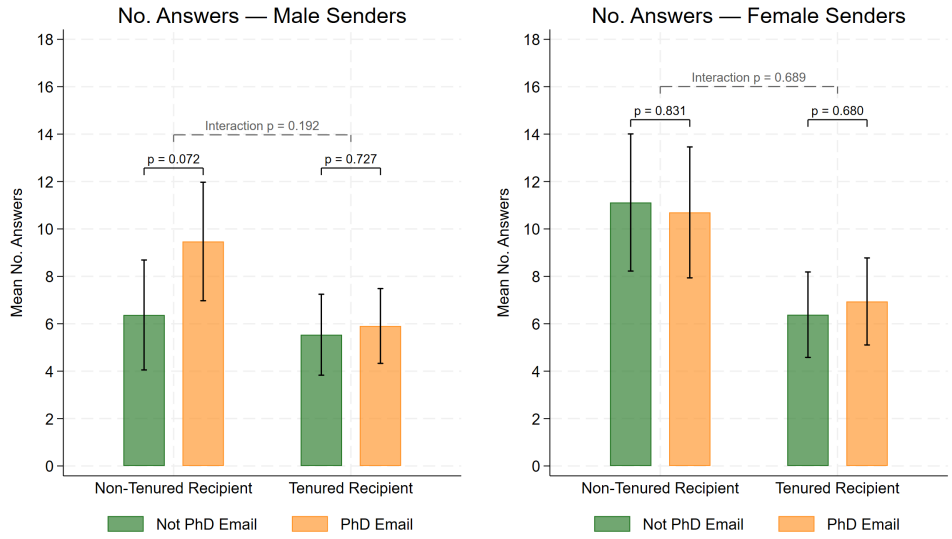


Figure 6: Number of Answers by Type of Email and Recipient Tenure Status

Notes: Bars show the mean number of questions answered in the survey among male senders (left panel) and female senders (right panel). Error bars indicate 95% confidence intervals. p-values refer to p-values generated from OLS models regressing the outcome on whether the email contained a statement expressing interest in pursuing a PhD or not, controlling for the sender's affiliation (University of Cologne, University Mannheim or Ruhr-University Bochum), and using robust standard errors. Regressions are run for male and female senders and tenured and non-tenured recipients separately. The p-value of the interaction stems from an OLS model regressing the outcome on the above mentioned independent variables, including an interaction of the recipient's tenure status and type of email (PhD/non-PhD email). See Table A12 in the Appendix for these estimations.

3.5.3 PhD Emails: Recipients' Gender and Tenure Status

To understand better why female senders do not receive the same increase in support – or even fewer responses – than men when sending an email with the expression of pursuing a PhD, we separately investigate the effect of PhD emails by gender and tenure status of the recipients. We organize the corresponding Figure 7 into four parts, which we discuss in the following.

First, and similar to the previous finding, both tenured male and tenured female researchers do not provide a significantly different number of answers to male senders if they send the email with or without expressing interest in pursuing a PhD; see right part of Panel B in Figure 7. Second, while non-tenured female recipients do not significantly differentiate between PhD and non-PhD emails of male senders, non-tenured male recipients provide 138.04% $((10.45 - 4.39)/4.39)$ more answers to male senders sending a PhD email (10.45 answers) compared to male senders without a PhD email (4.39 answers); see left part of Panel B in Figure 7.[19]

Third, for female senders, non-tenured male and female recipients do not significantly differ in their response pattern towards the two versions of the email; see left part of Panel A in Figure 7. Fourth, we do find, however, significant differences for emails sent by female senders to tenured recipients; see right part of Panel A in Figure 7): On average, tenured female recipients answer 7.54 questions if the sender is female

[19]The same pattern is found for the response rate, see Figure A8 in the Appendix.

and *does not* express interest in doing a PhD, while they only answer 3.58 question if the female sender expresses interest in pursuing this degree. This difference is statistically significant at the 10 percent level. In relative terms, female tenured recipients provide 110.61% more answers to a female sender who does not express interest in doing a PhD than if she does so $((7.54-3.58)/3.58)$. This effect is significantly different (see interaction term, $p = 0.041$) from tenured male recipients who do not significantly differentiate between PhD and non-PhD emails from female senders.[20]

In summary, we find two main effects: First, non-tenured male recipients are more supportive towards male students who send a PhD email as compared to if they send an email without this additional signal. Their behavior is in line with statistical discrimination, in which they use the additional PhD signal as a competence signal which increases the value of their time investment.

Second, tenured female recipients are less supportive towards female students who express interest in doing a PhD as compared to if they do not. Finding this behavior especially among tenured female researchers may be explained by what has been discussed as the "queen-bee syndrome" in the literature (Staines et al., 1974; Mathison, 1986). The phenomenon describes a behavior (potentially subconscious; see Conclusion) in which women, who have been successful in male-dominated environments, may hinder rather than support the career progress of junior women (Ellemers et al., 2004; Garcia-Retamero and Lopez-Zafra, 2006; Parks-Stamm et al., 2008; Derks et al., 2011; Ellemers et al., 2012). Both economics and business administration are male-dominated environments, especially at the senior level (77.06% of tenured researchers in our sample are men), such that the behavior of the tenured women in our sample fits into the idea of the concept described above.

Another potential explanation is that tenured women may have actively stopped engaging in non-promotable tasks in light of recent evidence showing that women are more likely than men to agree to take on such tasks (see e.g., Babcock et al. (2017)). However, if this mechanism explained the observed behavior, we should not see responsiveness to differ by the sender's gender or by whether the sender expressed an interest in pursuing a PhD. Alternatively, there might be the concern that women are more aware of these type of experiments as more women than men engage in studies on gender discrimination (Antman et al., 2024). However, again it is hard to argue why their increased awareness would differentially affect their responsiveness towards students of same gender with different competence signals.

Lastly, among male researchers we again observe that male students can offset the gender-based disadvantage they face by signaling their academic ambition: Non-tenured (tenured) male researchers provide 10.45 (5.74) answers to a male student signaling a PhD and 10.34 (6.03) answers to a female student who does not express this interest.

[20]This pattern is similar with respect to the response rate: Among tenured recipients, female senders receive significantly more responses from male recipients and insignificantly fewer from female recipients if they send the PhD email compared to not including this information, with the interaction term being significant, see right part of Panel A in Figure A8 in the Appendix.

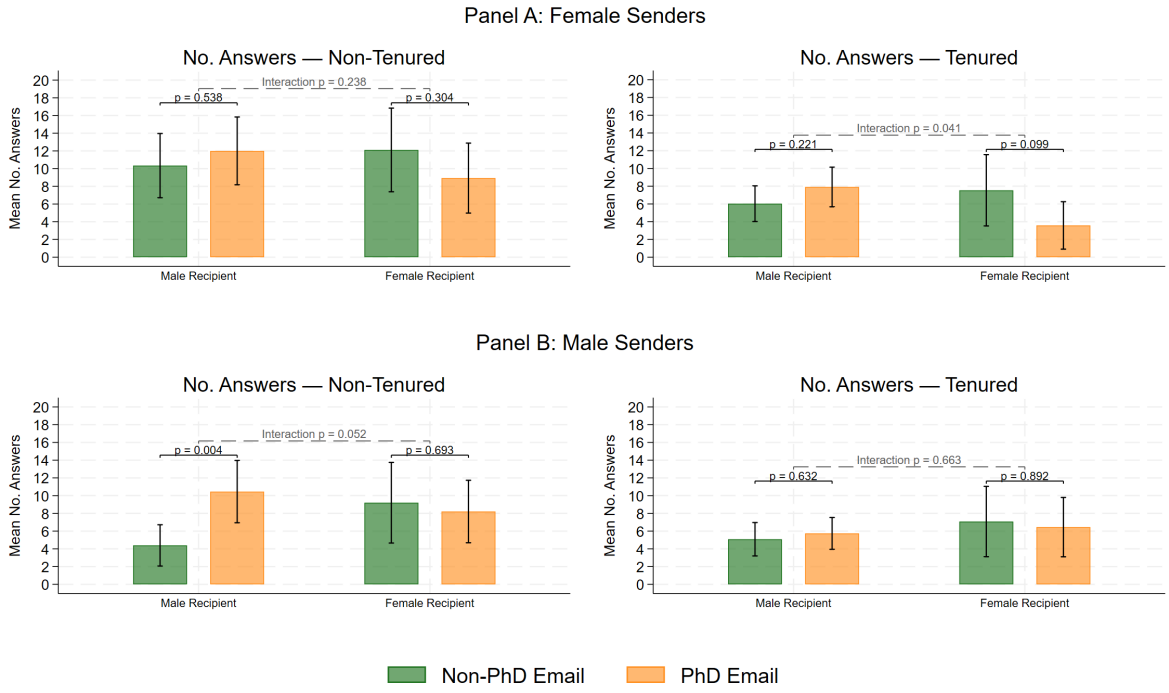


Figure 7: Number of Answers by Type of Email, Recipient Tenure Status, and Gender

Notes: Bars show the mean number of questions answered in the survey among female senders (panel A) and male senders (panel B). Error bars indicate 95% confidence intervals. p-values refer to p-values generated from OLS models regressing the outcome on whether the email contained a statement expressing interest in pursuing a PhD or not, controlling for the sender's affiliation (University of Cologne, University Mannheim or Ruhr-University Bochum), and using robust standard errors. Regressions are run for male and female senders, tenured and non-tenured, and male and female recipients separately. The p-value of the interaction stems from an OLS model regressing the outcome on the above mentioned independent variables, including an interaction of the recipient's tenure status and type of email (PhD/non-PhD email). See Table A14 in the Appendix for the estimations for male senders, Table A13 in the Appendix for the estimations for female senders.

3.5.4 Only PhD Emails

To shed more light on the previous findings on the different effects of PhD emails among tenured and non-tenured, male and female recipients, in this section, we restrict the data to those emails which contained the expression of interest pursuing a PhD. These emails explicitly express that the senders aim at following the same career path as the recipients.

In the sample of non-tenured recipients, we do not observe significant differences between male and female recipients in their responsiveness towards PhD emails of male and female senders, see the left panel in Figure 8.[21]

Among tenured recipients, we observe that female senders receive more answers than male senders who send a PhD email to a male recipient (n.s) and female senders receive fewer answers than male senders if they send a PhD email to a female recipients (n.s), with the interaction effect being significant with $p = 0.055$.[22] Again, this pattern is hard to reconcile with statistical discrimination, but rather hints at a form of taste-

[21] The effects are not significant at the extensive margin either, see Figure A9 in the Appendix.

[22] The pattern is similar at the extensive margin but insignificant, see Figure A9 in the Appendix.

based discrimination in which tenured women rather hinder than support the career progression of junior women who signal to aim at following their career path (see above and Introduction for a more exhaustive discussion).

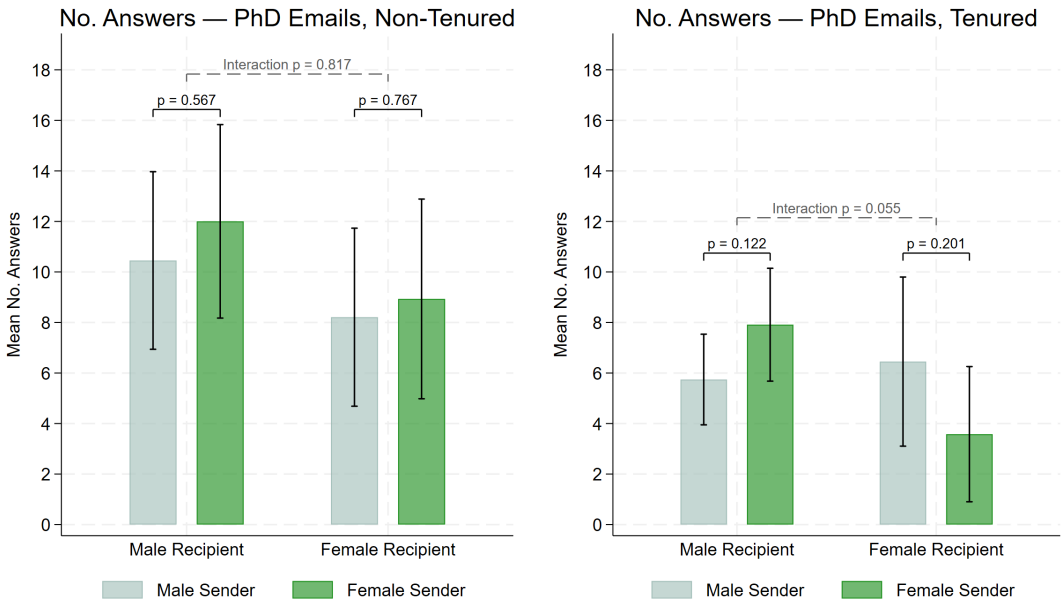


Figure 8: PhD Emails: Number of Answers by Gender

Notes: Bars show the mean number of questions answered in the survey by non-tenured (left panel) and tenured recipients (right panel). Error bars indicate 95% confidence intervals. p-values refer to p-values generated from OLS models regressing the outcome on the gender of the sender, controlling for the sender's affiliation (University of Cologne, University Mannheim or Ruhr-University Bochum), and using robust standard errors. Regressions are run separately for male and female recipients. The data is restricted to PhD emails only. See Table A15 in the Appendix for these estimations.

4 Conclusion

We study gender-based discrimination against students at the pre-PhD level in academic economics and business administration. We vary both the gender and the students' expressed interest in pursuing a PhD in a non-deceptive experimental correspondence study asking (senior) researchers for help through taking part in a student research project. We observe two main sets of effects. First, male researchers provide more answers to female than to male students whereas female researchers do not respond differently to male and female students on average. Second, the expressed signal regarding pursuing a PhD increases responses to male students among male researchers, in line with statistical discrimination. In contrast, among female researchers, female students expressing an interest in pursuing a PhD receive fewer responses than female students who do not express such an interest while no differential effect for male students is observed. The former effect is driven primarily by tenured female researchers and consistent with a mechanism documented in other contexts where women who have succeeded in male-dominated environments may be less supportive of junior female colleagues striving for the same career.

We add to the literature a study investigating the extent of everyday gender discrimination in early stages of an academic career. Our empirical setting does not allow any conclusion regarding the types of strategies that should be pursued to mitigate discrimination in academia (such as mentoring programs, see Blau et al. (2020)). Instead, we interpret our paper as a documentation of everyday discrimination against pre-PhD students in economics and business administration, and we leave it for future research to investigate how such discrimination might be combated.[23] Future research following this endeavor may also aim to directly investigate the effect of expected supportive social environment on the the decision to pursue an academic career.

Our results should be interpreted with a few considerations in mind. First, the discriminatory behavior that we observe may well be subconscious. The current literature on implicit bias shows that individuals are often unaware of their own biases (Bertrand et al., 2005; Ellemers, 2018) and may adjust their behavior once they become aware of it (Alesina et al., 2024). In their review article, Bertrand and Duflo (2017, p. 313) point out that "implicit biases are more likely to drive behavior under conditions of ambiguity, high time pressures and cognitive loads, or inattentiveness to the task". Such conditions may plausibly have applied to the email recipients in our study. For example, they may have experienced time pressure because responding to the survey required them to invest time from their already tight schedules, or they may have been inattentive because the student survey was not directly relevant to their own work or success. We therefore consider it plausible that the observed behavior may reflect implicit biases rather than being exclusively driven by conscious decisions not to support junior women and men pursuing the same career path. At the same time, we acknowledge that our study does not provide direct empirical evidence that would allow us to test this interpretation.

A second observation that deserves discussion regards the observed relation between tenure status and discrimination. An important caveat here is that tenure is not assigned exogenously and, for example, very likely to be correlated with age. For example, Farber et al. (2019) and Neumark et al. (2019) show that gender discrimination differs with the age of the discriminated party. While age of the senders is fixed in our setting, the age gap between senders and recipients plausibly varies. In particular, one age-related reason for the pronounced same-sex discrimination of non-tenured compared to tenured male researchers might be the smaller age gap between senders and recipients. While we do not have data on the age of recipients, the age gap between senders and non-tenured recipients is presumably smaller than between senders and tenured recipients. If the same-sex discrimination is at least partially explained by for example intrasexual competition (Hunt et al., 2009; Rosvall, 2011), the smaller age gap might be an explanation for stronger same-sex discrimination of non-tenured compared to tenured male researchers. We hence interpret the differences between tenured and non-tenured male researchers as differences between groups of researchers rather than as the causal effect of tenure. Whatever the underlying cause of the (lack of) support by both tenured and non-tenured researchers might be, their behavior is likely important for students' perception of the profession as a whole. While tenured researchers are the main gatekeepers who control positions, supervision, and access to networks, non-tenured researchers might be considered as students' future network and peers

[23] Looking at settings outside academia, Flory et al. (2021) is an example of a study investigating *how* diversity (within firms) can be increased.

with whom they more frequently interact and who thus also matter for access to cooperation and support in academia.

A third question is whether female economists are more aware of research on gender discrimination, including correspondence designs, and may therefore be more likely to suspect that a request is part of a study. In this case, their responses could partly reflect awareness of being observed in an experiment rather than their 'real' behavior or an unwillingness to contribute as participant in a study conducted by another researcher. Ultimately, we are unable to resolve this issue based on our data. However, some points cast doubt on this relation. First, our email invitations are unlikely to trigger particular suspicion because requests for taking part in surveys are a regular part of academic life and there are generally few correspondence studies targeting academic researchers. Familiarity with the method therefore does not imply that our individual message is recognized as part of an experiment, even more so because a survey on the effects of AI in teaching seems a timely topic. Second, correspondence studies are widely known across the profession (e.g. Bertrand and Mullainathan (2004) has currently almost 10,000 citations). As a result, even if a correspondence study is suspected, differences in awareness across men and women are likely small. Third, we have compiled all the feedback we received by researchers in response to our emails. Overall, we received very little feedback sent to the email address that we provided in the survey for feedback, which suggests that the researchers were not skeptical about the study and we, in particular, did not observe any difference between female and male researchers in this respect. Finally, some of our empirical observations seem difficult to explain if the female participants were more aware that they were taking part in a study. For example, female researchers are less likely to respond to female students who indicate they want to pursue a PhD than to female students who do not express this intention. It seems unlikely that female researchers would suspect a field experiment when a female sender expresses such an interest, but not when the otherwise identical email does not contain an explicit expression of PhD interest. We therefore consider it unlikely that for example the same-sex discrimination results are driven by greater awareness among female researchers.

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A Appendix - Figures and Tables

Name	Rank (1990s)	Rank (2000s)
Nikolas	107 (Nikolai)	295 (Nikolai)
Karsten	129	–
Jonathan	63	48
Felix	10	8
Vincent	62	52
Dominik	29	39
Leon	31	1
Malte	46	86
Leonhard	222	203
Frauke	–	–
Merle	61	67
Celine	78	54
Kathrin	6 (Katharina)	34 (Katharina)
Ina	138	209
Cara	235	229
Janette	–	–
Rosanna	216 (Rosa)	228 (Rosa)
Bianca	84	–

Note: The ranking is based on the 250 and the 300 most frequently used first names in Germany, as reported by Knud Bielefeld (2026a,b) for the 1990s and 2000s, respectively. Names in parentheses indicate the name listed in the ranking that differs from the student's actual first name (e.g., in spelling or form). "–" indicates that the name was not among the 250 (300) most frequently used first names.

Table A1: Rank of First Names in Germany

Table A2: Balance Table (Type Email and Gender)

	Full Sample	Male No PhD	Male PhD	Female No PhD	Female PhD	χ^2 p-value (2) – (5)
	(1)	(2)	(3)	(4)	(5)	(6)
Female	0.308	0.298	0.312	0.314	0.305	0.858
	(0.462)	(0.458)	(0.463)	(0.464)	(0.460)	
Tenured	0.608	0.617	0.612	0.604	0.601	0.873
	(0.488)	(0.486)	(0.487)	(0.489)	(0.490)	
Field: Economics	0.390	0.388	0.389	0.388	0.396	0.975
	(0.488)	(0.488)	(0.488)	(0.488)	(0.489)	
Field: Business	0.610	0.612	0.611	0.612	0.604	0.975
	(0.488)	(0.488)	(0.488)	(0.488)	(0.489)	
Germany	0.705	0.707	0.702	0.705	0.707	0.993
	(0.456)	(0.455)	(0.458)	(0.456)	(0.455)	
Austria	0.138	0.139	0.138	0.141	0.136	0.989
	(0.345)	(0.346)	(0.345)	(0.348)	(0.343)	
Switzerland	0.157	0.155	0.160	0.154	0.157	0.977
	(0.364)	(0.362)	(0.367)	(0.361)	(0.364)	
Public University	0.918	0.907	0.918	0.927	0.920	0.418
	(0.274)	(0.291)	(0.274)	(0.260)	(0.271)	
Automatic Response	0.045	0.050	0.036	0.042	0.052	0.233
	(0.207)	(0.217)	(0.187)	(0.201)	(0.223)	
Email Undeliverable	0.015	0.014	0.011	0.016	0.017	0.682
	(0.120)	(0.118)	(0.106)	(0.126)	(0.129)	
Observations	4471	989	1235	1121	1126	

Note: *Female* is a dummy indicating female receivers. *Tenured* is a dummy indicating tenured receivers. *Field: Economics* indicates whether the receiver is employed in the field of economics, *Field: Business* indicates whether a receiver is employed in the field of Business Administration. *Germany /Austria /Switzerland* are dummies indicating whether a receiver works at a university in the respective country. *Automatic Response* measures whether senders have received an automatic response. *Email Undeliverable* indicates if an email was undeliverable and the senders have received a respective notification. *Full Sample* reports the mean and standard deviation across the complete sample. Values in parentheses are standard deviations. χ^2 p-value from a test of independence between *type_sender* and each row variable (computed across the four *type_sender* groups, i.e. columns 2–5). * p<0.10, ** p<0.05, *** p<0.01.

Table A3: Summary Statistics by Field of Recipient

	Economics			Business Administration		
	N	Mean	SD	N	Mean	SD
Female Receiver	1745	0.28	(0.45)	2726	0.33	(0.47)
Tenured Receiver	1745	0.56	(0.50)	2726	0.64	(0.48)
German University	1745	0.77	(0.42)	2726	0.66	(0.47)
Austrian University	1745	0.10	(0.30)	2726	0.17	(0.37)
Swiss University	1745	0.13	(0.34)	2726	0.17	(0.38)
Response Rate	1745	0.13	(0.34)	2726	0.13	(0.34)
No. Answers	1745	7.67	(25.23)	2726	7.40	(25.24)
No. Ques. Answ. (cond. on response)	235	56.97	(43.85)	363	55.54	(45.99)

Note: *Response Rate* is a dummy variable which is equal to one if the receiver has participated in the survey, i.e. clicked on the survey link in the email / opened link in the browser, and zero otherwise. *No. Answers* counts the number of answers provided in the survey ($max = 117$). *No. Ques. Answ. (cond. on response)* counts the number of answers provided in the survey conditional on participating in the survey. Values in parentheses indicate standard deviations.

Table A4: Summary Statistics by Type of University

	Public Universities			German Private University		
	N	Mean	SD	N	Mean	SD
Female Recipient	4106	0.31	(0.46)	365	0.30	(0.46)
Tenured Recipient	4106	0.60	(0.49)	365	0.69	(0.46)
Response Rate	4106	0.13	(0.33)	365	0.19	(0.39)
No. Answers	4106	7.36	(25.06)	365	9.15	(27.08)
No. Ques. Answ. (cond. on response)	528	57.21	(45.11)	70	47.73	(44.71)

Note: The data shows summary statistics from public universities in Germany, Switzerland, and Austria and German private universities. *Response Rate* is a dummy variable which is equal to one if the receiver has participated in the survey, i.e. clicked on the survey link in the email / opened link in the browser, and zero otherwise. *No. Answers* counts the number of answers provided in the survey ($max = 117$). *No. Ques. Answ. (cond. on response)* counts the number of answers provided in the survey conditional on participating in the survey. Values in parentheses indicate standard deviations.

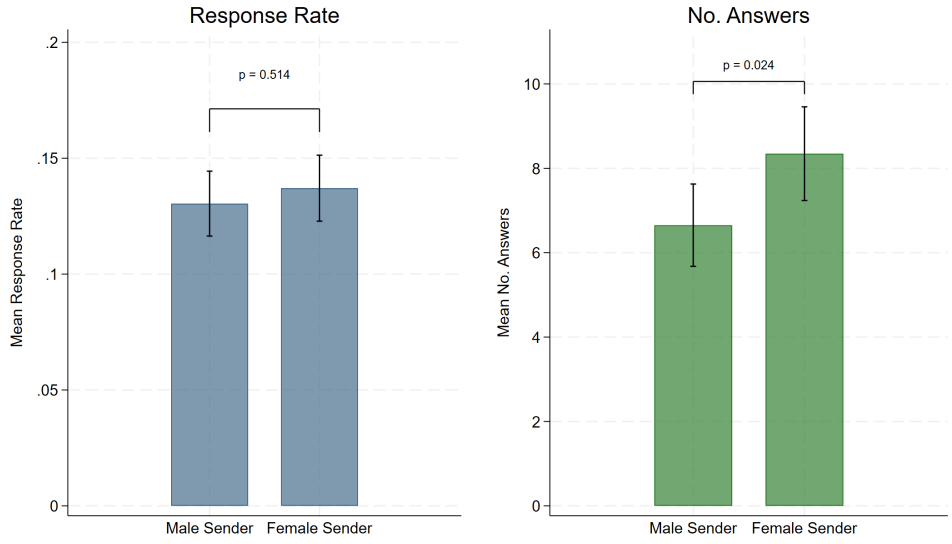


Figure A1: Response Rate and Number of Answers by Gender of the Sender

Notes: Bars show the mean response rate (left panel) as measured by whether a recipient has opened the survey, and mean number of questions answered in the survey (right panel), by gender of the sender. Error bars indicate 95% confidence intervals. p-values refer to p-values generated from OLS models regressing the outcome on the senders' gender, controlling for the sender's affiliation (University of Cologne, University Mannheim or Ruhr-University Bochum), the type of email sent (PhD/non-PhD email), and using robust standard errors. See Table A5 in the Appendix for these estimations.

Table A5: Average Differences by Gender of the Sender

	(1) Response Rate	(2) Response Rate	(3) No. Answers	(4) No. Answers
Female Sender	0.00664	0.00742	1.697**	1.736**
	(0.0102)	(0.0102)	(0.754)	(0.753)
PhD Email		0.0144		0.727
		(0.0102)		(0.754)
Constant	0.120***	0.112***	5.597***	5.215***
	(0.00988)	(0.0111)	(0.686)	(0.783)
Sender University	x	x	x	x
PhD/Non-PhD Email		x		x
R-squared	0.000992	0.00143	0.00204	0.00224
No. obs.	4471	4471	4471	4471

Note: The table reports OLS regressions with the response rate in Columns (1) and (2) and the number of questions answered in Columns (3) and (4) as outcome variables. *Response Rate* is a dummy variable which is equal to one if the receiver has participated in the survey, i.e. clicked on the survey link in the email / opened link in the browser, and zero otherwise. *No. Answers* counts the number of answers provided in the survey $(max = 117)$. Robust standard errors in parentheses. All specifications control for the senders' university. * for $p < 0.10$, ** for $p < 0.05$ and *** for $p < 0.01$.

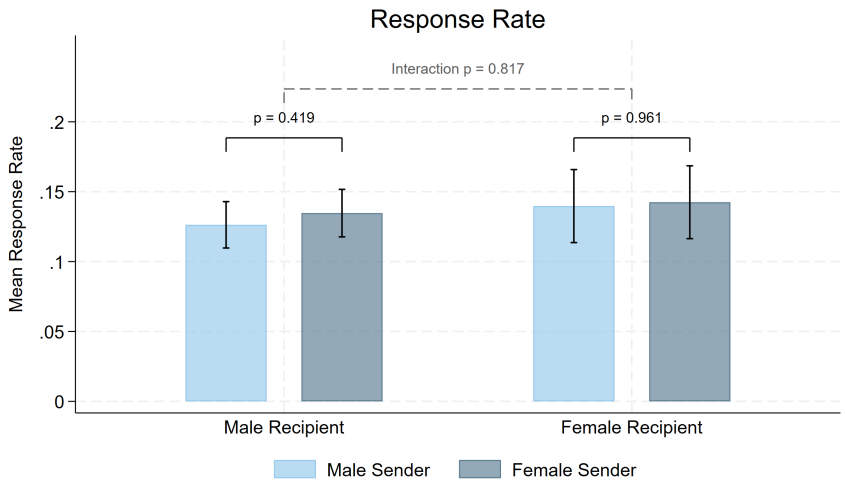


Figure A2: Response Rate by Gender of the Recipient

Notes: Bars show the response rate in the survey, by gender of the sender and recipient. Error bars indicate 95% confidence intervals. p-values refer to p-values generated from OLS models regressing the outcome on the senders' gender, controlling for the sender's affiliation (University of Cologne, University Mannheim or Ruhr-University Bochum), the type of email sent (PhD/non-PhD email), and using robust standard errors. Regressions are run for male and female recipients separately. The p-value of the interaction stems from an OLS model regressing the outcome on the above mentioned independent variables, including an interaction of the sender's and recipient's gender.

Table A6: No. of Answers: Heterogeneity by Recipient Gender

	All		Male Recipients		Female Recipients	
	(1)	(2)	(3)	(4)	(5)	(6)
	No. Answers	No. Answers	No. Answers	No. Answers	No. Answers	No. Answers
Female Sender	2.187**	2.220**	2.187**	2.282**	0.585	0.417
	(0.890)	(0.889)	(0.889)	(0.888)	(1.415)	(1.408)
Female Receiver	1.589	1.577				
	(1.128)	(1.129)				
Female Sender	-1.603	-1.584				
× Female Receiver	(1.670)	(1.670)				
PhD Email		0.717		2.053**		-2.318
		(0.754)		(0.884)		(1.429)
Constant	5.111***	4.738***	5.314***	4.243***	6.242***	7.475***
	(0.737)	(0.812)	(0.793)	(0.875)	(1.339)	(1.611)
Sender University	x	x	x	x	x	x
PhD/Non-PhD Email		x		x		x
R-squared	0.00245	0.00265	0.00256	0.00426	0.00185	0.00377
No. obs.	4471	4471	3096	3096	1375	1375

Note: The table reports OLS regressions with the number of answers provided as outcome variable. *No. Answers* counts the number of answers provided in the survey $(max = 117)$. Robust standard errors in parentheses. All specifications control for the senders' university. * for $p < 0.10$, ** for $p < 0.05$ and *** for $p < 0.01$.

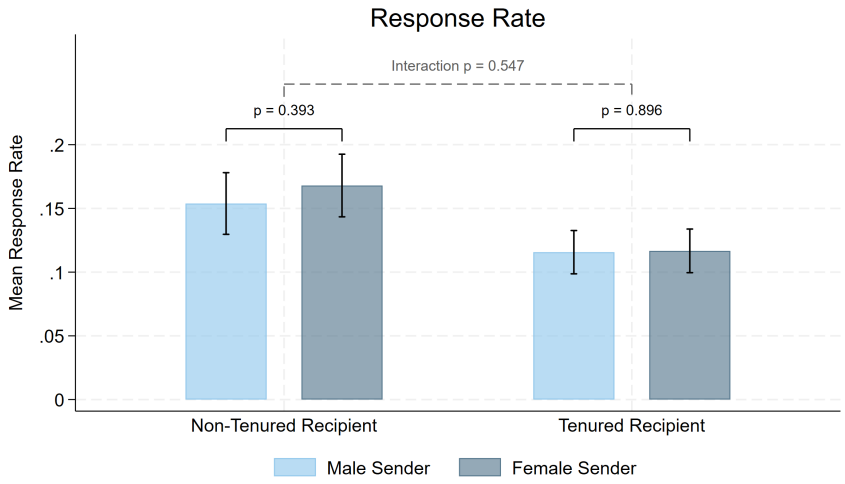


Figure A3: Response Rate by Tenure of the Recipient

Notes: Bars show mean the response rate in the survey, by gender of the sender and tenure status of the recipient. Error bars indicate 95% confidence intervals. p-values refer to p-values generated from OLS models regressing the outcome on the recipients' tenure status, controlling for the sender's affiliation (University of Cologne, University Mannheim or Ruhr-University Bochum), the type of email sent (PhD/non-PhD email), and using robust standard errors. Regressions are run for non-tenured and tenured recipients separately. The p-value of the interaction stems from an OLS model regressing the outcome on the above mentioned independent variables, including an interaction of the sender's gender and recipient's tenure status.

Table A7: No. of Answers: Heterogeneity by Tenure

	All		Non-Tenured Receivers		Tenured Receivers	
	(1)	(2)	(3)	(4)	(5)	(6)
	No. Answ.	No. Answ.	No. Answ.	No. Answ.	No. Answ.	No. Answ.
Female Sender	2.794**	2.834**	2.794**	2.863**	0.919	0.939
	(1.345)	(1.342)	(1.344)	(1.339)	(0.882)	(0.883)
Tenured Receiver	-2.385**	-2.380**				
	(1.062)	(1.061)				
Female Sender	-1.867	-1.869				
× Tenured Receiver	(1.608)	(1.608)				
PhD Email		0.714		1.239		0.377
		(0.752)		(1.343)		(0.883)
Constant	7.042***	6.665***	5.951***	5.297***	5.384***	5.187***
	(0.967)	(1.023)	(1.141)	(1.311)	(0.855)	(0.971)
Sender University	x	x	x	x	x	x
PhD/Non-PhD Email		x		x		x
R-squared	0.00651	0.00670	0.00593	0.00640	0.000986	0.00105
No. obs.	4471	4471	1751	1751	2720	2720

Note: The table reports OLS regressions with the number of answers provided as outcome variable. *No. Answers* counts the number of answers provided in the survey ($max = 117$). Robust standard errors in parentheses. Columns (3) and (4) restrict the sample to non-tenured receivers only, Columns (5) and (6) restrict the sample to tenured receivers only. All specifications control for the senders' university. * for $p < 0.10$, ** for $p < 0.05$ and *** for $p < 0.01$.

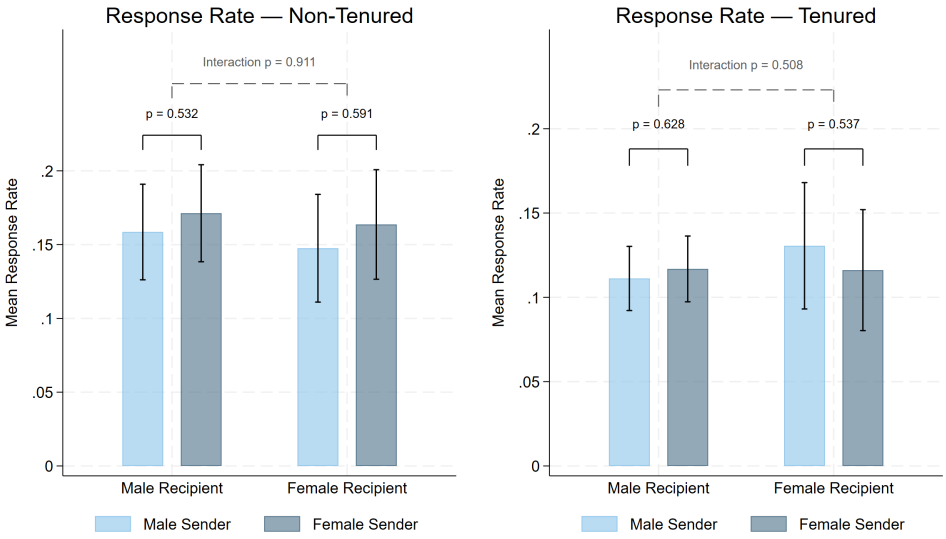


Figure A4: Response Rate by Tenure Status and Gender of the Recipient

Notes: Bars show the mean response rate in the survey by gender of the sender and recipient among non-tenured recipients (left hand side) and tenured recipients (right hand side). Error bars indicate 95% confidence intervals. p-values refer to p-values generated from OLS models regressing the outcome on the gender of the sender, controlling for the sender's affiliation (University of Cologne, University Mannheim or Ruhr-University Bochum), the type of email sent (PhD/non-PhD email), and using robust standard errors. Regressions are run for male, female, tenured and non-tenured recipients separately. The p-value of the interaction stems from an OLS model regressing the outcome on the above mentioned independent variables, including an interaction of the sender's and recipient's gender.

Table A8: No. Answers: Heterogeneity by Tenure and Gender

	Non-Tenured Receiver				Tenured Receiver			
	Male Receivers		Female Receivers		Male Receivers		Female Receivers	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	No. Answ.	No. Answ.	No. Answ.	No. Answ.	No. Answ.	No. Answ.	No. Answ.	No. Answ.
Female Sender	3.488**	3.639**	1.876	1.698	1.526	1.586	-1.107	-1.268
	(1.743)	(1.732)	(2.109)	(2.106)	(1.013)	(1.016)	(1.798)	(1.779)
PhD Email		3.819**		-2.270		1.200		-2.446
		(1.721)		(2.145)		(1.011)		(1.805)
Constant	5.387***	3.412**	6.695***	7.924***	5.287***	4.658***	5.718***	6.988***
	(1.369)	(1.423)	(1.936)	(2.397)	(0.973)	(1.100)	(1.795)	(2.064)
Sender Uni.	x	x	x	x	x	x	x	x
PhD/Non-PhD		x		x		x		x
R-squared	0.00875	0.0134	0.00350	0.00500	0.00166	0.00232	0.00188	0.00483
No. obs.	1000	1000	751	751	2096	2096	624	624

Note: The table reports OLS regressions with the number of answers provided. Robust standard errors in parentheses. Columns (1)-(4) restrict the sample to non-tenured receivers only, Columns (5)-(8) restrict the sample to tenured receivers only. All specifications control for the senders' university. * for $p < 0.10$, ** for $p < 0.05$ and *** for $p < 0.01$.

Table A9: No. Answers: Heterogeneity by Tenure and Gender - Fully Interacted

	All		Non-Tenured Receivers		Tenured Receivers	
	(1)	(2)	(3)	(4)	(5)	(6)
	No. Answ.	No. Answ.	No. Answ.	No. Answ.	No. Answ.	No. Answ.
Female Sender	3.473**	3.501**	3.481**	3.530**	1.527	1.546
	(1.744)	(1.741)	(1.743)	(1.737)	(1.013)	(1.015)
Female Receiver	0.937	0.918	0.948	0.914	1.280	1.278
	(1.805)	(1.807)	(1.805)	(1.811)	(1.455)	(1.456)
Female Sender	-1.586	-1.558	-1.605	-1.557	-2.651	-2.645
× Female Receiver	(2.735)	(2.737)	(2.735)	(2.738)	(2.056)	(2.056)
Tenured Receiver	-2.276*	-2.279*				
	(1.300)	(1.299)				
Female Sender	-1.942	-1.935				
× Tenured Receiver	(2.017)	(2.017)				
Female Receiver	0.328	0.344				
× Tenured Receiver	(2.318)	(2.319)				
Female Sender	-1.051	-1.066				
× Female Receiver × Tenured Receiver	(3.421)	(3.423)				
PhD Email		0.703		1.223		0.369
		(0.753)		(1.347)		(0.883)
Constant	6.645***	6.281***	5.544***	4.913***	5.096***	4.903***
	(1.167)	(1.181)	(1.284)	(1.364)	(0.904)	(1.009)
Sender University	x	x	x	x	x	x
PhD/Non-PhD Email		x		x		x
R-squared	0.00690	0.00709	0.00613	0.00659	0.00157	0.00164
No. obs.	4471	4471	1751	1751	2720	2720

Note: The table reports OLS regressions with the number of answers provided as outcome variable. *No. Answers* counts the number of answers provided in the survey $(max = 117)$. Robust standard errors in parentheses. Columns (3) and (4) restrict the sample to non-tenured receivers only, Columns (5) and (6) restrict the sample to tenured receivers only. All specifications control for the senders' university. * for $p < 0.10$, ** for $p < 0.05$ and *** for $p < 0.01$.

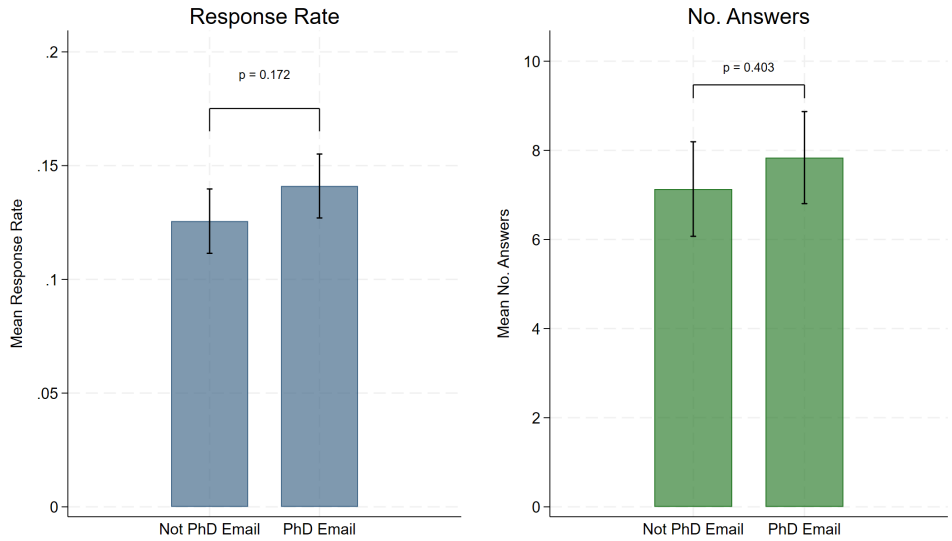


Figure A5: Response Rate and Number of Answers by Type of Email

Notes: Bars show the mean response rate (left panel) as measured by whether a recipient has opened the survey, and mean number of questions answered in the survey (right panel), by gender of the sender. Error bars indicate 95% confidence intervals. p-values refer to p-values generated from OLS models regressing the outcome on whether the email contained a statement expressing interest in pursuing a PhD or not, controlling for the sender's affiliation (University of Cologne, University Mannheim or Ruhr-University Bochum), and using robust standard errors. See Table A10 in the Appendix for these estimations.

Table A10: Average Differences by Type of Email (PhD/Non-PhD)

	(1) Response Rate	(2) No. Answers
PhD Email	0.0139	0.632
	(0.0102)	(0.755)
Constant	0.116***	6.136***
	(0.00968)	(0.701)
Sender University	x	x
R-squared	0.00131	0.00106
No. obs.	4471	4471

Note: The table reports OLS regressions with the response rate in Column (1) and the number of questions answered in Column (2) as outcome variables. *Response Rate* is a dummy variable which is equal to one if the receiver has participated in the survey, i.e. clicked on the survey link in the email / opened link in the browser, and zero otherwise. *No. Answers* counts the number of answers provided in the survey ($max = 117$). Robust standard errors in parentheses. All specifications control for the senders' university. * for p $<$ 0.10, ** for p $<$ 0.05 and *** for p $<$ 0.01.

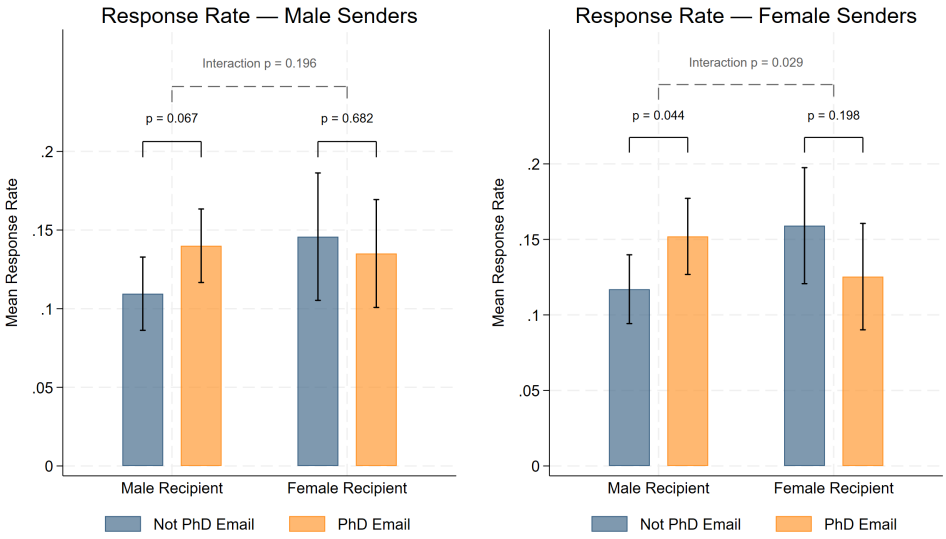


Figure A6: Response Rate by Type of Email and Recipient Gender

Notes: Bars show the mean response rate in the survey among male senders (left panel) and female senders (right panel). Error bars indicate 95% confidence intervals. p-values refer to p-values generated from OLS models regressing the outcome on whether the email contained a statement expressing interest in pursuing a PhD or not, controlling for the sender's affiliation (University of Cologne, University Mannheim or Ruhr-University Bochum), and using robust standard errors. Regressions are run for male and female senders and recipients separately. The p-value of the interaction stems from an OLS model regressing the outcome on the above mentioned independent variables, including an interaction of the recipient's gender and type of email (PhD/non-PhD email).

Table A11: No. Answers: Gender and PhD Email

	All	Male Senders			Female Senders		
		All	Male Recip.	Female Recip.	All	Male Recip.	Female Recip.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	No. Answ.	No. Answ.	No. Answ.	No. Answ.	No. Answ.	No. Answ.	No. Answ.
PhD Email	2.242**	2.413**	2.411**	-0.735	1.827	1.828	-3.542*
	(1.138)	(1.143)	(1.147)	(1.969)	(1.356)	(1.355)	(2.048)
Female Recipient	3.354*	3.332*			2.654		
	(1.715)	(1.713)			(1.849)		
PhD Email ×							
Female Recipient	-3.180	-3.153			-5.351**		
	(2.279)	(2.278)			(2.454)		
Female Sender	2.499**						
	(1.189)						
PhD Email ×							
Female Sender	-0.413						
	(1.775)						
Female Recipient							
× Female Sender	-0.713						
	(2.521)						
PhD Email ×							
Female Recipient ×	-2.162						
Female Sender							
	(3.349)						
Constant	3.909***	4.375***	4.237***	8.018***	5.864***	6.469***	7.189***
	(0.861)	(0.932)	(0.975)	(2.081)	(1.164)	(1.270)	(1.858)
Sender University	x	x	x	x	x	x	x
R-squared	0.00439	0.00326	0.00344	0.000352	0.00412	0.00205	0.0105
No. obs.	4471	2224	1544	680	2247	1552	695

Note: The table reports OLS regressions with the number of questions answered as outcome variable. *No. Answers* counts the number of answers provided in the survey ($max = 117$). Robust standard errors in parentheses. All specifications control for the senders' university. * for p < 0.10, ** for p < 0.05 and *** for p < 0.01.

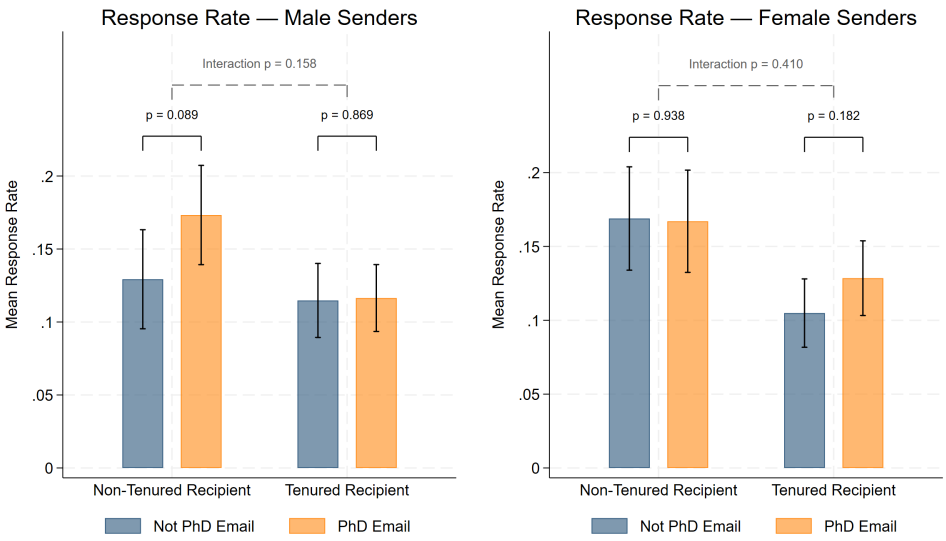


Figure A7: Response Rate by Type of Email and Recipient Tenure Status

Notes: Bars show the mean response rate in the survey among male senders (left panel) and female senders (right panel). Error bars indicate 95% confidence intervals. p-values refer to p-values generated from OLS models regressing the outcome on whether the email contained a statement expressing interest in pursuing a PhD or not, controlling for the sender's affiliation (University of Cologne, University Mannheim or Ruhr-University Bochum), and using robust standard errors. Regressions are run for male and female senders and tenured and non-tenured recipients separately. The p-value of the interaction stems from an OLS model regressing the outcome on the above mentioned independent variables, including an interaction of the recipient's tenure status and type of email (PhD/non-PhD email).

Table A12: No. Answers: Tenure Status and PhD Email

	All	Male Senders			Female Senders		
		All	Non-Tenured	Tenured	All	Non-Tenured	Tenured
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	No. Answ.	No. Answ.	No. Answ.	No. Answ.	No. Answ.	No. Answ.	No. Answ.
PhD Email	2.958*	3.149*	3.153*	0.416	-0.423	-0.435	0.539
	(1.736)	(1.737)	(1.749)	(1.190)	(2.034)	(2.034)	(1.309)
Female Sender	4.659**						
	(1.886)						
PhD Email ×							
Female Sender	-3.381						
	(2.677)						
Tenured Recipient	-0.862	-0.833			-4.742***		
	(1.465)	(1.465)			(1.734)		
PhD Email ×							
Tenured Recipient	-2.723	-2.741			0.968		
	(2.100)	(2.100)			(2.419)		
Tenured Recipient							
× Female Sender	-3.879*						
	(2.270)						
PhD Email ×							
Tenured Recipient ×	3.699						
Female Sender							
	(3.203)						
Constant	5.429***	5.866***	4.583***	5.871***	9.554***	8.763***	5.347***
	(1.249)	(1.300)	(1.509)	(1.182)	(1.591)	(1.858)	(1.231)
Sender University	x	x	x	x	x	x	x
R-squared	0.00721	0.00457	0.00739	0.000206	0.00809	0.00338	0.00276
No. obs.	4471	2224	858	1366	2247	893	1354

Note: The table reports OLS regressions with the number of questions answered as outcome variable. *No. Answers* counts the number of answers provided in the survey ($max = 117$). Robust standard errors in parentheses. All specifications control for the senders' university. * for p < 0.10, ** for p < 0.05 and *** for p < 0.01.

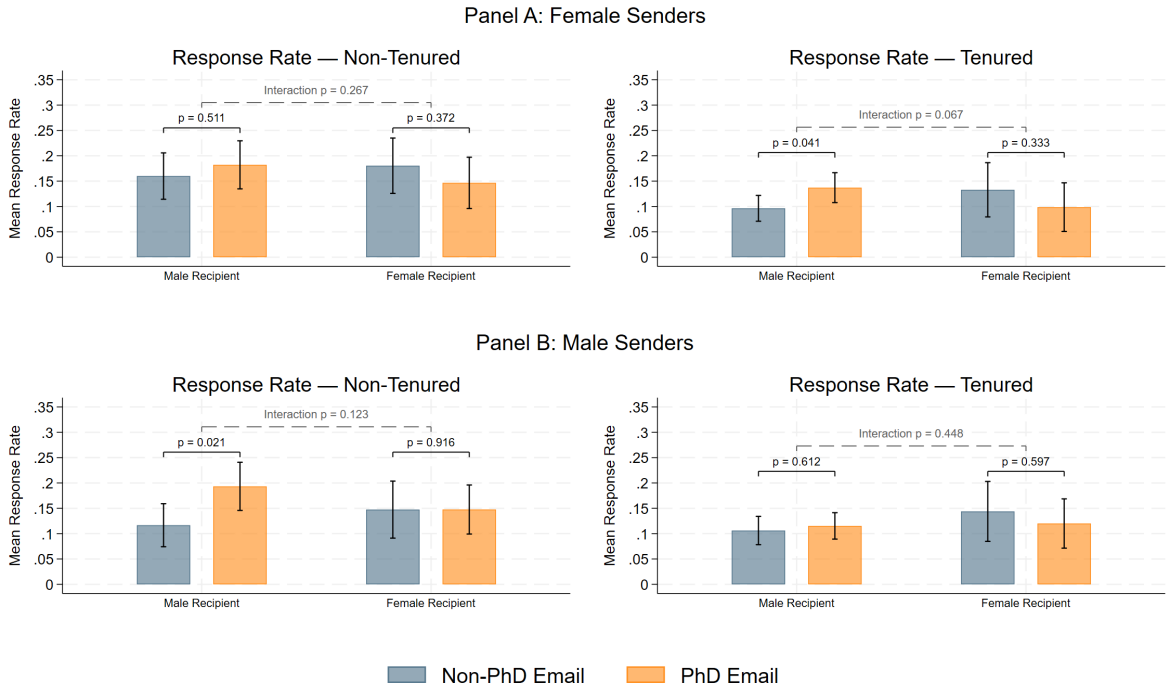


Figure A8: Response Rate by Type of Email, Recipient Tenure Status, and Gender

Notes: Bars show the mean response rate in the survey among female senders (panel A) and male senders (panel B). Error bars indicate 95% confidence intervals. p-values refer to p-values generated from OLS models regressing the outcome on whether the email contained a statement expressing interest in pursuing a PhD or not, controlling for the sender's affiliation (University of Cologne, University Mannheim or Ruhr-University Bochum), and using robust standard errors. Regressions are run for male and female senders, tenured and non-tenured, and male and female recipients separately. The p-value of the interaction stems from an OLS model regressing the outcome on the above mentioned independent variables, including an interaction of the recipient's tenure status and type of email (PhD/non-PhD email).

Table A13: No. Answers: Tenure Status, Gender Recipient, PhD Email (Female Senders)

	Female Senders						
	All	Non-Tenured Recipients			Tenured Recipients		
		All	Male Recip.	Female Recip.	All	Male Recip.	Female Recip.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	No. Answ.	No. Answ.	No. Answ.	No. Answ.	No. Answ.	No. Answ.	No. Answ.
PhD Email	1.661	1.649	1.652	-3.209	1.874	1.876	-4.055*
	(2.678)	(2.680)	(2.682)	(3.119)	(1.532)	(1.531)	(2.452)
Female Recipient	1.784	1.772			1.549		
	(3.017)	(3.019)			(2.270)		
PhD Email ×							
Female Recipient	-4.852	-4.852			-5.884**		
	(4.107)	(4.109)			(2.877)		
Tenured Recipient	-4.323**						
	(2.109)						
PhD Email ×							
Tenured Recipient	0.218						
	(3.085)						
Female Recipient							
× Tenured Recipient	-0.238						
	(3.776)						
PhD Email ×							
Female Recipient ×	-1.030						
Tenured Recipient							
	(5.015)						
Constant	8.770***	7.988***	8.716***	8.800***	4.979***	5.378***	5.224**
	(1.938)	(2.162)	(2.397)	(2.931)	(1.364)	(1.484)	(2.028)
Sender University	x	x	x	x	x	x	x
R-squared	0.0105	0.00506	0.00255	0.00895	0.00595	0.00287	0.0199
No. obs.	2247	893	508	385	1354	1044	310

Note: The table reports OLS regressions with the number of questions answered as outcome variable. *No. Answers* counts the number of answers provided in the survey ($max = 117$). Robust standard errors in parentheses. The sample is restricted to female senders. All specifications control for the senders' university. * for p $<$ 0.10, ** for p $<$ 0.05 and *** for p $<$ 0.01.

Table A14: No. Answers: Tenure Status, Gender Recipient, PhD Email (Male Senders)

	Male Senders						
	All	Non-Tenured Recipients			Tenured Recipients		
		All	Male Recip.	Female Recip.	All	Male Recip.	Female Recip.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	No. Answ.	No. Answ.	No. Answ.	No. Answ.	No. Answ.	No. Answ.	No. Answ.
PhD Email	6.105***	6.102***	6.242***	-1.165	0.704	0.645	-0.346
	(2.140)	(2.146)	(2.152)	(2.952)	(1.340)	(1.344)	(2.555)
Female Recipient	4.807*	4.816*			1.998		
	(2.585)	(2.594)			(2.219)		
PhD Email ×							
Female Recipient	-7.044*	-7.037*			-1.280		
	(3.612)	(3.618)			(2.936)		
Tenured Recipient	0.694						
	(1.518)						
PhD Email ×							
Tenured Recipient	-5.411**						
	(2.514)						
Female Recipient							
× Tenured Recipient	-2.824						
	(3.407)						
PhD Email ×							
Female Recipient ×	5.763						
Tenured Recipient							
	(4.657)						
Constant	3.886***	2.589*	1.646	8.674***	5.421***	5.460***	7.277**
	(1.230)	(1.345)	(1.349)	(3.020)	(1.228)	(1.286)	(2.826)
Sender University	x	x	x	x	x	x	x
R-squared	0.00718	0.0121	0.0262	0.000714	0.000972	0.000497	0.00156
No. obs.	2224	858	492	366	1366	1052	314

Note: The table reports OLS regressions with the number of questions answered as outcome variable. *No. Answers* counts the number of answers provided in the survey ($max = 117$). Robust standard errors in parentheses. The sample is restricted to male senders. All specifications control for the senders' university. * for p < 0.10, ** for p < 0.05 and *** for p < 0.01.

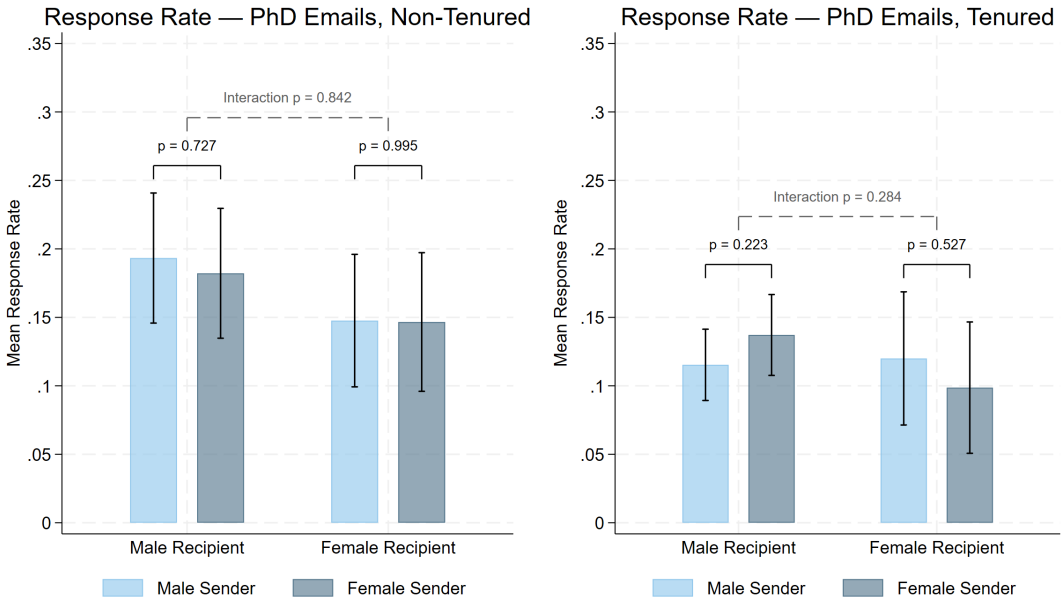


Figure A9: PhD Emails: Response Rate by Gender

Notes: Bars show the mean response rate in the survey by non-tenured (left panel) and tenured recipients (right panel). Error bars indicate 95% confidence intervals. p-values refer to p-values generated from OLS models regressing the outcome on the gender of the sender, controlling for the sender's affiliation (University of Cologne, University Mannheim or Ruhr-University Bochum), and using robust standard errors. Regressions are run separately for male and female recipients. The data is restricted to PhD emails only.

Table A15: No. Answers (only PhD emails) by Gender and Tenure Status of Recipients

	Sample: Only PhD Emails						
	All	Non-Tenured Recipients			Tenured Recipients		
		All	Male Recip.	Female Recip.	All	Male Recip.	Female Recip.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	No. Answ.	No. Answ.	No. Answ.	No. Answ.	No. Answ.	No. Answ.	No. Answ.
Female Sender	1.623	1.583	1.520	0.795	2.263	2.277	-2.809
	(2.641)	(2.648)	(2.656)	(2.684)	(1.469)	(1.472)	(2.190)
Female Recipient	-2.234	-2.216			0.694		
	(2.522)	(2.520)			(1.925)		
Female Sender ×							
Female Recipient	-0.838	-0.869			-5.027*		
	(3.758)	(3.756)			(2.613)		
Tenured Recipient	-4.725**						
	(2.006)						
Female Sender ×							
Tenured Recipient	0.625						
	(3.016)						
Female Recipient							
× Tenured Recipient	2.914						
	(3.173)						
Female Sender ×							
Female Recipient ×	-4.178						
Tenured Recipient							
	(4.577)						
Constant	9.157***	7.916***	8.674***	4.712**	5.263***	5.344***	5.676***
	(1.866)	(2.047)	(2.333)	(2.231)	(1.312)	(1.447)	(2.148)
Sender University	x	x	x	x	x	x	x
R-squared	0.00909	0.00711	0.00368	0.00867	0.00461	0.00359	0.00579
No. obs.	2361	928	527	401	1433	1106	327

Note: The table reports OLS regressions with the number of questions answered as outcome variable. *No. Answers* counts the number of answers provided in the survey ($max = 117$). Robust standard errors in parentheses. The sample is restricted to PhD emails. All specifications control for the senders' university. * for p < 0.10, ** for p < 0.05 and *** for p < 0.01.

B Appendix - Instructions

B.1 Invitation Email

Dear [Title] [Name],

My name is [STUDENT NAME] and I am a Master's student at the [University of Cologne/University of Mannheim/Ruhr University Bochum] in Germany. I am contacting you to invite you to participate in a survey as part of a student research project. The link to the survey can be found below this email. The aim of the project is to gather information on how professors and postdoctoral researchers in Germany, Austria and Switzerland evaluate the impact of artificial intelligence (AI) on work and education, particularly within the fields of business administration and economics.

[PhD Treatment:] [This project is very important to me, as I am considering doing a PhD after completing my Master's program. Therefore, your participation in the survey would be very valuable to me.]

Our project goal is to understand which competencies become more important in the context of AI. Specifically, we aim to understand whether teaching in business administration and economics needs to change and which competencies are especially important. For example, are competencies such as critical thinking or quantitative skills becoming more or less important? By participating in our survey, you will help us to obtain subjective ratings of competencies from academic experts. The list of competencies is very long. You can evaluate **as many as you wish and stop at any time. Even a few responses will be very helpful** for this project, as the order of items has been shuffled.

If you have any questions, please feel free to reply to this email. Thank you in advance for your participation.

Sincerely,

[STUDENT NAME]

Follow this link to access the survey: [Surveylink]

B.2 Survey

Dear participant,

This study aims at understanding how Artificial Intelligence (AI) is transforming work and education, particularly in the fields of business administration and economics. Your expertise will help to understand how AI affects the relevance of different competencies taught in business administration and economics programs.

The survey consists of two parts:

- **Part 1** includes a few short questions about AI and your perception of its impact on teaching and jobs (about **2 minutes**).

- **Part 2** presents a list of competencies to be assessed considering how the importance of these various competencies changes in the age of AI in your view. This list is very long (i.e., 22 categories of competencies).

On each page of Part 2, you will have the option *"Stop assessing competencies"*, which will immediately bring you to the end of the survey. The order of items has been shuffled to ensure that all questions, including the final ones, receive answers. You may evaluate as many as you wish and can stop at any time. Even a few responses will be very helpful for this project.

Data Protection & Consent

This study will be used as part of a master's student research project. Your participation is entirely voluntary, and you may withdraw from participation at any time during the survey, without providing any reasons. Your answers will be anonymous and only evaluated on an aggregated level. If you agree to participate, you must be aged 18 or older.

- **I agree** to the above conditions and want to participate.
- **I do not agree** to the above conditions and do not want to participate.

Thank you for participating!

[NAME]

Part 1: AI and Its Impact on Work and Teaching

1. At which levels do you have teaching experience? (Choose all that apply)
    - Bachelor level
    - Master level
    - PhD level
    - No teaching experience
2. What is your current employment status?
    - Non-permanent position
    - Permanent position
3. To what extent do you expect AI to have long-lasting effects on jobs in your subfield?
    - No effects
    - Minor effects

- Moderate effects
- Major effects
- Transformative effects

4. To what extent do you believe AI will change teaching practices in education in your field?

   - Not at all
   - Slightly
   - Moderately
   - Significantly
   - Completely

5. In your view, how well is the current teaching program in your field at your institution preparing students for an AI-driven work environment?

   - Not well at all
   - Slightly well
   - Moderately well
   - Well
   - Very well

6. Do you generally believe that AI will rather augment or substitute human work?

   - Augment low skilled workers & augment high skilled workers
   - Augment low skilled workers & substitute high skilled workers
   - No change
   - Substitute low skilled workers & augment high skilled workers
   - Substitute low skilled workers & substitute high skilled workers

Part 2: Importance of Competencies in Times of AI

Universities aim to help students develop a broad set of competencies. We would like to understand your thoughts on changes to importance of each competency as AI becomes more integrated into professional work and education.

Please indicate whether you think each competency will become less important, equally important, or more important compared to before AI became widespread. The order of items has been shuffled to ensure that all questions, including the final ones, receive answers. You may evaluate **as many as you wish and can stop at any time. Even a few responses will be very helpful** for this project.

The competencies which you will see in the following are based on different accreditation agencies (e.g., EQUIS) and competency models (e.g., WHO, Bloom's taxonomy).

[Response Scale (for all following questions)]

- *Much less important than before*
- *Less important than before*
- *Equally important as before*
- *More important than before*
- *Much more important than before*

Part 2: Competency Categories

1. **Critical thinking, analysis, and synthesis**
   (a) identifying assumptions
   (b) evaluating evidence
   (c) detecting flawed reasoning
   (d) defining terms
   (e) generalizing appropriately
2. **Problem solving and decision making**
   (a) using quantitative skills to identify, formulate, and solve business problems
   (b) using qualitative skills to identify, formulate, and solve business problems
   (c) evaluating options under uncertainty
   (d) break down objects or ideas into simpler parts and find evidence to support generalizations
   (e) make and defend judgments based on internal evidence or external criteria
3. **Communication skills (oral and written)**
   (a) preparing and writing reports
   (b) preparing and presenting results, using media commonly applied in business
   (c) presenting in front of larger groups
   (d) usage of body language and facial expressions
   (e) evidence-based discussion of results with experts in the field and laymen
4. **Numeracy and quantitative skills**
   (a) data analysis
   (b) data interpretation

(c) data extrapolation

(d) data visualization

(e) use of quantitative models

5. **Statistical analysis and management science skills**

   (a) applying statistical tools and analytical techniques to support organizational decision making

   (b) derive practical implications from data analysis

   (c) use data collection methods to gain causal insights

   (d) provide evidence-based insight for decision making

   (e) compile component ideas into a new whole or propose alternative solutions

6. **Use of communication and information technologies (IT) for business**

   (a) using digital tools and systems effectively for business applications

   (b) using statistical software for data analysis

   (c) technical expertise

   (d) knowing strengths and weaknesses of digital tools

   (e) teaching others how to effectively use digital tools

7. **Self-management skills**

   (a) time management

   (b) planning

   (c) motivation

   (d) initiative

   (e) self-directed action

8. **Teamwork and leadership**

   (a) team building

   (b) collaboration

   (c) influencing others

   (d) taking over responsibility for subtasks in teams

   (e) time management in teams

9. **Project management skills**

   (a) planning

   (b) anticipating challenges

(c) executing

(d) monitoring

(e) completing projects

10. **Interpersonal skills**

(a) active listening

(b) negotiation

(c) persuasion

(d) presentation

(e) recognition of others and their skills

11. **Research skills for business and management**

(a) apply knowledge to actual situations

(b) conducting research independently

(c) conducting research in teams

(d) evaluating business data and information sources

(e) evaluating applied methodologies

12. **Self-reflection and critical self-awareness**

(a) openness

(b) sensitivity to diversity

(c) reflective and adaptive learning

(d) learning-to-learn orientation

(e) seeking for help if needed

13. **Work ethics**

(a) giving voice to your values

(b) speaking up against discriminatory behaviour of others

(c) critical reflection of own behaviour

(d) using your values as decision making guidelines

(e) supporting others in their development

14. **Entrepreneurial thinking**

(a) identifying and evaluating business opportunities

(b) developing innovative solutions that create value

(c) taking calculated risks under uncertainty

(d) mobilizing resources (time, people, technology) to implement new ideas

(e) iterating, testing, and adapting ideas based on feedback and evidence

15. **Media Literacy**

(a) evaluating online sources

(b) understanding misinformation

(c) knowledge about available media platforms and their broadcasters

(d) knowledge about fact-checking

(e) properly referencing used sources in own work

16. **Intercultural and Global Competence**

(a) demonstrating openness, curiosity, and respect when engaging with people from different cultural backgrounds

(b) recognizing how cultural contexts influence communication, behaviour, and perspectives

(c) adjusting communication style to interact effectively across cultures

(d) resolving misunderstandings or conflicts that arise from cultural differences

(e) collaborating productively with culturally diverse teams in international or globalized environments

17. **Creating new value**

(a) adaptability

(b) creativity

(c) curiosity

(d) open-mindedness

(e) cooperation and collaboration with others

18. **Reconciling tensions and dilemmas**

(a) recognize interconnections

(b) trying to find a balance between competing demands

(c) understand the needs and desires of others

(d) reconcile diverse perspectives and interests

(e) consider short- and long-term perspectives

19. **Taking responsibility**

(a) self-control

(b) self-efficacy

(c) consider consequences of one's actions

(d) accept accountability for the product of one's work

(e) ability to think for yourself

20. **Computational Thinking**

(a) decomposing complex problems into manageable parts

(b) recognizing patterns in data

(c) abstracting general principles from specific instances

(d) iteratively testing and improving solutions

(e) understanding the needed level of detail

21. **Resilience & Coping**

(a) recovering quickly from setbacks

(b) managing stress under pressure

(c) maintaining motivation during long-term challenges

(d) developing healthy coping strategies

(e) staying flexible when plans change

22. **Cognitive Flexibility and Adaptive Thinking**

(a) shifting between multiple perspectives

(b) adjusting strategies based on new information

(c) learning quickly from mistakes

(d) balancing competing priorities in real time

(e) generating multiple solutions to ill-defined problems

=== Thank you for completing this questionnaire! ===

If you would like to receive a summary of the results, please send an email to [ai-befragung@uni-mannheim.de / ai-befragung@wiso.uni-koeln.de / ai-befragung@ruhr-uni-bochum.de]

Thank you very much for your time and valuable insights!

Your answers were submitted, you may close the browser window or tab now.

C Differences by Field

This Appendix shows the main graphs by field of work. We differentiate by the field of economics and the field of business administration. While the reduced sample size in the two sub-fields hinders us to replicate all significant effects, especially when studying heterogeneity with respect to gender, tenure status, and the type of email sent, the patterns in both fields are in line with the average results, i.e. we find in both fields (suggestive) evidence for i) female senders receiving more answers than male on average, ii) same-sex discrimination by male recipients, and iii) the queen-bee syndrome in which especially tenured women engage in behavior which hinders rather than supports junior women's entry into the profession.[24]

C.1 Average Differences

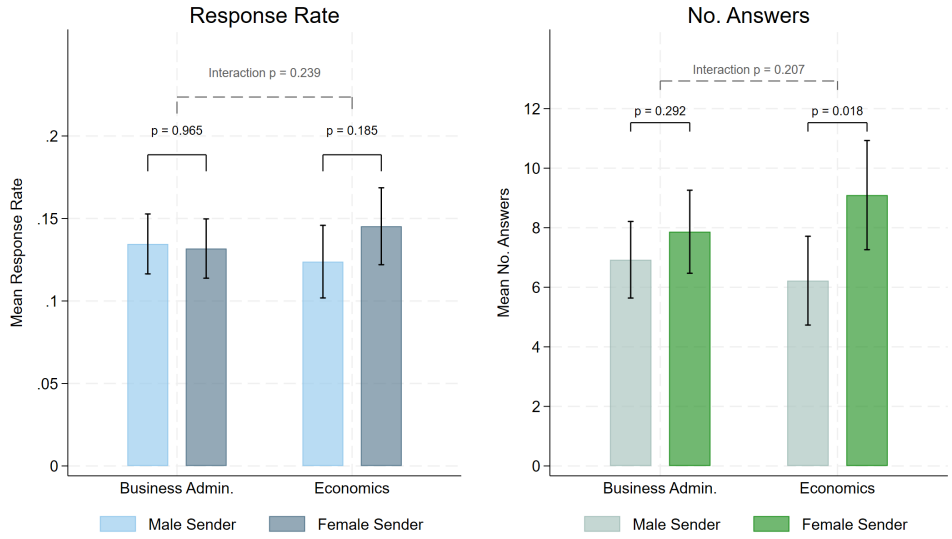


Figure A10: Average Differences by Field

Notes: Bars show the mean response rate in the survey (left panel) and the mean number of questions answered in the survey (right panel) by field of work (business administration and economics). Error bars indicate 95% confidence intervals. p-values refer to p-values generated from OLS models regressing the outcome on the gender of the sender, controlling for the sender's affiliation (University of Cologne, University Mannheim or Ruhr-University Bochum), the type of email (PhD email / non-PhD email) and the type of university (public / private university), and using robust standard errors. Regressions are run separately for recipients in business administration and economics. The p-value of the interaction stems from an OLS model regressing the outcome on the above mentioned independent variables, including an interaction of the sender's gender and the recipients field of work (business administration / economics).

On average, the response rate as well as the number of answers is very similar across the two fields, see Table A3, and does not differ significantly (see left part of Figure A10). Recipients from both business administration and economics provide more answers to female than to male senders (only significant in the field of economics), see right part of Figure A10. Researchers in economics answer 46.14% $((9.09 - 6.22)/6.22)$ more questions if a female sender contacts them (9.09 answers) than if a male sender does so

[24] In the analyses we also control for the type of university. 3.38% of recipients in economics and 11.23% of recipients in business administration are employed at a private university.

(6.22 answers). Similar to the main part, we will replicate the main graphs of the pooled sample for the composite measure of the extensive and intensive margin (unconditional number of answers) which is the most relevant measure for the senders.

C.2 Gender Differences

When studying differences by gender of the recipient we observe very similar patterns across the two fields. The average pattern of same-sex discrimination among men can be found in both economics and business administration with the effect being significant at the 5% level in economics ($p = 0.112$ in business administration), see Figure A11.

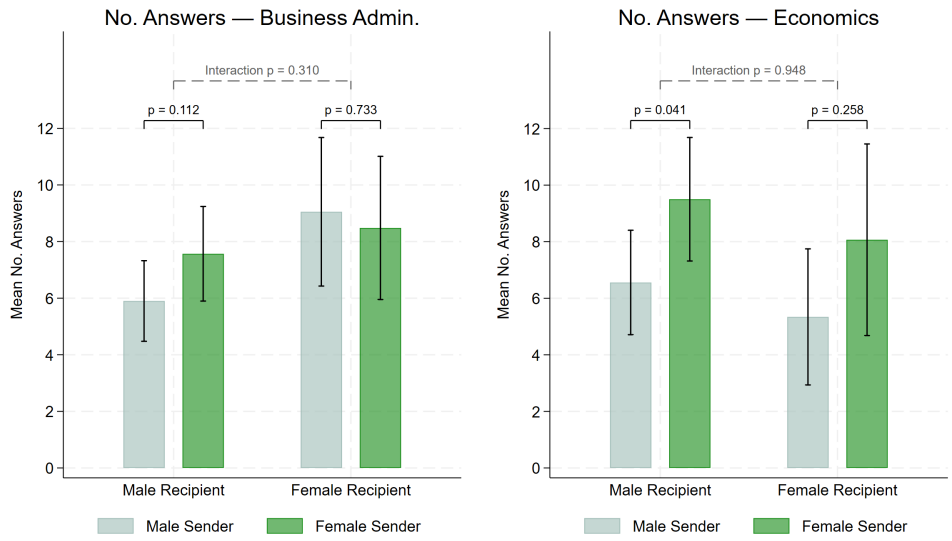


Figure A11: Differences Recipient Gender by Field

Notes: Bars show the mean number of questions answered in the survey by recipients working in business administration (left panel) and economics (right panel). Error bars indicate 95% confidence intervals. p-values refer to p-values generated from OLS models regressing the outcome on the gender of the sender, controlling for the sender's affiliation (University of Cologne, University Mannheim or Ruhr-University Bochum), the type of email (PhD email / non-PhD email) and the type of university (public / private university), and using robust standard errors. Regressions are run separately for male and female recipients. The p-value of the interaction stems from an OLS model regressing the outcome on the above mentioned independent variables, including an interaction of the sender's and recipient's gender.

C.3 Differences by Tenure Status

In both fields, tenured researcher provide significantly fewer answers than non-tenured researchers. Non-tenured researchers in economics provide significantly more (58.35%) answers to female senders (12.51 answers) than to male senders (7.90 answers), see right part in Figure A12. This pattern can also be observed in the field of business administration but is statistically insignificant.

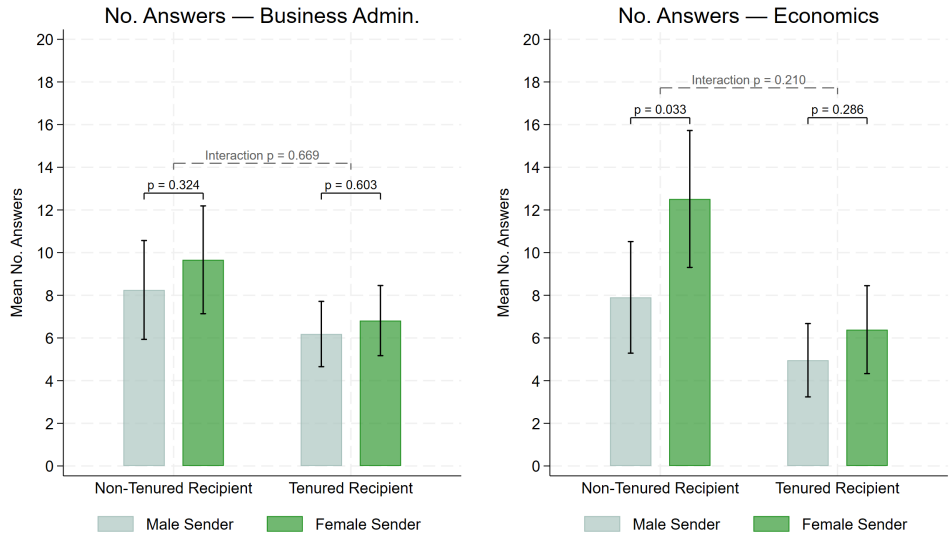


Figure A12: Differences by Recipient Tenure Status by Field

Notes: Bars show the mean number of questions answered in the survey by recipients working in business administration (left panel) and economics (right panel). Error bars indicate 95% confidence intervals. p-values refer to p-values generated from OLS models regressing the outcome on the gender of the sender, controlling for the sender's affiliation (University of Cologne, University Mannheim or Ruhr-University Bochum), the type of email (PhD email / non-PhD email) and the type of university (public / private university), and using robust standard errors. Regressions are run separately for tenured and non-tenured recipients. The p-value of the interaction stems from an OLS model regressing the outcome on the above mentioned independent variables, including an interaction of the sender's gender and and recipient's tenure status.

C.4 Differences by Gender and Tenure Status

When considering tenure status and gender of the receiver together, we do not find any significant effects in the two fields, see Figure A13. Descriptively, it seems that the pooled effect of non-tenured male receivers answering more questions if the sender is female is driven by both researchers in business administration and economics. We also find an indicative pattern of same-sex discrimination among tenured women in both economics and business administration.

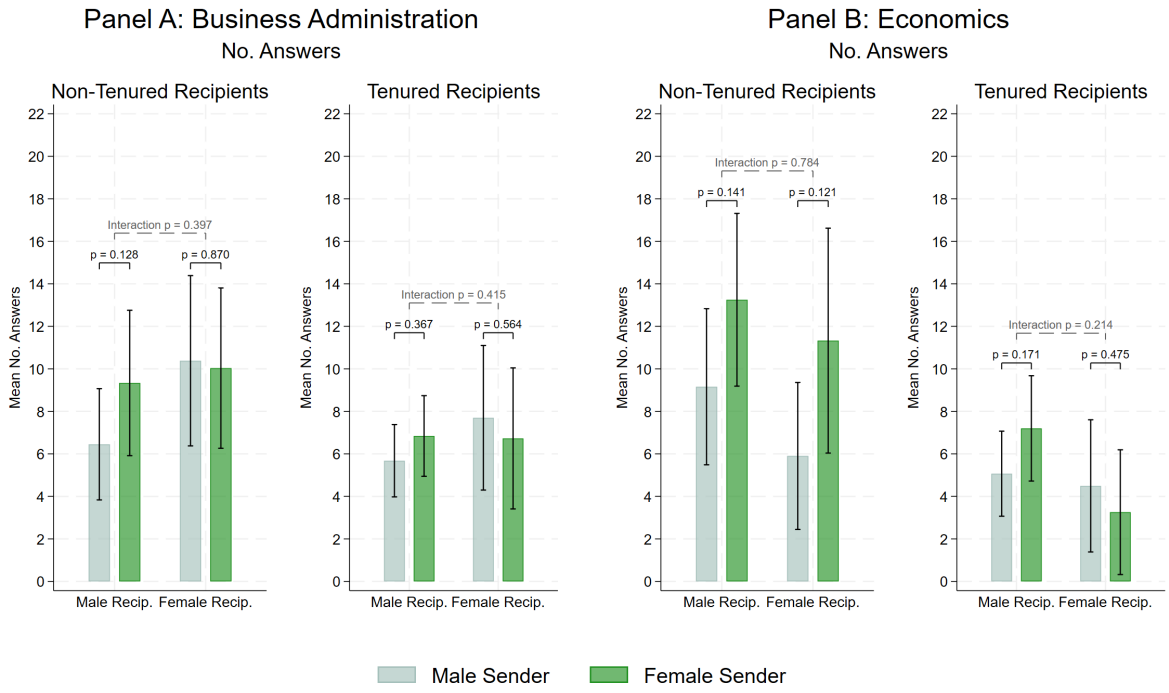


Figure A13: Differences by Gender and Recipient Tenure Status by Field

Notes: Bars show the mean number of questions answered in the survey by recipients working in business administration (panel A) and economics (panel B) and non-tenured (left parts) and tenured (right parts) recipients. Error bars indicate 95% confidence intervals. p-values refer to p-values generated from OLS models regressing the outcome on the gender of the sender, controlling for the sender's affiliation (University of Cologne, University Mannheim or Ruhr-University Bochum), the type of email (PhD email / non-PhD email) and the type of university (public / private university), and using robust standard errors. Regressions are run separately for female and male tenured and non-tenured recipients in business administration and economics separately. The p-value of the interaction stems from an OLS model regressing the outcome on the above mentioned independent variables, including an interaction of the sender's and recipient's gender.

C.5 PhD Emails

Similar to the average findings, in both fields of economics and business administration, the PhD email version does not significantly increase the number of answers provided, see right part of Figure A14. However, researchers in the field of business administration are 3.22 percentage points (27.71%) more likely to respond to a PhD email (14.84%) than to a non-PhD email (11.62%), see left part of Figure A14. We do not observe significantly different response rates for the two emails in the field of economics.

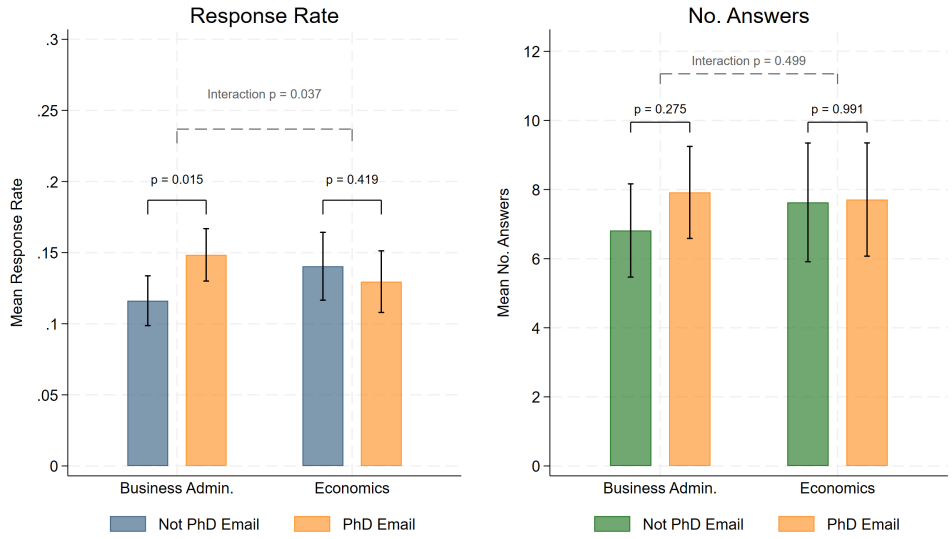


Figure A14: Differences by PhD version by Field

Notes: Bars show the mean response rate in the survey (left panel) and the mean number of questions answered in the survey (right panel) by type of email (PhD / non-PhD email) and field of work (business administration and economics). Error bars indicate 95% confidence intervals. p-values refer to p-values generated from OLS models regressing the outcome on the type of email (PhD / non-PhD email), controlling for the sender's affiliation (University of Cologne, University Mannheim or Ruhr-University Bochum) and the type of university (public / private university), and using robust standard errors. Regressions are run separately for recipients in business administration and economics. The p-value of the interaction stems from an OLS model regressing the outcome on the above mentioned independent variables, including an interaction of the type of email (PhD / non-PhD email) and the recipient's field of work (business administration / economics).

C.5.1 PhD Emails by Gender

We further analyze the effect of the PhD emails for female senders by gender of the recipient. With the reduced sample size due to splitting the sample by field of work of the researcher the confidence bands become very wide and estimations noisy. We can therefore only very carefully interpret the findings. However, in both fields we observe that while the PhD emails of female senders increase the number of answers provided by male recipients, it decreases the number of answers provided by female recipients, see left parts of Figure A15 (p-value of the interactions: $p = 0.123$ in economics, $p = 0.106$ in business administration). While not reaching statistical significance, the results suggest that the observed average pattern – women seem to engage in behavior which hinders the progression of junior women to their profession – is driven by women in both economics and business administration.

For male senders, we observe that they receive insignificantly more responses if they send the PhD email version to researchers in business administration, regardless of their gender (see right part in Panel A of Figure A15). In Economics, male students receive more answers from male recipients if they send the PhD email as compared to the non-PhD email version but fewer answers from female recipients if they do so, with the interaction being significant at the 5% level, see right part of Panel B in Figure A15.

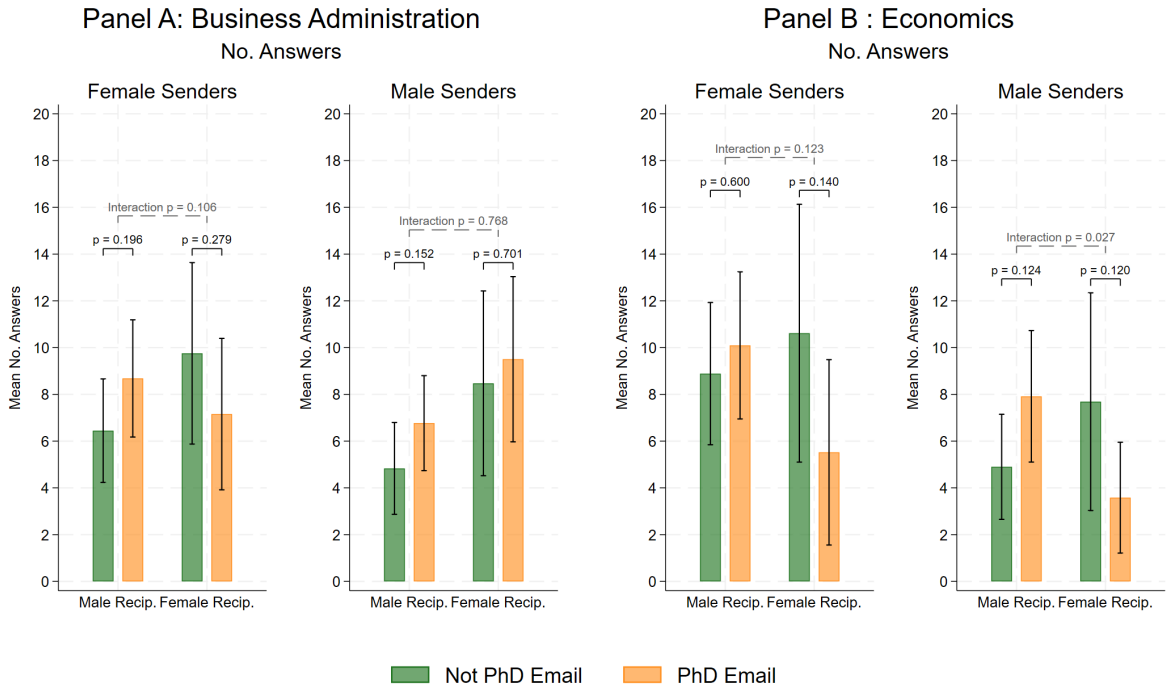


Figure A15: Differences by PhD version and Gender by Field

Notes: Bars show the mean number of questions answered in the survey by recipients working in business administration (panel A) and economics (panel B) and female senders (left parts) and male senders (right parts). Error bars indicate 95% confidence intervals. p-values refer to p-values generated from OLS models regressing the outcome on the type of email (PhD / non-PhD email), controlling for the sender's affiliation (University of Cologne, University Mannheim or Ruhr-University Bochum) and the type of university (public / private university), and using robust standard errors. Regressions are run separately for female and male recipients. The p-value of the interaction stems from an OLS model regressing the outcome on the above mentioned independent variables, including an interaction of the type of email and recipient's gender.

C.5.2 PhD Emails by Gender and Tenure Status

In a next step, we want to understand whether the evidence pointing towards the queen-bee syndrome can be replicated in both business administration, see top of Figure A24, and economics, see bottom of Figure A24. While again not reaching statistical significance, tenured female recipients in business administration provide 110.59% $((8.95-4.25)/4.25)$ more answers to female senders without a PhD email (8.95 answers) than to female senders who express interest in a PhD (4.25 answers), see right part of top Panel A in Figure A24. Tenured recipients do not meaningfully differentiate between the two emails if the sender is male, see right part of top Panel B in Figure A24. Also in economics, female, tenured recipients provide 117.48% $((4.48-2.06)/2.06)$ more answers to female senders who do not express interest in doing a PhD (4.48 answers) compared to female senders who do express this interest (2.06 answers). Again, this difference is not statistically significant.

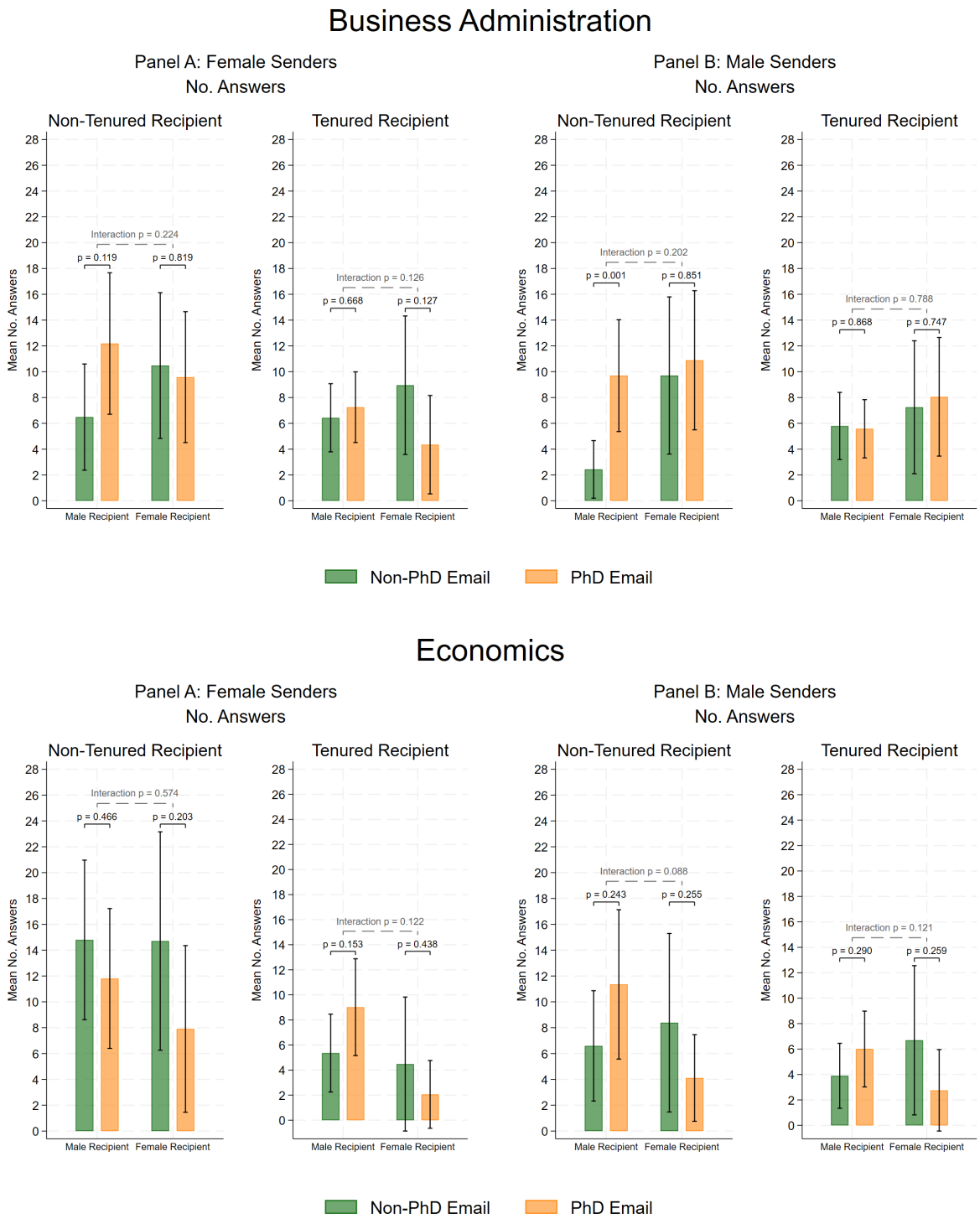


Figure A16: Differences by Gender, Tenure and Email Version (Business Administration and Economics)

Notes: Bars show the mean number of questions answered in the survey by recipients working in business administration (top) or economics (bottom) who are non-tenured (left parts) or tenured (right parts) and who received their email from a female sender (panel A) or male sender (panel B). Error bars indicate 95% confidence intervals. p-values refer to p-values generated from OLS models regressing the outcome on the type of email (PhD / non-PhD email), controlling for the sender's affiliation (University of Cologne, University Mannheim or Ruhr-University Bochum) and the type of university (public / private university), and using robust standard errors. Regressions are run separately for female and male recipients. The p-value of the interaction stems from an OLS model regressing the outcome on the above mentioned independent variables, including an interaction of the type of email and recipient's gender.

C.5.3 Only PhD Emails

Lastly, while again less clear due to power limitations, we restrict the data to PhD emails only and again see that while male recipients rather provide more answers to PhD emails from female than male senders (left pairs of bars), tenured female recipients reversely provide fewer answers to female students than to male students who are sending a PhD email, see Figure A17. None of the estimations are significant.

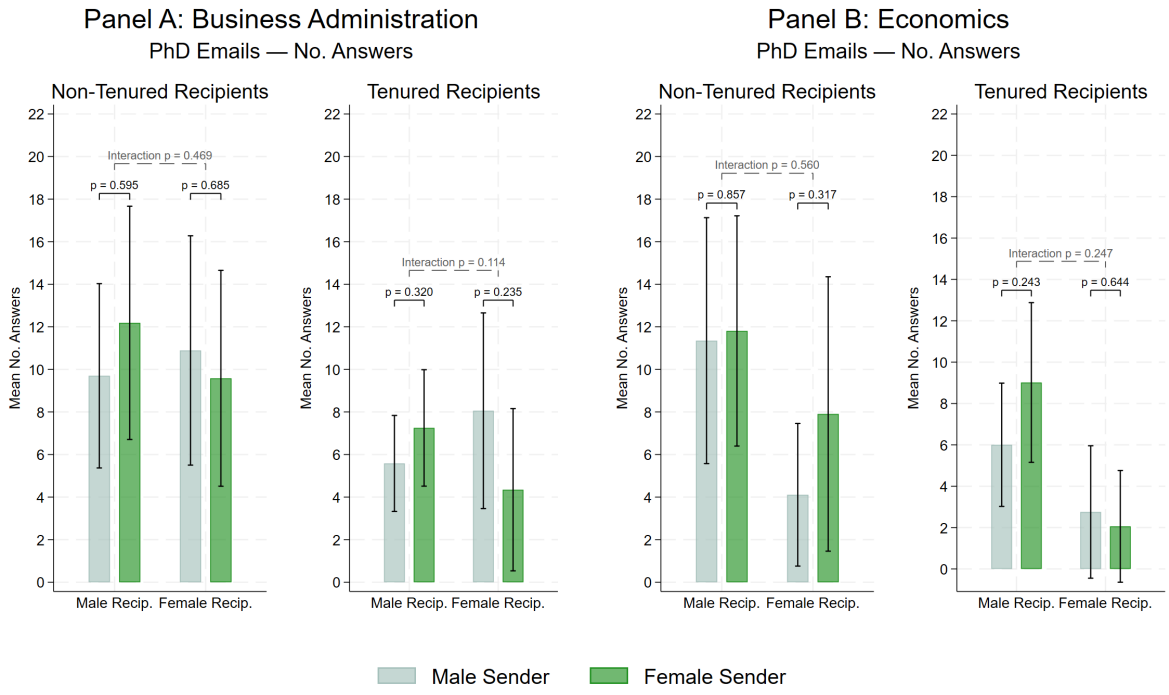


Figure A17: Differences Gender and Tenure (only PhD Emails) by Field

Notes: Bars show the mean number of questions answered in the survey by recipients working in business administration (panel A) or economics (panel B) who are non-tenured (left parts) or tenured (right parts). The data is restricted to PhD emails only. Error bars indicate 95% confidence intervals. p-values refer to p-values generated from OLS models regressing the outcome on the sender's gender, controlling for the sender's affiliation (University of Cologne, University Mannheim or Ruhr-University Bochum) and the type of university (public / private university), and using robust standard errors. Regressions are run separately for female and male recipients. The p-value of the interaction stems from an OLS model regressing the outcome on the above mentioned independent variables, including an interaction of sender's and recipient's gender.

D Differences by Type of University

This section explores differences between private and public universities. We have collected data on private universities in Germany. Different to the U.S., in Germany, public and private universities differ mainly in how they are funded and what they cost students. Public institutions are largely financed by the state and typically charge only a modest semester fee, while private institutions depend heavily on tuition payments. Private universities often provide smaller class sizes and closer individual support, whereas public universities generally enroll larger cohorts and expect students to work more independently. Despite these differences, degrees from private universities carry the same recognition as those from public ones in Germany, as long as the institution holds state recognition and the program is properly accredited.

The chapter again focuses on replicating the main effects while acknowledging that the reduced sample size (365 private German universities) hinders precise estimations. While we are not always able to estimate significant effects, we mostly replicate the results from the pooled analyses in the main text. We find the following. First, female senders receive on average more answers than male senders at both public and private universities. Second, we show evidence for same-sex discrimination by male recipients at both public and private universities. Notably, this same-sex discrimination is driven by male, *non-tenured* recipients at public universities but male, *tenured* recipients at private universities. Third, we do find suggestive evidence for the queen bee syndrome at public universities as well as private universities. However, due to the small sample size of recipients at German, private universities, meaningful interpretation of these last set of results is rather limited.

D.1 Average Differences

On average, recipients at private universities are more likely to respond (response rate of 19% compared to 13%) and provide more answers (9.15 compared to 7.36), see Table A4. Similar to the pooled the results, we do not see significant gender differences at the extensive margin for public universities, see left part of Figure A18. Recipients at private universities are more responsive to female senders (response rate of 22.67%) than to male senders (response rate of 16.06%) but this difference is not significant either. Female students receive significantly more answers from both researchers at public and private universities: researchers at private universities provide 117.49% more answers to female students (12.81 answers) than to male students (5.89 answers), a difference which is significantly smaller at public universities.

Similar to the main part, we will replicate the main graphs of the pooled sample for the composite measure of the extensive and intensive margin (unconditional number of answers) which is the most relevant measure for the senders.

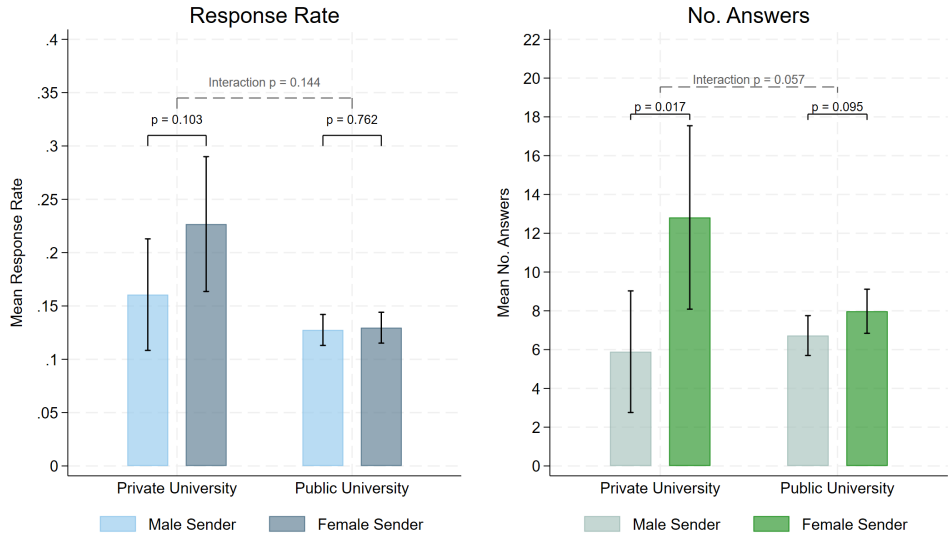


Figure A18: Difference by Private and Public University

Notes: Bars show the mean response rate in the survey (left panel) and the mean number of questions answered in the survey (right panel) by type of university (private / public). Error bars indicate 95% confidence intervals. p-values refer to p-values generated from OLS models regressing the outcome on the gender of the sender, controlling for the sender's affiliation (University of Cologne, University Mannheim or Ruhr-University Bochum) and the type of email (PhD email / non-PhD email), and using robust standard errors. Regressions are run separately for recipients at public and private universities. The p-value of the interaction stems from an OLS model regressing the outcome on the above mentioned independent variables, including an interaction of the sender's gender and thetype of university (public / private).

D.2 Gender Differences

We again find evidence for same-sex discrimination at both public and private universities among male recipients, see left pair of bars in Figure A19, with the effect being more pronounced at private universities. Female senders receive 12.95 answers from male recipients at private universities, while male senders receive only 4.86, a relative difference of 166.46% $((12.95 - 4.86)/4.86)$ with $p = 0.013$. While also female recipients provide more answers to female senders, the difference is not statistically significant.

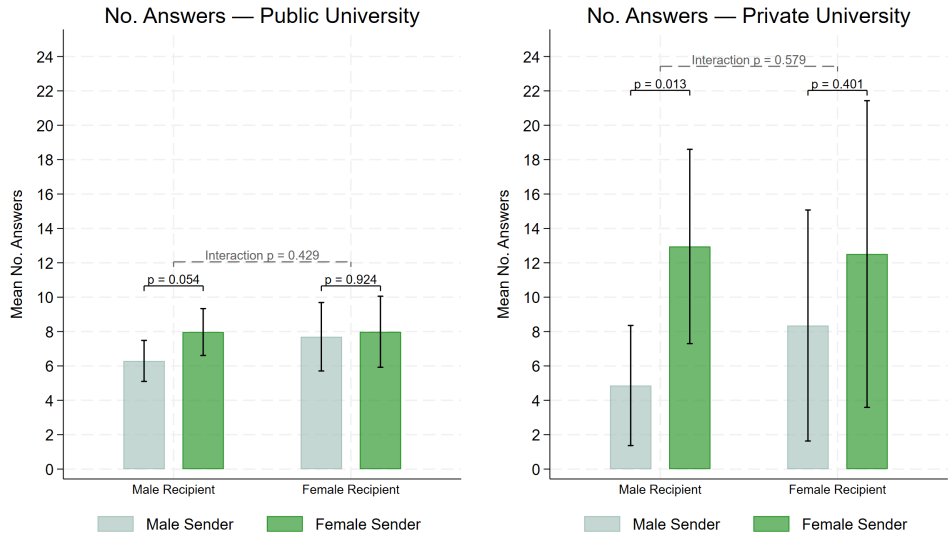


Figure A19: Gender Difference by Private Public University

Notes: Bars show the mean number of questions answered in the survey by recipients working in public (left panel) and private (right panel) universities. Error bars indicate 95% confidence intervals. p-values refer to p-values generated from OLS models regressing the outcome on the gender of the sender, controlling for the sender's affiliation (University of Cologne, University Mannheim or Ruhr-University Bochum) and the type of email (PhD email / non-PhD email), and using robust standard errors. Regressions are run separately for male and female recipients. The p-value of the interaction stems from an OLS model regressing the outcome on the above mentioned independent variables, including an interaction of the sender's and recipient's gender.

D.3 Differences by Tenure Status

At public universities, non-tenured recipients provide significantly more answers to female (10.71 answers) than to male senders (7.98 answers), see left part of Figure A20. This is in line with the average pattern found in the pooled sample. We also see this pattern among the non-tenured recipients at private universities but the difference is statistically insignificant, see right part of Figure A20.

Tenured recipients at private universities provide significantly more (203.97%) answers to female senders (12.25) than to male senders (4.03), see right panel of Figure A20. In the pooled sample as well as among tenured recipients at public universities, we do not find differences among tenured recipients.

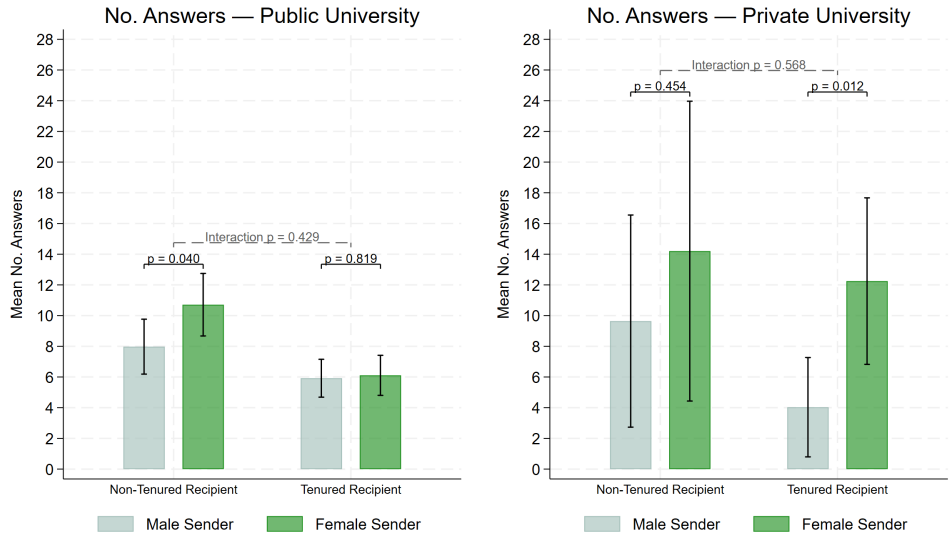


Figure A20: Differences by Tenure and by Private Public University

Notes: Bars show the mean number of questions answered in the survey by recipients working in public (left panel) and private (right panel) universities. Error bars indicate 95% confidence intervals. p-values refer to p-values generated from OLS models regressing the outcome on the gender of the sender, controlling for the sender's affiliation (University of Cologne, University Mannheim or Ruhr-University Bochum) and the type of email (PhD email / non-PhD email), and using robust standard errors. Regressions are run separately for tenured and non-tenured recipients. The p-value of the interaction stems from an OLS model regressing the outcome on the above mentioned independent variables, including an interaction of the sender's gender and and recipient's tenure status.

D.4 Differences by Gender and Tenure Status

We can replicate the average results of pronounced same-sex discrimination among non-tenured, male recipients among those at public universities, see left part of Panel A in Figure A21. Non-tenured male recipients provide 47.71% more answers to female than to male senders $((10.96 - 7.42)/7.42)$. We do not observe significant differences among tenured recipients, right part of Panel A in Figure A21.

Splitting the sample into tenured and non-tenured recipients at private universities and studying the differences by gender does not allow us to draw any conclusions for the non-tenured recipients as the confidence bands become too wide for any meaningful interpretation, see left part of Panel B in Figure A21. Different to the pooled results, among the tenured recipients at private universities (right part of Panel B in Figure A21), we observe significant same-sex discrimination among male recipients: they provide 309.70% $((12.25 - 2.99)/2.99)$ more answers to female (12.25) than to male senders (2.99).

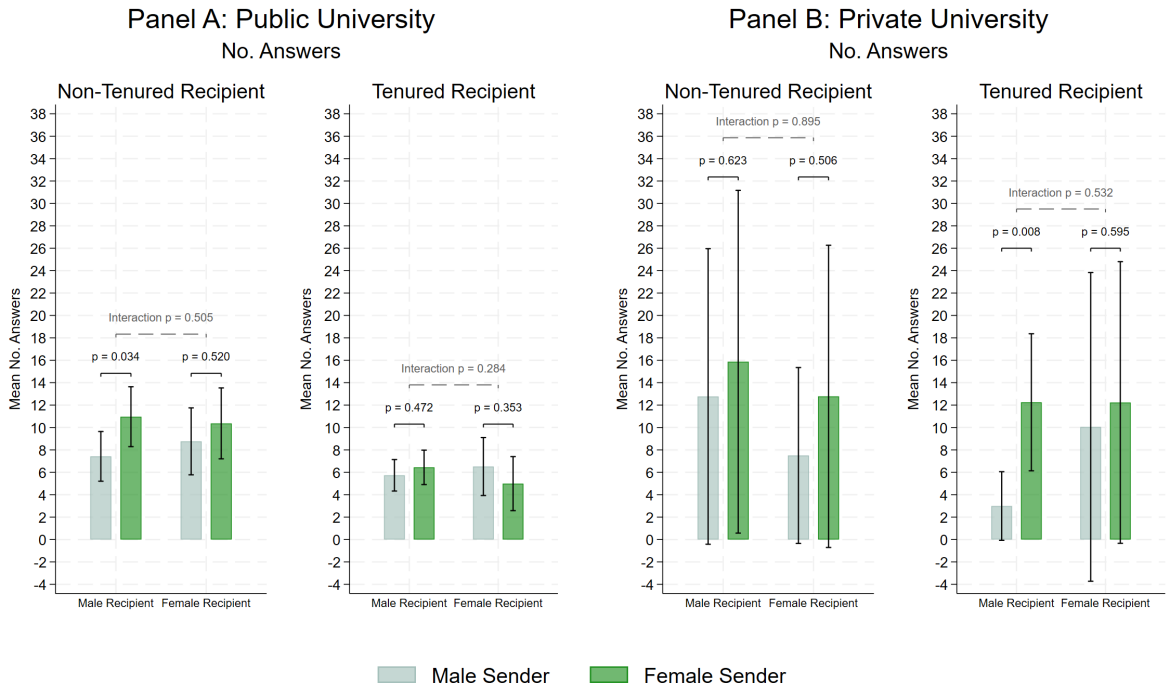


Figure A21: Differences by Tenure Status and Gender

Notes: Bars show the mean number of questions answered in the survey by recipients working in public universities (panel A) and private universities (panel B) and non-tenured (left parts) and tenured (right parts) recipients. Error bars indicate 95% confidence intervals. p-values refer to p-values generated from OLS models regressing the outcome on the gender of the sender, controlling for the sender's affiliation (University of Cologne, University Mannheim or Ruhr-University Bochum) and the type of email (PhD email / non-PhD email), and using robust standard errors. Regressions are run separately for male and female tenured and non-tenured recipients in public and private universities separately. The p-value of the interaction stems from an OLS model regressing the outcome on the above mentioned independent variables, including an interaction of the sender's and recipient's gender.

D.5 PhD emails

Similar to the pooled results, the PhD email version did on average not lead to a significantly higher response rate or significantly more answers in the survey among recipients at private or public universities, see Figure A22.

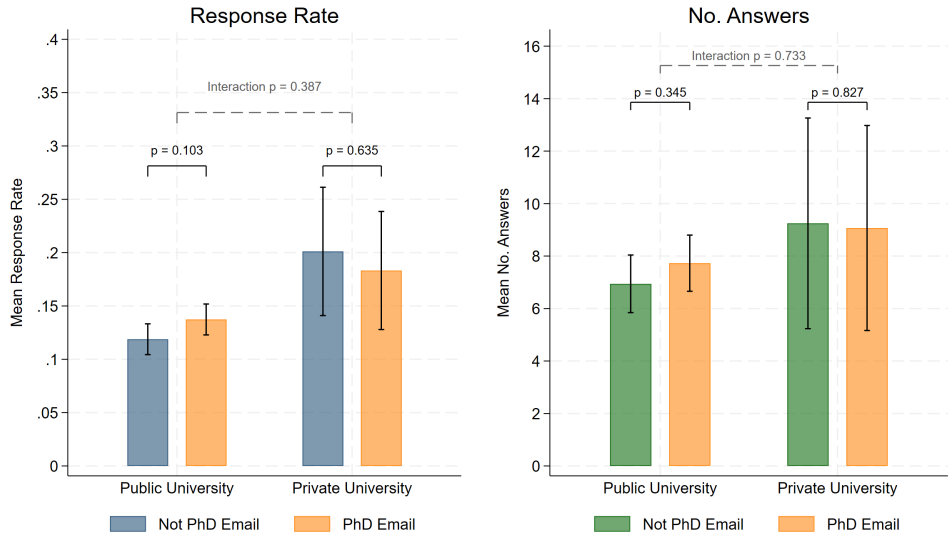


Figure A22: PhD Email Effect

Notes: Bars show the mean response rate in the survey (left panel) and the mean number of questions answered in the survey (right panel) by type of email (PhD / non-PhD email) and type of university (public / private). Error bars indicate 95% confidence intervals. p-values refer to p-values generated from OLS models regressing the outcome on the type of email (PhD / non-PhD email), controlling for the sender's affiliation (University of Cologne, University Mannheim or Ruhr-University Bochum), and using robust standard errors. Regressions are run separately for recipients at public and private universities. The p-value of the interaction stems from an OLS model regressing the outcome on the above mentioned independent variables, including an interaction of the type of email (PhD / non-PhD email) and the type of university (public / private).

D.5.1 PhD Emails by Gender

We now try to replicate the analysis on the effects of the PhD email on the numbers of answers provided by male and female recipients. The right part in Panel A in Figure A23 shows that we are able to replicate that male recipients at public universities provide significantly more answers (46.51%) to emails from male senders if they include the PhD information compared to if they do not include this information$((7.34 - 5.01)/5.01)$. Also, we replicate the observation that male and female recipients at public universities behave significantly differently towards female senders who send a PhD email: While male recipients tend to provide more answers (n.s.), female recipients provide fewer answers (n.s.) if they receive a PhD email from a female sender compared to if they receive this email without that information. The interaction effect is significant ($p = 0.059$).

Among recipients at private universities, see Panel B in Figure A23, we are unable to detect any significant differences. Nevertheless, we observe that i) male recipients provide more answers (n.s.) to PhD emails of male senders compared to non-PhD emails of them (right part of Panel B in Figure A23), and ii) female recipients seem to be less supportive towards PhD emails of female senders as compared to male recipients (n.s., left part of Panel B in Figure A23).

While not statistically significant, this might suggest that at both public and private universities women hinder rather than support other women who aim at entering the academic profession.

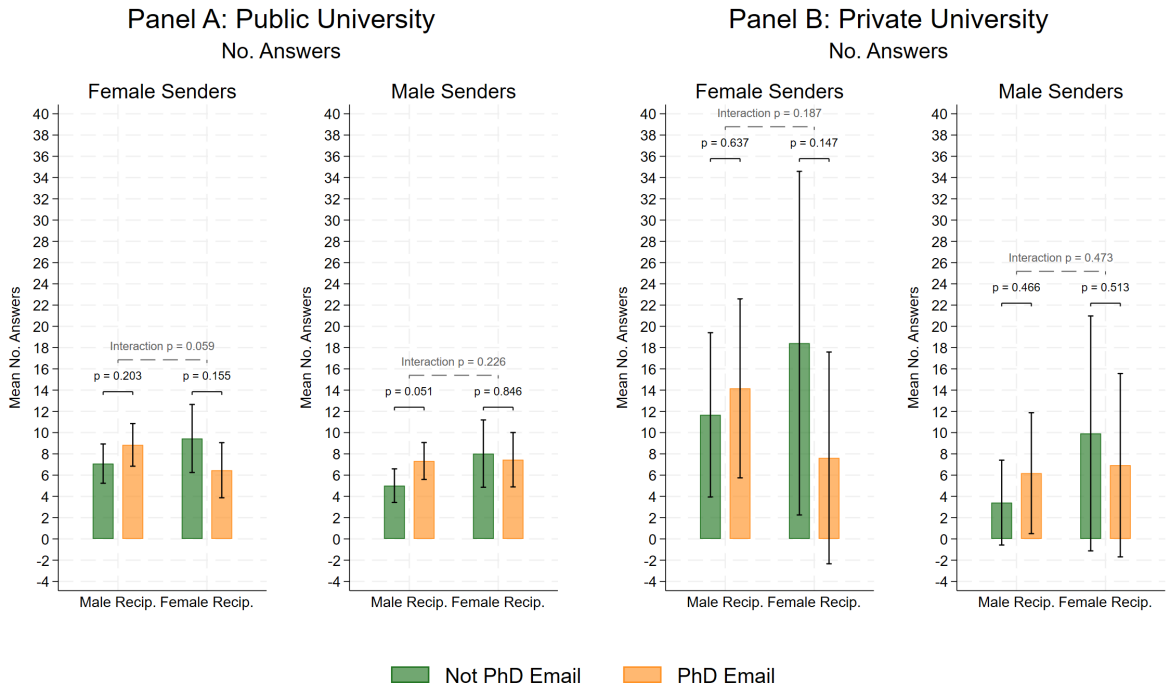


Figure A23: PhD Email Effect and Gender (Private)

Notes: Bars show the mean number of questions answered in the survey by recipients working at a public university (panel A) and at a private university (panel B) and female senders (left parts) and male senders (right parts). Error bars indicate 95% confidence intervals. p-values refer to p-values generated from OLS models regressing the outcome on the type of email (PhD / non-PhD email), controlling for the sender's affiliation (University of Cologne, University Mannheim or Ruhr-University Bochum), and using robust standard errors. Regressions are run separately for female and male recipients. The p-value of the interaction stems from an OLS model regressing the outcome on the above mentioned independent variables, including an interaction of the type of email and recipient's gender.

D.5.2 PhD Emails by Gender and Tenure Status

Among public university recipients, we observe that male senders (top Panel B in Figure A24) receive significantly more answers (169.01%) if they send a PhD email to a non-tenured male recipient than if they send a non-PhD email to them $(10.33 - 3.84)/3.84)$. While not being statistically significant, the response pattern of male and female tenured recipients at public universities towards the two versions of emails by female senders differ: while male recipients rather provide more answers if they receive a PhD (instead of a non-PhD-email) female recipients seem to provide fewer answers ($p = 0.183$ for the interaction).

For completeness, we also report the results among recipients at private universities, but the reduced sample size does not allow for any meaningful interpretation here, see bottom part in Figure A24.

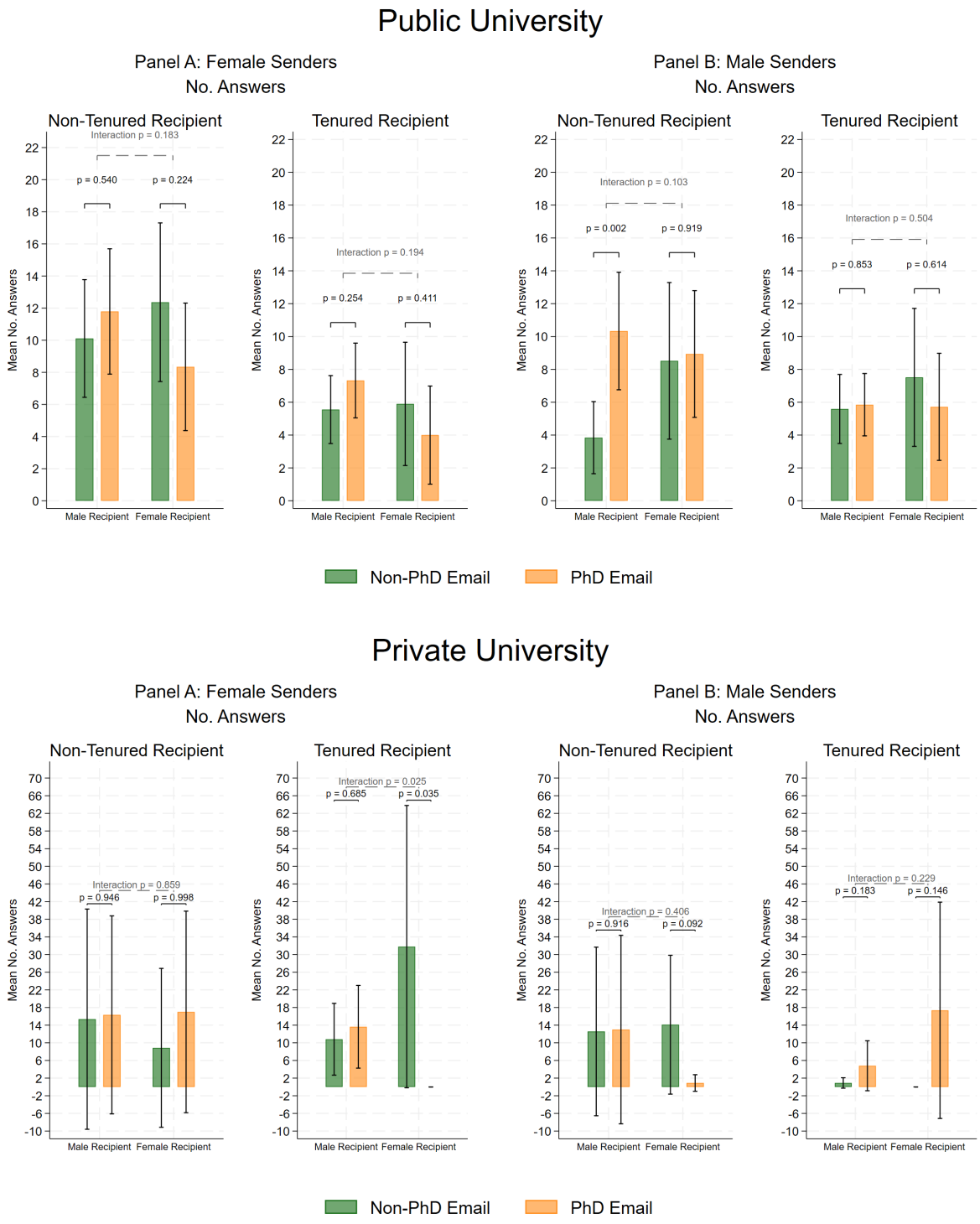


Figure A24: PhD Email Effect, Tenure Status, and Gender (Public and Private University)

Notes: Bars show the mean number of questions answered in the survey by recipients working at public universities (top) or private universities (bottom) who are non-tenured (left parts) or tenured (right parts) and who received their email from a female sender (panel A) or male sender (panel B). Error bars indicate 95% confidence intervals. p-values refer to p-values generated from OLS models regressing the outcome on the type of email (PhD / non-PhD email), controlling for the sender's affiliation (University of Cologne, University Mannheim or Ruhr-University Bochum), and using robust standard errors. Regressions are run separately for female and male recipients. The p-value of the interaction stems from an OLS model regressing the outcome on the above mentioned independent variables, including an interaction of the type of email and recipient's gender.

D.5.3 PhD Emails Only

While not reaching statistical significance, tenured recipients at public universities seem to behave differently towards male and female senders depending on their gender: While male recipients seem to be more supportive towards women, female recipients seem to be less supportive towards women than men who send a PhD email (see right part of Panel A in Figure A25). We again show the results on private universities (see Panel B in Figure A25) but the small sample size does not allow for any meaningful interpretation.

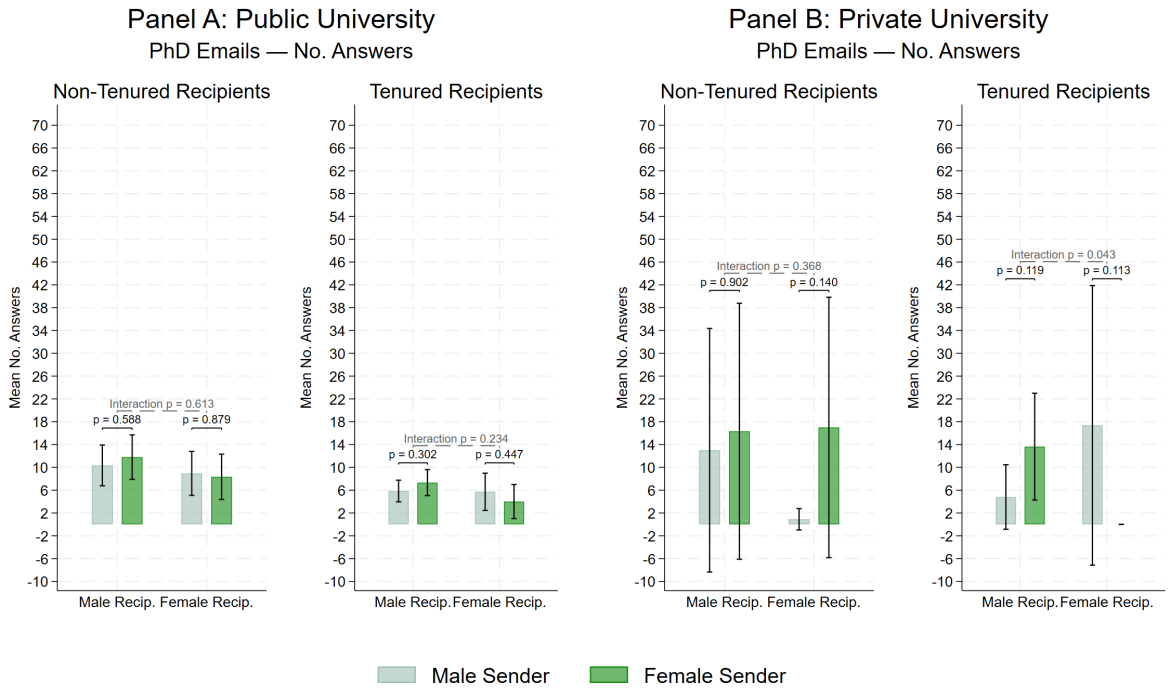


Figure A25: Differences Gender and Tenure (only PhD Emails) by Field

Notes: Bars show the mean number of questions answered in the survey by recipients working at public (panel A) or private (panel B) universities who are non-tenured (left parts) or tenured (right parts). The data is restricted to PhD emails only. Error bars indicate 95% confidence intervals. p-values refer to p-values generated from OLS models regressing the outcome on the sender's gender, controlling for the sender's affiliation (University of Cologne, University Mannheim or Ruhr-University Bochum), and using robust standard errors. Regressions are run separately for female and male recipients. The p-value of the interaction stems from an OLS model regressing the outcome on the above mentioned independent variables, including an interaction of sender's and recipient's gender.