Networking Opportunities and Gender Inequality in Science

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Abstract

Professional networks shape career advancement, but men and women may earn different returns from the same opportunities. We study a two-year service role that gives mid-career scientists access to influential senior scientists. Using administrative data from a major Chinese funding agency, we compare selected scientists with similarly qualified runners-up. After service, men experience sizable gains in large grants, promotions, and gatekeeping roles, while women gain no measurable benefits. These differences appear driven by gendered network formation: men form more new ties with senior scholars, especially where senior women are scarce. These patterns help explain persistent gender inequality in science.

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1 Introduction

Access to professional networks plays a critical role in shaping gender inequality in career advancement (Michelman, Price and Zimmerman, 2022; Cullen and Perez-Truglia, 2023; Hampole, Truffa and Wong, 2025). Yet even equal access to networking opportunities does not necessarily translate into comparable career benefits, with important implications for gender inequality along the career trajectory (Mengel, 2020; Gallen and Wasserman, 2021). Despite the importance of this channel, causal evidence on gender differences in the career returns to networking opportunities remains limited, largely because access to such opportunities is typically endogenous to performance or existing networks. This paper addresses this gap by studying how networking opportunities created by professional service shape gender disparities in career advancement, comparing those selected to serve with equally qualified candidates who were not selected.

We study a professional service role that provides a rare opportunity to causally assess the career returns to networking. Specifically, we examine the appointment of mid-career scientists to two-year service positions at a national funding agency, which place them in sustained contact with influential senior scholars. Using administrative data on academic scientists in China, we compare the subsequent career outcomes of scientists selected for service to those of similarly qualified runners-up. We document large gender differences in the career returns to this service, including subsequent grant receipt, promotion, and selection into senior gatekeeping roles. We then show that these disparities are closely linked to gender differences in network formation during service, and are not readily explained by alternative channels such as insider knowledge of funding processes or changes in scientific productivity.

The professional service role we study is the common practice at large national funding agencies to appoint temporary "rotators" to assist with grant solicitation, evaluation, and management.[1] In our context, these rotators are mid-career academic scientists who take a two-year leave of absence from their home institutions to serve at the National Natural Science Foundation of China (known within China as the "NSFC"), the largest funder of basic science research in China. A key benefit of this role, like other academic service roles such as journal editorship (Brogaard, Engelberg and Parsons, 2014; Colussi, 2018), is that it increases scientists' visibility and interaction with senior members of the profession.[2] Rotators' administrative responsibilities, such as selecting and organizing scientific review panels, provide direct exposure to senior scholars in their fields and create valuable opportunities to form professionally consequential ties.

Our data follow scientists who reach the final round of competition for these service positions.

[1] The U.S. National Science Foundation (NSF) operates a similar rotator program that brings external scientists into temporary roles to assist with agency operations (Hoenen and Kolympiris, 2020).

[2] Other benefits include the opportunity to gain familiarity with the inner workings of the funding agency and exposure to the frontiers of academic science in their field.

The data combine multiple administrative sources and link detailed information on scientists' background characteristics to a series of variables characterizing the evolution of each scientist's career. These include the type and amount of grants the scientist is awarded, their record of scientific publications, and their career advancement over time. The data allow us to track both the scientist's formation of network links over time and a rich set of career outcomes both before and after the service period.

We use a runner-up research design to estimate the effects of service, comparing scientists selected to serve as rotators with those who reached the final round of consideration but were not selected, following similar runner-up designs in the literature (Fisman, Schulz and Vig, 2014; Chambru, Henry and Marx, 2024). We show that rotators and unsuccessful final-round candidates (henceforth, "runners-up") are comparable in terms of age, academic rank, the prestige of their degree-granting and home institutions, pre-interview scientific productivity, and pre-interview ties with senior scholars. We then present our main results, using event study and difference-in-differences approaches to analyze changes in career outcomes between rotators and runners-up, separately for male and female scientists.

We find that the benefits of rotator service accrue almost exclusively to men. After their service, male rotators are much more likely than male runners-up to obtain funding from the NSFC. These gains are concentrated in the set of highly competitive and high-stakes NSFC "special" grants, which offer large amounts of funding and academic privileges, and are considered important stepping stones for career advancement. Male rotators experience a nearly five-fold increase relative to the pre-service baseline, as compared to male runners-up. In contrast, we find no evidence that female rotators experience any similar benefits in terms of grant receipt, whether overall or for special grants specifically, as compared to female runners-up.

We then document that rotator service also helps male scientists accrue influence and power in their fields later on in their careers. First, we show that they are more than twice as likely as male runners-up to be promoted to senior positions of power at their home institutions, such as dean or vice-dean, while female rotators experience no such advantage. Second, we show that being selected for rotator service increases male scientists' likelihood of later being selected for senior roles where they themselves become gatekeepers of future scientific funding. Once again, we find no such impact on the career trajectories of female rotators. These findings highlight that rotator service increases men's longer-term centrality within the social networks—and power structure—of academic science.

Our mechanism analysis reveals that the primary driver of the gender gap in benefits from rotator service appears to be the expansion of male rotators' professional networks. We first show that rotator service expands the professional networks of male rotators much more than those of females. Second, we document that these connections are primarily formed between male rotators

and senior scholars with whom they come in contact during the service period. We find little support for alternative explanations, such as the acquisition of insider knowledge or increased scientific productivity.

We further examine whether these gendered effects vary across academic fields that differ in the representation of women in senior roles. We find that the gender gaps in the various benefits from rotator service—in network formation, funding outcomes, and progression into senior gatekeeping roles— attenuate or disappear entirely in fields with greater female representation among senior scholars. In these fields, female scientists form more connections with senior panelists, face smaller funding gaps, and are more likely to become part of the next generation of senior gatekeepers. While these heterogeneity patterns are imprecisely estimated, they provide suggestive evidence that the composition of senior networks shapes the persistence of gender inequality in science.

This paper makes three contributions to the literature on networks, gender, and career advancement. First, we provide causal evidence on how men and women differ in the career returns to comparable networking opportunities. While prior work shows that networks can generate gendered short-term benefits, existing evidence is often limited to specific institutions or narrow settings (Yang, Chawla and Uzzi, 2019; Goldin, 2021; Cullen and Perez-Truglia, 2023). Using comprehensive administrative data from academic science in China, we study an entire high-stakes professional ecosystem and show that networking opportunities created by professional service generate persistent, multi-dimensional career effects that differ sharply by gender.

Second, we shed light on how these differential returns shape the composition of influence and power within STEM. Although a large literature documents gender gaps in STEM performance and entry (Nollenberger, Rodríguez-Planas and Sevilla, 2016; Bian, Leslie and Cimpian, 2017; Porter and Serra, 2020; Eble and Hu, 2022), less is known about why women remain underrepresented in senior scientific and gatekeeping roles, despite substantial progress towards gender equality in earlier stages of the career ladder (Carrell, Page and West, 2010; Ceci and Williams, 2011; Kahn and Ginther, 2017; Huang et al., 2020; Kim and Moser, 2025). We show that professional service accelerates men's transition into positions of influence while leaving women's trajectories unchanged, identifying professional networks as a key mechanism through which gender disparities persist at the top of the scientific hierarchy.[3]

Third, we contribute to research on the timing of network formation over the career. Much of the existing literature emphasizes connections formed early in life, particularly in educational settings (Mengel, 2020; Gallen and Wasserman, 2021; Michelman, Price and Zimmerman, 2022;

[3]In academic science, networks shape the reception and dissemination of research (Vásárhelyi et al., 2021; Carrell, Figlio and Lusher, 2024), but limited work to date has linked these networks to gender gaps in senior scientific leadership.

Hampole, Truffa and Wong, 2025). We instead study networks formed through professional service among mid-career scientists—when social capital becomes increasingly consequential for advancement (McDonald and Elder Jr, 2006).[4] Our results show that gendered differences in network returns emerge well after formal training and continue to shape career advancement. This finding highlights how cumulative advantage can arise even late in the career, as access to influence depends on who controls advancement opportunities within professional networks (Fisman et al., 2018; Zimmerman, 2019; Cullen and Perez-Truglia, 2023; Ajzenman, Ferman and Sant'Anna, 2025; Evsyukova, Rusche and Mill, 2025).

The rest of the paper proceeds as follows. Section 2 provides background information on the institutional setting, Section 3 describes the data, and Section 4 outlines the research design. Section 5 presents estimates of the career impacts of rotator service and documents how these effects differ by gender. Section 6 examines the role of network formation in shaping these gendered career outcomes. Section 7 explores heterogeneity in these effects across academic fields with differing levels of female senior representation. Section 8 considers alternative explanations for the documented patterns, and Section 9 concludes.

2 Institutional Background

The National Natural Science Foundation of China, or NSFC, is China's largest funder of basic science research, which provides funding through a rigorous merit-based review system.[5] To help manage the growing volume of funding applications it receives, the NSFC established its rotator program in 2002. Currently, rotators account for over one-third of the NSFC's staff.[6] Similar to rotator programs at the U.S. National Science Foundation and the Japan Science and Technology Agency, NSFC rotators are mostly scholars from universities or research institutions (Zhang et al., 2019; Hoenen and Kolympiris, 2020). Rotators serve for a fixed period, typically two years, before returning to their home institutions. Unlike their counterparts in the U.S. and Japan, NSFC rotators are paid by their home institutions, with the NSFC providing only a small stipend to cover basic living expenses.

NSFC rotator recruitment occurs annually, and only those researchers holding at least the rank of associate professor are eligible to apply. Applications are first screened by permanent agency staff, and a selected group of candidates—typically two to three per open position—are

[4] Relatedly, we contribute to the literature on professional service in science. Prior work documents how service roles benefit colleagues, coauthors, or institutional peers (Brogaard, Engelberg and Parsons, 2014; Colussi, 2018; Hoenen and Kolympiris, 2020; Carrell, Figlio and Lusher, 2024). In contrast, we study the career consequences for the scientists performing the service themselves, and show that these consequences are strongly shaped by gender, with durable effects on advancement and influence.

[5] We provide a short description of the NSFC's history, mission, and types of funding in Appendix A.

[6] As of 2023, rotators accounted for 36% of the NSFC's total workforce. Source: https://www.nsfc.gov.cn/publish/portal0/ndbg/2023ndbg/06/info92784.htm, last accessed December 15, 2025.

then invited to Beijing for in-person interviews. Candidates are evaluated first based on their academic qualifications, and then, during interviews, based on their demonstrated skills related to subject-area knowledge, organization, and management.

Similar to the US National Science Foundation, the main responsibilities of NSFC rotators include screening initial grant applications in their fields, convening expert committees to evaluate these applications, and overseeing the execution of approved grants. Rotators are also tasked with organizing expert teams to write the annual guidebook for submitting NSFC grant applications, which establish that year's funding priorities in each NSFC field.

2.1 Duties and Perceived Benefits of Rotator Service

Serving as an NSFC rotator offers significant opportunities for professional advancement. One major benefit is networking opportunities it creates, as rotators can formally engage with important senior scholars in their field, in part through extending invitations to participate in the various stages of the grant solicitation cycle. A second benefit is the enhanced access to information: rotators gain exposure to the frontiers of research and to the inner workings of the funding agency from which most Chinese scientists receive the majority of their research support.

Figure 1 summarizes the stages of the application review process, several of which provide rotators with opportunities to build connections with senior scholars. The central gray line marks the sequence of stages; the stage-specific rotator responsibilities appear in the dashed boxes below, while the actions of others (senior scholars, applicants, and the NSFC) appear in the solid boxes above.

In the first stage, rotators, working alongside NSFC permanent staff, invite senior scholars to help draft the annual application guide, which sets field-specific priorities for NSFC funding. Because these priorities shape the allocation of resources across research areas, the invitation is a meaningful favor that rotators can extend. At the end of this stage, the guide is issued. In the second stage, scientists submit applications for funding and rotators collect and screen these applications. In the third stage, rotators coordinate a correspondence review of these applications. In the fourth stage, rotators again invite senior scholars to evaluate second-round grant applications. These invitations offer paid travel to Beijing, opportunities for informal interaction with other evaluators, and a role in making final funding decisions. Particularly in stages 1 and 4, rotators help choose who participates in agenda-setting and grant evaluation, thereby offering invited senior scholars substantial influence over both the agency's research directions and a role in project selection.

The ability to offer senior scholars this influence gives rotators a tool for strategically establishing new network ties and, potentially, relationships of mutual favor exchange. Tangibly, these engagements can yield both short- and long-term professional benefits after service, such as favorable reviews of the rotator's own grant submissions, or invitations for academic visits or

Figure 1. Rotators' Roles in NSFC Grant Review

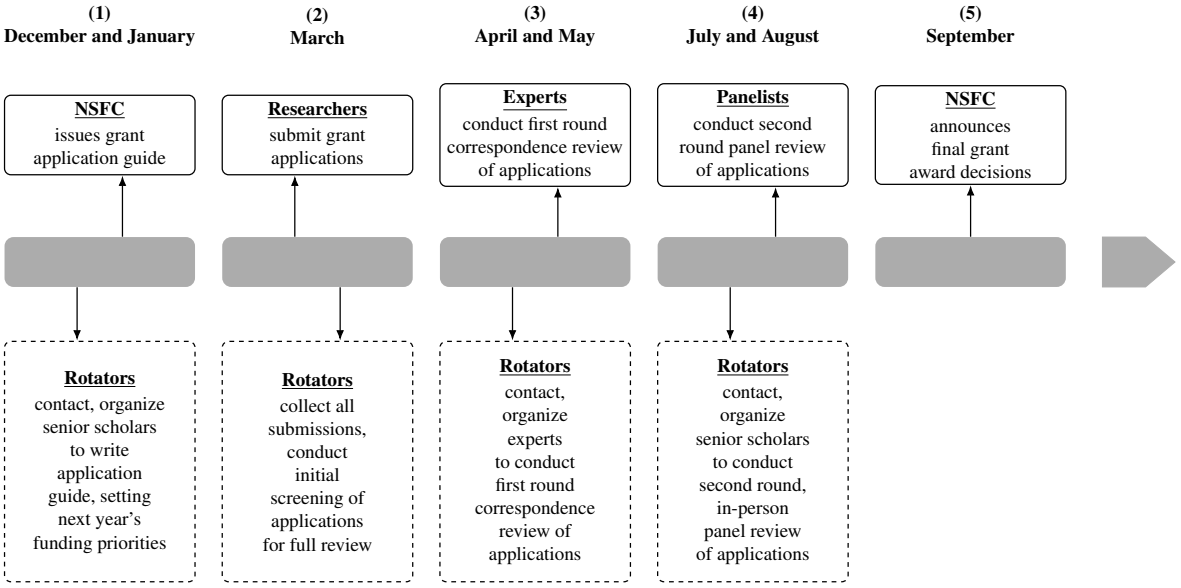


Figure 1 notes: this figure displays a visual representation of the timeline for the NSFC's annual grant review. Each node represents a time period. The sequence of the up and down arrows pointing to the actors indicate the sequence of actions in that period. The top set of boxes describes the activities of three sets of actors: the NSFC, scholars who apply for grants, and the experts who participate in grant review. The bottom set of boxes describes the activities of rotators, highlighting their opportunities for interaction with senior scholars, from which the benefits of networking are most likely to accrue.

collaboration. This benefit is so prominent that, after the period of our study, the NSFC introduced regulations on what constitutes permitted rotator activity aimed at curbing what was seen as improper networking practices among rotators.[7]

A second benefit of rotator service is enhanced access to institutional and scientific information. Rotators could acquire insider knowledge about the NSFC's internal review processes and funding criteria, which could help them craft stronger grant proposals and thus improve their chances of success in future grant applications. Furthermore, rotators may become better acquainted with the frontiers of scientific research in their field, both through interactions with leading experts and through soliciting research proposals. In Section 8, however, we argue that such informational gains are unlikely to differ systematically by gender, as the underlying operational responsibilities are similar for male and female rotators, and we find no evidence of an increase in scientific productivity following rotator service.

[7]Source: https://www.nsfc.gov.cn/publish/portal0/tab434/info94756.htm, last accessed July 18, 2024.

Gender and networking Both supply- and demand-side forces could lead to a gender imbalance in these networking benefits. On the supply side, senior scholars, who are disproportionately male, may prefer to associate or exchange favors with scholars of the same gender (Kuhn and Shen, 2013; Mengel, 2020), consistent with extensive theoretical and empirical work on homophily (Currarini, Jackson and Pin, 2009; Chetty et al., 2022). On the demand side, networking with senior male scholars entails risks for junior women—ranging from a misunderstanding of the intention behind an extended favor to sexual harassment or assault—which increases the cost to women of participating in settings such as after-dinner socializing or one-on-one meetings (Hersch, 2011; Buckles, 2019; Folke and Rickne, 2022).

3 Data

We compile four complementary data sources that capture rotator candidates' identities, grant records, publication histories, and professional networks to senior scholars. This section describes each source and how they are linked. A consolidated overview is provided in Table A1.

3.1 The Roster of NSFC Rotator Candidates

Our first data source comprises the identities of people who either served as NSFC rotators or reached the final round of the selection process but were not chosen. We refer to the former as "rotators," the latter as "runners-up," and the combined group as "rotator candidates." We use administrative records from the 2017-2021 period that list all candidates, including their names, home institutions, the NSFC department to which they applied, and final selection outcomes. In total, these data include 267 rotators and 309 runners-up.

To extend coverage backward, we also gather information on rotators who served before 2017 using the Internet Archive (http://web.archive.org/), author information published in the *Bulletin of the National Natural Science Foundation of China* (the official journal of the NSFC), and targeted searches on Google and Baidu with the keywords "NSFC rotators" (in Chinese, *liudong xiangmu zhuren*). This adds 187 rotators, comprising over 60 percent of the rotators who served between 2002 and 2016. Because data on runners-up are unavailable for these earlier years, we use this extended sample only in analyses requiring a longer time window, such as those on network links with senior scientists.

We link rotator candidates to official data from the NSFC and publicly available biographical information, including personal webpages and CVs. These data include each candidate's gender, home institution, year of birth, educational history, work history (including promotion and later appointment as an NSFC panelist), and academic rank at the time of the final-round interview. This yields matched data for 763 rotator candidates, covering 94 percent of the individuals in our sample.

Table A2 presents summary statistics for these NSFC rotator candidates. About one in four is female, and roughly 90 percent obtained their PhDs from top-tier Chinese universities, overseas universities, or the Chinese Academy of Sciences. Most candidates currently work at similarly elite institutions, with only one third affiliated with lower-ranked universities. We find no evidence of systematic differences between rotators and runners-up in terms of age, rank, home institution, and degree-granting institution. While we do not observe why a given candidate was ultimately selected or not, we show in Section 4.1 that rotators and runners-up are highly similar on observable characteristics.

3.2 Administrative Data on NSFC Grants

Our second dataset records research grants awarded by the National Natural Science Foundation of China (NSFC), the country's primary public funding agency for basic research. We scraped these data from the NSFC's official website (http://kd.nsfc.gov.cn/), which publishes information on all approved grants. For each award, the database reports the grant type, approval year, disciplinary department, and the awardee's name and institutional affiliation. We match these records to NSFC rotator candidates by name and institution, yielding 2,586 grants awarded to individuals in our analysis sample.[8]

These NSFC grants fall into two broad categories: "ordinary grants" support standard investigator-initiated projects, are relatively less competitive, and are small in scale; "special grants" are far more competitive, offer larger budgets, and are widely regarded as high-prestige awards.[9] Beyond funding, special grants confer additional career advantages, including preferential consideration in administrative promotions and stronger prospects for senior academic honors, such as election to the Chinese Academy of Sciences (Yang, 2014).[10] For reference, high-stakes special grants account for 20 percent of the grants in our matched sample (and 11 percent of all NSFC grants annually), reflecting the positive selection of rotator candidates.

This distinction is important to our analysis. Special grants are widely perceived to involve greater discretion on the part of the selection committee. Winning them is therefore seen as re-

[8] Most grants awarded by the NSFC list a single Principal Investigator (PI) alongside other investigators; this differs from the more common structure in the US and Europe, in which there is often a PI, one or more co-PIs, and other investigators. As a result, nearly all credit from a given grant can be attributed to one person, though other investigators may benefit through subcontracts.

[9] "Ordinary grants" include the "young scientist," "general," and "regional" awards, while "special grants" include grants awarded under various talent programs (the "excellent young scientist" and "distinguished young scientist" grants, for example) as well as what are called "key" grants. In terms of selectivity and professional status, special grants are comparable to awards such as the NSF CAREER Award or the Sloan Fellowship in the United States.

[10] Special grant awardees are disproportionately represented in China's top academic leadership positions: more than 80 percent of Chinese Academy of Sciences academicians under age 60 previously received the distinguished young scientist grant and over half of the presidents of China's elite universities are former awardees (Yang, 2014).

quiring more extensive networking efforts, in addition to scientific merit (Shi and Rao, 2010).[11] We will therefore examine whether rotator service differentially affects the likelihood of receiving special versus ordinary grants, using this comparison to shed light on the role of networking in career advancement.

3.3 Data on Scientific Publications

Our third dataset comprises information on each scientist's scholarly output in peer-reviewed journals, including publication year, outlet, authorship position, and citation counts. We use these data to construct measures of research productivity for all rotator candidates. We gather these records from Scopus (https://www.scopus.com), which we match to rotator candidates in our sample.[12] We extract all publication information for rotator candidates using the Scopus' application programming interface (API), successfully obtaining records for 83.1 percent of our sample.[13]

We use these data to construct person-year measures of both the quantity and quality of scientific output. For quantity, we examine three indicators: the total number of publications, the number of first-authored publications, and the number of last-authored publications. For quality, we construct the following two measures: the number of articles published in "top" journals," defined as journals in the top 25% of Scopus-indexed journals by impact factor within each field, and the number of citations received by a scientist's publications.

We also use Scopus-indexed publications to construct a supplementary dataset on research grants. Specifically, we link each acknowledged funder listed in a publication to its authors, thereby identifying grant-author associations. This dataset allows us to measure the incidence of funding from non-NSFC sources in addition to NSFC grants. With these data, we construct three person-year measures of grant exposure: (1) the number of associated NSFC grants, (2) the number of associated grants from non-NSFC domestic sources, and (3) the number of associated grants awarded by foreign institutions.[14] This supplementary dataset complements our main analysis based on administrative NSFC grant records by extending coverage to non-NSFC funding sources, allowing us to assess whether the grant-related benefits of rotator service extend beyond

[11] See Appendix A for more detail.

[12] We chose Scopus for three advantages it has over its competitors, such as Web of Science. First, Scopus has broader coverage than its competitors, particularly among Chinese-language journals (Mongeon and Paul-Hus, 2016; Vera-Baceta, Thelwall and Kousha, 2019; Baas et al., 2020). Second, it identifies authors by their full names, as opposed to first initial and last name, which is particularly useful in our setting. Finally, Scopus assigns author IDs using its own curated author-disambiguation algorithm rather than relying on self-registration, minimizing risk of non-classical measurement error arising from strategic registration behaviors.

[13] If we are unable to identify a match, the scientist typically does not publish in Scopus-indexed journals.

[14] We use the Doubao AI model developed by ByteDance to infer the award year from the grant number, which typically contains this information; observations without such information are dropped. We cross-validate NSFC grant associations for rotator candidates using administrative NSFC grant records. To reduce potential misattribution of funding to authors, we exclude grants acknowledged in publications with more than ten coauthors.

the NSFC.

3.4 Data on Rotator Candidate-Panelist Connections

Our final dataset documents links between rotator candidates and NSFC panelists, the senior scientists who serve as gatekeepers in the final stage of the NSFC funding review process. We construct two measures of rotator candidate-panelist connections based on their prior collaborative activity. The first captures connections formed through joint participation on NSFC grants, and the second captures connections formed through coauthorship of scientific publications.

To build the grant-based connection measure, we combine two data sources. The first is a roster of all panelists who served on NSFC grant committees from 2014 to 2020, drawn from the NSFC website (https://www.nsfc.gov.cn).[15] The second data source is a record of NSFC grant investigators obtained by web-scraping an NSFC site (https://kd.nsfc.gov.cn/) in 2021. We define a link when a rotator candidate and a panelist appear as investigators on the same grant between 2000 and 2020, and count the number of such links, as well as the number of panelists to whom each candidate is linked.

To construct our coauthorship-based connection measure, we match the panelist roster to rotator candidates' Scopus publication records. We identify connections by checking whether a candidate and a panelist coauthored a paper in a given year, and then count the total number of coauthored papers. This yields an annual measure of coauthorship-based scientific ties between rotator candidates and NSFC panelists.

4 Research Design

Our main analysis estimates the impact of being selected to serve as a rotator on a series of short- and longer-term career outcomes. Intuitively, we compare the outcomes of rotators before, during, and after service to those of runners-up who reached the final interview stage but were not ultimately selected. We estimate this difference separately for male and female rotator candidates.

We employ two main approaches to estimation: an event study and a difference-in-differences

[15] The NSFC began releasing the names of panelists in 2014. When information expired or was no longer accessible from the NSFC website, we supplemented it with records from other official platforms, including Sciencenet (a major science website supervised by the Chinese Academy of Science, http://fund.sciencenet.cn/) and Qingta (a leading education and science information provider in China, https://www.cingta.com/). This procedure yields 9,023 names, covering 89.2% of the roughly 600 NSFC review committees announced during this period. These data also contain each panelist's official NSFC ID number, field of research, committee type, and years of service.

approach. First, we estimate the following event study specification:

$$Y_{it} = \alpha_o + \sum_{p=-P, p\neq -1}^{P} \alpha_{1\#p} \cdot Rotator_i \cdot p_{it} + \rho_i + \lambda_t + \varepsilon_{it} \quad (1)$$

Y_{it} is the outcome variable for rotator candidate i in year t. Outcomes include the number of grants received, the amount of total grant funding, the number of publications, professional promotion, and appointments to senior gatekeeping roles. $Rotator_i$ is an indicator variable capturing whether a scientist served as a rotator. Our running variable is the distance in years between the year in which data was observed, relative to the first potential year of service, which is the year after the person's interview. We capture this with the set of period variables $p_{it} \in [-P, P]$, where $p = -1$ is set to the year of the interview, and $p = 0$ to the person's first year of (potential) service, should they be selected. The terms ρ_i and λ_t capture person and year fixed effects, respectively.

Our main parameters of interest are the coefficients $\alpha_{1\#p}$, which trace the evolution of outcomes for selected rotators relative to runners-up across event time. These coefficients are measured relative to the person's year of starting service and span three periods: pre-service ($p \leq -1$), the two years of service ($p = 0$ and $p = 1$), and post-service ($p \geq 2$). This specification allows us to assess whether and how outcomes diverge between rotators and runners-up before, during, and after service. In our main analysis, we restrict the sample to a six-year window on either side of the interview year (i.e., $P = 6$). Standard errors are clustered at the rotator candidate level. To examine gender differences, we estimate the model separately for men and women, comparing male rotators to male runners-up and female rotators to female runners-up.[16]

Our second approach implements a differences-in-differences design to estimate the average effect of rotator service. We compare outcomes for selected rotators and runners-up before and after the interview date. As in the event-study analysis, we estimate the model separately by gender. Our specification is:

$$Y_{it} = \beta_0 + \beta_1 \cdot Rotator_i \cdot AfterInterview_{it} + \rho_i + \lambda_t + \varepsilon_{it} \quad (2)$$

Y_{it} is again the outcome of rotator candidate i in year t.[17] $AfterInterview_{it}$ is an indicator variable that takes the value 1 if the year t is after the date in which the person completed their final, in-person interview for rotator service (i.e., $p \geq 0$). As in Equation (1), ρ_i and λ_t capture person- and year-level fixed effects, respectively. We cluster our standard errors at the rotator candidate level.

Our main coefficient of interest here is β_1, which captures the average change in outcomes for

[16] This could also be achieved with a single estimation by adding additional interaction terms between gender and all explanatory variables.

[17] The person-level fixed effect absorbs the stand-alone $Rotator_i$ variable.

rotators after being selected for service, relative to runners-up. This parameter aggregates both the short-run penalty during service—when rotators are barred from applying for or receiving NSFC grants—and any premium that emerges after service ends.

To isolate this penalty, we estimate an alternative to Equation 2, in which we produce two separate post-interview estimates: $DuringService_{it}$ equals one in the two years of service, and $AfterService_{it}$ equals one for all subsequent years.

$$Y_{it} = \gamma_0 + \gamma_1 Rotator_i \cdot DuringService_{it} + \gamma_2 Rotator_i \cdot AfterService_{it} + \rho_i + \lambda_t + \varepsilon_{it} \quad (3)$$

We have two parameters of interest in this specification. The first, γ_1, is the during-service estimate, which isolates the expected penalty arising from service (both from the time cost of rotator service, and the prohibition from applying for new grants that rotators face during service). The second, γ_2, is the after-service estimate, which captures any premium that might arise, should rotator experience yield benefits in longer-term career advancement after the completion of service.

4.1 Comparability of Rotators and Runners-up

To show that rotators and runners-up are comparable, we present a test of balance between their pre-treatment characteristics, including gender, age at interview, academic rank at interview, educational background, prestige of home institution, scientific productivity, and connections with NSFC panelists.

Figure 2 reports raw mean differences in these baseline characteristics between the two groups, along with 95 percent confidence intervals around these estimates. As expected, rotators and runners-up are broadly comparable, with the exceptions that rotators are slightly younger and somewhat more likely to come from elite universities than runners-up. The two groups also exhibit very similar pre-interview scientific productivity, both in publication quantity and quality. These patterns suggest that key predictors of future career success were well balanced between rotators and runners-up before the final interview.

A remaining concern is selection on unobserved non-cognitive traits, particularly social or networking skills. While such traits are difficult to measure directly, several features of the data suggest the risk of such selection is minimal. First, rotators and runners-up are balanced on pre-interview connections with influential panelists, and our event-study estimates show no differential pre-trends in network formation prior to the interview (Section 6). If rotators were systematically more socially skilled than runners-up, we would expect to see evidence of such differences before service begins.

Beyond these tests for balance and pre-trends, later in the paper we provide additional evidence against selection-based explanations. The expansion of professional networks following

rotator service is highly specific (Section 6): new connections arise only with senior panelists whose tenure overlaps with the rotator's service period, and not with panelists serving in other periods. Consistent with this pattern, we find no post-service increase in male scientists' broader coauthorship network ties beyond the senior scientists with whom they interacted through service (Section 6.2). Moreover, the benefits of rotator service in terms of funding are confined to support from the NSFC; we find no corresponding effects on grants from non-NSFC sources (Section 5.1). Taken together, these patterns suggest that selection into rotator service is unlikely to be driven by pre-existing differences in observables or unobserved non-cognitive traits such as social skills.

We repeat the same balancing exercises for females and males separately. These results appear in Figure A1 and the final two columns of Table A3. They document that rotators and runners-up are also similar on observable traits within gender categories, as well as overall. This is important, as many of our analyses rely on gender-specific comparisons.

To summarize, these results suggest that rotators and runners-up are closely comparable. This strengthens the credibility of our identification strategy and supports the interpretation of the difference-in-differences estimators as capturing the causal effect of rotator service on scientists' career outcomes.

5 Gendered Impacts of Rotator Service on Scientists' Careers

In this section, we present our estimates of the impact of rotator service on careers of female and male scientists. Our outcomes include a scientist's record of grants received from the NSFC and other sources, professional advancement, and their likelihood of later serving as an NSFC panelist—a role that signals scientific prominence and influence within the field.

5.1 Grants

In this subsection, we estimate how rotator service affects research funding received by male and female scientists. We first examine the effect of rotator service on the receipt of NSFC grants using administrative NSFC grant records. We then assess whether the effects of rotator service on funding extend beyond the NSFC by examining grants from other funding sources.

NSFC grants Figure 3 presents event study estimates for grant receipt. Three key patterns emerge. First, prior to service, our estimates are centered around and not statistically different from zero. This supports the parallel-trends assumption, required in difference-in-differences analysis, that pre-event trends in outcomes are not different for rotators and runners-up. Second, we observe an expected penalty during service: rotators are prohibited from applying for or receiving grants while serving. Third, large gender disparities appear after service concludes. Male rotators enjoy a post-service benefit that persists through at least the third year after service. In contrast,

Figure 2. Comparing Rotators and Runners-up on Observables

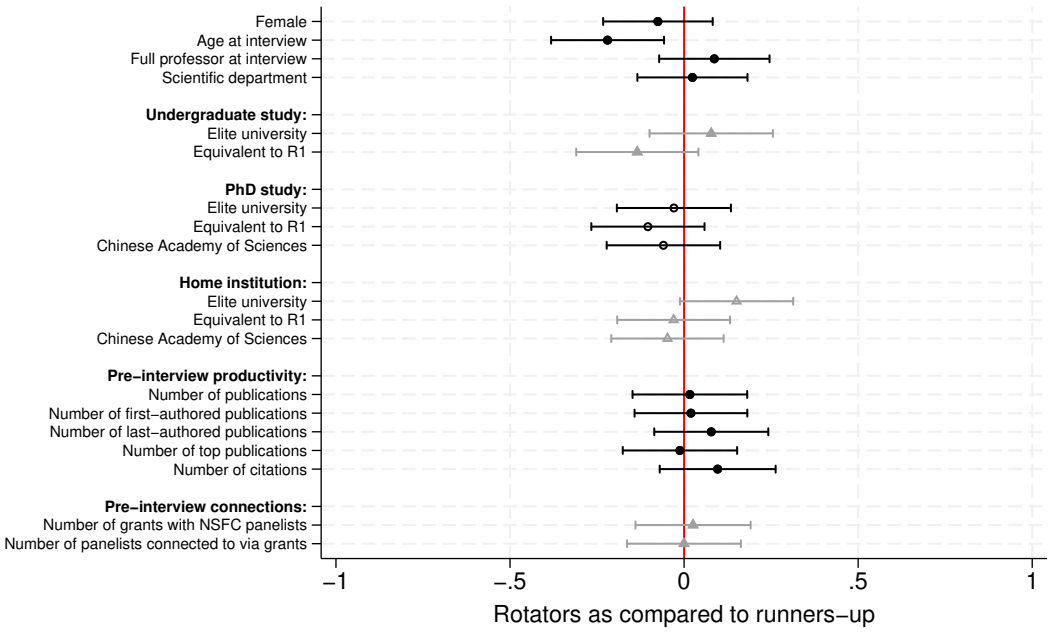


Figure 2 notes: this figure presents estimates from regressions of pre-treatment characteristics on the indicator variable for rotator experience without controls. Positive coefficients indicate higher average values among rotators relative to runners-up. These characteristics include gender, age at interview, academic rank at interview, educational background, and prestige of home institutions. "Elite universities" are the 39 universities recognized as the most prestigious in China, officially designed under China's "Project 985." This group includes both Peking and Tsinghua Universities. "Equivalent to R1" refers to the group of 77 Chinese universities, recognized by the Chinese government's 211-Project but not by (the more prestigious) Project 985. The Chinese Academy of Sciences (CAS) is China's premier national research institution; it comprises more than 100 affiliated institutes and laboratories. Connections with panelists are measured based on the number of grants that involve both rotator candidates and NSFC panelists. We present summary statistics for these variables, both overall and by rotator status, in Table A2.

the benefits for female rotators dissipate more quickly, returning to zero by the second post-service year.

We then present separate estimates by grant type. Panel (b) of Figure 3 reports estimates for ordinary grants, while Panel (c) focuses on higher-stakes special grants.[18] For ordinary grants, female and male rotators benefit similarly from their professional service. For special grants, however, the gender gap is pronounced: male rotators experience a nearly five-fold increase relative to the pre-service baseline (0.021), while the estimates for women are indistinguishable from zero.

To complement these event study results, we also present difference-in-differences estimates of the effect of service on grant receipt. We present estimates of the during-service penalty (γ_1) and post-service premium (γ_2) in Table 1. Consistent with our event study results shown in Figure 3, rotators of both genders experience a significant during-service decline in grant receipt relative to runners-up. After service, male rotators experience a large and statistically significant benefit that almost offsets the during-service penalty. For females, the estimated post-service premium is less than half the magnitude of that for males and is not statistically significant.[19]

Across both the event study and difference-in-differences results, the gender gap in grant outcomes is driven mainly by special grants. Male rotators experience a post-service increase of over 400 percent relative to their pre-service average likelihood of receiving a special grant, while female rotators show no detectable improvement.[20]

We assess the robustness of our estimates to three alternative samples: (1) excluding those who later become permanent NSFC employees and thus are no longer permitted to apply for NSFC grants,[21] (2) excluding those who attended the interview more than once,[22] and (3) limiting the sample to those job positions with complete candidate lists.[23] In Figure A2, we show that our main estimates are robust across these sample restrictions.

Finally, we examine how rotator service affects the total amount of NSFC funding. We show these results in Figure A3 and Table A5. These estimates show a similar pattern to the earlier results using total number of grants as the outcome (Figure 3 and Table A4). Further, our estimates for total amount of funding are slightly more precise than for number of grants, highlighting that female scientists experience a negative and statistically significant reduction in overall funding as a result of being selected for rotator service.

[18] The "all grants" measure is the sum of ordinary and special grants.

[19] Using Equation 2, we estimate the total effect up to six years after the interview. As shown in Table A4, the overall effect of the rotator experience is negative: compared with runners-up, a rotator's likelihood of being awarded any NSFC grant decreases by roughly 20 percent.

[20] As shown in Column (3) of Table A4, a male rotator's overall likelihood of being awarded a special NSFC grant during or after service more than doubles compared with the baseline likelihood.

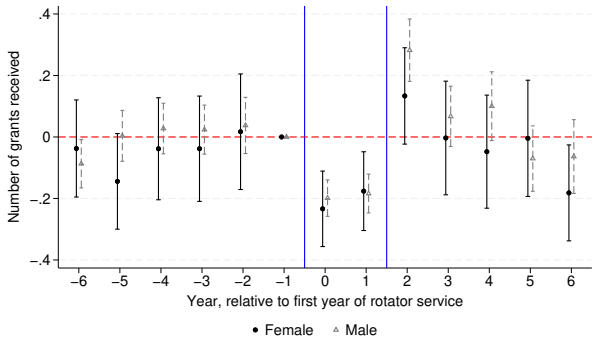
[21] Nineteen rotators and two runners-up became permanent NSFC employees after their period of service.

[22] Twenty people attended the final-round interview more than once.

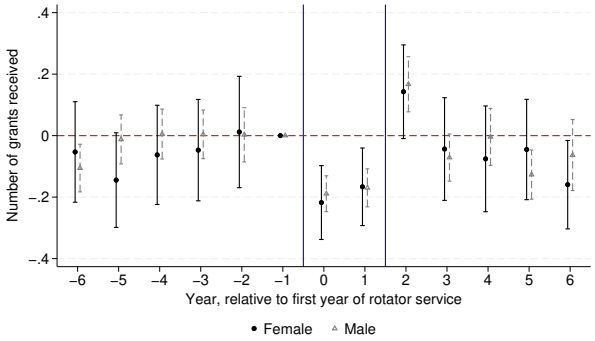
[23] There are thirty-six candidates for whom the data source did not contain the complete candidate list; this comprises less than seven percent of all rotator candidates over our period.

Figure 3. Rotator Service and Grant Receipt

(a) All grants



(b) Ordinary grants



(c) High-stakes special grants

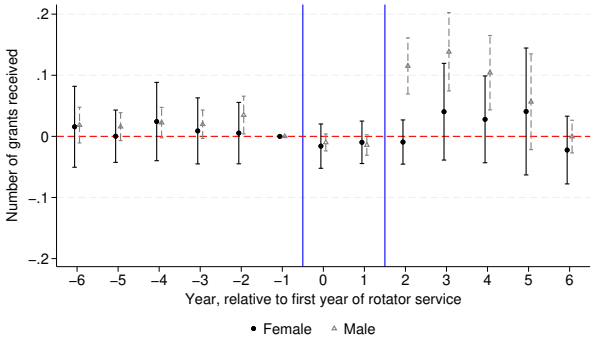


Figure 3 notes: this figure presents estimates of $\alpha_{1\#p}$ from Equation 1, along with 95 percent confidence intervals. The parameter captures the performance of a rotator of the gender indicated in the estimate marker, compared to a runner-up, in that year. The dependent variable is the number of all grants the person wins in a given year in Panel (a), the number of ordinary grants in Panel (b), and the number of special grants in Panel (c). We superimpose two vertical lines on the figure to delimit the two year period in which a rotator candidate would serve at the NSFC, were they to be selected. Standard errors are clustered at the rotator candidate level. We show the tabular analogue to these results in Table 1.

Table 1. How Rotator Experience Affects Grant Receipt During and After Service

	(1) All grants	(2) Ordinary grants	(3) Special grants
Panel A: Females			
During service (γ_1)	-0.174***	-0.153***	-0.022**
	(0.032)	(0.030)	(0.010)
After service (γ_2)	0.071	0.064	0.007
	(0.045)	(0.040)	(0.015)
Pre-interview outcome mean	0.198	0.180	0.019
N	1,362	1,362	1,362
Panel B: Males			
During service (γ_1)	-0.195***	-0.165***	-0.030***
	(0.015)	(0.014)	(0.006)
After service (γ_2)	0.148***	0.054***	0.094***
	(0.026)	(0.022)	(0.015)
Pre-interview outcome mean	0.208	0.187	0.021
N	4,818	4,818	4,818

Table 1 notes: this table presents estimates of γ_1 and γ_2 from Equation 3. γ_1 is the penalty in the outcome variable experienced by those selected for rotator service during their period of service, during which time they are ineligible to receive grants, and γ_2 is the (potential) premium they experience after they complete service and are once again eligible. The outcome variable is the number of NSFC grants the person won in a given year. We present estimates separately for all grants, and for two distinct types of grants (respectively), as listed in the column heading. Standard errors are clustered at the rotator candidate level. *** < 0.01, ** < 0.05, * < 0.1. Estimates of β_1 from Equation 2 are given in Table A4.

Grants from sources other than the NSFC Next we examine whether rotator service affects scientists' likelihood of receiving funding from sources other than the NSFC, including both non-NSFC grants awarded by Chinese institutions and grants awarded by foreign institutions. Panel (a) of Figure 4 shows that, relative to runners-up, rotators experience a clear decrease in associated NSFC grants during the service period, followed by an increase after service. The post-service gains in NSFC funding mostly accrue to male rotators, consistent with the gender-specific patterns documented in Figure 3.

In contrast, Panels (b) and (c) reveal no analogous post-service increase in funding from non-NSFC domestic sources or from foreign institutions.[24] For male scientists, the estimated post-service effects are small and statistically insignificant, while female rotators experience a temporary decline in non-NSFC domestic funding. This stark contrast indicates that the funding gains associated with rotator service are concentrated within the NSFC.

To sum up, these results show that rotator service does not increase the likelihood of receiving research funding from sources outside the NSFC, either from domestic, non-NSFC sources or foreign sources. These findings are also consistent with NSFC-specific mechanisms, such as networking, driving the observed returns to rotator service.

5.2 Advancement into Senior Positions

In this subsection, we estimate how rotator experience affects professional advancement of male and female scientists. In particular, we focus on two outcomes that reflect increased authority and influence in the scientific community: selection by the NSFC to serve as a senior panelist in subsequent grant reviews, and promotion to senior leadership roles at the scientist's home institution.

Selection as a senior NSFC panelist We first estimate how rotator service affects a scientist's likelihood of later being chosen to serve as a panelist on an NSFC review panel. These panelists are senior scientists invited by the NSFC to evaluate the quality of that year's grant submissions. In this role, they act as gatekeepers of research funding, deciding which proposals will be finally funded. Being chosen as a panelist, therefore, indicates both status and centrality in the research network of the person's field.

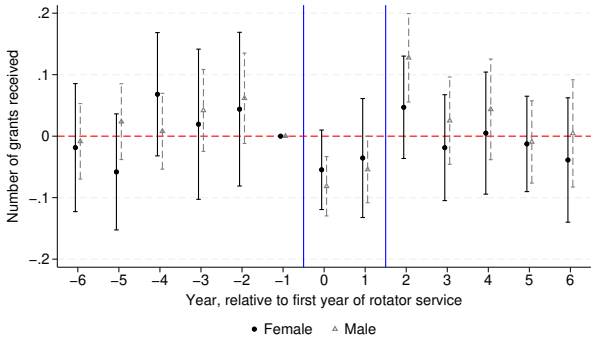
Panel (a) of Figure 5 presents these results. For males, selection to rotator service leads to a clear increase in the probability of later serving as a panelist. This probability increases over time after service, suggesting a shift in their longer-term career trajectory.[25] We observe the largest estimates in the final two years of our observation window—four years after service—when male

[24] While rotators are prohibited from applying for NSFC grants during the service period, no such restrictions apply to non-NSFC funding.

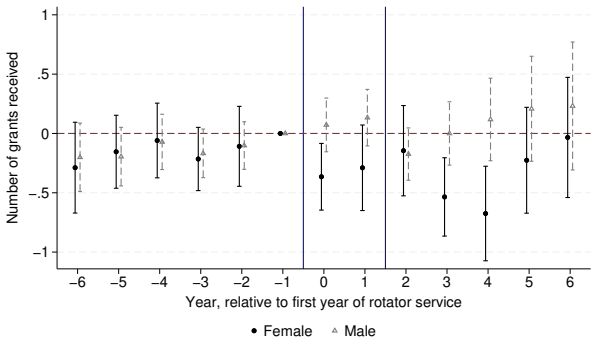
[25] The very small standard errors on estimates for years prior to rotator service reflect that candidates rarely had opportunities to serve as panelists at the career stage in which they applied for rotator service.

Figure 4. Rotator Service and Receipt of Grants from Various Sources

(a) NSFC grants: Females vs. males



(b) Non-NSFC domestic grants: Females vs. males



(c) Foreign grants: Females vs. males

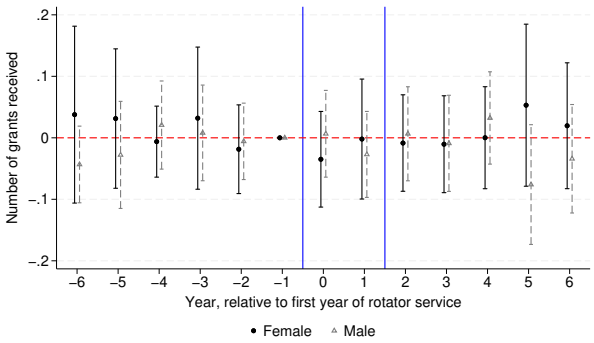


Figure 4 notes: this figure presents event-study estimates of $\alpha_{1\#p}$ from Equation 1, along with 95 percent confidence intervals. The dependent variable is the number of associated grants in a given year: NSFC grants in Panel (a), non-NSFC grants awarded by Chinese institutions in Panel (b), and grants awarded by foreign institutions in Panel (c). We superimpose two vertical lines on the figure to delimit the two year period in which a rotator candidate would serve at the NSFC, were they to be selected. Standard errors are clustered at the rotator candidate level. We show the tabular analogue to these results in Table A6.

rotators are 25 percent more likely to serve as panelists than male runners-up. For females, the estimated effects are much smaller. The corresponding difference-in-differences results in Table A7 show a significant effect for male scientists and a statistically insignificant and smaller estimate for females—less than half of the magnitude of that for males. We can reject the equality of the two estimates at the 5 percent significance level.

Promotion to senior leadership For institutional promotions, we study promotion to a set of senior positions that, in China, confer additional funding, power, and scientific recognition. These include promotion to dean or vice dean of a school, or to director or deputy director of an administrative office at the university level. Despite the common connotation of such titles in the US system of more service and less research, in China these positions confer *greater* allocation of research resources to the scientist, such as greater funding and administrative support, as well as greater power and influence in the scientific field in which the person works. Indeed, they are commonly seen as stepping stones to the most elite roles in the Chinese scientific establishment (Yang, 2014; Jia, Nie and Xiao, 2019; Acemoglu, Yang and Zhou, 2024).

Panel (b) of Figure 5 reports the event study estimates. Male rotators enjoy an increase in their likelihood of being promoted after service, relative to male runners-up. For females, we find little evidence of a corresponding effect. Our related difference-in-differences results appear in Table A8. For men, the estimated post-service increase is 0.044, a fourfold increase, relative to the baseline likelihood of annual promotion. For women, the estimated effect is positive but small (0.010) and not statistically significant. We reject equality of the male and female estimates at the 5 percent significance level.[26]

6 Gendered Impacts of Rotator Service on Network Formation

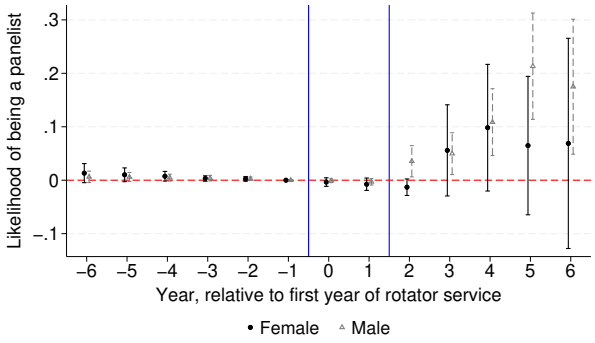
This section examines whether gender differences in professional networking explain the disparate career returns to rotator service documented above. We begin by studying how male and female scientists' professional networks evolve around the service period. We also present supplementary evidence illustrating how these networking advantages are exercised in practice.

We first study how rotators' professional networks vary before, during, and after their service, and how these changes differ by gender. Because a key benefit of rotator service is interaction with senior scientists serving as NSFC panelists, we focus on connections between rotators and these

[26]These results may raise the question of why women continue to apply for and serve as rotators despite realizing little ex post benefit. Our interpretation is consistent with recent evidence by Costa-Ramón et al. (2026), which shows that individuals' labor supply decisions are shaped by incomplete information and limited attention to long-run returns at the time choices are made. When scientists decide whether to apply for rotator service, the salient evidence points to a positive average return: men—who constitute roughly three-quarters of rotators—experience large gains from service. As a result, prospective female scientists are likely to form optimistic expectations about the returns to rotator service based on this aggregated evidence, even if the ex post benefits ultimately accrue primarily to men.

Figure 5. Effects on Career Advancement

(a) Selection to serve as an NSFC panelist



(b) Administrative promotion

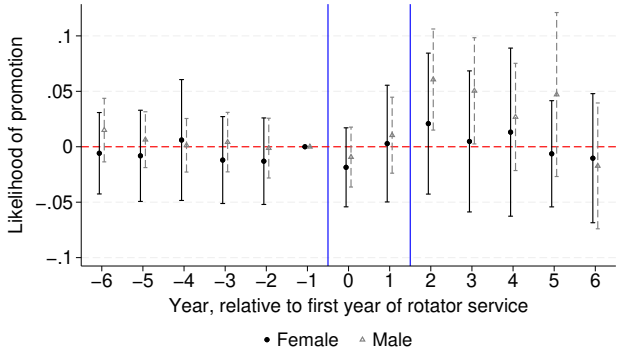


Figure 5 notes: this figure presents estimates of $\alpha_{1\#p}$ from Equation 1, along with 95 percent confidence intervals. The parameter captures the performance of a rotator of the gender indicated in the estimate marker, compared to a runner up, in that year. In Panel (a), the dependent variable is the likelihood the person is chosen to serve as an NSFC panelist (the senior role in grant review and selection discussed in Section 2). In Panel (b), the dependent variable is the likelihood the person is promoted to a senior leadership position in a given year. We superimpose two vertical lines on the figure to delimit the two year period in which a rotator candidate would serve at the NSFC, were they to be selected. Standard errors are clustered at the rotator candidate level. In Table A8, we show the tabular analog to these results. Our results there show similar patterns, and we can reject equality between estimates for males and for females at $p < 0.05$.

senior scholars.

Following Section 3.4, we measure rotator candidates' network ties using two outcomes: (1) the likelihood of appearing on NSFC grants with panelists and (2) the incidence of coauthoring with panelists. Shared-grant ties capture more direct relationships formed through joint involvement in scientific funding, whereas coauthorship ties reflect more indirect forms of scientific collaboration.

6.1 Shared-grant Ties

We first investigate ties between rotators and panelists based on the incidence on which they appear on the same grants. Because panelist identities in our data are observed only for a limited window, this analysis compares male and female rotators to each other rather than to runners-up, drawing on scientists who served as rotators prior to 2017. This approach allows us to study a substantially longer post-service horizon, which is important for capturing the gradual formation of collaborative ties.[27] To implement it, we adapt Equation 1 for use with only rotators, as opposed to rotators and panelists, as follows:

$$Y_{it} = \theta_o + \sum_{p=-P, p\neq -1}^{P} \theta_{1\#p} \cdot MaleRotator_i \cdot p_{it} + \rho_i + \lambda_t + \varepsilon_{it} \tag{4}$$

Here the person- and year-level fixed effects are the same, and our main object of interest is $\theta_{1\#p}$, which captures the time series of differences between male and female rotators' outcomes after selection for rotator service.

Figure 6 reports results on shared-grant ties, measured as the number of panelists with whom a rotator jointly appears on NSFC grants. As shown in Panel (a), we find no evidence of gender differences in co-investigator links between rotators and panelists prior to service, nor do we see differences emerge during service. This latter finding is as expected, since rotators are banned from applying for NSFC grants during this period. After service, however, male rotators establish substantially more grant-based ties with these panelists than do female rotators. These additional links arise almost entirely through direct relationships in which either the rotator or the panelist serves as the grant's principal investigator (Figure A5).

To isolate the role of service-period interaction, we further decompose shared-grant ties into those involving panelists who worked at the NSFC during the rotator's service period and thus had greater opportunities to interact with the rotator, and those involving panelists who began working

[27] Panelist identities in our dataset are observed between 2014 and 2020, reflecting data collection conducted in 2021. A rotator-runner-up comparison would therefore restrict the sample to cohorts entering between 2017 and 2020, yielding at most two post-service years of observations on connections between rotator candidates and panelists. We show analog analysis to the main findings in this section, but using this shorter time window, in Figure A4. Here we see that, when the time series is truncated at two post-service years, initial patterns consistent with our story begin to emerge for male rotators, while for female rotators experience no comparable increase.

after the rotator left the NSFC and thus were less likely to have direct contact with the rotator. Panel (b) of Figure 6 shows that the post-service gender gap in this variable is driven entirely by connections to panelists with whom the rotator overlapped during service. In contrast, we find no gender differences in connections to panelists whose NSFC service did not overlap with the rotator in question.

Taken together, these results suggest that men are more likely than women to convert service-period interactions with senior scholars into enduring professional connections, which are associated with higher subsequent success in securing scientific funding and career progress.

6.2 Coauthorship Ties

We show our results for coauthorship-based ties in Figure 7. Here we find similar patterns for coauthorship ties with panelists as we did for grant-based ties. Panel (a) shows that, after service, male rotators experience an increase in joint publications with senior panelists, relative to male runners-up. In contrast, female rotators experience no such increase and, if anything, a decrease in coauthorship relative to female runners-up.

When we further decompose coauthorship ties by panelists' tenure at the NSFC (as shown in Panels (b) and (c)), we find that the increase for male rotators is driven entirely by collaborations with panelists who worked at the NSFC during the rotator's service period; we find no corresponding increase in coauthored publications with panelists who began working after the rotator left the NSFC.

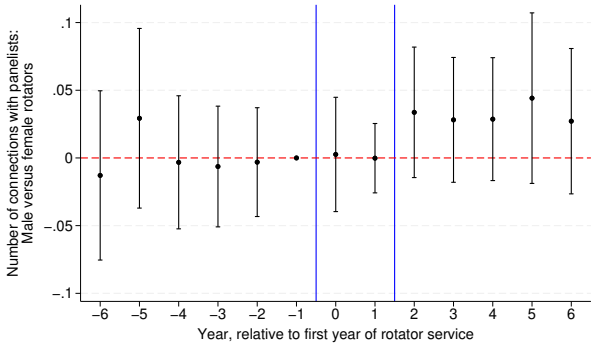
Broader coauthorship links If the observed increase in male rotators' coauthorship with panelists reflected unobserved networking ability, social skills, or increased visibility associated with selection into rotator service, we would expect rotator service to be associated with broader expansion of coauthorship networks. To test this, we conduct a placebo analysis examining their other coauthorship links. We refer to these as links to "non-panelists", i.e., other scientists with whom rotators did not interact via their NSFC service role. As shown in Panel (d) of Figure 7, we find no increase in coauthorship with non-panelists for male rotators following service. If anything, female rotators experience a decline in such coauthorship. This sharply contrasts with the persistent post-service increase in coauthorship with overlapping panelists for male rotators.

Finally, we separate rotator-panelist connections by panelist gender. As shown in Figures A6 and A7, consistent with the gender composition of NSFC panels—only about 10 percent of panelists are women—the post-service increase in connections for male rotators is driven entirely by ties with male panelists, while connections with female panelists show no meaningful gender differences. The patterns hold for both grant-based and coauthorship-based ties.

Overall, these results show that male rotators substantially expand their professional networks

Figure 6. Rotator Service and Shared-grant Ties with Panelists

(a) Overall gender differences in connections



(b) Gender differences in connections: Panelists working during the rotator's service period vs. in other periods

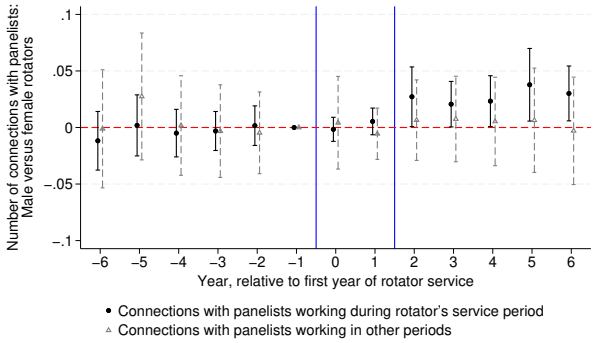
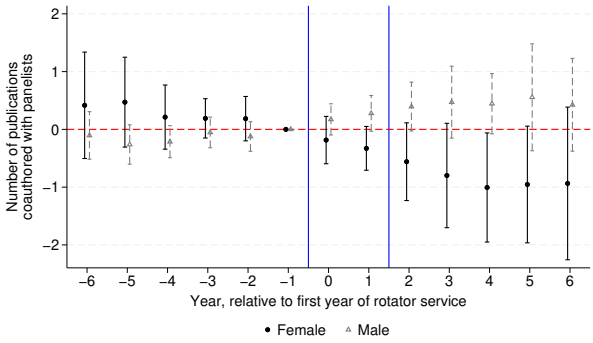


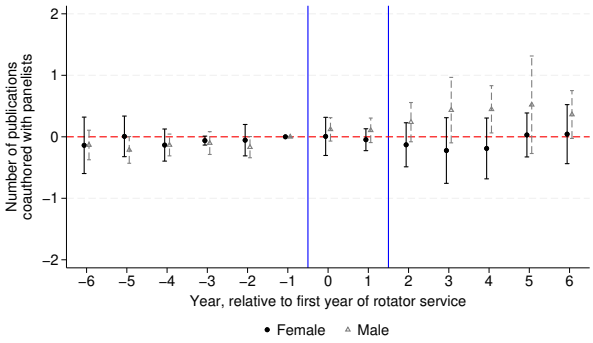
Figure 6 notes: this figure presents estimates of $\theta_{1\#p}$ from equation 4, along with 95 percent confidence intervals. The parameter captures the relative performance of male versus female rotators in year p. The dependent variable is the number of grants on which a rotator and a panelist are both listed in a given year. Panel (a) presents overall gender differences in connections with panelists, while Panel (b) compares gender differences in connections with panelists working at the NSFC during the rotator's service period and with those working in other periods. We superimpose two vertical lines on the figure to mark the two-year window of rotator service. Standard errors are clustered at the rotator level.

Figure 7. Rotator Service and Coauthorship Ties with Panelists

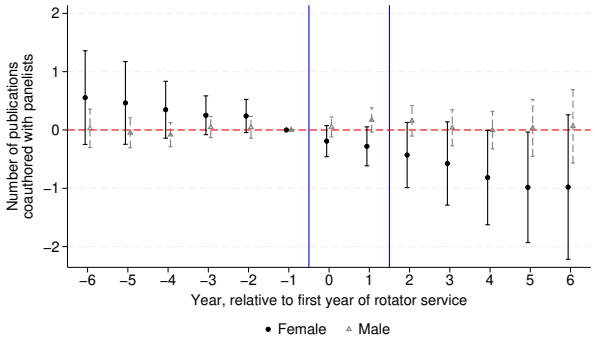
(a) Coauthorship with all panelists



(b) Coauthorship with panelists who overlapped with the rotator's service period



(c) Coauthorship with panelists who did not overlap with the rotator's service period



(d) Placebo test: Coauthorship with non-panelists

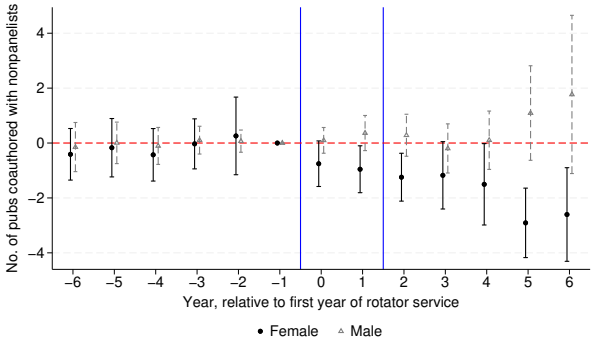


Figure 7 notes: in this figure we present event study estimates of the impact of rotator service on coautorship with senior panelists. This shows estimates of $\alpha_{1\#p}$ from Equation 1, along with 95 percent confidence intervals. The dependent variable is the number of publications coauthored with NSFC panelists at the individual-year level. Panel (a) shows the results for coauthorship ties with all panelists. Panels (b) and (c) restrict the analysis to panelists who worked at the NSFC during the rotator's service period, and not during that period, respectively. Panel (d) shows a placebo test in which the dependent variable is the number of publications coauthored with non-panelists (that is, all scientists in their field except panelists) at the individual-year level. We superimpose two vertical lines on the figure to delimit the period of two years in which a rotator candidate would serve at the NSFC were they to be selected. Standard errors are clustered at the rotator candidate level.

with NSFC panelists, while female rotators do not. The gains for men are concentrated in connections with panelists working during the rotator's service period and in direct relationships, and they arise almost exclusively with male panelists, reflecting both the male-dominated composition of NSFC panels and gendered patterns of professional networking.

6.3 Additional Evidence

We present two additional pieces of evidence on how male and female rotators may benefit from the networks established during service. Each speaks to potential differences in the extent to which rotator service expands professional networks, and, ultimately, career opportunities.

First, we examine perceptions of the benefits of rotator service using text scraped from two large online discussion forums frequently visited by Chinese scientists.[28] Using the key phrase "NSFC rotators" (*liudong xiangmu zhuren* in Chinese), we identified 107 relevant discussion threads.[29] About half (56) explicitly mention that rotator service allows individuals to form networks that benefit themselves or their colleagues. These discussions frequently allege that rotators use these networks to acquire high-stakes special grants, such as the *excellent young scientist* grant or the *distinguished young scientist* grant, or to help colleagues at home institutions secure NSFC funding. They also allege that scholars from other institutions actively seek connections with current rotators because of the influence rotators are perceived to hold in the funding process. Tables A9 and A10 provide examples of comments reflecting these views. While anecdotal, these perceptions highlight that networking is widely understood within the scientific community to be a key benefit of rotator service.

Second, we analyze data on NSFC-sponsored conferences, which serve as important venues for interactions among NSFC officers, panelists, and grant awardees. The data, collected from the NSFC's official website (https://www.nsfc.gov.cn/), include details on conference dates, sponsoring NSFC departments, and host institutions. We match the host institutions of these events to the home institutions of rotators who were serving at or around the time of each conference, focusing on the 37 NSFC-sponsored conferences held outside Beijing between 2017 and 2021.[30] We find that 14 of the 37 conferences were hosted by rotators' home institutions, suggesting that these rotators leveraged their service to bring NSFC-sponsored events to their home institutions and thereby strengthen their professional networks. Strikingly, all but one of these rotator-hosted conferences was organized by a male rotator, even though women make up about one-quarter of all rotators.

[28] These are the websites *Xiaomuchong* (http://muchong.com/bbs/) and the *Shuimu community* (https://www.mysmth.net/nForum).

[29] These data were collected in late 2021.

[30] We separate out non-Beijing conferences because Beijing-based rotators can attend Beijing events with little additional effort. In contrast, conferences held outside Beijing offer more distinct networking opportunities to build new ties.

Taken together, these pieces of evidence reinforce two conclusions. First, a key benefit of rotator service is the expansion of the scientist's professional network, both during and after the service period. Second, men appear to be more likely to leverage these opportunities for professional advancement, helping to explain the much larger career gains they experience relative to women.

7 Heterogeneity by Academic Field

This section examines whether the gendered effects of rotator service vary across academic fields that differ in female representation among senior scientists. Prior work highlights the importance of professional networks and exposure to senior women for women's career outcomes (Sheltzer and Smith, 2014; Ginther and Na, 2021; Athey and Palikot, 2026). Motivated by this literature, we explore heterogeneity in network formation and professional outcomes across fields with differing shares of senior female panelists with whom rotators might network. The heterogeneity results in this section should be interpreted as suggestive, given the relatively small sample size within groups and the potential for bias from other sources (e.g., sorting into fields or different models of knowledge production).

We group NSFC scientific departments into two categories based on the share of senior women in each field serving as panelists over the period of our study. Chemistry, life sciences, and medicine constitute the higher female-representation group, while computer science, earth sciences, engineering, material science, math, and physics form the lower-representation group. This grouping reflects both the gender composition observed in our data and prior evidence on cross-field differences in women's representation (Cheryan et al., 2017).[31]

The gender composition of senior panelists mirrors this classification. In chemistry, life sciences, and medicine, women comprise 17.2 percent of all panelists. In the remaining fields, this is only 7.9 percent—i.e., in this second group, a junior scientist would be less than half as likely to encounter a senior female scientist. Consequently, rotators in the higher-representation fields face greater exposure to influential senior female scientists than those in the low-representation fields.

7.1 Connections with Senior Panelists

Our first analysis examines whether the networking benefits of service vary by our grouping of academic fields. We present these results in Figure 8. Panel (a) reports estimates for shared-grant ties with senior panelists. A pronounced gender gap emerges in fields with lower female

[31] This grouping is consistent with documented gender distributions across fields in both the US and globally. See Sheltzer and Smith (2014), Huang et al. (2020), "The State of U.S. Science and Engineering 2022" (source: https://ncses.nsf.gov/pubs/nsb20221/u-s-and-global-stemeducation-and-labor-force\#demographic-composition-of-the-stem-workforce, accessed January 13, 2023), and the U.S. 2014 NCES report (source: https://nces.ed.gov/programs/digest/2014menu_tables.asp, accessed February 1, 2023).

representation among panelists, while the gap is smaller in fields with higher female representation.

Panels (b) and (c) present results for coauthorship ties between rotators and panelists. The pattern is similar: the gender difference in network gains from rotator service is much smaller in fields with a greater presence of senior female scientists. Taken together, these results suggest that when senior women are more prevalent within a field, the networking returns to rotator service, at least in terms of network formation, become more evenly distributed across genders.

7.2 Professional Benefits

We next explore the heterogeneity in gendered professional benefits associated with rotator service across fields, including both scientific funding and career outcomes.

Scientific funding Panel (a) of Figure 9 shows that in fields with more senior women, the gender gap in post-service NSFC grant receipt is relatively small. In contrast, Panel (b) shows a much larger gender gap in this benefit for rotators in fields with fewer senior women. In these fields, male rotators are more likely to secure grants after service relative to male runners-up, while we find no such effect for female rotators.

Figure A8 further presents results separately for ordinary and special grants. In fields with more senior female scientists, we find little gender gap in the likelihood of receiving ordinary grants and a muted advantage for male rotators in securing higher-stakes special grants, relative to the pooled estimates in Panel (c) of Figure 3. In contrast, in fields with fewer senior women, the gender gap in special grant receipt is much larger, and we observe no positive effects of rotator service on ordinary grant receipt for males and negative effects for females. Because special grant awards rely more heavily on applicant-driven networking, this pattern is consistent with a gendered networking channel underlying the observed differences.

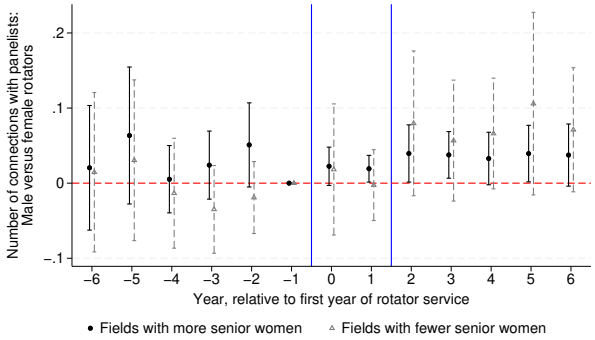
Career progression We next study heterogeneity in longer-run career progression, focusing on the likelihood of rotators later being selected to serve as NSFC review panelists. This outcome captures advancement into senior gatekeeping roles within the scientific funding system. We examine whether this transition differs across fields with varying female senior representation.[32]

Panel (c) of Figure 9 shows that in fields with greater representation of senior women, female rotators experience an increase in their likelihood of later becoming an NSFC panelist, relative to runners-up, which roughly tracks that for male rotators. In contrast, Panel (d) shows that in fields with fewer senior women, rotator service increases the likelihood of becoming an NSFC panelist for male scientists but not for female scientists.

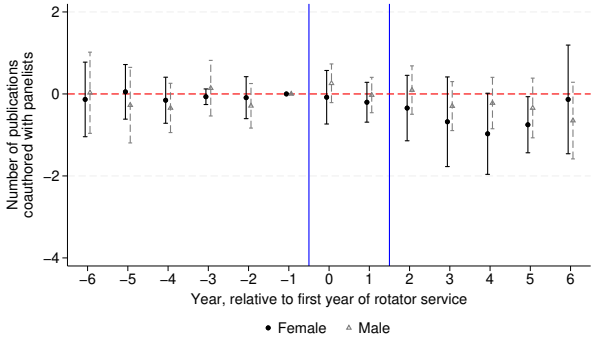
[32] Appendix Figure A9 reports analogous heterogeneity results for promotions to senior administrative positions at home institutions. While estimates for females are imprecise, we find modest gains for female rotators in fields with greater senior female representation and no gains in fields with lower representation.

Figure 8. Rotator Service and Connections with Panelists by Academic Field

(a) Shared grant ties by field



(b) Coauthorship ties in fields with more senior women



(c) Coauthorship ties in fields with fewer senior women

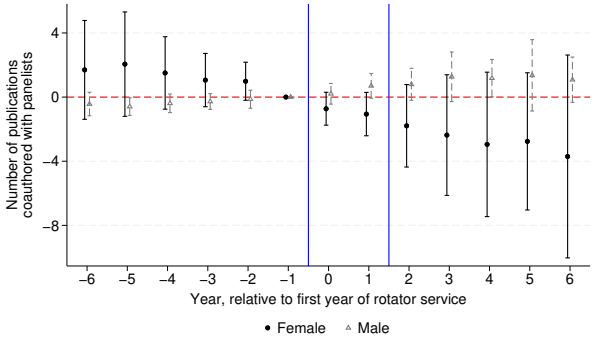
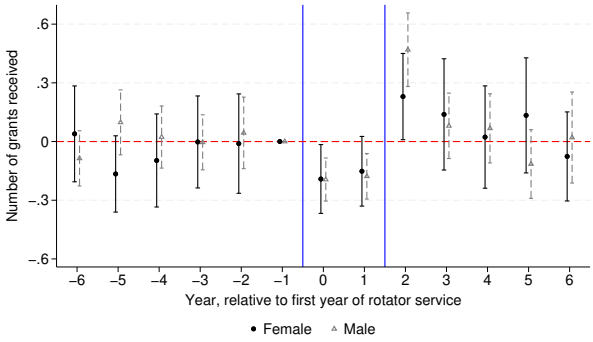


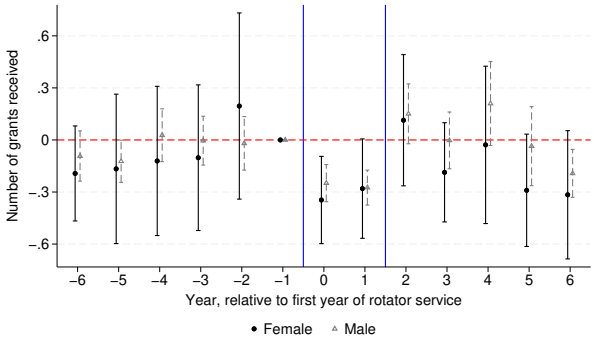
Figure 8 notes: this figure shows estimates of rotator service effects on connections with senior panelists. In Panel (a), we present the estimates of $\theta_{1\#p}$ from equation 4, along with 95 percent confidence intervals. The parameter captures the relative performance of male versus female rotators in year p. The dependent variable is the number of grants on which a rotator and a panelist are both listed in a given year. In Panels (b) and (c), we present estimates of $\alpha_{1\#p}$ from Equation 1 by academic field, along with 95 percent confidence intervals. The dependent variable is the number of publications coauthored with NSFC panelists at the individual-year level. In these two panels, we use all rotator candidates, both rotators and runners-up, because our coauthorship data span a longer period than our shared-grant data. Standard errors are clustered at the individual level.

Figure 9. Professional Benefits of Rotator Service by Academic Field

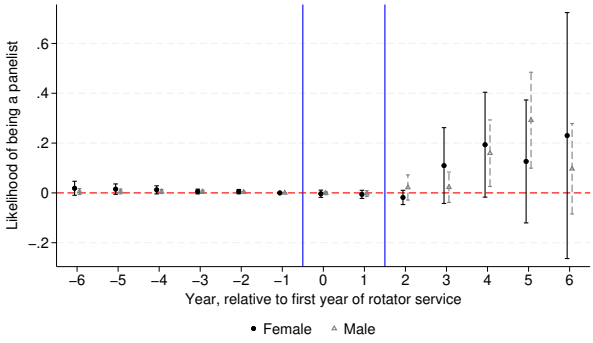
(a) Grants: Fields with more senior women



(b) Grants: Fields with fewer senior women



(c) Serving as panelist: Fields with more senior women



(d) Serving as panelist: Fields with fewer senior women

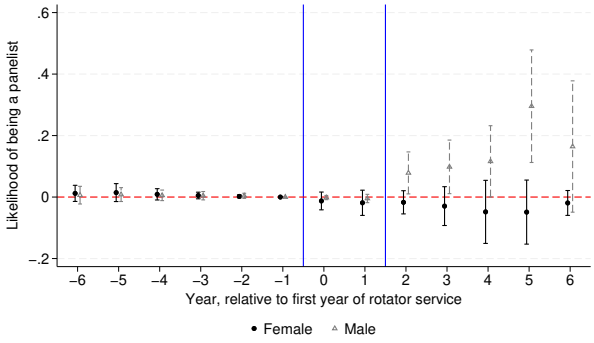


Figure 9 notes: this figure presents estimates of $\alpha_{1\#p}$ from Equation 1, along with 95 percent confidence intervals. In Panels (a) and (b), the dependent variable is the number of awarded NSFC grants at the person-year level. Panel (a) presents estimates for rotator candidates in fields with more senior women, while Panel (b) presents estimates for those in fields with fewer senior women. In Panels (c) and (d), the dependent variable is a dummy variable indicating whether an individual serves as an NSFC panelist in a given year. Panel (c) corresponds to fields with more senior women, and Panel (d) presents estimates for those in fields with fewer senior women. We superimpose two vertical lines on the figure to delimit the period of two years in which a rotator candidate would serve at the NSFC were they to be selected. Standardard errors are clustered at the rotator candidate level.

Taken together with the funding and network results, these patterns suggest a mechanism through which gender disparities in the returns to service arise. In fields with few senior women, female rotators may face limited opportunities to form influential ties, or higher costs of doing so, reducing the professional returns to service. In fields with greater senior female representation—where both access and reciprocity may be stronger—the benefits of service become more evenly distributed across genders, spanning network expansion, grant receipt, and advancement into gatekeeping roles.

Although these heterogeneity estimates are underpowered and should be interpreted cautiously, they consistently indicate that field environments with greater senior female representation are associated with smaller and less persistent gender gaps in professional outcomes.

8 Alternative Explanations

In this section, we evaluate whether channels other than networking could explain the gendered effects of rotator service on career outcomes documented in Section 5. We consider two alternative explanations: insider knowledge about agency processes and changes in scientific productivity.

8.1 Insider Knowledge about NSFC Processes

The first alternative explanation for our findings is that rotators, by virtue of their service, gain insider knowledge about how the NSFC operates—knowledge that could raise the quality of their subsequent grant applications even without relying on personal connections (Hoenen and Kolympiris, 2020). Through service, rotators may learn which research topics are prioritized, how proposals are evaluated, and how to frame contributions more effectively. If so, post-service gains could arise from improved proposal quality rather than from personal connections.

We find little support for this mechanism as an explanation for the gendered patterns documented in Section 5. First, we examine whether male and female rotators perform systematically different tasks during service. Using publicly available posts from NSFC departmental websites, we classify rotator activities into a small number of operational categories.[33] As shown in Figure A11, men and women are assigned a similar portfolio of operational duties. These include drafting reports related to publications from funded research, as well as conducting and reporting on regularly held events at the NSFC, such as forums held on different topics and convened meetings

[33] Because we lack access to internal administrative records, we infer rotator duties using public posts scraped from the website of each NSFC department. Each departmental website has two columns listing author names in each post: "funded publication reports," which highlight important research findings supported by the NSFC, and "work updates," which report NSFC-related activities such as forums or expert meetings. See Figure A10 for example screenshots. We match the author names in these posts to rotators and count the number of items authored by each rotator as a proxy for their engagement in specific duties. While this does not capture all activities, it provides a window into the responsibilities rotators assume during their service.

of experts. Given this similarity in observable duties, it is unlikely that men systematically acquire more procedural knowledge than women.

Second, the insider-knowledge mechanism yields a clear empirical prediction: if improved understanding of NSFC procedures drives post-service gains, the effect should extend across grant types, as application processes are broadly similar. However, as shown in Panels (b) and (c) of Figure 3, there is almost no gender gap in acquiring lower-stakes ordinary grants—where any gains in proposal-writing skill or institutional know-how should also matter. The gender gap instead emerges sharply for high-stakes special grants, which involve greater discretion and are widely viewed as more reliant on networking activities. Given this, the alternative explanation of improved technical understanding of the application process through rotator service cannot reconcile the patterns we document in the benefits from service for grant receipt.

8.2 Scientific Productivity

The next alternative explanation for the gender differences in career gains from rotator service is that men might become more scientifically productive than women as a result of serving at the NSFC. The visibility and information afforded by service—such as exposure to frontier proposals or interactions with senior experts—could translate into improved research output, especially if men are more motivated to respond to competitive environments (Niederle and Vesterlund, 2007). If male rotators are more likely than female rotators to increase their scientific productivity relative to runners-up, this could generate downstream gender gaps in career advancement including receipt of high-stakes special grants and promotions to senior positions.

On the other hand, rotators are required to work full-time at the NSFC for two years performing administrative tasks. This obligation substantially reduces the time available for pursuing their own research, thus potentially negatively affecting their scientific productivity. Thus, whether productivity can explain the gendered patterns is an empirical question.

We assess this by estimating the effect of rotator service on five annual measures of scientific output. The first three measures proxy for an individual's quantity of scientific output: number of total publications, number of first-authored publications, and number of last-authored publications. The last two measures proxy for their publication quality: number of top publications and number of citations to all publications.

Figure 10 plots the event-study results. Across all five metrics, we find no evidence of increases in scientific productivity for male rotators relative to male runners-up during the service period or in the first three years after service—precisely the period during which rotators are most likely to obtain NSFC grants. For women, the estimates also show no productivity gains and, in some cases, suggest some declines starting from the service period, consistent with the time demands of full-time administrative work. Table A11 reports corresponding difference-in-differences

Figure 10. Effects of Rotator Service on Production of Scientific Papers

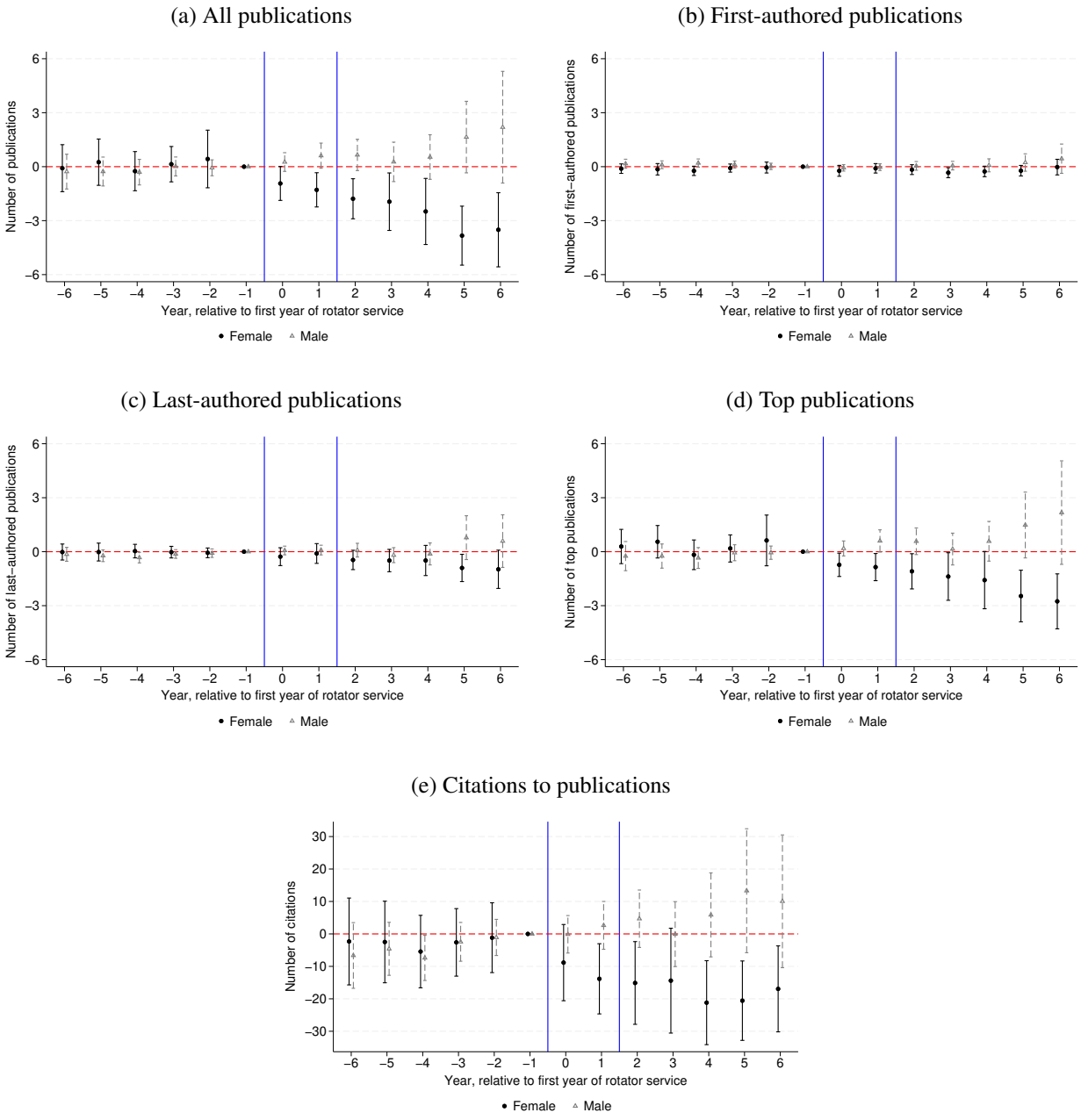


Figure 10 notes: this figure presents estimates of $\alpha_{1\#p}$ from Equation 1, along with 95 percent confidence intervals. The dependent variable is the academic productivity of the person, measured at the person-year level. We show this for five dependent variables, as indicated in the panel title. We superimpose two vertical lines on the figure to delimit the period of two years in which a rotator candidate would serve at the NSFC were they to be selected. Standardard errors are clustered at the rotator candidate level. We show the relevant difference-in-differences results in Table A11, which show no evidence of any difference in productivity between rotators and runners-up on all of these outcomes, except for overall number of papers published by female rotators, which shows a marginally significant penalty for rotator service.

results.[34]

Overall, the absence of any improvement in publication quantity or quality makes it unlikely that enhanced scientific productivity explains the sizable gendered career benefits documented in Section 5.[35]

9 Conclusion

Across high-skilled professions, far more men than women advance to senior roles. This phenomenon has persisted well into the 21st century, despite dramatic progress in recent decades towards gender equality in many educational and labor market outcomes. We study the role of professional networks, which are often crucial for professional advancement, to help explain this persistence. We focus on academic science, exploiting the final round of selection for professional service roles at a major funding organization in China as a source of plausibly exogenous expansions to scientists' professional networks.

We find large career gains for men chosen for service, including higher success in securing high-stakes research grants, greater advancement into senior leadership positions at home institutions, and an increased likelihood of later serving as influential NSFC panelists, who play an important role in allocating basic research funding in China. In contrast, women experience no comparable short or long-term benefits from the same service, despite facing similar formal responsibilities and networking opportunities.

Our analysis points to gendered professional networks as the central mechanism. While service provides access to influential scientists, these networking opportunities are not equally realized: men expand their networks far more than women, and the magnitude of their subsequent career gains closely tracks this expansion. These dynamics are reinforced by the structure of scientific gatekeeping: senior scientists are predominantly male, and male rotators are more likely to become future gatekeepers themselves. As a result, male-dominated networks reproduce themselves over time, perpetuating gender inequality at senior levels. Consistent with this mechanism, gender gaps in the returns to service are smaller in fields with greater senior female representation. Alternative explanations—such as the acquisition of insider knowledge or increases in scientific productivity—cannot account for these patterns.

Taken together, our findings highlight that professional service, networking opportunities, and gender inequality in science are deeply intertwined. Professional service—an institutional

[34] While male rotators show modest increases in both total publications and top publications, these gains are driven largely by middle-authored contributions rather than by roles indicating primary intellectual contributions. This pattern aligns with our connections-based mechanism. We report these results in Figure A12 and Table A12.

[35] This conclusion is consistent with our analysis of funding from sources outside the NSFC (Figure 4). If rotator service increased scientific productivity—particularly for male rotators—we would expect to observe corresponding gains in non-NSFC funding. We find no such post-service effects.

arrangement intended to strengthen the scientific system—can inadvertently amplify preexisting inequalities when embedded in networks dominated by historically advantaged groups. The benefits of professional interactions hinge both on network position and who occupies central roles: we show how men who gain access to influential networks gain disproportionate advantages, while women who gain similar access find that their participation is far less rewarded.

More broadly, our study shows that in science, as in other professions, the legacy of who has historically held power continues to shape opportunities. In settings where professional advancement depends on interpersonal interactions and the judgment of senior figures in allocating opportunities, the benefits from these interactions often depend, as they do in the case we study, on personal traits or advantages that historically have conferred privileges—such as gender, race, socioeconomic status, or able-bodiedness. As a result, past inequality can persist far into the future, even despite demographic or social changes which might otherwise suggest a trend toward greater equality.

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Appendices

Appendix Tables

Table A1. Data Sources

Description of data	Source of data	Years covered	Variables
Roster of candidates	Main NSFC website; internet archive; Bulletin of the National Natural Science Foundation of China; Google and Baidu searches with the keywords "NSFC rotators" (in Chinese, liudong xiangmu zhuren)	Rotators: 2002-2021; Finalists: 2017-2021	Age, gender, rank, home institution, promotion record, later appointment as an NSFC panelist
Administrative data on NSFC grants	Main NSFC website	2000-2023	Type of grant; amount of grant
Data on scientific publications	Scopus.com	1997-2024	Ordered author list; journal; annual citations
Data on rotator candidate-panelist connections	Main NSFC website; Sciencenet.com; Cingta.com; Scopus.com	Grant-based connections: 2014-2020; Publication-based connections: 2014-2024	Connections between rotator candidates and panelists

Table A1 notes: this table summarizes the data sources we describe in Section 3.

Table A2. Summary Statistics for Rotator Candidates

	All	Rotators	Runners-up
Female	0.222	0.204	0.236
Age at interview	38.42	37.97	38.80
Full professor at interview	0.421	0.445	0.402
Scientific department	0.746	0.752	0.741
Undergraduate study			
Elite university	0.400	0.420	0.382
Equivalent to R1	0.193	0.165	0.218
Other university	0.408	0.416	0.401
PhD study			
Elite university	0.470	0.463	0.477
Equivalent to R1	0.170	0.149	0.188
Chinese Academy of Sciences	0.115	0.104	0.123
Other institutions	0.245	0.284	0.211
Home institution			
Elite university	0.312	0.349	0.279
Equivalent to R1	0.239	0.232	0.244
Chinese Academy of Sciences	0.077	0.070	0.083
Other institutions	0.373	0.349	0.394
Pre-interview productivity			
Number of publications	4.520	4.566	4.479
Number of first-authored publications	0.745	0.757	0.735
Number of last-authored publications	0.908	0.971	0.852
Number of top publications	2.683	2.659	2.703
Number of citations	25.278	27.893	23.002
Pre-interview connections			
Number of grants with NSFC panelists	0.027	0.029	0.026
Number of panelists connected to via grants	0.074	0.074	0.074
N	622	274	348

Table A2 notes: This table presents summary statistics for the individuals in our sample of rotator candidates. We provide the mean of each variable in our sample (column 1) as well as the group-specific mean for rotators and runners-up separately (columns 2 and 3, respectively). "Elite universities" are the 39 universities recognized as the most prestigious in China, officially so by China's "Project 985." This group includes both Peking and Tsinghua Universities. "Equivalent to R1" refers to the group of 77 Chinese universities recognized by the Chinese government's 211-Project, but not by the slightly more prestigious Project 985. The Chinese Academy of Sciences (CAS) is China's premier national research institution; it comprises more than 100 affiliated institutes and laboratories.

Table A3. Do baseline characteristics predict being chosen for rotator service?

	(1) Full sample	(2) Full sample	(3) Female	(4) Male
Female	-0.019	-0.061		
	(0.058)	(0.111)		
Age at interview	-0.013**	-0.017	-0.019	-0.010
	(0.007)	(0.013)	(0.015)	(0.008)
Full professor at interview	0.044	0.066	0.128	0.038
	(0.051)	(0.103)	(0.135)	(0.057)
Scientific department	-0.052		-0.003	-0.073
	(0.058)		(0.142)	(0.066)
Undergraduate study:				
Elite university	-0.003	0.031	-0.164	0.041
	(0.057)	(0.106)	(0.140)	(0.065)
Equivalent to R1	-0.100	-0.094	-0.233	-0.054
	(0.066)	(0.125)	(0.176)	(0.075)
PhD study:				
Elite university	-0.097	-0.121	0.011	-0.108
	(0.060)	(0.109)	(0.150)	(0.068)
Equivalent to R1	-0.082	-0.228	-0.003	-0.081
	(0.079)	(0.152)	(0.204)	(0.088)
Chinese Academy of Sciences	-0.116	-0.076	-0.041	-0.115
	(0.095)	(0.171)	(0.209)	(0.115)
Home institution:				
Elite university	0.066	0.113	0.022	0.090
	(0.063)	(0.119)	(0.159)	(0.073)
Equivalent to R1	0.042	0.084	-0.045	0.065
	(0.066)	(0.127)	(0.147)	(0.074)
Chinese Academy of Sciences	0.122	0.325	0.200	0.063
	(0.111)	(0.214)	(0.214)	(0.145)
Pre-interview productivity:				
Number of publications	0.008	0.004	0.029	0.004
	(0.012)	(0.024)	(0.035)	(0.013)
Number of first-authored publications	-0.006	-0.019	0.062	-0.008
	(0.023)	(0.045)	(0.107)	(0.023)
Number of last-authored publications	0.012	0.025	-0.074	0.021
	(0.020)	(0.041)	(0.061)	(0.021)
Number of top publications	-0.015	-0.010	-0.027	-0.014
	(0.015)	(0.030)	(0.049)	(0.016)
Pre-interview connections:				
Number of panelists connected to via grants	0.010	-0.107	-0.014	0.023
	(0.084)	(0.167)	(0.158)	(0.098)
Position FEs	No	Yes	No	No
p-value for joint F test	0.591	0.798	0.268	0.743
R^2	0.029	0.128	0.129	0.029
N	480	407	98	382

Table A3 notes: this table presents estimates of regressing the rotator indicator on individual characteristics before the interview. In column (2) we control for position fixed effects in the regression. In columns (3) and (4) we repeat the analysis for females and males separately. *** < 0.01, ** < 0.05, * < 0.1. The number of observations varies between this table and our other results because we have missing values for some variables. We omit two variables ("Number of citations" and "Number of connections") to avoid issues with collinearity.

Table A4. How Rotator Service Affects Grant Receipt: Overall Effect Estimates

	(1) All grants	(2) Ordinary grants	(3) Special grants
Panel A: Females			
Overall effect (β_1)	-0.057*	-0.049*	-0.008
	(0.032)	(0.030)	(0.011)
Pre-interview outcome mean	0.198	0.180	0.019
N	1,362	1,362	1,362
Panel B: Males			
Overall effect (β_1)	-0.040***	-0.066***	0.026***
	(0.017)	(0.015)	(0.009)
Pre-interview outcome mean	0.208	0.187	0.021
N	4,818	4,818	4,818

Table A4 notes: this table presents estimates of β_1 from Equation 2. The outcome variable is the number of NSFC grants the person has won in a given year. We present estimates separately for all grants, and for two distinct types of grants (respectively), as listed in the column heading. We control for both individual and year fixed effects in all regressions. Standard errors are clustered at the rotator candidate level. *** < 0.01, ** < 0.05, * < 0.1.

Table A5. How Rotator Service Affects Amount of Grant Money Received, in Thousands of Yuan

	(1) Female	(2) Male
Overall effect (β_1)	-53.996*	20.693
	(27.674)	(20.471)
During service (γ_1)	-120.929***	-143.870***
	(23.206)	(14.364)
After service (γ_2)	19.390	220.363***
	(42.509)	(41.863)
Pre-interview outcome mean	105.814	119.465
N	1,362	4,818

Table A5 notes: this table presents estimates of β_1 from Equation 2 and, from a separate estimation, of γ_1 and γ_2 from Equation 3. The dependent variable is the amount of grant money the person received from the NSFC in a given year. We present estimates for females and males separately, as indicated in the column headings. Observations occur at the individual-year level. We control for both individual and year fixed effects in all regressions. Standard errors are clustered at the rotator candidate level. *** < 0.01, ** < 0.05, * < 0.1.

Table A6. How Rotator Experience Affects Grant Receipt from Various Sources

	(1) NSFC grants	(2) Non-NSFC grants	(3) Grants from other countries
Panel A: Females			
During service (γ_1)	-0.058***	-0.202**	-0.027
	(0.021)	(0.102)	(0.028)
After service (γ_2)	-0.000	-0.231*	-0.010
	(0.025)	(0.123)	(0.030)
Pre-interview outcome mean	0.081	0.556	0.069
N	1,362	1,362	1,362
Panel B: Males			
During service (γ_1)	-0.090***	0.200**	-0.005
	(0.015)	(0.093)	(0.022)
After service (γ_2)	0.047***	0.063	0.004
	(0.020)	(0.108)	(0.026)
Pre-interview outcome mean	0.118	0.862	0.107
N	4,818	4,818	4,818

Table A6 notes: this table presents estimates of γ_1 and γ_2 from Equation 3. γ_1 is the penalty in the outcome variable experienced by those selected for rotator service during their period of service, during which time they are ineligible to receive grants, and γ_2 is the (potential) premium they experience after they complete service and are once again eligible. The outcome variable is the number of associated grants in a given year: NSFC grants in Column (1), non-NSFC grants awarded by Chinese institutions in Column (2), and grants awarded by foreign institutions in Column (3). Standard errors are clustered at the rotator candidate level. *** < 0.01, ** < 0.05, * < 0.1.

Table A7. How Rotator Service Affects Likelihood of Becoming an NSFC Panelist

	(1) Female	(2) Male
Overall effect (β_1)	0.008	0.026***
	(0.015)	(0.008)
During service (γ_1)	-0.011	-0.007*
	(0.007)	(0.004)
After service (γ_2)	0.030	0.066***
	(0.028)	(0.016)
Pre-interview outcome mean	0.000	0.000
N	1,362	4,818

Table A7 notes: this table presents estimates of β_1 from Equation 2 and, from a separate estimation, of γ_1 and γ_2 from Equation 3. Our outcome variable of interest is the person's likelihood of being selected to serve as a panelist in a given year. We present estimates for females and males separately, as indicated in the column headings. We restrict our attention to six years prior to the interview and six years after the interview because we do not have observations for rotator runners-up beyond this window. We control for both individual and year fixed effects in all regressions. Standard errors are clustered at the rotator candidate level. *** < 0.01, ** < 0.05, * < 0.1.

Table A8. How Rotator Service Affects Likelihood of Promotion

	(1) Female	(2) Male
Overall effect (β_1)	0.007	0.019**
	(0.009)	(0.008)
During service (γ_1)	-0.002	-0.002
	(0.010)	(0.009)
After service (γ_2)	0.016	0.045***
	(0.015)	(0.013)
Pre-interview outcome mean	0.004	0.011
N	1,362	4,818

Table A8 notes: this table presents estimates of β_1 from Equation 2 and, from a separate estimation, of γ_1 and γ_2 from Equation 3. Our outcome variable of interest is the person's likelihood of being promoted in a given year. We present estimates for females and males separately, as indicated in the column headings. We control for both individual and year fixed effects in all regressions. Standard errors are clustered at the rotator candidate level. *** < 0.01, ** < 0.05, * < 0.1.

Table A9. Anecdotes from Online Discussion Forums: Set 1

Number	English	Chinese	Source
1	The funding committees are like emperors, whomever serves on them brings the favor of the emperor to their university, bringing lots of benefits, for example help in the grant assessment committee. After finishing, applying for grants becomes much more convenient, the person can contact those whom they served with regardless of the program in which they served. I know someone with a very mediocre publication record who won the outstanding young scholar award after three years of service – with more resources you can get more PhD students and post-docs, and the publications stack up fast – now this person has several hundred publications.	基金委就像皇帝，翻牌子来决定借调哪个学校的人，能被借调的学校倍感皇恩浩荡。到了皇帝身边，可以为婆家说好话，谋利益，比如各种本子函评会评都会有好处。皇帝宠幸结束会婆家，自己申请项目也方便，给基金委的前同事打个招呼，什么项目大差不差都能中。我知道一个三本毕业没什么干货甚至没几篇论文的给基金委宠幸三年回头上了杰青。资源多了以后多找博士博士后，很快论文就摞起来了，现在论文几百篇。	https://exp.newsmth.net/topic/1cdea01ba1768f8221c5eebaa5a1422c/1
2	If your friend goes to serve as a rotator, give him a ring and have him help you fix [your grant application's status].	你的本子要能上会，他打个招呼就给你搞定了。	https://www.mysmth.net/nForum/#!article/QingJiao/599679
3	We had two people who served as rotators, after which one of them won three big grants in the following four years, the other won grants three years in a row, for a total of four grants in five years. If you think there isn't something fishy in here, then you're fooling yourself.	我们这里两个人去基金委借调后，一个 4 年之内拿三个项目（分别是 2015、2016、2018），一个连续三年中奖，五年拿四个（分别是是 2014、2016、2017、2018）。你要说这里面没猫腻，那就见鬼了。	https://www.mysmth.net/nForum/#!article/QingJiao/599679

Table A9 notes: these anecdotes were collected from two large discussion forums for scientists in China: **Xiaomuchong** (http://muchong.com/bbs/) and the **Shuimu community** (https://www.mysmth.net/nForum) as described in Section 3.

Table A10. Anecdotes from Online Discussion Forums: Set 2

Number	English	Chinese	Source
4	Yourself, your colleagues, and your friends – everyone gets some benefit [from your service].	自己和单位或熟人，在不同程度上都可受益吧。	http://muchong.com/t-3551062-1
5	This year there was someone who had served as a rotator and then won the outstanding early career scholar grant. You tell me whether there's a relationship?	今年有一个担任项目主任，上了杰青的。你说有没有意义？	http://muchong.com/t-3551062-1
6	Every year there are rotators from universities at the NSFC, this is really a great business and everyone knows it. After the two years of service, whichever school had it, their amount of grants is going to go up. These rotators also get tons of invitations to give talks and participate in scholarly exchanges, and everyone knows what the goal is.	基金委每年都在高校公开招聘"流动编制项目主任"，这确是好差事，大家心知肚明。此流动部主任一般任期 2 年，哪个学校有的话，据说当年申请基金数目上涨。他们也经常被很多学校邀请去作报告、进行交流。目的大家是懂的。	http://muchong.com/t-3444071-1-authorid-1073943
7	Service for the NSFC as rotators or on grant selection committees is extremely unfair. I think everyone knows what these people can do. Can't the NSFC just hire more employees? Do they really need to use rotators? Who are the rotators really serving? Is it everyone at their home institution? Is it the people in their field? Their institution's leaders? Everyone knows someone who's like this.	坚决避免从下面高校借调人员参与基金委送审、打包等工作。这是明显的不公平的地方，借调去的人能做什么我想大家心里都会有个预期。难道基金委就不能多招些工作人员吗？非得用这种方式？借调过去的人能为谁谋福利？是他所在的学校的人？是和他有竞争关系的同学科的人？是他的本单位的领导？等等，大家都会有自己认识的。	http://muchong.com/html/201505/8975199.html

Table A10 notes: these anecdotes were collected from two large discussion forums for scientists in China: **Xiaomuchong** (http://muchong.com/bbs/) and the **Shuimu community** (https://www.mysmth.net/nForum) as described in Section 3.

Table A11. How Rotator Service Affects Scientific Productivity

	(1) Number of all publications	(2) First-authored publications	(3) Last-authored publications	(4) Top publications	(5) Number of citations
Panel A: Females					
During service (γ_1)	-1.202**	-0.074	-0.173	-1.023**	-9.221**
	(0.558)	(0.091)	(0.185)	(0.440)	(4.449)
After service (γ_2)	-2.288***	-0.145	-0.521*	-1.666***	-14.384***
	(0.783)	(0.109)	(0.267)	(0.679)	(5.813)
Pre-interview outcome mean	2.630	0.425	0.390	1.563	11.349
N	1,362	1,362	1,362	1,362	1,362
Panel B: Males					
During service (γ_1)	0.542	-0.128	0.205	0.507*	4.080
	(0.335)	(0.079)	(0.139)	(0.284)	(3.064)
After service (γ_2)	0.753	-0.004	0.171	0.689	7.190
	(0.524)	(0.119)	(0.243)	(0.445)	(4.472)
Pre-interview outcome mean	3.663	0.755	0.662	2.320	18.655
N	4,818	4,818	4,818	4,818	4,818

Table A11 notes: this table presents estimates of γ_1 and γ_2 from Equation 3. Here we study the impact of rotator service on scientific productivity in a given year. We use five annual indicators, as labeled in the top row of the table. We control for both individual and year fixed effects in all regressions. Standard errors are clustered at the rotator candidate level. *** < 0.01, ** < 0.05, * < 0.1.

Table A12. How Rotator Service Affects Scientific Productivity: Additional Evidence

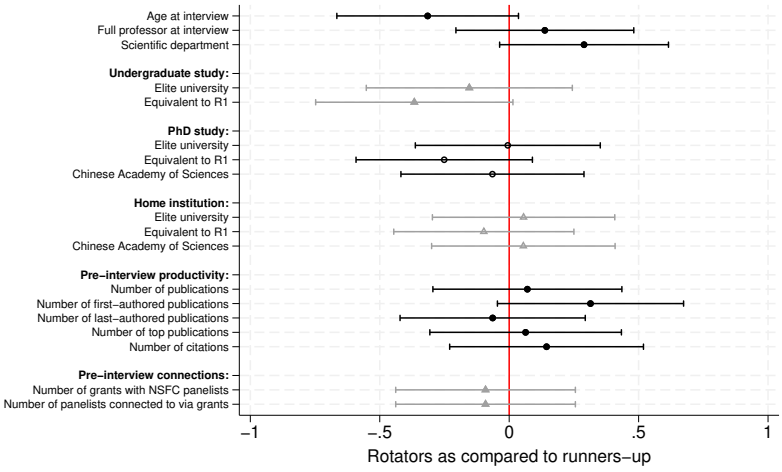
	(1) Number of publications: middle-authored	(2) Top publications: first/last-authored	(3) Top publications: middle-authored
Panel A: Females			
During service (γ_1)	-0.947**	-0.261*	-0.762**
	(0.439)	(0.156)	(0.348)
After service (γ_2)	-1.608***	-0.299	-1.367***
	(0.602)	(0.243)	(0.531)
Pre-interview outcome mean	1.824	0.446	1.118
N	1,362	1,362	1,362
Panel B: Males			
During service (γ_1)	0.457*	0.144	0.345
	(0.275)	(0.137)	(0.227)
After service (γ_2)	0.502	0.176	0.441
	(0.402)	(0.225)	(0.343)
Pre-interview outcome mean	2.260	0.817	1.503
N	4,818	4,818	4,818

Table A12 notes: this table presents estimates of γ_1 and γ_2 from Equation 3. Here we study the impact of rotator service on scientific productivity in a given year. We use three annual indicators, as labeled in the top row of the table. We control for both individual and year fixed effects in all regressions. Standard errors are clustered at the rotator candidate level. *** < 0.01, ** < 0.05, * < 0.1.

Appendix Figures

Figure A1. Do baseline characteristics predict being chosen for rotator service? Tests within gender

(a) Females



(b) Males

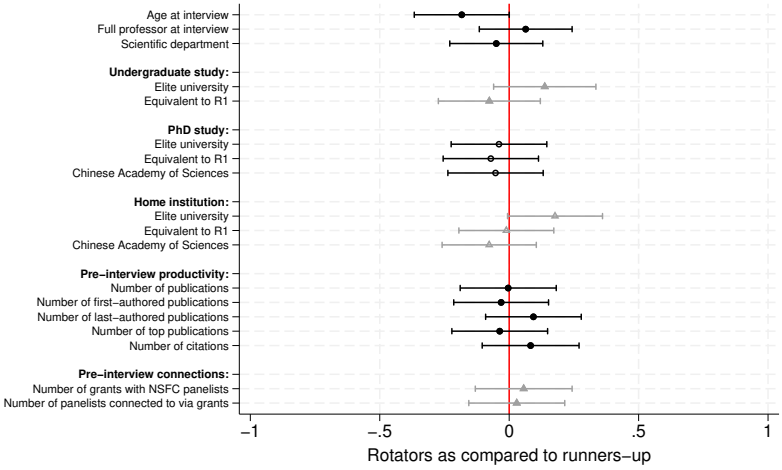
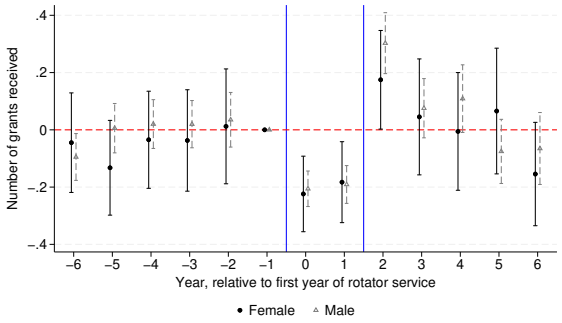


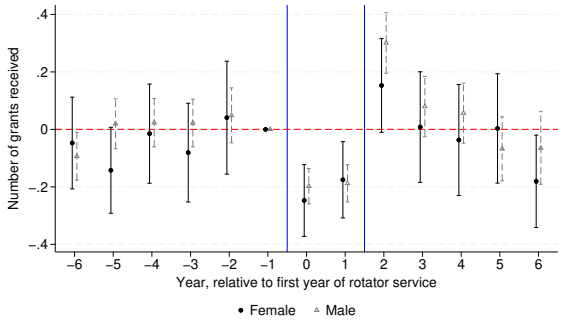
Figure A1 notes: this figure presents separate gender-specific estimates from regressions of pre-treatment characteristics on the indicator variable for rotator experience and no other controls. As in Figure 2, a positive value means rotators have greater average levels of the trait than runners-up, and a negative value means the opposite. These characteristics include age at interview, academic rank at interview, educational background, and prestige of home institutions. "Elite universities" are the 39 universities recognized as the most prestigious in China, officially so by China's "Project 985." This group includes both Peking and Tsinghua Universities. "Equivalent to R1" refers to the group of 77 Chinese universities, recognized by the Chinese government's 211-Project but not by (the slightly more prestigious) Project 985. The Chinese Academy of Sciences (CAS) is China's premier national research institution with more than 100 affiliated institutes and laboratories. Connections are measured in two ways: (a) the number of NSFC grants on which rotator candidates and panelists serve as co-investigators, and (b) an indicator for whether a rotator and a panelist serve as co-investigators on the same NSFC grant.

Figure A2. Robustness of the Results for Grant Receipt

(a) Dropping those who became permanent employees at the NSFC



(b) Dropping those who attended the interview more than once



(c) Dropping job positions with incomplete candidate lists

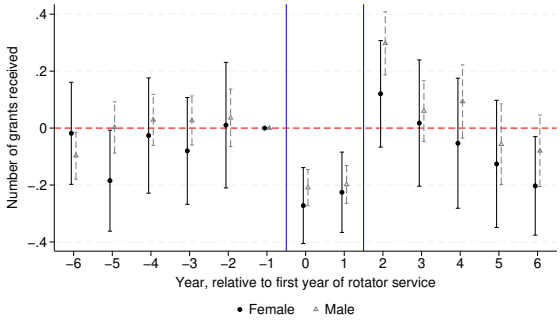


Figure A2 notes: in this figure we present a version of Figure 3 in which we show robustness of our results to excluding parts of the sample, as indicated in the panel title. As in Figure 3, these show estimates of $\alpha_{1\#p}$ from Equation 1, along with 95 percent confidence intervals. We superimpose two vertical lines on the figure to delimit the period of two years in which a rotator candidate would serve at the NSFC were they to be selected. Standard errors are clustered at the rotator candidate level.

Figure A3. Effects of Rotator Service on the Amount of Grant Funding Received

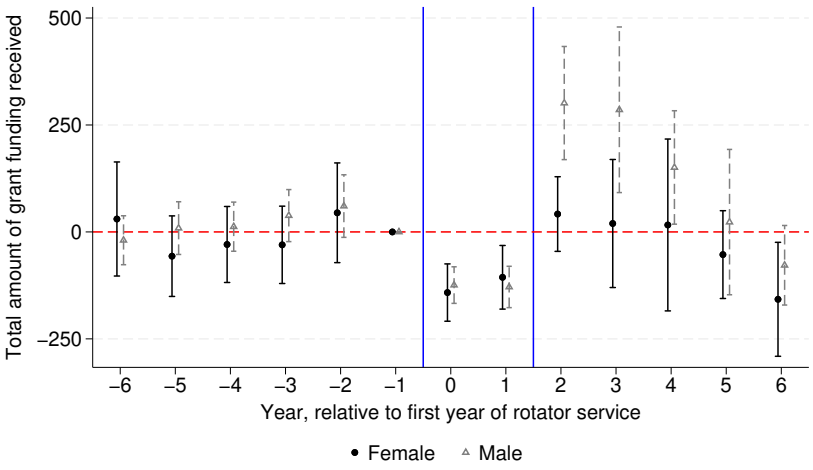
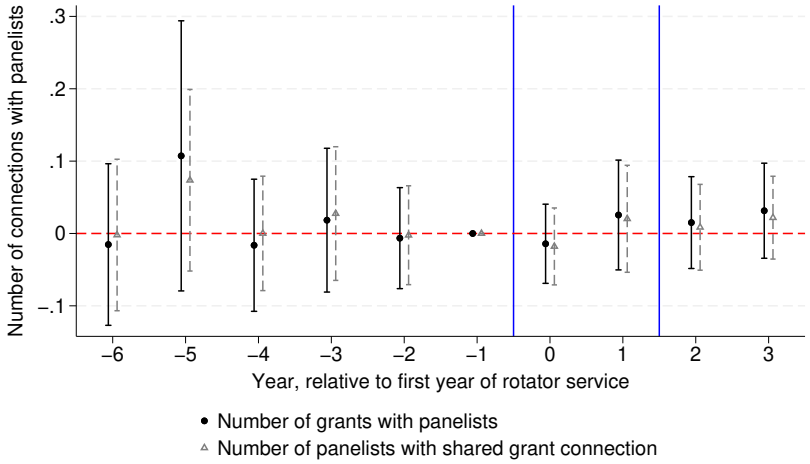


Figure A3 notes: this figure presents estimates of $\alpha_{1\#p}$ from Equation 1, along with 95 percent confidence intervals. The parameter captures the performance of a rotator of the gender indicated in the estimate marker, compared to a runner up, in that year. The dependent variable is the amount of grant money the person wins in a given year, measured in thousands of Chinese Yuan. We superimpose two vertical lines on the figure to delimit the two-year period in which a rotator candidate would serve at the NSFC, were they to be selected. Standard errors are clustered at the rotator candidate level.

Figure A4. Shared-grant ties by Gender: Rotators versus Runners-up

(a) Females



(b) Males

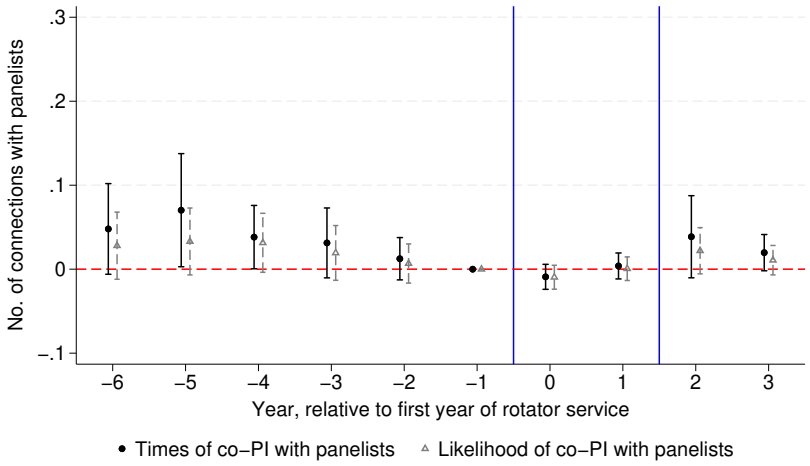


Figure A4 notes: in this figure we present event study estimates of the impact of rotator service on being co-investigator relationships with senior panelists. This shows estimates of $\alpha_{1\#p}$ from Equation 1, along with 95 percent confidence intervals. The dependent variables are either the number of grants on which a rotator and a panelist are both listed in a given year or an indicator for any such joint appearance. Panel (a) presents the estimates with female rotator candidates, while Panel (b) presents the estimates with male rotator candidates. We superimpose two vertical lines on the figure to mark the two-year window of rotator service. Standard errors are clustered at the individual level.

Figure A5. Direct and Indirect Connections Between Rotators and Panelists Before and After Service

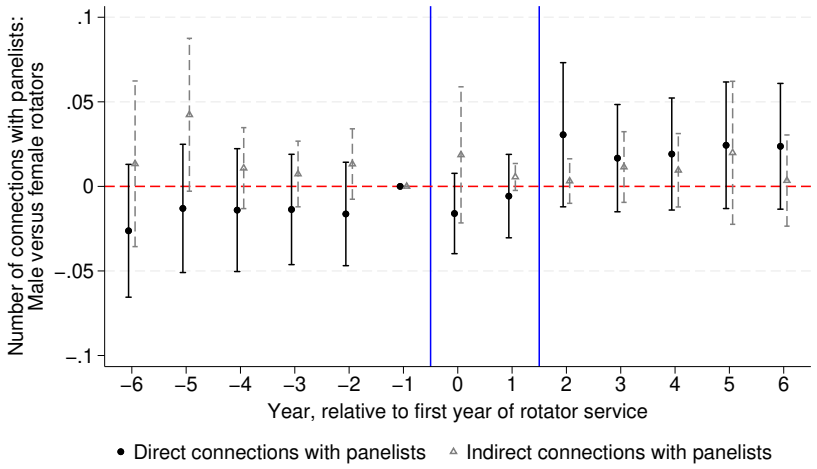


Figure A5 notes: this figure presents estimates of $\alpha_{1\#p}$ from equation 4, along with 95 percent confidence intervals. The parameter captures the performance of a male rotator, as compared to a female rotator, in that year. The estimates are for two separate dependent variables: the first is direct connections, described as a grant on which both rotator and PI are named, and either the rotator or panelist was the PI; and the second is indirect connections, which are grants in which both rotator and panelist are named, but neither was the PI. This disaggregates the results for all connections, shown in Figure 6. We superimpose two vertical lines on the figure to delimit the two year period in which rotator service occurs.

Figure A6. Rotator Service and Shared-grant Ties with Panelists: Female Versus Male Panelists

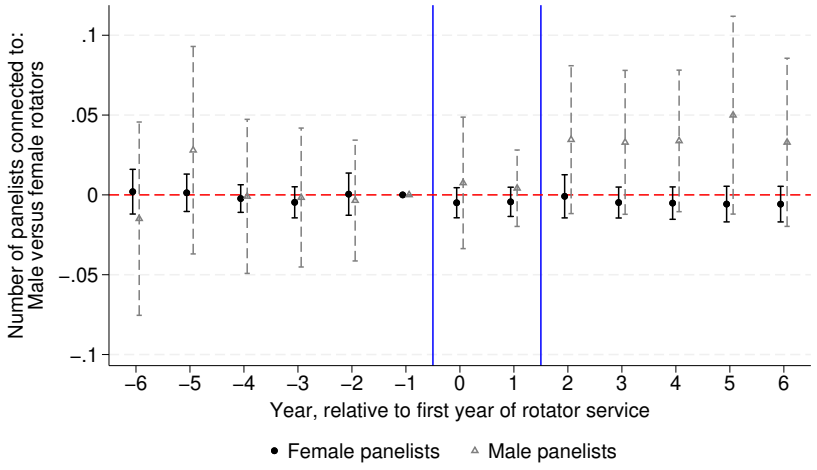
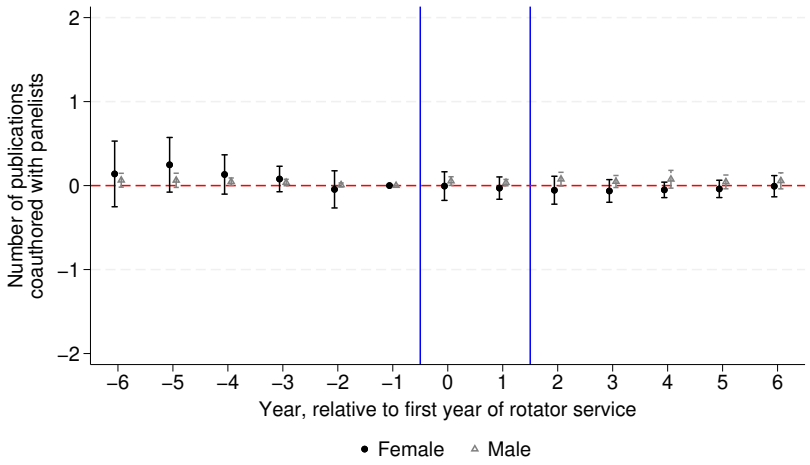


Figure A6 notes: this figure presents estimates of $\theta_{1\#p}$ from the equation 4. The parameter captures the relative performance of male versus female rotators in year p. The dependent variable is the number of grants on which a rotator and a panelist are both listed in a given year. The estimates are reported separately for connections with female and male panelists. We superimpose two vertical lines on the figure to mark the two-year window of rotator service. Standard errors are clustered at the rotator level.

Figure A7. Rotator Service and Coauthorship Ties with Panelists: Female Versus Male Panelists

(a) Coauthorship with female panelists



(b) Coauthorship with male panelists

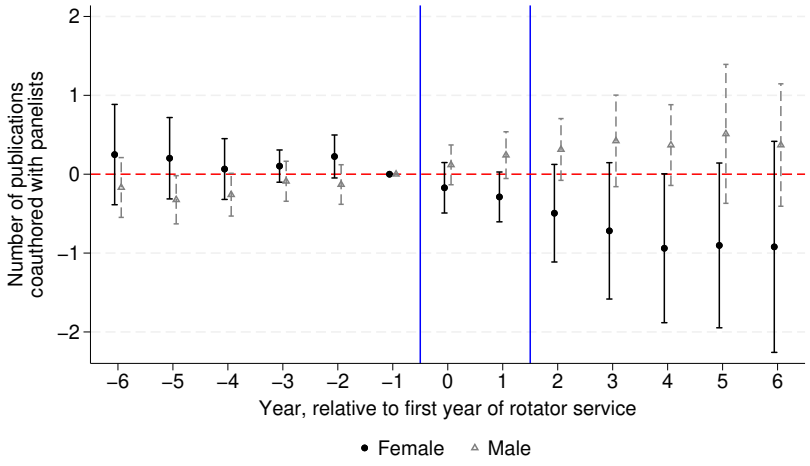
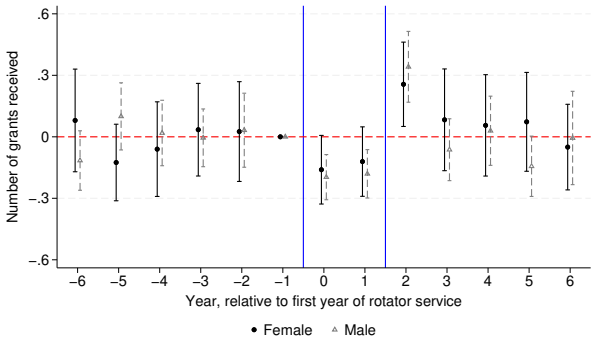


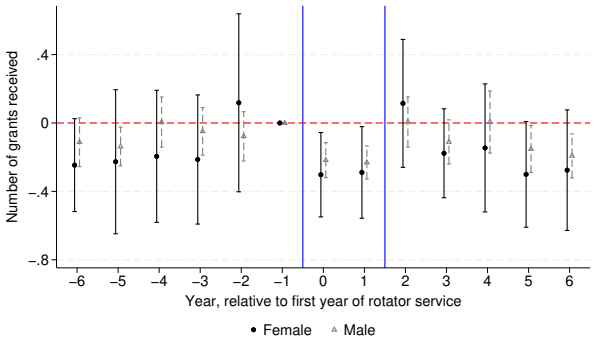
Figure A7 notes: in this figure we present event study estimates of the impact of rotator service on coautorship with senior panelists. This shows estimates of $\alpha_{1\#p}$ from Equation 1, along with 95 percent confidence intervals. The dependent variable is the number of publications coauthored with NSFC panelists at the individual-year level. The estimates are reported separately for coauthoring with female and male panelists. We superimpose two vertical lines on the figure to delimit the period of two years in which a rotator candidate would serve at the NSFC were they to be selected. Standard errors are clustered at the rotator candidate level.

Figure A8. Rotator Service and Scientific Funding by Academic Field: Ordinary vs. Special Grants

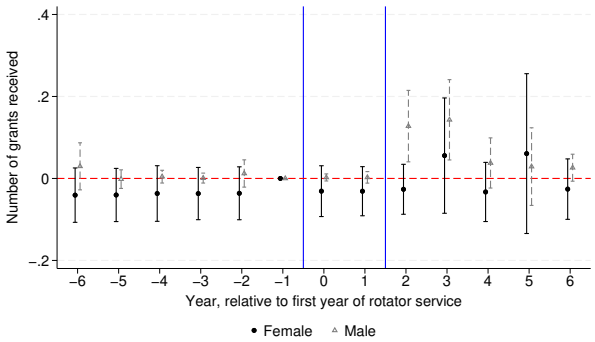
(a) Ordinary grants: Fields with more senior women



(b) Ordinary grants: Fields with fewer senior women



(c) Special grants: Fields with more senior women



(d) Special grants: Fields with fewer senior women

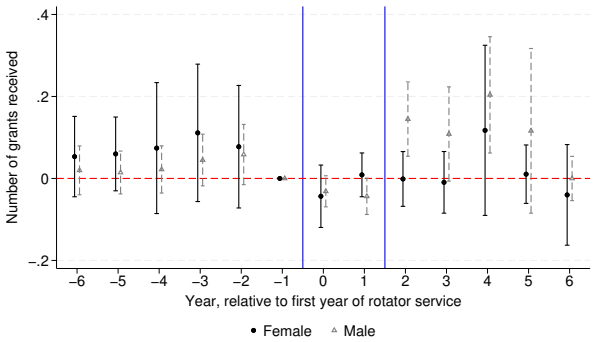
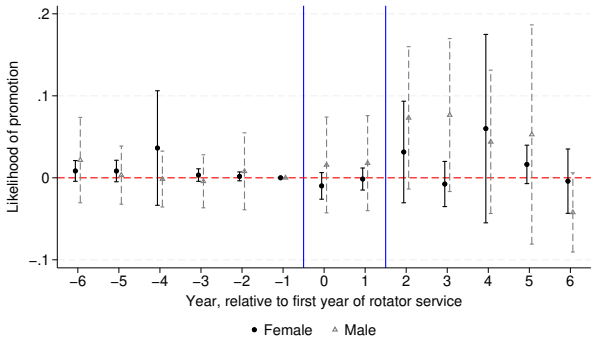


Figure A8 notes:this figure presents estimates of $\alpha_{1\#p}$ from Equation 1, along with 95 percent confidence intervals. The parameter captures the performance of a rotator of the gender indicated in the estimate marker, compared to a runner-up, in that year. The dependent variable is the number of ordinary grants the person wins in a given year in Panels (a) and (b) and the number of special grants in Panels (c) and (d). We superimpose two vertical lines on the figure to delimit the two year period in which a rotator candidate would serve at the NSFC, were they to be selected. Standard errors are clustered at the rotator candidate level.

Figure A9. Impacts of Rotator Service Effects on Likelihood of Promotion by Academic Field

(a) Fields with more senior women



(b) Fields with fewer senior women

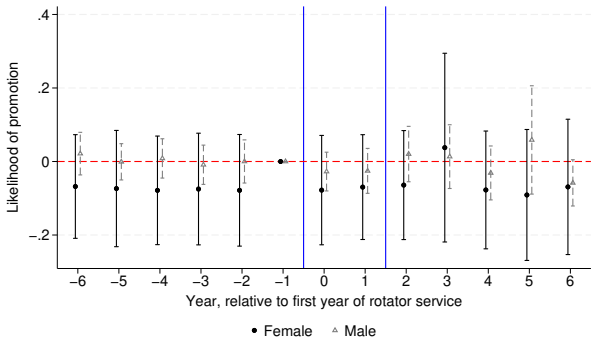
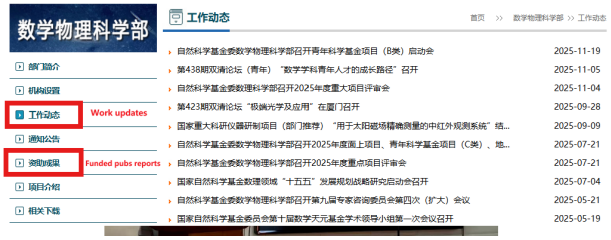


Figure A9 notes: this figure presents estimates of $\alpha_{1\#p}$ from Equation 1, along with 95 percent confidence intervals. The dependent variable is a dummy variable indicating whether an individual is promoted to a senior leadership position in a given year. We show this for rotator candidates in fields with more senior women in Panel (a) and those in fields with fewer senior women in Panel (b). We superimpose two vertical lines on the figure to delimit the period of two years in which a rotator candidate would serve at the NSFC were they to be selected. Standardard errors are clustered at the rotator candidate level.

Figure A10. Duty Information on the NSFC Website

(a) Two columns with author information



(b) An example of column “Funded Publication Reports”

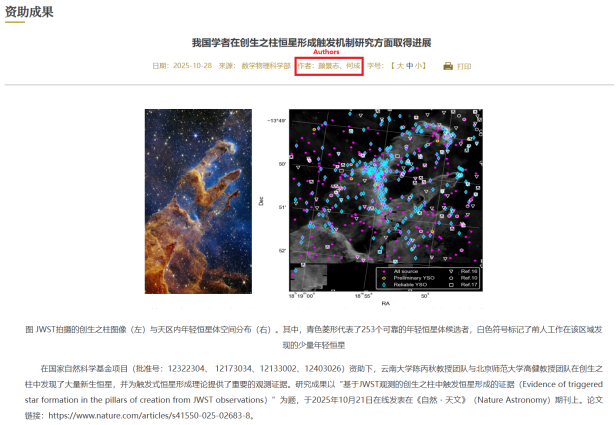


图 JWST拍摄的创生之柱图像（左）与天区内年轻恒星体空间分布（右）。其中，青色菱形代表了253个可靠的年轻恒星体候选者，白色符号标记了前人工作在该区域发现的少量年轻恒星

在国家自然科学基金项目（批准号：12322304、12173034、12133002、12403026）资助下，云南大学陈丙秋教授团队与北京师范大学高健教授团队在创生之柱中发现了大量新生恒星，并为触发式恒星形成理论提供了重要的观测证据。研究成果以“基于JWST观测的创生之柱中触发恒星形成的证据（Evidence of triggered star formation in the pillars of creation from JWST observations）”为题，于2025年10月21日在线发表在《自然·天文》（Nature Astronomy）期刊上。论文链接：https://www.nature.com/articles/s41550-025-02683-8。

(c) An example of column “Work Updates’



2025年10月27日，自然科学基金委数理科学部在北京召开2025年度重大项目评审会。自然科学基金委受组成员、副主任江松出席会议并讲话。自然科学基金委数理科学部主任陈仙辉主持开幕式，副主任倪培根介绍有关情况。

Figure A10 notes: this figure shows screenshots of duty information from the NSFC website using the Department of Math and Physics as an example. Panel (a) shows the two columns that contain author information, and Panels (b) and (c) provide illustrative screenshots of each column.

Figure A11. Gender Differences in Duties Completed as Rotator

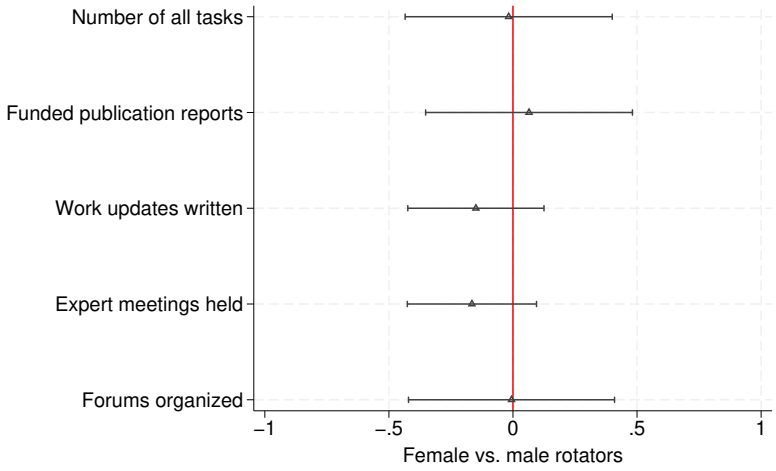
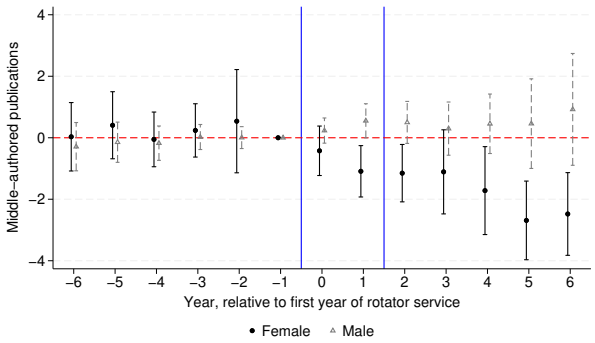


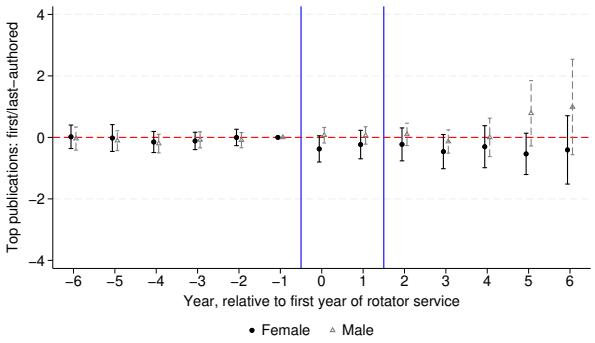
Figure A11 notes: this figure presents estimates from a regression of the number of activity reports posted on the NSFC website on an indicator for whether the rotator is female (relative to male). A positive value indicates that female rotators complete more of the corresponding duties than male rotators, while a negative value means the opposite. "Expert meetings" and "Forums" are subcategories of "Work updates," which may offer greater networking opportunities with senior scholars than "Funded publication reports."

Figure A12. Effects of Rotator Service on Production of Scientific Papers: Additional Evidence

(a) Middle-authored publications



(b) Top publications: First- or last-authored



(c) Top publications: middle-authored

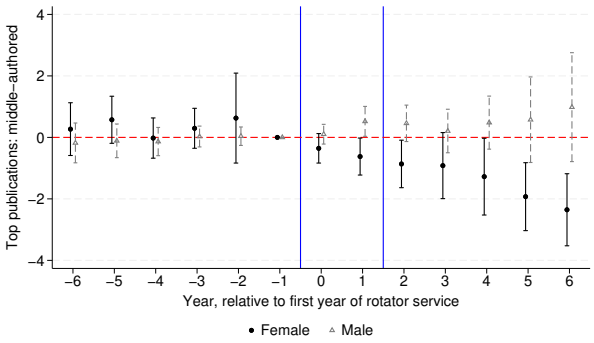


Figure A12 notes: this figure presents estimates of $\alpha_{1\#p}$ from Equation 1, along with 95 percent confidence intervals. The dependent variable is the academic productivity of the person, measured at the person-year level. We show this for three dependent variables, as indicated in the panel title. We superimpose two vertical lines on the figure to delimit the period of two years in which a rotator candidate would serve at the NSFC were they to be selected. Standardard errors are clustered at the rotator candidate level.

A NSFC Funding

The National Natural Science Foundation of China (NSFC) was established in 1986 with the mission of supporting basic research and cultivating talented scientists in China. As China's largest funder of basic science research, it provides funding through a rigorous merit-based review system. Since its founding, the NSFC's budget has grown significantly, from approximately 10 million US dollars in 1986 to $5.1 billion in 2024. In recent years, it has become the world's largest producer of scientific research in terms of studies funded, as well as the world's largest funding agency in terms of applications received. For instance, in 2024, the NSFC received nearly 380,000 applications, four times the combined total of two major US funding agencies, the NSF and the National Institutes of Health (NIH), in that year.[36]

The NSFC's grantmaking activities can be divided into two broad categories. The first category, referred to as "ordinary" grants, comprises a general grant open to all scientists, an early career grant with an age limit, and a grant specifically for scientists from less-developed regions of China. The second category comprises higher-stakes "special" grants. These include the *excellent young scientist grant*, the *distinguished young scientist grant*, the *international (regional) joint research grant*, and other large grants such as the *key* and *major* grants. While ordinary grants account for the majority of approved NSFC grants, they confer a much smaller amount of funding and are less competitive than special grants, which play an important role in scientists' career advancement. Special grants are also widely perceived as requiring more extensive networking, in addition to scientific merit, to secure than ordinary grants (Shi and Rao, 2010).

The NSFC solicits grant applications annually, following a set schedule each year, as illustrated in Figure 1 (see also Yao and Xiong 2017). The process begins with the NSFC issuing a call for proposals early in the year, with submissions due in March. After submission, NSFC officers conduct an initial screening of applications for completeness. Proposals that pass this initial screening are then evaluated through a correspondence review, which occurs in April and May.

[36]Sources: https://www.nsfc.gov.cn/p1/3381/2824/66854.html, https://report.nih.gov/nihdatabook/category/10, https://www.nsf.gov/about/about-nsf-by-the-numbers. Accessed October 8, 2025.

Those that successfully pass the correspondence review are further evaluated by expert panels. These experts, who are senior and influential scholars in the relevant fields, are invited by NSFC staff, many of whom are rotators. The panel review occurs in person during a series of agency-wide meetings, typically held in July or August, to make final decisions on grant approvals.