Age-based Career Opportunities and Gender Diversity in Academia*

Hyejin Ku† Jiangnan Liao‡

September 2024

Abstract

This paper evaluates the 2011 reform by the National Natural Science Foundation of China (NSFC), which aimed to enhance female representation by extending the eligibility age for the Young Scientist Grant (YSG) from 35 to 40 for women. Analysis of NSFC grant data reveals a 10 percentage point increase in female YSG awardees post-reform, a 30% rise compared to pre-reform levels. The quality of female awardees over 35, measured by their pre-award publications, is comparable to that of their male peers. The reform led to a 15 percentage point increase in the likelihood of holding an active grant by age 42 for affected women, largely due to the YSG, with minimal effects on other grant types. Additionally, the reform unintentionally directed more YSG funds to previously underfunded regions and institutions and increased the proportion of female researchers in funded teams.

Keywords: grant funding, upper age limits, tenure clock, gender gap

JEL codes: I23, J16, O38

* We are grateful to seminar/conference participants at AASLE, CReAM, LSE, and UCL for their helpful comments and suggestions.
† University College London, Department of Economics and CReAM, 30 Gordon Street, London, WC1H 0AX, UK. h.ku@ucl.ac.uk
‡ University College London, Department of Economics and CReAM, 30 Gordon Street, London, WC1H 0AX, UK. jiangnan.liao.16@ucl.ac.uk

1. Introduction

Career advancement in academia is often constrained by specific age or tenure milestones. In North American universities, tenure reviews for assistant professors occur six to seven years post-hiring, marking a critical “up or out” decision point. Similarly, in Europe, eligibility for the European Research Council (ERC) Starting Grant, which offers up to 1.5 million euros, requires the principal investigator to be within seven years of obtaining their Ph.D. Additionally, some grant and fellowship programs explicitly tie eligibility to researchers' biological age. Until 2011, the National Natural Science Foundation of China (NSFC), the largest funding agency in China, set an age limit of 35 for applicants seeking early-career grants.

Such age-based criteria often overlook individual differences in productivity trajectories. For instance, while some scientists achieve peak performance early, others may realize their potential later in their careers. This variability can be influenced by numerous factors, including research fields, methods, and early career disruptions like illness or caring responsibilities. A particularly pertinent factor is gender differences in age-productivity profiles. Research by Kim and Moser (2021) highlights that female scientists tend to reach their peak later than their male counterparts, even within the same fields, such as Chemistry. Women frequently face additional challenges, such as greater childcare responsibilities, which can impact their early career productivity. Ignoring these gender differences and assessing funding and career opportunities based solely on age can disadvantage qualified women who face these constraints.

Missing out on early-career grants due to age restrictions can hinder women’s chances for subsequent funding and career advancement, perpetuating the “leaky pipeline” phenomenon and contributing to the underrepresentation of women in academia (Ginther and Kahn, 2004; Ceci and Williams, 2011; Ceci et al., 2014; Iaria et al., 2022). Ensuring full participation of women in science not only promotes equity but also benefits research and

society. Increased diversity can broaden the scope of research and innovation, as diverse teams are more likely to address a wider range of issues and produce varied outputs. For example, women scientists are more likely to focus on women's health in biomedical research (Koning et al., 2021) and develop products catering to women's preferences (Einiö et al., 2023). Additionally, leveraging a diverse talent pool can drive productivity growth (Hsieh et al., 2019).

This paper investigates the role of age-based career opportunities, particularly age limits in grant funding, as a potential barrier to gender diversity and advancement in academia. We focus on the 2011 reform of the NSFC's Young Scientist Grant (YSG), which raised the upper age limit for female applicants from 35 to 40, while maintaining the 35-year limit for male applicants (Ma et al., 2018). Using comprehensive data on NSFC grants, combined with demographic and career trajectory information, we analyze the reform's impact on the gender composition of YSG awardees and the career trajectories of affected female scientists. Our analysis centers on researchers in Chemistry for two reasons: Chemistry is a leading field in China with strong publication and citation metrics (Qiu et al., 2022; Ku and Mu, 2024), and it has a relatively high proportion of female scientists, making it an ideal field for examining gender-focused policy interventions.

We first evaluate the reform's effect on the gender distribution of YSG awardees, noting a significant increase in female representation from 30% to approximately 40%. Notably, about 10% of post-reform awardees are women aged 36-40, who would not have been eligible under the previous age limit. Despite the lack of a specific quota for this age group, the quality of female awardees over 35, measured by their cumulative publications, is comparable to that of male awardees. Additionally, post-award publication outcomes for these women are similar to those of their male counterparts.

We then explore the reform's impact on the career trajectories of affected female scientists by comparing cohorts born between 1966-1970 (control) and 1971-1975 (treated).

We use a difference-in-differences (DID) approach to analyze outcomes such as YSG awards, other types of funding, and publications, and apply a triple-difference approach to account for cohort effects in publication outcomes. Our results indicate that the reform increased the likelihood of YSG receipt for women in the treated cohort relative to their male counterparts and the control cohort, without introducing a female quota or reducing standards.

Overall, our findings suggest that extending age limits for female applicants can mitigate some barriers to career advancement and address the leaky pipeline issue. This paper also raises broader questions about the balance between merit and age in career opportunities, suggesting that fine-tuning age-based criteria could be beneficial given the significant heterogeneity in age-productivity profiles across individuals, in particular gender.

By exploring how gender-specific policy changes in age-based grant schemes influence science and scientists, this paper contributes to two key areas of literature. First, it adds to research on how funding policies impact scientific outcomes and researcher behavior (see Azoulay and Li, 2020 for a review). Grant policies, including their duration, renewal conditions, and predefined outcomes, offer distinct incentives that shape research directions. Azoulay et al. (2011) find that grant schemes which accept early failures and prioritize long-term rewards encourage more innovative and high-risk research. The role of grant reviewers is also crucial; Boudreau et al. (2016) demonstrate that reviewers often score novel ideas lower when they fall within their own areas of expertise. Additionally, the emphasis placed on the proposal versus the principal investigator's credentials can affect grant success rates. Wittenman et al. (2019) reveal that programs focusing on evaluating principal investigators tend to have lower success rates for female applicants compared to those that emphasize proposal quality. Furthermore, evaluation noise, as shown by Adda and Ottaviani (2023), can influence funding distribution, with fields experiencing higher evaluation noise receiving more budget, potentially impacting application numbers in other fields.

Second, this paper contributes to the literature on the gender gap in academia (Ginther and Kahn, 2004; Ceci and Williams, 2011; Bayer and Rouse, 2016; Lundberg and Stearns, 2019; Iaria et al., 2022) and the broader context of talent allocation in scientific research (Agarwal and Gaule, 2020; Hager et al., 2023). Research has shown that female researchers often receive less credit for co-authored papers compared to their male colleagues (Sarsons et al., 2021) and are cited less frequently by leading journals and peers (Koffi, 2021). Female academics also face disparities in funding opportunities (Cruz-Castro et al., 2022) and harsher promotion evaluations by male committee members when other women are present (Bagues et al., 2017). This study extends the work of Antecol et al. (2018), who argue that gender-neutral tenure clock policies may inadvertently disadvantage women. By examining the effects of extending the upper age limit for female grant applicants, this paper provides insights into both the changes in awardee composition and the career trajectories of affected scholars.

2. Background

2.1 The National Natural Science Foundation of China (NSFC)

Founded in 1986, the National Natural Science Foundation of China (NSFC) ranks among the world's largest research funders. In 2021, it was the most frequently acknowledged funding agency according to Web of Science (WoS). Approximately 14.2 percent of all articles published in that year cited NSFC as a funding source, significantly outpacing other major funding bodies such as the NIH (3.5 percent), the European Commission (3.2 percent), and the NSF (2.3 percent). Notably, among the top 1% of cited articles, 28% acknowledged NSFC funding. Furthermore, NSFC is the predominant funding source for scientists based in China; in 2021, about 68% of Chemistry articles authored by researchers with mainland China addresses received NSFC support, compared to around 24% of articles from U.S.-based researchers funded by the NSF.

As of 2022, NSFC administers 14 types of grants across eight scientific fields, with each grant type having a predetermined annual budget. The grant review process is organized by field and grant type. Driven by China's increasing investment in science, NSFC's budget, number of grants, and volume of applications have all seen continuous growth, with success rates remaining relatively stable across various types and fields. In 2022, NSFC received 294,396 grant applications, compared to 42,700 applications received by the NSF in 2020. The NSFC's budget for 2022 stands at $4.8 billion, while the NSF's budget for the same year was $8.28 billion..[1]

2.2 The 2011 Reform of the Young Scientist Grant

Since 2021, the Young Investigator Grant (YSG) has emerged as the largest grant category funded by the NSFC in terms of the number of awards, representing approximately 43% of all projects funded. This grant is limited to one award per researcher over their career, with successful applicants receiving an average of 300,000 yuan (about $42,000) in 2021.

Beyond its financial support, the YSG holds significant non-monetary value. It is one of the few national-level grants available to all young scientists with an open review process, serving as a key milestone to gauge a scientist's progress. For many researchers, it is their first grant, and numerous universities use it as a criterion for junior faculty promotions (Ma and Xu, 2022). The prestige and signaling effect of the YSG are evident in the high volume of applications: in 2021, over 120,000 eligible scholars applied for approximately 20,000 awards, resulting in an average success rate of 17.28%.[2]

[1] See NSFC's 2022 Budget Report. https://www.nsfc.gov.cn/english/site_1///report/C1/2023/12-28/347.html
[2] See the NSFC's 2021 Report. https://www.nsfc.gov.cn/publish/portal0/tab1377/info86614.html

Prior to 2011, the Young Scientist Grant (YSG) had a gender-neutral age restriction, requiring all applicants to be under the age of 35. This age limit coincided with the typical childbearing years for scientists based in China. According to a 2016 study commissioned by the NSFC's Policy Office, which evaluated policies supporting female scientists' career development, 89% of surveyed scientists were married, 77% had children, and the average age of their first child was 30.4 years (Ma and Xu, 2022). Applicants were evaluated based on both the quality of their proposals and their research potential, often reflected in their track record at the time of application.

Female scientists with young children often face significant productivity challenges after having their first child, typically more so than their male counterparts. This can disadvantage women, as they may struggle to demonstrate their research potential within the fixed age limit. In response to concerns raised in China's National Medium-Term and Long-Term Talent Development Plan (2010-2020), the NSFC implemented a policy change in 2011. The reform aimed to support female scientists' career development by extending the age limit for female applicants from under 35 to 40, while maintaining the 35-year limit for male applicants. This change was intended to help balance work and family life and promote a more equitable gender ratio in the scientific workforce, without implementing quotas for awardees or reviewers on the grants committee.

3. Data

In this paper, we utilize three newly collected datasets.

NSFC Administrative Data. Our first dataset consists of project-level administrative data from the NSFC's web-based system. This data includes comprehensive details on all grants awarded since 1986. We have access to essential project information, including project

numbers, provinces, grant years, funding types, amounts, research fields, and the names, titles, and affiliations of principal investigators (PIs). Additionally, for most projects, we can review final project reports, which provide further insights into the research team, including both students and faculty, along with their roles and affiliations.

Dimensions AI. The second dataset is sourced from Dimensions AI, the world's largest linked research information database. This dataset integrates 130 million publications and 6 million grants from 664 global funders, linking researchers and their funding sources. Dimensions AI's superior disambiguation of scientists with common names allows us to accurately track individual scientists' research outcomes over time. For each scientist with a unique profile in Dimensions AI, we collect data on the number of active grants, publications, and citations from 1990 to 2021.

CVs and websites. Our third dataset is derived from the personal and institutional web pages and CVs of scientists of interest. We gather information such as name, research field, project number, affiliation, and position at the time of observation. This dataset includes detailed records of gender, year of birth, educational background, affiliation changes, and source URLs for verification. We successfully locate personal and/or university web pages for approximately 74.2% of the scientists. Among these, less than 1% have changed affiliations since their first faculty position, facilitating the linkage of researchers to Dimensions data and enabling a detailed analysis of their career trajectories and productivity.

4. Composition of the Young Scientist Grant Awardees

Gender composition of winners. To assess the impact of the 2011 reform on the gender composition of Young Scientist Grant (YSG) awardees, we first examine changes in the

demographic distribution of grant recipients. The 2011 reform extended the eligibility age for female applicants from 35 to 40, aiming to improve gender balance. However, the reform did not establish a specific quota for female awardees. Consequently, newly eligible female scientists (ages 36-40) had to compete equally with both male scientists and younger female applicants (ages 35 and under). Thus, if these newly eligible female scientists were not sufficiently competitive, the reform alone would not necessarily result in a higher proportion of female awardees.

Figure 1 illustrates that the proportion of female scientists among YSG awardees increased by approximately ten percentage points in 2011, rising from about 33% to 43%. This increased representation has persisted, with the share of female awardees maintaining around 40% in subsequent funding rounds. Among YSG awardees post-reform, females aged 36-40 represent about 10% of the recipients (see Figure 2). This indicates that some qualified female scientists may be missing out on the YSG due to the previous age restriction.

To address concerns that the reform might simply redirect female applicants from other NSFC grants to the YSG, we compare the share of female principal investigators (PIs) in the Open Application Grant, another major NSFC grant with a larger budget and no age limit. Our analysis, presented in Appendix Figure A.1, shows that the proportion of female PIs in the Open Application Grant remained stable at approximately 20-24% before and after the 2011 reform, suggesting that the increase in female YSG awardees does not come at the expense of other NSFC funding opportunities.

[Figures 1 and 2]

Quality of winners. Next, we investigate whether the average quality of YSG winners changed after the reform, with a focus on three groups: female scientists aged 36-40, female scientists aged 35 and younger, and male scientists aged 35 and younger. We evaluate quality based on

the number of cumulative publications at the time of winning the YSG, as well as additional publications produced 3 and 5 years after receiving the grant.

Figure 3 shows that female scientists newly eligible under the reform (aged 36-40) had a similar number of cumulative publications at the time of winning (approximately 22 articles) compared to their male counterparts (around 21 articles). Additionally, these older female awardees had a higher publication count than younger female awardees, who averaged about 15 articles.

Regarding post-award performance, female scientists aged 36-40 produced more publications 3 and 5 years after receiving the YSG compared to their younger female peers. Their publication output in these years is lower than that of male awardees but not significantly so. This suggests that the newly eligible female scientists, who benefited from the age extension, did not exhibit lower quality compared to other awardees based on their publication output at the time of application and subsequent performance.

In summary, from the perspective of funding agencies, the reform did not result in a decline in the quality of YSG recipients. The quality of newly eligible female scientists is comparable to or better than their younger counterparts, indicating that the age extension policy has not negatively impacted the overall caliber of awardees.

[Figure 3]

5. Impact on affected cohorts

5.1 Sample

We utilize a comprehensive dataset of projects funded by the NSFC, spanning from 1986 to 2021, which includes grants awarded through the YSG program and other funding initiatives. Unfortunately, our data does not include information on unsuccessful or unfunded grant applications. To address this limitation, we approximate the pool of scientists who could

potentially be impacted by the YSG by identifying “active scientists” — those who have served as principal investigators (PIs) or team members on any NSFC-funded project between 2000 and 2016.

To create this pool, we manually extract data on the year of birth and gender of these scientists, with a particular focus on the field of chemistry. For scientists whose birth year is not listed in their CVs, we estimate it based on the year they obtained their bachelor’s degree. For assessing academic performance over time, including active grants and publications, we leverage data from Dimensions AI. This bibliometric database is similar to Web of Science and Scopus but offers enhanced name disambiguation (Jia et al., 2022), allowing for more accurate tracking of individual scientists' research outputs.

One of the key challenges in assessing the impact of the age extension policy on NSFC grant recipients is that we only have access to data on awardees, not applicants. To approximate the pool of active scientists who might be affected by the policy, we use comprehensive NSFC data covering all funded projects, including both YSG and other grant programs. Although we lack information on grant applicants, we can observe all principal investigators (PIs) and team members associated with these grants. This allows us to identify scientists connected to NSFC grants, whom we refer to as "active scientists."

To define "active scientists," we consider those who have served as PIs or team members on any NSFC-funded grant between 2000 and 2016. We exclude students from this definition, as many of them transition to industry or leave China after completing their doctoral degrees. However, if these former PhD students later re-enter the research field and apply for grants in China, they are still captured under our definition of "active scientists." We limit our sample to grants issued between 2000 and 2016 due to the sparse data available before 2000 and the incomplete information on team members from 2017 onwards, as many projects were ongoing when we collected the data.

For the identified active scientists, we compile information from our three main data sources to assess their: i) History of NSFC grants, ii) Age profile of their active grants (including NSFC and other grants) and publications from Dimensions AI, and iii) Age and gender based on CVs and websites.

Our dataset comprises 47,843 unique researchers, identified through their Chinese names and affiliations recorded in NSFC funding data. This method is effective because Chinese researchers generally have more stable affiliations compared to their international counterparts. Our manual verification supports this, revealing that fewer than 1% of these researchers changed affiliations by the time we collected their work experience data from personal or university websites.

To link these active scientists with Dimensions AI profiles, we first collect all project numbers associated with each researcher from the NSFC data, whether as a PI or research team member. We then query these project numbers in Dimensions AI to obtain all authors of publications related to these grants. We verify matches by comparing the romanized versions of Chinese names in our funding data with those in Dimensions AI. Since Dimensions AI records comprehensive NSFC funding details, we can link NSFC funding to researchers who have published papers associated with these grants. Out of the active scientists observed in NSFC grant data, we successfully identified Dimensions AI profiles for approximately 52.1%, resulting in 24,940 unique researchers. This identification rate is reasonable given that NSFC data includes lab technicians and teaching-track lecturers, who may primarily publish in Chinese journals.

For these 24,940 unique researchers with Dimensions AI profiles, we searched for biographical information on their personal or university webpages. We were able to identify the webpage and observe both gender and year of birth or educational history for 76.5% of these researchers. For those whose year of birth was not directly available, we used educational

history as a proxy, starting with the year they began their undergraduate degree or, if that was unavailable, the year they completed it, extending to the year they obtained their PhD. While using educational history as a proxy is less precise than direct birth year information, approximately 90% of researchers had either their year of birth or an accurate proxy based on their educational history.

Table 1 provides summary statistics for active scientists born in relevant cohorts for our cohort analysis. Panel A presents these statistics by cohort and gender at the individual level, while Panel B provides information by age level. We observe that female scientists, on average, come from regions and institutions with less funding but from subfields with more abundant funding before 2011. Compared to their male counterparts, female scientists receive less funding and have fewer publications across all cohorts. Additionally, scientists born in later cohorts have a higher likelihood of winning the Young Scientist Grant (YSG) compared to those from earlier cohorts.

[Table 1]

5.2 Identification strategy

Our main analysis examines scientists born in the cohorts of 1966-1970 and 1971-1975, as the 2011 reform extended the age limit for Young Scientist Grant (YSG) applications. Specifically, only female scientists born in the later cohort (1971-1975) benefited from this extension.

Figure 4 Panel (a) illustrates that in 2011, when the reform was implemented, scientists born between 1971 and 1975 (the treated cohort) were aged 36 to 40. These scientists were all beyond the pre-reform age limit of 35 but within the new post-reform age limit of 40, thereby receiving an extension of one to five years to apply for the YSG, depending on their exact birth year. In contrast, scientists born in the 1966-1970 cohort (the control cohort) were all older than 40 in 2011 and thus were unaffected by the reform.

Given that the reform was not anticipated before 2011, pre-age 35 outcomes for scientists in both the treated and control cohorts should be similar. To assess the impact of the age-extension policy, we compare the outcomes of treated female scientists before and after age 35 with those of female scientists in the control cohort. This approach assumes that, in the absence of the reform, treated and control cohorts would have had similar age profiles for their outcomes. However, this assumption may be violated due to inherent differences in funding opportunities between the cohorts; scientists in the treated cohort, being from a later time period, might naturally face different funding landscapes compared to those in the control cohort.

Appendix Figure A.2 (a) shows an upward trend in the number of active grants between the treated and control cohorts before the reform, suggesting that the two groups might have different baseline levels of funding opportunities. To account for these cohort differences, we use male scientists, who were not eligible for the reform, as a control group. The pre-age 35 trends for male and female scientists within each cohort exhibit parallel trends, which allows us to control for cohort-specific differences.

Alternatively, we could compare the outcomes before and after age 35 for female and male scientists within the treated cohort. However, this comparison is problematic as it does not account for gender-specific differences in age profiles. Female and male scientists may naturally follow different patterns in their outcomes, even in the absence of the reform. To address this issue, we use the control cohort to adjust for gender-specific age effects. As shown in Appendix Figure A.2 (b), the gender difference between the treated and control cohorts follows parallel trends before age 35, allowing us to make meaningful comparisons across gender.

To address the limitations of the difference-in-differences (DiD) designs discussed, we adopt a triple difference approach to control for both cohort-specific and gender-specific age

effects. This method allows us to more precisely estimate the impact of the age extension policy by incorporating additional layers of comparison.

We estimate the following triple difference model:

$$(1) \quad y_{igka} = \gamma_{gk} + \lambda_{ka} + \theta_{ga} + \beta * Female_g \times Post35_a \times T_k + X_{igka(t)}\mu + \epsilon_{igka},$$

where y_{igka} denotes the outcomes of an individual i of gender g of birth cohort k at age a. We focus on outcomes of scientists that we observe over the age window of 27 to 42: from the point where researchers typically complete their PhD in China to the last year we are able to follow our latest cohort of interest. λ_{ka}, θ_{ga} and γ_{gk} control for cohort cohort-specific age effects, gender-specific age effects, and cohort-specific gender effect respectively. $Female_g$, $Post35_a$ and T_k are dummy variables that take value one if outcomes are observed from female scientists, after age 35, and from treated cohorts (those born in 1971-1975). $X_{igka(t)}$ includes province-by-year and subfield-by-year fixed effect, which allows additional controls for province-specific and subfield-specific funding shocks. Our coefficient of interest β captures the average difference in changes in outcomes (before and after age 35) of female scientists born in treated cohorts relative to their male counterparts compared to that of the control cohorts. We also estimate the event study version of specification (1) to show the age-specific difference.

[Figure 4]

5.3 Impact on female scientists in the affected cohorts

We begin by examining the impact of the age extension policy on the funding outcomes for treated female scientists. Figure 5(a) presents the estimated coefficients from our analysis of the probability of becoming a Principal Investigator (PI) for the Young Scientist Grant (YSG) by age. Our estimates, based on NSFC funding data, indicate a 15 percentage point increase in

the likelihood of winning the YSG by age 42 for treated female scientists compared to their male counterparts, relative to the control cohort at the baseline age of 35.

To further explore the impact on the broader funding landscape, including all types of grants (NSFC and other sources), we utilize scientist-level funding data from Dimensions AI. The results, shown in Figure 5(b), reveal a 10 percentage point increase in the probability of having any active grant as a PI by age 42 for treated female scientists.

We also investigate whether winning the YSG affects the likelihood of securing other types of grants. The extension of the age limit could either increase the chances of winning additional grants due to gained experience or potentially discourage applications for other grants. Figure 5(d) shows our findings from estimating the impact on the number of active grants, excluding YSG. The results indicate no significant crowding-in or crowding-out effect on other types of grants, suggesting that the increase in the number of active grants observed (Figure 5(c)) is primarily driven by winning the YSG.

Finally, we examine the effect of the age extension on the publication output of treated female scientists. Figure 5(e) shows that the policy had a limited impact on post-age-35 publication rates for these scientists. Several factors might explain this result. First, anecdotal evidence suggests that winning the YSG and publishing in high-impact journals can be interchangeable metrics in evaluating young scientists' productivity and career progression in China. While YSG funding could potentially enhance publication output, those who did not win the YSG might feel more compelled to publish extensively to compensate. Second, our analysis does not account for the quality of publications or the positions of scientists among co-authors.

[Figure 5]

Table 2 summarizes the event study results presented so far, showing estimates from specification (1). Columns (1) and (4) show results with only baseline controls. Columns (2)

and (5) present results where province-by-year fixed effect is added, and Columns (3) and (6) add both province- and subfield-by-year fixed effect. Standard errors are clustered at cohort level. Panel A presents the key findings. Columns (3) and (6) reveal that, after age 35, the probability of winning the YSG for the treated cohort of female scientists increased significantly by 11.9 percentage points. Similarly, the likelihood of having any active grant rose by 8.7 percentage points. Additionally, the average number of active grants for these treated female scientists increased by 8.4% after age 35, compared to before. Notably, there was no observed impact on the number of non-YSG grants or on publication output post age 35.

[Table 2]

5.4 Potential spillovers on other cohorts

Next, we examine the impact of the gender-specific age extension on "spillover cohorts"—scientists born between 1976 and 1979 who were also affected by the policy, but before they reached the previous age limit of 35. As illustrated in Figure 4 Panel (b), scientists in these spillover cohorts were 35 years old or younger in 2011, and thus received an additional five years of eligibility. However, because they anticipated the policy change before turning 35, their outcomes prior to age 35 were potentially influenced by the policy.

To investigate the effects on these spillover cohorts, we estimate a modified version of specification (1) to account for the pre-35 outcomes affected by the anticipated policy change. This modified specification allows us to discern how the treatment impacted these cohorts compared to other groups.

$$(2)\quad y_{igka} = \gamma_{gk} + \lambda_{ka} + \theta_{ga} + \beta_1 * Female_g \times P1_a \times T_k + \beta_2 * Female_g \times P2_a \times T_k + X_{igka(t)}\mu + \epsilon_{igka},$$

where $P1_a$ indicates age between 32 and 35 while $P2_a$ indicates age above 35. For an event study counterpart of (2), we use age 31 as the reference category.

Figure 6 (a) illustrates the event study coefficients based on a variant of specification (2), showing the probability of becoming a PI of YSG by age aaa for spillover cohorts, compared to the control cohorts (1966-1970). Our estimates reveal an intertemporal effect of winning YSG for scientists in the spillover cohorts, who anticipated the reform before turning 35. Specifically, we observe a small, though statistically insignificant, negative impact on the probability of winning YSG between ages 32 and 35. However, starting at age 36, there is a significant positive impact. By age 42, female scientists in the spillover cohorts are approximately 11 percentage points more likely to win YSG compared to male scientists in the control cohorts at base age 31. Similar to the treated female scientists, we find no significant impact on the quantity of publications for female scientists in the spillover cohorts (see Figure 6 (b)).

[Figure 6]

Table 3 summarizes the event study results derived from specification (2). We observe a small, statistically insignificant decrease in the probability of winning YSG by age aaa—an average reduction of 3.2 percentage points between ages 32 and 35 among spillover cohorts. This is followed by a significant 7.8 percentage point increase in the probability of winning YSG after age 35. As with the treated female scientists, there is minimal impact on publication output during both periods.

[Table 3]

6. Further Consequences of the reform

We also examine the unintended consequences of the increase in the share of female PIs among YSG awardees on the characteristics of funded projects, particularly in terms of geographic

distribution, institutional affiliations, and the gender composition of research students and team members.

To analyze these effects, we first rank all regions and affiliations by their NSFC funding intensity. Specifically, we consider data from 2008 to 2013, encompassing 30 regions and 462 affiliations that received YSG funding in chemistry. We calculate the percentile ranks of these regions and affiliations based on the total number of YSGs awarded before the reform (2008-2010). Figures 7 (a) and (b) display the average percentile ranks of the regions and affiliations of awardees before and after the reform, segmented by gender and age at the time of the award.

Our findings indicate that female awardees over the age of 35 (who were eligible due to the policy change) tend to come from less funded regions and affiliations compared to their younger counterparts. Specifically, the average funding intensity percentile for regions and affiliations of these older female awardees is around the 44th and 43rd percentiles, respectively. In contrast, younger female awardees are associated with regions and affiliations in the 52nd and 51st percentiles, while younger male awardees are linked to regions and affiliations in the 48th and 51st percentiles post-reform. These results suggest that extending the age limit for female scientists has led to a more inclusive distribution of funding across different regions and affiliations.

Furthermore, Figures 7 (c) and (d) illustrate the gender composition of research team members and students funded by YSG before and after the reform. We observe that female PIs, regardless of age group, have a higher proportion of female team members and students compared to their male counterparts. In the post-reform period (2011-2013), female PIs have about 39% female team members and 37% female students, compared to 36% and 34% for male PIs, respectively. This suggests that the increase in female PIs among YSG awardees is associated with a higher representation of female researchers and students in funded projects.

Overall, these findings highlight that the reform not only influenced the gender composition of YSG awardees but also had broader implications for the diversity and inclusiveness of funded research projects.

[Figure 7]

7. Conclusions

We investigate the impact of extending the age limit for female applicants to an early career grant on the composition of awardees and the career trajectories of scientists born in affected cohorts. Using three newly constructed datasets, we find that raising the age constraint for female applicants led to a significant increase in their representation among principal investigators (PIs) of early career grants, from 33 percent to 43 percent in 2011. Post-reform, women over the age of 35 make up approximately 10 percent of the awardees, indicating that these qualified individuals were previously missing out on funding opportunities due to the age constraint. Importantly, the average quality of female awardees over 35, measured by cumulative publications at the time of winning, is comparable to or exceeds that of their younger counterparts.

Our triple-difference estimates reveal that female scientists from the treated cohorts are 15 percentage points more likely to become PIs of Young Scientist Grants (YSG) by age 42, with minimal evidence of crowding in or out of other grant types. Additionally, female PIs over age 35 are more likely to be affiliated with previously underfunded regions and institutions, suggesting that the reform unintentionally increased the inclusivity of YSGs along these dimensions. Furthermore, the higher proportion of female PIs has led to a greater representation of female faculty members and students on their projects, as female PIs tend to have a higher share of female team members compared to their male counterparts.

These findings have significant implications for science funding policy. Extending the application window for early career grants can enhance female representation in science, prompting policymakers to reconsider how productivity is assessed relative to biological and academic age. The policy has demonstrated that increasing female participation as PIs can make science funding more inclusive without compromising the quality of the research or awardees. Future analyses, leveraging article-level publication data, will further explore 1) the impact on the quality of publications by affected scientists and 2) the effect on the research topics pursued by YSG awardees.

References

Adda, Jérôme, and Marco Ottaviani. “Grantmaking, Grading on a Curve, and the Paradox of Relative Evaluation in Nonmarkets.” *Quarterly Journal of Economics* (2023): qjad046.

Agarwal, Ruchir, and Patrick Gaule. “Invisible Geniuses: Could the Knowledge Frontier Advance Faster?” *American Economic Review: Insights* 2, no. 4 (2020): 409-424.

Antecol, Heather, Kelly Bedard, and Jenna Stearns. “Equal but Inequitable: Who Benefits from Gender-Neutral Tenure Clock Stopping Policies?” *American Economic Review* 108, no. 9 (2018): 2420-2441.

Azoulay, Pierre, Joshua S. Graff Zivin, and Gustavo Manso. “Incentives and Creativity: Evidence from the Academic Life Sciences.” *The RAND Journal of Economics* 42, no. 3 (2011): 527-554.

Azoulay, Pierre, and Danielle Li. “Scientific Grant Funding.” NBER Working Paper No. w26889 (2020).

Bagues, Manuel, Mauro Sylos-Labini, and Natalia Zinovyeva. “Does the Gender Composition of Scientific Committees Matter?” *American Economic Review* 107, no. 4 (2017): 1207-1238.

Bagues, Manuel, Giulia Vattuone, and Natalia Zinovyeva. “Women in Top Academic Positions: Is There a Trickle-Down Effect?” Working Paper.

Bayer, Amanda, and Cecilia Elena Rouse. “Diversity in the Economics Profession: A New Attack on an Old Problem.” *Journal of Economic Perspectives* 30, no. 4 (2016): 221-242.

Benson, Alan, Danielle Li, and Kelly Shue. “Potential and the Gender Promotion Gap.” Unpublished Working Paper (2021).

Bostwick, Valerie K., and Bruce A. Weinberg. “Nevertheless She Persisted? Gender Peer Effects in Doctoral STEM Programs.” *Journal of Labor Economics* 40, no. 2 (2022): 397-436.

Card, David, Stefano DellaVigna, Patricia Funk, and Nagore Iriberri. “Are Referees and Editors in Economics Gender Neutral?” *Quarterly Journal of Economics* 135, no. 1 (2020): 269-327.

Ceci, Stephen J., and Wendy M. Williams. “Understanding Current Causes of Women’s Underrepresentation in Science.” *Proceedings of the National Academy of Sciences* 108, no. 8 (2011): 3157-3162.

Ceci, Stephen J., Donna K. Ginther, Shulamit Kahn, and Wendy M. Williams. “Women in Academic Science: A Changing Landscape.” *Psychological Science in the Public Interest* 15, no. 3 (2014): 75-141.

Ceci, Stephen J., Shulamit Kahn, and Wendy M. Williams. “Exploring Gender Bias in Six Key Domains of Academic Science: An Adversarial Collaboration.” *Psychological Science in the Public Interest* (2023): 15291006231163179.

Cruz-Castro, Laura, Donna K. Ginther, and Luis Sanz-Menendez. “Gender and Underrepresented Minority Differences in Research Funding.” Working Paper (2022).

Einiö, Elias, Josh Feng, and Xavier Jaravel. “Social Push and the Direction of Innovation.” Mimeo (2023).

Galenson, David W., and Bruce A. Weinberg. “Age and the Quality of Work: The Case of Modern American Painters.” *Journal of Political Economy* 108, no. 4 (2000): 761-777.

Ginther, Donna K., and Shulamit Kahn. “Women in Economics: Moving Up or Falling Off the Academic Career Ladder?” *Journal of Economic Perspectives* 18, no. 3 (2004): 193-214.

Ginther, Donna K., Walter T. Schaffer, Joshua Schnell, Beth Masimore, Faye Liu, Laurel L. Haak, and Raynard Kington. “Race, Ethnicity, and NIH Research Awards.” Science 333, no. 6045 (2011): 1015-1019.

Hager, Sebastian, Carlo Schwarz, and Fabian Waldinger. “Measuring Science: Performance Metrics and the Allocation of Talent.” Available at SSRN 4472441 (2023).

Hsieh, Chang-Tai, Erik Hurst, Charles I. Jones, and Peter J. Klenow. “The Allocation of Talent and US Economic Growth.” *Econometrica* 87, no. 5 (2019): 1439-1474.

Iaria, Alessandro, Carlo Schwarz, and Fabian Waldinger. “Gender Gaps in Academia: Global Evidence Over the Twentieth Century.” Working Paper. Available at SSRN 4150221 (2022).

Jia, Ruixue, Margaret E. Roberts, Ye Wang, and Eddie Yang. “The Impact of US-China Tensions on US Science.” No. w29941. National Bureau of Economic Research, 2022.

Kim, Scott Daewon, and Petra Moser. “Women in Science: Lessons from the Baby Boom.” NBER Working Paper No. w29436 (2021).

Koffi, Marlène. “Gendered Citations at Top Economic Journals.” *AEA Papers and Proceedings* 111 (2021): 60-64.

Koning, Rembrand, Sampsa Samila, and John-Paul Ferguson. “Who Do We Invent For? Patents by Women Focus More on Women’s Health, but Few Women Get to Invent.” *Science* 372, no. 6548 (2021): 1345-1348.

Ku, Hyejin, and Tianrui Mu. “The Rise of China and the Global Production of Scientific Knowledge.” Working Paper, University College London (2024).

Lerchenmueller, Marc J., and Olav Sorenson. “The Gender Gap in Early Career Transitions in the Life Sciences.” *Research Policy* 47, no. 6 (2018): 1007-1017.

Lundberg, Shelly, and Jenna Stearns. “Women in Economics: Stalled Progress.” *Journal of Economic Perspectives* 33, no. 1 (2019): 3-22.

Ma, Ying, and Xiaohe Xu. “The Effects of Parenthood on Grant Application in China: The Case of an Early Career Grant.” *Higher Education Policy* (2022): 1-20.

Ma, Ying, Yandong Zhao, Xu Gong, Li Sun, and Yonghe Zheng. “Close the Gender Gap in Chinese Science.” *Nature* 557, no. 7703 (2018): 25-27.

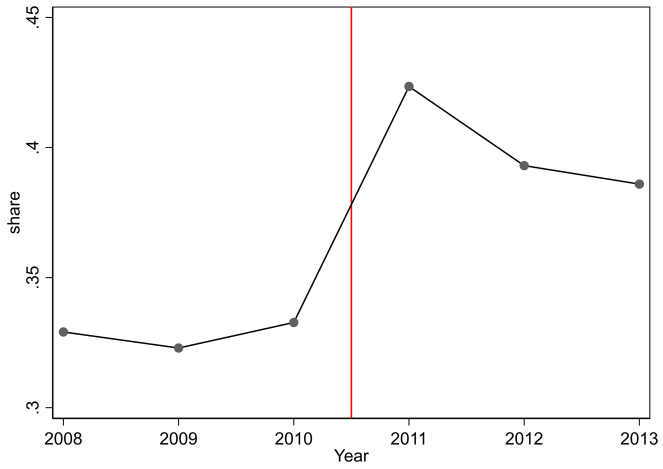
Qiu, Shumin, Claudia Steinwender, and Pierre Azoulay. “Who Stands on the Shoulders of Chinese (Scientific) Giants? Evidence from Chemistry.” NBER Working Paper No. w30772 (2022).

Sarsons, Heather, Klarita Gërxhani, Ernesto Reuben, and Arthur Schram. “Gender Differences in Recognition for Group Work.” *Journal of Political Economy* 129, no. 1 (2021): 101-147.

Sheltzer, Jason M., and Joan C. Smith. “Elite Male Faculty in the Life Sciences Employ Fewer Women.” *Proceedings of the National Academy of Sciences* 111, no. 28 (2014): 10107-10112.

Witteman, Holly O., Michael Hendricks, Sharon Straus, and Cara Tannenbaum. “Are Gender Gaps Due to Evaluations of the Applicant or the Science? A Natural Experiment at a National Funding Agency.” *The Lancet* 393, no. 10171 (2019): 531-540.

Figure 1: Share of female scientists among winners of the Young Scientist Grant (YSG)



Notes: This figure shows the share of female scientists among winners of YSG by grant round from 2008 to 2013. The share of female PIs among YSG awardees has increased by around ten percentage points in 2011 from around 33 percent to 43 percent. This share has remained at around 40 percent in the grant rounds after the 2011 reform.
Data source: Funding data collected from the website of the National Natural Science Foundation of China (NSFC); age and gender information collected from CVs and websites of scientists

Figure 2: Gender by age group composition of YSG awardees

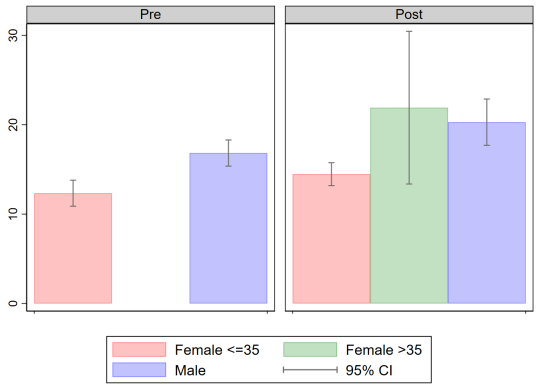
(a) share (b) number of grants awarded



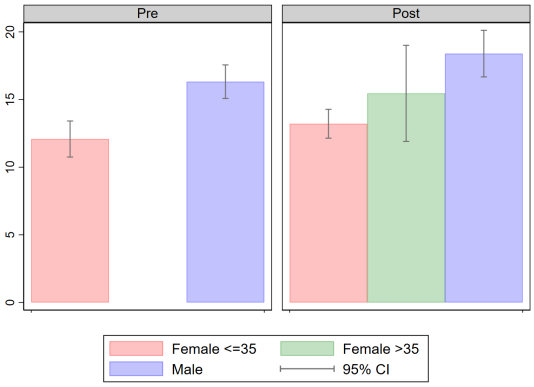
Notes: This figure shows gender by age (at winning) group composition among winners of YSG by each grant round from 2008 to 2013. Panel (a) shows that among winners of YSG post reform, the share of female scientists aged 36-40 (eligible due to reform) is around 10 percent. Panel (b) shows an increasing trend in the total number of YSG funded projects over time.
Data source: Funding data collected from the website of the National Natural Science Foundation of China (NSFC); age and gender information collected from CVs and websites of scientists

Figure 3: Publication of YSG awardees by gender and age(at winning) groups

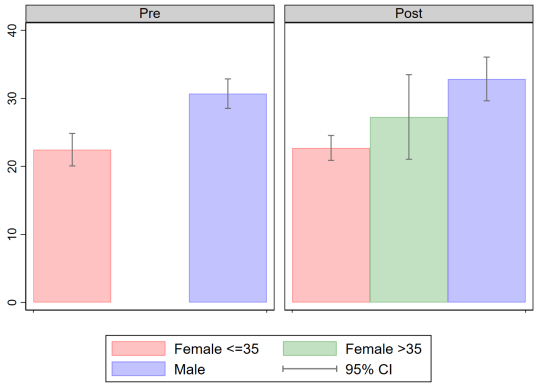
(a) cum. pub. at the time of winning



(b) pub. 3 years since winning



(c) pub. 5 years since winning



Notes: This figure illustrates the changes in various measures of publication of YSG awardees, before and after the reform by three groups of scientists: female scientists age 36-40, female scientists age 35 and under, and male scientists age 35 and under. Panel (a) shows average cumulative publication at the time of winning YSG. Panels (b) and (c) illustrate additional publications these awardees have had, 3 and 5 years since winning. Newly eligible female scientists (age over 35) have similar level of cumulative publication at the time of winning compared to male awardees, and a higher level compared to younger female awardees.
Data source: Funding data collected from the website of the National Natural Science Foundation of China (NSFC); age and gender information collected from CVs and websites of scientists; publication-related information collected from Dimensions AI.

Figure 4: Research design

(a) identify impact on treated cohorts

	Control					Treated				
Birth Cohort	**1966**	**1967**	**1968**	**1969**	**1970**	**1971**	**1972**	**1973**	**1974**	**1975**
Age in 2011	45	44	43	42	41	40	39	38	37	36
Years of windfall extension										
Female	0	0	0	0	0	1	2	3	4	5
Male	0	0	0	0	0	0	0	0	0	0

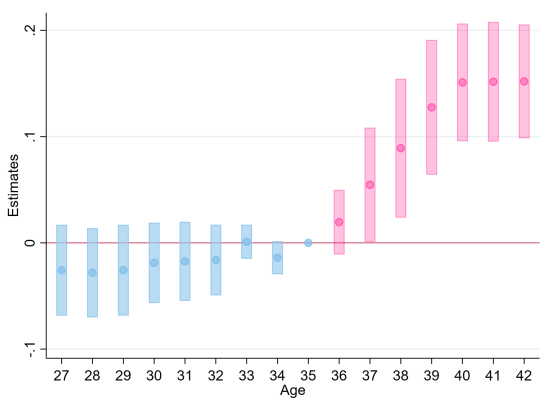
(b) identify impact on spillover cohorts

	Control					Treated					Spillover			
Birth Cohort	**1966**	**1967**	**1968**	**1969**	**1970**	**1971**	**1972**	**1973**	**1974**	**1975**	**1976**	**1977**	**1978**	**1979**
Age in 2011	45	44	43	42	41	40	39	38	37	36	35	34	33	32
Years of windfall extension														
Female	0	0	0	0	0	1	2	3	4	5	5	5	5	5
Male	0	0	0	0	0	0	0	0	0	0	0	0	0	0

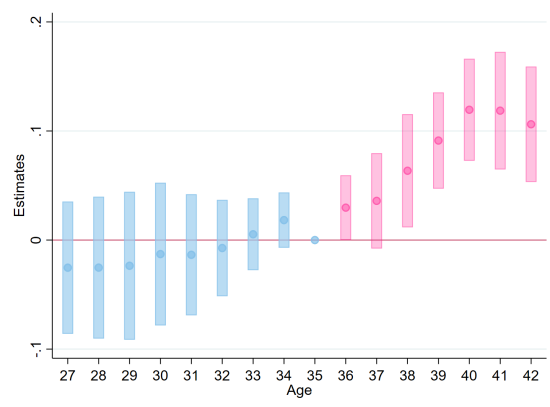
Notes: This diagram illustrates our research design. Panels (a) and (b) show our strategy to identify impact on treated cohorts (1971-1975) and spillover cohorts (1976-1979) respectively. For each birth cohort, both panels illustrate the age they were in 2011 and ,therefore, how many years of windfall extension they are eligible for due to the reform. In Panel (a), treated female scientists (highlighted) are eligible for 1-5 years of extension, and all groups were over age 35 in 2011 when policy took place. In Panel (b), female scientists in spillover group (highlighted in yellow) are all eligible for 5 years of extension, but they anticipated the reform before reaching the previous age limit (age 35).

Figure 5: The impacts on treated cohorts: results from event study

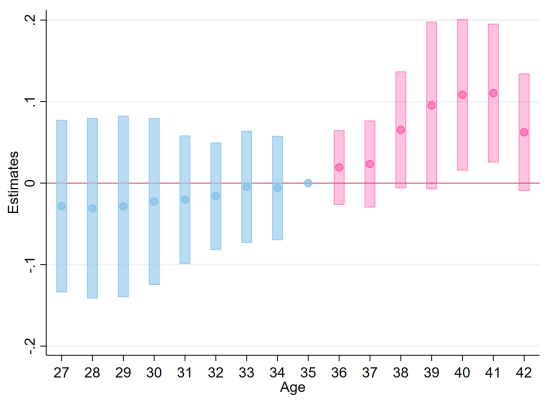
(a) win YSG by age a (NSFC)



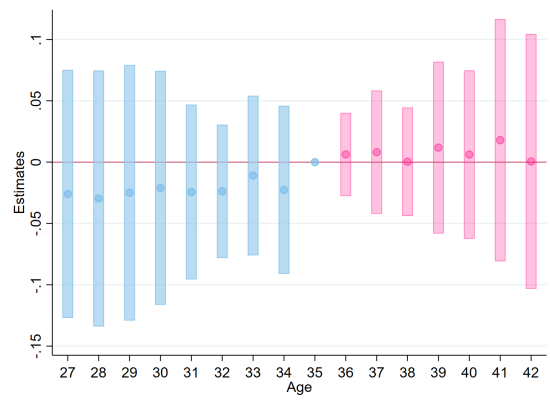
(b) has active grant(s) by age a (Dimensions)



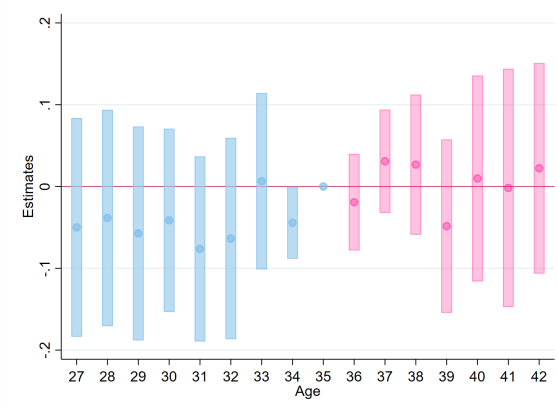
(c) num. active grants at age a



(d) num. active non-YSG grants at age a



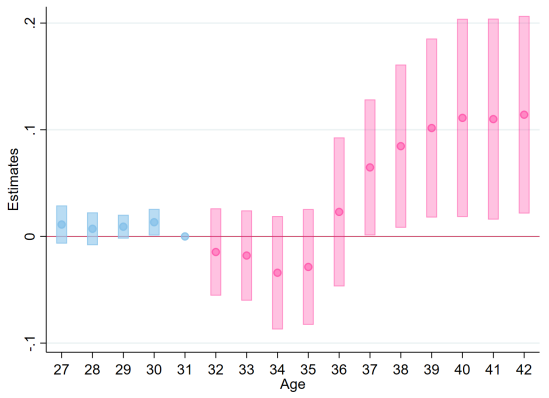
(e) log(1+pub) at age a



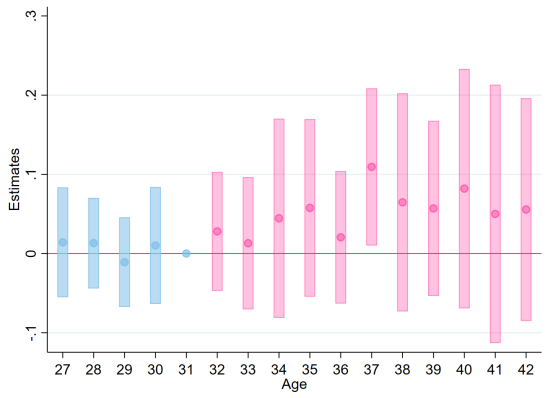
Notes: This figure displays the impact of age limit extension on funding and publication outcomes of treated (born in 1971-1975) female scientists, estimated by β^a in specification (2). Outcomes observed at age window 27 to 42. All effects are relative to age 35. The regression includes province-by-year FE and subfield-by-year FE. The vertical bars indicate 95 percent confidence intervals, with standard errors are clustered at cohort level.
Data source: Project information published by the National Natural Science Foundation of China (NSFC); publication-related information from Dimensions AI; and hand-collected age and gender information from researchers' websites.

Figure 6: The impacts on spillover cohorts: results from event study

(a) win YSG by age a (NSFC)



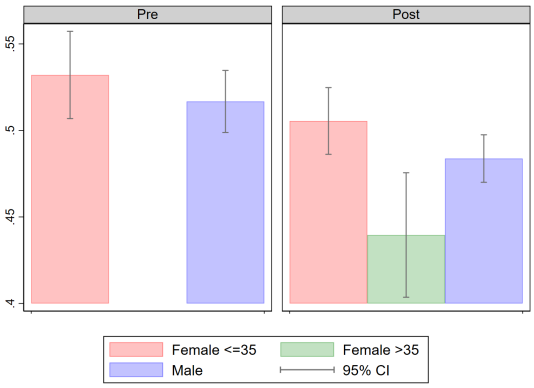
(b) log(1+pub) at age a



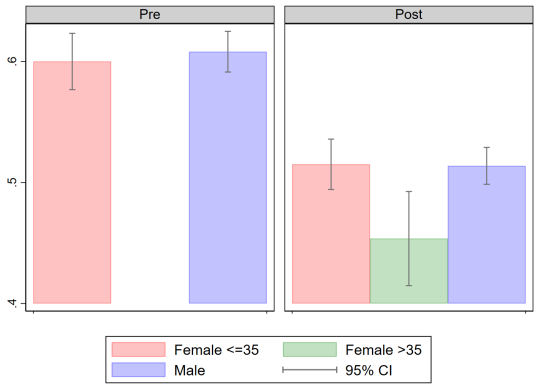
Notes: This figure displays the impact of age limit extension on funding and publication outcomes of spillover (born in 1976-1979) female scientists, estimated by β^a in specification (2)′. Outcomes observed at age window 27 to 42. All effects are relative to age 31. The regression includes province-by-year FE and subfield-by-year FE. The vertical bars indicate 95 percent confidence intervals, with standard errors are clustered at cohort level.
Data source: Project information published by the National Natural Science Foundation of China (NSFC); publication-related information from Dimensions AI; and hand-collected age and gender information from researchers' websites.

Figure 7: Further consequences of the reform

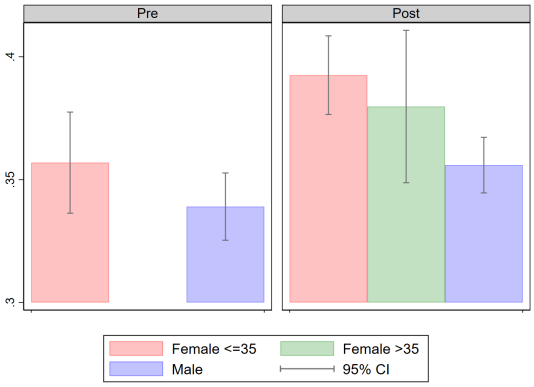
(a) region



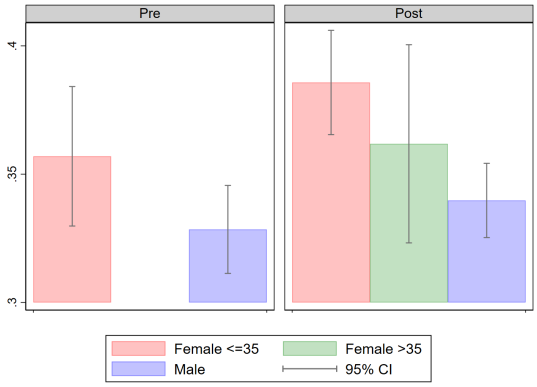
(b) affiliation



(c) share of female member



(d) share of female student



Notes:This figure illustrates further consequences of the reform, such as changes in the types of regions, affiliations, and the gender composition of research students and team members of these funded projects. Panels (a) and (b) show the percentile ranking of funding intensity of average region and affiliation by awardees' gender and age (at winning) group, pre (2008-2010) and post(2011-2013) the reform. The ranking of the funding intensity of these 30 regions and 462 affiliations is based on the total number of YSG funded before reform (2008 to 2010). Panels (c) and (d) illustrate the average share of female members and students by awardees' gender and age (at winning) group, pre (2008-2010) and post (2011-2013) the reform.
Data source:Project information published by the National Natural Science Foundation of China (NSFC); publication-related information from Dimensions AI; and hand-collected age and gender information from researchers' websites.

Table 1: Summary statistics: active scientists in affected cohorts

	1966-1970		1971-1975		1976-1979	
	female	male	female	male	female	male
	(1)	(2)	(3)	(4)	(5)	(6)
A. Person						
Year of birth	1968.27	1968.04	1973.16	1973.17	1978.15	1978.13
	(1.392)	(1.403)	(1.416)	(1.406)	(1.384)	(1.379)
Year of 1st NSFC grant	2008.30	2007.29	2009.50	2009.60	2011.66	2011.48
	(4.700)	(4.870)	(3.606)	(3.784)	(2.793)	(2.759)
Region	0.45	0.47	0.47	0.47	0.46	0.47
	(0.269)	(0.267)	(0.277)	(0.269)	(0.278)	(0.275)
Affiliation	0.44	0.49	0.47	0.48	0.46	0.48
	(0.297)	(0.300)	(0.298)	(0.304)	(0.298)	(0.310)
Subfield	0.50	0.47	0.50	0.48	0.50	0.47
	(0.286)	(0.287)	(0.281)	(0.286)	(0.283)	(0.286)
N	540	1367	886	1785	1412	2661
B. Person-age						
Win YSG by age	0.05	0.07	0.15	0.11	0.17	0.16
	(0.212)	(0.255)	(0.359)	(0.308)	(0.376)	(0.371)
Has active grant(s) by age	0.26	0.35	0.26	0.28	0.23	0.26
	(0.440)	(0.476)	(0.441)	(0.447)	(0.418)	(0.436)
N. active grants at age	0.23	0.36	0.22	0.27	0.17	0.24
	(0.571)	(0.767)	(0.555)	(0.647)	(0.628)	(0.654)
N. active non-YSG grants at age	0.23	0.35	0.18	0.25	0.12	0.20
	(0.566)	(0.762)	(0.530)	(0.634)	(0.588)	(0.621)
N. publications at age	2.53	3.92	2.23	3.14	1.88	2.84
	(6.148)	(8.133)	(5.744)	(6.960)	(7.339)	(7.135)
N (Person-age)	17376	44160	28704	57664	45696	86176

Notes: This table shows summary statistics of active scientists born in the three cohorts of our interest by gender. Panel A presents the statistics of these scientists at the unique person level, and Panel B presents information at the person-by-age level. For scientists' regions, affiliations and subfields, we report their percentile ranking in terms of funding intensity. Scientists most commonly observed region, affiliation and subfield are used. This table illustrates that female scientists on average tend to come from regions and affiliations with worse funding but subfield with more abundant funding before 2011. Compared to men, female scientists have less funding and publication across all cohorts. Active scientists born in later cohorts also have a higher chance of winning YSG compared to earlier cohorts.

Data source: Funding data collected from the website of National Natural Science Foundation of China (NSFC); Age and gender information collected from C.V.s and websites of scientists; Publication related information collected from Dimensions AI.

Table 2: The impacts on treated cohorts: results from triple diff

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A	win YSG by age x			has active grant(s) by age x		
Post35 × Treat × Female	0.121***	0.125***	0.119***	0.085**	0.094**	0.087**
	(0.019)	(0.020)	(0.018)	(0.021)	(0.021)	(0.018)
mean of dep. var	0.114	0.114	0.114	0.256	0.256	0.256
N	74112	74112	74112	74112	74112	74112
Prov × Year FE	N	N	Y	N	N	Y
Subfield × Year FE	N	Y	Y	N	Y	Y
Panel B	num. active grants			num. active non-YSG grants		
Post35 × Treat × Female	0.077*	0.089**	0.084**	0.017	0.030	0.028
	(0.025)	(0.025)	(0.022)	(0.029)	(0.028)	(0.025)
mean of dep. var	0.261	0.261	0.261	0.224	0.224	0.224
N	74112	74112	74112	74112	74112	74112
Prov × Year FE	N	N	Y	N	N	Y
Subfield × Year FE	N	Y	Y	N	Y	Y
Panel C	log (1+pub)					
Post35 × Treat × Female	0.051	0.058	0.041			
	(0.035)	(0.038)	(0.038)			
mean of dep. var.	0.754	0.754	0.754			
N	74112	74112	74112			
Prov × Year FE	N	N	Y			
Subfield × Year FE	N	Y	Y			

Notes: This table reports estimates of specification (1) based on our main sample of active scientists born in the treated (1971-1975) and control (1966-1970) cohorts, covering outcomes observed from age 27 to 42. Columns (1) and (4) show results with only baseline controls (cohort cohort-specific age effects, gender-specific age effects and cohort-specific gender effect). Columns (2) and (5) present results where province-by-year fixed effect is added and Columns (3) and (6) add both province and subfield-by-year fixed effect. Standard errors are clustered at cohort level. Standard errors are clustered at cohort level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.
Data source: Project information published by National Natural Science Foundation of China (NSFC); Publication related information from Dimensions AI; hand-collected age and gender information from researchers' websites.

Table 3: The impacts on spillover cohorts: results from triple diff

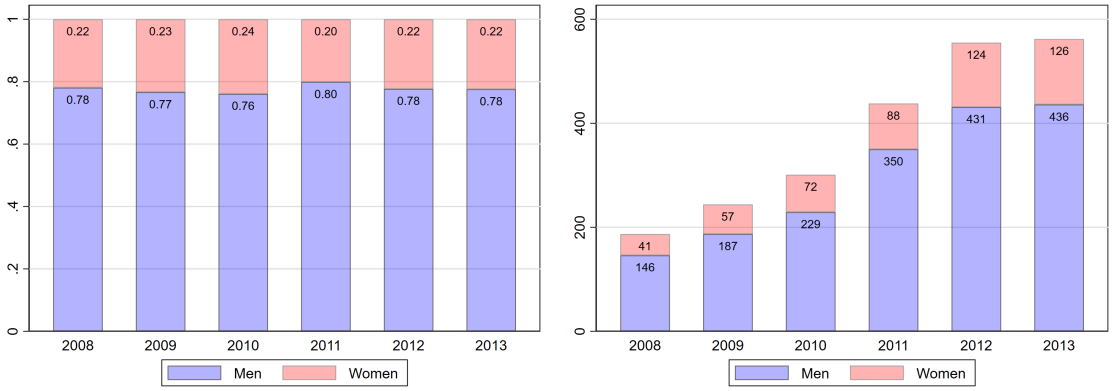
	win YSG by age x			log (1+pub)		
	(1)	(2)	(3)	(4)	(5)	(6)
Age 32-35 × Treat × Female	-0.033	-0.033	-0.032	0.032	0.036	0.031
	(0.019)	(0.018)	(0.018)	(0.031)	(0.033)	(0.036)
Age post35 × Treat × Female	0.079	0.082*	0.078*	0.072	0.080	0.061
	(0.036)	(0.034)	(0.033)	(0.047)	(0.051)	(0.055)
mean of dep. var	0.205	0.205	0.205	0.940	0.940	0.940
N	82560	82560	82560	82560	82560	82560
Prov × Year FE	N	N	Y	N	N	Y
Subfield × Year FE	N	Y	Y	N	Y	Y

Notes: This table reports estimates of specification (1)′ based on our main sample of active scientists born in the spillover (1976-1979) and control (1966-1970) cohorts, covering outcomes observed from age 27 to 42. Columns (1) and (4) show results with only baseline controls (cohort cohort-specific age effects, gender-specific age effects and cohort-specific gender effect). Columns (2) and (5) present results where province-by-year fixed effect is added and Columns (3) and (6) add both province and subfield-by-year fixed effect. Standard errors are clustered at cohort level. Standard errors are clustered at cohort level. $^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.
Data source: Project information published by National Natural Science Foundation of China (NSFC); Publication related information from Dimensions AI; hand-collected age and gender information from researchers' websites.

A Appendix

Figure A.1: Gender composition of *Open Application Grant* awardees

(a) share (b) number of grants awarded

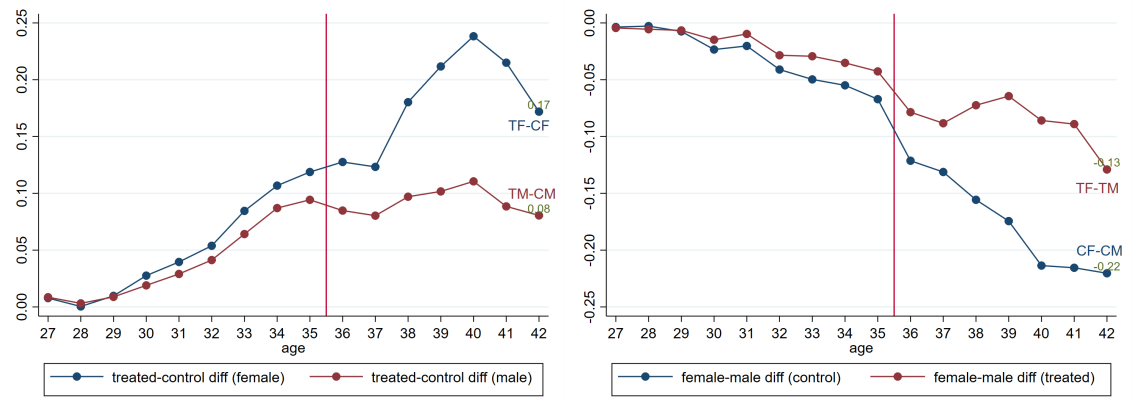


Notes: This figure shows gender by age (at winning) group composition among winners of *Open Application Grant* by each grant round from 2008 to 2013. Panel (a) shows the share of female PIs remained smooth at around 20-24 percent before and after the reform on YSG in 2011. Panel (b) shows an increasing trend in the total number of awardees funded by this grant scheme over time (similar to the trend in YSG).
Data source: Project information published by the National Natural Science Foundation of China (NSFC); and hand-collected age and gender information from researchers' websites.

Figure A.2: Number of active grants at age x

(a) treated-control difference

(b) female-male difference



Notes: This figure shows the differences in raw trend between the number of active grants at age a over age window 27-42 for different groups. Panel (a) shows the difference in number of active grants between treated and control cohorts observed at each age a, for female (*TF-CF*) and male scientists (*TM-CM*) respectively. Panel (b) shows this difference between female and male scientists, for treated (*TF-TM*) and control cohorts (*CF-CM*) respectively. Panel (a) illustrates female scientists in treated and control cohorts follow different trends for their funding outcomes even in the absence of reform. The difference in their funding outcomes observed at age 35 and under follows an upward trend. This calls for using male scientists, whose treated-control cohort difference follows a parallel pre-trend, to take out this cohort-specific trend. Similarly, we observed parallel pre-trends in female-male difference (illustrated in Panel (b)) for both treated and control cohorts. These pre-trends illustrated in both panels threaten diff-in-diff designs and motivate our triple difference design.
Data source: Project information published by the National Natural Science Foundation of China (NSFC); publication-related information from Dimensions AI; and hand-collected age and gender information from researchers' websites.