When Time Windows Widen: Fertility Timing and Women's Career Trajectories in Academic Science

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March 27, 2026

Early draft – Please do not circulate![1]

Abstract

Female scientists continue to face structural barriers in academia, where traditional family-support policies often fail to alleviate the time conflicts between fertility and early-career development. We study a rare preemptive policy intervention in China that extended the eligibility age for a prestigious early-career research grant from 35 to 40 for women—a stage when biological and professional timelines frequently collide. Leveraging a uniquely constructed dataset, we show that the reform shifted behavior among younger women: they delayed grant applications and were more likely to prioritize family formation, leading to slower trajectories in later-stage grant success and research output. We interpret these patterns as intertemporal trade-offs made more visible by relaxed institutional constraints. Our findings highlight the importance of designing complementary support mechanisms that recognize scholars' broader life-course optimization, especially when flexibility is introduced during high-stakes career stages.

Keywords: Gender disparities in academia, motherhood penalty, research grant competition, young scientist grant, age discrimination, NSF China

JEL Codes: J16, I23, J13

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1 Introduction

Gender disparities in academia remain persistent across countries and disciplines, particularly during the early-career years when research productivity and family formation coincide most tightly (Ley and Hamilton, 2008; Pohlhaus et al., 2011; Ginther et al., 2016; Lerchenmueller and Sorenson, 2018). Traditional family-supporting policies—such as parental leave or tenure-clock extensions—are reactive by design: they activate only after childbirth and therefore do not help women manage pre-birth planning or the structural overlap between their biological clock and early-career deadlines (Antecol et al., 2018; Malisch et al., 2020). These limitations underscore the importance of studying preemptive, birth-agnostic, gender-specific policies that intervene earlier in the career–family timing cycle.

The 2011 reform of the National Natural Science Foundation of China (NSFC) Young Scientist Grant (YSG) provides an unusually clean setting to study such a policy. Before 2011, all applicants had to apply before age 35; after the reform, women became eligible until age 40, while the age limit remained for men. In China's natural sciences and engineering fields, securing a YSG is not only advantageous but is frequently required for promotion at research universities. YSG attainment thus plays a gatekeeping role in career advancement. By extending eligibility for women without increasing the number of available grants, the reform created a gender-specific expansion in the time window during which women could enter the early-career funding pipeline. This institutional shift provides a clear quasi-experimental opportunity to examine how additional eligibility time alters early-career decisions.

This expansion changed the timing constraints facing younger female scholars. Before the reform, the fertility window and the YSG application window overlapped closely, forcing women to combine childbearing and early-career grant competition within the same narrow period. The additional five years of eligibility relaxed this overlap and reduced the immediate cost of postponing YSG applications.

Younger women could now delay their initial applications and reallocate time toward earlier childbearing without incurring the same career penalties as before. These adjustments in application and fertility timing had direct implications for later outcomes: a later start in the YSG sequence reduced opportunities for repeated attempts, slowed entry into subsequent grant streams such as general grants, and shifted the trajectory of early-career publications and promotion milestones. Importantly, this setting allows us to observe the process through which women resequence fertility and early-career research effort when timing constraints are relaxed.

The key to identification is that the reform fundamentally altered timing constraints only for women in natural science and engineering fields, where YSG attainment is evaluated as part of promotion and tenure and where NSFC funding is essential for sustaining research agendas. Non-STEM fields—such as management, psychology, and related social sciences—serve as a natural comparison group. Scholars in these fields may apply for NSFC grants, but NSFC performance is not central to their evaluation, and alternative funding channels are widely available. This institutional distinction implies that only women in STEM experienced a meaningful shift in the overlap between fertility timing and career evaluation. To estimate the policy's indirect effects on application behavior, fertility timing, and the resulting grant and career outcomes, we exploit variation across gender, STEM versus non-STEM fields, and time. This structure motivates our triple-differences event-study design, which allows us to trace the full sequence of behavioral responses to the expanded eligibility window.

Our empirical analysis draws on several novel administrative datasets that allow us to jointly observe application behavior, fertility decisions, and downstream academic outcomes. We use administrative application records from two major research universities, containing detailed CV information, proposal titles and abstracts, research field classifications, and annual YSG application decisions. We link these records to administrative fertility data from one of these universities, enabling

us to directly connect changes in application behavior to changes in fertility timing for the same individuals. To evaluate downstream consequences, we combine these data with the universe of NSFC grant records from 1987 to 2021 and publication histories from the OpenAlex database. This linked structure allows us to study the full decision sequence—from effort allocation and family planning to grant attainment and early-career research productivity.

We find that, following the age-eligibility expansion of the YSG, early-career stage female scholars delayed their YSG applications and shifted childbearing earlier relative to their pre-reform trend, whereas men exhibited no comparable fertility change and did not delay their applications. Specifically, the policy reduced the likelihood of applying for the YSG for female scholars below 35 by 0.15–0.2, translating to a 70%–95% reduction compared to the overall mean. Moreover, among the early-career applicants, female's proposal similarities (measured by proposal's titles and abstracts) increased by 1.0 (1.2%) in terms of word similarity and 1.2 (1.4%) in terms of content similarity, suggesting that, even among applicants, female's effort of application reduced after the reform. The application behavior corresponds to their fertility patterns: we observed that the first birth planning for female faculty in natural sciences and engineering fields increased by 25 percentage points right after the reform in 2011. These shifts reduced younger women's YSG success rates, lowered their access to the upper-level research grants (i.e., the general grants from NSFC), and delayed the age at which they secured their first major research award. Over time, these delays corresponded to weaker early-career publication records—particularly in top-journal work—and slower progression toward promotion milestones. Taken together, the results suggest that the reform's effects on early-career women stem not from intensified competition or changes in funding availability, but from a reorganization of the timing decisions that structure the early stages of a scientific career.

Our paper contributes to three strands of existing literature. First, we contribute to the literature on motherhood penalties and career-family tradeoffs in high-skill

labor markets, particularly in academia (Mason and Goulden, 2004; Cech and Blair-Loy, 2019). Kim and Moser (2025) show that women scientists during the U.S. baby boom era who became mothers reached their peak productivity significantly later than peers and were far less likely to obtain tenure. Their findings suggest that the rigid timeline of scientific evaluation, especially in the early career stage, disproportionately disadvantages mothers. Our study builds on this literature by examining a policy reform that relaxed an early-career timing constraint, allowing us to observe how women in science re-optimized the sequencing of fertility and research activity in response to institutional change. While Kim and Moser (2025) diagnose the consequences of inflexible timelines, our setting enables a rare causal test of how adjusting such constraints affects both family formation and research careers. Beyond academia, our study also contributes to the broader motherhood-penalty literature that examines how childbirth affects women's labor market outcomes across a range of occupations (Bertrand et al., 2010; Goldin, 2014; Kleven et al., 2019). This literature highlights the large and persistent child penalties in women's labor market trajectories. However, in most settings, researchers can observe only employment or wage changes after childbirth, making it difficult to capture the full extent of productivity declines and their dynamic nature. Academia, however, offers an unusually precise environment in which individual-level productivity is directly observable through publications and grant activity, allowing us to measure motherhood-related productivity adjustments with far greater accuracy. By leveraging this high-resolution setting, our analysis provides insights that complement and strengthen the broader understanding of child penalties in the general labor market.

Second, our study contributes to the economics of science by examining how early-career funding structures shape the allocation of scientific talent and affect gender gaps in productivity and participation. Recent work shows that gender disparities in science are driven not by per-year productivity differences, but by differential career durations and attrition rates (Holman et al., 2018; Charlesworth and

Banaji, 2019; Huang et al., 2020). The NSFC Young Scientist Grant (YSG) is a career-critical resource in China, with strict age-based eligibility. The 2011 policy reform extended the eligibility age from 35 to 40 for women only. We leverage this institutional change to causally identify how expanding temporal flexibility influences women's application behavior, retention in science, and research output. Additionally, our results speak to broader concerns about women's underrepresentation in STEM fields (Cheryan et al., 2017; Cimpian et al., 2020; Casad et al., 2021) and the opportunity cost of underutilized female talent in innovation, as highlighted by studies on gendered patterns in invention and topic selection (Koning et al., 2021).

Third, we contribute to the literature on institutional policy design under structural constraints. Policies such as gender-neutral tenure clock extensions have often backfired, unintentionally benefiting men more than women and exacerbating gender gaps (Antecol et al., 2018; Malisch et al., 2020). In contrast, the NSFC reform represents a rare example of a gender-specific, birth-agnostic, and preemptive policy intervention designed to address career–family overlap. Because this type of reform would be politically or legally infeasible in most Western democracies, the Chinese setting provides a unique natural experiment to evaluate its causal effects. Our linked administrative data—combining application records, fertility information, grant histories, and publication outcomes—allow us to directly trace the behavioral and career consequences of the policy. The evidence suggests that rather than improving equity through expanded opportunity, the reform nudged younger women to prioritize fertility over grant competition, contributing to lower grant success and leadership rates in the long run.

The rest of the paper proceeds as follows. Section 2 provides institutional background and describes the NSFC reform and its implications for career timing. Section 3 introduces the data sources and construction. Section 4 outlines the empirical strategy. Section 5 presents the main results on application timing, fertility behavior, and grant outcomes. Section 6 discusses heterogeneity, robustness, and interpretation. Section 7 concludes by reflecting on policy design implications and directions

for future research.

2 Background

2.1 Scientific Funding from the NSFC

Established in 1986, the National Natural Science Foundation of China (NSFC) supports basic research and fosters the development of talented scientists through a rigorous merit-review system. It is China's largest sponsor of basic science research and serves a role similar to that of the U.S. National Science Foundation (NSF). In recent years, the NSFC has become the world's largest research funder in terms of applications received: 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.[2]

The NSFC has two flagship funding mechanisms—the Young Scientist Grant and the General Grant. These two programs account for more than 80% of the NSFC's total funding, but differ in several key aspects. First, the Young Scientist Grant targets early-career scientists and imposes an age limit on applicants, whereas the General Grant is open to scientists of all ages. Second, while a scientist can receive only one Young Scientist Grant in their career, there is no limit on the number of General Grants awarded to a scientist. Third, the average funding amount of a General Grant is more than twice that of a Young Scientist Grant. Together, these distinctions highlight the differing objectives of the two programs—the Young Scientist Grant serves as a stepping stone for young scientists, while the General Grant provides sustained support for scientists throughout their careers.

[2]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.

2.2 Young Scientist Grant Age-Eligibility Policy

As in many other countries (Shen, 2013; Ceci et al., 2014), Chinese women are more likely than men to earn undergraduate degrees and comprise nearly 40 percent of PhD students (Ma et al., 2018). However, their representation declines sharply in academia, with women comprising only about one-third of STEM faculty. This gender gap widens at higher academic ranks, with women holding a disproportionately small share of more prestigious positions (Gu, 2021). For instance, in 2023, female scientists accounted for only six percent of members of the Chinese Academy of Sciences and five percent of members of the Chinese Academy of Engineering.

In 2010, the Central Committee of the Communist Party of China and the State Council jointly issued a directive advocating for policies to reduce gender inequality in professional workplaces (Ma et al., 2018). In response, the National Natural Science Foundation of China (NSFC), in collaboration with the All-China Women's Federation, introduced a policy in 2011 aimed at alleviating constraints faced by early-career women whose childbearing years overlap with critical periods of research development. The policy extended the upper age limit for women applying for the Young Scientist Grant from 35 to 40, while the age limit for men remained unchanged at 35. Additionally, the policy allowed female awardees to extend the duration of their projects during breastfeeding periods, reducing the adverse impact of motherhood on their academic progression.

The policy had an immediate and substantial impact. According to NSFC statistics (Yu and Gao, 2023), the number of female grant applicants surged by 94% in 2011, the first year of implementation, rising from 13,244 in 2010 to 25,694 in 2011. By comparison, male applicants increased by only 23.2% during the same period. The success rate for female applicants also improved significantly, with 5,676 women receiving youth grant funding in 2011—a 106.5% increase from the previous year—compared to a 33.7% increase for male recipients. Among these female recipients, 1,829 grants were awarded to women aged 36 to 40, representing 32.2%

of all female recipients.

These effects persisted over the next decade. From 2011 to 2021, applications from women aged 36 to 40 more than doubled, generating over 138,000 additional submissions and about 18,000 grants awarded, accounting for 23.2% of all female recipients. These additional recipients received approximately 4.05 billion RMB in funding. The policy has been widely lauded for its success in expanding research opportunities for women balancing family and professional responsibilities (Ma et al., 2018).

Yet the broader consequences are more ambiguous. Although the policy substantially benefited the newly eligible women, it is unclear how it affects the younger female cohort in the long run. Consistent with this uncertainty, as shown in Figure **??**, the gender gap in the Young Scientist Grant success rate continued to widen between 2009 and 2018, pointing to more complex equilibrium effects than the immediate gains alone suggest.

3 Data and Summary Statistics

Our data are constructed by combining original data from four data sources: 1) the universe of NSFC-granted projects provided by NSFC's official website, 2) the curriculum vitae of researchers in from all 39 "985" project universities along with the Chinese Academy of Science and 30 randomly selected "211" project universities, and 3) the universe of publication from OpenAlex. 4) Among the 30 selected "211"project universities, the information on the application for the NSFC from two of these universities, as well as the timing of childbirth of all the faculty and staff of one of these two universities.

3.1 NSFC Granted Projects

We first employ publicly accessible data from the official website of the National Natural Science Foundation of China (NSFC). The dataset documents all approved

and completed NSFC-funded projects from 1987 to 2021. The data provides a comprehensive view of research funding allocation, capturing detailed information on each funded project, including project identifiers, applicant institution names, project titles, principal investigator names, 1- to 3-digit discipline codes, project funding, project categories (Young Scientists Fund, General Fund, Key Fund, Major Fund, etc.), and more.

At the project level, the dataset includes several key variables that enable a detailed examination of funding patterns and trends over time. First, each project is assigned a unique project ID and a specific funding year, enabling a temporal analysis of research support. Second, the variables "applicant institution" and "institution city" enable exploration of the regional and institutional distribution of funding. Third, the project funding codes (levels 1-4) support field-specific funding comparisons. Fourth, the project titles and keywords provide insight into the research focus and scope, offering an opportunity for more granular topic classification through text-based analysis. Finally, the amount of funding awarded helps identify variations in funding levels.

Figure 1 uses public NSFC statistics to summarize the evolution of female participation and success in the Young Scientist Grant over 2001–2024. The bar series show that the number of female applicants and female awardees both rise strongly over time. The line series show that women's share of applicants increases substantially through 2010 and continues at a relatively high level thereafter. Starting in 2011, however, the female share of awardees diverges from the female share of applicants, and the distance between the two series becomes larger. Thus, although women account for an increasing share of the applicant pool, they do not account for a commensurate share of funded awards. This divergence suggests a deterioration in women's relative success conditional on applying and motivates our main analysis of how the reform affected application behavior, competitive pressure, and award outcomes.

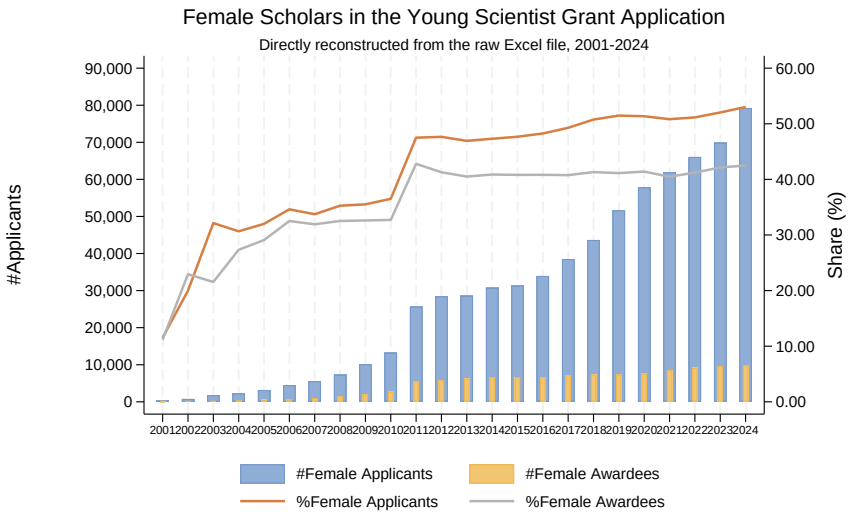


Figure 1: Female Share in Applicants and Awardees in Young Scientists Grant

Zooming in to the under-35 age group, Appendix Figure A1 shows that the gender gap in success rates among applicants aged 30–35 widened after the 2011 reform: the male–female difference rises from about 3.8 percentage points in 2011 to above 5 percentage points by the end of the sample. Appendix Figure A2 complements this pattern by showing that, before 2011, women aged ≤ 35 accounted for a steadily rising share of YSG awards, but this upward trend stalled after the reform, while the newly eligible group of women aged 36–40 entered the awardee pool without increasing women's overall award share relative to men. Taken together with Figure 1, these figures suggest that the 2011 eligibility extension changed both the composition of the female applicant pool and the gender composition of the awardee pool, with intensified within-female competition contributing to a widening gender gap among younger applicants.

3.2 Curriculum Vitae Data

We semi-automatically collected the resumes of faculty members from 39 universities under the "985" Project, the Chinese Academy of Sciences research institutions, and randomly selected 30 universities from among the 73 "211" Project universi-

ties that are not part of the “985" Project.[3] These CVs are retrieved by June 2023. Specifically, because website formats are not standardized across institutions, we first developed a web crawler tailored to the varying webpage structures of each department's official website, and collected faculty resumes by department, saving them by university and department name. It finally yields over 130,000 original, non-structured faculty CVs. Due to significant variations in resume formats across universities, departments, and even individual faculty members, we performed data cleaning using a semi-manual approach combined with large language models and standardized key information, including faculty members' age, gender, hukou registration, work experience, educational background, and promotion history.

3.3 Administrative Data on NSFC Application from Two Schools

We obtained detailed application records for all faculty members at two "211 Project" universities from 2001 to 2025, with authorization from their science and technology administration offices. The data include annual information on each NSFC application, including the number of applications per year, project titles, abstracts, and keywords; applicants' personal characteristics; research team composition (age, gender, academic title, and department); and approval status. Moreover, we matched these application data with additional individual-level background information from the CV data described in Section 3.2.

This dataset allows us not only to identify whether an individual applied for funding in a given year but also to construct indicators of application quality based on the similarity of project titles and abstracts submitted by the same applicant across different years. As such, this dataset is essential for examining gender differences in application behavior in response to policy changes.

[3]The “985" Project univeristies and “211" Project universites are key higher education initiatives in China aimed at developing world-class universities and high-level institutions. They represent the core strength and top-tier research capabilities of Chinese higher education and research, particularly of the “985" Project universities. The Chinese Academy of Sciences is the highest academic institution and a comprehensive research and development center in natural sciences in China. And its subordinate research institutions and universities serve as the primary force for basic research and high-tech innovation in China, representing the national-level standard of scientific research in the country.

3.4 Administrative Data on Fertility Timing from One School

Similarly, with authorization from the human resources department of one of the two "211 Project" universities as mentioned above, we obtained detailed fertility records for all current and former faculty and staff members. These records include each faculty and staff member's year of marriage, marital status, the birth date and gender of each child, departmental affiliation, and year of initial employment. As with the application data, we matched the fertility data with additional background information from CVs. Moreover, using unique faculty identifiers, we can match the project application data with each faculty member's fertility data at this university.

Based on this data, we can investigate the onset of (first) birth planning among female faculty in response to the eligibility age for applying to the NSFC being extended to 40 years using multiple empirical strategies, and we will report the estimation results in further detail in a later section.

3.5 Research Outcomes Data

To provide the research output and collaboration networks of the faculty members, we extracted all English-language journal articles published between 1980 and 2023 from the OpenAlex database. OpenAlex serves as a publicly accessible alternative to proprietary academic databases such as Elsevier's Scopus and Clarivate's Web of Science. Each publication record includes detailed information such as journal name, article title, publication date, citation count, author names and their institutional affiliations, among others.

To ensure our analysis focused on high-quality academic output, we first excluded conference papers, working papers, books, and other non-peer-reviewed document types. We then removed authors affiliated with non-academic institutions (e.g., corporations or government agencies), and kept only those affiliated with universities and research institutes. Finally, based on author names, institu-

tional affiliations, and publication years, we aggregated each scholar's publication records over time and measured their research productivity as the average number of publications per year.

In terms of research quantity, we constructed multiple indicators, including total annual publications, co-authored publications, single-authored publications, first-author publications, and corresponding-author publications. Regarding research quality, we adopted two measures. The first is the average cumulative citation count per article as of 2023. As (Huang et al., 2025) discussed, the number of citations is arguably an accurate indicator of the paper's scientific merit, reflecting the wisdom of crowds rather than the views of a few. The second measure is the annual number of publications in top-tier journals, classified according to the Journal Citation Reports (JCR) standards.

Furthermore, leveraging co-authorship information from publication records, we constructed a panel dataset to capture the dynamic evolution of scholars' collaboration networks. Given the significant time lag between the completion of research and its formal publication(Ductor, 2015), we employed a three-year rolling window (i.e., the current year and the two preceding years) to smooth annual fluctuations. This approach ensures that the coauthor network reflects the dynamic, evolving nature of research collaborations, capturing both ongoing and emerging connections. To test the robustness of our findings, we also constructed network indicators based on a five-year rolling window as an alternative measure.

Specifically, for each three-year window, we characterized scholars' collaboration networks from multiple dimensions, including: (1) average co-author frequency, calculated as the total number of co-author occurrences across all papers divided by the number of papers; (2) co-authors size, measured by the number of unique co-authors within the window; and (3) additional network structure indicators based on the institutional affiliations and academic age of unique co-authors, enabling a more comprehensive characterization of the diversity and heterogeneity of collaboration networks.

3.6 Key Variables Construction

In our study, age and gender serve as the two primary independent variables. The sources and methods for obtaining these variables differ across datasets.

For the NSFC application, data from two "211 projects" universities and fertility administrative data from one of them are used; both age and gender are fully and directly recorded. However, for the NSFC funding grants data, age and gender are not directly available and must be inferred by matching individuals with their CV data.

Regarding age, approximately 30% of the CV entries directly report the scholar's year of birth. For the remaining scholars, we impute age based on the year they enrolled in their bachelor's degree program. This imputation assumes that scholars began primary school at age six, in accordance with China's Compulsory Education Law, effective July 1, 1986, which sets the primary school enrollment age. Since our sample predominantly consists of scholars born after 1975, the vast majority were subject to this enrollment regulation. We acknowledge that using the bachelor's enrollment year as a proxy for age may introduce some measurement error. However, Chinese scholars typically follow a continuous, structured educational pathway without gap years before completing their undergraduate studies. Although isolated cases of grade-skipping may still occur, these are likely idiosyncratic and involve unobserved parental connections with local schools or government authorities.

Regarding gender, for approximately 40% of the sample, we directly identify gender from self-reported CV information or profile photos. For the remaining 60%, we predict gender based on Chinese given names using a Bayesian machine learning method developed by (Chen, 2024) The algorithm is trained on a large proprietary dataset containing Chinese names and their corresponding gender information. The Bayesian model returns the conditional probability that a given name is male. If the probability is less than 0.5, the name is classified as female. To

validate the accuracy of this approach, we applied the algorithm to predict the gender of over 10,000 faculty members for whom we already knew the actual gender. The validation results show that over 94.5% of the predictions align with the actual cases, which greatly strengthens our confidence in the algorithm's accuracy.

Finally, to assess whether potential measurement errors in the imputation of age and gender might lead to systematic estimation bias, we will conduct robustness checks using a subsample from the two universities where exact dates of birth and gender are known from the administrative application data. This allows us to validate the results obtained from the imputed sample.

3.7 Sample Restriction and Summary Statisitcs

Given that the policy extended the eligibility age for female applicants to 40 while keeping it at 35 for male applicants, and that the YSG offers only one funding opportunity per individual, we expanded our matched sample of NSFC-funded individuals into an unbalanced panel dataset before conducting descriptive statistical analysis. The specific procedure is as follows: (1) For female individuals, we extended the observation years up to age 35 for those observed before 2011, and up to age 40 for those observed in 2011 and after. If an individual had not obtained the grant during this period, the grant status was indicated as 0; once obtained, all subsequent observations were coded as missing. (2) For male individuals, we uniformly extended the observation years up to age 35. Similarly, grant status was coded as 0 before obtaining and as missing after receiving.

3.7.1 Summary Statistics on Application and Fertility

As mentioned above, while the grants data allow us to identify whether the faculty ultimately received the YSG, they cannot directly capture the faculty's application behavior and fertility outcomes. To address these behavior mechanisms, we draw on administrative application data from two universities and fertility records from one of them to construct an individual-year panel dataset. This dataset tracks each

faculty member's annual application status and fertility history. According to our empirical design, we first restrict the sample to individuals aged 35 or younger. And then, we code years without a YSF application as 0 and years without a childbirth as 0. Using these data, we first systematically compare faculty application behaviors and fertility patterns across STEM and non-STEM fields.

Table 1 presents a comparative analysis of STEM and non-STEM faculty in several dimension, including application behavior,research output, and fertility characteristics.

Table 1: Summary Statistics on Application and fertility (STEM vs non-STEM)

		STEM			Non-STEM	
Panel A: Application	count	mean	sd	N	mean	sd
Apply yes=1	14403	0.113	0.317	6183	0.063	0.242
Apply number	14403	0.431	0.846	6183	0.226	0.634
Apply=1(3-year window,alt)	12772	0.128	0.241	5496	0.069	0.183
Grant=1	14403	0.070	0.255	6183	0.027	0.162
Enter year	14403	2013.626	5.420	6183	2013.305	5.846
Age	14403	30.172	2.825	6183	30.215	2.834
Female=1	14339	0.412	0.492	6183	0.542	0.498
Pubnum	9531	0.989	1.974	2545	0.460	1.110
Pubnum(correesponding)	9531	0.102	0.489	2545	0.079	0.345
Pubnum(first auhtor)	9531	0.221	0.601	2545	0.150	0.482
Pubnum(JCR=Q1)	9531	0.722	1.642	2545	0.308	0.846
Panel B: Application quality sample						
sim-abs_words	1840	9.485	20.797	371	10.085	21.187
sim-abs_contents	1840	13.104	26.974	371	14.511	27.715
sim-title_words	1840	10.991	23.301	371	11.271	22.423
sim-title_contents	1840	13.652	27.640	371	14.861	27.724
Panel C: fertility sample						
Married before 35=1	7703	0.658	0.474	3082	0.674	0.469
Married=1	7703	0.696	0.460	3082	0.735	0.441
Children number	7703	0.876	0.739	2669	0.957	0.749
Have child=1	7703	0.651	0.477	4408	0.635	0.482
Child-bearing age	4775	30.887	2.900	2797	31.260	3.336

Notes: Panel A includes 2,964 faculty members (2,008 STEM, 956 non-STEM). Panel C includes 1,357 faculty members (825 STEM, 532 non-STEM).

In terms of application behavior, 11.3% of STEM faculty apply for YSG of the NSFC each year, significantly higher than the 0.63% among non-STEM faculty. Re-

garding cumulative application times, 0.43 of STEM faculty applied within the whole eligibility window, compared to only 0.23 of their non-STEM counterparts. Similarly, the ultimate success rate for STEM faculty's YSG is around 55%. However, the corresponding granted rate for non-STEM faculty is around 26%. The substantial disparity in application rates may mainly stem from the fact that non-STEM faculty can apply for either the Social Science Fund or the NSFC in the same year, whereas STEM faculty can apply only for the NSFC. The average age of applicants is similar across both fields, at approximately 30.0 years. In terms of gender composition, women account for 54.0% of non-STEM faculty, notably higher than the 42.0% in STEM fields.

Moreover, we also constructs four variables to measure the submitted proposal similarity. The first two variables capture similarity in the abstracts of applications.`sim-abs_words` measures the lexical similarity of two applications submitted by the same scholar at different time, while `sim-abs_contents` reflects their semantic similarity based on the context of the abstract text. The next two variables extend the same idea to project titles. `sim-title_words` measures word-level similarity between past and current titles, whereas `sim-title_contents` captures their semantic similarity. Because project titles become observable only after an application is submitted, these two title-based measures are constructed using the set of projects for which title information is available.

As shown in Panel B of Table 1 , the average value of all the similarities between STEM and non-STEM faculties are similar. the across the 2210 observations in the sample, all four similarity are all 10% on a 0–100 scale,while still exhibiting substantial variation (standard deviations around 30). In addition,the similarities in contents are relatively higher than the words, corresponding to 13% to 14%. This pattern indicates that although applicants often reuse similar thematic concepts across submissions, there remains considerable heterogeneity in how much they revise or adapt their abstracts and titles over time.

Regarding research output, STEM faculty publish an average of 0.9 papers per

year, compared with 0.5 for non-STEM faculty. In terms of first-author and corresponding-author publications, STEM faculty average 0.1 and 0.2 papers per year, respectively, while non-STEM faculty average 0.2 and 0.08 papers. STEM faculty also publish more papers in JCR Q1 journals, averaging 0.7 papers, compared to non-STEM faculty. These differences in publication patterns may reflect disciplinary characteristics, such as longer review cycles in non-STEM fields, as well as differences in performance evaluation criteria across fields.

As shown in Panel B of Table 1, in contrast, fertility and marriage patterns show little variation between the two groups. The proportion of faculty who got married by age 35 is 66.0% in STEM and 67.0% in non-STEM fields. The share of faculty with at least one child is 65.0% in STEM and 63.5% in non-STEM fields. The proportion married married STEM faculty is 69.6% among STEM faculty and 73.5% among non-STEM faculty. The average childbearing age of STEM faculty is 30.9 years, slightly younger than that of non-STEM, who are 31.3 years old on average. Overall, while STEM and non-STEM faculty differ markedly in application behavior and research output, their fertility and marriage patterns are strikingly similar.

3.7.2 Summary Statistics on Grants

As described above, we matched the NSFC funding grants data with faculty CVs to obtain information on grant recipients' age, gender, and other individual characteristics. This process yielded a final dataset comprising approximately 36,024 scholars across 2,000 departments at universities.[4] Table 2 presents the descriptive statistics for the key variables in this dataset.

Regarding scholar characteristics, the sample covers faculty born between 1969 and 1994. Among them, 28% are female, and 28% of STEM faculty. In terms of NSFC grants outcomes, the final success rates for the YSG is 54%. Although the General Program imposes no limit on the number of applications, the data show that scholars receive this grant 0.53 times on average, with a maximum of six times.

[4]The detailed process of data linking is documented in the Data Appendix (see Section D).

Table 2: Summary Statistics of the Full Regression Sample

	Mean	Std. Dev.	Min	Max	N
Individual-level Variables					
Ever granted YSG	.5498834	.4975123	0	1	36,024
#General Grants	.5328947	.8480448	0	6	36,024
Age	29.69734	2.75812	26	35	36,024
Female	.2792305	.4486273	0	1	36,024
Year of Birth	1981.258	6.195871	1969	1994	36,024
STEM	.862203	.3446916	0	1	36,024
Individual-year-level Variables					
Total Publication Count	.0482755	.4271841	0	20	231,111
First-authored Publication Count	.0163125	.1735196	0	8	231,111
Corresponding-authored Publication Count	.0060231	.1118564	0	12	231,111
High-quality Publication Count	.0318765	.3276332	0	20	231,111

In terms of academic output, we constructed a scholar-year panel and calculated publication and collaboration network indicators. As shown in Table 2, scholars publish an average of 0.5 per year, of which 3% appear in JCR Q1 journals. First-author and corresponding-author publications are more limited, averaging 0.2 and 0.06 papers per year, respectively.

Regarding the disciplinary distribution of YSG grants, our sample includes 10,750 funded projects, classified according to NSFC discipline codes. The results show that Engineering and Materials Science received the largest share of grants, accounting for 26.59% of all projects, followed by Information Science (17.69%), Mathematics and Physics(12.91%), Management Science (10.53%), Chemistry (9.72%), Life Sciences (9.17%), and Earth Sciences (7.87%)..[5] This distribution indicates that YSF grants are highly concentrated in Engineering, Information Science, and Mathematics, reflecting the current funding policy's emphasis on foundational and applied sciences.

4 Empirical Strategy

To estimate how the 2011 NSFC age-limit reform reshaped fertility timing, grant application, and downstream academic outcomes, we implement a differences-in-

[5]It should be noted that due to the reclassification of NSFC discipline codes, Medical Science was separated from Life Science around 2010, which explains its relatively small share (1.5%) in this sample. Additionally, approximately 4.01% of projects are classified as "unknown" due to missing discipline code information, particularly for the year 2021.

differences-in-differences (DDD) event-study design that exploits variation across gender, discipline, and time. Our starting point is the gender gap, since the reform extended the Young Scientist Grant eligibility window for women but not for men. The natural first comparison is therefore a DD design that asks whether the female-male gap changed after 2011. However, this comparison alone cannot separate the effect of the reform from other contemporaneous changes that may also have differentially affected women during the same period, including shifts in university personnel reforms, fertility behavior, and broader family-policy changes. To isolate the component of the post-2011 gender divergence that is specifically related to NSFC eligibility, we add a third difference across disciplines, comparing fields in which NSFC competition is highly binding with fields in which NSFC incentives are present but less central to career progression.

Our key comparison is between STEMM and non-STEMM faculty. The relevant distinction is not exposure to NSFC per se, but dependence on it. In STEMM fields, NSFC funding is often central to launching an independent research agenda, supporting lab- or team-based production, and meeting tenure and promotion benchmarks. Age-based YSG eligibility therefore creates a particularly sharp institutional clock in these disciplines. By contrast, the non-STEMM comparison group in our data is not composed of faculty outside the NSFC system. Because our analysis requires observing actual NSFC application behavior, the comparison group must have non-zero incentives to apply and realistic access to the program. We therefore define non-STEMM as fields such as management, economics, psychology, and related interdisciplinary areas, where faculty can and do apply for NSFC funding, but where NSFC support is typically less binding because alternative funding channels (e.g., National Social Science foundation of China), publication technologies, and evaluation criteria are more diverse. This yields a comparison group that shares the same broad academic environment and remains connected to the NSFC application margin, while facing weaker career dependence on the YSG age rule.

Under this design, identification comes from whether the female-male gap changes

differentially after 2011 in STEMM relative to non-STEMM. The third difference thus removes both general gender-specific time shocks and broad post-2011 changes affecting all faculty, leaving the component of the gender-gap change that is most plausibly attributable to the reform in fields where the age threshold is especially consequential. We then examine whether this shift altered the sequencing of childbirth and grant application around age 35, and whether those behavioral responses carried through to grant success, publication, and promotion. Specifically, we estimate the following equation:

$$\begin{aligned} Y_{icfst} = \sum_{k=-8}^{10} \tau_k \times Female_i \times STEMM_f \times \mathbb{1}(Year_t - 2011 = k) + \\ \beta_1 Female_i + \beta_2 STEMM_f + \beta_3 Female_i \times STEMM_f \\ + \eta_t + \eta_t^{female} + \eta_t^{STEMM} + \delta_c + \theta_f + \gamma_s + S_{it}'\Lambda + \varepsilon_{icfst} \end{aligned} \tag{1}$$

where Y_{icfst} is the outcome of interest for individual (i), from birth cohort (c), in field (f), school (s), and year (t). The outcomes include YSG application events (indicators of applying or not), fertility events (indicators of the onset of each birth), YSG success (indicators of obtaining YSG or not), publication patterns (a series of publication measures including total number of publication, number of first-authored publications, number of corresponding-authored publications, number of top-journal publications, etc.), and promotion (indicators of became associate/full professor or not). The parameters (τ_k) trace dynamic effects in event time—relative to the reform year—specifically for women in STEM fields. We include leads and lags to examine pre-trends and temporal responses.

The specification includes year fixed effects (η_t), year-by-gender fixed effects (η_t^{female}), year-by-STEM fixed effects (η_t^{STEMM}), birth cohort fixed effects (δ_c), research field fixed effects (θ_f), and school fixed effects (γ_s). The vector (S_{it}') captures time-varying individual-level controls—including prior publication records, undergraduate and doctoral institution tier and ranking, and other background variables.

Standard errors are clustered at the individual level.

This empirical framework allows us to assess whether expanding the YSG eligibility window changed how young women navigated the trade-off between fertility and career-building during a critical stage of academic development, and to track the consequences of these behavioral shifts for longer-term academic success.

The key coefficients of interest are the event-time interactions τ_k, which trace how the behavior of young women in STEM fields evolved before and after the policy relative to men and non-STEM peers. For YSG application timing, we expect to observe a delay in applications immediately following the reform, reflecting the relaxed urgency due to the extended eligibility window. For fertility timing, we expect to see an increase in early childbearing among treated women, as the policy reduced the career cost of prioritizing fertility before age 35. If these behavioral shifts restructured early-career investment, we may observe reduced YSG success rates, slower entry into subsequent grant streams, and weaker early publication performance among treated cohorts. In each case, the sign and persistence of the estimated τ_k coefficients help assess whether institutional flexibility merely reorders career decisions or introduces long-run academic trade-offs.

We provide a number of covariate balance test in Appendix Figure A3 to assess whether the policy change is associated with discontinuous shifts in sample composition or predetermined characteristics. Across gender, age, field composition, and institutional rank measures, the estimated coefficients on the relevant policy interaction terms are small and statistically indistinguishable from zero.

5 Main Findings

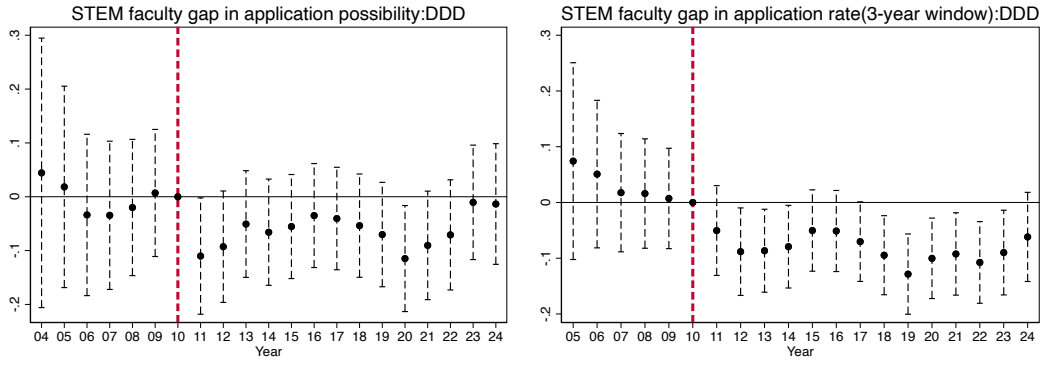
5.1 Application to the Young Scientist Grant

We begin by examining whether the reform changed the timing or likelihood of YSG applications among young women in STEMM fields using our administrative sample. Figure 2a plots the triple-difference event study estimates of the gender gap in

the probability of submitting any YSG application in a given year. The coefficients are close to zero prior to 2011, indicating no differential pre-trends, but become negative in the years following the reform. Specifically, for most years post-reform, the likelihood of application decreased by 0.15–0.2,equivalent to a 70% to 95% decrease to the mean.

Given the substantial costs associated with preparing NSFC grant proposals, and the observation that unsuccessful applicants often resubmit a revised version in the following year, we smooth application behavior by employing a three-year moving average.[6]

As shown in Figure 2b, after smoothing with a three-year window, the gender gap in application rates widens significantly following the 2011 policy change, reaching its peak approximately four to five years later. This pattern suggests that young women either postponed their proposal submissions or opted out of the application process altogether because of diminished expected returns. The gender gap reaches a trough around 2022 and remains negative thereafter. This finding is consistent with the trends observed in annual application rates discussed above.



(a) Yearly (b) 3-Year Average

Figure 2: Policy's Effects on Application

Notes: These figures plot estimates of τ_k from Equation (1). Outcome variable definitions: (Left panel) A binary indicator that equals 1 for a YSG application in year k and otherwise 0; (Right panel) The three-year rolling average of application frequency.

Beyond aggregate application behavior, we also examine how the content of submitted YSG proposals evolved following the reform. in order to make the co-

[6]The summary statistic of our sample show that the text and contents similarity of the proposals over the two consecutive years reached 86%.

efficient comparable across different measures, we standardized them with zero mean and unit variation. Table 3 reports within-individual changes in text similarity across proposals. We find that treated women, those in STEM under age 35, exhibited significantly higher similarity in both word usage and content structure post-reform. Specifically, their abstracts and full proposal texts were more similar to their own prior submissions, indicating lower variance across versions. This provide additional evidence on that, conditional on applying, younger women may have revised their applications less intensively, potentially reflecting reduced effort or investment in grant preparation once the urgency of the pre-35 deadline was removed.

Table 3: Effect of Policy Reform on Application Text Similarity

	(1) Word Abst	(2) Cont Abst	(3) Word Text	(4) Cont Text
female × post × stem	0.140*	0.137*	0.123*	0.129*
	(1.93)	(1.97)	(1.87)	(1.90)
N	1915	1915	1915	1915
R^2	0.474	0.499	0.484	0.507
Adj. R^2	0.195	0.232	0.211	0.244

t-statistics in parentheses

$^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

To further probe whether the post-2011 decline in women's YSG applications below age 35 reflects a change in application timing rather than only a reduction in overall participation, we estimate age-specific application hazards within the pre-35 eligibility window. Specifically, we model the probability of submitting an application at each age from 26 to 35 using an IPCW-weighted complementary log-log specification. The inverse-probability-of-censoring weights adjust for selective exit from the risk set due to earlier YSG success, so that the estimated age profiles are not mechanically shaped by differential first-win timing across groups. Appendix Figure A4 shows a clear pre-reform "rush-to-35" pattern for both men and women: application probabilities rise sharply as age approaches 35, consistent with strong incentives to apply before the eligibility deadline. After the reform, however, the

female age profile flattens markedly, while the male profile remains steeply upward sloping. In particular, women's predicted probability of application no longer accelerates in the early thirties and is substantially lower at ages close to 35 than in the pre-reform period. This pattern provides direct timing-based evidence consistent with the main event-study results in Figure 2: once women were granted a longer eligibility window, the pressure to apply before age 35 weakened, leading some younger women to shift applications to later ages rather than bunching before the original cutoff.

5.2 Timing of Fertility

Did the delay in YSG application coincide with earlier family formation? We next investigate whether the expanded application window altered family formation decisions during the early-career stage. Figure 3 applies the same estimation specification based on the entire faculty population, comparing female and male faculty across STEMM and non-STEMM fields. Aligning with the policy's effect on the timing of grant application, we observe a sharp post-reform increase in early childbirth among treated women.

In Appendix B, we use an alternative DDD that extends the comparison to administrative staff and STEMM faculty. The purpose of this design is to address a key identification concern in the faculty-only analysis: fertility timing may have been shifting for reasons unrelated to the NSFC reform, including macroeconomic change, evolving marriage behavior, and the relaxation of China's family-planning policies. Administrative staff provide a useful comparison group because they are exposed to the same broad institutional and social environment as faculty, but are not subject to the grant-competition incentives and age-based evaluation pressures generated by the Young Scientist Grant. We therefore compare female-male differences in birth timing across staff and STEMM faculty, where the latter group faced both direct changes in YSG eligibility and linked career incentives. Under the assumption that common gender-specific time shocks affect staff and faculty similarly

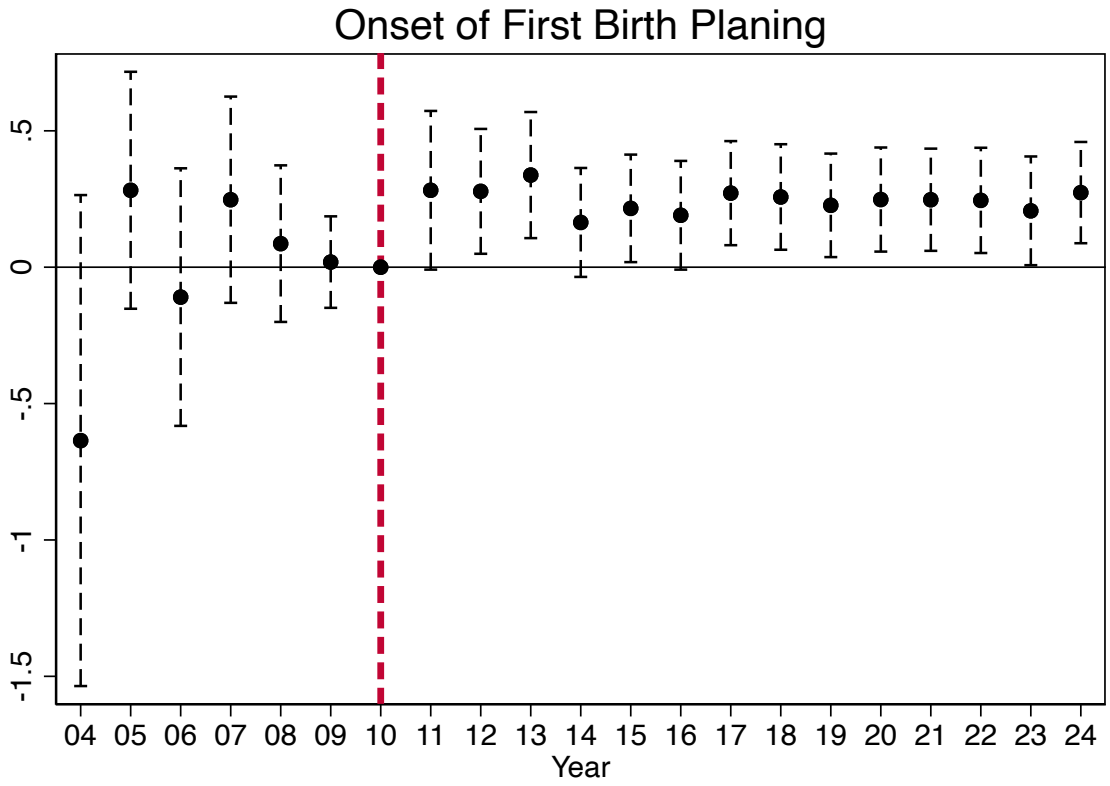


Figure 3: Policy's Effect on Timing of Fertility

Notes: These figures plot estimates of τ_k from Equation (1). The outcome variable is a dummy which equals 1 if there is a first-birth planning (imputed from birth record–10 months prior to the first-birth) in year k and 0 otherwise.

absent the reform, the triple interaction isolates the component of fertility retiming attributable to academic funding constraints. Figure A5 is consistent with this interpretation: younger female faculty shifted first birth earlier, while younger female staff exhibited a delayed peak that tracks broader societal trends instead. The alternative DDD therefore strengthens the claim that the reform changed fertility timing through academic career incentives, rather than through contemporaneous demographic shifts alone.

Together, these analyses point to a consistent pattern: the reform appears to have nudged younger women to prioritize family formation earlier in their academic careers, aligning with the delay in application timing documented above. Assuming that early-career years are a binding constraint in academia, such deferral of grant application would not be expected absent a compelling reason. The synchronization of increased fertility planning with reduced application urgency

suggests that the expanded eligibility window relaxed the career–family tradeoff by loosening the institutional deadlines that previously forced women to choose between research advancement and childbearing. We further illustrate this grant-fertility trade-off using a simple conceptual model in Appendix B. This timing shift underscores how structural constraints can shape intertemporal choices over family and career formation, particularly in high-stakes academic environments.

5.3 The Young Scientist Grant Success

We next explore whether the observed changes in application and fertility behavior translated into the young scientist grant success, then the down-stream grant outcomes (e.g. the “general grant") and publication outcomes.

We first report the outcomes of grant success from our administrative sample, where we directly observe application-linked outcomes. In Figure 4, we plot the DDD event-study estimates of the 2011 eligibility expansion on women’s YSG success outcomes. Consistent with the identification strategy laid out in the Methods section, the DDD structure differences out (i) common time shocks to YSG outcomes and (ii) gender-specific changes that are not unique to STEMM by using non-STEMM faculty as an explicit control group.

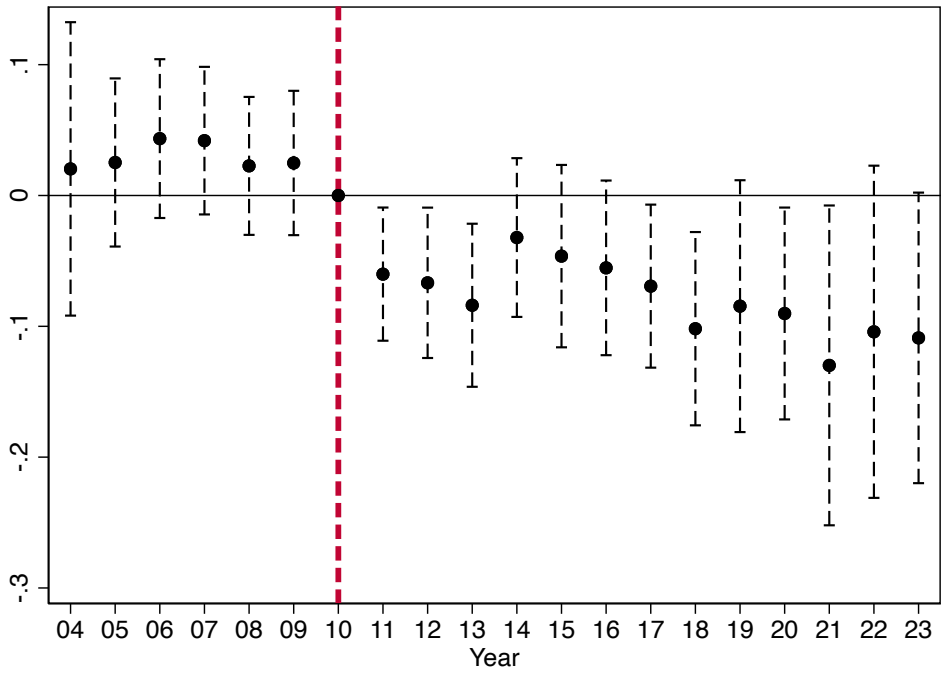


Figure 4: Young Scientist Grant Success (Admin Sample with Applications)
Notes: This figure plot estimates of τ_k from Equation (1). The outcome variable is a dummy, which takes 1 if wining YSG in year k while takes 0 if not yet won while eligible, missing otherwise. Regression sample size: .

The pre-policy coefficients (2004–2010) fluctuate around zero without a systematic trend, supporting the identifying assumption that, relative to non-STEMM, STEMM women and men were on similar trajectories prior to the reform. Strikingly, the first post-reform coefficient in 2011 drops immediately below zero, indicating an abrupt widening of the STEM gender gap in YSG success right at the time women's eligibility was extended. The negative effects persist throughout the post period, with point estimates remaining below zero in subsequent years, consistent with a sustained deterioration in women's relative success in STEM rather than a short-lived transition shock.

A key advantage of this administrative sample is that we can more tightly net out compositional and measurement concerns that often confound long panels: we observe the start of employment and track professional titles accurately over time, allowing us to control for cohort-by-career-stage changes and to align success outcomes with the appropriate rank/tenure timing. Taken together, the admin evi-

dence suggests that the policy change generated an immediate and enduring increase in the relative disadvantage of STEM women in YSG success, consistent with intensified competition following the eligibility expansion.

To assess external validity and national representativeness beyond the administrative setting, we next replicate the same DDD event-study framework in our larger sample with grant information, which allows us to verify whether the dynamic pattern observed here generalizes in a broader, nationally representative sample.

Figure 5 reports the dynamic treatment effects on the YSG success outcome from our DDD event-study design using the full sample with web-based CV. The sample restriction rules align with the regression analysis reflected in Figure 4: we keep only researchers aged 26–35 for both genders between 2003–2021. This restriction holds fixed the age window around the pre- and post-policy periods, so any post-2011 changes in the estimated STEM gender gap in the right panel reflect shifts within the stable early-career applicant pool rather than the mechanical re-entry of older female applicants.

The pre-reform coefficients are small and statistically indistinguishable from zero, providing support for parallel pre-trends in the STEM gender gap relative to the non-STEMM benchmark. After the reform, the estimated gender gap in STEMM success outcomes becomes increasingly negative over time.

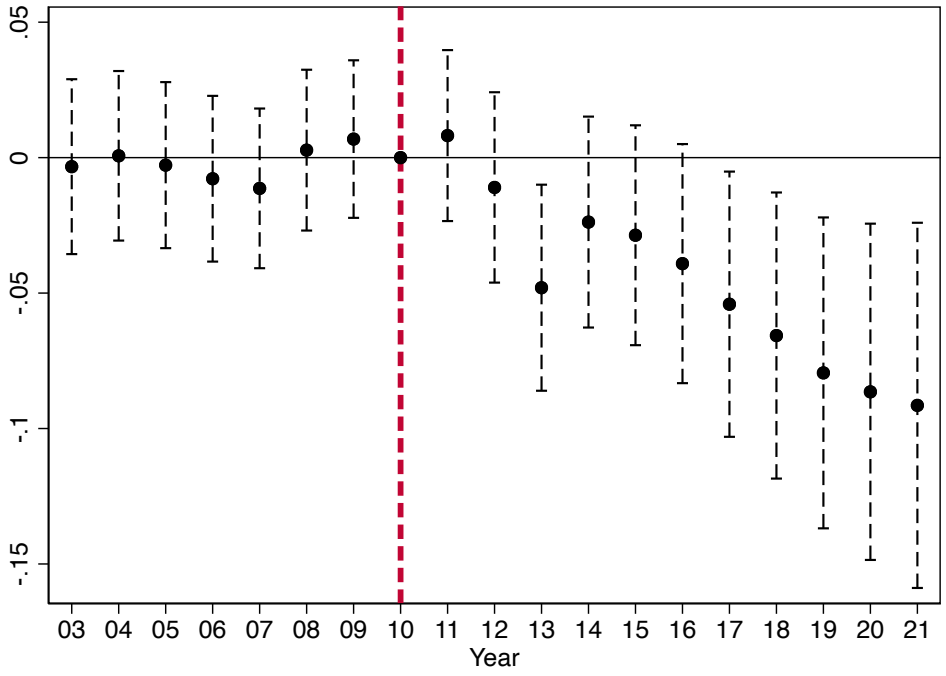


Figure 5: Young Scientist Grant Success (Full Sample with Web-based CV)

Notes: These figures plot estimates of τ_k from Equation (1). The outcome variable is a dummy, which takes 1 if wining YSG in year k while takes 0 if not yet won while eligible, missing otherwise. The regression sample is the full sample of our web-based CV of all researchers aged 26-35 between 2003-2021. Regression sample size: .

The negative effect only starting to show since 2012 rather than 2011, compared to our administrative sample, which potentially driven by the fact that the age identification from the web-based CV is not as accurate as administrative sample, thus the estimates around policy cut-off is not as accurate.

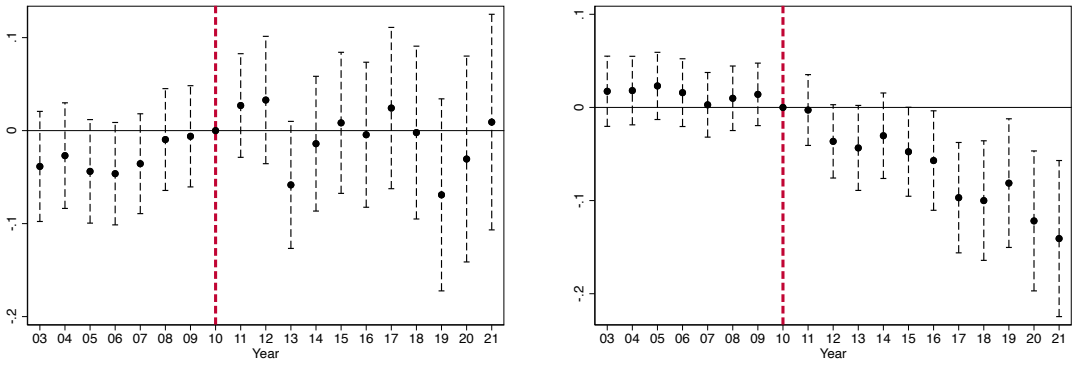
This trend in gender gap aligns with descriptive trends reported in the NSFC's official statistical yearbooks (Yu et al., 2020), which consistently document lower grant success rates for early-career women in STEM fields. Our results also echo Eble and Hu (2025), who show—using nationally representative data—that female scholars face greater barriers in project approval, particularly at early stages of the funding pipeline.

5.4 Heterogeneity

5.4.1 Heterogeneity by institutional prestige

Our full sample with web-based CV not only provides external validation to our administrative sample, but also facilitates rich variation for heterogeneity exploration.

Figure 7 shows substantial heterogeneity by institutional type. Among faculty at top universities (Figure 6a), the post-reform coefficients remain close to zero, with no clear evidence of a persistent decline after 2010. This suggests that the 2011 reform did not materially change YSG-related timing behavior in top institutions. By contrast, the policy effect is concentrated among faculty outside the top-university group (Figure 6b). In non-top universities, the post-reform coefficients turn negative immediately after 2010 and become more negative over time. The pattern is both larger in magnitude and more persistent than in the top-school sample, indicating a sustained behavioral response rather than transitory noise.



(a) Top Schools (b) Non-top Schools

Figure 6: Heterogeneity by Institutional Prestige

Notes: These figures plot estimates of τ_k from Equation (1). The outcome variable is a dummy, which takes 1 if wining YSG in year k while takes 0 if not yet won while eligible, missing otherwise. Left panel sample: top 50% schools classified by Chinese school ranking (the full list is shown in Appendix A). Right panel sample: the subsample with only age 26-36 applicants.

This contrast is consistent with differences in how binding YSG incentives were before the reform. In top universities, applying early for the YSG was likely already essential for promotion, evaluation, and access to future research resources. As a

result, although the reform relaxed formal eligibility for women, it did little to relax the effective timing constraint they faced in practice. There was limited scope to delay without incurring substantial career costs.

In non-top universities, by contrast, the pre-reform timing pressure appears weaker. Once the eligibility window was extended from age 35 to 40, women in these institutions had more room to adjust application timing. The negative post-reform coefficients are therefore consistent with a timing-shift response: rather than applying as early as possible, affected faculty delayed application into the expanded eligibility window.

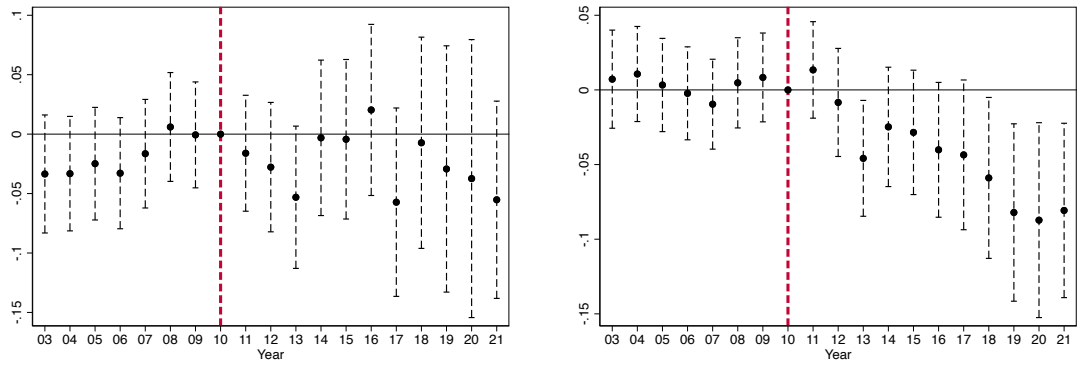
Taken together, these results suggest that the aggregate policy effect is driven primarily by non-top universities. This pattern supports our interpretation that the reform operated through endogenous timing reallocation rather than a uniform mechanical effect across institutions. Where YSG incentives were already binding, behavior changed little; where they were less binding, the added flexibility induced delay.

5.4.2 Heterogeneity by field-level female representation

We next examine whether the policy effect differs by the gender composition of the field. To do so, we partition the treatment group into two sets by mean of female ratio. The first includes biology, medicine, and management, where women account for at least 35 percent of faculty. The second includes mathematics, physics, geological science, engineering, and computer and information science, where women are substantially less represented. The post-reform decline is much larger in the latter group.

Figure 7a shows that in fields with relatively stronger female representation, the event-study coefficients remain close to zero throughout the post-2010 period. Although there is some year-to-year fluctuation, the estimates do not display a clear or persistent shift after the reform. By contrast, in fields with fewer women to begin with (see Figure 7b), the coefficients turn negative soon after the reform and con-

tinue to fall over time. The post-2010 pattern is both more pronounced and more persistent than in the better-represented fields, with the estimates reaching substantially larger negative magnitudes in the later years. This dynamic indicates that the policy effect is concentrated in disciplines where female under-representation was already more severe before the reform.



(a) Fields with above-mean Female Ratio (b) Fields with below-mean Female Ratio

Figure 7: Heterogeneity by field-level female representation

Notes: These figures plot estimates of τ_k from Equation (1). The outcome variable is a dummy, which takes 1 if wining YSG in year k while takes 0 if not yet won while eligible, missing otherwise. Left panel sample: contains fields of Biology, Medicine and Management across all institutions, this sample's mean of female ratio is 37%. Right panel sample: Math, Physics, Geological Science, Engineering and Computer Science, this sample's mean of female ratio is 23%.

The contrast across field groups implies that the reform widened the gender gap most in male-dominated disciplines. In fields with lower baseline female representation, women experienced a substantially larger post-reform decline, whereas in fields with stronger female representation the estimates remain close to zero. The policy therefore appears to have amplified pre-existing disparities across fields rather than offset them.

One plausible explanation is that in more male-dominated fields, women face weaker peer support, fewer senior female role models, and a more competitive environment at the early-career stage. In that setting, extending the eligibility window may have induced larger delays in application timing or sharper competitive crowding, leading to a more negative equilibrium effect on women's YSG success. By contrast, in fields where women are better represented, the same policy may have generated less timing distortion and smaller downstream effects.

5.5 Other Outcomes

5.5.1 Publication Patterns

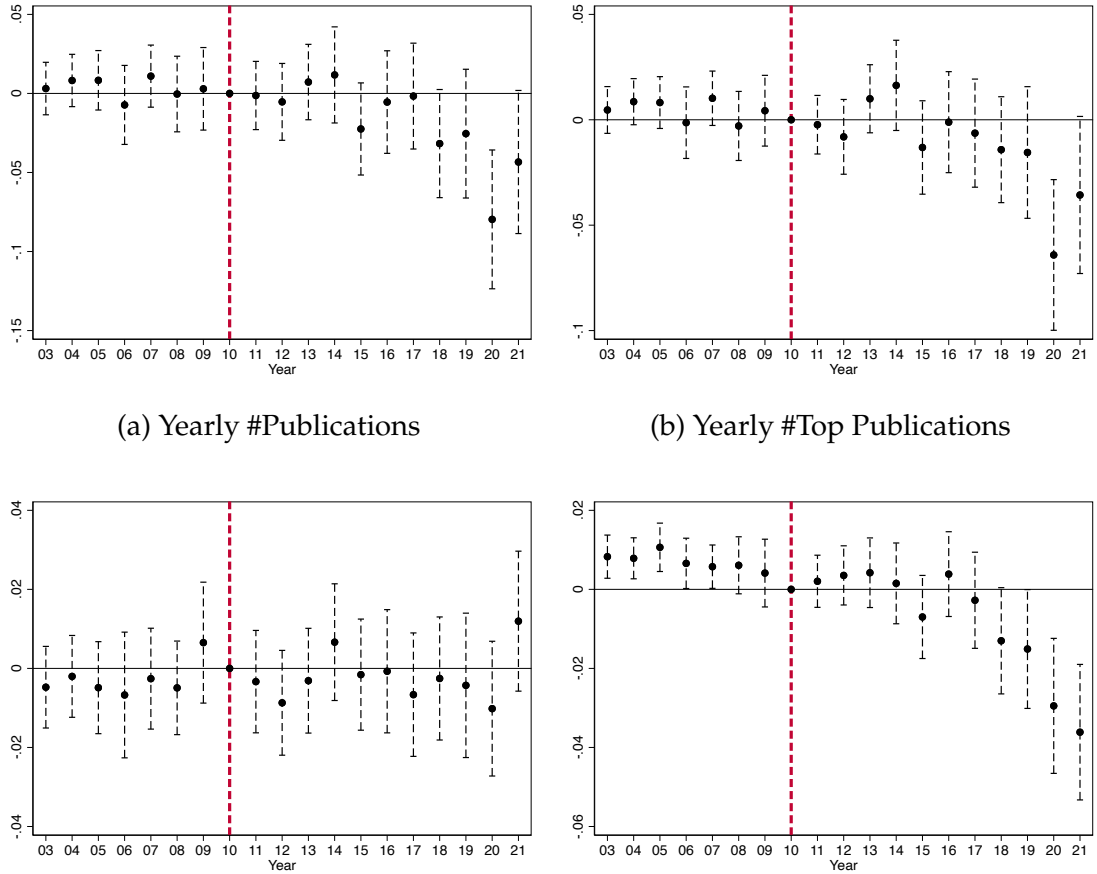
We next turn to publication outcomes. Figure 8 shows no immediate decline in research output following the 2011 reform. This pattern is imformative: it shows that 1) the policy has no trade-off effect between grant application and publication production; 2) the policy may affect research output through delayed grant entrance. The mechanism implies delayed, not contemporaneous, publication effects: if women respond by having children earlier and postponing Young Scientist Grant pursuit, the first margin to adjust is research input and grant timing, while publication declines emerge only later, as those earlier delays propagate through the production pipeline. The event-study estimates closely match this timing.

Panel (a) plots the effect on the total number of yearly publications. The coefficients remain close to zero in the years immediately after the reform, indicating that publication flow did not contract contemporaneously. This is consistent with the fact that publications reflect research activity initiated in earlier periods and are therefore unlikely to respond mechanically in the short run. Beginning in 2018, however, the estimates turn negative and grow in magnitude, reaching roughly -0.08 publications per year by 2020. This delayed decline fits the interpretation that the reform changed the timing of career investment: when fertility is moved forward and grant application or research-resource accumulation is postponed, the downstream publication pipeline weakens only with a lag.

Panel (b) examines high-impact publications. Here too, the early post-reform coefficients remain close to zero, with only modest negative movement in the later years. The muted short-run response again accords with the idea that top publications are especially slow-moving outcomes, requiring both prior investment and sustained project development. Thus, the absence of an immediate decline should not be read as evidence of no effect, but rather as evidence that the policy's consequences operated through delayed research inputs rather than contemporaneous

withdrawal from academic work.

Panels (c) and (d) distinguish the decline by authorship role. Panel (c) shows that first-authored publications remain broadly stable for much of the post-reform period before turning negative near the end of the sample. Panel (d), by contrast, reveals a clearer and more pronounced late-stage decline in corresponding-authored publications, reaching about -0.08 in 2020. This margin is especially informative. In these fields, corresponding authorship more often captures the principal-investigator role: leading projects, directing collaboration, and anchoring the research agenda. The stronger negative response on corresponding-authored output therefore suggests that delayed Young Scientist Grant attainment did not merely reduce publication counts mechanically, but also slowed women's progression into PI-type positions in the downstream research production process.



(a) Yearly #Publications

(b) Yearly #Top Publications

(c) Yearly #First-authored Publications

(d) Yearly #Corresponding-authored

Figure 8: Policy Effect on Publication

Taken together, the publication results reinforce the interpretation from the earlier outcomes. The reform did not generate an immediate drop in output, which would have been inconsistent with the slow-moving nature of academic production. Instead, the estimates point to a lagged decline that emerges as earlier delays in fertility, grant timing, and research-resource input propagate through the publication pipeline. The sharper response in corresponding-authored publications further suggests that the consequences extended beyond short-run productivity to the timing of research leadership itself. In this sense, the publication patterns provide downstream evidence for a broader re-timing mechanism: the reform relaxed early career pressure, altered the sequencing of fertility and grant competition, and only subsequently affected realized output and PI-role attainment.

5.5.2 Career Trajectory

We further find that the policy delayed women's promotion to associate professor in STEM (Figure 9). Measured as a dummy for having attained the associate professor rank, the promotion outcome declines for treated women after the reform, indicating slower transition into this key mid-career milestone. This result is consistent with our broader interpretation that the eligibility extension encouraged a later career timetable—delaying grant application and related accumulation of academic credentials—which then translated into postponed promotion.

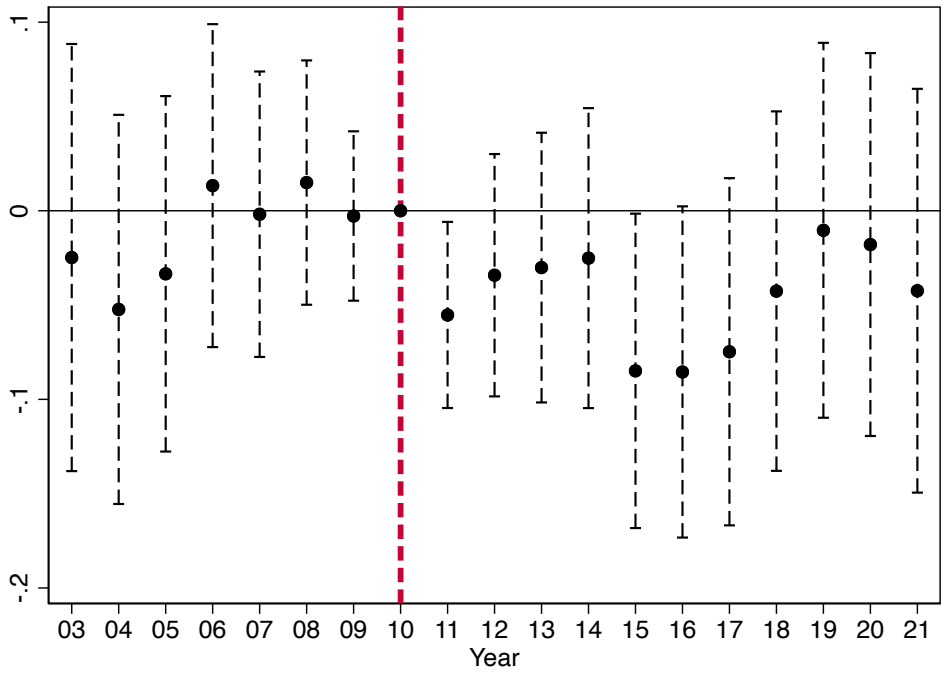


Figure 9: Promotion to Associate Professor

Notes: These figures plot estimates of τ_k from Equation (1). The outcome variable is a dummy, which takes 1 if being associate professor in year k while takes 0 if not yet, missing for individuals title not known. The regression sample is consistent with the one in Figure 5. Regression sample size: 188,459.

6 Discussion and Conclusion

6.1 What we learn from the 2011 eligibility extension

At the center of this paper lies a longstanding tension: how women in science navigate overlapping timelines of fertility and career progression when the most demanding early-career years coincide with biological constraints. We study this question through a rare institutional shift: the 2011 reform to China's Young Scientist Grant (YSG), which extended women's eligibility by five years without conditioning on childbirth. This policy change provides a revealing window into how early-career scholars respond when a salient temporal constraint is eased while competitive pressures remain high.

We find that the reform reduced the urgency for younger women to apply for early-career grants and coincided with earlier family formation. These shifts were

not merely symbolic. They translated into a slower trajectory through key academic milestones, including grant attainment and research productivity. Downstream grant access (general grants that fund established scholars) fell for women in more competitive, funding-reliant fields. Publication output also declined, with more pronounced drops in leadership roles as measured by corresponding authorship.

Taken together, the 2011 YSG eligibility extension for women provides rare evidence on how early-career scientists re-sequence career investments and family formation when a binding temporal constraint is relaxed. The results underscore a broader lesson: relaxing one clock can change behavior, but sustained progress depends on how multiple clocks—eligibility thresholds, recent-output screening, and career advancement deadlines—interact over the academic life course.

6.2 Interpreting behavioral responses

These patterns can be interpreted as choices made under a new set of constraints and opportunities. Faced with greater temporal flexibility, some women may have shifted effort toward family formation during the early-career period, aware of potential trade-offs for their academic trajectories. Such adjustments need not reflect diminished ambition or missed opportunities; they may reflect broader dimensions of utility and well-being that extend beyond publication counts and grant awards.

Importantly, our results do not imply that women "benefit" or "lose" from the reform in a welfare sense. Rather, the evidence highlights how life-cycle constraints and institutional timelines jointly shape behavior. When one deadline is relaxed (the eligibility cutoff), scholars may re-sequence investments across career and family, yet remain exposed to other forms of competitive screening and cumulative advantage.

6.3 Anecdotal evidence on the "double-clock" constraint

Our empirical analysis isolates behavioral responses to a specific policy reform, but the underlying constraint is often described more broadly in public discourse as a "double-clock" pressure for women in research: age-bounded eligibility and recent-output screening in grant competitions coincide with high-stakes promotion and hiring timelines that can function as an "up-or-out" clock (the Chinese version of the tenure clock), all while marriage and childbearing remain concentrated in the same life stage.

We bring two pieces of anecdotal evidence here—a "Top-Down" (media discourse) and a "Bottom-Up" (direct practitioner testimony) perspective—to illustrate this structural problem in Chinese academia. A recent media report by Lai (2024) from *Nanfengchuang* provides a concrete illustration of these interacting clocks.[7] The report describes how funding and hiring evaluations may emphasize age-bounded eligibility and recent-output records, making short interruptions especially salient for early-career women, and discusses how pregnancy can constrain research activity in ways that amplify concerns about falling behind evaluation windows. We use this source as contextual illustration rather than causal evidence. It emphasizes that early-career evaluation is not only governed by a formal age threshold; it is also shaped by implicit "recency" expectations that reward uninterrupted production. In this environment, pregnancy and childbirth are framed not merely as time-consuming events but as periods that can directly restrict research activity, particularly in lab-intensive settings. These narratives align with a mechanism consistent with our findings: easing the eligibility cutoff can alter early-career sequencing, but persistent screening based on recent outputs and downstream career deadlines can still penalize temporary slowdowns, contributing to delayed grant attainment and reduced measured productivity.

Complementing this top-down narrative, a 2025 discussion thread on Xiaohong-

[7] Nanfengchuang (or South Review) is a well-known biweekly politics and economics magazine based in Guangzhou, China.

shu (also known as “Rednote") offers a bottom-up view of how early-career women internalize and strategize around the same “double-clock” constraint.[8] Strikingly, participants do not frame fertility timing as a private preference problem; instead, they map it explicitly onto institutional milestones and evaluation rules. Some comments advance an extreme “earliest possible” logic (e.g., undergraduate years), arguing that later stages impose too high an opportunity cost once grant deadlines and performance metrics become binding. Others propose a narrow “student-status” window (PhD or postdoc) as the least damaging period, while simultaneously noting that in China postdoctoral appointments can carry high KPI requirements tied to faculty job-market competitiveness. A third cluster explicitly coordinates childbirth around grant cycles and “up-or-out” reviews (e.g., timing birth to the year of submitting a Youth Fund application), underscoring that the relevant constraint is not merely the formal eligibility cutoff, but the need to preserve continuity and signal momentum within evaluation windows.

The practitioner testimony also highlights mechanisms that our administrative outcomes cannot directly observe but help interpret them. Commenters repeatedly emphasize field-specific constraints in lab-intensive disciplines (e.g., avoiding chemical exposure during pregnancy) and the physiological toll of sustained academic stress, suggesting that the effective cost of a childbirth-related interruption may exceed the nominal time granted by formal policies. Together, the media narrative and practitioner testimony converge on the same point: time-compensation policies may shift early-career sequencing by relaxing a salient eligibility deadline, yet they do not eliminate the broader set of constraints that operate through recency-based evaluation, promotion clocks, and the difficulty of rebuilding research momentum after childbirth.

Such anecdotal evidence cannot establish causal effects, nor does it speak to representativeness. However, it helps interpret why time-compensation policies

[8] We draw on a selected Xiaohongshu thread titled “When is the best fertility window for female scientific researchers?” and its comment replies. Appendix C presents original Chinese excerpts with author translations and a thematic synthesis. As with the media account, these materials are illustrative and not intended to be representative.

may change the timing of applications and family formation without eliminating longer-run structural constraints that operate through evaluation windows, promotion clocks, and the costs of rebuilding research momentum after childbirth.

6.4 Implications, limits, and directions for future research

From a policy perspective, our findings suggest that age-limit extensions may remove one salient barrier while leaving other constraints unchanged. If post-birth rebuilding costs and recent-output screening remain central to evaluation, then complementary measures may be needed to align time-compensation policies with sustained professional advancement. Examples include mechanisms that reduce the penalty from short research interruptions or that support re-entry and catch-up (e.g., bridge funding, flexible evaluation windows, or targeted support for re-establishing research teams and pipelines).

Several limitations are important. First, our outcomes are measured through observable academic milestones (applications, funding, and publications) that capture only part of welfare and do not directly measure well-being, family outcomes, or subjective career satisfaction. Second, while the reform provides a compelling quasi-experimental setting, institutional responses and academic competition may evolve over time, potentially shaping the mapping from eligibility to long-run trajectories. Third, heterogeneity across fields and institutions indicates that the same eligibility change may have different implications depending on funding dependence, publication norms, and the intensity of promotion screening.

Future work could combine administrative data with survey or qualitative evidence to better measure welfare-relevant outcomes and decision-making constraints, explore institutional adjustments in hiring and promotion in response to eligibility rules, and evaluate complementary policies designed to support post-birth rebuilding in high-competition research environments.

References

Antecol, H., Bedard, K., and Stearns, J. (2018). Equal but inequitable: Who benefits from gender-neutral tenure clock stopping policies? *American Economic Review*, 108(9):2420–2441.

Bertrand, M., Goldin, C., and Katz, L. F. (2010). Dynamics of the gender gap for young professionals in the financial and corporate sectors. *American economic journal: applied economics*, 2(3):228–255.

Casad, B. J., Franks, J. E., Garasky, C. E., Kittleman, M. M., Roesler, A. C., Hall, D. Y., and Petzel, Z. W. (2021). Gender inequality in academia: Problems and solutions for women faculty in stem. *Journal of neuroscience research*, 99(1):13–23.

Cech, E. A. and Blair-Loy, M. (2019). The changing career trajectories of new parents in stem. *Proceedings of the National Academy of Sciences*, 116(10):4182–4187.

Ceci, S. J., Ginther, D. K., Kahn, S., and Williams, W. M. (2014). Women in academic science: A changing landscape. *Psychological Science in the Public Interest*, 15(3):75–141.

Charlesworth, T. E. and Banaji, M. R. (2019). Gender in science, technology, engineering, and mathematics: Issues, causes, solutions. *Journal of Neuroscience*, 39(37):7228–7243.

Chen, Y. (2024). Does the gig economy discriminate against women? *Journal of Development Economics*, page 103275.

Cheryan, S., Ziegler, S. A., Montoya, A. K., and Jiang, L. (2017). Why are some stem fields more gender balanced than others? *Psychological bulletin*, 143(1):1.

Cimpian, J. R., Kim, T. H., and McDermott, Z. T. (2020). Understanding persistent gender gaps in stem. *Science*, 368(6497):1317–1319.

Ductor, L. (2015). Does co-authorship lead to higher academic productivity? *Oxford Bulletin of Economics and Statistics*, 77(3):385–407.

Ginther, D. K., Kahn, S., and Schaffer, W. T. (2016). Gender, race/ethnicity, and national institutes of health r01 research awards: is there evidence of a double bind for women of color? *Academic Medicine*, 91(8):1098–1107.

Goldin, C. (2014). A grand gender convergence: Its last chapter. *American economic review*, 104(4):1091–1119.

Gu, C. (2021). Women scientists in china: current status and aspirations. *National Science Review*, 8(10):nwab101.

Holman, L., Stuart-Fox, D., and Hauser, C. E. (2018). The gender gap in science: How long until women are equally represented? *PLoS biology*, 16(4):e2004956.

Huang, J., Gates, A. J., Sinatra, R., and Barabási, A.-L. (2020). Historical comparison of gender inequality in scientific careers across countries and disciplines. *Proceedings of the National Academy of Sciences*, 117(9):4609–4616.

Huang, W., Liu, Q., Xing, J., and Zheng, S. (2025). Breaking the iron rice bowl: Tenure-track systems and the rise of academic innovation in china. *The Economic Journal*, page ueaf093.

Kim, S. and Moser, P. (2025). Women in science. lessons from the baby boom. *Econometrica*, 93(5):1521–1560.

Kleven, H., Landais, C., and Søgaard, J. E. (2019). Children and gender inequality: Evidence from denmark. *American Economic Journal: Applied Economics*, 11(4):181–209.

Koning, R., Samila, S., and Ferguson, J.-P. (2021). Who do we invent for? patents by women focus more on women's health, but few women get to invent. *Science*, 372(6548):1345–1348.

Lai, Y. (2024). “penned-up" female phds: Breaking the barriers of marriage and childbearing. *Nanfengchuang*, 13.

Lerchenmueller, M. J. and Sorenson, O. (2018). The gender gap in early career transitions in the life sciences. *Research Policy*, 47(6):1007–1017.

Ley, T. J. and Hamilton, B. H. (2008). The gender gap in nih grant applications. *Science*, 322(5907):1472–1474.

Ma, Y., Zhao, Y., Gong, X., Sun, L., and Zheng, Y. (2018). Close the gender gap in chinese science. *Nature*, 557(7706):25–28.

Malisch, J. L., Harris, B. N., Sherrer, S. M., Lewis, K. A., Shepherd, S. L., McCarthy, P. C., Spott, J. L., Karam, E. P., Moustaid-Moussa, N., Calarco, J. M., et al. (2020). In the wake of covid-19, academia needs new solutions to ensure gender equity. *Proceedings of the National Academy of Sciences*, 117(27):15378–15381.

Mason, M. A. and Goulden, M. (2004). Do babies matter (part ii). *Academe*, 90(6):10–15.

Pohlhaus, J. R., Jiang, H., Wagner, R. M., Schaffer, W. T., and Pinn, V. W. (2011). Sex differences in application, success, and funding rates for nih extramural programs. *Academic Medicine*, 86(6):759–767.

Shen, H. (2013). Inequality quantified: Mind the gender gap. *Nature*, 495:22–24.

Yu, X. and Gao, R. (2023). Nsfc encourages female scientists to grow: Policy, effectiveness and prospects. (in chinese). *Bulletin of Chinese Academy of Sciences*, 38(2):265–276.

Yu, X., You, C., Huang, R., Ke, M., Shangguan, X., Yang, L., Cai, Y., and Gao, Z. (2020). Discussion on improving the funding efficiency of the national natural science foundation of china young scientist grant. (in chinese). *Bulletin of National Natural Science Foundation of China*, 34(3):324–331.

A Additional Figures and Tables

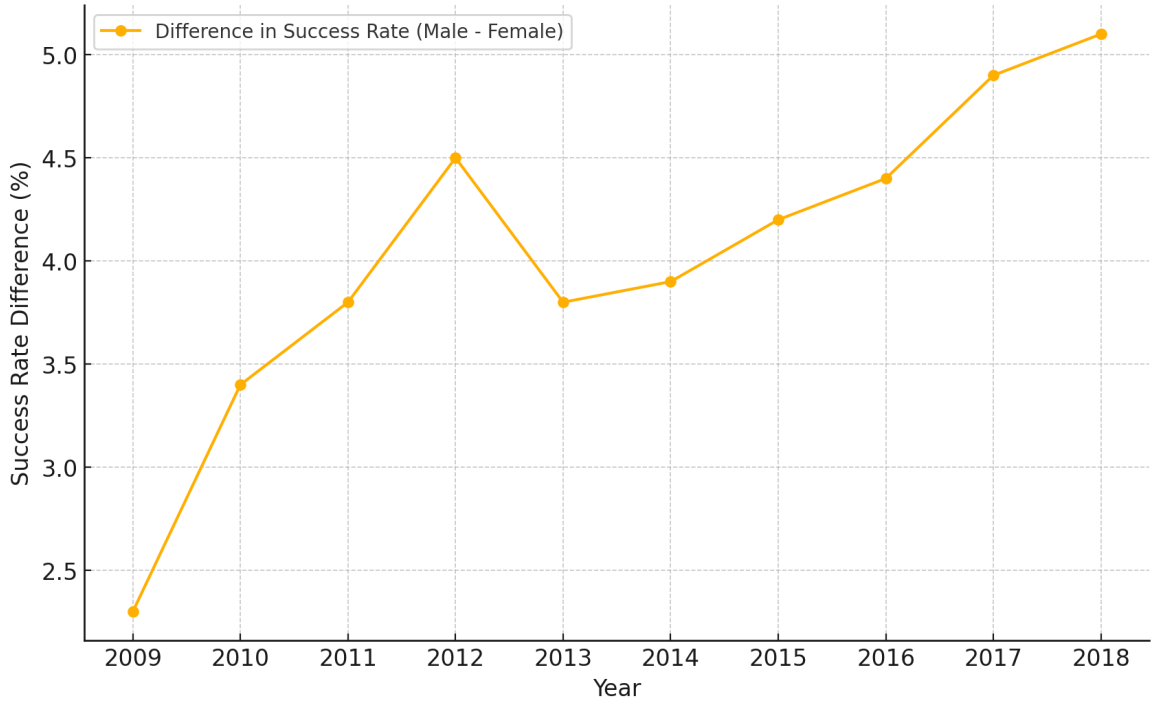


Figure A1: Gender Gap in Success Rate of the Young Scientist Grant (Aged 30-35)
Notes: Data come from the NSFC's statistics report (Yu et al., 2020).

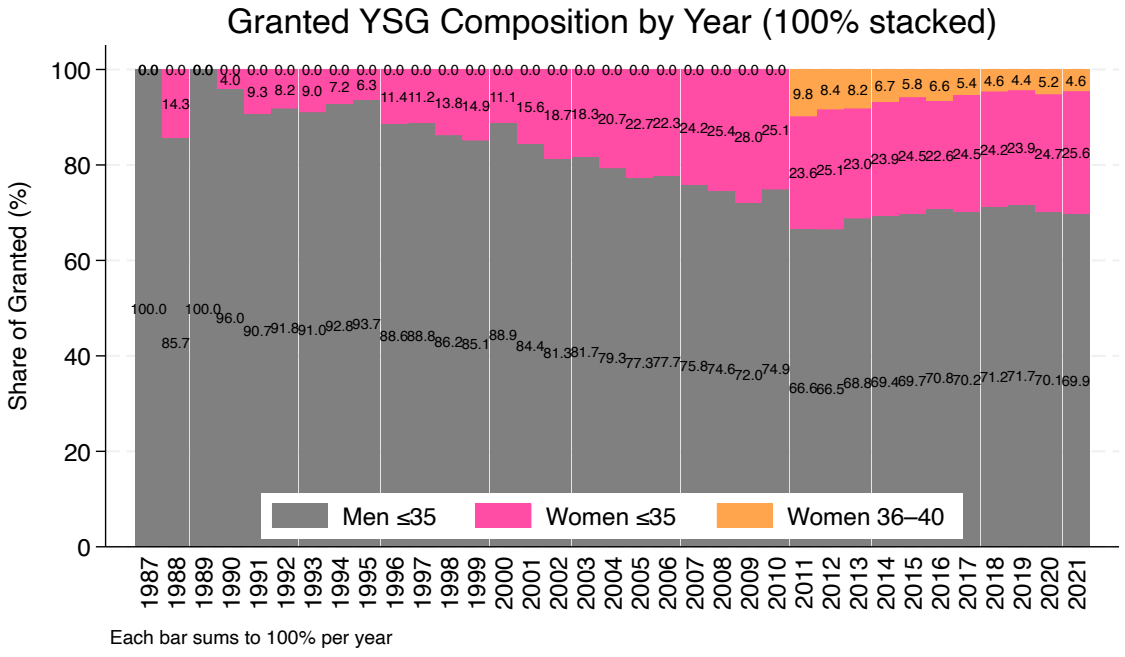


Figure A2: The Share of Winners of the Young Scientists Grant
Notes: Data is from our own data of this paper, combined NSFC's public granted project information and researchers' CV data.

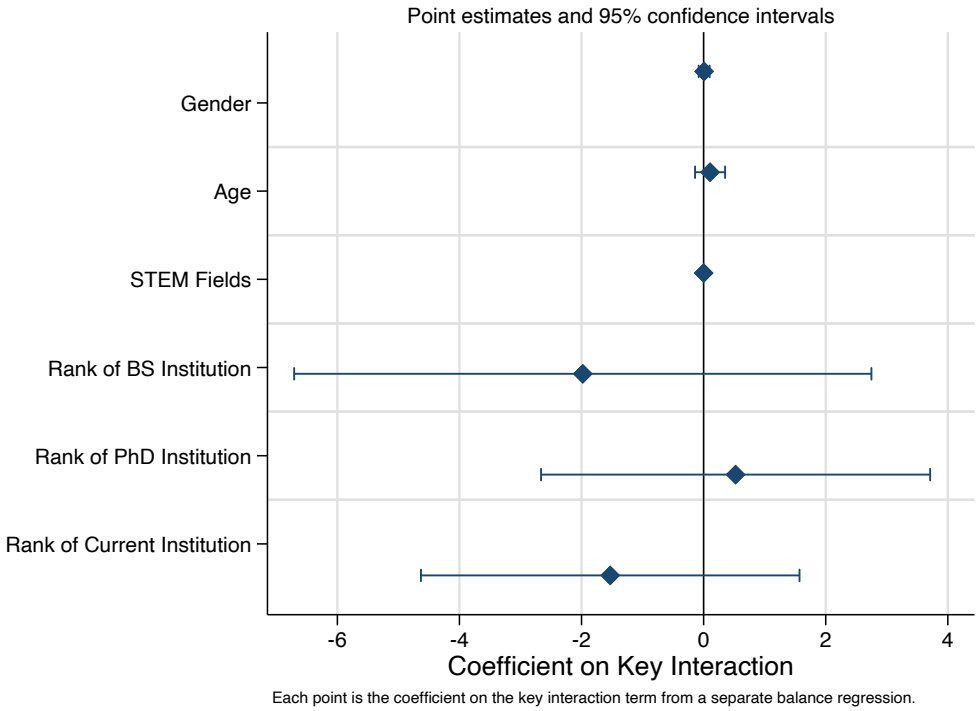


Figure A3: Covariate Balance Test

Notes: Each point reports the coefficient on the relevant policy interaction term from a separate balance regression in which the listed observable characteristic is used as the outcome. For gender composition, we estimate a difference-in-differences specification with the interaction between STEM status and the post-policy indicator; for STEM composition, we estimate a difference-in-differences specification with the interaction between gender and the post-policy indicator; for birth year and institutional rank measures, we estimate a difference-in-differences-in-differences specification with the interaction between gender, STEM status, and the post-policy indicator. Error bars indicate 95% confidence intervals. All regressions use the same sample restrictions as in the main analysis.

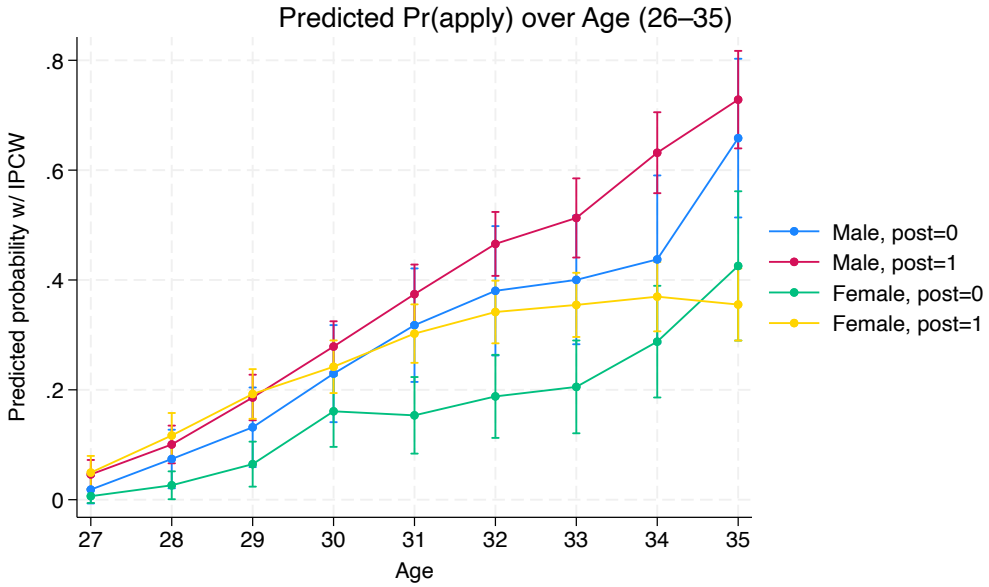


Figure A4: The Pre-35 "Rush" Flattens for Women

Notes: The figure plots predicted probabilities of submitting a YSG application by age from an IPCW-weighted complementary log-log model estimated on the at-risk sample of scholars who were eligible for the Young Scientist Grant and had not previously won it. The sample is restricted to ages 26–35. The specification interacts female, post-reform (= 1 for 2011 and after), and age, while controlling for field-by-year fixed effects, marriage status, professor and associate professor indicators, and data-source-by-year and data-source-by-field fixed effects. Inverse-probability-of-censoring weights are constructed from first-win hazards to adjust for selective exit from the risk set after prior YSG success. Predicted values are reported separately by gender and reform period.

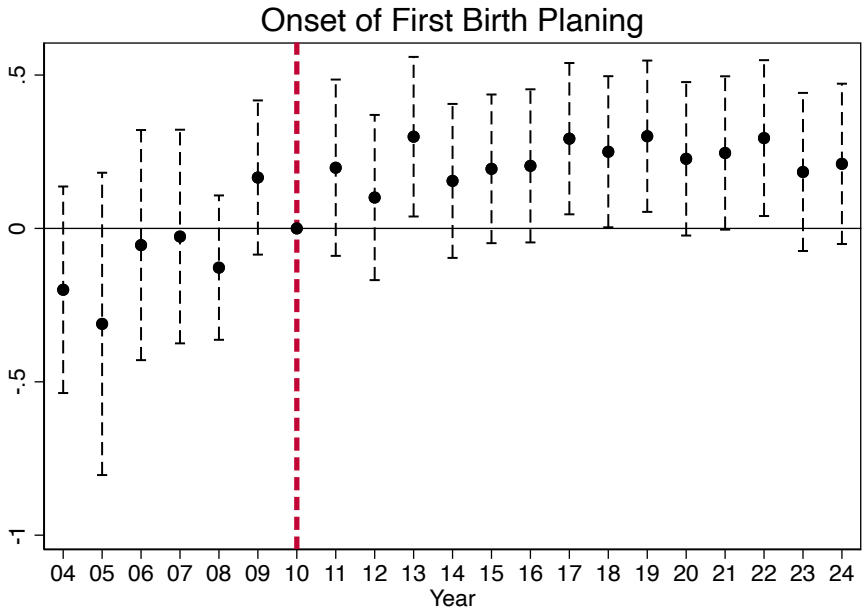


Figure A5: Policy's Effects on Fertility: Alternative Identification compares Faculty and Staff

Notes: These figures plot estimates of τ_k from Equation (1) but replacing the control group with staff. The outcome variable is a dummy which equals 1 if there is a first-birth planning (imputed from birth record–10 months prior to the first-birth) in year k and 0 otherwise.

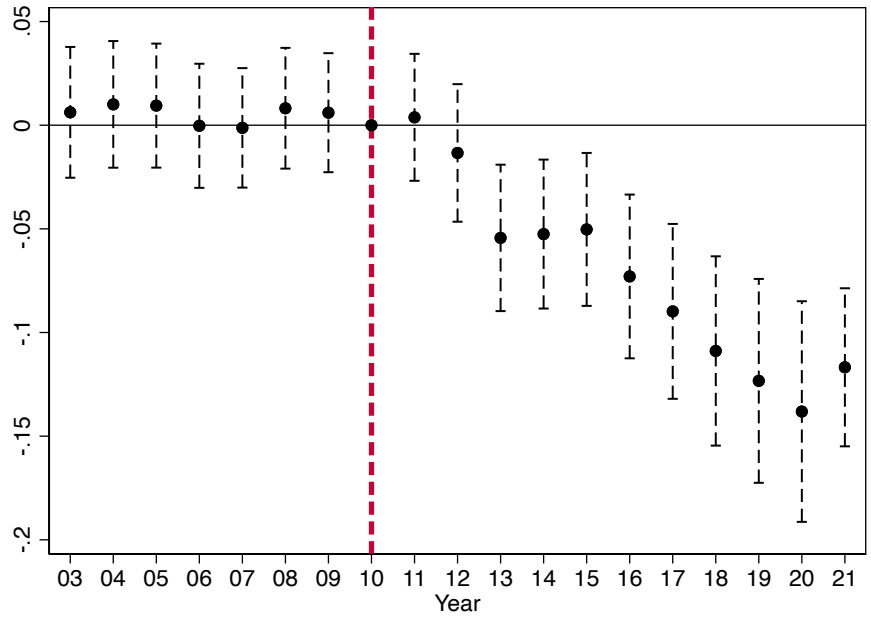


Figure A6: Young Scientist Grant Success: Age Group 26-40

Notes: These figures plot estimates of τ_k from Equation (1). The outcome variable is a dummy, which takes 1 if wining YSG in year k while takes 0 if not yet won while eligible, missing otherwise. Left panel sample: the entire sample of applicants including female applicants aged 36-40 after 2011. Right panel sample: the subsample with only age 26-36 applicants.

B A Simple Model of Grant-Fertility Trade-offs

To interpret the contrasting behaviors of two generations of female researchers—those who came of age before the policy reform and those after—we need a simple economic model that captures the core trade-offs they face. While the policy intended to support work-family balance by expanding grant eligibility for women, it simultaneously reshaped the competitive landscape across cohorts. A formal model helps clarify how women weigh the costs of delaying childbirth versus delaying grant applications under changing institutional rules, and how increased competition from older entrants may unintentionally alter the incentives and outcomes for younger scholars. This framework is essential for understanding both the direct and unintended effects of gender-targeted time-based policy interventions.

Environment

A female researcher faces two time periods:

- $t = 1$: age 30–35
- $t = 2$: age 36–40 (available only after the 2011 NSFC reform)

She chooses both:

- When to apply for a Young Scientist Grant (YSG): $a_t \in \{0, 1\}$, with $\sum_t a_t \leq 1$
- When to have a child: $b_t \in \{0, 1\}$, with $\sum_t b_t \leq 1$

Grant Success and Productivity

- $\bar{\pi}$: baseline research productivity
- $\lambda > 0$: productivity loss if grant and childbirth occur in same period
- p: reverse pre-reform grant competition
- p_1, p_2: reverse post-reform competition in $t = 1$ and $t = 2$

Success probability in period t is:

$$s_t = (\bar{\pi} - \lambda \cdot b_t) \cdot p_t$$

Utility and Parameters

- V: value of winning the YSG
- C: cost of having a child (economic and emotional burden)
- δ: cost of delaying childbirth (biological and psychological)

Total utility depends on timing of application and childbirth.

Pre-Reform Problem (Born leq1975)

Before 2011, women could apply for YSG only at age ≤ 35. The strategic options are:

(U_1^{pre}) Delay childbirth until after grant application:

$$U_1^{\text{pre}} = V \cdot \bar{\pi} \cdot p - C - \delta$$

(U_2^{pre}) Have child during grant application window:

$$U_2^{\text{pre}} = V \cdot (\bar{\pi} - \lambda) \cdot p - C$$

Trade-off condition:

$$U_1^{\text{pre}} \geq U_2^{\text{pre}} \quad \Longleftrightarrow \quad V\lambda p \geq \delta$$

Interpretation: A woman delays childbirth if the expected productivity loss from childbearing during the grant period ($V\lambda p$) exceeds the disutility of delaying childbirth (δ). This explains delayed fertility observed among older cohorts.

Post-Reform Problem (Born $>$ 1975)

After 2011, women can apply up to age 40. The strategy set expands:

(U_1) Delay childbirth to apply early (age 30–35):

$$U_1 = V \cdot \bar{\pi} \cdot p_1 - C - \delta$$

(U_3) Have child first, apply later (age 36–40):

$$U_3 = V \cdot \bar{\pi} \cdot p_2 - C$$

(U_4) No grant application:

$$U_4 = -C$$

Note: Option U_2 (grant + childbirth in $t = 1$) is dominated by U_3 or U_1 in most cases.

Trade-off condition:

$$U_3 \geq U_1 \quad \Longleftrightarrow \quad p_2 \geq p_1 - \frac{\delta}{V\bar{\pi}}$$

Interpretation: As p_2 (postponed application success rate) declines due to crowd-in, fewer women will delay grant application. Even with expanded eligibility, intensified competition may discourage younger women from taking advantage of the flexibility.

Summary

- **Pre-reform cohorts** chose between delaying childbirth (U_1^{pre}) or enduring productivity loss (U_2^{pre}), based on p and δ.
- **Post-reform cohorts** weigh a new choice between applying early (U_1) or delaying application (U_3), shaped by p_1, p_2, and unchanged δ.

- The model explains observed shifts in fertility timing and grant outcomes, highlighting how second-order competition effects can reduce the policy's intended benefits.

Linking Theory to Empirical Findings

The model explains key cohort-based differences in behavior observed in the data. In particular, it rationalizes how changes in policy constraints and option sets affect both grant application timing and fertility decisions.

Table B1: Empirical Patterns and Their Theoretical Interpretation

Empirical Finding	**Theoretical Explanation**
1. Pre-reform women apply earlier for YSG (mostly age $\leq$35)	Before 2011, women had no eligibility beyond age 35. The only choice was when to have children. Optimal strategy under high productivity cost (λ) and grant value (V) was to delay childbirth and apply early (strategy U_1^{pre}).
2. Pre-reform women have children later	In the pre-reform regime, delaying childbirth was preferred if $V \cdot \lambda \cdot p \geq \delta$. Many chose U_1^{pre}, delaying childbirth to avoid productivity loss during grant application.
3. Post-reform women apply later (more dispersed grant timing)	The post-2011 reform introduced a second grant window (age 36–40). When competition in that window (p_2) was not too high, women could choose U_3 (child first, grant later), leading to delayed or more distributed application timing.
4. Post-reform women have children earlier	With flexible eligibility and the option to apply post-childbirth, many younger women chose to avoid delay cost (δ) and had children earlier (strategy U_3), consistent with a shift away from the old delay-child norm.

C Public discourse sources (illustrative)

C.1 A Media Report by the Well-known *"Nanfengchuang"*

The original Chinese report is《被"圈养"的女博士，打破婚育藩篱》by Lai (2024) published on Nanfengchuang (2024-06-17) as cover story "女士赛先生"（Female Scientists). Table C1 provides some selected direct quotes from the report and complement with English translations.

Table C1: Selected Quotes from the Report

Original Chinese Text	**English Translation**
"当社会中有关青年教师"非升即走"压力的讨论越来越多时，女性科研人员还面临着另外一层压力—她们也恰好处于社会所认知的"最佳生育年龄"时期。当社会时钟嘀嗒嘀嗒转动时，她们好似必须在此刻做出自己的选择—这个时段里到底选科研，还是选婚育？"	When discussion of the "up-or-out" pressure facing young faculty becomes increasingly common, female researchers confront an additional layer of pressure: they happen to be in what society regards as the "optimal childbearing age." As the social clock keeps ticking, they can feel compelled to make an immediate choice—during this period, should they choose research, or marriage and childbearing?
"而生育则有三难，占用时间，消耗精力，损耗身体。与此同时，有生育计划的女性科研者自己也会犹豫，高龄生育是否会对自己和孩子的身体健康造成影响。"	Childbearing entails three difficulties: it takes time, drains energy, and imposes physical costs. At the same time, women researchers who plan to have children may hesitate, worrying whether later-age childbearing could affect the health of themselves and their children.
"但无论是国家自然科学基金项目还是博士科研启动基金项目的申请，都有年龄限制。能不能通过申请，还需要考量过去几年的科研成果。"	Yet applications for both National Natural Science Foundation of China (NSFC) grants and doctoral start-up research funds are subject to age limits. Whether an applicant can succeed also depends on their research record over the past several years.
"后来入职高校的时候，对方也顾虑我快35岁了，好在国家延长了女性申请国家自然科学基金的时间，所以我当时说我可以申到40岁，这么看我还小。"	When I was later hired by a university, they were concerned that I was close to 35. Fortunately, the state extended the eligibility age for women applying to the NSFC, so I told them that I could apply until 40—by that logic, I was still 'young'.

C.2 A Thread on Career-Fertility Trade-offs from “Xiaohongshu"

This section provides a detailed mapping of the “double-clock” constraint as discussed by practitioners on social media. The data is drawn from a 2025 thread by account "boon的小本子" on one of the most popular Chinese social commerce apps (*Xiaohongshu, or Little Red Book*), where female researchers discussed the “optimal fertility window” in the context of China’s academic evaluation system. The original post title: “提问：女性科研工作者最佳生育窗口是什么时候？”(Question: When is the best fertility window for female scientific researchers?). The thread involves PhD students and early-career researchers in Chinese academia discussing the trade-offs between biological constraints and academic milestones. Figures B1-B3 provide screenshots of the original thread while Tables B1-B4 provide selected comments with English translations.

In short, the testimonies in Tables C2-C5 align closely with institutional analyses in the media report by (Lai, 2024). While media reports focus on the **age-bounded eligibility** (the formal clock), the practitioners focus on the **implicit recency expectation** (the informal clock). For example, while a policy may grant a one-year extension for birth, the practitioner’s fear of “falling behind” or “losing research momentum” in a lab-intensive setting suggests that the effective penalty of an interruption exceeds the formal time allotted by the policy.

As detailed in the Appendix tables, respondents evaluate various windows of opportunity based on shifting opportunity costs and institutional pressures: the undergraduate years are perceived as a period of high physical resilience and minimal career disruption despite financial precariousness (Table C2), while the PhD and postdoctoral stages offer a level of flexibility that can be leveraged to provide positive signals to hiring committees regarding "completed" fertility (Table C3). Upon entering the formal labor market, the conflict between biological and professional timelines intensifies, forcing researchers to synchronize childbearing with administrative "dead periods"—such as the National Natural Science Foundation of China

(NSFC) grant review cycles—to mitigate the "recency" penalties of the "up-or-out" tenure clock (Table C4). This strategic behavior is ultimately underscored by severe physical and biological costs, including laboratory-specific hazards in STEM fields and stress-induced reproductive health issues, which highlight the profound friction between institutional evaluation windows and biological realities (Table C5).

Table C2: The “Optimal" Fertility Timing

User	**Original Chinese Text**	**English Translation**
bb猪	说不好听点，但是确实是，本科。	To put it bluntly, it’s actually during undergraduate years.
一排鱼	现在回过头真的觉得是本科，身体好，精力好，只不过感情不稳定，收入不稳定。但是对自己的事业没影响。	Looking back, it really is undergrad. You have health and energy; it’s just that relationships and income are unstable. But it has zero impact on your career.
中薯炸得焦脆	生化环材很难... 去掉年龄大怀孕风险增加，那么就剩：本科。	BCEE* fields are hard... Subtracting the risks of advanced maternal age, the only thing left is: Undergrad.

*Note: “生化环材” (BCEE) refers to Biology, Chemistry, Environment, and Materials Science, fields often cited for high lab hazards.

Table C3: The "PhD / Post-Doctoral" Window

User	Original Chinese Text	English Translation
Eva	我刚生，是博二升博三的暑假生的... 因为已婚已育所以被面试的时候居然还是加分项。	I just gave birth in the summer between my 2nd and 3rd year of PhD... Because I was already married with children, it was actually a "plus" during job interviews.
拉雷	感觉研二或者博士开完题生是最好的时间... 不耽误毕业。	I feel the best time is after the thesis proposal in the 2nd year of Master's or PhD... It doesn't delay graduation.
wowo	我目前遇到的所有女老师都是在博士或是博士后期间生的孩子... 可能对于坚定走学术道路的人来说，这两个阶段是最轻松的?	Every female professor I've met had their kids during PhD or Postdoc... Maybe for those committed to academia, these two stages are the "easiest"?
momo	还是建议博后，因为没有博士的毕业压力。	I'd still suggest the Postdoc stage, because there isn't the pressure of the PhD graduation [requirements].
冬冬	一看就是海外。国内博后要完成很高KPI才能找教职。	[Reply to above] You must be overseas. In China, postdocs have to hit very high KPIs just to qualify for a faculty position.

Table C4: The "Grants & Tenure" Window

User	Original Chinese Text	English Translation
露露	我感觉递交年初青基申请书等结果的那一年是最合适... 那时候接近临盆或者刚生完不耽误。	I feel the year you submit your "Youth Fund" (NSFC) application and wait for results is best... You'd be near delivery or just finished, so it doesn't cause a delay.
momo	读博觉得太忙不行，博后忙着找工作不行，工作了有非升即走考核不行...	PhD is too busy; Postdoc is too busy job hunting; once you start working, the "Up-or-Out" (Tenure-track) evaluation makes it impossible...

Table C5: The "Physical & Biological" Cost

User	Original Chinese Text	English Translation
露露	对于生化环材这类学科孕期是影响最大的，因为必须要停止做实验不接触化学品。	For BCEE fields, pregnancy has the biggest impact because you must stop all experiments to avoid chemical exposure.
Liz	女科研工作者这么累能怀上都不错了，还能自己选择窗口吗?	Female researchers are so exhausted it's a miracle they even get pregnant. Do we even get to "choose" a window?
毛毛力	笑鼠，根本不来月经。	[Laughing] I don't even get my period anymore [due to stress].
momo	职称标准达到了发现自己长期压力导致不排卵了。	By the time you meet the standards for promotion, you find that long-term stress has caused you to stop ovulating.
鸿雁	最佳可能是不生吧。	The "best" window might just be not having kids at all.



Figure C1: Screenshots of the Original Thread (1/3)



Figure C2: Screenshots of the Original Thread (2/3)

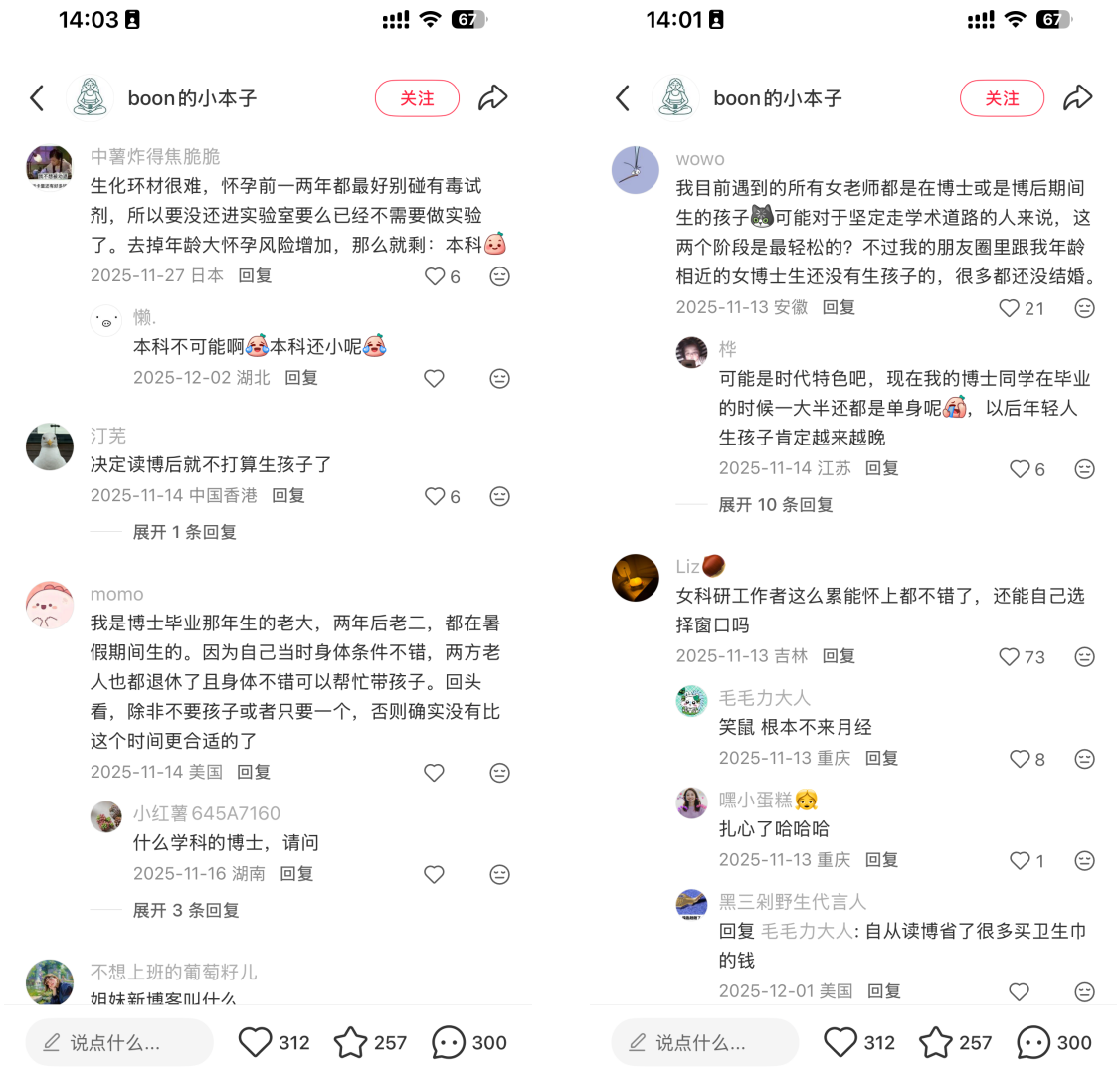


Figure C3: Screenshots of the Original Thread (3/3)

D Data Linking

Starting from the CV sample, we match researchers to NSFC funding data and their research output data, respectively. To match researchers with NSFC projects (including the Young Scientists Grant (YSG) and the General Scientists Grant (GSG)), we adopted the following procedures.

D.1 Matching Researchers with YSG

Given that each scholar is eligible to receive the YSG only once, each scholar can be matched to at most one YSG. Accordingly, we first matched scholars to YSG through a three-round procedure. Prior to matching, we preprocessed the data as follows: First, in the CV data, we excluded cases with identical names across different departments within the same university, ultimately constructing a scholar sample with "institution + name" as the unique identifier, containing gender and age information for a total of 68,000 individuals. Second, in the YSG funding data, we removed 4,162 grant records from 1987 to 2021 that involved researchers with identical names within the same institution. Based on this preprocessing, we proceeded with the following three-round matching procedure. After each round, successfully matched scholars and grants were removed from the sample before proceeding to the next round.

In the first round, we adopted the strictest one-to-one matching strategy, based on the uniqueness of the “institution + name” combination in both the CV dataset and the YSG sub-dataset of the NSFC. This yielded 22,977 exact matches. For these scholars, the institution recorded in the YSG data coincided with the current institution reported in the CV, suggesting no inter-institutional job mobility.

In the second round, we extracted unique names from the remaining YSG subsample (80,601 records) and performed one-to-one matching with unmatched scholars in the CV sample (35,483 individuals) whose names were also unique. This round relied solely on name uniqueness for identification and yielded 5,827 addi-

tional matches.

In the third round, we used the work-history information in the CVs of the remaining unmatched scholars. Specifically, we matched each work-experience segment, defined by institution, name, and work period, to the remaining unmatched YSG grant records. This procedure identified 902 additional matches.

After three rounds of matching, we identified 28,916 individuals who had received YSG. We then constructed a control group of scholars who had never received a YSG during 1987–2021. To minimize the risk of misclassifying true YSG recipients as controls due to incomplete CV information, we adopted a highly conservative strategy. Specifically, using the remaining unmatched CV sample (68,000 - 28,916 = 39,084 individuals), we conducted unique-name-based screening against the remaining unmatched YSG records. We retained as controls only those scholars whose names never appeared in the remaining YSG database, yielding a final control group of 26,817 individuals.

Combining the funded group (28,916 individuals) and the control group (26,817 individuals), we constructed the baseline individual-level "YSG + CV" sample, which contains 55,733 individuals and implies a matching rate of 83%.

D.2 Matching Researchers with the GSG

The General Scientists Grant (GSG) is another major component of the NSFC funding system. Unlike the YSG, a scholar may receive multiple GSGs over time, and each grant typically provides four years of funding. Although overlapping applications are possible, they are rare. In our data, among scholars who received at least two GSGs, the minimum interval between two grants is greater than three years.

Using the YSG-linked sample described above, we next identified the GSG status of each researcher. Because this is a one-to-many matching problem, we first excluded about 1,200 cross-institutional observations with identical names and ages from the matched YSG sample. Subsequently, based on the assumption that the probability of individuals with the same name and age receiving GSG in the same

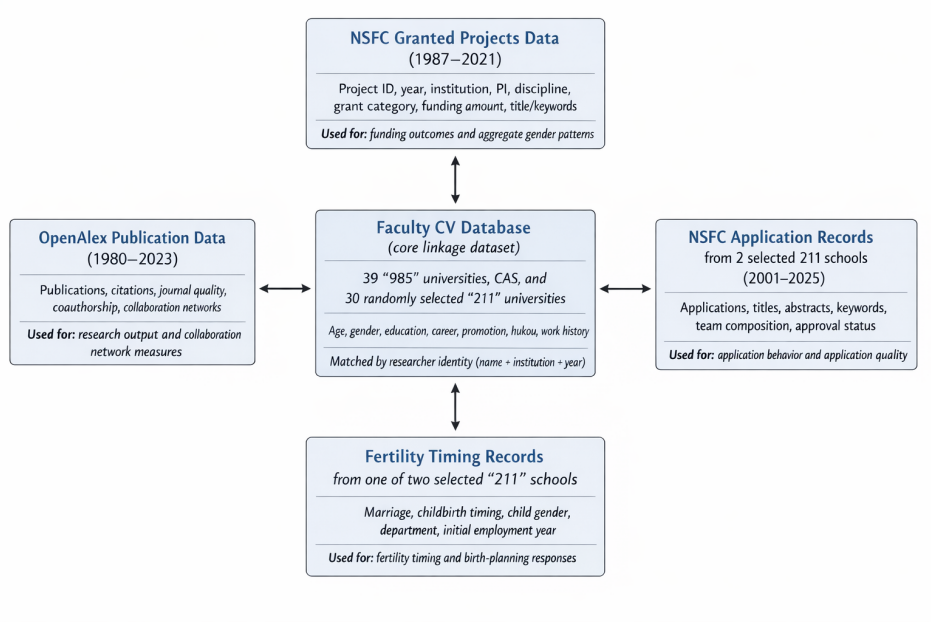
year is extremely low, we employed a "name + age" combination for one-to-many matching with the complete GSG database. For observations with candidate matches, we further validated the match using the researcher's affiliated institutions and work-history periods reported in the CV.

Applying this procedure to the baseline YSG+CV sample of 55,733 individuals, we identified roughly 48,000 individuals with GSG records. Observations without an identified GSG remain in the estimation sample for analyses of YSG-related outcomes.

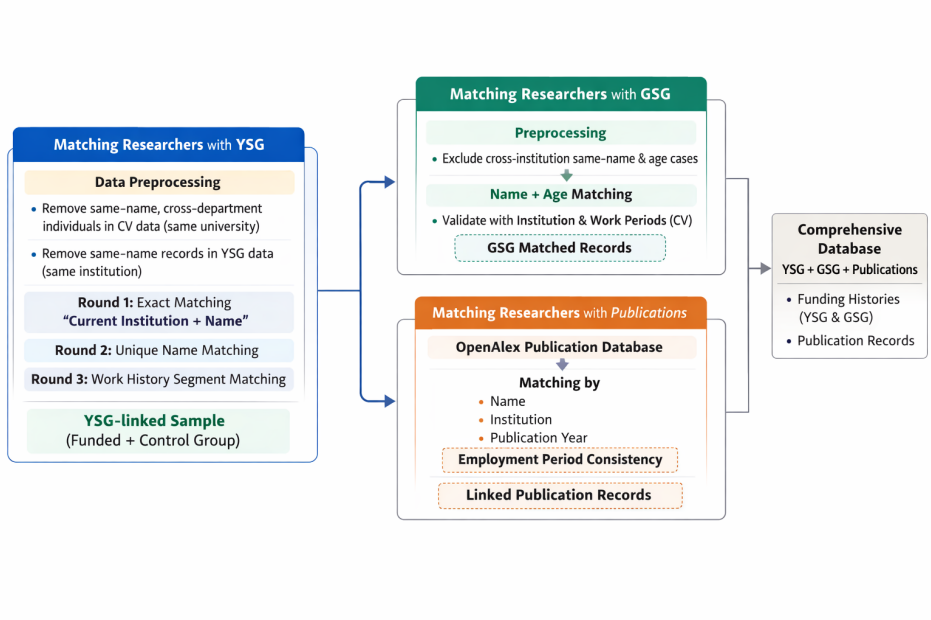
D.3 Matching Researchers with Publications

Based on the YSG-linked sample constructed above, we next linked researchers to the complete OpenAlex publication database. Matches were identified using researcher names, affiliated institutions, and publication years, requiring that the publication year be consistent with the period in which the researcher was employed at the affiliated institution.

Combining the matching procedures for YSG, GSG, and publications, we constructed a comprehensive individual-level database that links Chinese university researchers to their funding histories and publication records.



(a) Data description



(b) Data linking

Figure C1: Structure of the linked datasets