



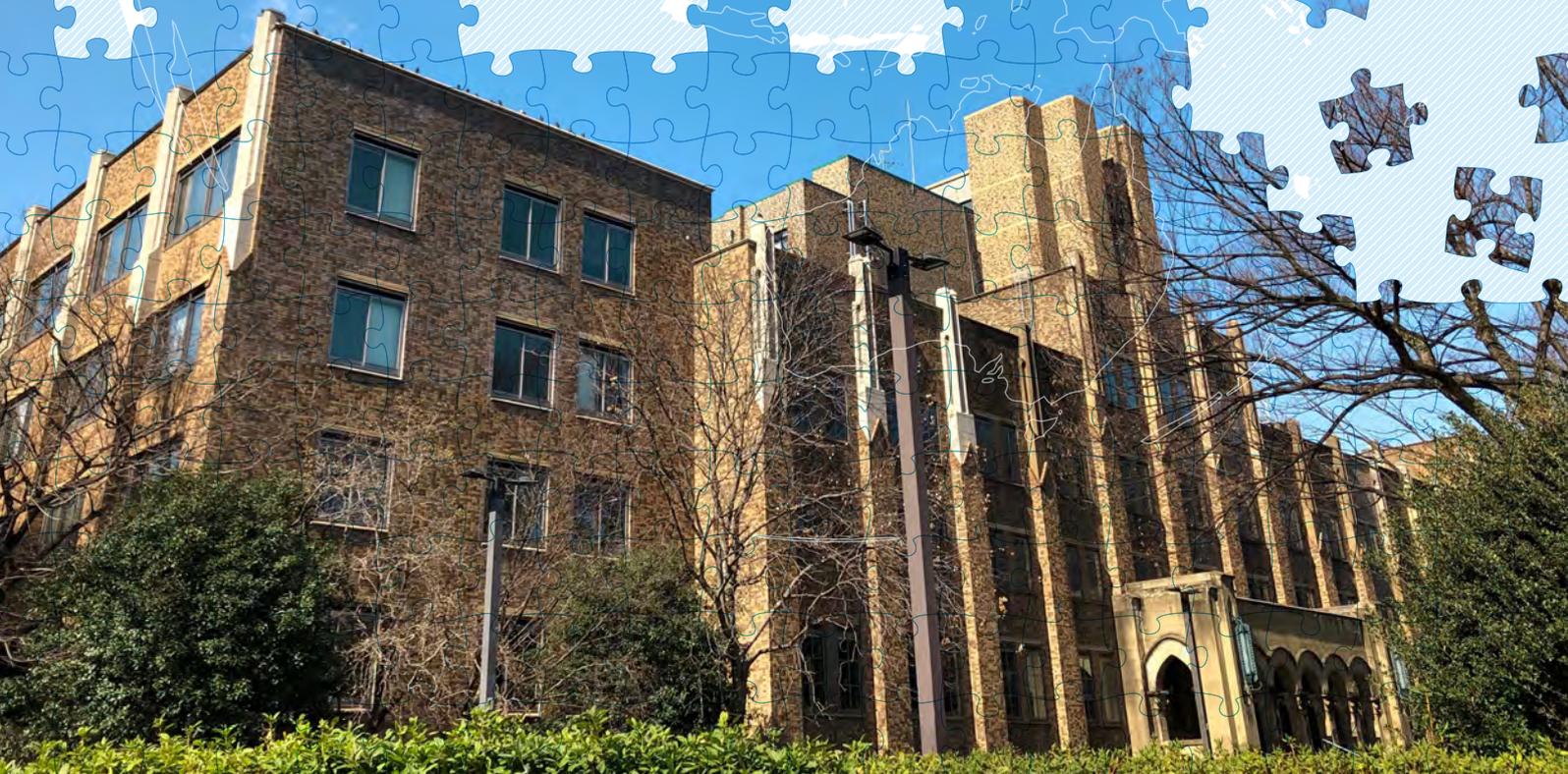
Center for Social Research and Data Archives,
Institute of Social Science, The University of Tokyo

CSRDA supports the Sustainable Development Goals

SUSTAINABLE
DEVELOPMENT
GOALS

CSRDA Discussion Paper

Exam-Retaking as a Source of Gender Stratification: The Case of Female Underrepresentation in Selective Colleges in Japan



No. **31**

Date **Jul. 2022**

SDGs

Name **Fumiya Uchikoshi**



Exam-Retaking as a Source of Gender Stratification:

The Case of Female Underrepresentation in Selective Colleges in Japan

Fumiya Uchikoshi

Princeton University

July 12, 2022

Acknowledgment

This research is supported by the Nakajima Foundation and the Eunice Kennedy Shriver National Institute of Child Health & Human Development of the National Institutes of Health under Award Number P2CHD047879. An earlier version of this paper was presented at the Japanese Association for Mathematical Sociology biannual meeting (September 4, 2021), Tokyo Center for Contemporary Japanese Studies, the University of Tokyo (September 7, 2021), the Japan Society of Educational Sociology annual meeting (September 11, 2021), 21st Century Japan Politics and Society Initiative (21JPSI), Indiana University (September 16, 2021), and Princeton University Stratification Workshop (October 15, 2021). The data for this secondary analysis, “Japanese Longitudinal Study of Children and Parents” (Benesse Educational Research and Development Institute), were provided by the Social Science Japan Data Archive, Center for Social Research and Data Archives, Institute of Social Science, The University of Tokyo. I thank Mika Akesaka, Ha-Joon Chung, Rama Hagos, Yuko Hara, Hilary Holbrow, Natsumi Isa, Mei Kagawa, Takuma Kamada, Tate Kihara, Jordan Klein, Kaori Mitsushima Maruno, Ryota Mugiyama, Eunmi Mun, Yoko Okuyama, Hiroshi Ono, Tamkinat Rauf, Jim Raymo, Risa Saiki, Ziyao Tian, Kohei Toyonaga, Zoey Wang, and Yu Xie for their helpful comments and suggestions. All errors are the author’s own.

Corresponding Author: Fumiya Uchikoshi, Department of Sociology and Office of Population Research, Princeton University, Princeton, NJ 08540. 2626488750. uchikoshi@princeton.edu.

Abstract

There has been ongoing controversy over the way high-stakes standardized exams impact class inequality and race/ethnic diversity. However, relatively few studies have examined the potential consequences for gender inequality in access to selective institutions. There is a significant gender gap in students who retake the high-stakes entrance exam when they fail, especially when admissions opportunities are extremely limited. Drawing upon previous studies, I examine how the seemingly fair meritocratic selection in the transition from upper-secondary to higher education in Japan, where only one in five undergraduate students in the nation's top university are women, contributes to the persistence of women's "leaky pipeline" to selective colleges. The results from longitudinal surveys of high schoolers and their parents reveal that parents' educational expectations and psychological traits relevant to competitive environments are not associated with the gender gap in exam-retaking. Instead, the positive association between aspirations to attend a selective college and exam-retaking is significantly reduced for women, suggesting that men and women with similar competitive academic aspirations are treated differently. These results provide important evidence to reduce gender inequality in science, politics, and the labor market.

1. Introduction

The use of nationwide high-stakes testing, which relies on standardized test scores for admission, has increased in many countries (Furuta et al. 2021; Högberg and Horn 2022; Verger et al. 2019), especially in admissions to selective institutions. Although the high-stakes entrance exam system has not been implemented widely in US education, admissions to several selective public schools (often called *magnet schools*), such as New York City’s Specialized High Schools, tend to use high-stakes testing. While high-stakes testing is characterized by its objectivity and transparency, there has been ongoing controversy over the equity of access and diversity of the student body (Corcoran and Baker-Smith 2018). In this context, it is critically important to examine whether and how the use of high-stakes testing improves, maintains, or even exacerbates preexisting inequality in access to elite education.

A sizable number of previous studies have examined the role of high-stakes testing for class inequality or race/ethnicity diversity (Buchmann et al. 2010; Grodsky et al. 2008; Sattin-Bajaj and Roda 2020; Vigdor and Clotfelter 2003), but relatively few studies have investigated its potential consequence for gender inequality in access to selective institutions. This is surprising because women’s underrepresentation in selective colleges¹ is still the case in many countries, including the United States (Bielby et al. 2014; Buchmann et al. 2010). Because attending selective colleges has a number of socioeconomic advantages (see, e.g., Gerber and Cheung 2008; Hout 2012; Hoxby 2009 for reviews), especially for women (Ge et al. 2022), it is critical to consider how the high-stakes exam may shape the underrepresentation of women in selective institutions (Corcoran and Baker-Smith 2018), with potential implications for reducing gender inequality.

¹ Throughout this paper, I discuss the selectivity of colleges based on their admission competitiveness.

Why are there few women in selective colleges? How does the exam setting play a role? Some studies suggest its connection to the risk of exam failure. Since admission to these selective colleges is competitive, a sizable number of applicants fail admission in this testing system in the absence of a properly designed matching system based on scores. This is especially the case when a student can only apply to a limited number of schools. In such admission systems, students often miscalculate their likelihood of admission and end up spending an additional uncertain year to retake the exam. Interestingly, studies have reported that there is a significant gender gap in exam-retaking for selective college applications (Kang et al. 2021; Landaud and Maurin 2020; Yu 2009), suggesting that the gender gap in exam-retaking is an important source of gender stratification in countries that rely upon high-stakes exams. However, a plausible mechanism to explain the gender gap in exam-retaking is still unclear.

This study examines how meritocratic selection in the transition from upper-secondary to higher education contributes to the persistence of women's "leaky pipeline" to selective colleges. Specifically, I aim to advance the literature on women's underrepresentation in selective educational institutions in three ways. First, I provide descriptive evidence that women are significantly less likely to retake the exam when they fail; this is an important factor in explaining the gender gap in attending a selective college. Second, drawing upon previous studies that examined explanations for gender gaps in higher education, I assess three explanations for the gender gap in exam-retaking, including gender gaps in (1) students' aspirations, (2) parents' educational expectations, and (3) psychological attitudes relevant to competitive environments (e.g., ambitions and confidence). Third, I analyze whether men and women respond to the risk of exam failure and the uncertainty of exam-retaking differently net of compositional differences in these traits. As an interesting case of potentially broader

relevance to other societies, the current study examines Japan, where (1) many high schoolers fail to pass the high-stakes entrance exams for selective colleges (defined as national and public universities) and often retake the exam the following year, (2) parents' financial support to attend a selective college is critical because of the considerably limited public spending on higher education and the heavy emphasis on shadow education, and, importantly, (3) only one in five undergraduate students in the nation's top university are women despite the gender gap convergence in overall college attendance (Rich 2019; Schubert and Marinica 2018).²

This study provides important insights into potentially unintended consequences of the recent educational reforms that increasingly emphasize the high-stakes exams in school admissions (Furuta et al. 2021). In a sense, objectively measured test scores could be “open doors for the talented poor” (Cronbach 1975), and exam-retaking may be a fair system because it allows applicants who are willing to attend their desired school to attempt a second try, although sociologists have also criticized standardized testing as a gatekeeper that reproduces preexisting social inequality (Alon and Tienda 2007). Studies with mixed arguments regarding the power of high-stakes exams in the United States, for example, have examined the role of standardized tests (e.g., the SAT) in relation to class origin or race/ethnicity (Buchmann et al. 2010; Grodsky et al. 2008; Vigdor and Clotfelter 2003). This study adds another aspect, namely, gender, by arguing that the high-stakes exams may exacerbate gender inequality in some education contexts, including but not limited to Japan, where the emphasis on parents' role in children's school choice and fewer admission opportunities for selective institutions may reproduce the existing gender inequality in selective college attendance.

² Importantly, the female proportion in Japanese selective universities has increased, but the change is much slower than that of four-year universities overall (See Appendix Figure 1), suggesting that some mechanism discourages talented female high school students from applying to or attending these universities.

2. Background

Importance of horizontal stratification in higher education for gender inequality

Reflecting the cooccurrence of college expansion and the growth of institutional heterogeneity through the proliferation of lower-tier institutions (Arum et al. 2007) and the increased competitiveness of selective colleges (Bound et al. 2009; Hoxby 2009), scholars have increasingly paid attention to how qualitative aspects of higher education play a role in status attainment. Prior work has focused on selective colleges to examine heterogeneity within higher education in terms of labor market returns to higher education (Astin and Oseguera 2004; Brand and Halaby 2006; Brewer et al. 1999; Chetty et al. 2020; Ge et al. 2022; Haveman and Smeeding 2006; James et al. 1989; Karen 2002; Sekhri 2020; Thomas 2003; Thomas and Zhang 2005). Attending selective institutions provides students with social networks or access to relationships with recruiters from elite firms (Domina et al. 2017) or elite clubs (Khan 2011; Michelman et al. 2021), which can be transformed into economic returns via employment in highly rewarding occupations.

In light of the abundant evidence that attending selective colleges provides many advantages, especially for women (Ge et al. 2022), women's underrepresentation in these institutions may be an important mechanism that potentially explains gender inequality in the labor market. Indeed, women's underrepresentation in selective institutions varies to a great degree across countries. Elite schools in English-speaking countries (Ivy Leagues in the US and Oxbridge in the UK), for example, achieve gender parity;³ more women than men are enrolled in

³ College Factual (<https://www.collegefactual.com/>) for Ivy League colleges. International Alliance of Research Universities (IARU), a group of 11 top research universities in nine countries, published a report on gender diversity

Nordic, Dutch, and Irish top universities;⁴ and fewer female undergraduate students than male students are enrolled in other top universities in Switzerland and East Asia.⁵ Against this backdrop, it is surprising that almost no studies have investigated the sources that could potentially explain the cross-national variation in women's underrepresentation in selective institutions and its consequences.

Potential mechanisms for gender difference in selective colleges

In this study, I examine two potential mechanisms that explain the difference in outcomes for multiple groups, one focusing on compositional differences in characteristics relevant to exam-retaking and the other on different behavioral responses for men and women. Based on this approach, this section briefly reviews the explanations for why fewer women than men retake the exam and are hence less likely to be enrolled in selective institutions.

Compositional differences in individual characteristics

If some traits (e.g., academic aspirations) are associated with attending a selective college through exam-retaking and the distribution of these traits differs for men and women, this distributional difference may account for the gender difference in selective college attendance. In this study, I discuss three traits, namely, gender gaps in (1) academic aspirations, (2) parents' educational expectations, and (3) psychological attitudes relevant to competitive environments.

in five member institutions, i.e., University of Tokyo, University of Cape Town, ETH, University of Copenhagen, and Oxford University (Schubert and Marinica 2018).

⁴ Delaney and Devereux (2021); Schubert and Marinica (2018), <https://www.uva.nl/en/about-the-uva/about-the-university/diversity-and-inclusion/facts-and-figures-diversity/facts-and-figures-on-diversity-at-the-uva.html>

⁵ Schubert and Marinica (2018). For Seoul National University, the nation's top university in South Korea, see: https://en.snu.ac.kr/snunow/snu_media/news?md=v&bbsidx=126626

First, one aspect that potentially explains the gender gap in selective college attendance via exam-retaking is the gender gap in aspirations. Studies have shown that, for example, there is a robust relationship between educational aspirations or expectations and attainment (Kao and Tienda 1998; Marini and Greenberger 1978; Pinguart Ebeling 2020). While there was a gender gap in such aspirations in the past (Marini and Greenberger 1978), it has been reduced to a negligible degree in the United States (Watt et al., 2012). Convergence in male and female children's educational aspirations is also the case in Japan (Ojima and Aramaki 2018).

Although the gender gap in children's educational aspirations in terms of educational levels has diminished, no studies have reported whether aspirations for selective colleges differ by gender among those who aim to attend college. If women are less likely to aim to attend a selective college than men, this may explain the gender difference in exam-retaking. Additionally, there is good reason to believe that this reflects a gender difference in expected returns to selective college attendance (Heckert et al. 2002; Hogue et al. 2010; Smith and Powell 1990). As I discuss in more detail below, this could be the case especially for the Japanese context, where attending a selective college typically leads graduates to large firms (Hirasawa 2010; Ishida 1998; Yoshida 2020), but the working conditions in these firms, including long work hours and frequent relocation to other regions (JILPT 2016; MHLW 2022), often prevent women from continuing their employment after marriage and childbearing.

Second, in contrast to the convergence of children's educational aspirations, at least at vertical levels, parents still tend to have lower expectations for female children than for male children (Holloway 2010; Ojima and Aramaki 2018; Yamamoto 2014). Parents' role is particularly relevant to the Japanese context, where public spending on higher education is considerably limited (Brinton 1993; Nakazawa 2016). The lack of public spending results in

children's heavy reliance on parents' financial support to attend a higher education institution. Parents' role is further emphasized for admission to selective colleges because parents' investment in shadow education, including sending their children to a prep school when they retake the exam, is critical for success in meritocratic selection through high-stakes exams (Stevenson and Baker 1992).

Finally, in addition to these well-known predictors of aiming for selective colleges, a few studies have discussed the importance of the psychological factors that shape gender differences in participation in elite education. Scholars have paid particular attention to the role of preference for competition and self-confidence. In general, women are less likely to prefer a competitive environment (Gneezy et al. 2003; Niederle and Vesterlund 2007; 2011) and more likely to be risk averse (e.g., Cohen and Einav 2007; Eckel and Grossman 2008; Eckel et al. 2009; but see Nelson 2016), and women tend to report lower confidence or self-esteem than men (Beyer 1990; Beyer and Bowden 1997; Ehrlinger and Dunning 2003; Soll and Kalyman 2004; van Houtte 2005) and to be less ambitious (Eagly and Karau 2002; Fox and Lawless 2014).

Psychological attitudes relevant to competition (e.g., risk-taking, ambition, or confidence) are important because the meritocratic selection in most contemporary societies is more or less characterized by a heavy emphasis on standardized test scores under pressure and thus is detrimental to students' mental health (Högberg and Horn 2022). Indeed, studies have argued that competitive high-stakes exams often favor men over women (Azmat et al. 2016; Bielby et al. 2014; Niederle and Vesterlund 2010; Ors et al. 2013; Shurchkov 2012). For example, a few observational studies report that women are more likely to report test anxiety than men (Núñez-Peña et al. 2016; Putwain and Daly 2014), which may lead to women's underperformance in competitive exam settings (Jurajda and München 2011; Ors et al. 2013; Price 2008).

Since admission to higher education is based on meritocratic selection, one may wonder whether gender differences in elite education could plausibly be due to an ability difference by gender. Studies have shown that the gender gap in academic ability is an important mechanism for explaining the gender gap in selective colleges, but they also suggest that this depends on measurement. According to these studies, women and men do not differ in their cognitive ability (Halpern 2011). Women tend to perform better in grades (Spinath et al. 2014), but their standardized test scores tend to be lower than those of male students (Duckworth and Seligman 2006), especially math test scores (OECD 2019),⁶ suggesting that each measurement captures different aspects of academic performance (DiPrete and Buchmann 2013).⁷

Different behavioral responses

Another perspective posits that women and men with the similar characteristics discussed above may behave differently, resulting in gender differences in selective college attendance. Specifically, even if men and women have similar academic aspirations or competition-relevant psychological traits, they may be treated differently by someone who is responsible for decision-making regarding their school choice.

In this line of research, abundant studies have revealed that men and women are not treated equally by their parents or teachers (Gunderson et al. 2012). In the context of the lack of female students majoring in STEM fields, for example, studies have argued that parents with gender stereotypic attitudes tend to have favorable views of their sons', but not their daughters',

⁶ We do not discuss the mechanisms that make women's performance in grades better while their test scores are not. For reviews, see Duckworth and Seligman (2006).

⁷ Importantly, this also indicates that a potential gender difference in admission results may be due to the possibility that some admission systems rely much more on measurement that favors men over women. Indeed, Bielby et al. (2014) argued that the admission system in US colleges, especially elite ones, increasingly relies on SAT scores that favor men in the sense that men tend to perform better in math than women do, which is partly why women are still underrepresented in US elite colleges.

math ability (Gunderson et al. 2012; Jacobs and Eccles 1992). Studies have shown that teachers also tend to perceive men's math or science competencies more favorably than those of women (Moss-Racusin et al. 2012; Riegle-Crumb and Humphries 2012). Children or students may be discouraged from aiming high due to sex-based preferences for educational investment or expectations that attending selective colleges may not help women's socioeconomic achievement (Brinton 1993; Yu 2009). If this is true, the likelihood of exam-retaking may differ even for men and women with similar traits relevant to selective college attendance.

Japanese context

Since Japanese education and admission systems are quite distinctive compared with those in other rich countries, such as the United States, this section reviews their basic structure. For the sake of brevity, I limit the explanations to those relevant to my research question and hypotheses.

Secondary and tertiary education in Japan

Secondary education in Japan is characterized by comprehensive education at the lower level (from 7th to 9th grades) and hierarchical academic ranking at the upper level (from 10th to 12th grades). The former is similar to secondary education in other countries (e.g., the United States), while the latter is distinctive in the sense that high schools are differentiated according to their academic selectivity (Rohlen 1983). Junior high school students are sorted into high schools with different selectivity depending on their academic ability, measured by the entrance exam organized by each high school. Importantly, the school hierarchy is widely shared among people (LeTendre et al. 2003), at least among those who live in the local areas. As such, Japan's distinctiveness in upper secondary education is characterized by between-school tracking, as opposed to US secondary education, where students are sorted within schools depending on their

academic ability. As a result, it is often the case that the large majority of students in selective high schools apply to and enter four-year universities.

According to the comparative education policy literature, admission systems across countries are classified into several models, namely, secondary leaving exams, entrance exams, aptitude tests, and no exam (Helms 2009; Reshetar and Pitts 2020). Admission in Japanese secondary and tertiary education, as in other East Asian countries, belongs to the group of entrance exams, where students are evaluated objectively solely by test scores, most notably, high-stakes exams for high school and college admissions. Studies suggest that such admission systems have mixed consequences for students' well-being. On the one hand, the competitive environments pay because their ranking in high school predicts students' probability of attending elite colleges net of student ability (Kariya and Rosebaum 1987; Ono 2001), which in turn leads to economic returns in the labor market, including higher earnings (Ono 2004; 2007), employment in large firms (Hirasawa 2010; Ishida 1998; Yoshida 2020), access to managerial positions (Ishida et al. 1997),⁸ or even returns in the marriage market (Uchikoshi and Raymo 2021). On the other hand, students are under high pressure in such high-stakes exams, which may increase students' emotional stress (Högberg and Horn 2022); previous studies have criticized the negative side of this admission system as "exam hell" (Kariya and Rosenbaum 2003; Rohlen 1983). The stressful environment could be more detrimental to women's willingness and ability to apply to and attend elite institutions.

Admission system in Japanese higher education

⁸ A strong belief that attending a prestigious school pays is a source of the national obsession that education scholars have described as "examination hell" (Frost 1991; Ono 2007).

Although between-school tracking is critical in shaping opportunities for attending selective colleges (Kariya and Rosebaum 1987; Ono 2001), it is important to note that not all students in these selective high schools are admitted to selective colleges without interruption. Rather, high school students often fail the entrance exam and take the same exam the next year; these students are called *Ronin* (examination repeaters, literally masterless samurai) (Zeng 1999).

This is an important informal educational track for selective colleges and later labor market success because these students spend a whole year exclusively on the entrance exam, typically attending a prep school for university admission (*Yobiko*) (Tsukada 1991). Therefore, one year of *Ronin* experience increases their chances of being admitted to selective universities (Nishimaru 2006; Ono 2007), and by attending selective colleges, exam repeaters tend to enjoy better socioeconomic attainment in later life (Ono 2007). For this reason, exam-retaking pays off in Japan. For example, in the late 20th century, one in three four-year university students had at least one year of *Ronin* experience; importantly, the proportion of *Ronin* students is larger for selective (=national and public) universities than less selective (=private) universities (see Appendix Figure 2).⁹

Students fail the exam for several reasons. A proximate cause is that a sizable number of students who are as competitive candidates as high schoolers also failed the exam in previous years. Against this backdrop, one may wonder why students fail the entrance exams because available seats (enrollments) are scarce but, importantly, the acceptance rate to universities was already high during the 1990s (above 50%). Currently, some low-ranked universities have adopted a de facto open admission where students are accepted without admission if they apply.

⁹ The share of students who spend at least one year as *Ronin* has decreased over the 21st century because of the declining cohort size and increase in private universities (See Appendix Figure 2). It is interesting to see an increase in *Ronin* admitted to national universities during the 2010s.

This means that students do not have to spend an additional year as *Ronin*. Takeuchi (1997: 185) explains that a sizable number of high schoolers still fail the exam and spend an additional year retaking the exam. This is especially the case for selective institutions¹⁰ because the explicit university ranking, which is measured by the standardized score based on the mock exam by testing companies (*Hensachi*),¹¹ encourages students to aim for a university “one rank higher than the one he or she is confident of entering.”

At the institutional level, many applicants fail the exam, especially for national and public universities, which are often perceived to be more prestigious, more selective, and of better quality (Ishida 1998; Ono 2008), because admission windows are controlled by the Ministry of Education and windows for these universities are extremely limited (only one or two windows).¹² This is enough to make students feel stressed, but admission to these national/public institutions often uses two-stage screening in which students are required to take a nationwide standardized test as a first stage and, after the nationwide exam, apply to each school they aim to enter and take the second exam coordinated by each university. Most selective schools typically establish a cutoff based on the score of the nationwide exam, so it is critical for students to carefully choose and apply to schools with a threshold lower than their score on the nationwide entrance exam.

In contrast, private universities, most of which are in the lower ranks of the selectivity hierarchy (with a few notable, widely recognized exceptions), admit prospective students by

¹⁰ Ono (2007) reported that more than half of the incoming students at the University of Tokyo and Kyoto University, two top national universities in Japan, had at least one year of *Ronin* experience.

¹¹ The score is standardized with a mean of 50 and a standard deviation of 10.

¹² For example, in the 2020 academic year, national universities had only two windows, one from February 25 and the other from March 12. In addition to the two windows, public universities have another window starting from March 8. In reality, students, especially those who aim to enter national universities, have only one exam in the initial time window because most national universities accept a very limited number of students for the second window.

using exams they design rather than the nationwide test; thus, they usually have a wide range of admission windows without multi-screening processes. Additionally, compared with the strict time window for national/public universities, private universities have more admission windows, so applicants can take an exam for the same school multiple times. Moreover, their exams are conducted earlier than the nationwide test.

Based on the difference in the academic hierarchy for these two types of institutions and the high probability of miscalculation due to the limited number of admission opportunities, students typically take entrance exams for private universities as a backup, followed by exams for national/public universities. Indeed, applying to both national/public and private universities even if students' first choice is the former is a strategy often suggested by high schools, which have incentives to lower the risk of students spending an additional year as *Ronin* (JILPT 2017).

How exam-retaking may reinforce gender inequality in selective college attendance

Although the admission structure is gender-neutral by nature, there are good reasons to believe that the distinctive structure in Japanese higher education described above plays a critical role in explaining women's underrepresentation in selective institutions. On the one hand, the highly stressful and uncertain environment in admission to selective colleges suggests that admission systems characterized by high-stakes exams may penalize those who prefer less competition, are more risk averse, and report less confidence in their ability. If these traits differ for men and women on average, which seems to be the case in Japan (Mizutani et al. 2009), the high-stakes exam could be an important driver of women's underrepresentation in selective institutions.

On the other hand, women's lower likelihood of spending an additional year as *Ronin* could partly be due to women's lower expected return to (elite) education (Heckert et al. 2002;

Hogue et al. 2010; Smith and Powell 1990). Although I use students' aspirations for selective college attendance as a proxy of the expected return and deal with this possibility by comparing the results for the entire sample and the sample limited to those who aim for selective colleges in the early years of high school, their perceived economic return for attending a selective college is still not measured. Even when the sample is limited to those who likely have higher expected returns, parents (and/or teachers) may have different expectations of women's and men's educational attainment. As Yu (2009: 171) notes, "The importance of individuals' educational aspirations and their family's expectations for them, independent of their abilities, also rose with Japan's adoption of a two-stage exam system" under national universities' admission policy that forces applicants (and their parents) to think carefully about "how undesirable their situation will be if they fail. Japanese men and women are likely to have different answers to these questions." Specifically, Yu (2009) argues that, although not directly examined, parents are less likely to support their daughters' exam-retaking. If this is the case, even men and women with similar characteristics relevant to exam-retaking may have different responses to the potential risk of exam failure. Parents' expectations may differ for sons and daughters, which may also explain the gender gap in exam-retaking.

3. Research questions and hypotheses

The literature review above suggests that the macrolevel admission system in higher education is a critical source of the gender gap in access to selective colleges in Japan and, in turn, the significant gender gap in the labor market. While the Japanese admission system belongs to the group of high-stakes exams from a comparative perspective, its admission system, especially for national and public universities, is distinctive in the sense that students often need

to take two high-stakes exams to get into these universities. Importantly, students *must* choose schools they apply to by themselves based on the first nationwide test score. If they are not admitted, then they might spend another year to make it to the national/public university.

Therefore, those who prefer not to retake the exam for various reasons or who are simply good at calculating their likelihood of admission are likely to lower their goal and apply to the second-best school for them. Alternatively, even if they intend to attend national/public universities at an earlier point in time in high school, they could shift their goal to private universities, which typically have more admission opportunities, including multiple entrance exams and admissions not based on the high-stakes exam (Yoshihara 1998).¹³

As such, previous studies have argued that women are more likely to be admitted to universities without taking the high-stakes exam (Yoshihara 1998) and are less likely to retake the exam (Stevenson and Baker 1992; Yoshihara 1998); however, the focus of these studies was on college attendance in general and did not pay specific attention to selective colleges. In contrast to these studies, this study pays explicit attention to the “leaky pipeline” into selective colleges as a potential explanation for the gender gap in selective institutions by focusing on the gender difference in exam-retaking. Specifically, I examine whether women are less likely to retake the exam than men even if they reported they were interested in attending national or

¹³ In this alternative type of admission, which is called recommendation admission (*Suisen*) because students need to be recommended by the principal in their school, students are evaluated based on their grades in school, extracurricular activities, or interviews with the admission office, similar to US admission to four-year universities. There are two types of recommendations, general (*Ippan Suisen*) and designated (*Shiteikou Suisen*). Applicants through the general recommendation must compete with other applicants, while applicants through the designated recommendation will almost certainly be admitted (Cremonini et al. 2011). Each year, high schools designated by private universities are given a maximum number of students they can recommend through the system. Based on school grades or other criteria, high schools recommend a certain number of students for the designated admission. This admission is efficient for all high schools, universities, and applicants in the sense that high schools benefit from sending their students to universities, universities can admit qualified students without an entrance exam and, most importantly, students do not have to risk exam failure.

public universities in their early stage of high school. The educational aspirations among students who choose to retake the exam are heterogeneous, but a majority of these students aim for a national or public university in their third year of high school. Unlike earlier studies (Stevenson and Baker 1992; Yu 2009), this study is the first to pay explicit attention to the mechanisms of the gender difference in exam-retaking.

Based on the literature review, I examine the following hypotheses. First, I examine whether the compositional difference, if any, in academic aspirations, parental expectations, or psychological characteristics for men and women accounts for the difference in exam-retaking for the two groups. To answer this question, Hypothesis 1 tests the following relationship.

Hypothesis 1a: Students with lower academic aspirations are less likely to retake the exam.

Hypothesis 1b: Students whose parents have lower educational expectations are less likely to retake the exam.

Hypothesis 1c: Students with lower confidence or ambition are less likely to retake the exam.

If women are more likely than men to have these characteristics, this could at least partially explain women's underrepresentation in selective institutions in Japan. I also expect that parents tend to have higher expectations for their sons' education than their daughters' education. The distributional difference in parental expectations is likely to explain the gender gap in exam-retaking.

Next, I hypothesize that men and women may have different experiences even though they have similar characteristics (e.g., academic aspirations and psychological attitudes). A posited mechanism is that women are discouraged by parents or teachers to aim high even though they are equally qualified to attend a selective college. Specifically, I hypothesize that the gender gap in exam-retaking is much larger for those who have individual traits that are

positively correlated with exam-retaking (more academic aspirations, more ambition or confidence).

Hypothesis 2: The positive association between exam-retaking and academic aspirations, confidence, or ambition is suppressed for women.

4. Data, variables, and method

Data

To answer the research questions discussed above, I use the Japanese Longitudinal Study of Children and Parents conducted by the Benesse Educational Research and Development Institute and the Institute of Social Science at the University of Tokyo. This is a nationally representative survey targeting school-age children from 6 to 18 and their parents or guardians. The initial wave was conducted in September 2015, with a follow-up survey every year until the children graduated from high school. For high school students, the survey asked about their educational aspiration or first-choice school after graduating from high school, including whether the desired college was national, public, or private, as well as other relevant questions including their school grades. When students graduated from high school, an additional survey questionnaire was sent to them asking about their plan after school graduation (e.g., whether they would attend a university or spend an additional year as *Ronin*). In this study, I used the four publicly available waves of the survey (2015 to 2018) and limited the sample to those who answered the school graduation survey. After omitting missing cases for the outcome variable, 1,494 cases remained. I employed multiple imputations by iterative chained equations (MICE) to create 10 imputed datasets to address the missing data. The descriptive table can be found in Appendix Table 1.

Variables

In this study, I define selective colleges as national and public four-year universities. Although I am aware of the sizable variation within these institutions in terms of selectivity,¹⁴ one theoretical rationale for the definition, in addition to the data limitation that the name of the school they attended is not publicly available, is that most selective universities (e.g., the former imperial universities such as the University of Tokyo or Kyoto University) are located in urban rather than rural areas. Therefore, limiting the selective colleges to a few very selective ones in my analysis may add another complication. Specifically, studies have shown that women are less likely to leave their parental homes in the transition from high school to college (Higeta 2020). In contrast, defining selective colleges as national and public universities is less affected by geography because these universities are located in all prefectures.¹⁵

To test Hypothesis 1, I first utilized two educational aspirations of students. The first involves measuring aspirations for vertical levels of education (how far students want to go in terms of educational attainment). I converted the categorical measure to years of education, ranging from 12 (high school education) to 18 (graduate education). The other involved measuring aspirations for horizontal levels of education. Specifically, I used the question asking students about the extent to which they wanted to enter a competitive university. This question was asked of all students regardless of whether they aimed for a university. Additionally, I

¹⁴ College quality in Japan is usually measured by two characteristics, selectivity and prestige. Selectivity is often made explicit by the standardized rank score (*Hensachi*), as discussed earlier. Another indicator of college quality is prestige. This is a less explicit measure based on the year of establishment. For example, seven schools that were imperial universities before World War II (Tokyo, Kyoto, Tohoku, Kyushu, Hokkaido, Nagoya, and Osaka) are considered the most prestigious schools in Japan. Importantly, selectivity and prestige are often correlated. The older a school is, the more selective it is. Therefore, in this study, I use selectivity rather than prestige.

¹⁵ Practically, the survey did not ask students about the name of the school they aimed to attend, so this is the most fine-grained answer to examine the selectivity of colleges.

constructed an index that measured parents' expectations for their children's education based on three variables. To avoid the possibility that the parental attitude was endogenous to their children's psychological attitude, I only used parental expectation measured in students' 1st and 2nd year of high school. Finally, I constructed two psychological attitudes (ambition and confidence). The variables used to create the indexes are shown in Appendix Table 2. After standardizing all attitudinal variables, I summarized them and standardized them again.

Since parental socioeconomic status likely influences the availability of exam-retaking, I included household income and the number of children reported by parents. I also included students' preference for STEM subjects because admissions for non-STEM departments in private universities typically do not require students to take STEM subjects, whereas most national and public universities do, at least for the nationwide exam. This approach considers and controls the possibility that women are more likely to shift to private universities because of their weaker preference for STEM subjects. I also use the nationwide mock exam score reported by students to control for students' academic ability (as of September in their senior year).¹⁶

Method

To estimate the impact of psychological traits and parental expectations on exam-retaking and how they differ by gender, I estimate the following OLS regressions (essentially, linear probability models). First, in Model 1, I estimate models of the form where the outcome is exam-retaking compared with other plans after school graduation, regressed on student's gender (female dummy). To control for the potential gender difference in academic ability or other

¹⁶ This variable was only measured in students' senior year.

unobserved characteristics, Model 2 adds covariates such as the nationwide mock test results prior to the high-stakes exam, preference for STEM subjects, and parental education.

$$ExamRetake_i = \beta_0 + \beta_1 \times Female_i + u_i \quad (\text{Model 1})$$

$$ExamRetake_i = \beta_0 + \beta_1 \times Female_i + \sum_{k=1}^K \beta_k X_i + u_i \quad (\text{Model 2})$$

In Model 3, I add two academic aspirations. Model 4 further adds parental expectations, while Model 5 adds two psychological variables (ambition and confidence). All of these variables are added to Model 6 as follows.

$$ExamRetake_i = \beta_0 + \beta_1 \times Female_i + \sum_{l=1}^2 \beta_l Aspiration_i + \sum_{m=1}^2 \beta_m Psych_i + \beta_2 \times Parent_i + \sum_{k=1}^K \beta_k X_i + u_i \quad (\text{Model 6})$$

Finally, I add interaction variables between these traits and the female dummy if the variable shows a statistically significant relationship with the outcome at baseline. Suppose academic aspirations are significant:

$$ExamRetake_i = \beta_0 + \beta_1 \times Female_i + \sum_{l=1}^2 \beta_l Aspiration_i + \sum_{m=1}^2 \beta_m Psych_i + \beta_2 \times Parent_i + \beta_3 \times Aspiration_i \times Female_i + \sum_{k=1}^K \beta_k X_i + u_i \quad (\text{Model 7})$$

To deal with missing data, I employ multiple imputations by iterative chained equations (MICE) to create 10 imputed datasets (Royston and White 2011). See Appendix Figure 3 for a comparison of the observational and imputed data. The statistical results are robust to different imputation models.

5. Results

Descriptive results

Trajectories of educational aspirations and admission outcomes

Figure 1 presents the trajectories of male and female high school students' educational aspirations and outcomes. The first three bars from the left show their aspirations, including educational levels (whether they aim for a university or not) and horizontal stratification in university education (whether they aim for a national/public or private university or are undecided). The fourth bar shows their admission outcome reported in the last month of their senior year.

This figure clearly shows that high school students' aspirations are relatively stable, but not all of them realize their aspirations in actual outcomes. For example, a majority of men and women who plan to enter a national or public university in their 2nd or 3rd year also stated the same preference one year earlier. We also see that a fraction of students have not decided whether they aim to enter a national/public or private university in their 1st year, but most of them eventually plan to aim for a private university, which suggests that those who aim for a national or public university decide their first-choice school relatively earlier than those who aim for a private university. This result makes sense in the Japanese higher education admission context, where applicants for national/public universities tend to take more subjects than those for private universities, so they are more likely to start preparing for the exam earlier.

We can also see that there is a sizable gender gap in exam-retaking. Close to one in five men (19%) spend another year preparing for the entrance exam, while fewer than 6% of women do the same. For both men (74%) and women (64%), a majority of exam retakers aimed for a national or public university in their senior year, suggesting that the vast majority of them failed

the entrance exam for national or public universities and were likely to retake the entrance exam for these universities in the following year. Interestingly, there is no major gender difference in attending a national or public university upon high school graduation (19% for men and 18% for women). Since one year of exam-retaking experience increases students' chance of entering a selective college (Nishimaru 2006; Ono 2007), this result suggests that exam-retaking is likely an important mechanism explaining the gender gap in selective institutions in Japan.

[Figure 1]

Distributional differences in psychological attitudes and other variables

The distribution of key predictor variables used in this study separately by gender is shown in Figure 2 (STEM preference and the mock test result are shown for reference). The gender differences are mostly in line with my expectations. For example, men tend to report more educational aspirations than women do, measured at both vertical and horizontal levels. The parental expectation for children's education is also higher for sons than daughters. Additionally, consistent with my expectation, men are more ambitious or confident than women. These gender differences, however, are relatively smaller than the gender difference in STEM preferences. In contrast, we do not see a major difference in the mock test result, suggesting that women's academic ability is comparable to that of men in my analytical sample.

The earlier descriptive figures are consistent with my theoretical expectations. Possibly reflecting women's lower educational expectations or their lower confidence in their ability and ambition, they may be more likely to switch to apply to less selective institutions and less likely to retake the exam when they fail. An important assumption is that, conditional on another assumption that the variables constructed here reflect such traits, these mechanisms can

potentially explain the gender gap in selective institutions net of academic ability. It could also be the case that none of the distributional differences explains the gender gap in exam-retaking. Instead, men and women with similar characteristics may respond differently to the outcome. In the subsequent section, I examine whether the observed relationship is explained, at least partially, by considering the gender difference in these traits as well as whether the relationship still holds even after considering other potential confounders.

[Figure 2]

Multivariate results

Table 1 presents the results of OLS regression models predicting whether students plan to retake the entrance exam (a full table can be found in Appendix Table 3). In this analysis, I focus on exam-retaking as the main outcome since descriptive figures show that this is the source of the major gender difference.

The results clearly show that even after controlling for covariates in Model 2, women are less likely to choose to spend another year as *Ronin* to retake the exam. Specifically, Model 1 shows that female students are 13.7% less likely to spend another year on exam-retaking than male students. This relationship holds after controlling for covariates in Model 2.

From Models 3 to 5, I add key variables that explain the gender gap in exam-retaking. Since all of these measures are standardized, we can compare the effect sizes. By and large, adding these variables attenuates the negative coefficients of the female dummy, which is consistent with Hypothesis 1. In Model 3, students' aspirations for attending a selective college, not educational aspirations measured as years of education, are positively associated with the likelihood of exam-retaking. This result makes sense since exam-retaking is typically done by

students who are already qualified to attend a college but who spend another year aiming for a more selective college. In Model 4, parental expectations are also positively associated with exam-retaking. Finally, in Model 5, one psychological attitude (ambition) is positively associated with exam-retaking. Another trait, confidence, is negatively correlated with exam-retaking, but the coefficient is not statistically significant. In terms of magnitude, selective college aspirations are most strongly associated with exam-retaking. Specifically, a one standard deviation increase in attitude is associated with a 6.3% increase in the likelihood of exam-retaking.

In Model 6, I add these five variables. According to this model, only selective college aspirations are positively associated with exam-retaking. Effect sizes for parents' educational expectations and ambitions are attenuated after controlling for other candidate variables. In contrast to the expectation of Hypothesis 1, this model suggests that parental expectations and psychological attitudes do not play a major role in explaining the gender difference in exam-retaking. These results are consistent with Hypothesis 1a, but the results do not support the hypotheses that parental expectations (Hypothesis 1b) or students' psychological characteristics (Hypothesis 1c) explain the gender difference in exam-retaking. Even though Hypothesis 1a is supported, the degree to which it accounts for the gender gap in exam-retaking is small (2.3%).

Another research question in this study is whether men and women with the same attitude respond to the outcome differently. Indeed, some studies suggest that women are discouraged from aiming high and retaking the exam (Yoshihara 1998). Although we cannot observe such social norms that treat men and women differently, an expectation is that women are discouraged from choosing this option regardless of their competitive attitudes toward entering selective colleges. To test this expectation, Model 7 adds an interaction between the female dummy and

selective college aspirations, which shows a negative coefficient that is statistically significant at the 0.1% level.

To understand the gender difference in the impact of competition attitudes toward opting for exam-retaking, Figure 3 presents the predicted probability of retaking the exam with various selective college aspiration settings for men and women. For those who are less competitive in terms of their attitude toward selective colleges, there is no gender difference, while the gender gap increases with the competition index. Around one standard deviation of the index, the chance of exam-retaking differs by gender by approximately 20%. This result suggests that, consistent with Hypothesis 2, women with similar academic aspirations to attend a selective college as men tend to face normative pressure not to aim high or pressure to “settle” for their second choice to avoid exam-retaking.

[Table 1]

[Figure 3]

6. Supplementary analysis

The results shown above were based on the sample who entered a college or who would retake the exam. Although I assume that retaking the exam increases their chance to enter a selective college in the following year, this “casting a wider net” approach may include a group of the population who are less qualified to attend a selective college even after spending another year. To compare “apples and apples” (i.e., students with similar academic potential), I therefore conduct a supplementary analysis by limiting the sample to students who stated their interest in attending a selective college (national or public university) in their 3rd of high school, with the

assumption that this is correlated with academic potential.¹⁷ If the results are comparable between the samples based on the wider or narrower definition, we can speculate that the same mechanism is at work in diverging men's and women's educational trajectories regardless of their academic potential.

Appendix Table 4 and Figure 3 summarize the results. I perform the same regression analyses. Note that children's educational expectations are omitted since by definition all students in this analytical sample are aiming for a college. Table 4 suggests that the substantive results are comparable to the results based on the full sample. Specifically, parental educational expectations and psychological traits relevant to the competitive environment are not associated with students' chance of retaking the exam. Similar to the earlier results, I also find that the interaction coefficient for the female dummy and children's aspirations for a selective college is negative and statistically significant. Appendix Figure 3 presents the predicted probability of exam-retaking by gender and students' selective college aspirations. Consistent with what we observed in Figure 2, the positive association between aspirations to attend a selective college and students' likelihood of retaking the exam is suppressed for women.

7. Discussion and conclusion

In this paper, I tested several potential mechanisms that help in understanding gender inequality in Japanese higher education, which is characterized by an extremely low number of female students in selective institutions. The results of the analysis show the following findings. First, net of academic ability measured as the nationwide mock exam result, a good proxy of

¹⁷ It may be the case that men may be more ambitious than women in regard to goal setting; thus, women may be more selective than men in terms of unobserved ability.

college selectivity in Japan, women are less likely to choose to retake the exam. Second, the gender gap in exam-retaking is partly explained by women's lower aspirations for selective college attendance, which may reflect women's lower expected returns for attending a selective college. However, the size of the variation explained is small. I also found that parents' expectations and psychological characteristics relevant to admissions to selective universities, such as confidence or ambitions, do not account for the gender difference. Third, and most interestingly, I found that the positive association between aspirations for selective college attendance and exam-retaking was significantly reduced for women.

This study made an explicit case selection by choosing the Japanese case, an extreme outlier in comparative perspective in terms of women's representation in selective higher education. What can we learn from this single case study? Women's lower confidence or ambitions have been well documented across countries (Niederle and Vesterlund 2011). This situation may be even worse in Japan, which is characterized by persistent gender inequality in the labor market and gender-specific socialization at home. However, the lack of evidence supporting the explanatory power of these psychological characteristics needs an alternative explanation for why few women aim for a selective college net of academic ability and these psychological characteristics.

One important insight suggested by the analysis is that social norms may treat individuals with the same aspirations differently based on their ascribed trait, namely, gender. Although still suggestive, the results indicate that academic aspirations are institutionalized in the transition from secondary to higher education in the sense that students' attitudes are evaluated in a gendered way. Theoretically, exam-retaking should not occur in contemporary Japan because the number of applicants to universities is almost the same as the capacity of universities, but in

reality, a sizable number of high school students end up spending an additional year. This happens because the admission opportunities for selective institutions are considerably limited, and students must take a risk in making it to their dream school or failing. In this context, exam-retaking offers an informal means for a second try, but the results indicate that men and women do not enjoy the opportunity equally. Even if women have academic aspirations that are equally competitive with those of men, their aspirations may be evaluated differently by their parents or teachers. These results provide important insights into why gender inequality in attending a selective college has been stable despite the ongoing gender convergence in four-year university enrollment. Since attending a selective college is a pipeline to high-stakes positions in Japan (e.g., bureaucrats, researchers, and leadership positions in large firms), it is critical to further investigate the underlying mechanisms behind the gender gap in selective colleges for gender equality.

The case of Japan is an illustrative example that highlights this discouraging mechanism. This does not mean, however, that the implication is limited to Japan because high-stakes exams exist almost everywhere in contemporary societies (Furuta et al. 2021; Högberg and Horn 2022; Verger et al. 2019). For example, although the mechanisms are still unclear, the gender gap in admission and matriculation for New York City's Specialized High Schools, which is much larger than the gap between White and Black or Hispanic students, remains even after controlling for students' prior test scores (Corcoran and Baker-Smith 2018). As such, it is likely that we can find similar institutional mechanisms that unintentionally locate women in a less advantaged position, especially in gender inequalitarian contexts.

If correct, this speculation provides important social, economic, and political implications for gender equality. Despite the fact that women now outnumber men in higher education in

most rich countries (DiPrete and Buchmann 2013; van Bavel 2012), the gender gap in labor market outcomes remains substantial and has been stalled among college graduates (England 2010; Goldin 2014). A number of studies have suggested that fields of study may be a source of the gender pay gap (Zafar 2013) because women are less likely than men to specialize in fields associated with high-paying occupations, most notably STEM majors (Ceci and Williams 2011; Riegle-Crumb and Peng 2021; Weeden et al. 2020). Even after considering gender differences in fields of study, however, the gender pay gap remains (Kim et al. 2015; Zafar 2013). Although this is likely accounted for by gender differences in career interruption after family events, the remaining gender pay gap net of gender differences in fields of study among university graduates suggests that women's underrepresentation in selective institutions may be a critical source of gender stratification in the labor market.

Future studies need to identify causal mechanisms that can help us to understand what is happening during high school years and why more women than men are likely to drop out of the meritocratic competition for selective colleges even if they are equally qualified in terms of their academic achievements and aspirations. Specifically, the current data allow future studies to examine the detailed process, including whether students change their first choice in later years or use much safer admissions, by which men and women with similar academic aspirations diverge in their admission outcomes. These data would be more helpful if they collected rich information about individuals' risk preferences, attitudes toward competition, or confidence in their ability.¹⁸ If these attitudes are properly measured, we could explain the remaining gender difference in exam-retaking, which would allow us to distinguish the psychological explanation

¹⁸ Ideally, it would be preferable if the survey could ask about these psychological attitudes after taking the nationwide exam since it is likely that students' risk preference may change depending on the admission results.

from a more structural explanation, including female students being discouraged regardless of their mindset. For future studies, it should also be noted that school climate, which is missing from experimental studies, is an important institutional mechanism that reinforces students' gender stereotypes (e.g., Nakanishi 1998). It is also necessary to expand the role of high-stakes exams under high pressure for gender inequality in selective higher education from a comparative perspective. Reflecting diverse views on what should be counted as merit and what is fair competition, there is a large between- and within-country variation in admissions (Michel and Pollard 2020). Although many countries increasingly use national-level high-stakes exams, these admission systems are also constrained by institutional path dependency and cultural norms in each country (Furuta et al. 2021; Zwick 2017; Wikström and Wikström 2020), leading to speculation that the comparative perspective on meritocratic selection may help in understanding women's underrepresentation in elite education across countries. I expect that the high-stakes exam penalizes women more or less, but this is open to empirical investigation. If we find consistent patterns, then education policymakers should consider how to reduce gender inequality due to the potential bias in admission systems.

References

- Alon, Sigal, and Marta Tienda. 2007. "Diversity, Opportunity, and the Shifting Meritocracy in Higher Education." *American Sociological Review* 72(4):487–511. doi: [10.1177/000312240707200401](https://doi.org/10.1177/000312240707200401).
- Arum, Richard, Adam Gamoran, and Yossi Shavit. 2007. "More Inclusion than Diversion: Expansion, Differentiation, and Market Structure in Higher Education." Pp. 1–35 in *Stratification in Higher Education: A Comparative Study*, edited by Y. Shavit, R. Arum, and A. Gamoran. Stanford: Stanford University Press.
- Astin, Alexander W., and Leticia Oseguera. 2004. "The Declining 'Equity' of American Higher Education." *The Review of Higher Education* 27(3):321–41. doi: [10.1353/rhe.2004.0001](https://doi.org/10.1353/rhe.2004.0001).
- Azmat, Ghazala, Caterina Calsamiglia, and Nagore Iriberry. 2016. "Gender Differences in Response to Big Stakes." *Journal of the European Economic Association* 14(6):1372–1400. doi: [10.1111/jeea.12180](https://doi.org/10.1111/jeea.12180).

- Beyer, Sylvia. 1990. "Gender Differences in the Accuracy of Self-Evaluations of Performance." *Journal of Personality and Social Psychology* 59(5):960–70. doi: [10.1037/0022-3514.59.5.960](https://doi.org/10.1037/0022-3514.59.5.960).
- Beyer, Sylvia, and Edward M. Bowden. 1997. "Gender Differences in Self-Perceptions: Convergent Evidence from Three Measures of Accuracy and Bias." *Personality and Social Psychology Bulletin* 23(2):157–72. doi: [10.1177/0146167297232005](https://doi.org/10.1177/0146167297232005).
- Bielby, Rob, Julie Renee Posselt, Ozan Jaquette, and Michael N. Bastedo. 2014. "Why Are Women Underrepresented in Elite Colleges and Universities? A Non-Linear Decomposition Analysis." *Research in Higher Education* 55(8):735–60. doi: [10.1007/s11162-014-9334-y](https://doi.org/10.1007/s11162-014-9334-y).
- Bound, John, Brad Hershbein, and Bridget Terry Long. 2009. "Playing the Admissions Game: Student Reactions to Increasing College Competition." *Journal of Economic Perspectives* 23(4):119–46.
- Brand, Jennie E., and Charles N. Halaby. 2006. "Regression and Matching Estimates of the Effects of Elite College Attendance on Educational and Career Achievement." *Social Science Research* 35(3):749–70. doi: [10.1016/j.ssresearch.2005.06.006](https://doi.org/10.1016/j.ssresearch.2005.06.006).
- Brewer, Dominic J., Eric R. Eide, and Ronald G. Ehrenberg. 1999. "Does It Pay to Attend an Elite Private College? Cross-Cohort Evidence on the Effects of College Type on Earnings." *The Journal of Human Resources* 34(1):104–23. doi: [10.2307/146304](https://doi.org/10.2307/146304).
- Brinton, Mary C. 1993. *Women and the Economic Miracle: Gender and Work in Postwar Japan*. California: University of California Press.
- Buchmann, C., D. J. Condron, and V. J. Roscigno. 2010. "Shadow Education, American Style: Test Preparation, the SAT and College Enrollment." *Social Forces* 89(2):435–61. doi: [10.1353/sof.2010.0105](https://doi.org/10.1353/sof.2010.0105).
- Ceci, Stephen J., and Wendy M. Williams. 2011. "Understanding Current Causes of Women's Underrepresentation in Science." *Proceedings of the National Academy of Sciences* 108(8):3157–62. doi: [10.1073/pnas.1014871108](https://doi.org/10.1073/pnas.1014871108).
- Chetty, Raj, John N. Friedman, Emmanuel Saez, Nicholas Turner, and Danny Yagan. 2020. "Income Segregation and Intergenerational Mobility Across Colleges in the United States." *The Quarterly Journal of Economics* 135(3):1567–1633. doi: [10.1093/qje/qjaa005](https://doi.org/10.1093/qje/qjaa005).
- Cohen, Alma, and Liran Einav. 2007. "Estimating Risk Preferences from Deductible Choice." *American Economic Review* 97(3):59.
- Corcoran, Sean Patrick, and E. Christine Baker-Smith. 2018. "Pathways to an Elite Education: Application, Admission, and Matriculation to New York City's Specialized High Schools." *Education Finance and Policy* 13(2):256–79. doi: [10.1162/edfp_a_00220](https://doi.org/10.1162/edfp_a_00220).
- Cremonini, Leon, Liudvika Leisyte, Elke Weyer, and Hans Vossensteyn. 2011. *Selection and Matching in Higher Education: An International Comparative Study*. Center for Higher Education Policy Studies.
- Cronbach, Lee J. 1975. "Five Decades of Public Controversy Over Mental Testing." *American Psychologist* 30:1–14.
- Delaney, Judith M., and Paul J. Devereux. 2021. "Gender Differences in College Applications: Aspiration and Risk Management." *Economics of Education Review* 80:102077. doi: [10.1016/j.econedurev.2020.102077](https://doi.org/10.1016/j.econedurev.2020.102077).
- DiPrete, Thomas A., and Claudia Buchmann. 2013. *The Rise of Women: The Growing Gender Gap in Education and What It Means for American Schools*. Russell Sage Foundation.

- Domina, Thurston, Andrew Penner, and Emily Penner. 2017. "Categorical Inequality: Schools As Sorting Machines." *Annual Review of Sociology* 43(1):311–30. doi: [10.1146/annurev-soc-060116-053354](https://doi.org/10.1146/annurev-soc-060116-053354).
- Duckworth, Angela Lee, and Martin E. P. Seligman. 2006. "Self-Discipline Gives Girls the Edge: Gender in Self-Discipline, Grades, and Achievement Test Scores." *Journal of Educational Psychology* 98(1):198–208. doi: [10.1037/0022-0663.98.1.198](https://doi.org/10.1037/0022-0663.98.1.198).
- Eagly, Alice H., and Steven J. Karau. 2002. "Role Congruity Theory of Prejudice toward Female Leaders." *Psychological Review* 109(3):573–98. doi: [10.1037/0033-295X.109.3.573](https://doi.org/10.1037/0033-295X.109.3.573).
- Eckel, Catherine C., Mahmoud A. El-Gamal, and Rick K. Wilson. 2009. "Risk Loving after the Storm: A Bayesian-Network Study of Hurricane Katrina Evacuees." *Journal of Economic Behavior & Organization* 69(2):110–24. doi: [10.1016/j.jebo.2007.08.012](https://doi.org/10.1016/j.jebo.2007.08.012).
- Eckel, Catherine C., and Philip J. Grossman. 2008. "Chapter 113 Men, Women and Risk Aversion: Experimental Evidence." Pp. 1061–73 in *Handbook of Experimental Economics Results*. Vol. 1. Elsevier.
- Ehrlinger, Joyce, and David Dunning. 2003. "How Chronic Self-Views Influence (and Potentially Mislead) Estimates of Performance." *Journal of Personality and Social Psychology* 84(1):5–17. doi: [10.1037/0022-3514.84.1.5](https://doi.org/10.1037/0022-3514.84.1.5).
- England, Paula. 2010. "The Gender Revolution: Uneven and Stalled." *Gender & Society* 24(2):149–66. doi: [10.1177/0891243210361475](https://doi.org/10.1177/0891243210361475).
- Fox, Richard L., and Jennifer L. Lawless. 2014. "Uncovering the Origins of the Gender Gap in Political Ambition." *American Political Science Review* 108(3):499–519. doi: [10.1017/S0003055414000227](https://doi.org/10.1017/S0003055414000227).
- Frost, Peter. 1991. "Examination Hell." Pp. 291–305 in *Windows on Japanese Education*, edited by E. R. Beauchamp. Greenwood Publishing Group.
- Furuta, Jared, Evan Schofer, and Shawn Wick. 2021. "The Effects of High Stakes Educational Testing on Enrollments in an Era of Hyper-Expansion: Cross-National Evidence, 1960–2010." *Social Forces* 99(4):1631–57. doi: [10.1093/sf/soaa071](https://doi.org/10.1093/sf/soaa071).
- Ge, Suqin, Elliott Isaac, and Amalia Miller. 2022. "Elite Schools and Opting In: Effects of College Selectivity on Career and Family Outcomes." *Journal of Labor Economics* 40(S1):S383–427. doi: [10.1086/717931](https://doi.org/10.1086/717931).
- Gerber, Theodore P., and Sin Yi Cheung. 2008. "Horizontal Stratification in Postsecondary Education: Forms, Explanations, and Implications." *Annual Review of Sociology* 34(1):299–318. doi: [10.1146/annurev.soc.34.040507.134604](https://doi.org/10.1146/annurev.soc.34.040507.134604).
- Gneezy, U., M. Niederle, and A. Rustichini. 2003. "Performance in Competitive Environments: Gender Differences." *The Quarterly Journal of Economics* 118(3):1049–74. doi: [10.1162/00335530360698496](https://doi.org/10.1162/00335530360698496).
- Goldin, Claudia. 2014. "A Grand Gender Convergence: Its Last Chapter." *American Economic Review* 104(4):1091–1119. doi: [10.1257/aer.104.4.1091](https://doi.org/10.1257/aer.104.4.1091).
- Grodsky, Eric, John Robert Warren, and Erika Felts. 2008. "Testing and Social Stratification in American Education." *Annual Review of Sociology* 34(1):385–404. doi: [10.1146/annurev.soc.34.040507.134711](https://doi.org/10.1146/annurev.soc.34.040507.134711).
- Gunderson, Elizabeth A., Gerardo Ramirez, Susan C. Levine, and Sian L. Beilock. 2012. "The Role of Parents and Teachers in the Development of Gender-Related Math Attitudes." *Sex Roles* 66(3–4):153–66. doi: [10.1007/s11199-011-9996-2](https://doi.org/10.1007/s11199-011-9996-2).
- Halpern, Diane F. 2012. *Sex Differences in Cognitive Abilities*. Psychology Press.

- Haveman, Robert H., and Timothy M. Smeeding. 2006. "The Role of Higher Education in Social Mobility." *The Future of Children* 16(2):125–50. doi: [10.1353/foc.2006.0015](https://doi.org/10.1353/foc.2006.0015).
- Heckert, Teresa M., Heather E. Droste, Patrick J. Adams, Christopher M. Griffin, Lisa L. Roberts, Michael A. Mueller, and Hope A. Wallis. 2002. "Gender Differences in Anticipated Salary: Role of Salary Estimates for Others, Job Characteristics, Career Paths, and Job Inputs." *Sex Roles* 47: 139–151.
- Helms, Robin Matross. 2009. "University Admissions: Practices and Procedures Worldwide." *International Higher Education* 54(Winter):5–7.
- Higeta, Takeshi. 2020. *College Expansion for Women and Inequality of Opportunity (Josei No Daigaku Shingaku Kakudai to Kikai Kakusa)*. Toshindo (in Japanese).
- Hirasawa, Kazushi. 2010. "Daisotsu Shyushoku Kikai ni Kansuru Shokasetsu no Kensho [Testing Hypotheses on Employment Opportunities for University Graduates]." Pp.61-85 in *Daisotsu Shushoku no Shakaigaku* [The Sociology of Transition from University to Work], edited by T. Kariya, and Y. Honda. Tokyo: The University of Tokyo Press.
- Högberg, Björn, and Daniel Horn. 2022. "National High-Stakes Testing, Gender, and School Stress in Europe: A Difference-in-Differences Analysis." *European Sociological Review* Advance article. doi: [10.1093/esr/jcac009](https://doi.org/10.1093/esr/jcac009).
- Hogue, Mary, Cathy L. Z. DuBois, and Lee Fox-Cardamone. 2010. "Gender Differences in Pay Expectations: The Roles of Job Intention and Self-View." *Psychology of Women Quarterly* 34(2):215–27. doi: [10.1111/j.1471-6402.2010.01563.x](https://doi.org/10.1111/j.1471-6402.2010.01563.x).
- Holloway, Susan. 2010. *Women and Family in Contemporary Japan*. Cambridge University Press.
- Hout, Michael. 2012. "Social and Economic Returns to College Education in the United States." *Annual Review of Sociology* 38(1):379–400. doi: [10.1146/annurev.soc.012809.102503](https://doi.org/10.1146/annurev.soc.012809.102503).
- Hoxby, Caroline M. 2009. "The Changing Selectivity of American Colleges." *Journal of Economic Perspectives* 23(4):95–118.
- Ishida, H., S. Spilerman, and K. H. Su. 1997. "Educational Credentials and Promotion Chances in Japanese and American Organizations." *American Sociological Review* 62(6):866–82.
- Ishida, Hiroshi. 1998. "Educational Credentials and Labour-Market Entry Outcomes in Japan." Pp. 287–309 in *From School to Work: A Comparative Study of Educational Qualifications and Occupational Destinations*, edited by Y. Shavit and W. Muller. Clarendon Press.
- Jacobs, Janis E., and Jacquelynne S. Eccles. 1992. "The Impact of Mothers' Gender-Role Stereotypic Beliefs on Mothers' and Children's Ability Perceptions." *Journal of Personality and Social Psychology* 63(6):932–44.
- James, Estelle, Nabeel Alsalam, Joseph C. Conaty, and Duc-LE To. 1989. "College Quality and Future Earnings: Where Should You Send Your Child to College?" *American Economic Review* 79(2):247–52.
- Japan Institute for Labour Policy and Training (JILPT). 2016. *Results of a Survey on Job Relocation*.
- Japan Institute for Labour Policy and Training (JILPT). 2017. *Results of a Survey on Methods of Career Guidance in High Schools*.
- Jurajda, Štěpán, and Daniel Münich. 2011. "Gender Gap in Performance under Competitive Pressure: Admissions to Czech Universities." *American Economic Review* 101(3):514–18. doi: [10.1257/aer.101.3.514](https://doi.org/10.1257/aer.101.3.514).
- Kao, Grace, and Marta Tienda. 1998. "Educational Aspirations of Minority Youth." *American Journal of Education* 106(3):349–84. doi: [10.1086/444188](https://doi.org/10.1086/444188).

- Karen, David. 2002. "Changes in Access to Higher Education in the United States: 1980-1992." *Sociology of Education* 75(3):191. doi: [10.2307/3090265](https://doi.org/10.2307/3090265).
- Kariya, Takehiko, and James E. Rosenbaum. 1987. "Self-Selection in Japanese Junior High Schools: A Longitudinal Study of Students' Educational Plans." *Sociology of Education* 60(3):168–80. doi: [10.2307/2112274](https://doi.org/10.2307/2112274).
- Kariya, Takehiko, and James E. Rosenbaum. 2003. "Stratified Incentives and Life Course Behaviors." Pp. 51–78 in *Handbook of the Life Course, Handbooks of Sociology and Social Research*, edited by J. T. Mortimer and M. J. Shanahan. Boston, MA: Springer.
- Kang, Le, Ziteng Lei, Yang Song, and Peng Zhang. 2021. "Gender Differences in Reactions to Failure in High-Stakes Competition: Evidence from the National College Entrance Exam Retakes." SSRN Electronic Journal. doi: [10.2139/ssrn.3861378](https://doi.org/10.2139/ssrn.3861378).
- Khan, Shamus. 2011. *Privilege: The Making of an Adolescent Elite at St. Paul's School*. Princeton University Press.
- Kim, ChangHwan, Christopher R. Tamborini, and Arthur Sakamoto. 2015. "Field of Study in College and Lifetime Earnings in the United States." *Sociology of Education* 88(4):320–39. doi: [10.1177/0038040715602132](https://doi.org/10.1177/0038040715602132).
- Landaud, Fanny, and Éric Maurin. 2020. "Aim High and Persevere! Competitive Pressure and Access Gaps in Top Science Graduate Programs." PSE Working paper No. 2020: 79.
- LeTendre, Gerald K., Barbara K. Hofer, and Hidetada Shimizu. 2003. "What Is Tracking? Cultural Expectations in the United States, Germany, and Japan." *American Educational Research Journal* 40(1):43–89. doi: [10.3102/00028312040001043](https://doi.org/10.3102/00028312040001043).
- Marini, Margaret Mooney, and Ellen Greenberger. 1978. "Sex Differences in Occupational Aspirations and Expectations." *Sociology of Work and Occupations* 5(2):147–78. doi: [10.1177/009392857852001](https://doi.org/10.1177/009392857852001).
- Michel, Rochelle, and Simone Pollard. 2020. "An Overview of Higher Education Admissions Processes." Pp. 5–17 in *Higher Education Admissions Practices*, edited by M. E. Oliveri and C. Wendler. Cambridge University Press.
- Michelman, Valerie, Joseph Price, and Seth Zimmerman. 2021. "Old Boys' Clubs and Upward Mobility Among the Educational Elite." *National Bureau of Economic Research Working Paper Series* w28583. doi: [10.3386/w28583](https://doi.org/10.3386/w28583).
- Ministry of Health, Labour, and Welfare (MHLW). 2022. *Monthly Labour Survey*.
- Mizutani, Noriko, Okudaira Hiroko, Kinari Yusuke, and Ohtake Fumiya. 2009. "Overconfidence Makes Men Compete More." *Journal of Behavioral Economics and Finance* 2:60–73.
- Moss-Racusin, C. A., J. F. Dovidio, V. L. Brescoll, M. J. Graham, and J. Handelsman. 2012. "Science Faculty's Subtle Gender Biases Favor Male Students." *Proceedings of the National Academy of Sciences* 109(41):16474–79. doi: [10.1073/pnas.1211286109](https://doi.org/10.1073/pnas.1211286109).
- Nakanishi, Yuko. 1998. *Gender Track*. Toyokan Shuppansha.
- Nakazawa, Wataru. 2016. *Why Is Public Expenditure on Education in Japan Low?: Re-examining the Public Function of Education*. Osaka University Press.
- Nelson, Julie A. 2016. "Not-So-Strong Evidence for Gender Differences in Risk Taking." *Feminist Economics* 22(2):114–42. doi: [10.1080/13545701.2015.1057609](https://doi.org/10.1080/13545701.2015.1057609).
- Niederle, M., and L. Vesterlund. 2007. "Do Women Shy Away From Competition? Do Men Compete Too Much?" *The Quarterly Journal of Economics* 122(3):1067–1101. doi: [10.1162/qjec.122.3.1067](https://doi.org/10.1162/qjec.122.3.1067).

- Niederle, Muriel, and Lise Vesterlund. 2010. "Explaining the Gender Gap in Math Test Scores: The Role of Competition." *Journal of Economic Perspectives* 24(2):129–44. doi: [10.1257/jep.24.2.129](https://doi.org/10.1257/jep.24.2.129).
- Niederle, Muriel, and Lise Vesterlund. 2011. "Gender and Competition." *Annual Review of Economics* 3(1):601–30. doi: [10.1146/annurev-economics-111809-125122](https://doi.org/10.1146/annurev-economics-111809-125122).
- Nishimaru, Ryoichi. 2006. "An Effect of Ronin on University Admission." *Butsudai Shakaigaku* 31:14–23.
- Núñez-Peña, María Isabel, Macarena Suárez-Pellicioni, and Roser Bono. 2016. "Gender Differences in Test Anxiety and Their Impact on Higher Education Students' Academic Achievement." *Procedia - Social and Behavioral Sciences* 228:154–60. doi: [10.1016/j.sbspro.2016.07.023](https://doi.org/10.1016/j.sbspro.2016.07.023).
- Ojima, Fumiaki, and Sohei Aramaki. 2018. *Kokosei Tachi no Yukue*. Sekai-Shisoshu. (in Japanese)
- Ono, Hiroshi. 2001. "Who Goes to College? Features of Institutional Tracking in Japanese Higher Education." *American Journal of Education* 109(2):161–95. doi: [10.1086/444265](https://doi.org/10.1086/444265).
- Ono, Hiroshi. 2004. "Are Sons and Daughters Substitutable?" *Journal of the Japanese and International Economies* 18(2):143–60. doi: [10.1016/S0889-1583\(03\)00049-2](https://doi.org/10.1016/S0889-1583(03)00049-2).
- Ono, Hiroshi. 2007. "Does Examination Hell Pay off? A Cost–Benefit Analysis of 'Ronin' and College Education in Japan." *Economics of Education Review* 26(3):271–84. doi: [10.1016/j.econedurev.2006.01.002](https://doi.org/10.1016/j.econedurev.2006.01.002).
- Ono, Hiroshi. 2008. "Training the Nation's Elites: National–Private Sector Differences in Japanese University Education." *Research in Social Stratification and Mobility* 26(4):341–56. doi: [10.1016/j.rssm.2008.08.002](https://doi.org/10.1016/j.rssm.2008.08.002).
- Ors, Evren, Frédéric Palomino, and Eloïc Peyrache. 2013. "Performance Gender Gap: Does Competition Matter?" *Journal of Labor Economics* 31(3):443–99. doi: [10.1086/669331](https://doi.org/10.1086/669331).
- Pinquart, Martin, and Markus Ebeling. 2020. "Parental Educational Expectations and Academic Achievement in Children and Adolescents—a Meta-Analysis." *Educational Psychology Review* 32(2):463–80. doi: [10.1007/s10648-019-09506-z](https://doi.org/10.1007/s10648-019-09506-z).
- Price, Joseph. 2008. "Gender Differences in the Response to Competition." *ILR Review* 61(3):320–33.
- Putwain, Dave, and Anthony L. Daly. 2014. "Test Anxiety Prevalence and Gender Differences in a Sample of English Secondary School Students." *Educational Studies* 40(5):554–70. doi: [10.1080/03055698.2014.953914](https://doi.org/10.1080/03055698.2014.953914).
- Reshetar, Rosemary, and Martha F. Pitts. 2020. "General Academic and Subject-Based Examinations Used in Undergraduate Higher Education Admissions." Pp. 237–55 in *Higher Education Admissions Practices*, edited by M. E. Oliveri and C. Wendler. Cambridge University Press.
- Rich, Motoko. 2019. "At Japan's Most Elite University, Just 1 in 5 Students Is a Woman" *New York Times*. December 8th. <https://www.nytimes.com/2019/12/08/world/asia/tokyo-university-women-japan.html>
- Riegle-Crumb, Catherine, and Melissa Humphries. 2012. "Exploring Bias in Math Teachers' Perceptions of Students' Ability by Gender and Race/Ethnicity." *Gender & Society* 26(2):290–322. doi: [10.1177/0891243211434614](https://doi.org/10.1177/0891243211434614).
- Riegle-Crumb, Catherine, and Menglu Peng. 2021. "Examining High School Students' Gendered Beliefs about Math: Predictors and Implications for Choice of STEM College Majors." *Sociology of Education* 003804072110147. doi: [10.1177/00380407211014777](https://doi.org/10.1177/00380407211014777).

- Rohlen, Thomas P. 1983. *Japan's High Schools*. University of California Press.
- Royston, Patrick, and Ian White. 2011. "Multiple Imputation by Chained Equations (MICE): Implementation in *Stata*." *Journal of Statistical Software* 45(4). doi: [10.18637/jss.v045.i04](https://doi.org/10.18637/jss.v045.i04).
- Sattin-Bajaj, Carolyn, and Allison Roda. 2020. "Opportunity Hoarding in School Choice Contexts: The Role of Policy Design in Promoting Middle-Class Parents' Exclusionary Behaviors." *Educational Policy* 34(7):992–1035. doi: [10.1177/0895904818802106](https://doi.org/10.1177/0895904818802106).
- Saygin, Perihan Ozge. 2016. "Gender Differences in Preferences for Taking Risk in College Applications." *Economics of Education Review* 52:120–33. doi: [10.1016/j.econedurev.2016.02.002](https://doi.org/10.1016/j.econedurev.2016.02.002).
- Schubert, Renate, and Ioana Marinica. 2018. *Gender Attainment Gaps Literature Review and Empirical Evidence from IARU Universities*.
- Sekhri, Sheetal. 2020. "Prestige Matters: Wage Premium and Value Addition in Elite Colleges." *American Economic Journal: Applied Economics* 12(3):207–25. doi: [10.1257/app.20140105](https://doi.org/10.1257/app.20140105).
- Shurchkov, Olga. 2012. "Under Pressure: Gender Differences in Output Quality and Quantity under Competition and Time Constraints." *Journal of the European Economic Association* 10(5):1189–1213. doi: [10.1111/j.1542-4774.2012.01084.x](https://doi.org/10.1111/j.1542-4774.2012.01084.x).
- Smith, Herbert L., and Brian Powell. 1990. "Great Expectations: Variations in Income Expectations Among College Seniors." *Sociology of Education* 63(3):194. doi: [10.2307/2112837](https://doi.org/10.2307/2112837).
- Soll, Jack B., and Joshua Klayman. 2004. "Overconfidence in Interval Estimates." *Journal of Experimental Psychology: Learning, Memory, and Cognition* 30(2):299–314. doi: [10.1037/0278-7393.30.2.299](https://doi.org/10.1037/0278-7393.30.2.299).
- Spinath, Birgit, Christine Eckert, and Ricarda Steinmayr. 2014. "Gender Differences in School Success: What Are the Roles of Students' Intelligence, Personality and Motivation?" *Educational Research* 56(2):230–43. doi: [10.1080/00131881.2014.898917](https://doi.org/10.1080/00131881.2014.898917).
- Stevenson, David Lee, and David P. Baker. 1992. "Shadow Education and Allocation in Formal Schooling: Transition to University in Japan." *American Journal of Sociology* 97(6):1639–57. doi: [10.1086/229942](https://doi.org/10.1086/229942).
- Takeuchi, Yo. 1997. "The Self-Activating Entrance Examination System: Its Hidden Agenda and Its Correspondence with the Japanese 'Salary Man.'" *Higher Education* 34(2):183–98.
- Thomas, Scott L. 2003. "Longer-Term Economic Effects of College Selectivity and Control." *Research in Higher Education*, 44(3):263–99.
- Thomas, Scott L., and Liang Zhang. 2005. "Post-Baccalaureate Wage Growth within Four Years of Graduation: The Effects of College Quality and College Major." *Research in Higher Education* 46(4):437–59. doi: [10.1007/s11162-005-2969-y](https://doi.org/10.1007/s11162-005-2969-y).
- Tsukada, Mamoru. 1991. *Yobiko Life: A Study of the Legitimation Process of Social Stratification in Japan*. Institute of East Asian Studies, University of California.
- Uchikoshi, Fumiya, and James M. Raymo. 2021. *Educational Assortative Mating in Japan: Insights into Social Change and Stratification*. Springer.
- Van Bavel, Jan. 2012. "The Reversal of the Gender Gap in Education and Female Breadwinners in Europe" edited by W. Lutz, K. S. James, V. Skirbekk, and J. Van Bavel. *Vienna Yearbook of Population Research* 10:127–54. doi: [10.1553/populationyearbook2012s127](https://doi.org/10.1553/populationyearbook2012s127).
- Van Houtte, Mieke. 2005. "Global Self-Esteem in Technical/Vocational Versus General Secondary School Tracks: A Matter of Gender?" *Sex Roles* 53(9–10):753–61. doi: [10.1007/s11199-005-7739-y](https://doi.org/10.1007/s11199-005-7739-y).

- Verger, Antoni, Lluís Parcerisa, and Clara Fontdevila. 2019. "The Growth and Spread of Large-Scale Assessments and Test-Based Accountabilities: A Political Sociology of Global Education Reforms." *Educational Review* 71(1):5–30. doi: [10.1080/00131911.2019.1522045](https://doi.org/10.1080/00131911.2019.1522045).
- Vigdor, Jacob L., and Charles T. Clotfelter. 2003. "Retaking the SAT." *The Journal of Human Resources* 38(1):1–33. doi: [10.2307/1558754](https://doi.org/10.2307/1558754).
- Watt, Helen M. G., Jennifer D. Shapka, Zoe A. Morris, Amanda M. Durik, Daniel P. Keating, and Jacquelynne S. Eccles. 2012. "Gendered Motivational Processes Affecting High School Mathematics Participation, Educational Aspirations, and Career Plans: A Comparison of Samples from Australia, Canada, and the United States." *Developmental Psychology* 48(6):1594–1611. doi: [10.1037/a0027838](https://doi.org/10.1037/a0027838).
- Wikström, Christina, and Magnus Wikström. 2020. "Merit-Based Admissions in Higher Education." Pp. 34–50 in *Higher Education Admissions Practices*, edited by M. E. Oliveri and C. Wendler. Cambridge University Press.
- Yamamoto, Yoko. 2016. "Gender and Social Class Differences in Japanese Mothers' Beliefs about Children's Education and Socialisation." *Gender and Education* 28(1):72–88. doi: [10.1080/09540253.2015.1091917](https://doi.org/10.1080/09540253.2015.1091917).
- Yoshida, Wataru. 2020. "How Large Japanese Firms Regard College Selectivity When Hiring New Graduates: The Quantitative Analysis of Firm-Level Data on New Hires." *The Journal of Educational Sociology* 107: 89-109. (in Japanese)
- Yoshihara, Keiko Nakashima. 1998. "Gender Differentiation in the Process of the Selection of Universities: An Analysis of 'Tracks' Embedded in the Entrance Examination System." *Journal of Educational Sociology* 62:43–67.
- Yu, Wei-Hsin. 2009. "Higher Education and Gender Inequality." Pp. 147–77 in *Gendered Trajectories: Women, Work, and Social Change in Japan and Taiwan*. Stanford University Press.
- Zafar, Basit. 2013. "College Major Choice and the Gender Gap." *Journal of Human Resources* 48(3):545–95. doi: [10.1353/jhr.2013.0022](https://doi.org/10.1353/jhr.2013.0022).
- Zeng, Kanming. 1999. *Dragon Gate: Competitive Examinations and Their Consequences*. Cassell.
- Zwick, Rebecca. 2017. *Who Gets in? Strategies for Fair and Effective College Admissions*. Harvard University Press.

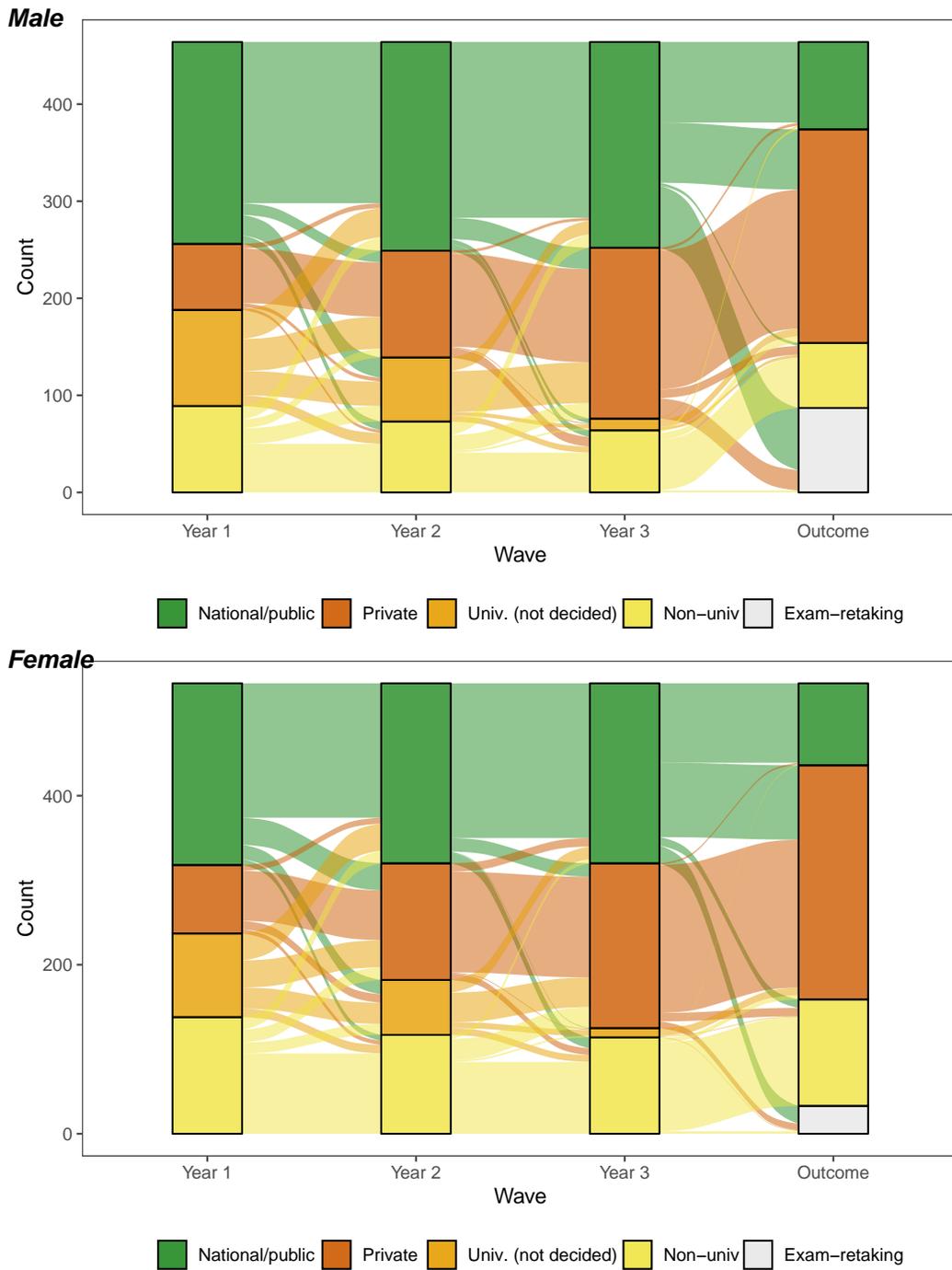


Figure 1 Trajectories of male and female students' educational aspirations and outcomes

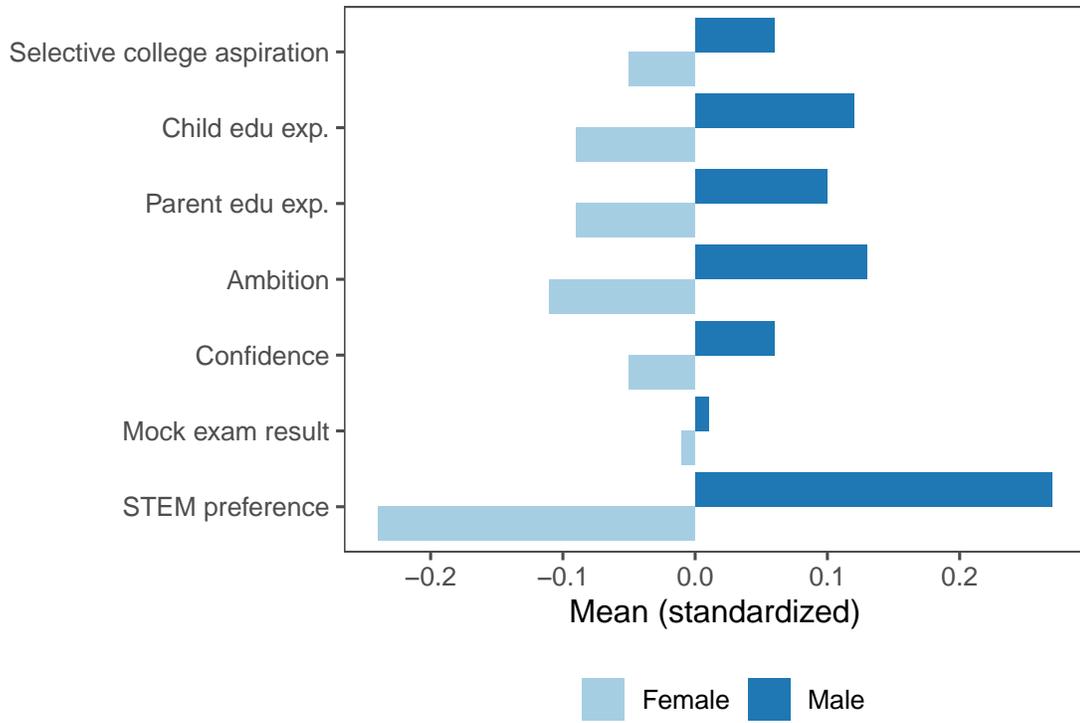


Figure 2 Gender differences in key individual characteristics

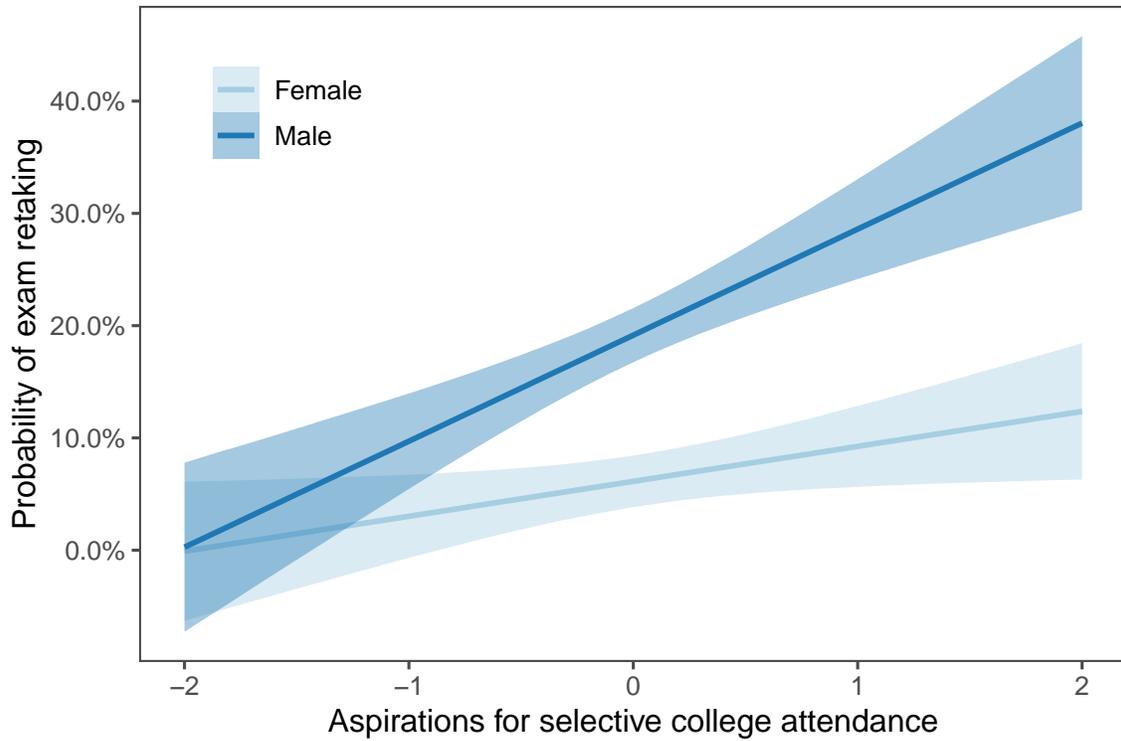


Figure 3 Predicted probability of exam-retaking (*Ronin*) by sex and selective college aspirations with 95% confidence intervals

Table 1 OLS regression results predicting exam-retaking (*Ronin*)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Female	-0.137*** (0.017)	-0.133*** (0.017) (0.009)	-0.130*** (0.017) (0.009)	-0.127*** (0.017) (0.010)	-0.128*** (0.017) (0.009)	-0.130*** (0.018) (0.010)	-0.130*** (0.018) (0.010)
Child educ. expectation			-0.005 (0.012)			-0.011 (0.014)	-0.010 (0.014)
Selec. college aspiration			0.063*** (0.013)			0.060*** (0.014)	0.094*** (0.018)
Parent educ. expectation				0.031** (0.010)		0.012 (0.014)	0.013 (0.014)
Confidence					-0.016+ (0.009)	-0.018* (0.009)	-0.018* (0.009)
Ambition					0.025** (0.009)	0.007 (0.010)	0.007 (0.010)
Selec. college aspiration # Female							-0.063*** (0.018)
Controls		X	X	X	X	X	X
Constant	0.196*** (0.012)	0.177*** (0.032)	0.171*** (0.032)	0.170*** (0.032)	0.174*** (0.031)	0.168*** (0.031)	0.164*** (0.031)
Observations	1494						

Standard errors in parentheses. + p<0.10 * p<0.05 ** p<0.01 *** p<0.001

Appendix

Table 1 Descriptive statistics

	Male			Female		
	Mean	SD	N	Mean	SD	N
Graduated in 2019	0.51	0.50	719	0.50	0.50	775
Exam-retaking	0.20	0.40	719	0.06	0.24	775
Mother junior college	0.30	0.46	719	0.29	0.45	775
Mother university	0.27	0.44	719	0.23	0.42	775
Father university	0.50	0.50	719	0.45	0.50	775
Number of child	2.26	0.78	625	2.21	0.80	684
Parental income (std.)	0.03	1.02	692	-0.03	0.98	733
STEM preference	0.27	0.99	508	-0.24	0.94	564
Mock test result	0.01	1.07	618	-0.01	0.93	644
Child educ. expectation	0.12	0.89	313	-0.09	1.07	414
Selec. college aspiration	0.06	0.95	499	-0.05	1.04	563
Parent educ. expectation	0.10	0.94	427	-0.09	1.04	448
Ambition	0.13	0.97	608	-0.11	1.02	679
Confidence	0.06	0.95	598	-0.05	1.04	656

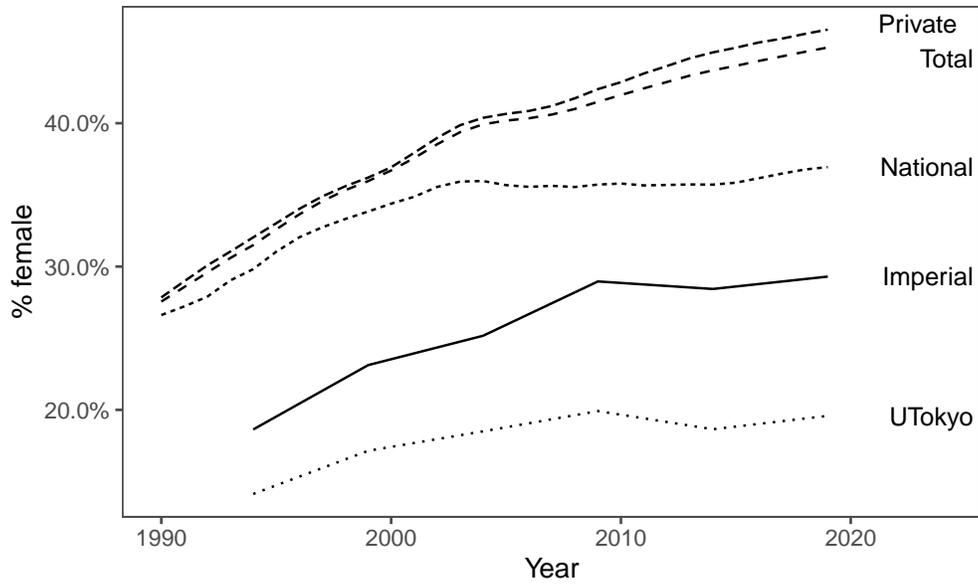
Table 2 Definition of composite indexes

Educational aspirations	“How far do you want to go to in terms of educational attainment” as of September in students’ 1 st , 2 nd , and 3 rd year of high school. All measured categorically and converted into years of education.
Selective college aspirations	“I want to enter a competitive university” as of September in students’ 1 st , 2 nd , and 3 rd year of high school. All measured at four-point scale with a higher value indicating supporting these ideas.
Parental expectation	“I want my child to improve his or her grades to get into the best universities possible.” “I want to spend a lot of money on my child's education, even if it is a little hard.” “I try to keep up with the general trend in children's education and advancement” “How far do you want your child to go to in terms of educational attainment?” as of their 1 st and 2 nd year. The first three are measured on a four-point scale with a higher value indicating supporting these ideas.
Ambition	“I want to get ahead (Wave 3),” “I want to get ahead (as of March, 3rd year),” “I want to be rich (Wave 3),” and “I want to be rich (as of March, 3rd year)” All measured on a four-point scale with a higher value indicating supporting these ideas.
Confidence	“I am confident in myself” as of their 3 rd year of high school. This is measured on a four-point scale with a higher value indicating supporting these ideas.

Table 3 OLS regression results (full sample)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Female	-0.137*** (0.017)	-0.133*** (0.017)	-0.130*** (0.017)	-0.127*** (0.017)	-0.128*** (0.017)	-0.130*** (0.018)	-0.130*** (0.018)
Graduated in 2019		0.002 (0.017)	0.004 (0.017)	-0.005 (0.017)	0.002 (0.017)	0.000 (0.017)	0.001 (0.017)
Mock exam result		0.007 (0.009)	-0.013 (0.009)	0.004 (0.009)	0.009 (0.009)	-0.009 (0.009)	-0.011 (0.009)
STEM preference		-0.001 (0.010)	-0.005 (0.010)	-0.003 (0.010)	-0.000 (0.010)	-0.006 (0.010)	-0.007 (0.010)
Mother junior college		-0.018 (0.021)	-0.032 (0.021)	-0.025 (0.021)	-0.019 (0.020)	-0.032 (0.020)	-0.031 (0.020)
Mother university		-0.001 (0.023)	-0.006 (0.023)	-0.005 (0.023)	-0.000 (0.023)	-0.003 (0.023)	-0.006 (0.023)
Number of child		-0.005 (0.011)	0.001 (0.011)	0.002 (0.011)	-0.005 (0.011)	0.003 (0.011)	0.003 (0.011)
Father university		0.071*** (0.020)	0.061** (0.020)	0.064** (0.020)	0.074*** (0.019)	0.062** (0.020)	0.064** (0.020)
Parental income		0.022* (0.009)	0.014 (0.009)	0.016 (0.010)	0.020* (0.009)	0.012 (0.010)	0.013 (0.010)
Child educ. expectation			-0.005 (0.012)			-0.011 (0.014)	-0.010 (0.014)
Selec. college aspiration			0.063*** (0.013)			0.060*** (0.014)	0.094*** (0.018)
Parent educ. expectation				0.031** (0.010)		0.012 (0.014)	0.013 (0.014)
Confidence					-0.016+ (0.009)	-0.018* (0.009)	-0.018* (0.009)
Ambition					0.025** (0.009)	0.007 (0.010)	0.007 (0.010)
Selec. college aspiration # Female							-0.063*** (0.018)
Constant	0.196*** (0.012)	0.177*** (0.032)	0.171*** (0.032)	0.170*** (0.032)	0.174*** (0.031)	0.168*** (0.031)	0.164*** (0.031)
Observations	1494						

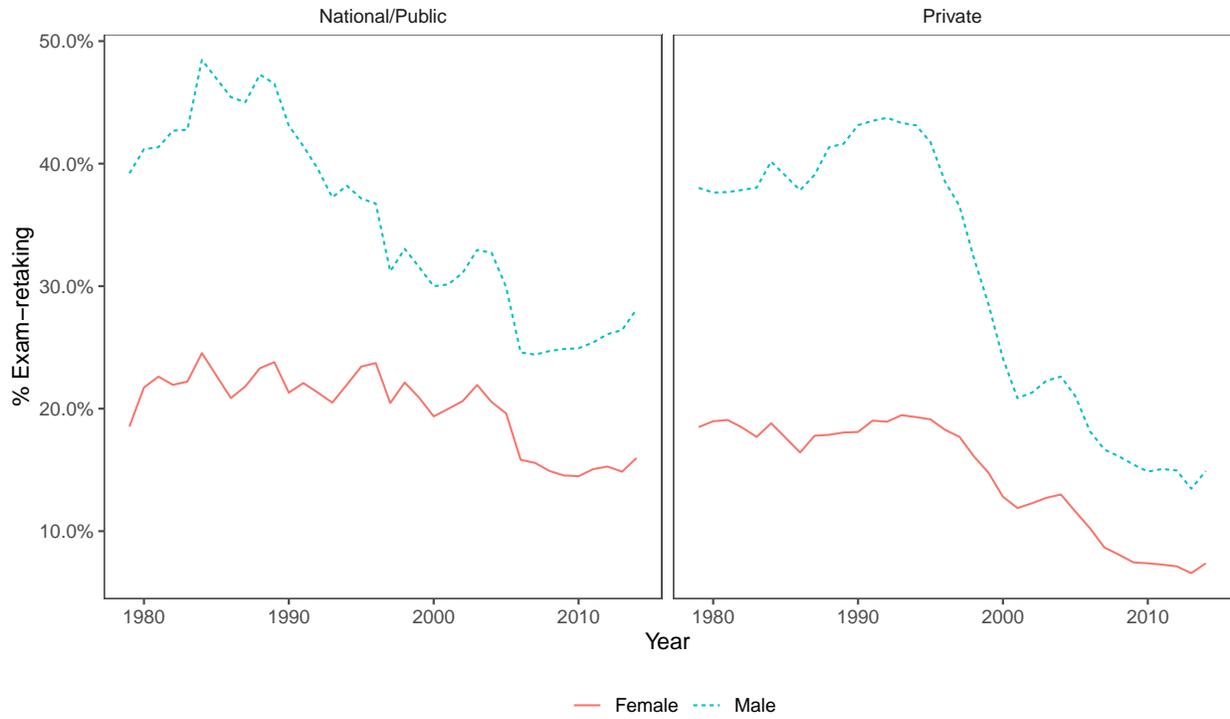
Standard errors in parentheses. + p<0.10 * p<0.05 ** p<0.01 *** p<0.001



Source: School Basic Survey and author's own calculation based on demographic information provided by each university

Note: Imperial universities comprise seven national universities (University of Tokyo, Kyoto, Tohoku, Kyushu, Hokkaido, Osaka, and Nagoya) founded and run by the imperial government of Japan until the end of the WWII. These universities are perceived as the nation's top universities.

Figure 1 The proportion of female four-year university students by university type



Source: School Basic Survey

Note: Data since 2015 are not available. % is calculated by the number of those who graduated from a high school more than one year before the year of enrollment, divided by the sum of all high school graduates admitted in a given year.

Figure 2 The proportion of exam repeaters (*Ronin*) by sex and sector

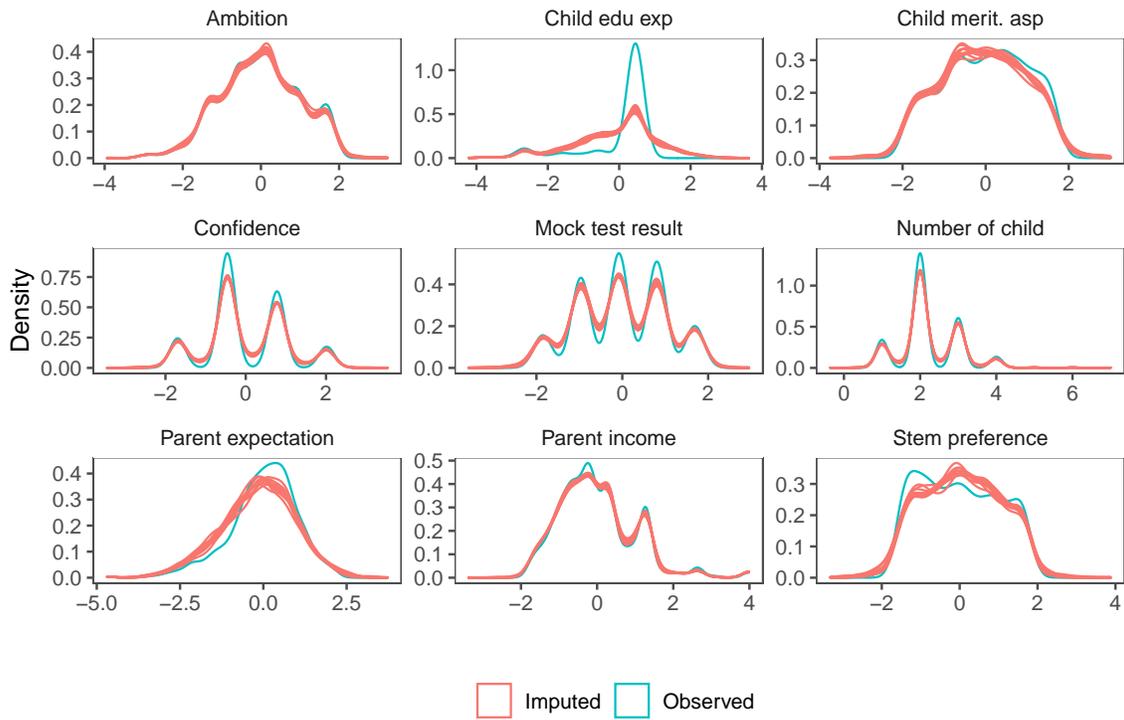


Figure 3 Kernel density plots of observed and imputed variables

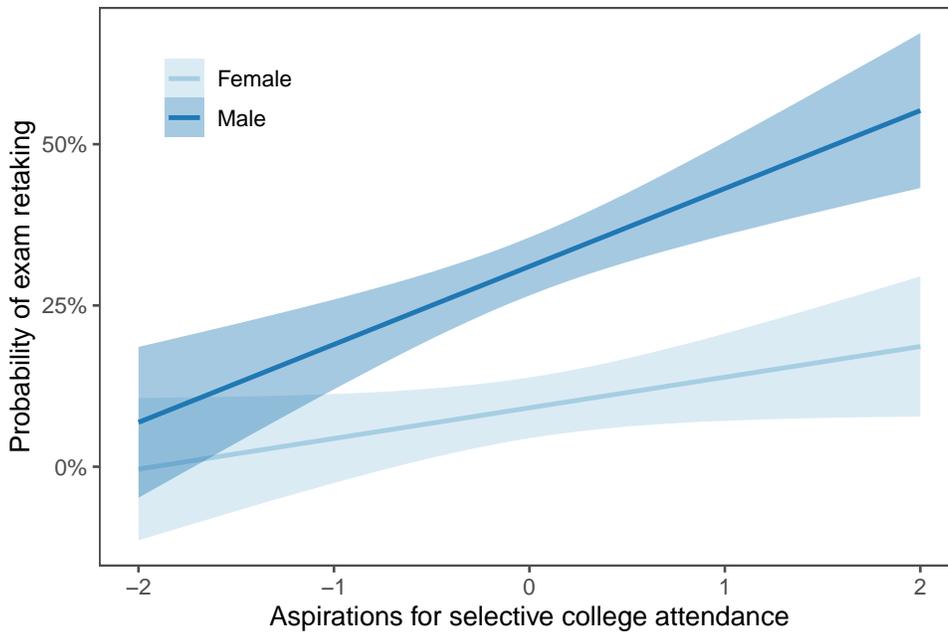


Figure 4 Predicted probability of exam-retaking (*Ronin*) by sex and selective college aspirations with 95% confidence intervals among those who aimed for a national or public university in their 3rd year