

College Admissions Criteria, Students' Academic Performance and Social Mobility

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Abstract

Entrance exams reveal information that helps colleges select the most suitable students, but they also reduce applications as applicants need to strategically choose between alternative programs. To understand these trade-offs, I consider a major reform that shifted admissions criteria from program-specific entrance exams to standardized high-school exit exams in Finnish universities. I use program-level variation in admission quotas and administrative data on university applications to show that the reform made it significantly less costly and less strategic to apply. Yet, the students admitted via the new criteria perform academically as well or better than under the old system. Comparing marginal admittees across selection quotas to the same program, I find that the post-reform level with 50-50 split between entrance exams and exit exams is close to at least a local optimum. While low-SES students may have benefited from the application process becoming less strategic, I find no evidence that the reform significantly improved their access to higher education. Overall, these results suggest that students can be admitted with significantly lower application costs without detrimentally affecting student performance.

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1 Introduction

Colleges often require applicants to exert significant effort for them to be considered for admission. This process may reveal information about the applicant's skills and motivation that may help find the most suitable students. But if the process is very costly, it will decrease applications as individuals need to strategically allocate effort between programs. This is particularly the case with decentralized admissions processes where marginal application costs can become very high. Moving to standardized tests or high-school grades to rank applicants would provide an opportunity for colleges to significantly lower marginal application costs and make applications less strategic. Yet, it is not obvious that they would provide sufficient information to select the most suitable students. This creates an important economic trade-off that is not empirically well understood, but which is relevant for the design of admissions policies.

To make progress, I leverage a Finnish 2020 reform that mandated all higher education programs to admit the majority of students based on standardized high-school exit exams and thus significantly lowered marginal application costs. Prior to the reform, most students were admitted based on program-specific entrance exams that required extensive preparation. This preparation would only improve admission prospects in the specific program one is applying to. Thus, it was very costly to apply to programs and made it impossible to apply and to be considered to more than a single competitive program. In the new system, programs use weighted averages of standardized exit exam grades that are based on high-school curriculum. Thus, good grades and effort in the exams improves admission chances in all programs and marginal application costs become significantly lower.

In the empirical analysis, I use two complementary research designs to inform these debates. First, I use program-level variation in mandated change to admission quotas.

Prior to reform, some programs already selected more than 50 percent of their students using high-school exit exam grades, while others did not. This allows me to leverage difference-in-difference and event-study type strategies and compare admissions outcomes in programs that were mandated to change their admissions quotas to those that were not. Second, using administrative information on the ranking of students in the admissions process, I compare marginal admittees to the same program but who were admitted via different admissions criteria. In particular, I compare individuals who were marginally admitted via high-school exit exams to those who were admitted via the entrance exam quota. This allows me to test whether programs could improve their admission outcomes by marginally increasing or lowering the share of students admitted via either selection criteria.

To understand the effects of lowering applications costs, the Finnish context provides important advantages. First, all university admissions were centralized before and after the reform. This allows me to observe applications and admissions to all programs as well as the stated preferences for programs. Second, I can link admittees to student registries to track their academic performance once they enter universities. This allows me to study the key trade-off potentially associated with different types of admissions criteria to the extent that programs care about the match quality. Third, I can link applicants and admittees to registry data on individual characteristics to evaluate how the change in admissions criteria affected student socioeconomic composition.

I provide evidence that the reform indeed made it significantly less costly and less strategic to apply college programs and these effects are likely to be economically important. I show that programs that were induced to change their admission criteria due to the reform started admitting more applicants that did not apply to only that program. Thus the reform importantly allowed students to realistically apply to more than a single program. I also find that the same programs started admitting significantly more recent

secondary school graduates. This suggest that the reform achieved its primary policy target and sped up the transition from secondary to higher education. The new admission criteria also affect the types of students that were admitted. As the new criteria put more weight on high-school grades, the exposed programs admit more students from the top 20 percent of the high-school grade distribution and less from the middle of the grade distribution who otherwise may have been admitted due to good performance on the entrance exam.

Despite significantly lowering applications costs, I find no evidence that the reform would have led to worse student-program matches. I show that the first-year GPA of students in more exposed programs are similar to those in less exposed programs. This suggest that the change in admission criteria did not affect student-program match quality. If student performance is a sufficient condition for universities, the reform seems to have significantly reduced costs in the admissions process without change in quality.

Third, I study the socioeconomic background of admittees by combining the admissions data to rich population level registry data. I find that, while there is a tendency of more admission from lower parental income ranks compared to those in the middle, these effects are not very large or statistically significant. I find some evidence that there was an increase in admissions from applicants who had a lower tertiary degree and that this is driven by an increase in applications. Thus, while applications were made easier and this could may help applicants with lower resources or knowledge about university applications and less support for entrance exam preparation, these effects are not significant enough to show up in the aggregate. This is supported by evidence that the change in admissions criteria increased applications from individuals whose parents do not hold the program's target degree and who might have significant disadvantage in preparing for the entrance exam.

Fourth, I show that most of the effects are driven by selections rather than by changes

in the application behavior. For example, top performers in high-school are more likely to apply to programs where high-school grades become more important for admissions. This suggest that applicants take into account acceptance probability when making application choices. But the main observed effect in admissions comes from the increase in admissions conditional on applying. One exception is that women apply more often to programs with higher high-school grade quota and this explains the small increase in women admittees.

Finally, using data on individual level admission scores, I can compare marginal admittees via different selection quotas. In the post reform period, most programs admit students based both on high-school grades and entrance exams, which allows me to follow students in the same program who were admitted with different selection criteria. I show that both high-school diplomas as well as entrance exam scores predict better performance in post-admission studies. Yet, the marginal admittees via these two admission quotas are on average performing equally well as measured by their first-year GPAs. This suggest that programs would not benefit from marginally changing the new, post-reform admissions quotas and that the current 50-50 admission split between high-school diplomas and entrance examinations are at least locally optimal.

This paper contributes to several strands of the literature on education and admissions policies. First, I contribute to the literature on student assignment mechanisms (see, f.e. [Sönmez and Utku Ünver \(2011\)](#), [Che and Koh \(2016\)](#), [Hafalir et al. \(2018\)](#)), which has provided theoretical evidence that the design of the admission mechanisms can affect applicants welfare given plausible estimates of applicants preferences. Yet, empirical evidence on the impacts of admissions mechanisms on admissions outcomes is scarce, likely due to absence of reforms that could be empirically evaluated and lack of access to necessary data. Recent examples that deviate from this include [Terrier et al. \(2021\)](#) who evaluate the effects of transitioning from immediate acceptance to deferred accep-

tance model in the UK. Interestingly, the results from these empirical exercises are not always similar to what might be expected based on the theoretical literature, because not all applicants seem to be as sophisticated as predicted by the models.

Secondly, and more directly, I contribute to the empirical literature on admission reforms that aim to understand how moving to lower cost applications affects application choices and admissions ([Francesconi et al. \(2019\)](#), [Machado and Szerman \(2021\)](#), [Knight and Schiff \(2022\)](#) [Tanaka et al. \(2020\)](#)). For example [Knight and Schiff \(2022\)](#) study the effects of colleges joining the common application system and see that colleges receive more applications. In contrast to the previous literature, I can leverage rich administrative data at the individual level on both applications and admissions and I can follow post-admissions student performance. This allows to measure effects on student-program match quality, which are important for understanding the trade-offs colleges care about when making policy choices.

In the following sections, I describe the institutional background and data, the research designs and the results. Finally, I conclude.

2 Institutional Background and Data

2.1 Admission Criteria

Finnish universities have historically selected the majority of students based on program-specific entrance exams that require extensive preparation in order to be admitted. The examinations are based on a pre-announced material and may be related to secondary school curriculum or college-level introductory textbooks related to the target program. The exams are organized in late spring or early summer for the following academic year. This gives recent graduates who finish their high-school coursework and matriculation

exams in spring a few months to prepare for the exams. Applicants are expected to prepare for the exams on their own, but private tutoring firms have also emerged to provide classes tailored to specific exams. This has raised concerns that the most competitive programs have become inaccessible to applicants who may not have the resources to take private classes. All applicants can submit a preference list of up to 6 tertiary programs when they apply, but it often becomes infeasible to prepare for multiple entrance exams. This forces applicants to weigh their expected admission probability against the expected utility from admission. Finally, many of the entrance exams are organized on the same day, which means that applicants cannot in practice participate in all the exams they might want to. Anecdotally it has also been suggested that the exams have been organized on the same day in order to limit the number of participants and to lower the cost of correcting and grading the exams.

The entrance exam based admission system has been blamed for the slow transition of secondary school students to higher education (see f.e., [Pekkarinen and Sarvimäki \(2016\)](#)). For example, Finland has had among the oldest university graduates in OECD (see Figure A1). The average age of first-time graduates in Finland has been 28 which is the third highest and in comparison countries such as the UK, Belgium and the Netherlands have first-time graduates who are about 5 years younger. Also the transition rate of graduates from secondary to higher education is among the lowest. This called for changes in the way students are admitted to universities and resulted in the universities agreeing with the government to change the their admission policies.¹

Thus, starting from 2020 student admissions, all programs were mandated to admit the majority of students based on high-school exit exams or the so-called Matriculation Exam rather than entrance exams. The Matriculation Exam is a bi-annual standardized

¹Universities are autonomous in making decisions about their admission policies and criteria, but the reform was supported by the Finnish government.

test in which the whole (academic) high-school cohort takes the same set of exams. The exams are graded in a standardized way by external censors which allows comparisons both across high-schools and across cohorts. In particular, the highest grade is given to the approximate top 5 percent of the cohort, the next grade to the following 15 percent and so on. High-school students may decide which subject-specific exams they participate in, but all high-school graduates need to participate in at least the Finnish language exam and most typically also participate in Math and English language test as well as some exams in sciences.

Figure 1 shows how there was a major shift in the way students were admitted to universities in 2020 in association with the reform. By 2019, the share of students admitted via the matriculation exam quota (i.e. the high-school diploma based admission) was around 20 percent, but it jumped to over 50 percent in 2020. This shift was not associated with a drop in the pure entrance examination quota, but rather on the joint entrance examination and matriculation exam quota (from 30 percent to almost zero percent) in which students were required to participate in an exam but also were given credit for good performance in matriculation exams. The fact that some programs had already introduced matriculation exam quotas prior to the mandate helps me construct a control group for the main empirical analysis.

2.2 Applications and Admissions Data

For the primary outcomes on applications and admissions, I use data on the universe of applicants to Finnish higher education programs from the Finnish National Agency for Education. This contains information on all applicants, their program preferences (from 1 to 6 programs), their Matriculation Exam results, entrance exam results and admission points as well as information through which admission quota the applicant was admitted.

To measure the socioeconomic characteristics of the applicants and admittees, I match

the applicants to Finnish population registries using social security numbers. I use parental education and earnings when the applicant is 15 years old to measure applicant's socioeconomic status. Further, I use information on the applicants age, gender, country of birth and home municipality.

Figure 3 shows the distribution of programs that applicants apply to and the probability of acceptance. First, the left hand side figure shows that prior to the reform the modal applicant applied to a single program and only 21 percent of applicants listed 6 programs even if there is practically no cost in listing more programs in the application files. However, after 2020, the distribution shifted to the right and the mode shifted to 6 programs. This suggests that as the reform allowed acceptance without participating in the entrance exam, applicants were willing to apply to more programs. The right hand side figure shows that this paid off as the probability of acceptance significantly increased in the lower ranked programs following the reform.

3 Empirical Strategy

In this section I describe the two complementary research designs that I use to quantify the potential trade-offs between different admissions criteria. First, I use a difference-in-difference strategy that leverages variation in reform exposure across programs. Second, to understand whether programs could improve admissions by changing the admission quotas by criteria, I leverage a regression discontinuity-type design that compares marginal admittees.

3.1 Diff-in-diff

The baseline difference-in-difference design is estimated in the following specification

$$Y_{ipt} = \alpha + \beta \text{Exposure}_p * \text{Post}_t + X_{ip}\gamma + \theta_p + \lambda_t + \varepsilon_{it} \quad (1)$$

where Y_{ipt} is the outcome for applicant i to program p in year t , Exposure_p is the mandated increase in diploma-based admissions, post_t is a dummy for years following the reform, θ_p are program fixed effects and λ_t time fixed effects.

This design allows me to compare the outcomes (applications and admissions) in programs that were more affected by the reform to those that were not directly affected. The identification relies on the assumption that in the absence of the reform, the applicant and admission outcomes would have been similar in more and less exposed programs. To support this assumption, I will also estimate an analogous model by interacting exposure with years dummies around the reform to construct and event-study estimates. However, for interpretation, it is necessary to note that all programs are to some extent affected via applicants who apply and may be admitted to programs that were not directly affected. This is inherent in the way the centralized admission mechanism works and creates offers to applicants. This mechanically creates spillovers between programs and means that, without additional assumptions, the effects that we may estimate do not reflect the total effects of the reform.

To understand how more exposed programs differ from less exposed programs it is useful to look at descriptive statistics between these programs. First, Table 1 column (1) shows the descriptive statistics of admittees to all university programs before the reform in 2018-2019. Column (2) shows the correlation in exposure and the characteristics of the admittees. On the other hand, Figure 2 shows the exposure by educational fields. It shows that there are three main fields that remain in the control group with low exposure to the reform: business and administration, natural sciences and engineering programs. In these fields, a large share of students have been admitted via matriculation exam grades

already before the reform. As programs in different fields in general attract different types of applicants it is thus natural that there are pre-existing differences in the applications and admissions to these programs. However, in the baseline diff-in-diff specification I use program fixed effects to control for these pre-treatment differences. Further, I use event-study analyses to understand whether exposed programs are in a differential trend already prior to the reform.

3.2 Comparison of Marginal Admittees by Admission Criteria

Next, I leverage the fact that in the post-reform period, most programs admit students based both on high-school exit exams and entrance exams. This allows me to compare post-admission performance of student admitted to the same program but with different admission criteria. Further, using information on the order that students are admitted, I can identify the marginal admittees from each admission quota. Now, if marginal admittee from one of the quotas was performing worse than on the other, the program could potentially improve average admittee performance by marginally changing the selection quota in favor of the one where the marginal admittee is performing better.

In practice, we may study the differences between marginal applicants via different selection criteria in the following specification

$$Y_{ip}^{Admittee} = \alpha + \beta \text{Exit Exam Quota}_{ip} + f(\text{AcceptancePercentile}_{ip}) + X_{ip}\gamma + \varepsilon_{ip} \quad (2)$$

where $Y_{ip}^{Admittee}$ is the outcome of admittee i to program p , $\text{Exit Exam Quota}_{ip}$ is a dummy for admission by high-school exit exam and $\text{AcceptancePercentile}_{ip}$ is the flipped acceptance percentile of the admittee in that program which gets values between -1 and 0 for admittees via the entrance exam and values between 0 and 1 for admittees via the exit exam. $f(\text{AcceptancePercentile}_{ip})$ is a smooth function of the flipped acceptance per-

centile. Now, $\hat{\beta}^{OLS}$ will measure the differences between the marginal matriculation admittee vs the marginal entrance examination admittee.

The identification in this regression discontinuity type design relies on the assumption that the last admittee from a quota is as close a substitute as one can get to the next applicant on the queue who was not admitted to that program and whose post-admission study performance cannot be observed. Further, by studying only admittees within the margin, we can expect that a small change in a quota will not affect the admission probability of potential applicants and thus application choices. Thus, a marginal increase in a quota in any single program is not likely to significantly affect the admissions as a whole or create large spillovers to other programs.

4 Main Results

In this section, I first characterize applications and admissions to understand the mechanisms through which the reform operated and lowered application costs. I then consider the trade-off in student performance resulting from the reform leveraging the two research designs discussed above.

4.1 Application and Admission Decisions

Figure 4 shows the event-study estimates on the effects of the reform on admission criteria in more vs less exposed programs. First, the estimates suggest that the matriculation exam quota increased by one half for every expected unit increase in the quota. This (“first-stage”) allows us interpret the following event-study and difference-in-difference results as comparing programs that were mandated to increase the matriculation exam quota from 0 to 50 percent to those that were already complying with the mandated 50 percent quota. Second, 4 also shows that the matriculation exam quota increase was associated

with a corresponding drop in the joint matriculation exam + entrance exam quota which used to require participation in an exam to be admitted. Instead, the share of students admitted simply via the entrance exam was unaffected. Thus, these estimates suggest that the empirical design is successfully capturing the expected and the mandated increase made it possible for more students to be admitted to programs without participation in the entrance exams.

To understand how the reform affected costs and strategic choices in applying, Figure ?? first shows the effects on how the admittees had ranked the programs they were admitted to. The estimates are positive and the average admittee to exposed programs had ranked that program almost 0.4 ranks lower in preference list that range between 1 to 6. This suggest that exposed programs became more accessible to applicants and that it was no longer required to strategically only apply to that program to be admitted. Indeed, this effect is predominantly driven by the drop in admittees who had ranked the program as their first choice and an increase in admittees who had ranked the program as their 3rd to 6th program as shown in blue in Figure 6a. The first-rank admissions dropped by 13 percentage points which is 23 percent from a baseline of 55 percent. Increases in lower ranks were relatively higher due to low baselines ranging from 33 percent to 80 percent. Figure 6a also shows that these effects are partly but not completely driven by differences in application decisions. In particular, programs that switch to less costly admissions criteria receive a smaller share of first- or second-preference applications, but an increasing share of lower-preference applications. These effects suggest that after the reform applicants can rank programs less strategically as they no longer need to only apply to a single program to be admitted.

Figure 6 shows the event-study and diff-in-diff estimates on the age distribution of admittees. These results suggest that the reform made it easier to access universities directly after graduating from secondary school. In particular, there was a significant increase in

the share of 19-year-old admittees which is the group graduating from high-school on the same year. The effect is seven percentage points which is a 26 percent increase from a baseline of 27 percent. In contrast, the share of 21-25 year-olds dropped and the 25 plus category was on average unaffected. These estimates suggest that the reform made it significantly easier for secondary school graduate to transition to higher education with less gap years preparing for entrance examinations. However, there were also potential losers in the cohorts that had not yet been admitted directly after secondary school in the previous years. Yet, faster transition to higher education is likely to be economically significant for the individuals but also for public finances as one year of earnings for a high-school graduate can be expected to be significantly lower than one year of earnings for the same individual as a college graduate.

As the admissions criteria change, we may also expect that the admittee composition and skills change correspondingly. To measure these changes, we may use information on the applicants matriculation exam grades. Figure 7 shows the event-study estimates on the Finnish language and advanced math grades which are the two grades typically given the highest weight in admissions. Estimates on both are positive and significant. The average admittee had around 0.4 grades higher performance in the Finnish language and math exams. This change is driven by higher admission shares from those who are in the top 20 percent of the national grade distribution (grades 6 and 7) but a drop among those in the middle of the grade distribution (grades 3 and 4) (see 6b). These results show that the change in admissions criteria did indeed change the types of students being admitted, including more top performers in the standardized matriculation exams but admitting less mediocre performers who would have been admitted in a joint matriculation exam and entrance exam quota.

These results suggest that, after the reform, students entered programs that they had ranked lower than they would have in the old system. A natural worry among the pro-

gram administrators could be that this signals that the students are less motivated to participate in that program. If this would be the case, that would obviously be a negative for the new system. However, this obviously need not be the case as applicants need now to be less strategic and can rank more programs. The fact that there are higher ranked programs does not mean that there would not have been more preferred programs that were simply not applied to in the old system. On the other hand, the results on significantly higher high-school grades suggest that the new students are in general better prepared academically than in the old system.

4.2 Student Academic Performance

Next, I study whether there was a change in post-admission study performance. Figure 9 shows the event-study estimates on the first-year GPA in university courses. The estimates suggest that there was no significant change in study performance. Overall, these results suggest that while the reform made applying easier and less strategic and it also changes the admittee composition, it did not affect study performance to a significant degree and that universities were on average able to admit equally well matched students using the new low cost criteria.

To compare marginal admittees and to illustrate the differences in admission criteria at the margin, Figure 10 Panel (A) shows the Finnish matriculation exam grade as a function of the flipped acceptance percentile. It shows that, on the right side of the 0 cut-off, there is a significant positive correlation between matriculation exam grade and the acceptance percentile as higher performers are given preference in matriculation exam quota. On the other hand, there is much smaller correlation on the left hand side which shows the flipped acceptance percentile in the entrance exam quota. This suggest that among that group, acceptance is not to a significant degree correlated with high-school grades but reflects some other skills measured in the entrance examinations. Finally, we may notice

that there is a significant gap also at the margin. The last admittee in the matriculation exam quota has a higher grade than the last admittee in the entrance exam grade. By marginally increasing the matriculation quota on the right hand side, universities could attract students who are on average performing better in the Finnish language matriculation exam.

Figure 10 Panel (B) instead shows how well the students are performing in their first-year studies after admission. First, there is a significant positive correlation between the acceptance percentile and first-year GPA on both margins. This suggest that both the high-school exit exam and college entrance exams provide useful information about applicants suitability for university programs and predict performance after admissions. Further, if we compare the average performance of the admittees by admission quota, we may observe that the marginal admittees performing equally well on both margins.

To formally test the difference in student performance, Table 3 shows the estimates on the difference at the margin. The result suggest that there is no significant change in first-year GPA. The point estimate is 0.03 which statistically insignificant and around 1 percent of the mean GPA. This allows to rule out This is also true once we control for program fixed affects and thus compare marginal admittees to the same program. These results suggest that with the current policy of around 50-50 split, programs on average are able to attract equally suitable student on both margins and that it would not pay off to marginally change the quotas if the programs aim to admit students based on expected study performance.

5 Student Characteristics and Social Mobility

The reforms made college applications significantly less costly and strategic. There are good reasons to believe that the ability of individuals to optimally apply might be related

to socio-economic status of the applicants. On the one hand, this could be either via the cognitively challenging task of predicting the programs that one has a good chance of being admitted, considering all the other applicant's choices. Applicants whose parents have higher education, may have also more information on how to successfully navigate the application process. It could also be that high-SES applicants can take more risks and are able to tolerate an extra gap year between high-school and college. In the Finnish context, high-SES students could have also been more likely to take preparatory classes for the entrance exams. As the reform made it less important to select a single program to apply, it should limit the consequences of small mistakes and thus potentially help disadvantaged students.

To make progress in empirically evaluating these potential effects, I use the variation induced by the reform to study how it affected the characteristics of applicants and admittees. Figures 13, 14 and Table 4 show the main results. Figure 13 Panels (A) and (B) shows that there were limited changes in socioeconomic composition of the admittees and the applicants around the reform. In particular, neither the applicants nor the admittees are more likely to have parents with higher education nor with higher earnings. Table 4 Column (6) shows that the difference-in-difference estimate for parental education is positive at +2.3 percentage but only marginally statistically significant and small relative to the baseline of 81 percent of admittees having parents with higher education. Figure 14 Panel (A) shows these for a more disaggregated educational classification and shows that the increase is driven by applicants whose parents have a Bachelor's degree rather than the Master's degree which is the target of most students. Thus this increase is not driven by what could be called the most socioeconomically advantaged group.

Results using parental earnings point to similar results. Figure 13 Panel (B) shows the changes in applications and admissions by parental earnings deciles and shows that overall there are no important changes. Gradient in applications is very flat and statisti-

cally insignificant. The gradient in admissions is somewhat negative as for the bottom 5 deciles the point estimates are positive, but overall none of these are statistically significant. These results are also summarized in the DiD point estimate which suggest that the average earnings percentile change is -0.3 for applicants and -1.3 for admittees. Yet, both are small and statistically not significant.

A potentially more powerful test of the mechanisms is to test whether having parents who have a specific degree might be helpful in accessing those programs. In Table 4 Column (7) I show that after the reform, a smaller share of applicants have parents who hold the target degree. While this is consistent with reduction in application frictions, the result does not carry over to admissions.

Similarly, applicants with immigrant status of immigrant background may also have been at a disadvantage, as they might be less likely to have parents with knowledge about the applications system and to be less likely to be exposed to peers that are going to college. Thus, Figure 13 Panel (D) a and table 4 Column (2) show the effects on the share of immigrant applicants and admittees. There is no increase in the share of immigrant applications and the effect on admissions is only marginally significant. The point estimate of the DiD estimate is positive at 0.8p.p. and large relative to the baseline of only 3 percent, but only marginally statistically significant.

Finally, we might expect there to be gender differences in applications behavior. For example, if women are less willing to apply when acceptance is dependent on performance in a competitive exam and a risky application choice, we might expect women to benefit more from the reform. Figure 13 Panel (C) and Table 4 Column (1) show the changes in gender composition among applicants and admittees. First, there is some evidence that there are more women applicants to exposed programs. The point estimate on applications is 3p.p. and statistically significant. Yet, the point estimate on admissions is only 1.5 p.p. and not statistically significant. Thus, it is not likely that, on overall, the

reform significantly favored women vs. men.

To complement the diff-in-diff analysis, it is potentially useful to also look at differences in the candidates at the margin of acceptance across admissions quota. Figure 11 shows the characteristics of applicants across the two margins along four dimensions: parental earnings, parental education, gender and immigrant background. Overall these results are consistent with the above findings that the changes are likely to not be obviously significant. The only significant gap emerges by parental earnings, suggesting that exit exam quota admittees have slightly higher earnings than entrance exam admittees. This goes in the same direction as the diff-in-diff estimate, but is slightly larger. In contrast, there emerge no differences by gender, immigrant background or parental education.

Taken together, the results in this section suggest that the reform had on average limited effects on socioeconomic mobility or gender distribution in admissions. Now, for interpretation, it is important to note that on average, applications from low-SES status are also performing worse in standardized high-school exit exams which after the reform get a significantly more important role in the admissions process. Thus, it is likely that the zero result is a result of two counteracting forces. On the one hand, the reform makes it less strategic to apply which helps low-SES students. On the other hand, the admissions criteria favor, on average, high-SES students with better academic preparedness. The evidence here suggests that the net result is close to zero.

6 Conclusion

In this paper, I have used extensive registry data on student admissions and leveraged an important admissions reform in Finnish universities to make progress in understanding the effects of application costs and effort requirements on student admissions and especially student-program match quality. I first show evidence that the reform made it

significantly easier to apply and to be accepted to multiple programs and that it sped up transition from secondary to higher education. Yet, despite many publicly expressed concerns that the new admittees would be less motivated, the students are getting at least as good grades as before. These results suggest that old admission system that required participation in entrance exams did not generate information that would be more valuable in selecting better students than the associated costs it induced by forcing strategic behavior in applications. Second, I find that the new 50-50 split in admissions based on high-school grades and entrance exams cannot be obviously improved by increasing one quota over the other if universities mostly care about post-admissions student performance. Overall, these results suggest that the old entrance exam based system may have been important in making Finland have among the oldest first-time university graduates.

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Figures and Tables

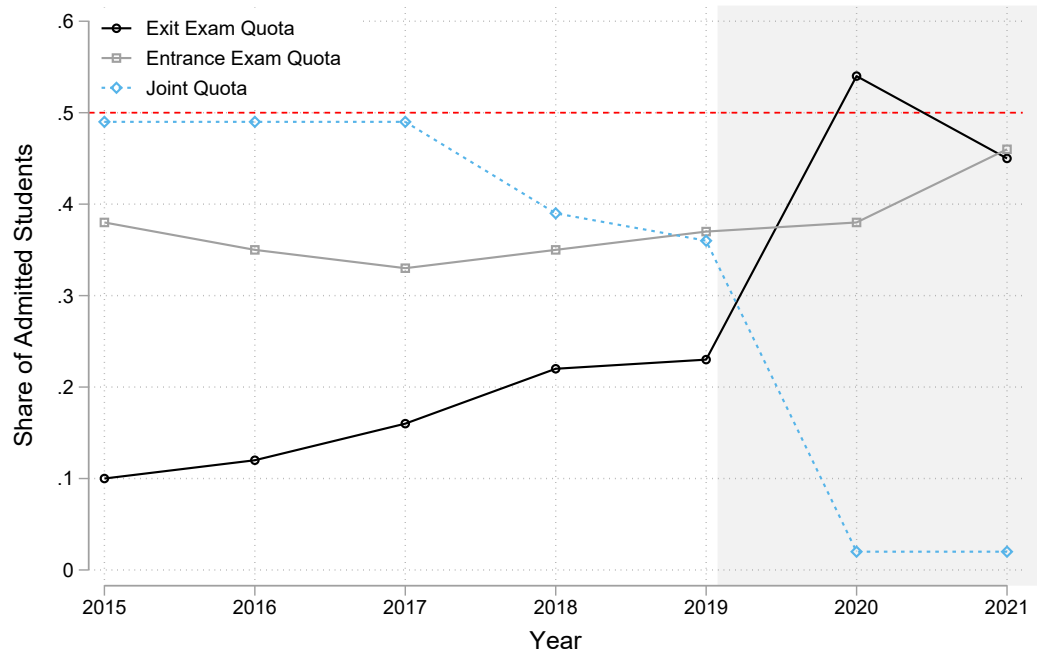


Figure 1: 2020 Reform Shifted Admissions Criteria from Entrance Exams to High-School Diplomas

Note: Figure shows the share of students admitted to Finnish universities by selection quota. Matriculation exams standardized tests that every high-school graduate participates in and programs can use in ranking of applicants. Entrance exams are specific to each program and grading is based only on applicants who participate in that exam. Joint quota is a combination of the two in which admission requires participation in program specific exam.

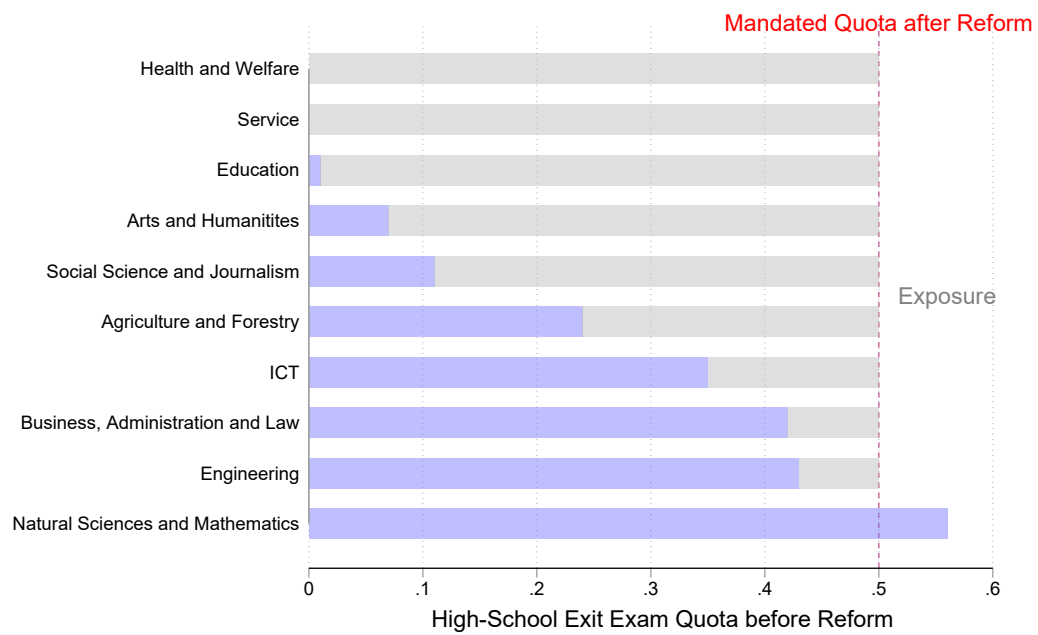


Figure 2: Variation in Exposure to Reform by Education Fields

Note: This figure shows the average exit exam quotas prior to the reform by field of study and the mandated increase in the quota following the reform.

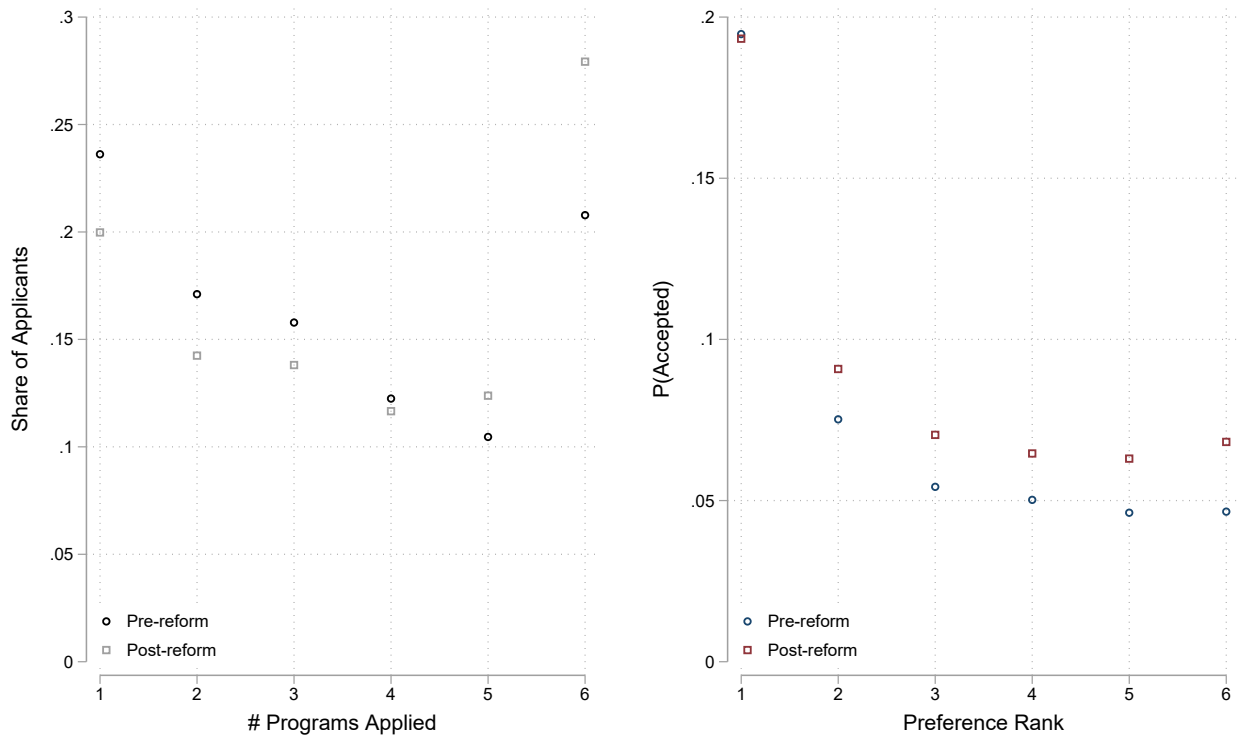


Figure 3: Applications and Probability of Acceptance to Lower Ranked Programs Increases
Note: Left-hand side panel shows the distribution of the number of programs applied to. Right-hand panel shows the probability of acceptance to a program conditional the rank of the program in applications. Pre-reform years refer to 2018-2019 and post-reform years refer to 2020-2021.

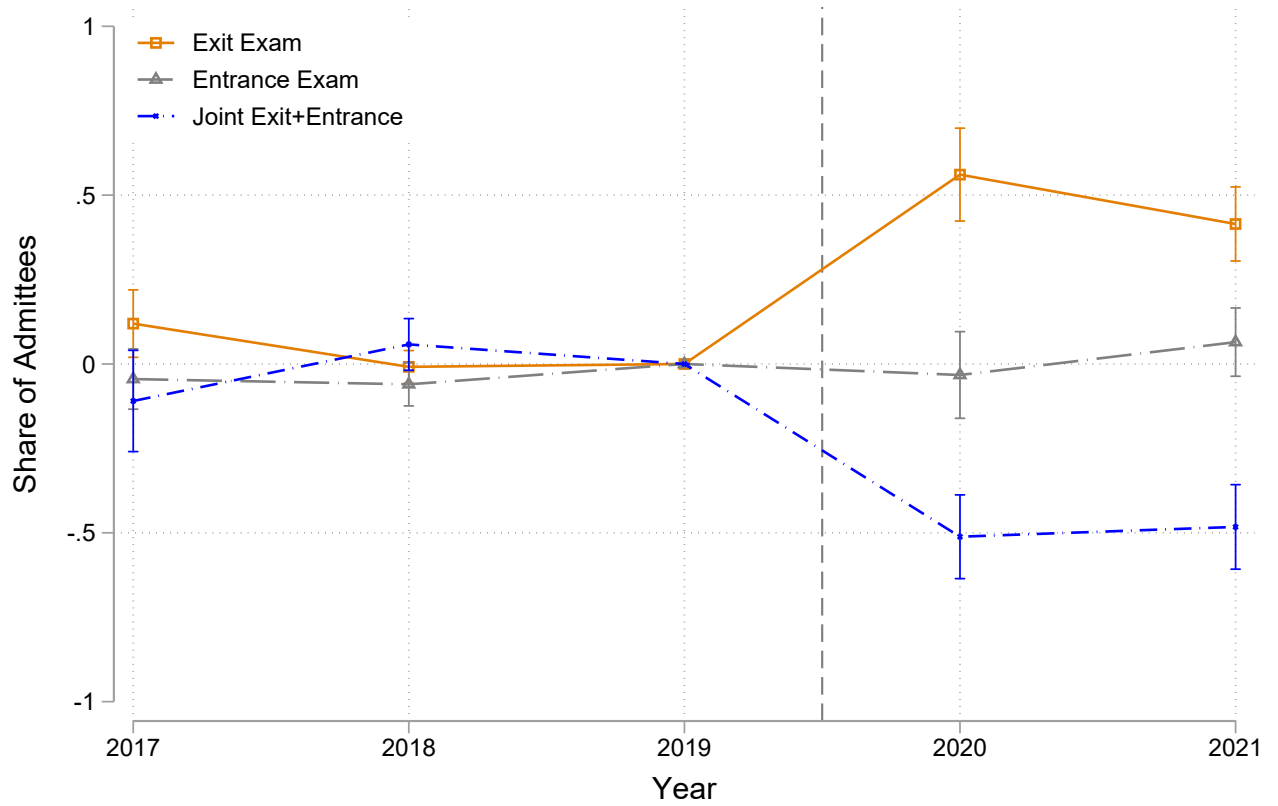
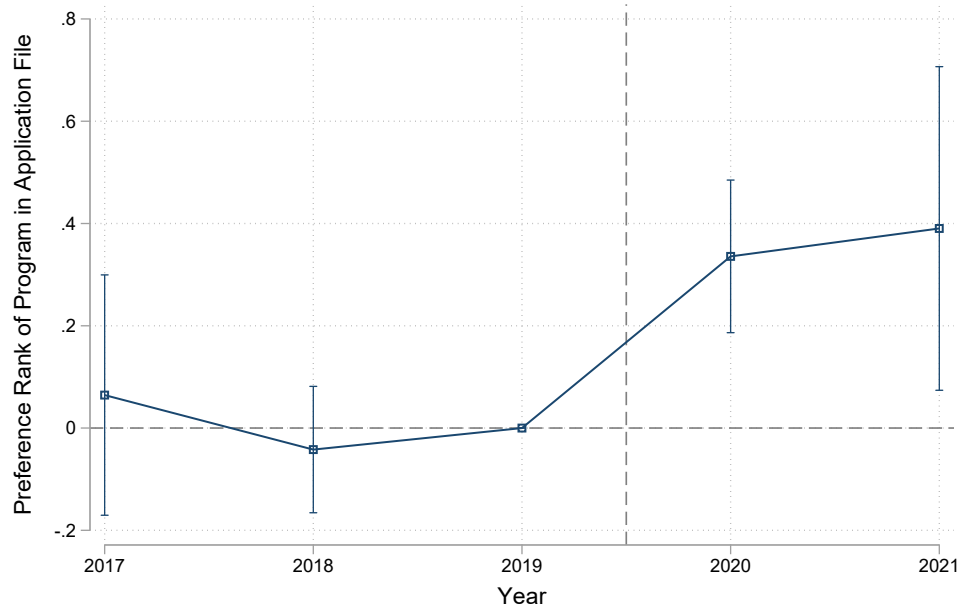
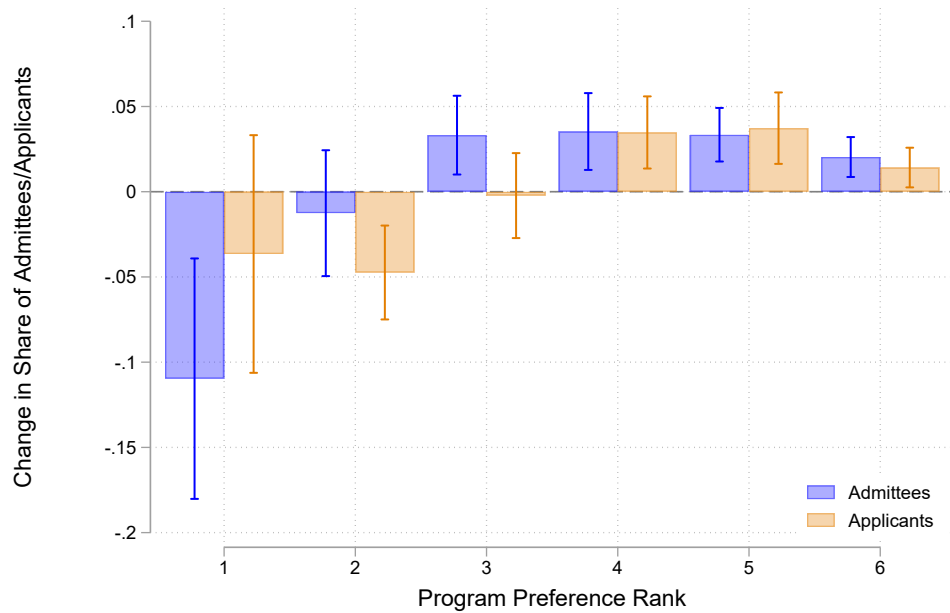


Figure 4: Event-study: Admittees by Selection Quota

Note: Figure shows the event-study estimates on the share of admittees from different selection quotas leveraging program-level variation in exposure to the admissions reform.



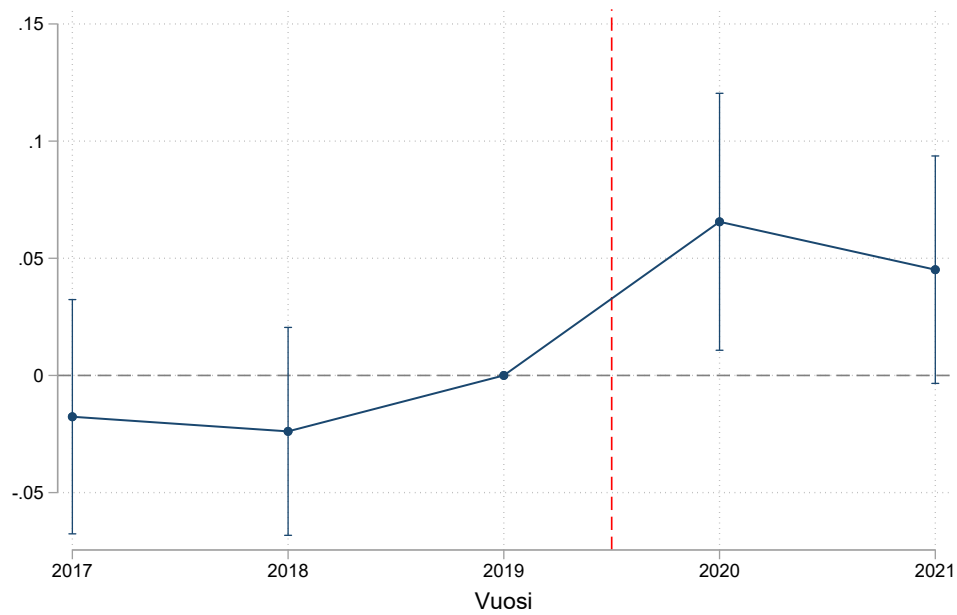
(a) Average Preference Rank



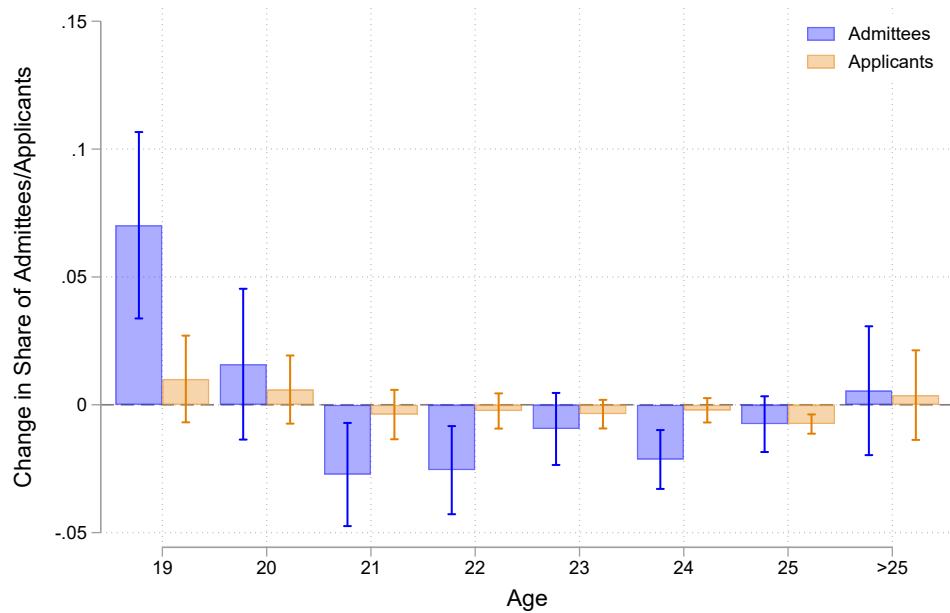
(b) By Program Preference Rank

Figure 5: Difference-in-Difference Estimates on Admissions

Note: These figures show difference-in-difference estimates comparing admissions in programs that were more exposed to the admissions reform to those that were not. Panel (a) shows the change in students admitted by each admission criteria. Panels (b)-(f) show similar results by admittee's preference rank, age, Finnish high-school grade, parental education level and parental earnings decile.



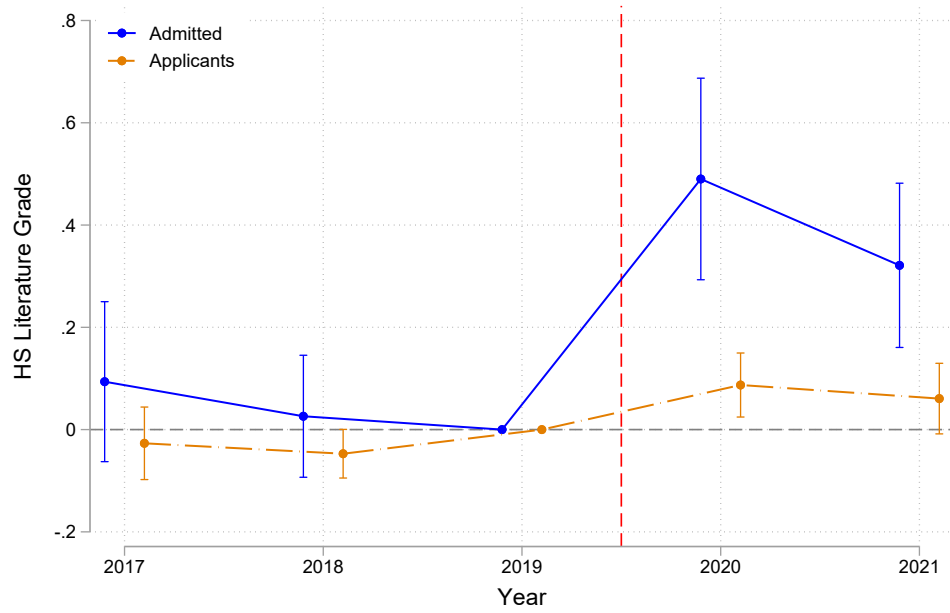
(a) Same-Year High-School Graduates



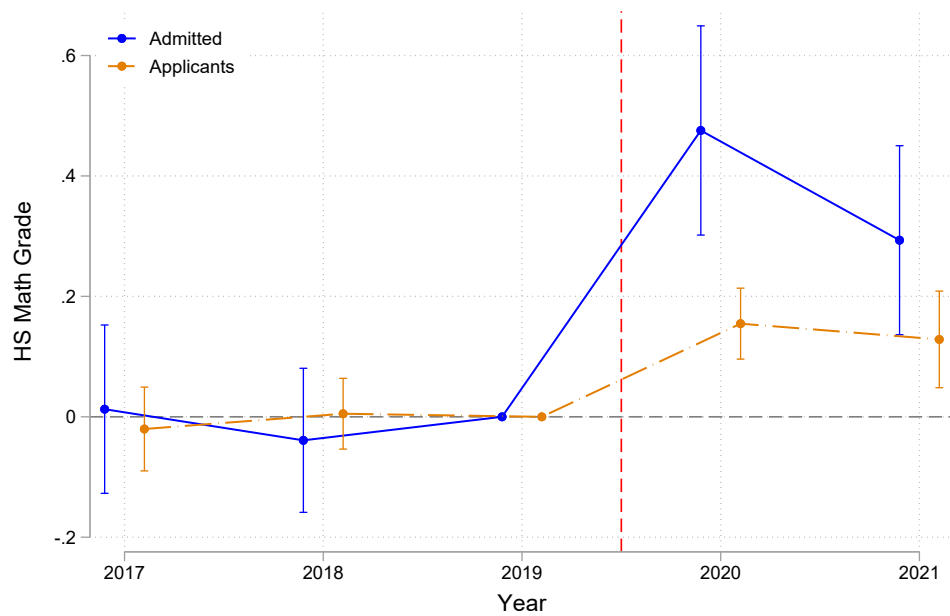
(b) Age Distribution

Figure 6: Difference-in-Difference Estimates on Admissions

Note: These figures show difference-in-difference estimates comparing admissions in programs that were more exposed to the admissions reform to those that were not. Panel (a) shows the change in students admitted by each admission criteria. Panels (b)-(f) show similar results by admittee's preference rank, age, Finnish high-school grade, parental education level and parental earnings decile.



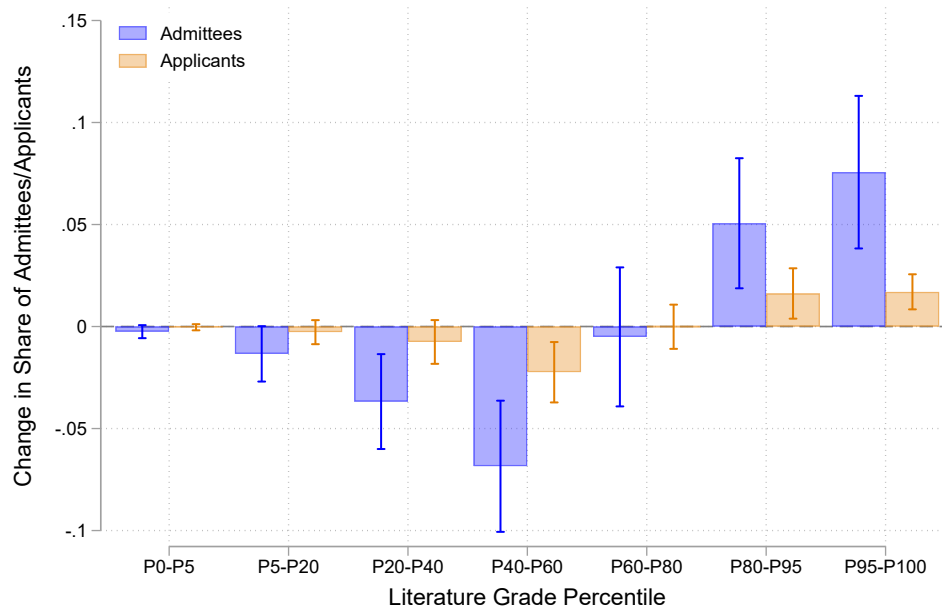
(a) Literature Grade



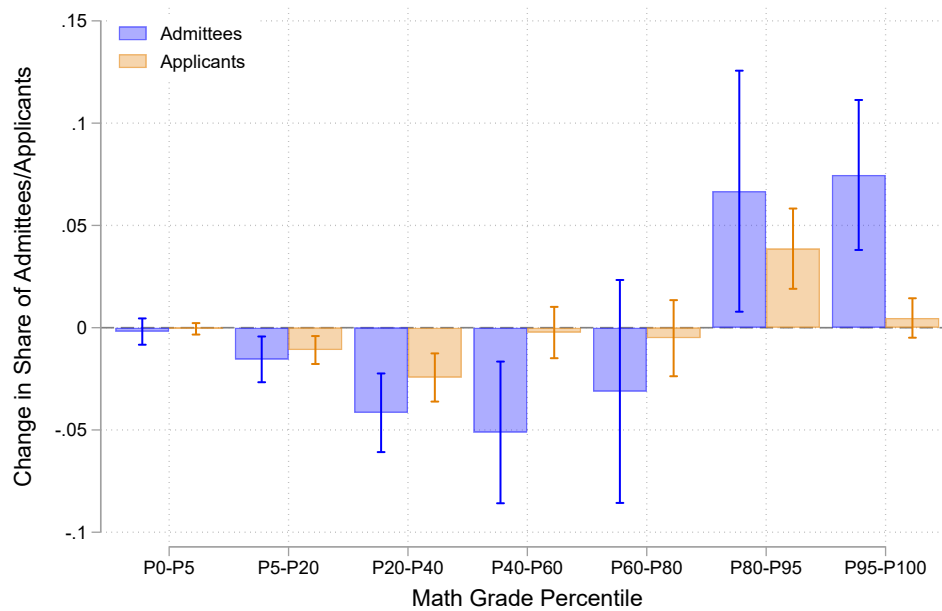
(b) Math Grade

Figure 7: Difference-in-Difference Estimates on Admissions

Note: These figures show difference-in-difference estimates comparing admissions in programs that were more exposed to the admissions reform to those that were not. Panel (a) shows the change in students Finnish language high-school grade and panel (b) shows the change in students mathematics high-school grade.



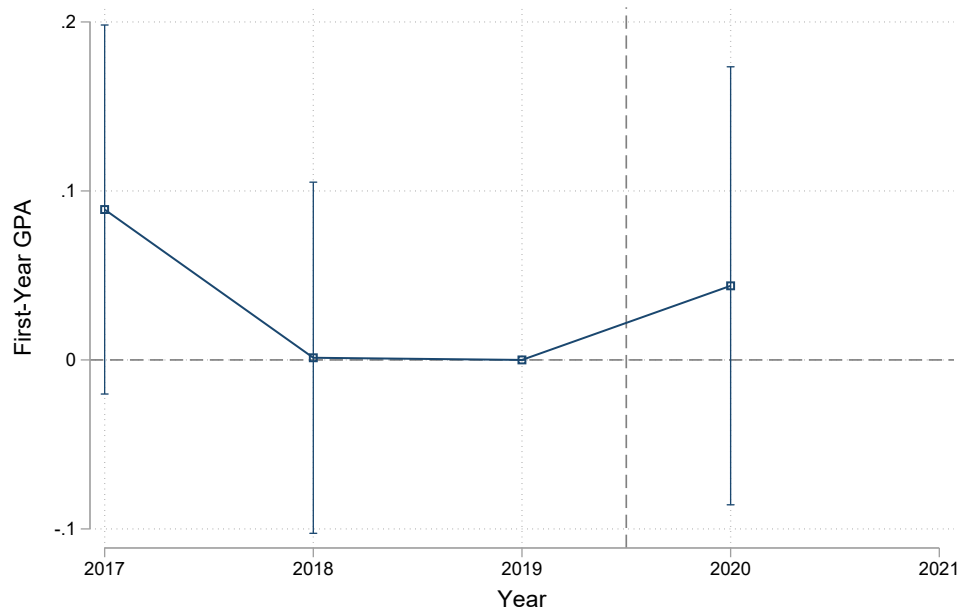
(a) Literature Grade



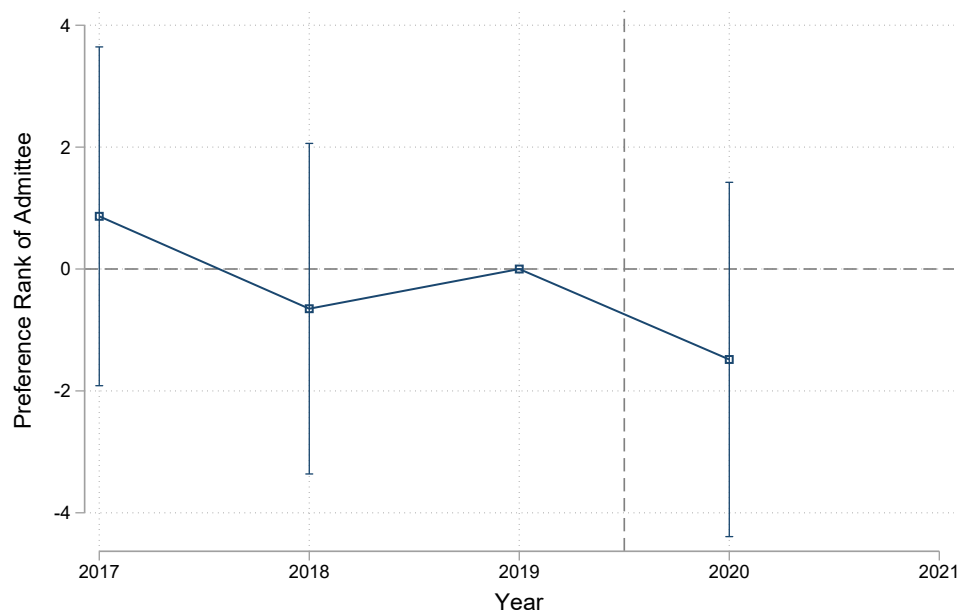
(b) Math Grade

Figure 8: Difference-in-Difference Estimates on Admissions

Note: These figures show difference-in-difference estimates comparing admissions in programs that were more exposed to the admissions reform to those that were not. Panel (a) shows the change in students Finnish language high-school grade and panel (b) shows the change in students mathematics high-school grade.



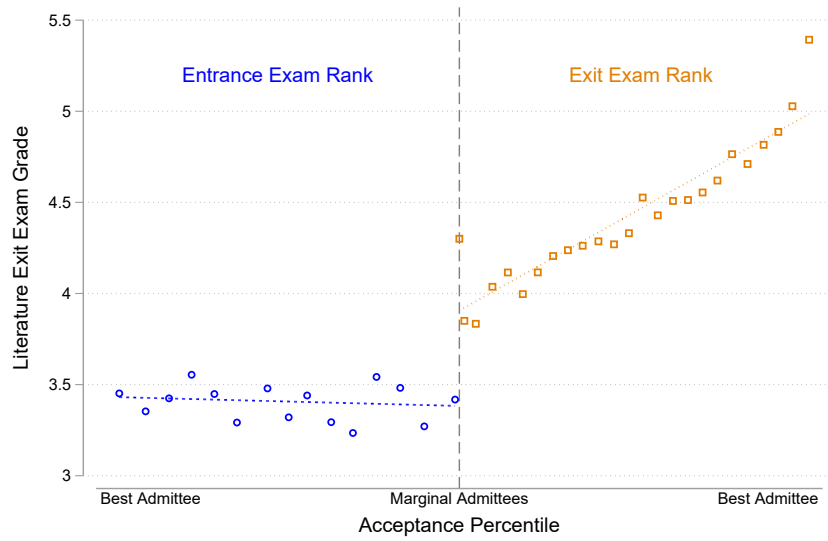
(a) ES: First-Year GPA



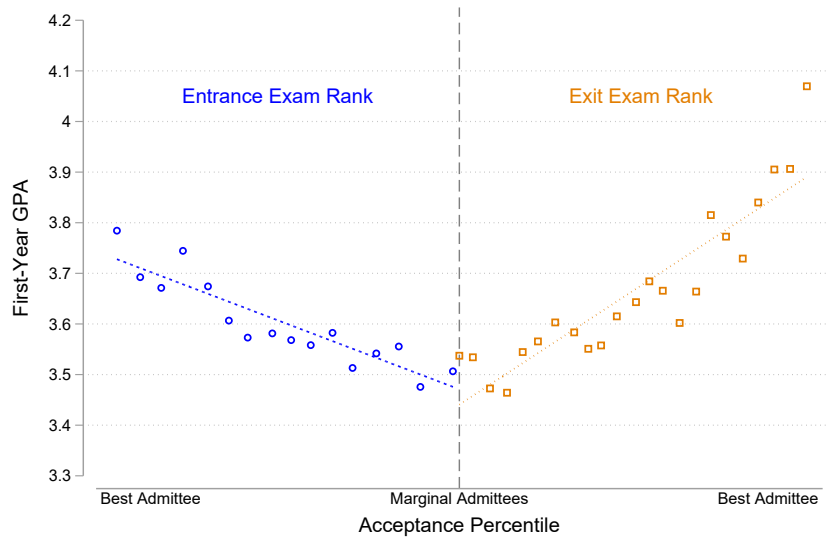
(b) ES: First-Year Study Credits

Figure 9: Difference-in-Difference Estimates on Admissions

Note: These figures show difference-in-difference estimates comparing admissions in programs that were more exposed to the admissions reform to those that were not. Panel (a) shows the change in students admitted by each admission criteria. Panels (b)-(f) show similar results by admittee's preference rank, age, Finnish high-school grade, parental education level and parental earnings decile.



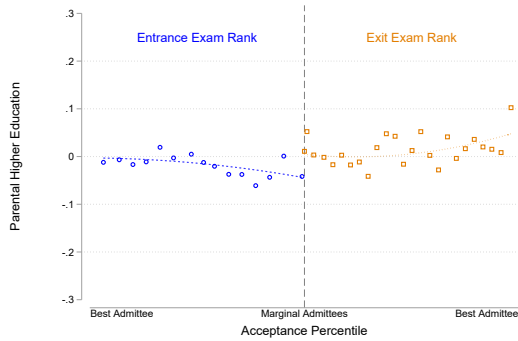
(a) Pre-Admission Exit Exam Grade



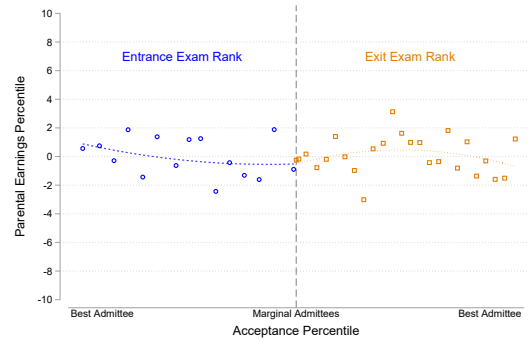
(b) Post-Admission First-Year GPA

Figure 10: Admittees by Acceptance Percentile and Selection Quota

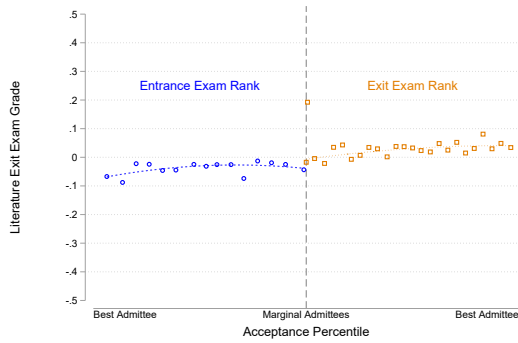
Note: This figure shows the average differences of admittees to education programs by their admission rank. Admittees are ranked by the quota through which they were admitted. Blue circles show admittees ranked by the entrance exam. Orange squares show admittees ranked by the high-school exit exam. Values closer to zero in absolute indicate being closer to the acceptance threshold. Jump at zero shows the difference in the marginal admittees. Panel (A) shows how the pre-admission academic performance differs by admission rank and by the admission quota. Panel (B) shows the differences in post-admission academic performance. Both criteria positively predict performance.



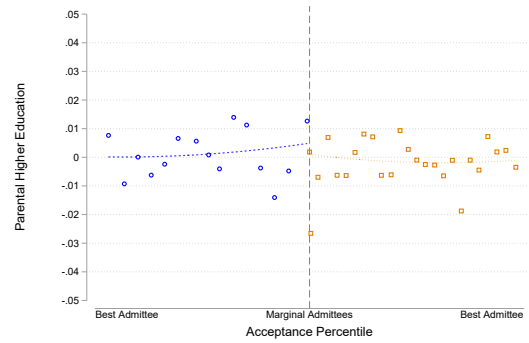
(a) Parental Education



(b) Parental Earnings



(c) Gender



(d) Foreign Born

Figure 11: Admittee Characteristics by Acceptance Percentile and Quota

Note: This figure shows the differences in admittee characteristics at the margin of admission. Panels (A) and (B) show the differences in parental earnings and education at age 15 and (C) and (D) show the shares of women and foreign born admittees.

Table 1: Descriptive Statistics and Pre-Reform Differences

	Applicants			Admittees		
	Mean	Difference	Observations	Mean	Difference	Observations
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Applications						
Exit Exam Quota	0.19	-1.01***	394,473	0.24	-0.99***	32,993
Entrance Exam Quota	0.42	0.32***	394,473	0.36	0.41***	32,993
Joint Quota	0.37	0.69***	394,473	0.37	0.61***	32,993
1st Rank	0.33	0.21***	412,705	0.61	0.19***	34,707
2nd Rank	0.24	0.05***	412,705	0.18	-0.02**	34,707
3rd Rank	0.18	-0.03***	412,705	0.10	-0.05***	34,707
4th Rank	0.12	-0.06***	412,705	0.06	-0.05***	34,707
5th Rank	0.08	-0.08***	412,705	0.04	-0.04***	34,707
6th Rank	0.04	-0.08***	412,705	0.02	-0.03***	34,707
Panel B: Socioeconomic characteristics						
Age	23.11	3.80***	412,705	22.86	3.42***	34,707
19-year-old	0.25	-0.24***	412,705	0.26	-0.34***	34,707
Women	0.61	0.58***	412,705	0.60	0.55***	34,707
Foreign Born	0.04	0.00**	412,400	0.03	-0.01*	34,696
Income Percentile	61.47	-10.48***	401,747	63.89	-6.25***	33,929
P0-P50	0.34	0.13***	401,747	0.31	0.06***	33,929
P50-P90	0.47	0.01*	401,747	0.48	0.05***	33,929
P90-P100	0.19	-0.14***	401,747	0.21	-0.11***	33,929
Primary Education	0.03	0.02***	409,095	0.02	0.02***	34,510
Secondary Education	0.21	0.12***	409,095	0.17	0.09***	34,510
Lower Tertiary	0.38	0.01***	409,095	0.37	0.02**	34,510
Higher Tertiary	0.38	-0.15***	409,095	0.44	-0.13***	34,510
Parent Holds Target Degree	0.02	0.01***	399,427	0.02	0.01***	33,983
Panel C: Academic Performance						
Literature Grade (High-School)	3.57	0.42***	351,493	3.98	0.24***	29,745
Advanced Math Grade (High-school)	3.53	-0.68***	169,417	4.07	-0.85***	18,115
Intermediate Math Grade (High-School)	3.34	-0.41***	150,027	3.74	-1.27***	10,126
English Grade (High-School)	3.57	-0.46***	362,591	3.96	-0.67***	31,410
First-Year GPA (College)	3.50	0.12***	106,666	3.52	0.18***	25,134
First-Year Study Credits (college)	47.64	14.04***	138,491	47.70	16.94***	32,909

Note: This table shows descriptives of college applicants (Column 1) and admittees (Column 4) prior to the reform. Panel A shows the average admissions quotas and the average program ranks applicants submitted or the programs admittees were admitted. Panel B shows applicant and admittee socioeconomic characteristics. Panel C describes academic performance in four main subjects (literature, math and english language) prior to applying to college and the first year performance after admission (gpa and course credits). The unit of observation for applicants is all program-applicant combinations. the Robust standard errors in parentheses: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table 2: Difference-in-Difference Estimates on Academic Performance

	All		Women		Men	
	(1)	(2)	(3)	(4)	(5)	(6)
	GPA	Credits	GPA	Credits	GPA	Credits
Post X Exposure	0.038 (0.063)	-1.241 (1.281)	0.008 (0.071)	-1.064 (1.701)	0.129 (0.085)	-2.510 (1.817)
Mean	3.559	47.541	3.601	55.325	3.468	36.323
SD	0.683	26.092	0.642	19.487	0.758	30.026
N	36209	47550	24784	28070	11419	19478

Note: This table shows the difference-in-difference estimates on the academic performance of admittees in more vs less exposed programs. Columns(1) and (2) shows the estimates on first-year GPA and first-year study-credits respectively. Columns (3)-(6) show the same estimates separately by gender. Robust standard errors in parentheses: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table 3: Marginal Admittees' Gap in Academic Performance

	Pooled			Program FE		
	All (1)	Women (2)	Men (3)	All (4)	Women (5)	Men (6)
Exit vs Entrance Exam	0.030 [0.043]	0.053 [0.084]	0.014 [0.049]	0.072** [0.035]	0.081 [0.061]	0.057 [0.039]
<i>Mean</i>	3.526	3.445	3.565	3.526	3.445	3.565
<i>N</i>	3576	1171	2405	3575	1171	2404
<i>Bandwith</i>	0.32	0.32	0.32	0.32	0.32	0.32
<i>p</i>	1	1	1	1	1	1
Program FE	No	No	No	Yes	Yes	Yes

Note: This table shows the differences in academic performance of admittees via the high-school exit exam quota and entrance exam quotas. Columns(1)-(3) show pooled estimates and Columns(4)-(6) show estimates with program-fixed effects. Robust standard errors in parentheses: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table 4: The Effects of Reform on Applicant and Admittee Socioeconomic Characteristics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Women	Foreign Born	Percentile	Primary	Parents Middle	Higher	Same Degree
Panel A: Applications							
Post X Exposure	0.030*** (0.008)	-0.002 (0.003)	-0.382 (0.378)	-0.000 (0.002)	-0.007 (0.004)	0.007 (0.005)	-0.007*** (0.003)
Mean	0.612	0.039	61.545	0.029	0.206	0.766	0.020
SD	0.487	0.194	28.474	0.166	0.404	0.424	0.140
Panel B: Admissions							
Post X Exposure	0.015 (0.012)	0.008* (0.005)	-1.310 (0.892)	0.003 (0.004)	-0.026** (0.013)	0.023* (0.014)	-0.000 (0.004)
Mean	0.596	0.030	64.010	0.020	0.170	0.809	0.022
SD	0.491	0.170	27.699	0.141	0.376	0.393	0.148

Note: This table shows the difference-in-difference estimates comparing the characteristics of applicants (Panel A) and admittees (Panel B) in less to more exposed programs. Column (1) shows the estimates on gender composition, Column (2) on immigrant background and Columns (3) to (7) measures of parental socioeconomic background, including parental earnings percentile at age 15 of the applicant/admittee and highest education of parents. Robust standard errors in parentheses: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Appendix

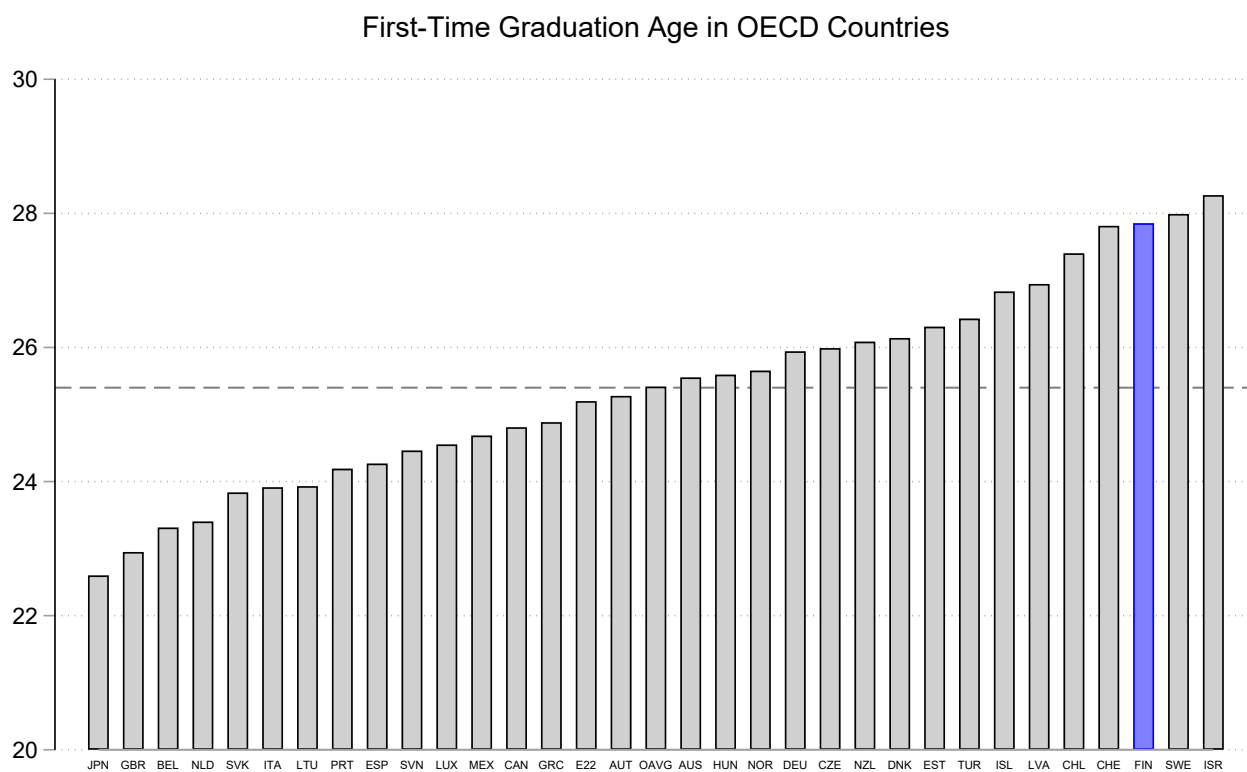
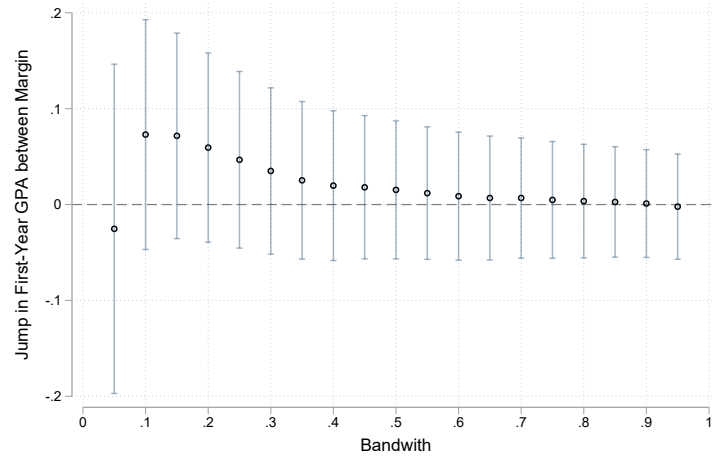
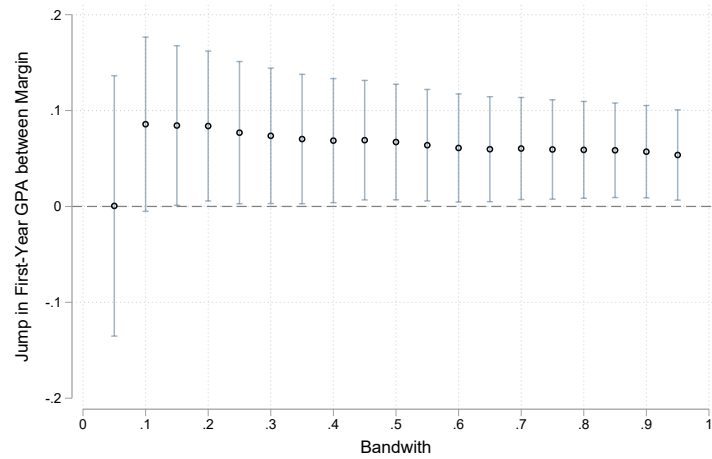


Figure A1: Finland's Graduates Among the Oldest in OECD Countries
Source: OECD Education at a Glance database.



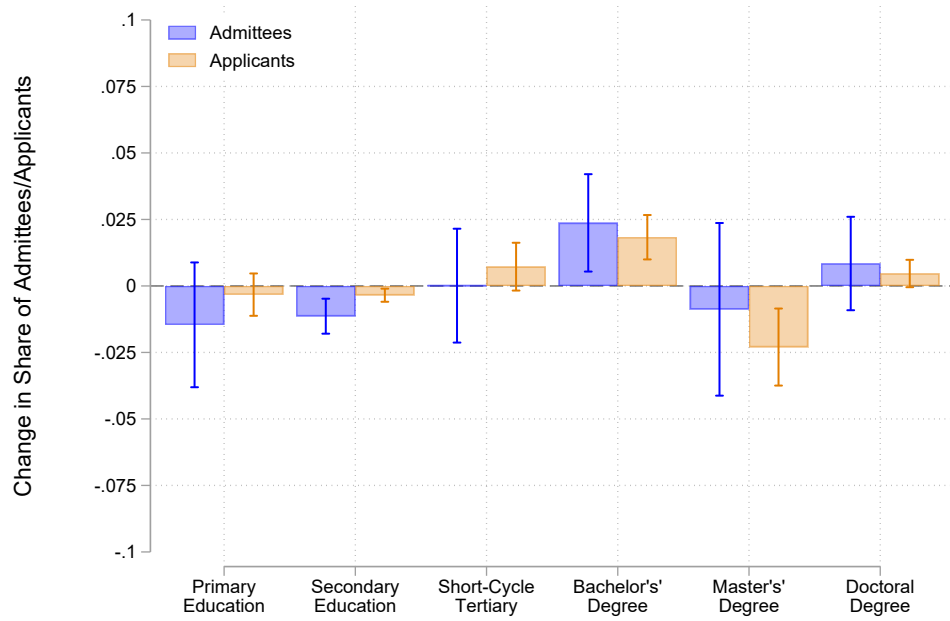
(a) Pooled Estimates



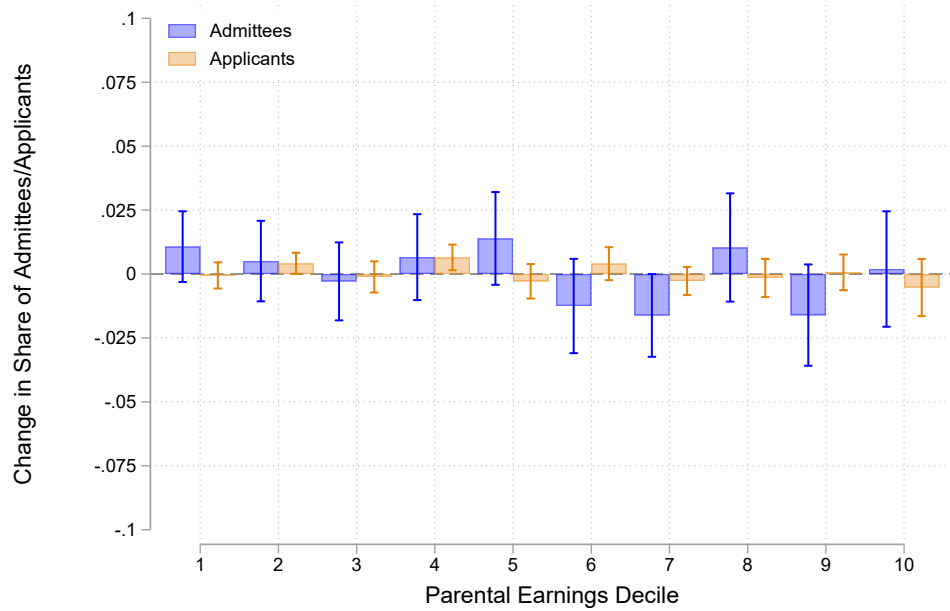
(b) Program FE Estimates

Figure A2: Estimates on First-Year GPA Gap by Bandwidth Choice

Note: This figure shows the difference between marginal admittees first-year academic performance for different choices of the bandwidth.



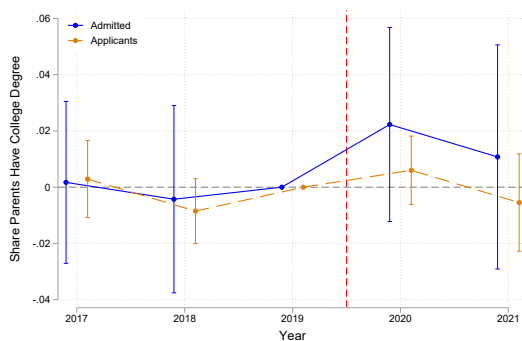
(a) Parental Education



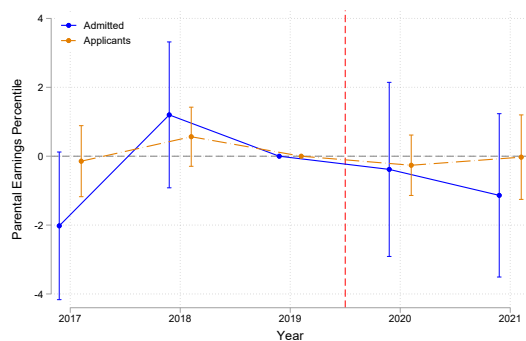
(b) Parental Income Decile

Figure A3: Difference-in-Difference Estimates on Admissions

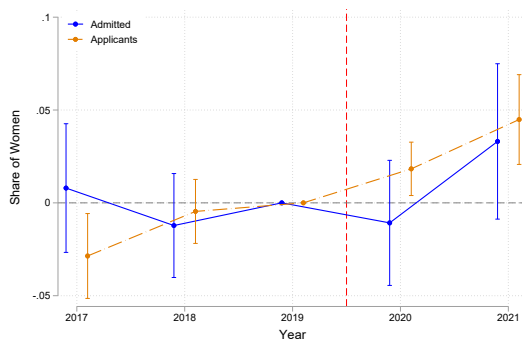
Note: These figures show difference-in-difference estimates comparing admissions in programs that were more exposed to the admissions reform to those that were not. Panel (a) shows the effects on parental education level and panel (b) parental earnings decile.



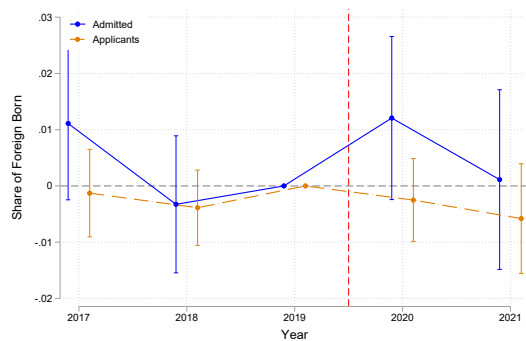
(a) $P(\text{Parent Has Higher Education})$



(b) Parental Earnings



(c) Women



(d) Foreign Born

Figure A4: Event-Study: Applicant and Admittee Characteristics

Note: This figure shows the event-study estimates on the applicant and admittee characteristics using variation across programs in the mandated change in admissions criteria. Panels (A) and (B) shows the estimates on parental education and earnings as measured when the applicant was fifteen years old. Panels (C) and (D) shows the shares of women and foreign born applicants.