College Admissions and Universities' Preferences for Students

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Abstract

We study the role of university discretion over college admission requirements in determining academic achievement and access to higher education. We exploit a reform that expanded the set of admission requirements – information used to select students – used in the Chilean centralized admission system. Universities can use admission requirements to increase or decrease the share of admitted low-SES students by up to 5%, with significant variation across different institutions. Students' application patterns respond marginally to changes in admission requirements. Using prediction exercises and comparisons pre- and post-policy introduction, we find evidence of a trade-off between increased access for underrepresented groups, and academic achievement. Students marginally admitted under the policy are significantly less likely to persist in the degree up to 3 years after admission.

1 Introduction

Colleges are engines of social mobility, yet access to higher education is often unequal and segregated (Chetty et al. 2020). The role of university admissions in creating this inequality has motivated an array of policies that directly affect its mechanisms, either through the use of quotas and separate admission procedures (Bleemer 2021; Otero, Barahona, and Dobbin 2021), or by intervening the set of tools colleges can use to select students, such as banning the use of standardized test (Borghesan 2023).

A priori, intervening admission requirements allows policymakers to shape the composition of the applicant pool. However, limiting universities' discretion over admissions introduces a trade-off. Admission systems that grant universities more discretion in selecting students may allow them to better match students to their programs. However, discretion may also lead to unintended consequences, such as increased segregation or reduced access for disadvantaged students, if universities' preferences for their student body do not coincide with the policymakers'.

In this paper, we study the role of universities' discretion over admission criteria in determining college access and outcomes. Using data from the centralized assignment mechanism in Chile, we document substantial heterogeneity across colleges in the weight assigned to different admission requirements. We leverage a policy reform in 2014 that introduced discretion over a new admission criterion – a "contextual" GPA score, or GPA+. This additional score was designed to increase access to higher education for high-achieving students from low socio-economic status (SES) backgrounds.

We exploit the structure of the Chilean admission system to study how discretion over admission requirement weights affects college admissions. The Deferred Admission (DA) algorithm allows us to simulate and explore counterfactual admission results from universities' changing the determinants of admission priority. We show that universities' choices over the weights of admission requirements meaningfully affect their admissions and the diversity of their student pool. Using different weights enables universities to change on average 11% of their admitted students and increase or decrease the share of low-SES students by 5%. We also find evidence of some strategic application responses of students – despite truth-telling constituting a dominant strategy in the DA –who increase their applications to colleges where they are more likely to gain admission by up to 5%.

Choices over the weight of different admission requirements may reflect two forces. On the one hand, colleges may have preferences over certain types (demographics) of students. On the other hand, institutions may have private information about the determinants of their students' academic success. Therefore, colleges may use the available selection tools to select students based on their type or to screen applicants most likely to succeed. In the second part of the paper, we use data on college persistence, along with the GPA+ policy variation, to examine the observable determinants of college success and compare them with universities' choices over admission requirements.

Our takeaways are four. First, persistence varies with observable characteristics of students: high-SES and female students are up to 10 pp. more likely to persist to a degree than their low-SES male counterparts. Second, college persistence is generally hard to predict based on observable characteristics. Our Random Forest model cannot jointly reach a high accuracy, precision, and recall rate for any outcome variable. Third, universities face heterogeneous trade-offs in the share of low-SES students they admit and their persistence within a degree. For most of them, the correlation between both is negative. The trade-off is quantitatively minimal, with most universities being unable to affect the average predicted persistence by more than 2%. Fourth, students "pulled in" by the GPA+ policy persist significantly less than those "pushed out, suggesting the trade-off is important at the margin but small relative to the entirety of the admitted student body.

Taken as a whole, we derive three conclusions from our exercises. First, we provide evidence of the importance of discretion over admission requirements and the trade-offs associated with it. The choices of universities reveal "preferences", or heterogeneous willingness to prioritize admission for certain groups of students based on observables (demographic characteristics) or unobservables (persistence within the degree). Second, these results are important for analyzing the problem of a planner who cares about increasing access and diversity in higher education and the academic achievement of students within each degree and university. Our results suggest that allowing for discretion in Chile *reduced* the impact on the access dimension while modestly affecting academic achievement. Finally, the quantitatively small results reinforce the idea that the GPA+ policy may have been limited in its potential to have broader impacts on universities' compositions.

The rest of the paper proceeds as follows. The remainder of this section discusses related literature and the paper's contributions to it. Section 2 introduces the context and the data. Section 3 studies the role of university discretion over admission requirements and its impacts on the demographic composition of the student body and students' applications. Section 4 discusses our measure of student performance – persistence or re-enrollment in the degree – and studies the effects the GPA+ policy had on it at the university level. Section 5 concludes.

Related literature Our paper contributes to several strands of the literature. Our results highlight a policy trade-off in the design of diversity and inclusion policies. The data and setting also allow us to speak closely and convincingly to the "quality-fit" trade-off (Arcidiacono and Lovenheim 2016), given that we observe all the instruments colleges can use in order to select students. We add to this literature by studying the role of discretion over new admission tools and how it affects this trade-off. In particular, when universities have discretion over admission requirements designed to increase diversity, they can use this discretion to affect the policy's effectiveness significantly. Therefore, the universities' discretion may be used to express preferences for certain types of students (Arcidiacono, Kinsler, and Ransom 2022). However, if universities have private information about the skills required to succeed at their institution, discretion over their admissions can also allow for better selection of high-performing students into degrees. The transparency of admission mechanisms in our setting allows us to observe universities' potential choices and assess the relative importance of each of these channels.

We find weak evidence of a trade-off between increased access to higher education and academic performance. This result stands in contrast to recent literature studying higher education diversity policies, which has shown that policies can promote equity without sacrificing efficiency (e.g. Bleemer 2021). Our results on the GPA+ reform in Chile are more mixed in this dimension since the students admitted under the policy ("pulled-in") show a reduction in academic performance relative to those who were "pushed-out". We discuss potential reasons for this result, including the role of universities in endogenously determining student persistence and the limited set of tools used to determine admissions in the Chilean context.

We contribute to a broader literature documenting and studying centralized admission systems in educational contexts. The adoption of these mechanisms has increased in recent years (Neilson 2019). However, their concrete implementation – regarding discretion or available information to agents (Kapor, Neilson, and Zimmerman 2020) – differs across countries and settings. We highlight the role of discretion over admission weights in shaping admission and college outcomes, contributing to the analysis of how a planner may decide to allow (or not) this agency.

This paper also speaks to a vast literature on the consequences of diversity and inclusion-enhancing policies such as affirmative action or top-percent policies (Black, Denning, and Rothstein 2022; Otero, Barahona, and Dobbin 2021). These policies may induce supply responses (Kapor 2020), which are usually hard to observe and disentangle. We use an exogenous policy shock in a transparent, centralized setting to show the heterogeneous response of colleges.

We also add to several papers studying the effect of the GPA+ policy in Chile. Larroucau, Ríos, and Mizala (2015) document winners and losers from the policy, concluding it benefitted primarily female students from less affluent high schools. Reyes (2022) shows that the GPA+ policy generally increased the share of low-SES students admitted into selective degrees, with positive effects on academic performance and labor market outcomes. The effects are almost offset one-to-one by symmetric adverse effects on high-SES students displaced by the policy. González and Johnson (2018) and Concha-Arriagada (2023) study strategic responses by students to the introduction of the policy. Concha-Arriagada (2023) shows that students respond to the policy by switching high schools, which reduces the increase in the number of low-SES students accepted into top colleges from 5% to 1%. Our emphasis is on the effect of the policy on universities, and in particular on the role of their responses by choosing the weight of different admission requirements. In line with the findings in Larroucau and Rios (2020) and Larroucau et al. (2024), we also document strategic application behavior by Chilean students.

Finally, our results also highlight the limits of specific policies in incentivizing diversity within higher education institutions. The literature has emphasized the importance of peer effects in determining students' and parents' preferences over colleges and schools (Allende 2021). Similarly, the inclusion effect of the GPA+ policy in the Chilean setting is also limited by application behavior. Given the structure of the Chilean admission system, we find that a majority of the heterogeneity in universities' diversity in terms of, e.g., socioeconomic status is dictated by students applying to different colleges. The choice of admission requirement has a relatively minor effect on this outcome. Therefore, our paper further emphasizes the need for policies that address other sources of application behavior – financial constraints, mistakes (Larroucau and Rios 2020) – and reinforces the trade-off faced by a social planner with a preference for diverse student bodies.

2 Context & Data

The Chilean Higher Education Centralized Admission System Tertiary education in Chile is offered by close to 150 institutions, which can be broadly categorized into three types: (i) technical schooling centers that offer vocational programs, (ii) professional institutes that offer technical and professional degrees, and (iii) universities that award academic degrees (i.e., bachelor's, master's, and doctoral degrees). Admission requirements and processes vary across institutions. However, the most selective universities use a centralized admission system (CAS) where students submit a single application with a ranked order of preferences, and an algorithm simultaneously carries out assignments for all participating institutions. The remaining institutions not part of the CAS run independent, de-centralized admission processes.

In this paper, we focus on the CAS, which allows us to study how universities express preferences for students. In 2012, 33 institutions participated in the system, offering a combined total of about 1,200 *programs* or *degrees*: unique combinations of institution, campus, and major. In order to participate in the CAS, institutions must agree to a set of rules and regulations, which include publishing their admission requirements and the number of seats available for each program.

Admission to all programs in the CAS is governed by a set of admission requirements, which are used to evaluate each student's application. At the coarsest level, these requirements can be divided into exa and high school requirements. Exam requirements are determined by the student's performance on the national college entry exam, a set of four standardized subject tests that all students must take to apply to programs in the CAS. Between 2003 and 2020, the national entry exam in Chile was the *Prueba de Selección Universitaria* (PSU henceforth), which consisted of four standardized subject tests: Mathematics, Language, Natural Sciences, and Social Sciences. Each exam was a multiple-choice test whose score ranges from 150 to 850 and was standardized so that the sample distribution of scores in each year approximated a normal distribution with a mean of 500 points and a standard deviation of 110 points. The PSU was offered once a year, usually in December, and students received their scores in January of the following year.

High school requirements are based on the student's secondary education performance (i.e., typically between ages 14 and 18), and until 2012, the only school requirement was the student's high school grade point average (GPA). The high school GPA is transformed into a score that is standardized to be on the same scale as the entry exams. All students that wish to apply to a program in the CAS must have graduated from high school with a minimum GPA and must have taken the college entry exam either during the current or the previous admission process.[1]

Every year, each program that participates in the CAS reports to the system their choice on the number of available seats for that program and the weights for each of the admission requirements considered in their admission process, as well as any other minimum requirements.[2] Admission requirement weights are used to compute each student's *application score* for that program, which is simply the weighted average of each student's admission requirement scores. Each program's effective list of applicants is determined by first filtering out all students who do not meet the program's minimum requirements, and then ranking the remaining students by their application scores. Students are admitted to the program in descending order of their scores until all available seats are filled.

[1]For instance, a student graduating from high school in 2012 can take the entry exam towards the end of 2012 to be considered in the 2013 admission process. However, the same student could also use their 2013 admission process scores to apply to programs in the 2014 cycle.

[2]For example, a program may require a minimum application score or minimum scores in specific tests.

Students apply to programs in the CAS by submitting a ranked list of preferences, and the system assigns students to programs using a variation of the deferred acceptance (DA) algorithm in Gale and Shapley (1962); the exact implementation details for the Chilean context are discussed in Rios et al. (2021). After running the algorithm, students are assigned to their preferred program that has not yet filled all available vacancies. Therefore, programs' preferences for students are expressed by their choice of admission requirement weights, which induce the application score by which students are ranked and ultimately assigned to programs.

The main object of study in this paper are the weights that programs assign to admission requirements, and how these interact with the assignment mechanism. Although programs have discretion over the weights they assign to each of the four tests in the entry exam, we focus exclusively on the aggregate weights assigned to the entry exam vis-a-vis the high school requirements. The weights assigned to each test mostly correlate with the program's coursework requirements (Kapor, Karnani, and Neilson 2024). For example, programs with more STEM coursework typically assign higher weights to the Mathematics and Natural Sciences tests, with relatively less weight on the Language and Social Sciences tests. In contrast, the choice of GPA weight and overall entry exam weight shows almost no correlation with the program's coursework, is much more stable within all degrees offered by each institution, and is strongly correlated with the socioeconomic composition of the student body, as we discuss below.

While programs have discretion over the weights they assign to each of these, there are constraints imposed by the *Consejo de Rectores de las Universidades Chilenas* (CRUCH henceforth), which is the governing body that oversees the CAS. The main restrictions are as follows

1. admission requirement weights must add up to 100 and be nonnegative multiples of 5,
2. high school GPA must have a weight ranging from 20 to 50, and
3. the entry exam must have a weight ranging of from 50 to 80.

The GPA+ policy In the second half of 2012, CRUCH announced adding a third admission requirement whose objective was to boost application scores for students with above-average performance in their high school. Following Reyes (2022), we refer to this new requirement as the GPA+ because its score is equal to or higher than the student's high school GPA, depending on the student's performance relative to their high school's historical distribution. In particular, students with a GPA above the average of their past three high school cohorts receive a GPA+ score that is, by construction, above their own high school GPA. The maximum GPA+ score is achieved if the student's own GPA is equal to the maximum GPA in their high school's three-year historical distribution. This design implies that in virtually all cases (i.e., high schools), there are more students with a top GPA+ score than a top GPA score. If the student is at or below the historical average, they receive a GPA+ score equal to their high school GPA. Figure 1 illustrates these scenarios, with an example of the boost that the GPA+ can represent for a hypothetical student.

The use of within-school GPA was motivated by the increasing socioeconomic segregation in tertiary education, even though admissions rely solely on high school GPA and standardized entry exam scores. The policy was also motivated by evidence of the within-school GPA being a good predictor of college persistence ("¿Quieres saber más sobre el puntaje ranking?" 2013). Since 2000, universities in the CAS have increasingly relied on entry exam scores to admit students. As Figure 3 shows, these scores are heavily correlated with students' socioeconomic status and, to a lesser extent, with their sex. Therefore, the GPA+ was implemented to increase admission of low-SES, high-achieving students without explicitly considering the student's socioeconomic background as an admission criterion. By including admission requirement based on observable variables correlated with academic skills but less so with socioeconomic status or income, policymakers aimed to reduce the gap in access to higher education faced by these groups. The design of the GPA+ therefore resembles policies implemented in other contexts, with a prominent example being the use of class rank in the Texas Top 10% (Kapor 2020) or the Eligibility in the Local Context policy in California (Bleemer 2021). However, an important distinction of the GPA+ policy is that the Chilean centralized implementation allowed for the universities' discretion in the use of the policy [3]

The inclusion of the GPA+ requirement in the CAS was carried out in two stages with different constraints. For the 2013 admission cycles – students taking the entry examn in 2012 and starting college in 2013 –, this new component was included in the system as a mandatory requirement with a fixed weight of 10% of the total application score for all programs in the system. In 2014 and subsequent years, programs were allowed to choose the weight they assigned to the GPA+ requirement, up to a maximum of 40%, retaining a minimum weight of 10%. Therefore, the total weight assigned to GPA and GPA+ still had to add up to 50%, but programs were given discretion over how to distribute this weight between the two requirements. Figure 2 depicts the choice set for programs in the CAS after the introduction of the GPA+ requirement. Figure A.2 shows the weight choices for two equivalent programs in different institutions, highlighting the heterogeneity in program preferences. We explore this heterogeneity in more detail in the following section.

[3] Another distinction is that the GPA+ was designed to avoid classmate competition, by basing score thresholds on past cohorts' performances instead of a students' direct peers.

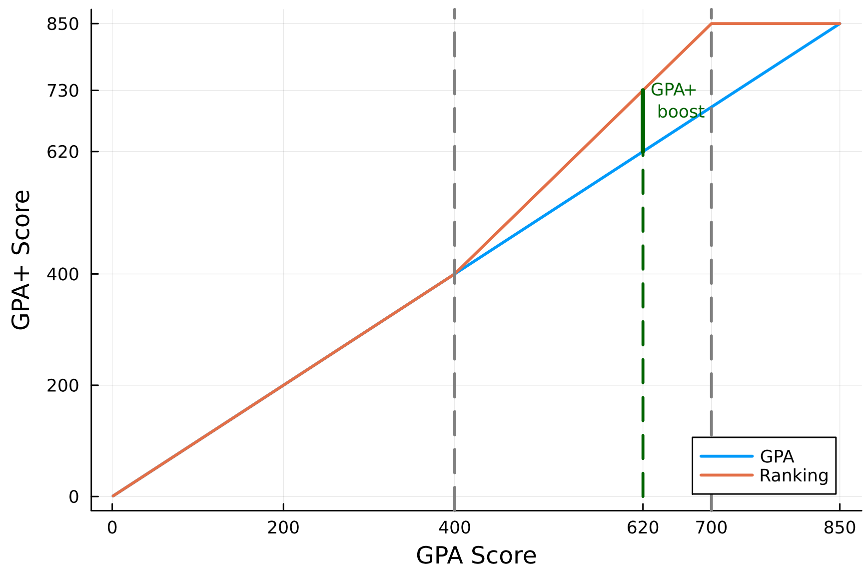


Figure 1: GPA+ score distribution for a hypothetical high school.

Note: In this example, the historical mean GPA score is 400, and the historical maximum GPA is 700 (dashed gray lines). A hypothetical student with a GPA score of 620 has a GPA+ score of 730, representing a 110 points (i.e. 1 standard deviation) "boost" in their score (green line).

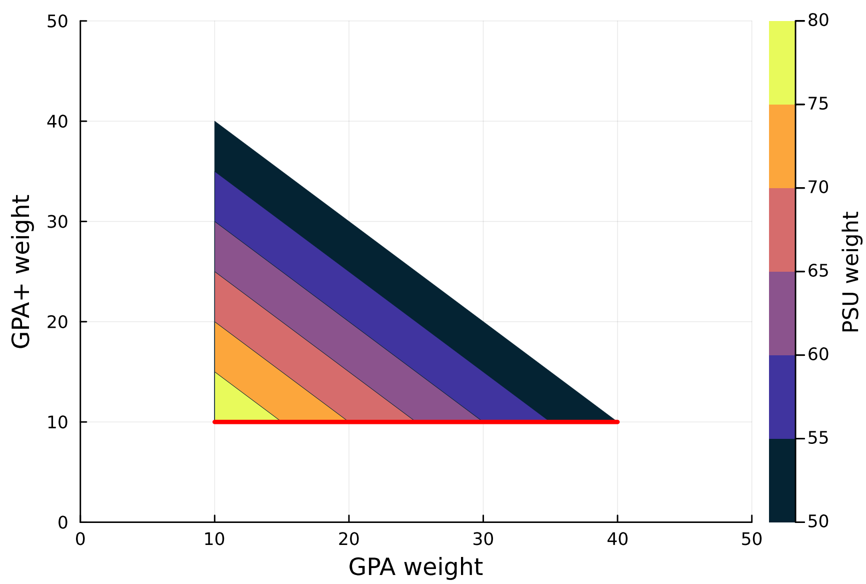
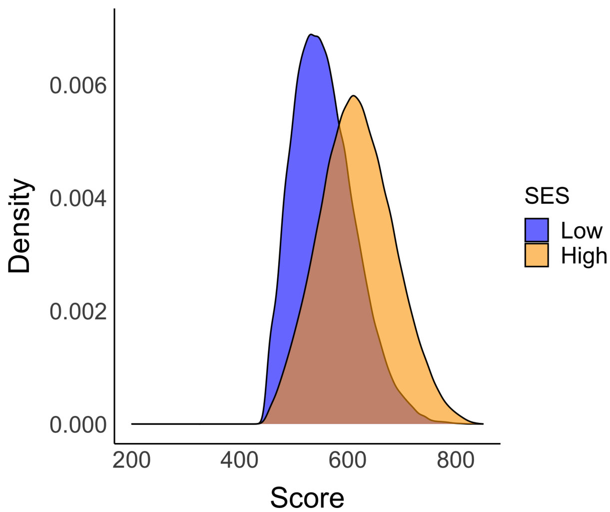
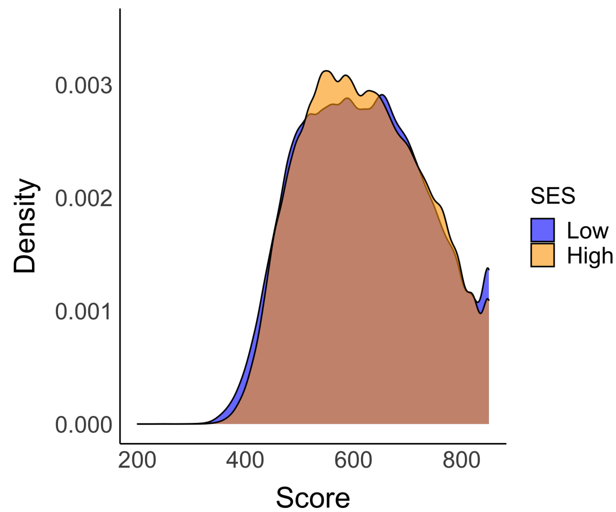


Figure 2: Programs' choice set for admission requirement weights after the "relative GPA" policy.

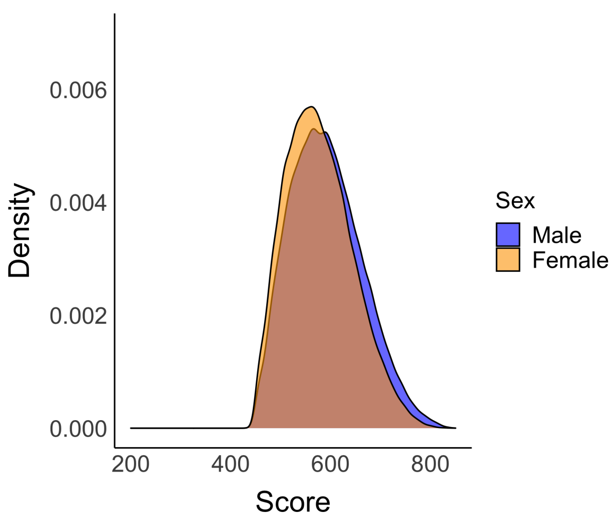
Note: The figure shows the weight choice set for programs in the CAS after the introduction of the GPA+ requirement in 2014. Programs can choose weights for GPA and GPA+ that are at least 10 each, and add up to 50. The weight assigned to the entry exam (PSU) must be so that the weights assigned to all requirements adds up to 100. This is represented by the fill color of the polygon (lighter is higher).



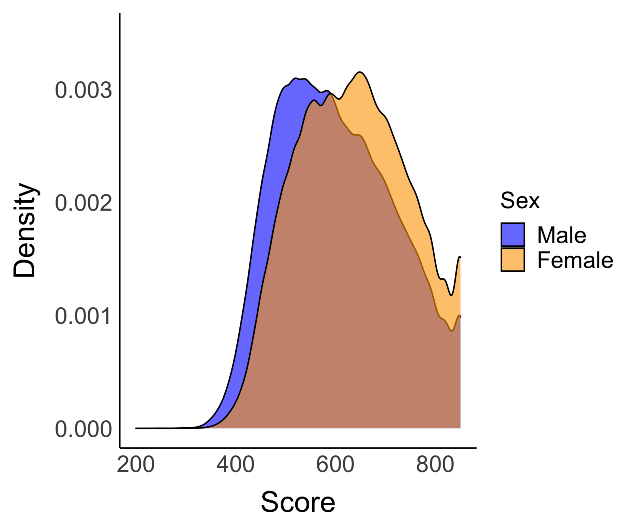
(a) ST scores – SES



(b) GPA+ scores – SES



(c) ST scores – Sex



(d) GPA+ scores – Sex

Figure 3: Distribution of admission requirements

Note: This figure shows the distribution of ST and GPA+ scores by student demographic characteristics. The two top panels show the distribution of ST and GPA+ scores by SES, while the two bottom panels show the distribution of ST and GPA+ scores by sex. Data is from the 2013 admission cycle.

Data Our analysis is based on administrative data from the Chilean CAS from 2012 to 2015. Data come from several sources we link at the student and program levels. For each year, the data encompasses all students registered for the standardized test (ST) and all programs participating in the system. Student-level data include basic demographic information, graduating high school information, and the scores of each of the admission requirements. We complement these with data from the CAS, which include students' rank-order list (ROL) of degrees and their admittance status to each one. Program-level data include the number of available seats, the weights assigned to each admission requirement, and other program information such as price, duration, and location. Finally, we add information on program enrollment for up to three years after admission.

Administrative student data come from DEMRE, the organization that oversees the ST in Chile. It consists of demographic and socioeconomic information of all students that take the ST (gender, date of birth, reported family income, and parents' education), as well as their admission requirement scores: GPA, GPA+, and the four subject tests. The data also include a unique identifier for the high school the student graduated from, which allows us to link it to data from Education Quality Measurement System (SIMCE). SIMCE is a battery of standardized tests that are administered to all students in Chile at the end of 4^{th}, 8^{th}, and 10^{th} grade and is used to evaluate the quality of education in the country. Additionally, it contains detailed information on the student's high school, including its location, type, and socioeconomic composition.

Our second data source is students' application information from the CAS itself. Students submit a ROL with all programs they wish to apply to, and the system assigns students to programs based on the DA algorithm. We observe each student's ROL along with the application status of the programs listed: accepted, waitlisted, or admitted to a preferred program, as well as various status codes for invalid applications. These data on student preferences and program assignments allow us to simulate alternative assignments under different admission requirement weight (ARW).

We also include in our analysis data on all institutions that participate in the CAS, which come from the Ministry of Education. Each institution offers several degrees. For each program, we observe basic information such as price, duration, location, and the number of available seats. Most importantly, we observe the weights each degree assigns to the admission requirements in the admission process. These data allow us to study the heterogeneity in program preferences and how these interact with the assignment mechanism.

Finally, we use data from the Ministry of Education on program enrollment for up to three years after admission. These data allow us to track students' academic progress after being admitted to a program and to study the relationship between student characteristics and program outcomes.

3 The role of university discretion

In this section, we show evidence of the role of university discretion over admission requirement weights in the Chilean setting. We begin by highlighting the heterogeneous responses across universities to introducing the "contextual GPA" policy in 2013. Universities vary substantially in the relative weight they set on standardized test scores, GPA, and GPA+. We then show the importance of these choices by simulating counterfactual admissions under the re-weighting of admission requirements. Several universities could significantly alter their student body composition as defined by socioeconomic status (SES), gender, and other demographic characteristics. We argue that these choices and possibilities reflect universities' preferences or beliefs about their applicant and admitted pool. Our counterfactual admissions rely on assuming that students' application behavior does not significantly respond to the changes in admission weights. We assess this assumption's adequacy and find evidence consistent with strategic behavior, which could exacerbate some of the effects we highlight.

The Chilean CAS has three key features that make it uniquely well suited to study the role of university discretion over admission requirements: (i) admission requirements is a small, fixed set; (ii) participating programs have discretion over the weights they assign to each requirement, and (iii) programs must disclose these weights. The US college admissions system is similar in that programs have discretion over the weights assigned to each admission requirement. However, the weights are not publicly disclosed (except for a few exceptions), and the requirements themselves are not fixed, making it difficult to make comparisons across programs. For example, Bleemer (2021) model California universities' preferences in a way that closely maps to UC Davis' 2002 "admissions protocol" (i.e., admission requirements and weights; see Figure A.1), but they do not directly observe these choices for other institutions. In contrast, the Spanish college admission system has a fixed set of admission requirements and weights: application scores for all programs [4] are computed by assigning 60% of the weight to high school GPA and 40% to the university entrance exam (Pérez, Sierra, and Costa 2015). The Chilean CAS allows programs to have discretion over the weights they assign to admission requirements, similar to the US, but the weights are publicly disclosed, and the requirements are fixed, as in Spain.

[4] There are exceptions to this generalization; see Pérez, Sierra, and Costa (2015) for details. The national entry exam in Spain is the *Evaluación para el Acceso a la Universidad* (EvAU). The college application score (*Calificación de Acceso a la Universidad*, or CAU) assigns a weight of 60% to the average GPA of the two last years of high school and 40% to the EvAU score.

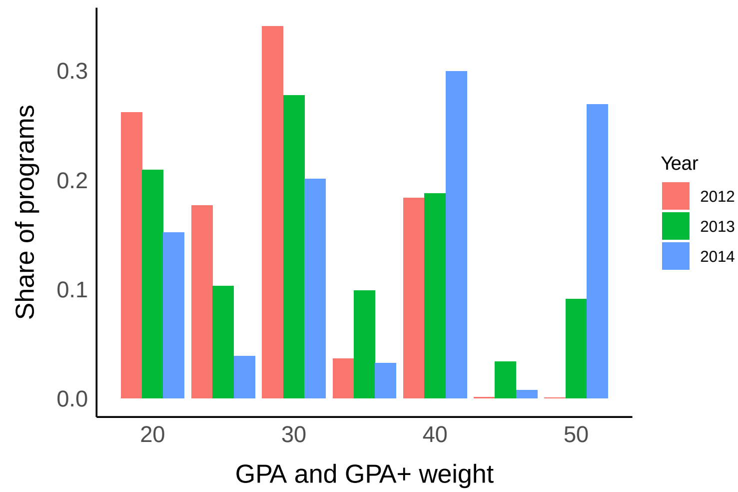
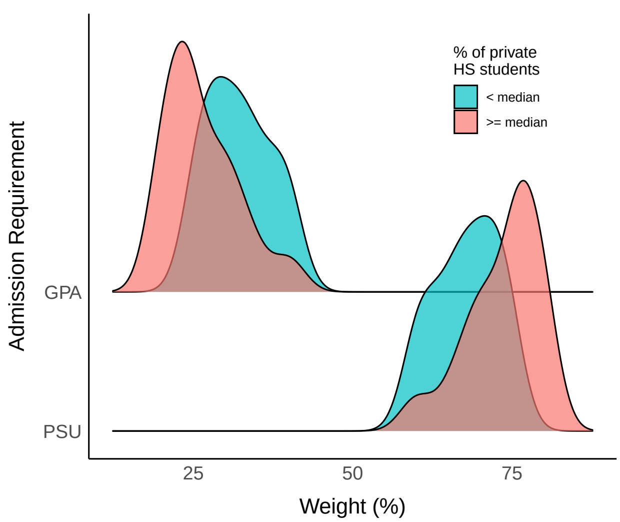
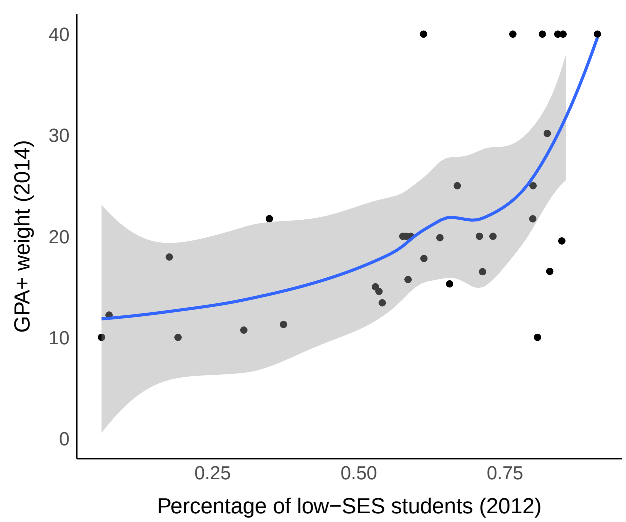


Figure 4: Histogram of GPA weights for programs in 2012.

Note: The histogram shows the GPA and GPA+ weights distribution for all programs in the CAS. Frequencies are normalized by vacancies. The share of programs is computed annually, with 1335 programs in 2012, 1395 in 2013, and 1419 in 2014. Note that because weights must add up to 100, the entry exam weights are implicitly determined by the GPA weights (e.g., a program with a GPA weight of 30% must have an entry exam weight of 70%).



(a) Heterogeneous admission requirement weights by percentage of student body from private high schools.



(b) GPA+ weights are positively correlated with the percentage of low-SES students.

Figure 5: Choice of admission requirement weights is correlated with the socioeconomic composition of the student body.

Note: These figures show the relationship between ARW and aggregate demographics at the university level. Panel (a) shows that universities admitting higher shares of students graduating from private high schools are more likely to choose smaller weights on the GPA measure in 2012. Panel (b) shows a similar correlation between the share of admitted low-SES students in 2012 and the universities' choice of GPA+ weight in 2014.

Choice of admission requirements weights We start by documenting substantial heterogeneity in the choice of ARW across programs. Figure 4 shows the annual share of programs that assign a given weight to the GPA and GPA+ (when available). In 2012, over 25% of programs chose a weight of 20 for the GPA, with 34% choosing a weight of 30 and 18% choosing a weight of 40. The distribution is left-skewed, with a negligible fraction of programs assigning the maximum possible weight. Nevertheless, the existing heterogeneity creates significant differences in application scores across programs, as we discuss later. In 2013 and 2014, we observe an overall shift towards higher weights for the GPA/GPA+.

Additionally, we find that programs' choice of ARWs seem to be strongly correlated with the socioeconomic composition of their student body (Figure 5). In particular, programs with a lower proportion of students from low-SES backgrounds tend to assign higher weights to the entry exam and lower weights to GPA and GPA+. For 2012, we find that programs with a higher proportion of students from private high schools tend to follow this trend, favoring the entry exam (Figure 5a). After the introduction of the contextual GPA policy, we find that in 2014, the weight assigned to this new admission requirement is positively correlated with the percentage of low-SES students that the program had in 2012 (Figure 5b). This pattern is robust to other proxies of income.[5]

The correlation between the choice of ARWs and the socioeconomic composition of the student body is not a claim about causality.However, it constitutes suggestive evidence consistent with the idea that universities can use ARWs to select students based on characteristics correlated with specific admission requirements. If low-SES students tend to have lower entry exam scores but higher GPA, then a program that assigns a higher weight to the entry exam will be less likely to admit low-SES students. However, the actual impact that discretion over ARWs has on the composition of admitted students also depends on the applicant pool that the program faces.

Impact of discretion Having established the heterogeneity of responses by different universities and programs, we now assess the relevance of this discretion on admissions. We leverage the microdata on the CAS to do this. We observe the ROLs of all applicants and the final allocation of students to programs. We also have data on all students' admission requirement scores, which are used to compute application scores for each program. Finally, we have information on all programs' ARWs and vacancies for each year between 2012 and 2016.

Admissions to each program are determined by the students' (i) application preferences (given by their ROLs) and (ii) admission requirement scores, which interact with the program's choice of both admission requirement weights and number of vacancies. For each program, we define the

[5] A particular example of this pattern can also be observed in Figure A.2, which shows the choice of weights for two equivalent majors in institutions with different student body compositions.

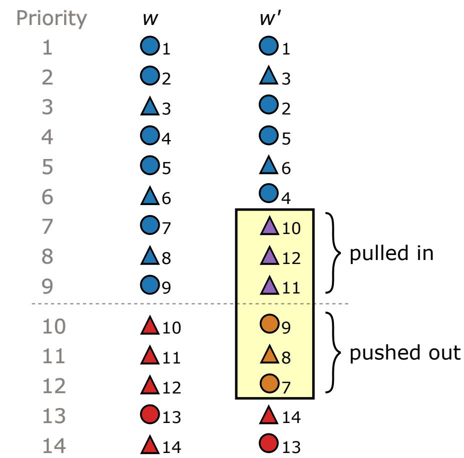


Figure 6: Simplified admission simulations diagram

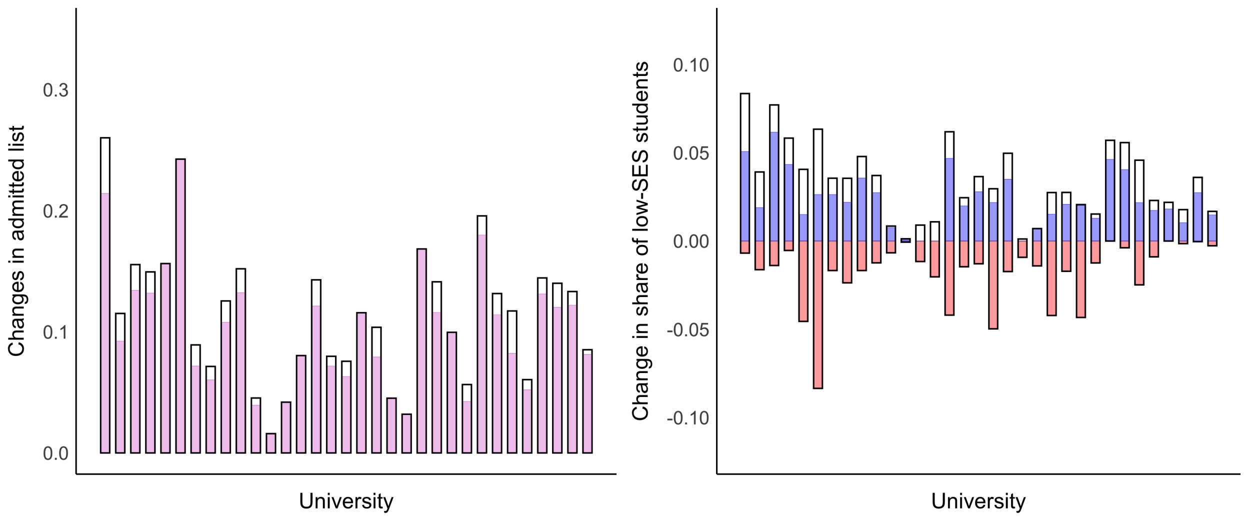
Note: This diagram exemplifies admissions for a program with nine vacancies. The program's choice of admission weights w sorts applicants, and determines admitted and waitlisted students. Holding the pool of 14 *realized* applicants fixed, choosing an alternative set of weights w' would "pull in" waitlisted students and "push out" admitted students relative to w. If admitted and waitlisted students differ in terms of observable characteristics such as gender or SES – here represented by the circle or triangle shapes – the demographic composition of the program is subject to change with the choice of weights.

notion of a *realized* applicant pool: this is the set of all students who listed the program in their ROL and were not admitted into any preferred alternative. Students in the realized applicant pool are sorted by their application scores, which are computed given a choice of admission requirement weights w. Applicants are then admitted or rejected, given the number of available vacancies. A simple example of this procedure is given in the column labeled w in Figure 6.

In order to assess the role of discretion for admissions to each degree, we consider how changes in ARWs affect the sorting of applicants and, therefore, the list of *admitted* students. Consider a set of weights $w' \neq w$, which induces a different ordering of the realized applicant pool.[6] This re-ordering can occur around the cutoff of admitted students, leading to "pulling in" students from the waitlist and "pushing out" previously admitted students. In other words, students rejected under w may be admitted under w', and vice versa. An example of such a situation is in the column labeled w' in Figure 6.

Given the motivation of the GPA+ policy, we are particularly interested in exploring how the choice of ARWs affects the demographic composition of admitted students across programs. For example, if certain groups – such as women or low-SES students – have relatively higher GPA+ scores, they may disproportionately benefit from requirement weight choices that prioritize these

[6]Unless all students in the realized applicant pool have the same scores in all admission requirements, w' will induce different application scores and almost always implies a different ordering of the realized applicant pool under w'.



(a) All changes in admissions

(b) Low-SES students

Figure 7: Admission possibilities in 2013

Note: This figure shows the potential effect of alternative choices of ARW on admissions in the extensive and intensive margins. Panel (a) shows the maximum share of students that a university can change by adjusting their choice of weights. Panel (b) shows the maximum effect these changes can have on the share of low-SES students admitted to the university. The white portion of the bars represents the effect of the GPA+ policy, which expands the choices available to universities.

over standardized tests. A set of weights w' that assigns a higher weight to GPA+ may pull in more students from these groups than it pushes out, effectively increasing their representation in the admitted pool. The hypothetical example in Figure 6 illustrates this point. However, in general, the effect of the choice of weights on the composition of admitted students will differ across programs since each degree faces a heterogeneous pool of applicants.

We simulate admissions by varying ARWs for all programs in the data between 2013 and 2016. In order to account for heterogeneous ST weightings of programs with distinct coursework requirements [7], we consider exclusively variations in the weight assigned to the GPA and GPA+ components (from 2014 onward) while keeping the relative weight of each ST test constant.[8] We also summarize the results by university, based on two observations. First, and as outlined above, decisions on GPA/GPA+ vs. ST weights are made mainly at the university level, which provides a natural benchmark and aggregation level. Second, this allows us to abstract from small sample issues since most programs admit less than 100 students.

Different choices of ARW can significantly affect the pool of admitted students in most

[7]See Figure 2.

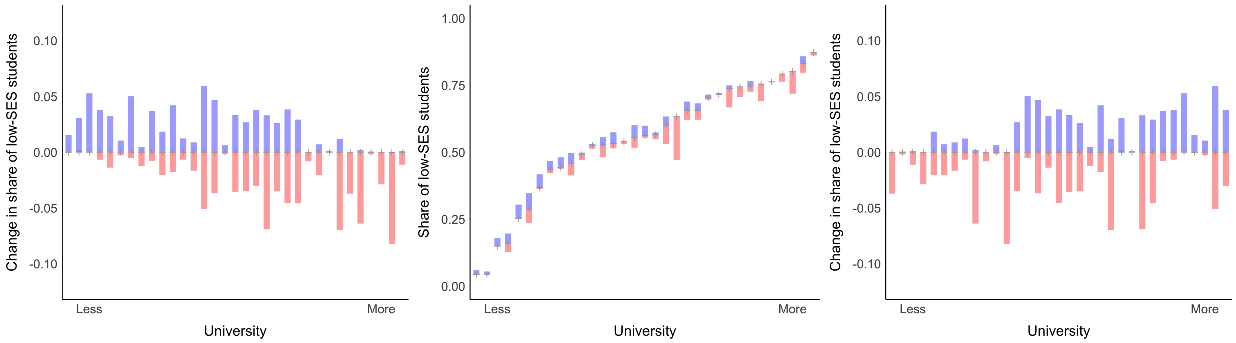
[8]For example, suppose a degree's original requirement weights were 10% on GPA+, 30% on GPA, 20% on each of the Math, Verbal, and Science ST. When simulating admissions with 10% on GPA+ and 15% on GPA, we keep the relative weight of Math, Verbal, and Science ST constant by setting them to 15%.

universities, both in terms of the percentage of different admitted students relative to the original weights and in terms of the characteristics of these students. Figure 7 highlights the potential for weight choices to affect admissions in 2013. The bars in panel (a) show the maximum share of admittance a university can change by adjusting its choice of weights. The average is 11%, with significant heterogeneity across institutions. Panel (b) shows the maximum effect these changes can have on the share of low-SES students admitted to the university. The figures also highlight the effect of discretion over the GPA+ score: the policy expands the choices available to universities, particularly allowing them to admit more low-SES students. The white portion of the bars in both panels reflects the expanded possibilities.

The results summarized in Figure 7 also highlight how the extent to which universities can exercise discretion over their admissions is limited by the composition of their applicant pool. In panel (a), 15% of universities cannot change more than 5% of their admitted students. This effect is due to the homogeneity of the realized applicant pool in terms of admission requirement scores. If all applicants have similar scores across all admission requirements, then the choice of weights will not significantly affect the ordering of the realized applicant pool. Additionally, even if universities can significantly change the share of admittance, they may not be able to significantly affect the share of a given group of students. In panel (b), some universities cannot change the share of low-SES students. The most direct explanation is that, as explained in panel (a), those universities already have a limited ability to change the number of admitted students. However, it is also possible that universities face a pool of applicants that is relatively homogenous in terms of SES, so re-sorting students according to their admission cutoff will not have a significant effect on this dimension.

We note that universities have a range of possibilities regarding the admission of students from a demographic group. Their choice of ARWs positions them at a particular point in this space. In the simulation results in Figure 7, we note that universities choose a particular share of low-SES students given their applicant pool. We observe that an important fraction of them seem to have positioned themselves in a way that either maximizes or minimizes the share of low-SES students they admit, with little or no room to increase or decrease their share.

The idea is further reinforced when universites can actually exercise discretion over the GPA+ ARW. Figure 8 shows the possibilities for universities in 2014, after the introduction of the GPA+ policy, and how they relate to university characteristics. In panel (a), we show that these are – as expected – linked to choices on how much weight to allocate to the GPA/GPA+ requirements. Universities that choose lower weights can mainly increase their share of low-SES students, while those who choose more can mainly lower it. The weight decision is the most relevant factor:



(a) By GPA/GPA+ weight (b) By share of low-SES students (c) By selectivity

Figure 8: Admission possibilities in 2014

Note: This figure shows the potential effect of alternative choices of ARW on the share of low-SES students that are admitted in 2014, when universities can exercise discretion over the GPA+ requirement. Bars indicate the range of low-SES students that each university can change by adjusting their choice of weights. Each panel sorts universities by a different characteristic: (a) the GPA/GPA+ weight, (b) the share of low-SES students, and (c) the selectivity of the university.

panels (b) and (c) highlight that across other orderings of universities – such as their share of low-SES students and their selectivity – there is room for both increases and decreases. There is also substantial heterogeneity in the possibilities available to each university. In panel (b), for instance, we see that universities with a low share of low-SES students have little to no room to increase it.

Application responses So far, the simulations conducted abstract from two key potential mechanisms. First, they ignore potential "spillover" effects from other majors and universities through the Deferred Admission procedure. Intuitively, if a particular degree (university and major) changes its admission requirements, it will affect the admission outcomes for other degrees. Previously admitted students are waitlisted and may displace applicants at their next preference. In contrast, previously waitlisted students are admitted and free up vacancies for other students at their previous admission outcome.

Our simulations represent a reasonable benchmark for universities for two reasons. First, this "partial equilibrium" simulation holds all other universities' actions fixed and is therefore akin to an individual (best) response in a Nash Equilibrium. Second, this exercise is based on information and calculations that a university could feasibly conduct on its own just by observing the (publicly available) list of admitted and waitlisted students. We think it is reasonable to assume a degree of "limited" rationality by universities when deciding on their admission requirements.

Second, our simulations assume away any responses in application behavior following a change in the admission requirements. This assumption is common in DA settings, given that truthful revelation is dominant (Gale and Shapley 1962). Nevertheless, a vast literature – including work on Chile, see Larroucau and Rios (2020), and Larroucau et al. (2024) – has shown the prevalence of strategic behavior (and "mistakes") in DA educational settings. (elaborate on why we think people may be responding) Intuitively, suppose applicants behave and apply strategically given their expected probabilities of being accepted – as suggested in Larroucau and Rios (2020). In that case, students will respond to admission requirement changes by targeting universities where these changes benefit them. Those with higher GPAs and rank scores will target universities and degrees, increasing their weight in these requirements. On the contrary, those students with relatively better performance in standardized tests will increasingly apply to degrees that prioritize these tests in allocating admissions.

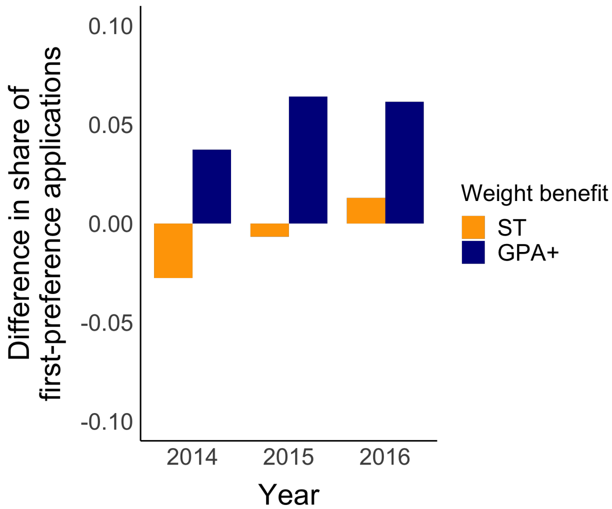
To assess this mechanism, in Figure 9, we show how applications respond to the implementation of the policy using across-year variation starting in 2013. In particular, we focus on the share of students who apply to degrees that substantially increase their weight on rank or GPA requirements. We consider both the probability of applying in first preference, as well as the probability of listing a degree as one of the first four preferences of the ROL.[9] To distinguish potential strategic responses, we categorize students into two groups ("GPA+" and "ST", Standardized Tests) according to their relative advantages from different admission requirements.

The figure shows the changes in applicants' shares in the three years following the reform. We focus on applications to "high-GPA+ degrees": those that, in 2014, increase the weight assigned to either GPA or GPA+ scores. The data suggest small responses indicative of strategic behavior: students shift their applications towards degrees where they are more likely to be admitted. The share of GPA+-benefitting students applying to high-GPA+ degrees as their first preference increases by up to 5%, and the share of those applying to at least one high-GPA+ degree by up to 2.5%. On the contrary, the share of ST-benefitting students applying to these degrees decreases by similar magnitudes.

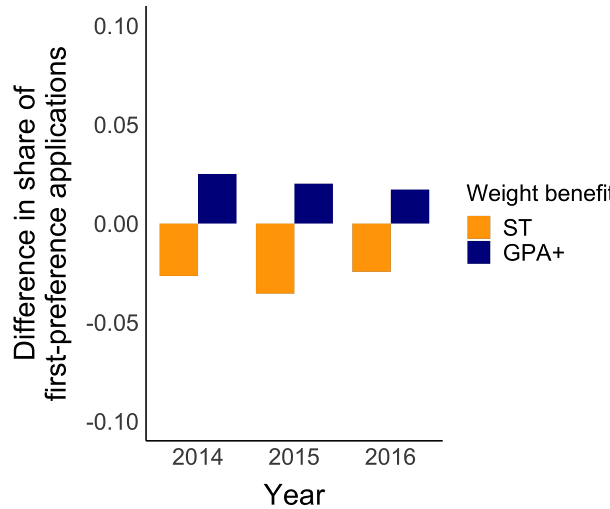
Both outcomes – first and top four preferences – are limited in their ability to capture more nuanced effects of applications. The policy may induce applicants to shift which degrees are listed and their relative ordering. In order to jointly capture these mechanisms, we estimate "application utilities" for degrees using an exploded logit. We separately recover fixed-effect parameters for every program, for GPA+ and ST students, for each year between 2013 and 2016 and compare the evolution of these "utilities" across time.[10] Figure 10 leads to essentially identical conclusions as

[9]This cutoff is motivated by the data and evidence on decreasing "seriousness" of applications at the lower preferences of the ROL. 93% of admitted students are selected into one of the first four listed degrees.

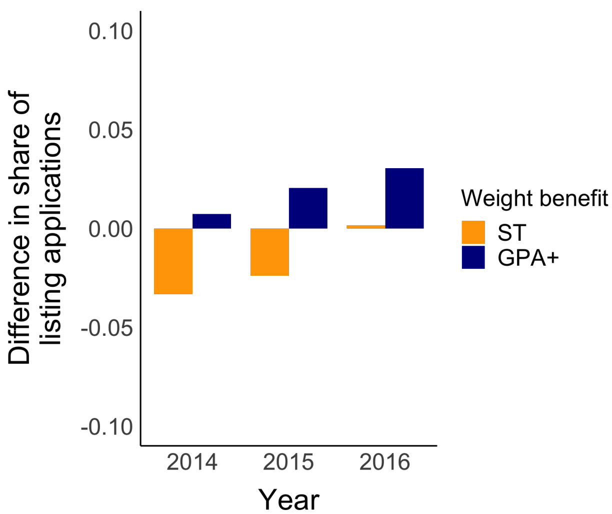
[10]Utilities recovered from an exploded logit are difficult to compare adequately. Interpreting some of the coefficients forces us to coerce the list of degrees to those available in all four years.



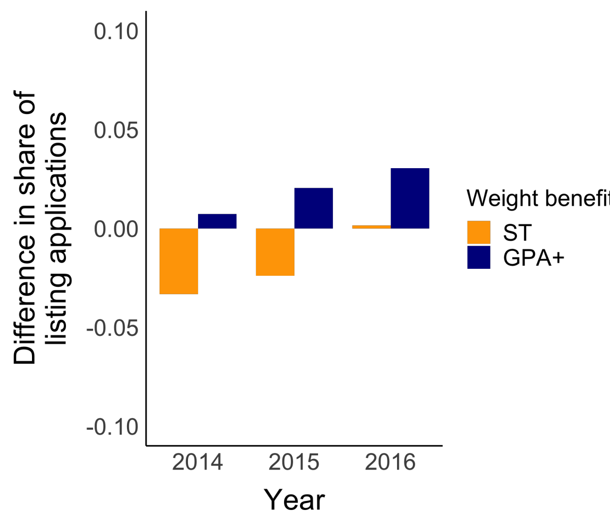
(a) High GPA/GPA+ degrees



(b) High GPA+ degrees



(c) High GPA/GPA+ degrees



(d) High GPA+ degrees

Figure 9: Applications to "high-GPA+ degrees"

Note: The figures show the response in application behavior to changes in admission requirement weights. The blue bars denote "GPA+"-benefitting students and the orange bars "Standardized Tests"-benefitting applicants. Figure (a) shows the differences – relative to 2013 – in the share of students listing a "high-GPA/GPA+" degree as their first preference. Figure (c) shows the difference in the share of students listing *at least* one "high-GPA/GPA+" degree among their top four preferences. Figures (b) and (d) show these changes, defining "high-GPA+'-degrees as substantially increasing only the GPA+ weight.

Figure 9. There is evidence of strategic responses in applications, with students whose probability of admission at high-rank GPA+ degrees showing a higher propensity to apply. "Application utilities" are more likely to increase, as is the model-computed probability of listing these in first preference.

Taking a stand, we find evidence of strategic responses to the introduction of the GPA+ policy. We do not consider these responses a threat to our results and design for two reasons. First, and as shown in Figure 7, the effect of discretion is of a similar magnitude in 2013 – before the introduction of discretion over the GPA+ policy – and in 2014, confirming the application behavior cannot be driving this result. Second, the strategic responses are likely to *exacerbate* the effect of admission requirement changes on the composition of students within a university. Indeed, in the data, those benefitting from the GPA+ score are predominantly low-SES students ($\sim 70\%$). Intuitively, upon a university increasing the weight on GPA and GPA+, it is more likely to admit lower-SES students both through the selection within the applicants as well as through the composition effect on the applicant pool.[11]

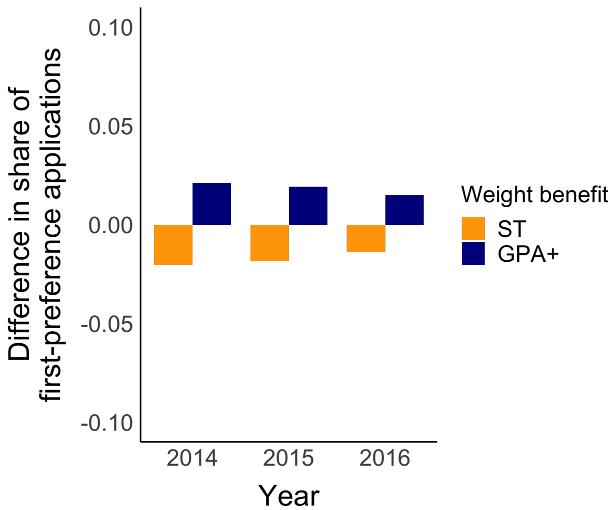
The results in this section also suggest the importance of universities' discretion in mediating the effects of the GPA+ policy. The heterogeneity in responses and weights assigned to the new admission tool could indicate a wide range of preferences for, for example, admitting more students from lower socio-economic backgrounds. However, universities may care about more than just student demographic characteristics. A primary concern for institutions may be an academic fit with students, reflected in strong academic performance. Their choices of ARWs may reflect the use of knowledge about the observables that best correlate with the skills determining academic performance at each institution and program. In the next section, we analyze the role of a specific performance measure – persistence within the degree – in shaping university responses.

4 Student performance

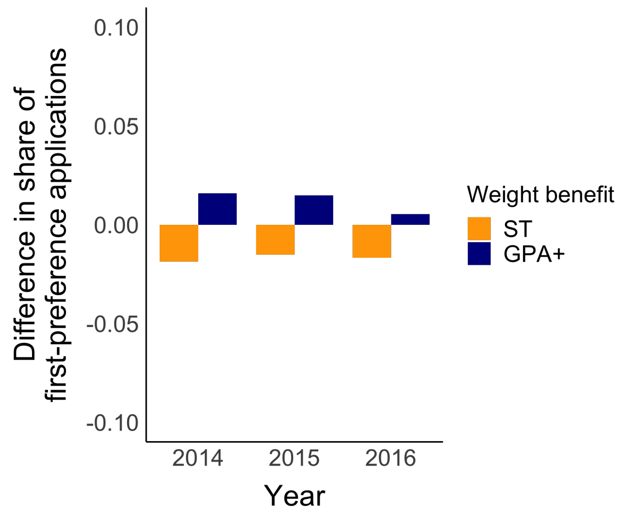
Our measures of student performance are university enrollment records from 2011 to 2021. For each student with a successful assignment in the CAS in year t, we define "persistence" at years 1, 2, and 3 based on whether we observe them in the degree that "accepted" them in the year $t+1$, $t+2$, and $t+3$ respectively.

This metric of persistence presents two challenges. First, it is a coarse representation of student performance: evidence from the Chilean context suggests that students are likely to switch degrees or universities for various reasons, such as learning about "match effects" (Larroucau and Rios

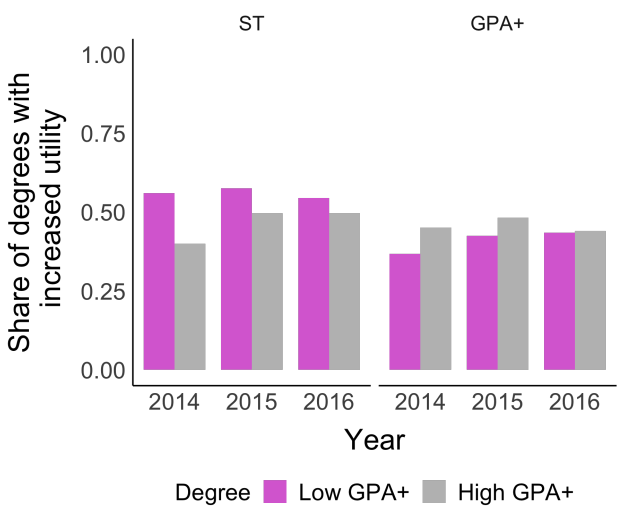
[11] We are also here abstracting from the potential peer-seeking effects.



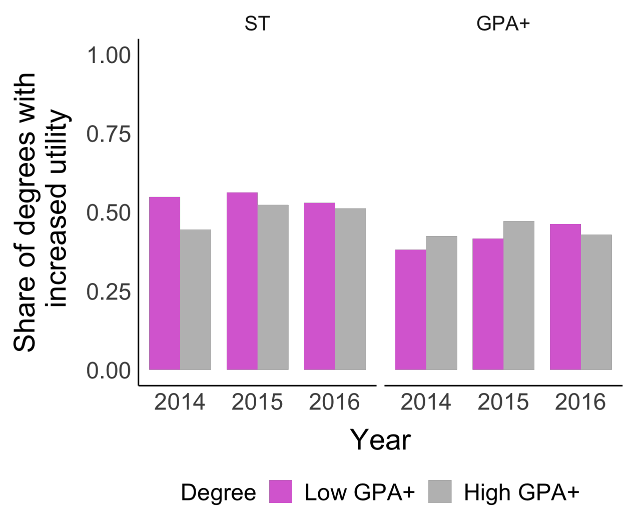
(a) High GPA/GPA+ degrees



(b) High GPA+ degrees



(c) High GPA/GPA+ degrees



(d) High GPA+ degrees

Figure 10: Applications to "high-GPA+ degrees" – Exploded Logit

Note: The figures show the response in application behavior to changes in admission requirement weights using an exploded logit model. In Figures (a) and (b), the blue bars denote "GPA+"-benefitting students, and the orange bars "Standardized Tests"-benefitting applicants. Figure (a) shows the differences – relative to 2013 – in the share of students listing a "high-GPA/GPA+" degree as their first preference. Figure (b) shows the difference in the share of students listing *at least* one "high-GPA/GPA+" degree among their top four preferences. In Figures (c) and (d), the pink bars denote "low-GPA/GPA+" degrees and the gray "high-GPA/GPA+" ones. The figures show the share of degrees of each type that increase their normalized utility relative to 2013 for both "ST" and "GPA+" students. Figure (c) shows at "high-GPA/GPA+" degrees, and Figure (d) shows "high-GPA+" degrees.

2024). We cannot differentiate students who drop out or switch due to academic performance issues from those who do so for other reasons, such as "match effects", which introduce noise into our estimates. Second, the pass-through from acceptance within the CAS to enrollment into a degree is imperfect, partly due to students withdrawing or choosing an outside option and due to frictions in the aftermarket (Kapor, Karnani, and Neilson 2024). This pattern raises the question of whether universities are likely to optimize persistence *conditional* on enrollment or to view enrollment as the first stage of student persistence within a degree. We think both objective functions are reasonable: on the one hand, enrollment can be supplemented by calling students from the waitlist and is therefore "remediable". On the other hand, the known frictions and additional costs of going through the waitlist may make optimizing enrollment valuable. To address this, we consider both definitions of persistence in our analysis.

We begin by assessing the potential relevance of persistence in determining universities' ARW choices. We show that this metric is negatively related to the admission quartile within the degree and that there are significant differences across students' demographic characteristics. We then conduct a prediction exercise. We use machine learning tools to predict students' persistence in degrees where we do not observe them. We use these predicted measures to look for evidence of an access-quality trade-off. Finally, we zone in on a particular group of students for whom we can observe persistence – those whom we can identify as having been "pulled in" or "pushed out" due to the GPA+ policy before and after its introduction – and look for further evidence of a trade-off among marginally admitted students.

Persistence across student types Figure 11 shows the 3-year persistence of students in the 2013 admission cohort by admission quartiles and type of students. Two patterns emerge. First, the probability of persistence – conditional or unconditional – is decreasing in the admission order, with differences of up to 20 pp. between the top and the lowest quartile. For reference, waitlisted but enrolled students are also shown in panels (b) and (d): their persistence rate is similar to that of the last admission quartile.[12] Second, there are significant differences between the persistence of observably heterogeneous students. High-SES and female students are generally more likely than their peers to persist across most admission quartiles. The differences are relatively small, on the order of 5-10 pp. The Appendix shows that similar effects apply to students who graduate from private high schools.

This exercise confirms the potential existence of a trade-off between increased student body

[12]A potential concern with the students in the waitlist is that they constitute a selected sample since they have navigated the aftermarket frictions described in Kapor, Karnani, and Neilson (2024), or because they are admitted under the *Beca de Excelencia Académica* (BEA) program – a scholarship providing university admission to selected, top-performing students from lower SES. We, therefore, exclude the waitlisted students from our prediction exercise.

diversity and student performance. A university that chooses a particular set of ARW may, therefore, be both expressing a preference for particular observable characteristics of a student – such as their sex or SES –, as well as attempting to select those students expected to perform academically and persist throughout the degree.

The determinants of student performance may be highly specific to a particular degree-university pair and depend on the coursework, examination procedures, and overall course and university structure. In the following section, we use a flexible prediction tool to model the counterfactual persistence of students in degrees where we cannot observe them and use these predictions to assess the importance of this trade-off.

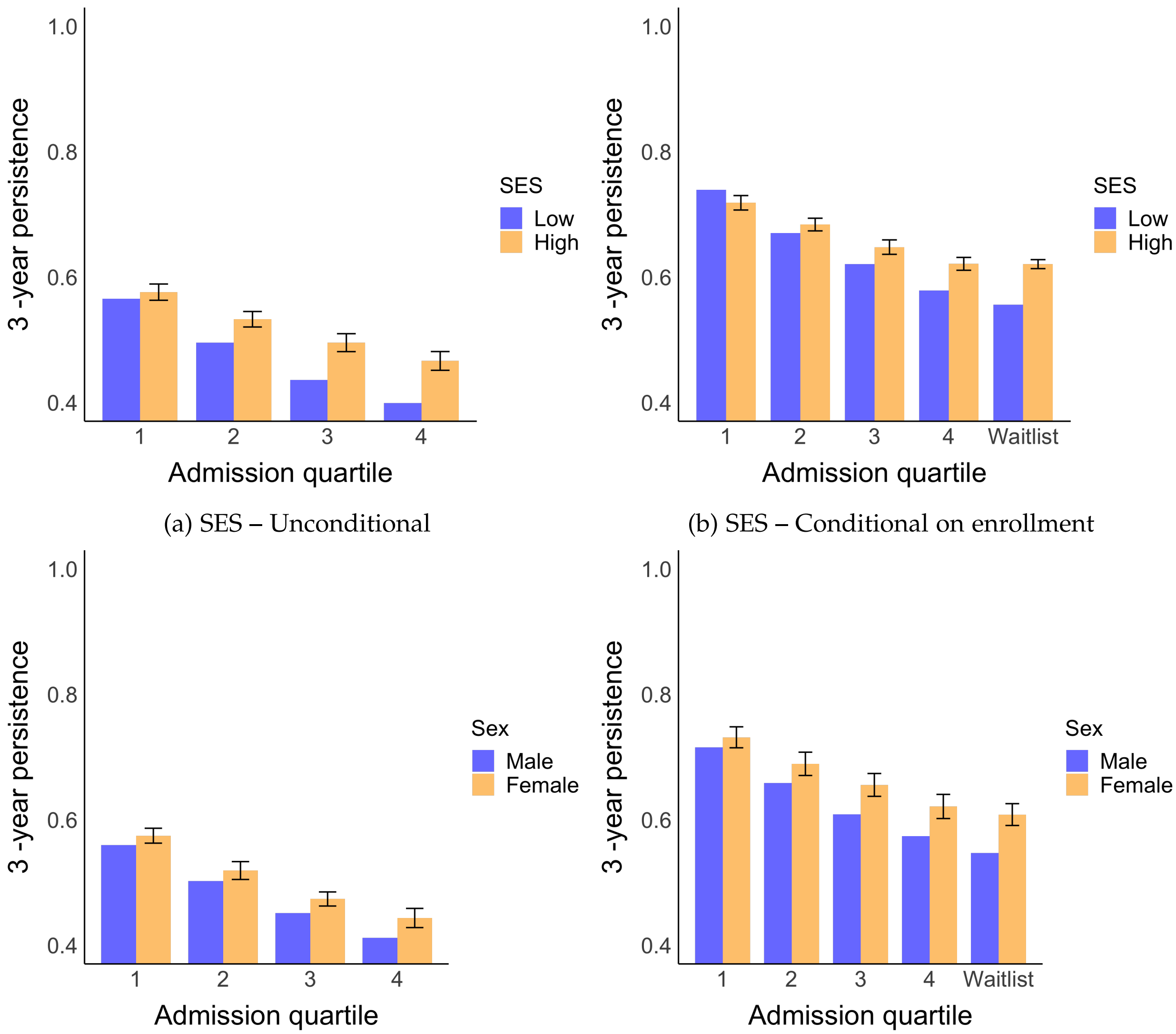
Predicting persistence Predicting persistence is a binary classification problem: we predict whether a student will persist (continue to re-enroll) in a program. We use a Random Forest (RF) classifier. This commonly-used machine learning algorithm combines the output of multiple decision trees to reach a single result about the prediction (see Agrawal, Gans, and Goldfarb 2019, for additional details).

The RF algorithm has two significant benefits. First, it corrects for the decision trees' tendency of overfitting to the training set. This problem is particularly relevant in our case, as we have a moderately imbalanced outcome: for example, 60% of students who are admitted enroll and re-enroll after one year. Conditional on enrollment, the share of 1-year persisting students is close to 80%.

Second, the RF algorithm naturally lends itself to feature importance analysis, as it is easy to implement mean decrease impurity and mean decrease accuracy methods to identify the average decrease in accuracy when a feature is excluded. This feature is helpful in our setting since it allows us to analyze which characteristics are most important in predicting persistence and how these characteristics might correlate with admission requirements in a way that programs can exploit.

We trained the model using enrollment data of all applicants from 2013 through 2015. We fit the model on all of the student's admission requirement scores and a large set of demographic characteristics (e.g., age, gender) and observable characteristics of their high school (e.g., type of administration, location). We also include attributes of the program, such as parent institution and number of vacancies, as well as its position in the student's ROL. Our final model is trained on a sample of over 200,000 observations, on which we use an 80-20 train-test split to assess accuracy.

The first result from this exercise is negative: despite the large number of observable characteristics, the Random Forest struggles to reach a high level of accuracy. The lack of predictive



(a) SES – Unconditional

(b) SES – Conditional on enrollment

(c) Gender – Unconditional

(d) Gender – Conditional on enrollment

Figure 11: 3-year persistence across admission quartiles

Notes: This figure shows the 3-year degree persistence across the admission distribution, for observably heterogeneous groups of students. The bars are computed by regressing a 3-year persistence dummy on the full set of interaction terms of admission quartiles and student types, controlling for degree-university fixed effects. Standard errors are clustered at the degree-university level.

power is particularly salient for persistence conditional on enrollment: the model's accuracy on the test data is barely above the share of persistence within it, suggesting the observable variables are insufficient in explaining which particular students are likely (or not) to drop off.[13] The model performs substantially better when jointly predicting enrollment and persistence – however,

[13]Intuitively, despite the accuracy being 80%, the model is performing only marginally better than one that blindly assigns a value of 1 to every observation. A variant of the Random Forest designed to deal with imbalanced samples (SMOTE, or Synthetic Minority Oversampling Technique) also fails to improve accuracy. However, it does improve the trade-off between Type I and Type II errors.

accuracy stays within 0.7 for any dependent variable.[14]

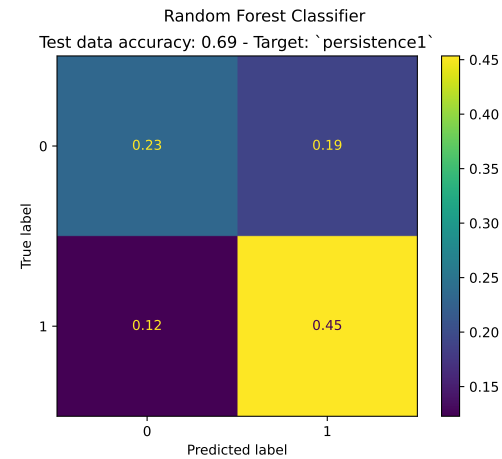
Next, we replicate our exercise from section 3 using the predicted student persistence outcomes. We simulate admissions under variations in the weight assigned to GPA and GPA+ admission requirements and compute the changes in the average *persistence probability* of admitted students. Given the performance of the Random Forest, we focus on predicting unconditional persistence – that is, enrollment and persistence across years.

We find minimal predicted changes of the order of 1-2% at the degree level. The variation across universities is minimal, and – contrary to the results in section 3 – does not correlate with the universities' choices of admission weights.

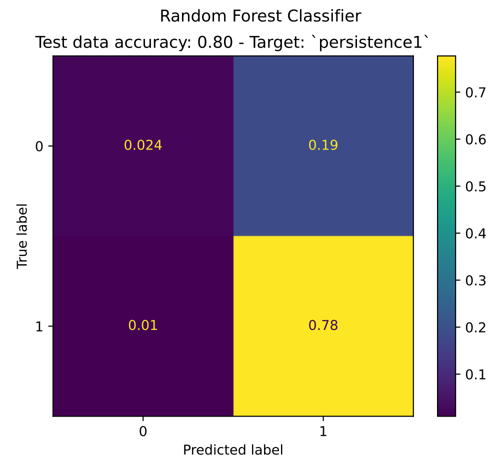
Using the simulations on the prediction above and those based on observable student characteristics, we can verify whether the hypothesized trade-off between increased access and academic performance arises across the different universities. In particular, we can check whether, across the choices of possible ARWs, predicted increases in student-body persistence are negatively correlated with increases in access for lower-SES students. Figure 14 presents this relationship for three selected universities: we show the complete figure in the Appendix. The selected examples show types of trade-offs that may emerge from the data: On the left, university A faces a clear trade-off between admitting more low-SES students and increasing the predicted performance of the student body. B does not face any trade-off: it cannot manipulate the share of admitted low-SES students and can only marginally affect the performance. University C faces the opposite trade-off to A: admitting more low-SES students is predicted to increase the average persistence. Across universities, the case of A is the most common one. This pattern confirms our intuition for the trade-off between increased access and student persistence.

Given the poor performance of the predictive model, we are cautious in interpreting these effects. The quantitatively small results are consistent with two explanations. One, persistence is hard to predict, and the difference in observables for marginal students needs to be larger to predict a significant increase or decrease across these students confidently. Two, the effects are significant, but they appear small at the degree level due to the share of students being "pushed out" or "pulled in" due to the changes in ARW is small, yielding an overall negligible effect. In the next section, we, therefore, turn to analyze a small sample of comparable students for which we can directly observe – instead of needing to impute – both the students' characteristics and their performance.

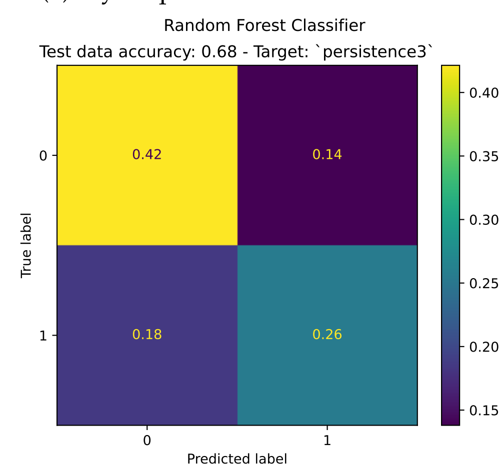
[14] In terms of explanatory power, GPA, math scores, and our high school measure of socioeconomic background are the strongest predictors among our independent variables. Information on the assignment *preference* for each student also has predictive power, suggesting again a "match-effect"-driven persistence, or the fact that applicants who are not selected into their top preferences are more likely to reapply next year (Larroucau et al. 2024).



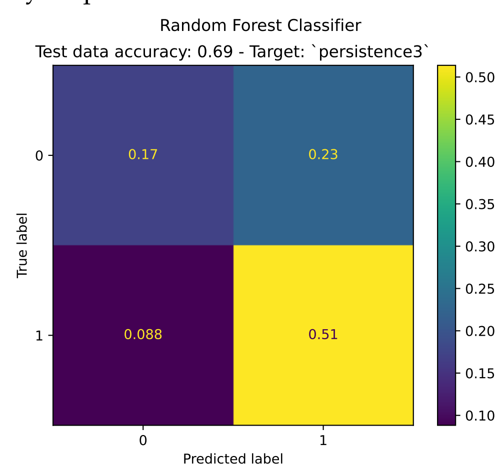
(a) 1-year persistence – Unconditional



(b) 1-year persistence – Conditional on enrollment



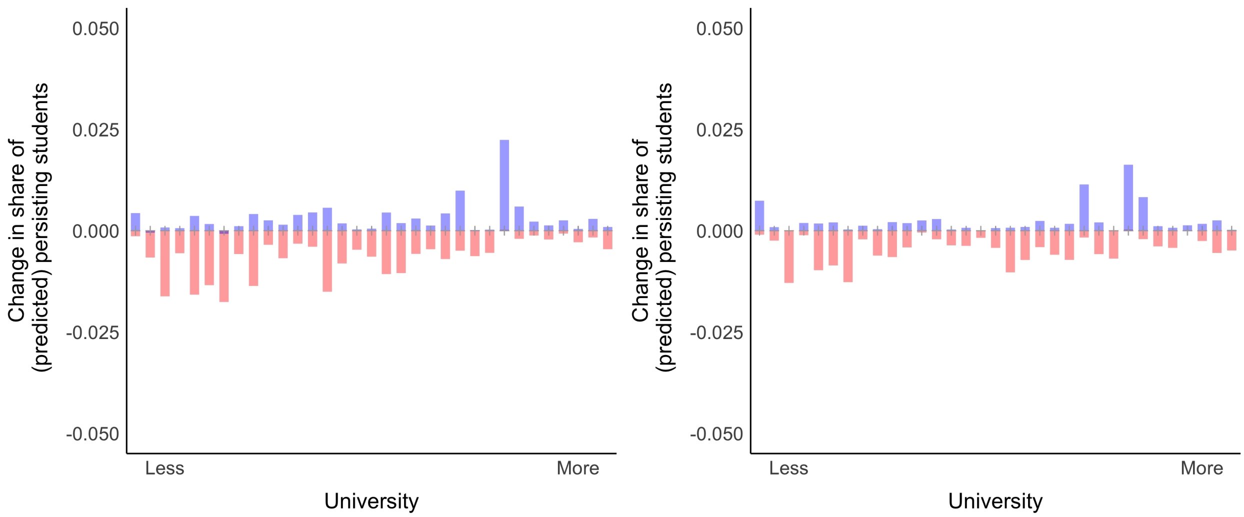
(c) 3-year persistence – Unconditional



(d) 3-year persistence – Conditional on enrollment

Figure 12: Random Forest Confusion Matrices

Notes: The four panels show the confusion matrices for the Random Forest classifier predicting persistence in degrees. A confusion matrix represents the prediction summary in matrix form, summarizing the share of correct and incorrect predictions per class. Shares along the main diagonal represent correct predictions, while off-diagonal shares represent incorrect predictions. The accuracy of the model is the sum of the main diagonal.



(a) 1-year – by GPA/GPA+ weight

(b) 3-year – by GPA/GPA+ weight

Figure 13: Admission possibilities in 2014 – Predicted persistence

Notes: The figure shows the potential effect that alternative choices of ARW can have on predicted persistence. Panel (a) shows potential changes in the share of students persisting after one year, while panel (b) shows the same for three years. The predictions are based on a Random Forest classifier trained on data from 2013-2015.

Pre/post reform comparison For this exercise, we focus on the 2013 admission process – where the GPA+ requirement had a fixed weight at 10% – and 2014 when universities can exercise discretion. Intuitively, our goal is to assess whether the students admitted due to the GPA+ policy are significantly more or less likely to persist within the degree than those who *lost* admission after the introduction of the policy. For this, we again leverage the Chilean CAS's design, together with the timing of the GPA+ reform, to find appropriate comparison groups before and after its implementation.

The schematic in Figure 15 shows the procedure we use to construct these groups. For each degree in 2014, we first simulate the admission order using the ARWs for that degree in 2013, w_{2013}. This procedure yields a set of students – 10, 11, and 12 in Figure 15 – that would have lost their admission to the program if the policy change had not been introduced. Similarly, for the same degree in 2013, we can compute the admission priorities using the weights in 2014, w_{2014}. We can then identify the students admitted in 2013 who would have lost admission if the policy change had already been implemented in 2013 (7, 8, and 9 in Figure 15). We can use the observed differences in persistence across both groups to study the trade-off of interest. This sample selection leaves us with a balanced group of approximately 9,500 students.

Some potential concerns arise with this design. The first one is that universities' policies affecting academic performance – such as grading policies, tutoring, or other forms of student

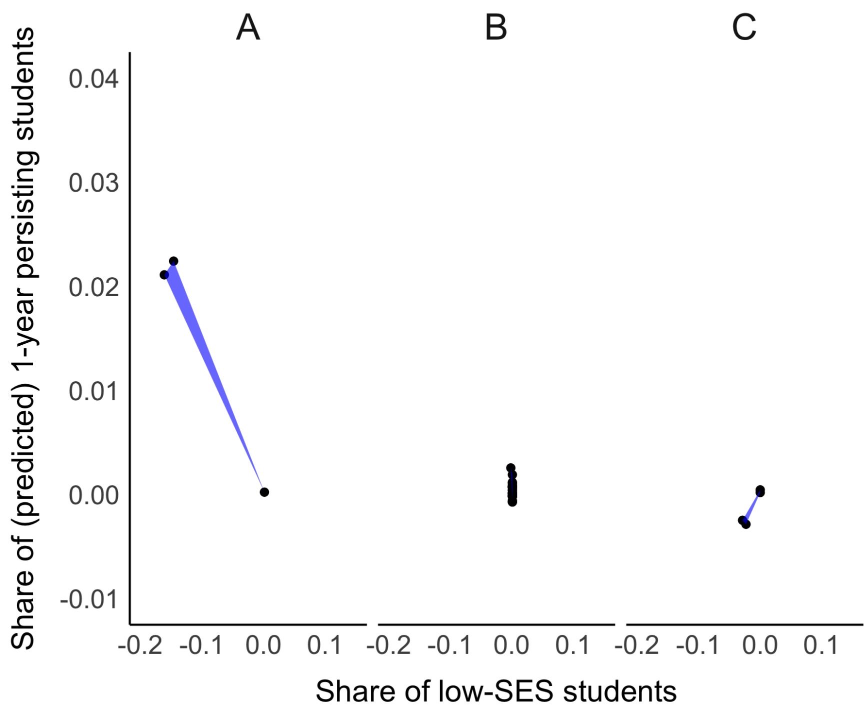


Figure 14: Equity-performance trade-off for selected universities

Notes: The figure illustrates three different trade-offs between the share of low-SES students and predicted persistence, with three different universities labeled A, B, and C. University A faces a trade-off between increasing access of low-SES students and increasing the predicted persistence of the admitted students. This pattern is by far the most common observed across universities. University C faces a reversed trade-off relative to A (albeit in smaller magnitude), while University B does not face any trade-off. Figure A.5 in the Appendix shows the complete set of universities.

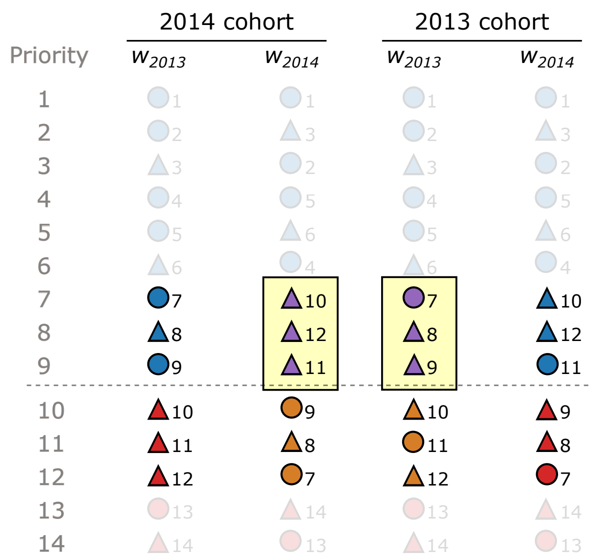


Figure 15: "Pulled-in" and "pushed-out" students in 2013/2014

Notes: The figure shows the procedure for constructing the comparison groups of "pulled-in" and "pushed-out" students. We compare students in the two highlighted groups. The first corresponds to students who would only have been admitted to the program with the GPA+ policy. The second group corresponds to students admitted in 2013 who would not have been admitted if the GPA+ policy had been in place. In our exercise, we compare the relative persistence of these two groups while also comparing the students admitted "immediately above" in the priority list as a control group.

support – may have changed simultaneously to (or even due to) the GPA+ policy. To isolate these concerns and absorb any cohort-specific shocks to persistence, we identify students *immediately above the cutoff* in 2013 and 2014 and use them as a control group. We choose the size of the control groups in both years to be equal to the number of "pushed-out" or "pulled-in" students.

The second concern is that the sample may need to be larger to detect effects at the university level: for some, our sample contains less than 50 students. We, therefore, group universities based on the weight they assigned to the GPA+ measure in 2014 and distinguish three groups: "Low" (GPA+ weight equal to or less than 20%), Medium, and High (30% or more). We also control for degree-university fixed effects and cluster the standard errors at that level.

Figure 16 shows the results from this exercise. We find a small but significant drop in persistence for students "pulled-in" due to the GPA+ policy, who are between 3% and 10% less likely to persist in the degree than the students who were "pushed-out". The effect also appears to increase with the weight assigned to the GPA+, with the "High" group showing effects up to twice as large as for the other groups.[15] On the other hand, panels (c) and (d) show further evidence

[15]At first glance, these results may appear at odds with the ones in Reyes (2022), who finds students benefitted by the policy to be *more* likely to graduate from selective degree. The difference in our results relies on the comparison group. Reyes (2022) compares "pulled-in" students in 2014 to those who would have been "pulled-in" in 2013. Our

of the policy having increased access to the university: students pulled in are significantly more likely to be female or have lower SES.

Discussion The key takeaways of this section are four. First, persistence in degrees correlates with admission priorities and with some demographic characteristics. Second, student performance across degrees is only poorly predicted by observable student and degree characteristics. Third, the effects of varying ARWs seems to have a quantitatively small effect on the predicted share of students persisting, with some heterogeneity across universities. Fourth, the marginal group of admitted students – those gaining admission only due to the implementation of the GPA+ policy – seems to be significantly less likely to persist, and more likely to be female and from a lower SES.

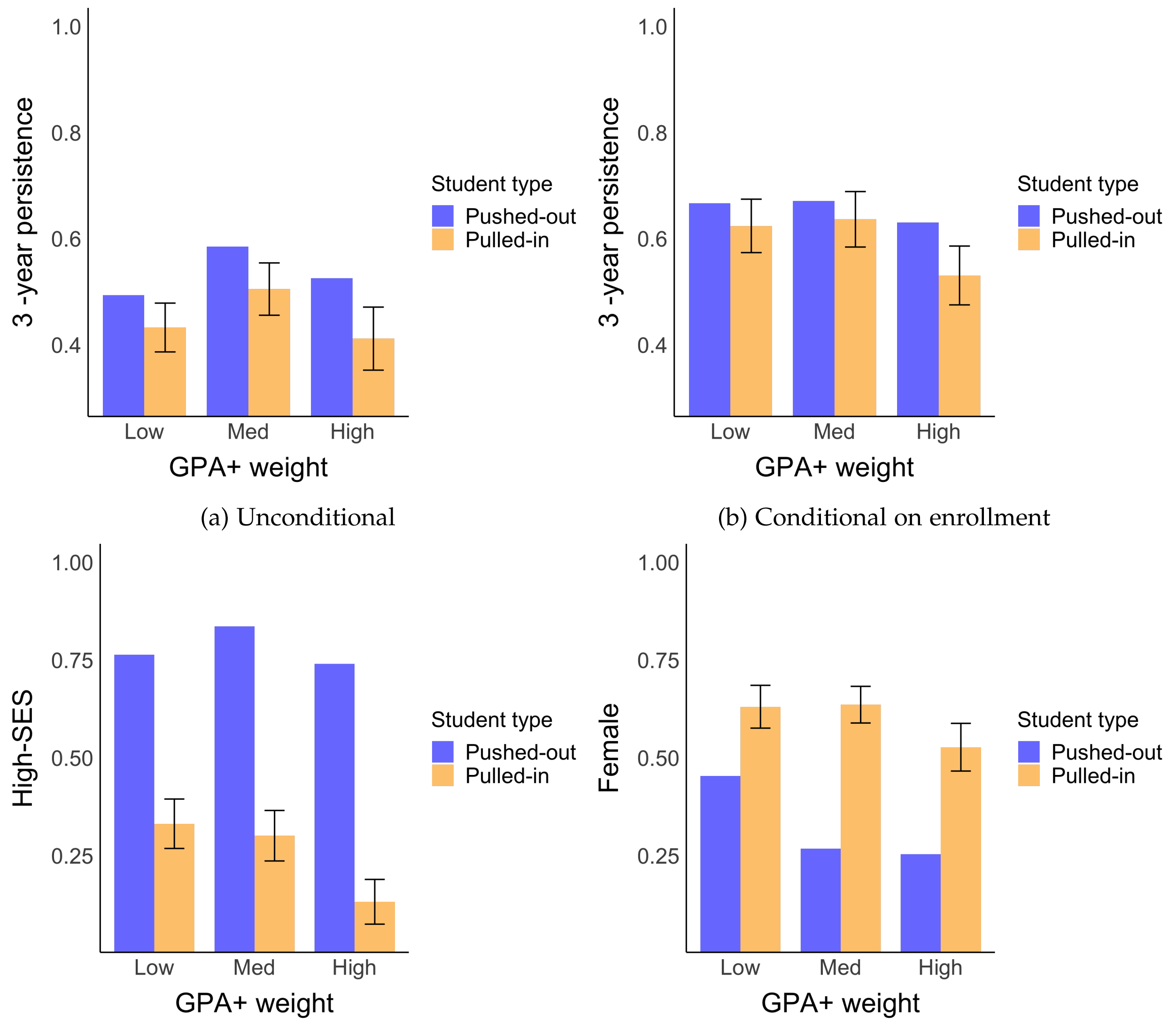
Taken together, these results support the hypothesized trade-off faced by universities through the choice of ARWs. The GPA+ policy seems to be effective at increasing the share of low-SES and female students across universities. However, the marginally admitted student seems to be less likely to persist and re-enroll in subsequent years, which may suggest lower academic performance. The effects on persistence appear to be almost negligible when considered at the aggregate degree level. To the extent that the trade-offs differ across universities, these can be interpreted as expressions of the universities' relative preferences over diversity and academic achievement of their students.

Our results differ from the ones reported in recent literature on higher education inclusion policies, for example Bleemer (2021). Two reasons may be driving the differences. First, student persistence may partly be part of a university's choices, affecting persistence. Anecdotally, universities in Chile may be less willing to invest in making sure their students complete the degrees than those in the U.S. Second, selection tools in Chile are exclusively based on observable characteristics, which may prevent further exercise of discretion to admit students with a high probability of completing the degree.

5 Conclusion

In this paper, we highlight the role of university discretion in determining admission requirements. We first show evidence of these choices impacting the composition of the student body: universities that choose to select based primarily on the GPA+ measure can increase the share of students from low socioeconomic backgrounds they admit.

comparison group is instead those "pushed-out" in 2013 since we are interested in the outcomes from the university's perspective.



(a) Unconditional

(b) Conditional on enrollment

(c) SES

(d) Sex

Figure 16: Performance and demographic composition of "pulled-in" and "pushed-out" students

Notes: This figure shows the difference in persistence and demographic composition between that the GPA+ policy "pulled-in" vs the ones it would have "pushed-out" if it were implemented a year before. The comparison groups are constructed as in Figure 15. Full table results are in the Appendix.

We then analyze to what extent these choices can be interpreted as expressions of preference for students of certain demographic types or who are expected to have strong academic performance. We find some evidence of a trade-off: universities may expand access to students from lower socioeconomic backgrounds at the cost of reducing the expected persistence within the degree.

We want to emphasize three points for discussion and future research. The first is the implications for a social planner. As outlined before, a planner may face a trade-off in allowing universities to exercise discretion in admissions. On the one hand, if universities' preferences differ from the planner's, discretion may be used to prioritize students to whom the planner assigns a lower welfare weight (for example, high-SES students). On the other hand, universities may have private, intangible information about the skills that allow students to thrive at their institutions. Suppose these skills correlate with different admission requirements, and the correlations (and skills) differ across degrees and universities. In that case, discretion may enable a better "match" between students and colleges and contribute to enhancing academic performance across the board. The evidence we present in the Chilean setting would suggest that the planner mandating discretion would have bolstered the access-improving effect of the policy at the cost of some lower student persistence. In future versions of this paper, we intend to formally explore the conditions – in the form of correlations and preference (mis)alignment – under which the planner would want to restrict the discretion allowed to universities.

Second, we find quantitatively limited impacts of the policy on access as measured by the composition of universities. These results align with the modest results for students found in other papers on this setting (Reyes 2022; Larroucau, Rıos, and Mizala 2015). These patterns underscore the factors determining (or constraining) access to different universities and higher education in general. For example, in the particular case of the GPA+ policy, its effects on access to particular universities are constrained by students' application behavior and the joint distribution of the admission requirements. Therefore, the design of admission policies aiming to achieve more significant effects on access and diversity of the student bodies must account for these constraints.

Finally, throughout this paper, we have referred to "student performance" or persistence within a degree as an individual characteristic or individual-degree match effect. However, persistence can also be interpreted as student retention and, as such, as an active choice or investment the university conducts. A planner looking to increase access to higher education while maintaining or improving academic achievement could also require a certain level of investment in academic student support within universities. Institutions may also respond by adjusting their standards, with complex implications for human capital accumulation and labor market outcomes.

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A Figures

POINT RANGES & WEIGHTS FOR SELECTION CRITERIA

Criteria	Point range	Weight	Total possible score
HS GPA	2.8–4.0	1000	4000
5 Exams (SAT I/ACT & 3 SAT II)	200–800 each	1	4000
ELC (Eligibility in the Local Context)	0 or 1	1000	1000
Number of "a-f" courses beyond minimum	0–5	100	500
Individual Initiative	0 or 1	500	500
EOP (Educational Opportunity Program)	0 or 1	500	500
Pre-collegiate motivational program	0 or 1	500	500
First-generation university attendance	0 or 1	250	250
Non-traditional	0 or 1	250	250
Veteran/ROTC Scholarship	0 or 1	250	250
Significant Disability	0 or 1	250	250
Leadership	0 or 1	250	250
Special Talent	0 or 1	250	250
Perseverance	0 or 1	250	250
Marked improvement in 11th grade	0 or 1	250	250
TOTAL REVIEW			13,000

Note: This photograph shows an internal archival UC Davis admissions document visualizing Davis's 2002 freshman admissions protocol. Students were assigned points on the basis of applicant characteristics, and those with scores above a designated threshold were admitted to the campus. Source: Archives and Special Collections, UC Davis — Shields Library.

Figure A.1: UC Davis admission requirements and their weights for the 2002 admissions. Source: Bleemer (2021).

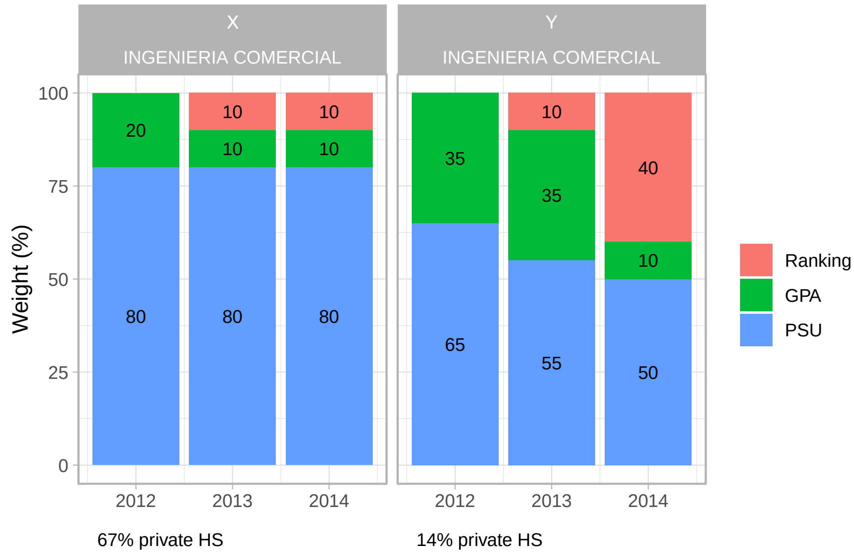
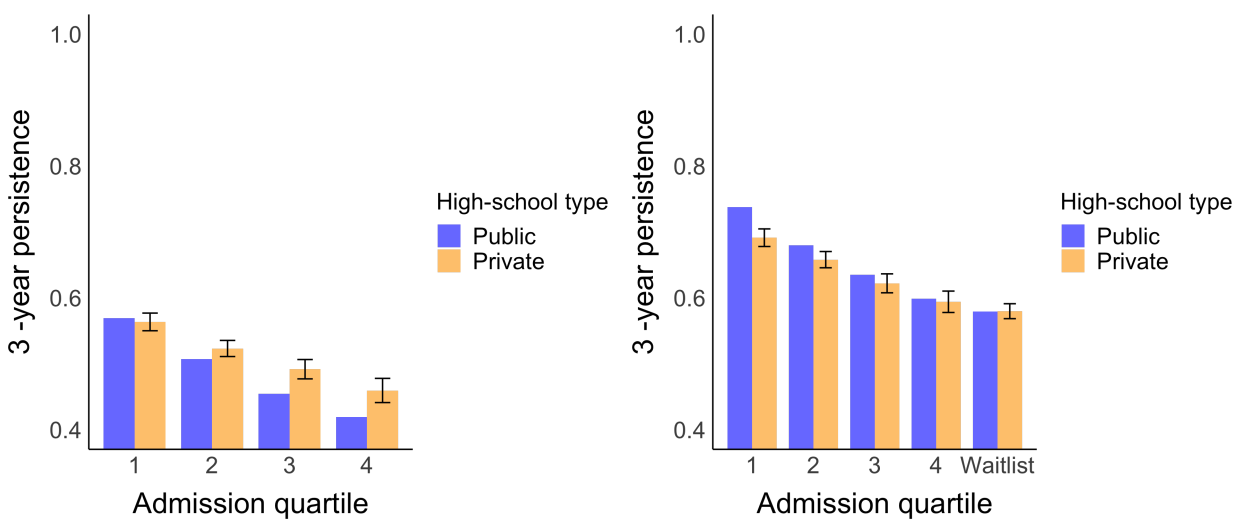


Figure A.2: Heterogeneous admission requirement weights for two equivalent majors at different institutions.

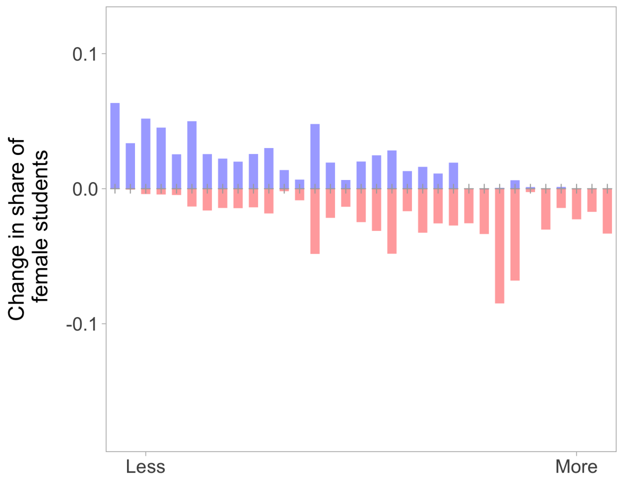
Note: The left panel shows a program that strictly minimizes GPA and GPA+ weights, given the institutional constraints. The right panel shows a program that is close to the maximum possible GPA/GPA+ weights. These examples highlight the heterogeneity in program preferences across different institutions. Moreover, these programs are clearly differentiated in their pre-policy student body composition: the left and right panel programs admitted 67% and 14% of students from private high schools in 2012 respectively.



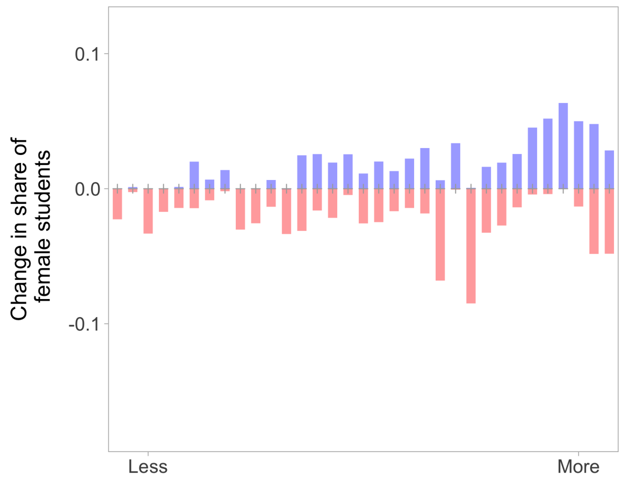
(a) Unconditional

(b) Conditional on enrollment

Figure A.3: 3-year persistence – By high-school type



(a) By GPA/GPA+ weight



(b) By selectivity

Dependent Variable:	3-year persistence		
Model:	(1)	(2)	(3)
Variables			
procesoPost	0.0178	0.0388**	0.0138
	(0.0168)	(0.0176)	(0.0222)
treatedPushed/Pulled	-0.0052	0.0258	-0.0018
	(0.0159)	(0.0203)	(0.0211)
procesoPost $\times$ treatedPushed/Pulled	-0.0608***	-0.0803***	-0.1138***
	(0.0235)	(0.0251)	(0.0303)
Fixed-effects			
Degree x University	Yes	Yes	Yes
Fit statistics			
Observations	7,530	6,372	4,640
R^2	0.18445	0.13217	0.10112
Within R^2	0.00279	0.00210	0.00968

Clustered (Degree x University) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table 1: Persistence for "pulled-in" vs "pushed-out" students (unconditional)

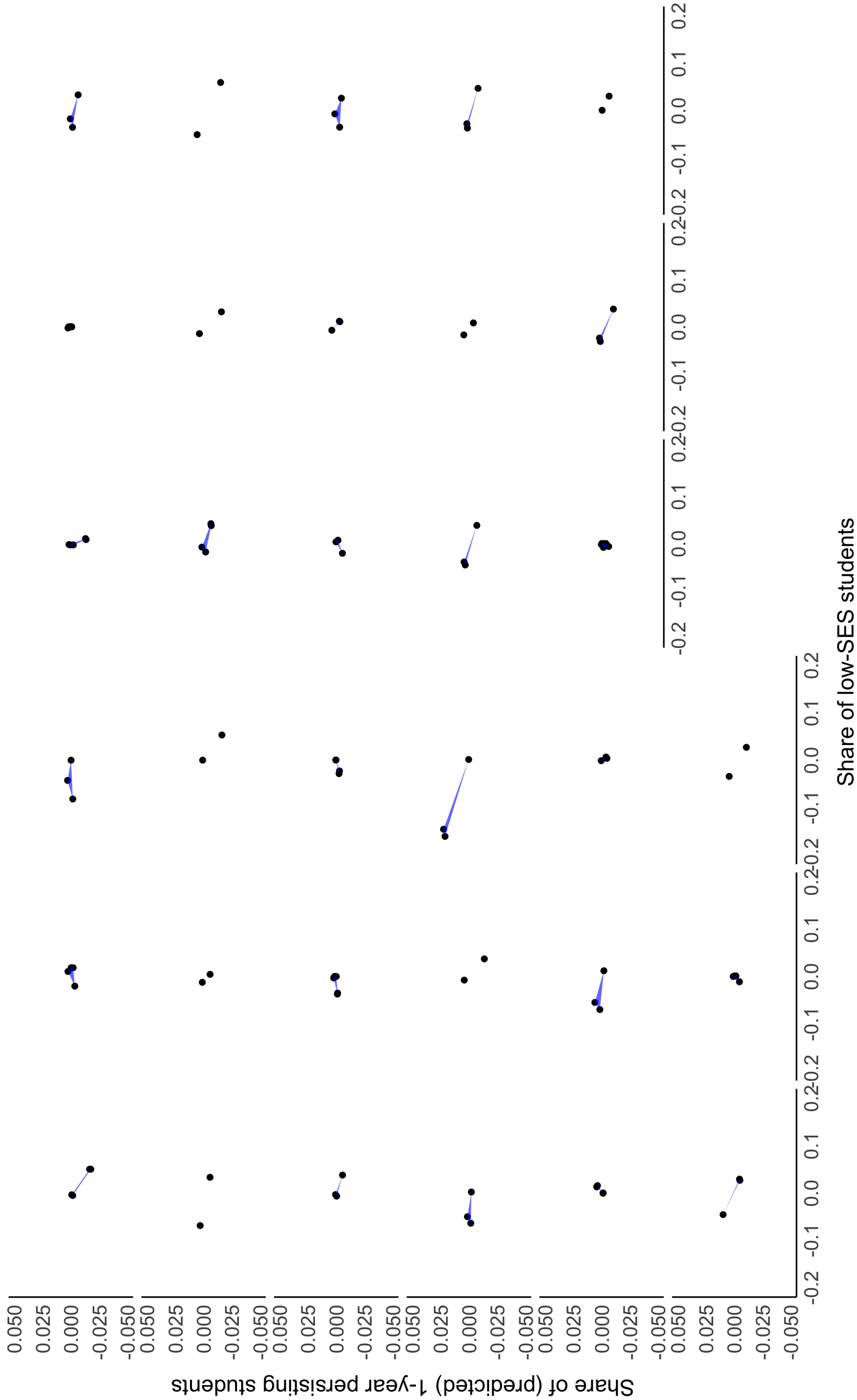
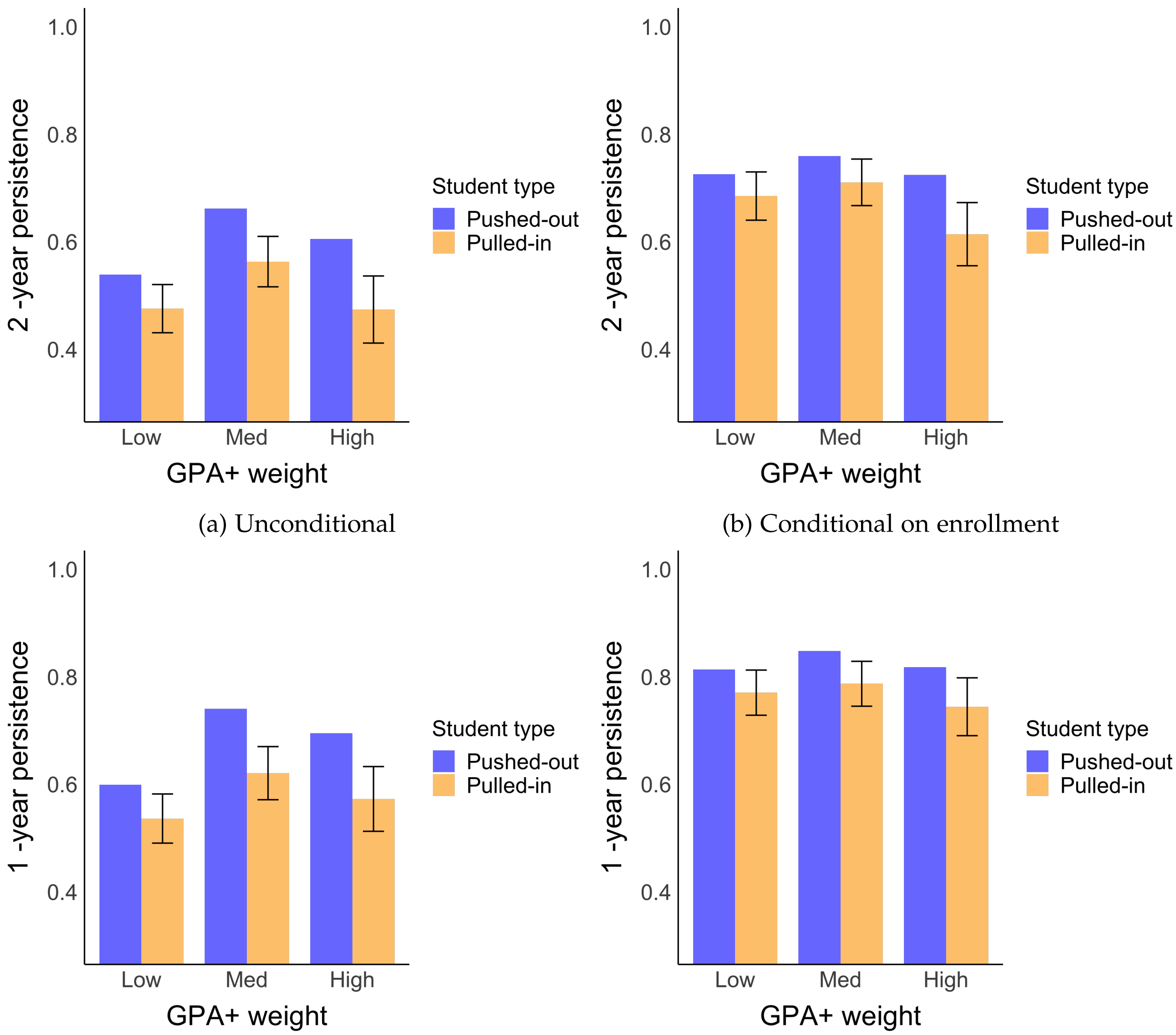


Figure A.5: Access-performance trade-off – All universities



(a) Unconditional (b) Conditional on enrollment

(c) SES (d) Sex

Figure A.6: Performance of "pulled-in" and "pushed-out" students

Dependent Variable:	3-year persistence		
Model:	(1)	(2)	(3)
Variables			
procesoPost	0.0054	0.0123	0.0087
	(0.0184)	(0.0166)	(0.0215)
treatedPushed/Pulled	-0.0159	-0.0035	-0.0085
	(0.0167)	(0.0205)	(0.0220)
procesoPost × treatedPushed/Pulled	-0.0428*	-0.0345	-0.0999***
	(0.0257)	(0.0267)	(0.0283)
Fixed-effects			
Degree x University	Yes	Yes	Yes
Fit statistics			
Observations	5,358	5,158	3,751
R^2	0.21949	0.19241	0.15992
Within R^2	0.00282	0.00102	0.00935

Clustered (Degree x University) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table 2: Persistence for "pulled-in" vs "pushed-out" students (conditional on enrollment)