Affirmative action, college access and major choice: redistribution with strategic behavior

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Abstract

I estimate the redistributive and behavioral effects of a race-neutral affirmative action policy targeting low-income applicants at a flagship university in Brazil. I find that the policy redistributed college seats toward applicants from low socioeconomic backgrounds and underrepresented racial groups, increasing their representation in selective majors. This diversity gain came with an expected decrease in the average achievement of the incoming cohort but retained admissions for candidates in the upper half of the statewide achievement distribution. Applicants also responded strategically to the policy by adjusting their application choices, resulting in a reduction of the socioeconomic gap in applications to selective majors by 21 percent of the unconditional gap and 36 percent when comparing applicants with similar academic backgrounds and demographic characteristics. However, while some applicants successfully updated their choices, others aimed too high and missed their chance of admission—an especially costly outcome for the targeted group.

Keywords: affirmative action, higher education, redistribution, major-choice.
JEL Codes: I24, I28, O15

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1 Introduction

Access to higher education is central to the social mobility debate (Chetty et al., 2020). Policies focused on lowering the barriers to college enrollment are increasingly popular (Deming and Dynarski, 2010; Page and Scott-Clayton, 2016). Beyond college access, field of the study explains a significant portion of the persistent wage gaps among college graduates (Altonji et al., 2016; Kirkeboen et al., 2016). With well-documented and significant demographic and socioeconomic discrepancies across majors (Patnaik et al., 2020), efforts towards promoting increased diversity across fields are a top priority across colleges and disciplines (Bayer and Rouse, 2016; Griffith, 2010). Due to cumulative inequality in the pre-college years, applicants from disadvantaged backgrounds might face specific barriers to entering high-return majors.

Affirmative action, top percent policies, or a holistic admissions approach aim to compensate for structural inequalities, providing applicants from disadvantaged backgrounds the opportunity to attend high-quality colleges. When students apply jointly to college and major, the most common admissions mechanism worldwide, policies targeting college access of underrepresented applicants may simultaneously affect college access and major choice. While there is extensive evidence on how affirmative action impacts the representation of historically excluded groups at universities worldwide[1], less is known about how it affects sorting across majors and how these effects together can influence the final allocation of university seats.

In this paper, I evaluate a race-neutral affirmative action policy targeting applicants from low socioeconomic backgrounds in a setting with joint college-major admissions. I estimate the effects of the policy on the socioeconomic gap in college access and major choice. I distinguish between the policy's direct effect on accepting more applicants from lower socioeconomic backgrounds into college and the indirect effect of how the change in relative admissions probabilities shapes the choice of major and, consequently, influences the socioeconomic gap in college through major re-sorting.

I use data from a flagship university in Brazil, where admission to a given major follows a predetermined rule. The university ranks applicants exclusively based on entrance exams

[1]Evidence on the introduction of affirmative action introduction in Brazil, India, and Israel: Alon and Malamud (2014); Bagde et al. (2016); Barahona et al. (2023); Bertrand et al. (2010); Estevan et al. (2018, 2019); Francis and Tannuri-Pianto (2012a,b); Francis-Tan and Tannuri-Pianto (2024); Krishna and Robles (2016); Krishna and Tarasov (2016); Mello (2022); Oliveira et al. (2024). Evidence on the affirmation action bans and top percent plans in the US: Andrews et al. (2010); Antonovics and Backes (2014); Arcidiacono (2005); Black et al. (2023); Bleemer (2021, 2024); Fletcher and Mayer (2014); Hinrichs (2012); Howell (2010); Klasik and Cortes (2022); Long and Tienda (2010); Niu and Tienda (2010); Niu et al. (2006).

and selects the top-ranked applicants, with capacity fixed and known in advance. Traditionally, applicants are required to select only one major during registration, before they take the entrance exams, an option they cannot change. This admissions mechanism incentivizes applicants to misrepresent their preferences in favor of majors to which they believe to have a higher chance of acceptance - a direct channel through which the relative changes in admissions probability affect individual choices. This admission rule represents an extreme case of the Boston Mechanism (Abdulkadiroglu and Sonmez, 2003), where applicants can apply to only one major and all seats are allocated in the first round.

The affirmative action policy modified the admissions rule by reserving 40 percent of college seats per major for low-income applicants from public elementary and high schools. In Brazil, low-income students typically attend public schools, which are of lower average quality than the private schools attended by high-income students. This combination of low socioeconomic status (SES) and low-quality education results in a persistent achievement gap in the college entrance exam, affecting both college attendance and major choices for disadvantaged applicants. This is the structural inequality the policy aims to address.

My empirical strategy is two-fold. First, I calculate the direct effects of the policy on the redistribution of college seats by comparing individuals accepted or rejected due to the policy. I refer to these groups as "pushed in" and "pushed out." The transparent admissions mechanism based on test scores allows me to identify these two groups directly by simulating the admissions rule with and without quotas. Second, I estimate the indirect effects on major choice using a differences-in-differences model, comparing targeted and non-targeted applicants before and after the policy. This approach identifies the effects of the policy on the socioeconomic gap in applications and acceptance but not on each group separately. Since the policy aims to address a historical socioeconomic gap in college attendance, this strategy can recover the main parameter of policy interest.

I find that the introduction of the affirmative action policy redistributed college seats toward low-SES applicants. This redistribution strongly benefited first-generation applicants and underrepresented minority (URM) - two demographic groups not explicitly targeted by the policy. The effects varied across fields, with admissions for the targeted groups increasing more in majors with higher potential earnings, particularly in Health and STEM. As expected, the policy achieved significant socioeconomic redistribution at the cost of academic achievement: applicants admitted under the policy scored, on average, 0.31 standard deviations lower on the pre-college exam than those displaced. However, applicants admitted under the policy still ranked in the top 40 percent of all state test-takers, while displaced applicants were in the top 30 percent. This expansion of admissions to relatively high-achieving low-SES applicants in high-return fields, where they were previously underrepresented, highlights the policy's potential to advance social mobility.

The affirmative action policy reduced the socioeconomic gap in applications to selective majors by 21 percent compared to the unconditional pre-policy gap. It also narrowed socioeconomic differences in applications among individuals with comparable baseline chances of acceptance, with the conditional gap decreasing by 36 percent. These effects are attributed to differential behavioral responses from eligible and non-eligible applicants, particularly in their decisions to apply to college and, conditional on applying, in their choice of major. I provide evidence that the reduction in the socioeconomic gap in applications to selective majors is most driven by eligible applicants shifting their application patterns toward more selective majors.

Heterogeneity analysis revealed that the policy's effects on the socioeconomic gap in applications to selective majors varied by baseline achievement levels, with larger effects observed among lower-achieving applicants. This suggests that while some applicants successfully adjusted their application choices, others overreached, making strategic mistakes that effectively reduced their chances of acceptance. This highlights an unintended consequence of a policy operating within an admissions mechanism that incentivizes strategic behavior. Furthermore, although the policy increased the number of URM students admitted to college, the analysis shows that the race-neutral policy did not differentially impact the application behavior of URM applicants. Additionally, the effects on the socioeconomic gap in acceptance were primarily driven by non-URM applicants. This finding aligns with prior research indicating that race-neutral admissions policies are less effective for URM applicants compared to race-based affirmative action, even when there is a strong correlation between the target group and race (Bleemer, 2023; Vieira and Arends-Kuenning, 2019).

Strategic behavior in applications has meaningful potential consequences in a context where applicants could choose only one major at the time of application and exams were administered just once per year. Applicants who were not accepted could only reapply to the public college system the following year. For many low-income applicants, whose private or out-of-state college options were limited due to cost, rejection often meant delaying college enrollment by at least a year. Duryea et al. (2023) shows that in Brazil, although rejected low-income applicants still graduated from less desired institutions, their labor market returns were significantly lower than those of their peers who were accepted. In contrast, high-income applicants who enrolled in less desired colleges did not experience similar negative effects. This underscored the costly nature of strategic mistakes for low-income applicants. Therefore, while affirmative action policies could significantly redistribute college seats, the structure of admissions mechanisms and the levels of uncertainty faced by applicants play a critical role in shaping these policies' potential effects.

This paper contributes to the literature on access to higher education and socioeconomic inequality in college and major choice (Dillon and Smith, 2017; Hoxby and Avery, 2013; Kirkeboen et al., 2016). I contribute to this literature by, first, providing evidence of the cross-majors equalizing effect of affirmative action, which increases the representation of targeted, low-income applicants in selective, high-return majors. Related papers include Alon and Malamud (2014), which evaluates a class-based affirmative action policy in Israel and finds that eligible applicants are more likely to be accepted in college and selective majors. In most of the world, where tertiary education is more specialized, a student's field of study correlates more with post-college occupation than in contexts with relatively less specialization, such as the U.S., Scotland, or Canada. For instance, Hastings et al. (2013) finds high returns from high-selectivity programs for both high and low-SES applicants in Chile, suggesting that expanding access to high earnings degrees might provide greater economic opportunities to low-SES students than increasing access to low-selectivity degrees.

Second, specific to affirmative action and major choice, research typically focuses on the role of preferences, labor market returns, ability, and preparation effort (Altonji et al., 2016). I provide evidence that individual application choices are influenced by perceived probabilities of success, with the policy reducing the socioeconomic gap in applications to selective, high-return majors, even among applicants with comparable likelihoods of admission. This finding directly complements the work of Estevan et al. (2019), which evaluates the effects of a different form of affirmative action on major choice using data from another flagship university in Brazil. Their study examines how *bonus points* allocated to public high school applicants impact the gap in major choice between public and private school students. Regarding the effects of the policy on major choice, their results align with mine, showing similarly significant effects on the likelihood of applying to more selective majors. Furthermore, my paper provides novel evidence of a potential increase in strategic mistakes induced by the substantial shift in admissions probabilities, combined with the strict design of the admissions mechanism - a combination of factors common to admissions systems worldwide.

My paper also indirectly relates to the literature on mismatching, which argues that affirmative action may lead students to enroll in colleges for which they are unprepared. Although I cannot provide evidence on graduation rates or post-secondary outcomes in this paper, this literature offers valuable insights for conjecturing the potential long-term effects of the increased representation of historically underrepresented groups in selective majors. Earlier studies suggested that affirmative action induces URM applicants to pursue less competitive majors when attending selective colleges and that attending a less selective college could increase their chances of majoring in fields such as STEM (Arcidiacono et al., 2012, 2011, 2016; Arcidiacono and Lovenheim, 2016). More recent research, however, provides growing empirical evidence of no negative effects of affirmative action on performance or persistence in specific majors (Bagde et al., 2016; Barahona et al., 2023; Black et al., 2023; Bleemer, 2021). In the context of Brazil, Francis-Tan and Tannuri-Pianto (2018) conducted a pioneering study comparing the post-college outcomes of Black applicants affected by a race-based affirmative action policy at another flagship college. They found that quota beneficiaries, particularly males just above the major cutoff, attained more years of education and earned higher post-college incomes than their peers just below the cutoff. Other studies also demonstrate that affirmative action in Brazilian institutions increased welfare (Barahona et al., 2023), with strong catch-up effects during college years (Oliveira et al., 2024). Together, this evidence supports the claim that increased college access and changes in major choices can enhance social mobility, even with the possibility of strategic mistakes.

2 Admissions policy and affirmative action at the University of Espírito Santo

The University of Espírito Santo (UFES) is in the southeastern state of Espírito Santo, Brazil. Established in 1954, it is the largest public university in the state. Other public higher education institutions in Espírito Santo are relatively small. In 2009, UFES offered 83 majors, compared to 20 majors offered by the other three public institutions combined. UFES accounted for 88 percent of the incoming students in 2009 among the four public institutions. Other colleges in the state are private and costly. For instance, at private universities, the monthly tuition for a medicine program is approximately R$ 6,000, equivalent to six times the monthly minimum wage (reference year: 2019). Since UFES offers free tuition and high-quality education, it is the preferred option for most college applicants in the state. As a result, the institution is highly selective, with an acceptance rate of 16 percent.

UFES provides a unique context for studying the effects of affirmative action on college-major choice. First, UFES is the primary public university in the state, with about 90 percent of its students coming from within Espírito Santo. Its geographic and institutional characteristics allow the estimation of policy effects without substantial interference from other public universities. Second, applications are made at the major-campus level, and the admissions process is based exclusively on test scores. This admissions design provides advantages over studies conducted in the U.S., where admissions rules are more complex, and applications are typically made at the college level. Third, Espírito Santo is ranked highly in high school quality and has one of the highest registration rates for the *Exame Nacional do Ensino Médio* (ENEM), a national exam designed to evaluate high school graduates and used for college admissions nationwide. Together, these factors create a setting where typical confounding effects, such as migration decisions or competition with another major public institution, are less significant than in other contexts, such as the U.S.

2.1 Admissions process

Applications occur in August each year and are major specific, with students choosing one major upon application. Only those who apply in August are eligible to take the university exams administered in November and December. The admission exams have two stages. In the first stage, all applicants take the same standardized test in late November, which assesses general knowledge of topics covered in high schools. Figure A.1 summarizes the admissions process timeline.

During the study period, the first-stage score was calculated as a weighted average of the national exam (ENEM) score and the university's exam score. A student's final score was the higher of this weighted average or the university exam score alone. Since ENEM could only improve final scores, the majority of students submitted their ENEM records, an average of 73 percent during 2006-09. Approximately 45 percent of applicants were selected to proceed to the second stage based exclusively on their first-stage exam ranking. Major-specific rules determined the number of students advancing to the second stage based on the number of available seats and the competitiveness of each major.[2] The second stage consists of field-specific exams with five open-ended questions on high school-level topics and three essays common to all majors. For example, Nursing and Medicine have the same field-specific exams: biology and chemistry.

Choosing a major is a strategic step in the application process. Preparation often takes a year, and high school seniors are encouraged to decide on a major or a broad field early due to preparation efforts. This means applicants usually have one or two options in mind months before selecting a major on the application form. At the time of application, the competitiveness of each major may also influence their final choice. Applicants receive detailed information on the competitiveness and cutoff scores of each major from previous years.

[2]The exact number of students advancing is determined by prespecified rules based on the number of candidates per seat. For example, if there are 0-4 candidates per seat in a specific major, the number of students advancing to the second stage equals twice the number of seats. For competition rates between 4–8 candidates per seat, three times the number of seats advance, and so on.

Before the policy, Medicine was the most competitive major, with 40 applicants per available spot, compared to 16 applicants per seat for Nursing. Applicants who have prepared for the biology-chemistry field-specific exams can use this information to decide whether to pursue the more competitive Medicine major or the less competitive Nursing major. However, registering instead for, for example, Engineering after preparing for biology-chemistry exams would mean losing all prior preparation and starting over with mathematics and physics exams.

Acceptance decisions are announced in late January. Most seats are filled in the first round of acceptances. Changing majors after enrollment is costly. Although there are internal mechanisms for switching majors, students often retake the entrance exams if they wish to pursue a different major.

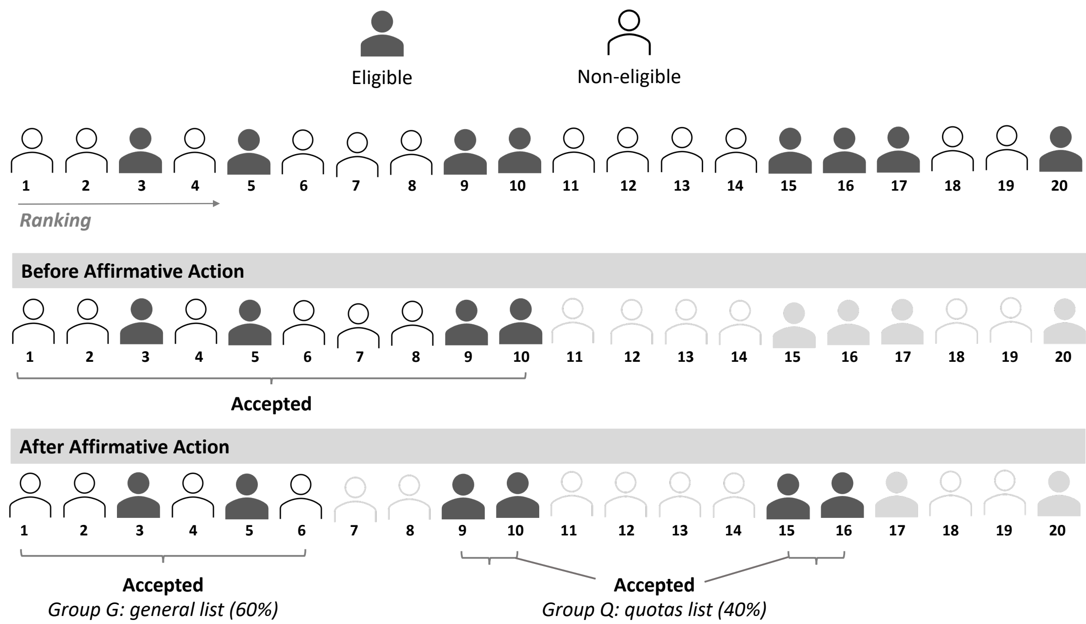
2.2 Affirmative action at UFES

In August 2007, following a national trend, UFES announced its affirmative action policy based on social quotas. To increase the representation of low-income students from public high schools, the policy reserved a minimum of 40 percent of available seats. Eligibility requirements included a public high school diploma and at least four years of public elementary school education. An additional income criterion allowed a maximum household income of seven times the minimum wage. This threshold is generous: in 2019 values, seven minimum wages amounted to R$7,000 (US$1,800) per month. Considering two working adults in a household, this equates to an average of R$3,000 per person per month, placing them above the 85th percentile of the state's income distribution.

UFES adopted its affirmative action policy amid a national debate about diversity in college admissions in Brazil. By 2008, approximately 50 universities had implemented affirmative action policies (Daflon et al., 2013). The first policies appeared in the early 2000s in response to Brazil's increased demand for racial inclusion. However, the race-neutral criteria adopted by UFES align with a national trend, as most colleges targeted applicants from public high schools. Policies targeting Black and Indigenous applicants were the second and third most popular, respectively.

A relevant design choice was that the quota rule was only applied to the final ranking of applicants after the second stage. During the first stage, applicants were ranked and selected without considering their eligibility status. If the number of eligible applicants passing the first stage did not reach the minimum necessary to meet the minimum quota requirement, additional eligible applicants were admitted to the second stage. This rule was rarely triggered: in 2008 and 2009, only 0.3 percent of applicants advancing to the second stage did so because of this minimum requirement.

Figure 1: Example of the admissions and affirmative action mechanisms



Note: This figure presents a hypothetical example of a major offering 10 seats and receiving 20 applications. Before the policy, applicants ranked 1st through 10th would be admitted, regardless of their socioeconomic backgrounds. After the policy, admissions are conducted in two steps. First, 60 percent of the seats are allocated based on traditional ranking. Second, 40 percent are reserved exclusively for eligible applicants. In the figure, applicants ranked 1st through 6th form the General List and would have been admitted regardless of the policy. This group includes two quota-eligible applicants (applicants 3 and 5). Additionally, while applicants 9 and 10 are admitted under the reserved quota, they would have been admitted even without the policy. The quota provision is binding for applicants 15 and 16, who are admitted only due to the policy, whereas applicants 7 and 8 are not admitted because of the policy.

Figure 1 illustrates the admission mechanism for a hypothetical major with 10 seats and 20 applicants. Admissions were divided into general admissions (G) and quotas (Q). Group G may include both quota-eligible and non-eligible applicants. The G list is a universal ranking, and quota eligibility is not considered during this stage. Applicants are ranked solely based on entry scores until 60 percent of the seats are filled. Thus, a high-scoring eligible applicant would be accepted regardless of their eligibility status (e.g., applicants 3 and 5 in Figure 1). After this stage, the Q list is implemented, which includes only eligible applicants who were not already admitted through the general (G) list. In the example below, the Q list consists of applicants 9 and 10, who would have been admitted even without the policy, applicants 15 and 16, who are admitted only because of the policy, and applicants 17 and 20, who are not admitted to the university in either scenario. Eligible applicants are admitted until the remaining 40 percent of seats are filled or until the Q list is exhausted, whichever comes first.

If any seats remain unfilled, they are allocated to applicants from the universal G list.

3 Data, restrictions, and descriptive statistics

I use admissions data on all applicants to UFES from 2006 to 2009, obtained directly from the university, with 2008 corresponding to the first year of the policy. During this period, the university received 103,933 applications to 87 majors. The dataset includes individual-level information on major choice, entrance exam scores, and applicants' municipalities of residence. It also contains an array of demographic and socioeconomic characteristics collected through a survey administered during registration. I combine this data with publicly available information on major capacity by year, accessible to all applicants at registration.

I restrict the analysis to majors in the primary admissions cycle, covering 78 majors and 84 percent of applicants. I further restrict to majors at the main campus in Vitória, which accounts for 56 majors and 75 percent of applicants. Additionally, I include only majors with regular admissions and that were open before the policy's implementation. The final subpopulation comprises 74,164 applicants to 44 majors from 2006 to 2009. Admission was offered to 9,722 applicants, corresponding to a 13.11 percent admissions rate. Table B.1 summarizes these population restrictions.

As an outcome of interest, I identify the most selective majors using pre-policy measures of major selectivity averaged across 2006 and 2007. Selectivity is defined by a major's first-stage exam cutoff score, measured as the minimum score among admitted applicants in the first-stage exam, which is common to all applicants. The five most selective majors are Medicine, Pharmacy, Law, Environmental Engineering, and Production Engineering.

The dataset includes raw scores from the two entrance exams and ENEM scores reported by the Ministry of Education for applicants who provided their ENEM registration number, which is not mandatory. The ENEM exam, a federally administered test, consists of multiple-choice questions and an essay, scored on a scale from 0 to 100. Final scores are calculated using each year's predefined formula, available to applicants during registration. The first-stage score (S_1) is calculated as $S_1 = max\{(0.75E_1 + 0.15ENEM), E_1\}$, where E_1 is the first-stage exam score (out of 60 points), and $ENEM$ is the weighted average of the multiple-choice and essay scores (weights: 0.75 and 0.25, respectively). The maximum score for S_1 is 60 points. The second-stage score (S_2) is calculated as: $S_2 = F_1 + F_2 + Essay$, where F_1, F_2, and the essay each contribute up to 10 points, for a maximum S_2 score of 30 points. The final score (T) used for admissions is defined by $T = S_1 + 4S_2$, with a maximum of 180 points. I standardized all exam scores within each year to have mean zero and standard deviation one.

The policy targets applicants from low socioeconomic backgrounds. Eligibility is defined as being from a low-income household and attending public elementary and high schools. I create a variable to identify this group using self-reported data from the socioeconomic survey. Family income is a categorical variable ranging from *up to 3 times the minimum wage* (1), *up to 5 times the minimum wage* (2) to *above 30 times the minimum wage* (7). I classify as "low-income" all applicants in families receiving up to 5 times the minimum wage. This classification understates the policy's maximum requirement of 7 times the minimum wage. Public school attendance is a combination of elementary school and high school attendance. In the survey, respondents reported whether they had studied all or most of their studies in either federal, state, municipal, or private schools. My classification of an applicant as 'Eligible' may also deviate from the policy's classification since the latter required all high school and at least four years of elementary public school.

When comparing my eligibility classification with data on applicants claiming quota benefits in 2008, I find that 9.1 percent of those classified as non-eligible claimed the benefit, compared to 85.5 percent among eligible applicants. Claiming the benefit increases the probability of acceptance but involves a cost, as the university requires proof of eligibility upon admission. Low-income candidates need to present documentation for gross household income per capita, which may explain why the number of eligible applicants differs from those claiming the benefit. Additionally, classification errors, misinformation, or discrimination avoidance may affect the claim rate. Among non-eligible applicants, discrepancies could result from misclassification or attempts to fraudulently claim benefits.

Table B.2 compares individuals who claimed or did not claim quota benefits within simulated eligibility categories. Descriptive statistics suggest misclassification, partly due to measurement errors. Non-eligible applicants who claimed the benefit were more disadvantaged in several dimensions, including household income and public school status. They also had significantly lower ENEM scores than their peers who did not claim the benefits. This likely introduces a downward bias in the estimates. However, the overall direction of the bias is less clear, as discrimination avoidance or misinformation about the policy may also influence eligible applicants' decisions. For example, eligible applicants who did not claim the benefit were more likely to be from out of state and, therefore, potentially less informed about the policy. They were also more socioeconomically advantaged, with higher household incomes, less likelihood of being first-generation college students, and more likely to have previous college experience. These advantages are consistent with self-reporting inconsistencies and discrimination avoidance if, for example, they believe they can be admitted to college despite the policy.

Table 1: Summary statistics, pre-policy

	Eligible	Non-eligible	Δ
Individual Characteristics			
Female	0.61	0.54	0.06***
Age	23.03	20.07	2.95***
URM	0.59	0.42	0.17***
Works >30 hours/week	0.24	0.11	0.13***
From within state	0.95	0.90	0.06***
From within commuting zone	0.75	0.73	0.02*
First time applying	0.59	0.55	0.04***
Previous college experience	0.13	0.17	−0.04***
First generation in college	0.85	0.40	0.44***
Household income per capita	0.71	2.52	−1.76***
HH homeownership	0.77	0.83	−0.06***
Outcomes			
Reported ENEM scores	0.74	0.71	0.01
Average ENEM score	46.31	57.94	−11.32***
Applied to a most selective major	0.14	0.33	−0.19***
Passed the first-stage	0.36	0.49	−0.13***
Admitted into college	0.09	0.15	−0.06***
Admitted to a most selective major	0.00	0.02	−0.02***
Observations	5,156	13,448	

Note: Includes all applicants to 44 majors on the main campus with regular admissions in the pre-policy year 2007. Eligible applicants are defined as low-income and from public schools. Underrepresented racial minority (URM) includes Black, mixed-race, and Indigenous individuals. "First generation in college" refers to applicants whose mother and father did not attend college. "Household per capita" is measured by the average number of minimum monthly salary per capita. "Commuting zone" comprises five neighboring municipalities with inter-municipality public transportation available. p-value levels: $p < 0.1$, $p < 0.05$, and $p < 0.01$.

Table 1 presents pre-policy descriptive statistics for eligible and non-eligible applicants. Eligible applicants come from more disadvantaged backgrounds. They are also older, more likely to be female, and more likely to belong to an underrepresented racial minority (URM). Parental characteristics show the largest disparities, as eligible applicants are substantially more likely to be first-generation college students. Eligible applicants are also more likely to work full-time, highlighting inequalities in the time available for exam preparation.

Eligible applicants also scored lower on the ENEM exam (see A.2 for the density plots), with an average difference of 11 points (0.71 standard deviations). They were also less likely to be accepted in any major, an inequality the policy aimed to address. Before the policy, acceptance rates among eligible applicants were around 9 percent compared to 15 percent for non-eligible applicants. As shown in Figure A.3, after the policy, the acceptance rates among eligible applicants roughly doubled to 16 percent, while rates among non-eligible applicants remained stable.

4 Empirical strategy and results

I use a two-fold empirical strategy to evaluate the effects of affirmative action on the socioeconomic gap in college admissions. First, I demonstrate how the policy directly increased the representation of low-income individuals in college by comparing applicants who were "pushed in" to those "pushed out" due to the policy. Second, for the indirect effects of the policy on application behavior, I estimate a differences-in-differences model to identify the change in the socioeconomic gap (eligible vs. non-eligible) in applications to more selective majors.

4.1 Direct effects: the redistributive effects of affirmative action

Admissions are determined by directly observed criteria (i.e., exam scores). Therefore, it is possible to assign acceptance status under different admissions rules for each cohort of applicants. To assess the direct effects of the policy on increasing representation from underrepresented groups at the university, I compare whether an applicant would have been accepted without the policy versus with the policy in place. Based on their scores, I classify applicants in 2008 (the first policy year) into three groups: (i) always admitted, (ii) not admitted due to the policy (pushed-out), and (iii) admitted due to the policy (pushed-in). This approach follows similar methodologies used by Bertrand et al. (2010), Francis and Tannuri-Pianto (2012a), and Estevan et al. (2018).

For the implementation, I restricted the analysis to applicants who passed the first stage in 2008, as second-stage scores are only available for this group. Applicants are ranked by total scores. Without affirmative action, applicants are accepted if their rank is less than or equal to major capacity. With affirmative action, applicants are first ranked by total scores, and the top 60 percent of capacity is filled regardless of eligibility. The remaining 40 percent is then allocated exclusively to eligible applicants. This procedure assigns each applicant an acceptance status under both admissions designs. This simulation is performed prior to imposing population restrictions.

To measure the redistributive effects of the policy, I compare demographic and socioeconomic characteristics across the three groups. Observed variables include public school attendance, low-income status, standardized ENEM score, first-time applicant status, previous college experience, gender, age, racial minority group membership, full-time employment, first-generation college status, family homeownership, and residency within the state or commuting zone. I use a t-test to compare the difference in composition between the "pushed in" and "pushed out" groups.

4.1.1 Results

Table 2: Redistribution effects: comparing applicants always admitted, pushed in and out by the policy

	Always admitted	Pushed-in	Pushed-out	Diff.[In - Out]
Public-school	0.28	0.97	0.07	0.90^{***}
Low-income	0.44	0.86	0.29	0.57^{***}
Standardized ENEM Score	0.59	0.42	0.72	-0.31^{***}
First-time applicant	0.43	0.49	0.39	0.10^{**}
Previous college experience	0.82	0.87	0.85	0.02
Female	0.52	0.47	0.51	-0.04
Age	20.92	21.04	19.78	1.26^{***}
Racial minority	0.45	0.51	0.41	0.10^{**}
Works >30hours/week	0.13	0.15	0.07	0.08^{***}
First-generation college	0.46	0.75	0.37	0.37^{***}
HH homeownership	0.82	0.74	0.82	-0.08^{**}
Within state	0.97	0.95	0.98	-0.02
Commuting zone	0.86	0.70	0.85	-0.15^{***}
Observations	1903	498	498	996

Note: The first column, "always accepted," refers to applicants accepted under both types of admissions, with and without quotas. The second column, "pushed-in," refers to applicants accepted only because of the policy who would have been rejected in its absence. The third column, "pushed-out," refers to applicants not accepted due to the policy but who would have been accepted without it. The fourth column presents the mean difference between "pushed-in" and "pushed-out," with symbols indicating the p-value level of the test under the null hypothesis [Diff = 0]. The values for public school and low-income do not sum to 1 due to misreporting, as discussed in Section 3. p-value (p) levels: * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

Simulation results show that 79 percent of accepted applicants would have been admitted regardless of the policy. Table 2 indicates that the policy increased the representation of first-time applicants, racial minorities, and full-time workers more than it pushed out similar groups. The most notable change is the increased representation of first-generation college students: 75 percent of the "pushed in" group are first-generation, compared to 37 percent of the "pushed out" group, a proportion lower than those always admitted. The policy also redistributed seats to individuals living outside the metropolitan area. Field-specific results are presented in Table B.4.

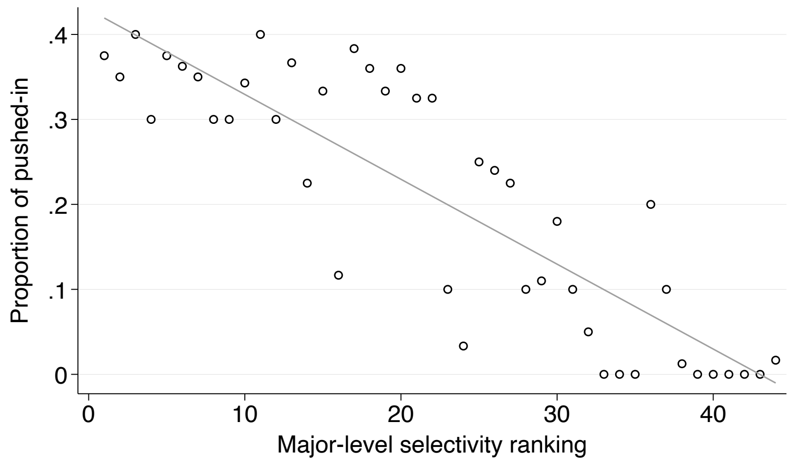
Analysis across majors (Figure 2a) and fields (Figure 2b) reveals that redistribution is concentrated in highly selective majors and high-return fields. The more selective the major, the stronger the redistribution effect. In Health and STEM fields, about 30 percent of eligible applicants were admitted only because of the policy.

As expected, applicants pushed in by the policy generally have lower average achievement than those pushed out. The average difference in scores between those groups is 0.31 standard deviations. This outcome is expected due to the policy's goal to address persistent achievement gaps that impose a college barrier to individuals from disadvantaged backgrounds. However, Figure A.4 shows that trade-offs occur among high-achieving applicants, as both "pushed-in" and "pushed-out" groups score within the top percentiles of the state-level ENEM distribution. The average ENEM score for the "pushed-in" group is 76.5 (top 10th percentile), while for the "pushed-out" group it is 81.6 (top 5th percentile).

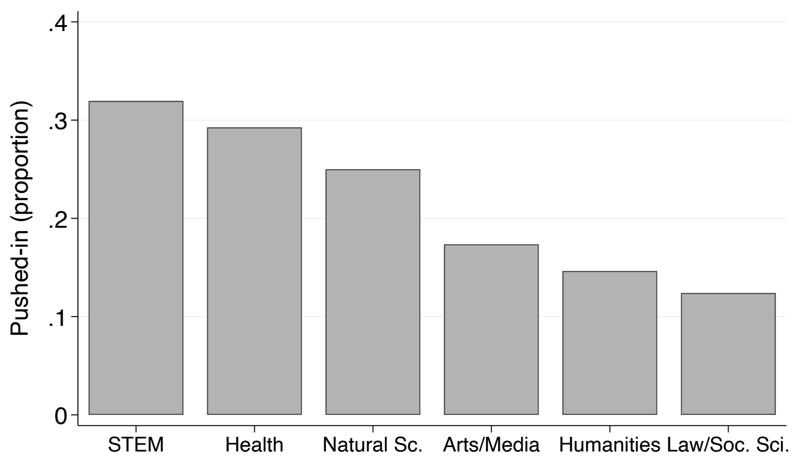
More than promoting access to college in general, increasing the representation of low-income students in high-return majors is an important channel through which affirmative action can affect social and economic mobility. The higher socioeconomic background of "pushed out" applicants suggests they have more resources to pursue alternative options, which may be unavailable to disadvantaged individuals. This hypothesis aligns with findings from Barahona et al. (2023), which show that AA promotes a 1:1 income transfer from non-targeted to targeted, and Duryea et al. (2023), which show that public colleges play a critical role in increasing income among disadvantaged applicants, while advantaged ones find alternative ways to compensate for losing university quality when rejected.

Figure 2: Proportion of eligible applicants 'pushed-in' by major selectivity and fields

(a) By major-level selectivity



(b) By field



Note: This figure reports the proportion by major and fields of low-income applicants from public schools (eligibles) admitted only because of the affirmative action policy. Selectivity is defined by the first-stage exam cutoff. Scores are ranked from highest to lowest, and the selectivity ranking ranges from most selective (ranking = 1) to least selective (ranking = 44). Majors are grouped within fields as described in Table B.3. The proportion of pushed-in is given by $\frac{\#pushed-in}{\#accepted}$.

Finally, a caveat to these simulation results is that they do not account for the potential incentives for applicants to behave strategically (e.g., by updating their major choices). I provide insights on the relative impact of strategic behavior on redistribution by performing an alternative simulation exercise. Since I do not observe self-reported quota status before the policy, I use an eligibility dummy based on self-reported socioeconomic data. To allow cross-year comparisons, I simulate both quotas and non-quotas scenarios for the pre- and post-policy years.

Table B.5 reports the results of the alternative simulations. Columns labeled "2007" use pre-policy data and do not account for strategic behavior, while columns labeled "2008" use post-policy data and thus reflect strategic behavior induced by the policy. The results show no systematic differences between the pushed-in or pushed-out groups across scenarios, except for high-achieving and younger applicants. For instance, strategic responses may have improved the academic readiness of the initial cohort, as evidenced by an increase in the average ENEM scores among the pushed-in group from 0.29 to 0.42 standard deviations. Age also correlates to how individuals responded to the policy, with younger targeted applicants being more likely to be pushed in, whereas younger non-targeted applicants are slightly more likely to be pushed out.

4.2 Indirect effects: the effects of affirmative action on the socioeconomic gap in major choice

I use a differences-in-differences model (Equation (4.2)) to estimate the effects of the policy on the socioeconomic gap in application behavior and admissions to selective majors. A comparable identification strategy has been utilized in previous studies (Antonovics and Backes, 2013; Bleemer, 2023; Estevan et al., 2018, 2019). The outcomes of interest (A_{imt}) are: (i) major choice by selectivity ranking, (ii) applying to a most selective major, (iii) applying and passing the first stage for a most selective major, and (iv) applying and being admitted to a most selective major, for applicant i, from municipality m, at year t.

$$A_{imt} = \alpha + \gamma_1 Eligible_i + \gamma_2 Post_t + \beta(Eligible_i \times Post_t) + \delta ENEM_i + \nu \mathbf{X}_i + \sigma_m + \epsilon_{imt}$$

In this equation, *Eligible* and *Post* are group- and post-policy-specific indicators. The coefficient of interest, β, captures the short-term effect of the policy on the socioeconomic gap for each outcome of interest - i.e., the difference between eligible and non-eligible applicants before and after the policy. It is important to note that the introduction of the policy in 2008 creates variation in admission probabilities between the two groups, increasing the likelihood of admissions for eligibles and decreasing it for non-eligibles. Because the policy affects both groups, β identifies the change in the gap between eligibles and non-eligibles. With this strategy, I cannot distinguish between the effects on each group separately, and results should *not* be interpreted exclusively as the effect on eligible applicants.

To leverage the cleaner exogenous shock provided by the policy's introduction, the preferred estimates restrict the analysis to the first policy year and one pre-policy year. In the appendix, I show that the results remain robust when including one more pre- and post-policy periods. To support the causal interpretation of β, I test whether the gap between the two groups was stable in the pre-policy period by estimating Equation (4.2) for various outcomes using two pre-policy years. The results of these tests, presented in Table B.6 in the appendix, confirm the absence of significant pre-policy trends.

The vector X_i contains the following individual-level controls: sex, race, age, first-time applicant, and previous college experience. Municipality of residence fixed effects (σ_m) control for geographic differences in education quality and distance costs. As a proxy for unobserved ability, I control for the standardized national high school exam score (ENEM), which applicants take before applying to the university. Standard errors are clustered at the municipality level to account for correlations in the error term across individuals within the same municipality.

The ENEM score is included to control for differences in academic readiness prior to application. Applicants take the ENEM before applying to the university, and, while they do not receive official reports until later, they generally know their raw scores when deciding which major to apply for. This timing makes the ENEM a reliable measure of academic readiness. However, reporting ENEM scores is not mandatory, and 26 percent of applicants did not report it between 2006 and 2009. One possible reason is the timing of ENEM registration, which occurs months before the university's applications.

A potential concern is that policy anticipation or expectations might have influenced the composition of those reporting ENEM scores. In Table B.7, I test whether the composition of applicants changes from year to year, both for all applicants and within the group that reported ENEM scores. Comparing pre-policy (2007) and post-policy (2008) periods, I find no significant compositional changes, except for an increase in the proportion of eligible applicants. Restricting the population to those reporting ENEM scores replicates the same trends, mitigating concerns about selection bias in this subgroup.

A final consideration involves the potential policy effects at the extensive margin, such as the decision to apply to the university, compared to effects at the intensive margin, such as changes in major choice conditional on applying. While the empirical strategy used in this paper cannot separately identify these two mechanisms, I provide descriptive evidence suggesting that the effects more likely reflect changes in major choice rather than extensive application decisions. I investigate differential behavioral responses between the groups using two approaches. First, Figure A.5a shows a decline in the number of applications between 2006 and 2009, primarily driven by a steady decline in non-eligible applicants. However, in Figure A.5b, I demonstrate that the decrease in non-eligible applicants is not strongly correlated with major selectivity. In contrast, changes in applications among eligibles are more strongly correlated with major selectivity, suggesting that eligibles are switching from less selective to more selective majors. Second, Table B.8 compares observed characteristics across years for eligibles and non-eligibles reporting ENEM scores. I find no substantial evidence of selection effects, except that non-eligible applicants have slightly higher post-policy achievement (+0.05 SD). In contrast, eligible applicants are more likely to have previous college experience (+3 p.p.) and to come from outside the commuting zone (+ 4 p.p.). These trends suggest that higher-achieving non-eligible applicants continuing to apply may bias the estimates downward.

After restricting the population to those reporting ENEM scores, I further exclude applicants with missing information on a relevant control variable and municipalities with only one applicant. Details of the sample restrictions are provided in Table B.1. The final dataset for analysis consists of 51,547 applicants to 44 majors from 2006 to 2009.

4.2.1 Results

Effects on application behavior

I first describe the effects of the policy on the socioeconomic gap in application behavior. I present OLS estimates for two of the four outcomes of interest: (i) major selectivity ranking and (ii) applied to a most selective major. Although my preferred estimates compare the immediate pre- and post-policy years, I provide additional evidence that the results are persistent (Table B.6 and Figure A.6).

I first evaluate the effects of the policy on the socioeconomic gap in the major selectivity ranking. In Table 3, column (1) shows the average change in the socioeconomic gap without adjustments for observed characteristics. Before the policy, eligible applicants chose majors ranked, on average, 8.43 positions lower than non-eligible applicants. Unconditionally, the policy reduced the gap by 1.61 ranking points, closing 19 percent of the unconditional pre-policy gap.

Table 3: Effects of AA on the socioeconomic gap in major selectivity ranking

	Selectivity ranking		
	(1)	(2)	(3)
Eligible x Post	1.606***	1.646***	1.424***
	(0.33)	(0.31)	(0.30)
Eligible	-8.427***	-5.383***	-3.639***
	(0.58)	(0.37)	(0.41)
Post	0.687***	0.467**	0.490***
	(0.18)	(0.18)	(0.15)
Observations	25084	25084	25084
R^2	0.081	0.182	0.249
ENEM Std Score		x	x
Mun. FE; Ind. controls			x
Mean Dep. Var	29.248	29.248	29.248

Note: This table shows OLS estimates for Equation (4.2), using major ranking as the dependent variable. Rankings are based on major cutoffs in the first stage in pre-policy years. Columns (2) and (3) include a non-linear function of ENEM scores (degree-four polynomial). Column (3) also controls for age, race, sex, first-time applicant status, prior college experience, and fixed effects for municipality of residence. Errors are clustered at the municipality level. p-value levels: * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

Given the significant achievement gap between eligible and non-eligible applicants, column (2) controls for a polynomial of degree four for the ENEM score to account for differences in acceptance probabilities influencing application behavior. While ENEM scores are highly correlated with the first-stage exam scores (Figure A.7), there was still a pre-policy gap of about five ranking positions between the two groups. Conditional on scores, the policy reduced the achievement gap by 1.65 points or 30 percent of the pre-policy conditional gap. In column (3), after adjusting for both academic and demographic backgrounds, there is a remaining pre-policy application gap of 3.64. The policy closed this fully conditional gap by 1.42 points, equivalent to 39 percent of the pre-policy conditional gap. For robustness, Table B.9 reports consistent results from an alternative specification using cutoff scores rather than rankings.

Next, in Table 4, I report results on the socioeconomic gap in applications to a most selective major. Columns (1)-(4) show before-and-after estimates for separate equations for eligible and non-eligible applicants. Before the policy, eligible applicants were 21 percentage points (p.p.) less likely to apply to a most selective major. After the policy, both groups applied proportionally more to these majors, but the increase was larger for eligibles (+5.8 p.p. and 5.1 p.p.) than for non-eligibles (+1.4 p.p. and 1.7 p.p.). This evidence, along with

Figure A.5b, suggests that the pooled effects on the socioeconomic gap are primarily driven by eligible applicants' responses to the policy.

Table 4: Effects of AA on the socioeconomic gap in applications to a most selective major

Dep. Var.: 1[Applied to a most selective major]

	Before-After				**Diff-in-Diff**	
	Eligible	Eligible	Non-eligible	Non-eligible	Pooled	Pooled
Eligible x Post					0.044^{***}	0.036^{***}
					(0.01)	(0.01)
Eligible					-0.209^{***}	-0.099^{***}
					(0.02)	(0.01)
Post	0.058^{***}	0.051^{***}	0.014^{*}	0.017^{**}	0.014^{*}	0.017^{**}
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Observations	7614	7609	17470	17467	25084	25084
R^2	0.006	0.096	0.000	0.136	0.036	0.150
ENEM; Ind. ctrls		x		x		x
Mun. FE		x		x		x
Mean Dep. Var	0.139	0.139	0.348	0.348	0.289	0.289

Note: This table shows OLS estimates of Equation (4.2). The dependent variable is a dummy equal to one if the applicant applied to a most selective major (Medicine, Pharmacy, Environmental Engineering, Production Engineering, or Law). Columns (2), (4), and (6) include controls for ENEM scores (degree-four polynomial), age, race, sex, first-time applicant status, prior college experience, and fixed effects for municipality of residence. Errors are clustered at the municipality level. p-value levels: * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

The estimates in columns (5) and (6) of Table 4 quantify the effects of the policy on the socioeconomic gap in applications to selective majors. The policy reduced the unconditional gap by 4.4 p.p. or 21 percent of the pre-policy gap. When accounting for individual characteristics, the policy reduces the conditional gap by 3.6 p.p. or 36 percent of the pre-policy gap. These findings indicate that the policy not only redistributed seats towards individuals from a lower socioeconomic background but also reduced the socioeconomic gap in applications to more selective majors.

Finally, while the empirical strategy identifies the policy's effects on the socioeconomic gap in major choice, a key policy-relevant parameter, the results may reflect a combination of individual strategic behaviors, such as major choice or the decision to apply to the university. Figure A.5a shows a steady decline in non-eligible applications between 2006 and 2009, while eligible applications remained relatively stable. This suggests the policy may have encouraged eligible applicants who otherwise might not have applied. Figure A.5b further reveals that eligible applications were strongly correlated with major selectivity, while non-eligible applications declined more evenly across the selectivity distribution. This evidence suggests that strategic major choice, particularly among eligible applicants, accounts for a substantial portion of the estimated effects.

Effects on the joint probability of applying and being accepted to a most selective major

Next, I estimate the effects of the policy on the joint probability of applying and being admitted to a most selective major. Table 5 reports these results. Columns (1) to (3) refer to applying and passing the first stage, while columns (4) to (6) report results on applying and being admitted to a most selective major.

Table 5 provides additional evidence that the policy successfully lowered barriers for applicants from disadvantaged backgrounds. The policy's primary goal was to address structural inequalities in education that lead to low SES applicants scoring lower on entrance exams and, consequently, having reduced chances of being accepted to a high-quality, tuition-free university. In this context, column (4) shows that the policy closed the unconditional gap in the joint probability of applying to and being accepted to selective majors. Additionally, columns (5) and (6) show that the policy also redistributed seats to low-income applicants from public schools relative to their counterparts with comparable achievement levels.

Table 5: Effects of AA on the socioeconomic gap in admissions to a most selective major

	Applied and passed the first stage			Applied and accepted		
	(1)	(2)	(3)	(4)	(5)	(6)
Eligible x Post	-0.011	-0.021***	-0.020***	0.022***	0.017***	0.017***
	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)
Eligible	-0.127***	-0.031***	-0.026***	-0.022***	-0.000	0.001
	(0.02)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)
Post	0.020***	0.028***	0.029***	-0.005	0.001	0.002
	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)
Observations	25084	25084	25084	25084	25084	25084
R^2	0.036	0.253	0.267	0.003	0.078	0.087
ENEM Std Score		x	x		x	x
Mun. FE; Ind. controls			x			x
Mean Dep. Var	0.113	0.113	0.113	0.019	0.019	0.019

Note: This table shows OLS estimates of Equation (4.2). The dependent variable for columns (1) to (3) is a dummy indicating whether the applicant applied to a most selective major and passed the first stage. The dependent variable in columns (4) to (6) is a dummy indicating whether the applicant applied to and was admitted to a most selective major. Additional control variables include, progressively, a non-linear function of the applicant's ENEM score (degree-four polynomial), age, race, sex, first-time applicant status, prior college experience, and fixed effects for the municipality of residence. Errors are clustered at the municipality level. p-value levels: * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

However, columns (1) to (3) in Table 5 reveal an unintended effect of the policy. Column(1) shows the policy had no effect on the unconditional probability of applying to and passing the first stage for a selective major. This result is expected, as the eligible group received no advantage at this stage. However, when controlling for achievement and background, in columns (2) and (3), the policy appears to have widened the socioeconomic gap by 2 p.p., nearly doubling the gap. These findings suggest that redistribution happened at the cost of exacerbating the socioeconomic gap among those applying to a most selective major in the first stage. Heterogeneity analyses in the next section provide suggestive evidence that some individuals may have overestimated their chances of acceptance, with a substantial portion of the effects on application behavior being driven by applicants less likely to gain admission to selective majors.

5 Heterogeneity

5.1 Differential effects on URM applicants

Although the affirmative action policy studied in this paper is race-neutral, it indirectly targeted underrepresented minorities (URM) applicants due to the correlation between attending public high schools and belonging to a racial minority (see Table 1). The results from the direct effects analysis show that URM applicants were more likely to be pushed into college than pushed out by the policy (see Table 2), with a 10 p.p. difference between these groups. This outcome is largely a mechanical effect of the strong correlation between race and socioeconomic status.

Beyond the mechanical effects, I investigate whether the policy influenced the application *behavior* of eligible URM applicants by estimating a variation of Equation 4.2, which includes interaction terms for URM status. Table B.10 presents results for the outcomes: (1) ranking of the chosen major, (2) applying to a most selective major, (3) passing the first stage for a most selective major, and (4) being accepted into a most selective major.

The results show no statistically significant differences in application behavior between URM and non-URM eligible applicants. However, estimates in column (4) indicate that the effects on the probability of being accepted to a most selective major are largely driven by non-URM applicants. These findings align with Vieira and Arends-Kuenning (2019), which demonstrates that race-blind affirmative action policies in Brazil are generally less effective at increasing URM representation in colleges compared to race-based policies.

5.2 Application behavior by achievement levels

One explanation for the worsening of the gap in passing the first stage lies in the combination of the admissions design and the potential change in application behavior induced by the affirmative action policy. Since there is no quota in the first stage, if more applicants with lower scores switch to a more selective major, this movement may reduce their admission chances.

In this section, I investigate the hypothesis of whether individuals over-predict their chances of acceptance under the new policy. I estimate equation 4.2 separately by achievement level, where "above mean" is defined as scoring above the ENEM mean. Figure A.8 illustrates that the ENEM mean marks a sharp increase in the probability of being admitted to a most selective major. The likelihood of acceptance is non-zero for individuals scoring above the mean, whereas those scoring below the mean have little to no chance of admission.

Table 6: The effects of AA on the socioeconomic gap in applications to a most selective major, by achievement levels

	Applied to a most selective major					
		Below			Above	
Eligible x Post	0.050***	0.053***	0.050***	0.056***	0.047***	0.042***
	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)
Eligible	-0.126***	-0.116***	-0.085***	-0.221***	-0.166***	-0.134***
	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Post	-0.000	-0.001	0.001	-0.003	0.026**	0.030***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Observations	12026	12026	12026	12718	12718	12718
R^2	0.018	0.023	0.064	0.021	0.082	0.144
ENEM Std Score		x	x		x	x
Mun. FE & Ind. cntrls			x			x
Mean Dep. Var	0.185	0.185	0.185	0.396	0.396	0.396

Note: This table shows results for Equation (4.2), by achievement levels. The dependent variable is a dummy indicating whether the applicant applied to a most selective major. Achievement levels are defined by whether the applicant's ENEM score is above or below the mean, reflecting their likelihood of acceptance to a most selective major. Column (2) includes a degree-four polynomial of ENEM scores. Column (3) includes controls for observed characteristics (age, race, sex, first-time applicant status, prior college experience) and fixed effects for the municipality of residence. Errors are clustered at the municipality level. p-value levels: * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

The results support the hypothesis that some applicants over-predict their chances of acceptance under the new policy. Table 6 shows that although both groups are more likely to apply to a selective major, a substantial portion of the effects of the policy on reducing the socioeconomic gap is occurs among applicants less likely to be admitted to a most selective major. Before the policy, the unconditional socioeconomic gap among applicants scoring below the ENEM mean was 12.6 p.p. (column (1)). The policy closes that gap by 40 percent, equivalent to a 5 p.p. effect for lower-scoring applicants. Conversely, for applicants scoring above the ENEM mean, the pre-policy gap was 22.1 percentage points, and the policy reduced this gap by 25 percent, or 5.6 percentage points. Looking at the fully conditional gap, the reduction among applicants scoring below the mean was 59 percent, while the gap among those scoring above the mean decreased by 31 percent.

One potential explanation is that the strategic behavior, such as applying to more selective majors, benefited some applicants but made others worse off. While some individuals accurately predicted their chances of acceptance, others with lower probabilities of admission may have overestimated their chances, leading them to miss the opportunity to attend a public college in that year. Table B.11 provides estimates including additional pre- and post-policy years, offering suggestive evidence of learning for those more likely to successfuly update their major choices. Over time, the effects of the policy on applications among individuals below the ENEM mean diminished slightly. In contrast, for those above the mean, the effect increased from 5.6 p.p. in 2008 to 7.7 p.p. in 2009.

5.3 Zooming into the potential net effects of the policy: comparing applicants across field-related majors

To further investigate the major switching behavior induced by the policy, particularly among eligible applicants, I show descriptive statistics on the probability of choosing between closely related majors. I restrict the analysis to applicants for the following majors: Medicine, Nursing, Pharmacy, and Dentistry. These majors fall within the same field and require the same second-stage exams (Biology and Chemistry), minimizing switching costs. This approach helps identify potential substitute majors without requiring observed ranked major preferences.

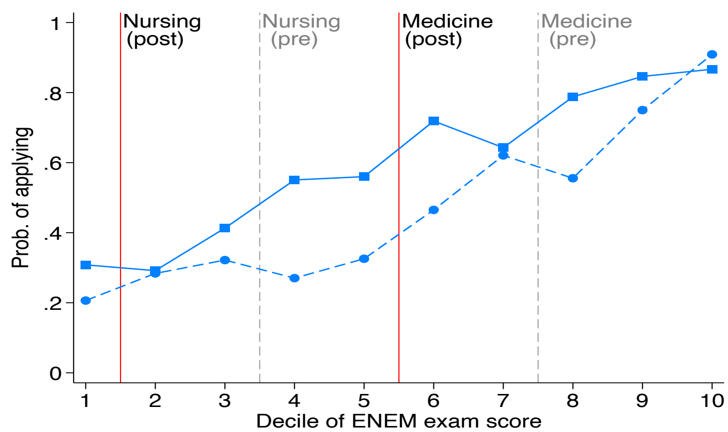
Figure A.9 shows the proportion of applicants by achievement deciles. The four-panel figure indicates that most substitution effects seem to have occurred between Medicine and Nursing, particularly for eligible applicants. This is intuitive, as these two majors are closer substitutes compared to other options within the field. In the remainer of the discussion, I focus on the switching behavior between Medicine and Nursing.

Figure 3 presents the proportion of applicants by ENEM score deciles before and after the policy for Medicine and Nursing, calculated among eligible applicants to the four related majors. The vertical red (gray) lines indicate the ENEM decile corresponding to a non-zero likelihood of acceptance in each major after (before) the policy, which I interpret as an expected cutoff.

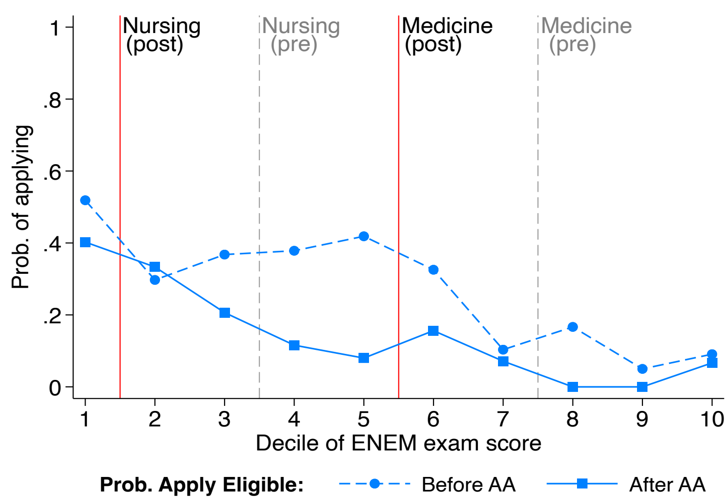
Comparing the proportion of eligible applicants applying before and after the policy, there is a decrease in Nursing applicants and a parallel increase in Medicine applicants. More importantly, focusing on the expected pre- and post-policy cutoff lines reveals that some individuals accurately predicted their improved chances of acceptance, while others overestimated them. For instance, individuals in the 2nd to 5th deciles fall below Medicine's post-policy cutoff but above Nursing's. For this group, switching to Medicine cost them a chance at college admission in that year. Applicants in the 1st decile are below the cutoffs for both majors, so switching does not impact their outcomes. Conversely, for individuals in or above the 6th decile, switching between the two majors is consistent with their high likelihood of admission to either.

Figure 3: Probability of applying to Medicine or Nursing, among eligible applicants

(a) Medicine



(b) Nursing



Note: This figure shows the proportion of low-income public-school (eligible) applicants per decile of ENEM scores applying to (a) Medicine or (b) Nursing. Proportions are calculated across majors in the health field that share the same second-stage exams. Results for all majors are presented in Figure A.9. Vertical red lines represent the post-policy expected cutoff for eligibles in each major. Gray lines represent the expected cutoffs for all applicants pre-policy. Expected cutoffs are based on ENEM scores of accepted applicants before and after the policy.

Finally, it is important to note that individuals applied to majors where they were unlikely to gain admission in both the pre- and post-policy periods. This suggests that the combination of affirmative action with a strict policy requiring applicants to choose only one major, alongside uncertainty about entrance scores, created conditions for individuals to apply to majors where they had minimal chances of acceptance. Alternative admissions designs could mitigate this issue while preserving the distributional gains of the affirmative action policy. In recent years, Brazil implemented a centralized admissions policy that altered the timing of major selection and allowed applicants to choose two majors instead of one. Future research is needed to determine whether these changes effectively addressed the issues highlighted in this paper.

6 Conclusion

This paper evaluates the effects of an affirmative action policy on redistributing college seats toward applicants from low socioeconomic backgrounds and its indirect effects on major choice. The quota-based affirmative action policy implemented by a flagship university in Brazil reserved 40 percent of seats for low-income applicants from public elementary and high schools. The policy aimed to address the historical socioeconomic gap in achievement that left low-income applicants underrepresented at the university, particularly in selective majors.

The results indicate that the policy effectively redistributed seats to applicants of low socioeconomic status (SES). Since targeted applicants were already well represented in some majors, the policy primarily ensured redistribution across fields. The policy accounted for 30-40 percent of low-SES applicants admitted to selective majors. Furthermore, affirmative action reduced the socioeconomic gap in applications to the most selective majors by 21 percent of the unconditional gap and 36 percent among individuals with comparable pre-college achievement levels and backgrounds.

However, heterogeneous effects suggest that a significant share of the impact on major choice occurred among individuals with lower chances of admission to selective majors. These findings are consistent with the hypothesis that the policy induced strategic major choices that only paid off for some applicants. For others, the policy may have prompted strategic mistakes, with some applicants reaching too high and missing the opportunity of acceptance in a less competitive major. This highlights the importance of examining the interaction between affirmative action and the admissions mechanism to mitigate unintended consequences of the policy.

This paper contributes to the literature on access to higher education, major choice, and affirmative action policies, particularly the recent research on affirmative action in Brazil. Quotas are Brazil's most prevalent form of affirmative action, although some institutions adopt alternative mechanisms, such as bonus points. Comparing my findings to previous research on bonus points policies (Estevan et al., 2018, 2019), I find similar results on major choices between a 40 percent quota and a 30-point bonus policies. These comparable outcomes are puzzling, given that quotas are more aggressive in altering admissions probabilities. While bonus points level the playing field, quotas guarantee top-achieving public school students a seat regardless of their score relative to private school students. One possible explanation for these findings is that students may respond to the existence of a policy but not necessarily to its specific design details. Comparing the operating mechanisms across different types of affirmative action policies is an important topic for future research.

Finally, the finding that a race-neutral policy increased racial diversity in admissions warrants further consideration. The redistributive effect of the policy showed that applicants pushed in were significantly more likely to be Black, mixed-raced, or Indigenous than those pushed out. This finding reflects Brazil's demographic composition, where over half the population belongs to these racial groups, with the state of Espírito Santo reaching 57 percent. Moreover, non-white Brazilians are disproportionately represented at the lower end of the income distribution, with Black and mixed-raced workers earning, on average, about 40 percent less than their white counterparts. However, the finding that the reduced socioeconomic gap in acceptance to selective majors is driven by non-URM eligibles aligns with prior research suggesting that race-neutral policies are less effective at increasing racial diversity than race-based policies. After years of social pressure for race-based policies, the federal government enacted a national affirmative action policy in 2012 that included specific quotas targeting Black and Indigenous people. UFES, in particular, was required to adapt its policies to meet these federal requirements. The extent to which race-neutral and race-based policies differentially affect racial representation at Brazilian colleges is left for future research.

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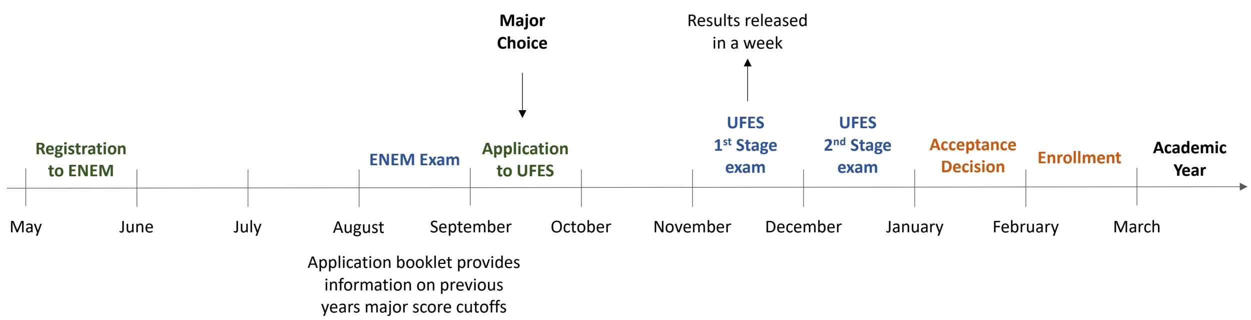
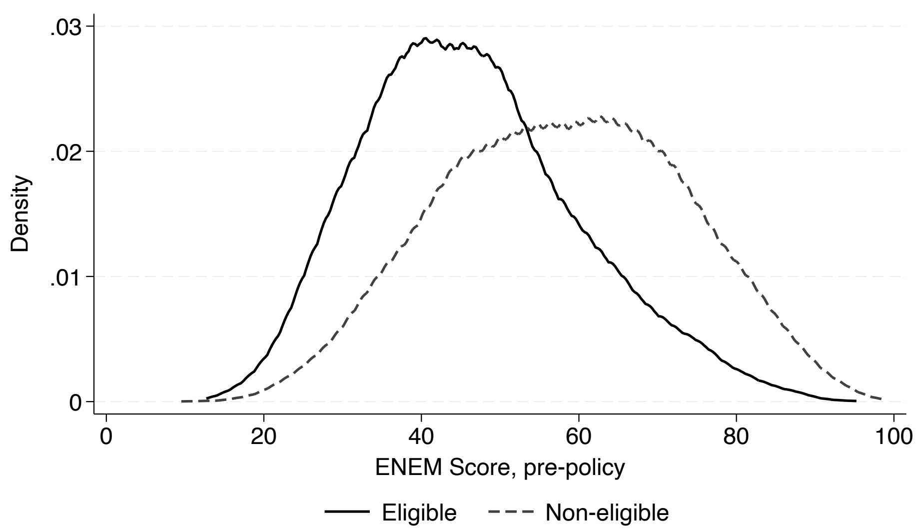
A Additional figures

Figure A.1: UFES's application schedule



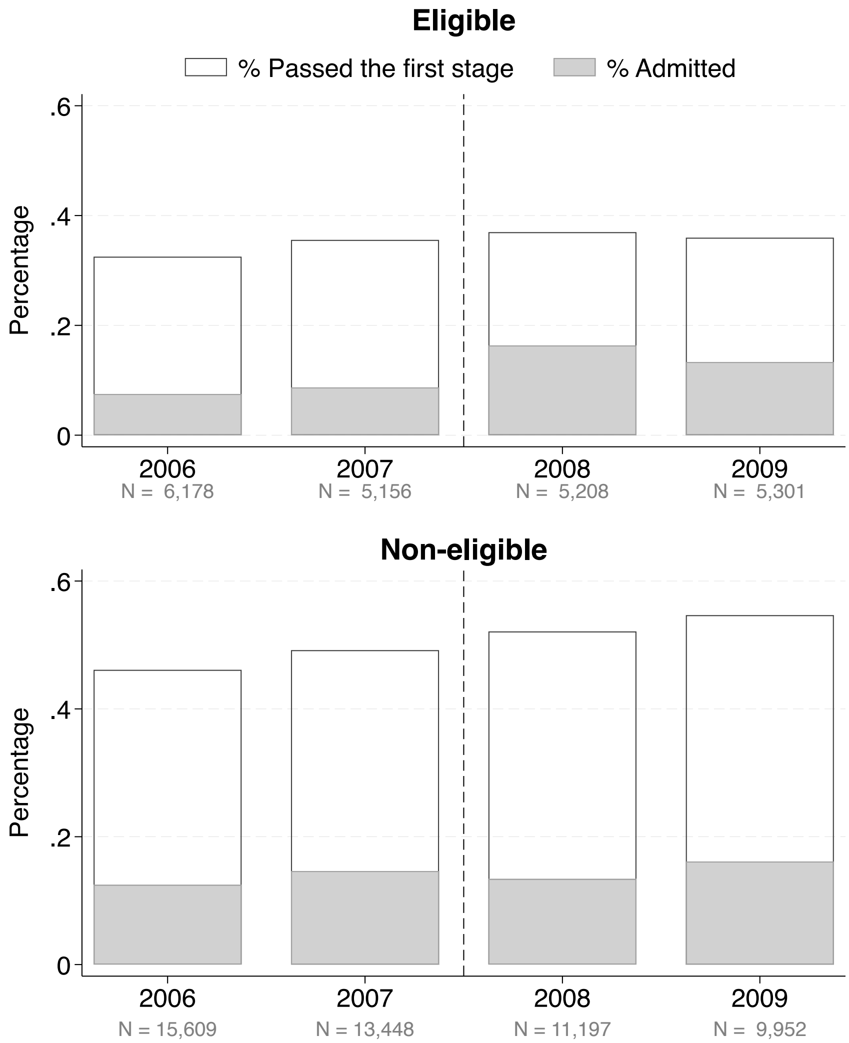
Note: This figure shows the timeline of events for an application year. Applicants register for the ENEM exam in May to qualify for bonus points in the university admissions process. Applications open in August, and applicants receive booklets with detailed information, including previous years' cutoffs and major competitiveness. Exams are held in November and December. A portion of applicants advance to the second stage. Results are released in January and accepted applicants enroll in February. The academic year begins in March.

Figure A.2: ENEM score distribution, by eligibility



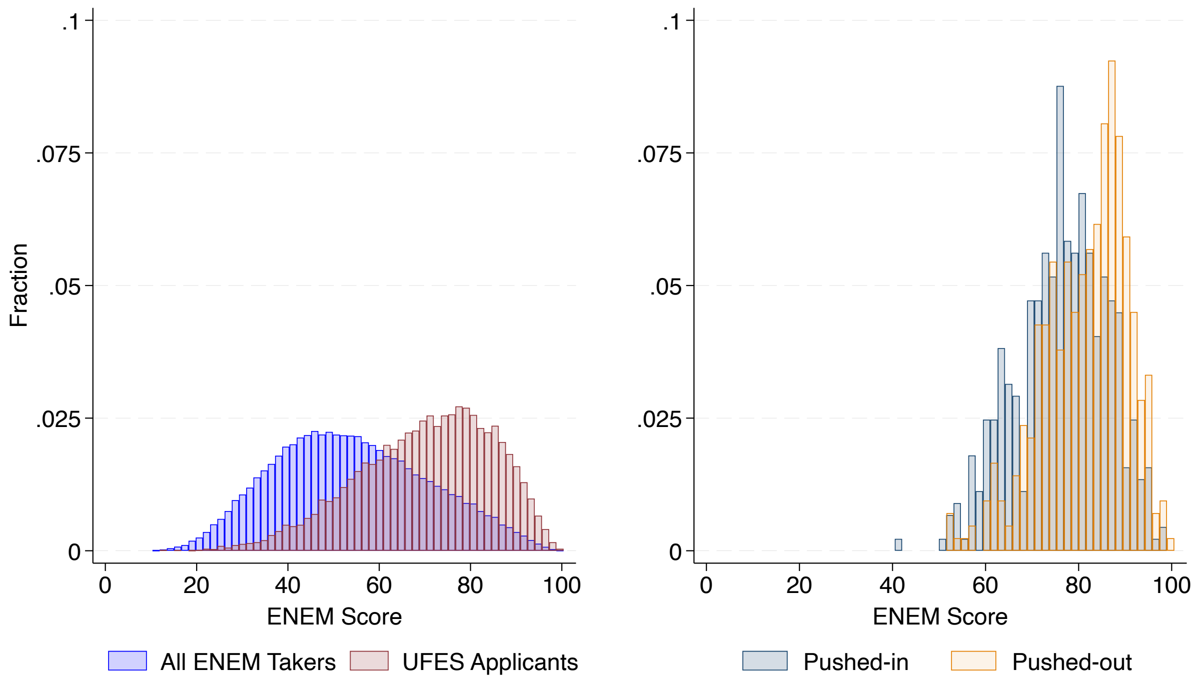
Note: The "Eligible" category refers to low-income applicants from public schools, while "Non-eligible" includes all other applicants not meeting at least one of these criteria. Data is for the pre-policy year 2007.

Figure A.3: Number of applicants and acceptance rates, by year



Note: The "Eligible" category refers to low-income applicants from public schools, while "Non-eligible" includes all other applicants not meeting at least one of these criteria. Includes all applicants to 44 majors on the main campus under regular admissions.

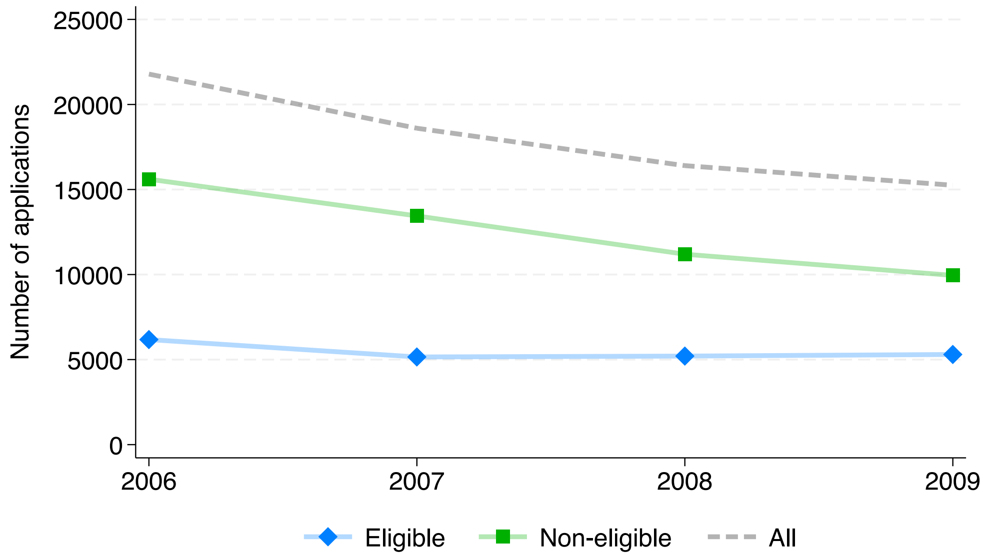
Figure A.4: Distribution of ENEM scores, by different groups



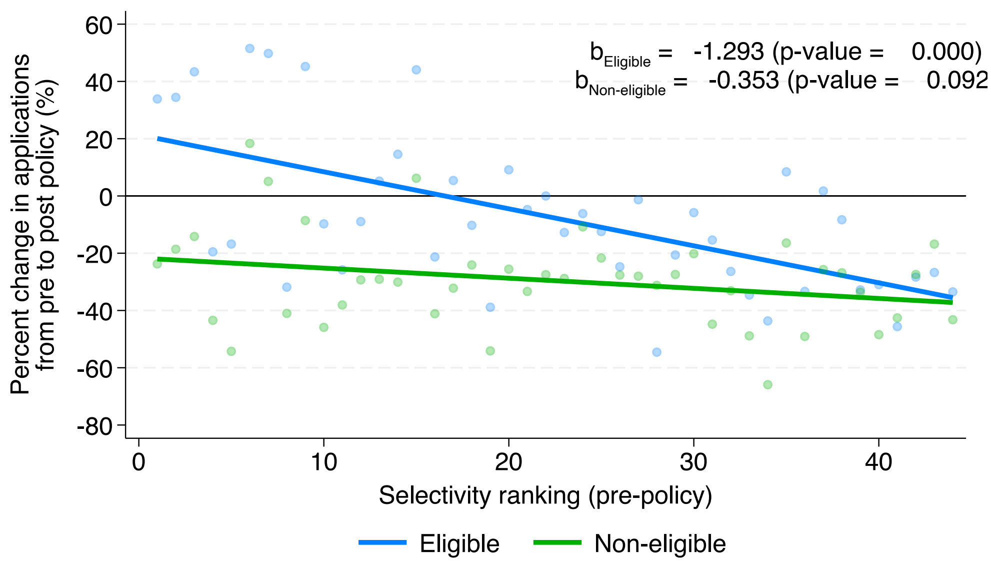
Note: This figure shows the distribution of ENEM scores across different populations. Data source is ENEM 2007, used by applicants to college admissions in the first year of the policy. "All ENEM takers" includes individuals residing in Espírito Santo who took the ENEM exam. "UFES Applicants" refers to all applicants who reported their ENEM scores to the university. "Pushed-in" are applicants that were only accepted because of the affirmative action policy. "Pushed-out" are applicants who were not admitted because the policy was in place.

Figure A.5: Change in applications pre- and post-policy

(a) Total number of applications

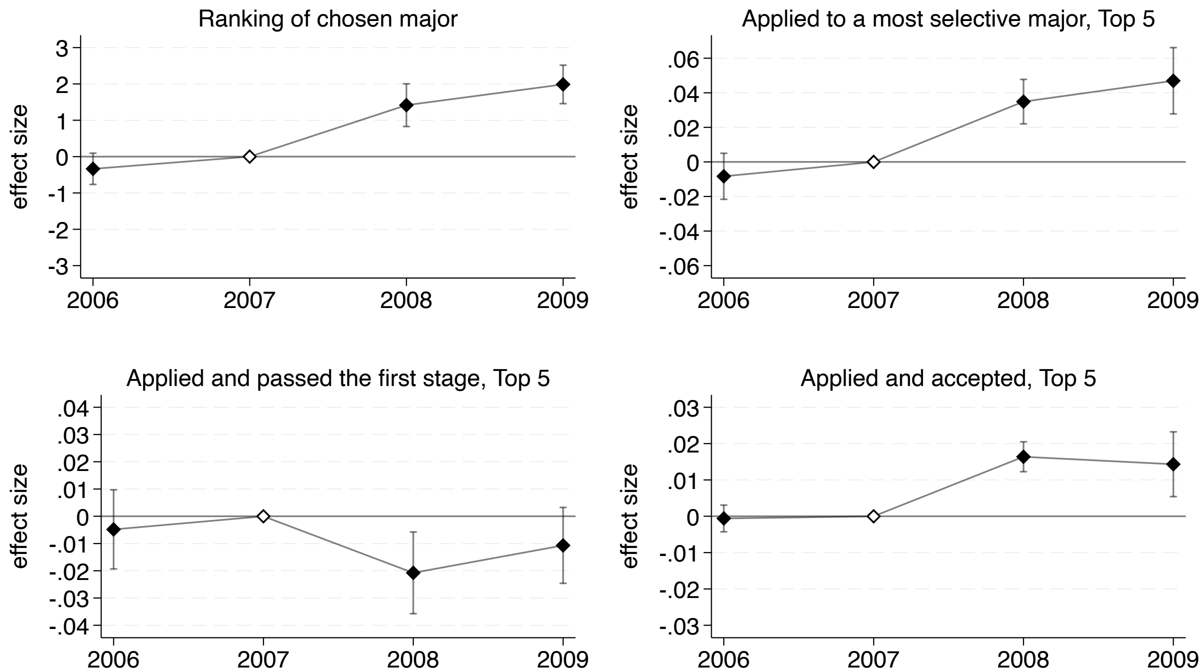


(b) Percentage change in applications from pre- to post-policy years, by majors' selectivity



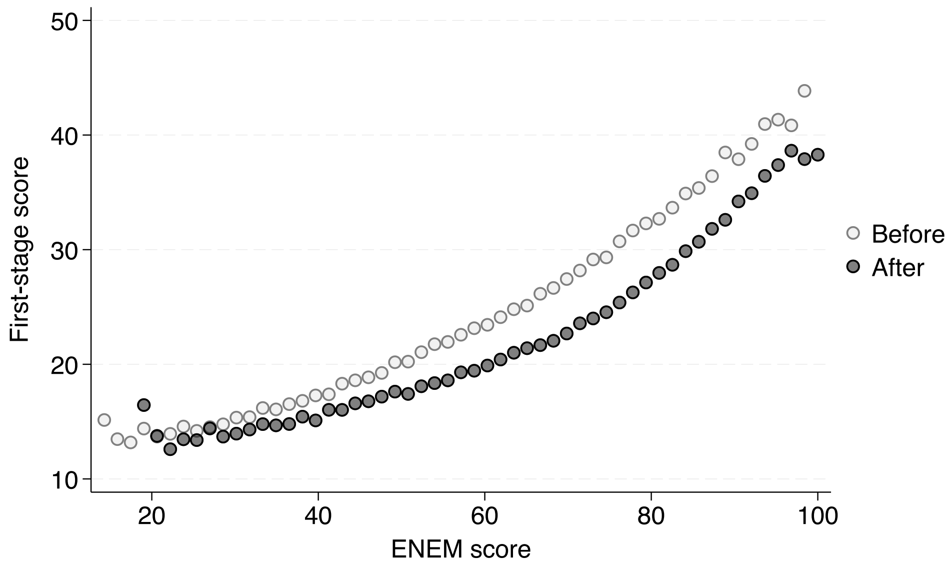
Note: Panel (a) shows the total number of applicants to the main campus for 44 majors that existed prior to the policy. Panel (b) illustrates the percentage change in the number of applicants per major, ranked by selectivity (1 = most selective, 44 = least selective), from 2006 to 2009.

Figure A.6: The dynamic effects of AA on the socioeconomic gap in major choice and admissions



Note: This figure presents results that include additional pre-policy and post-policy years. The dependent variables are: (1) major ranking, (2) a dummy indicating whether the applicant applied for a most selective major, (3) a dummy indicating whether the applicant applied and passed the first stage for a most selective major, and (4) a dummy indicating whether the applicant applied and was admitted to a most selective major. Results control for a non-linear function of the applicant's ENEM score (polynomial of degree 4) and observed characteristics (age, race, sex, first-time applicant status, prior college experience) and fixed effects for the municipality of residence. Errors are clustered at the municipality level. p-value levels: * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

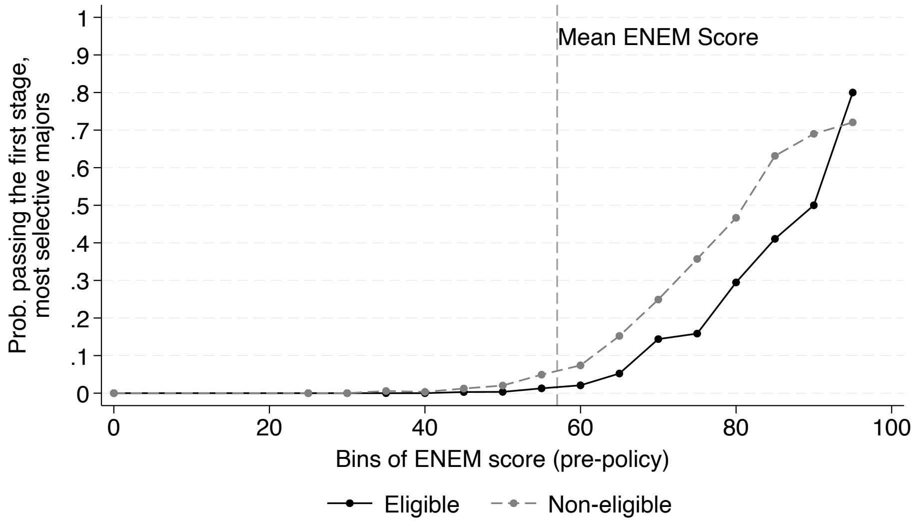
Figure A.7: Relationship between ENEM score and first-stage exam score, before and after the policy



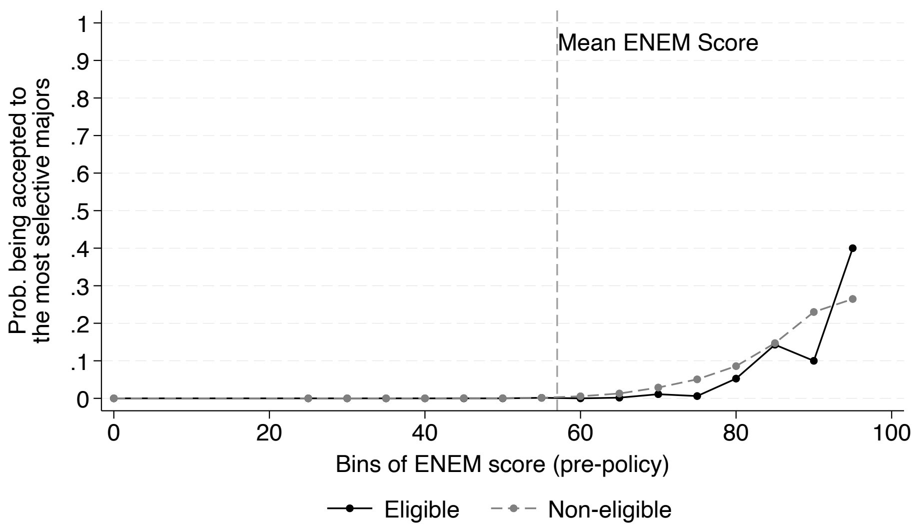
Note: This figure illustrates the relationship between ENEM scores and the university's first-stage exam scores. The horizontal axis represents applicants' ENEM exam scores, while the vertical axis shows the average first-stage exam scores for each ENEM score. Results are reported for pooled pre-policy years (2006 and 2007) and post-policy years (2008 and 2009). The correlation between the two scores is 0.77 before and 0.72 after the policy.

Figure A.8: Probability of passing the first stage and being admitted in a most selective major (pre-policy)

(a) Applying and passing the first stage to a most selective major



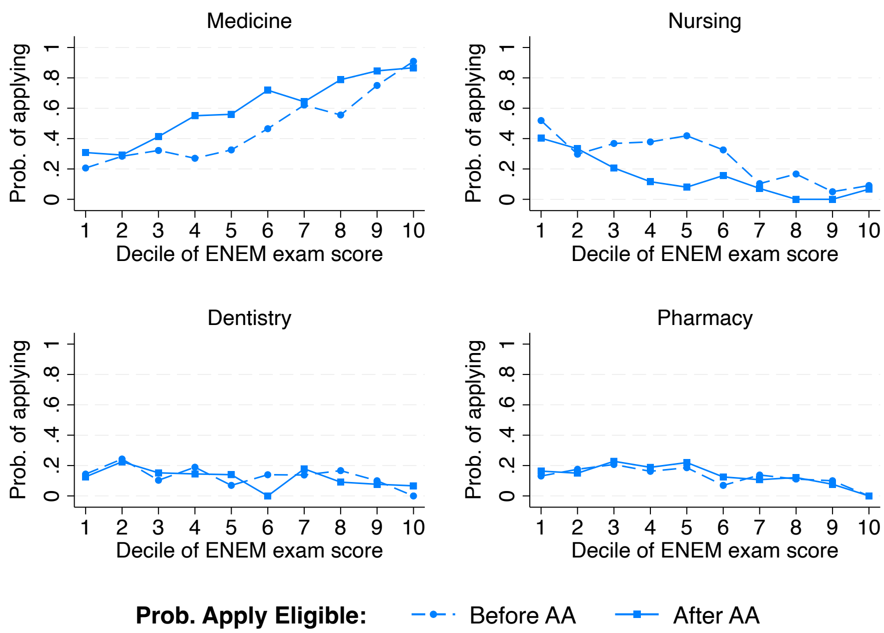
(b) Applying and being admitted to a most selective major



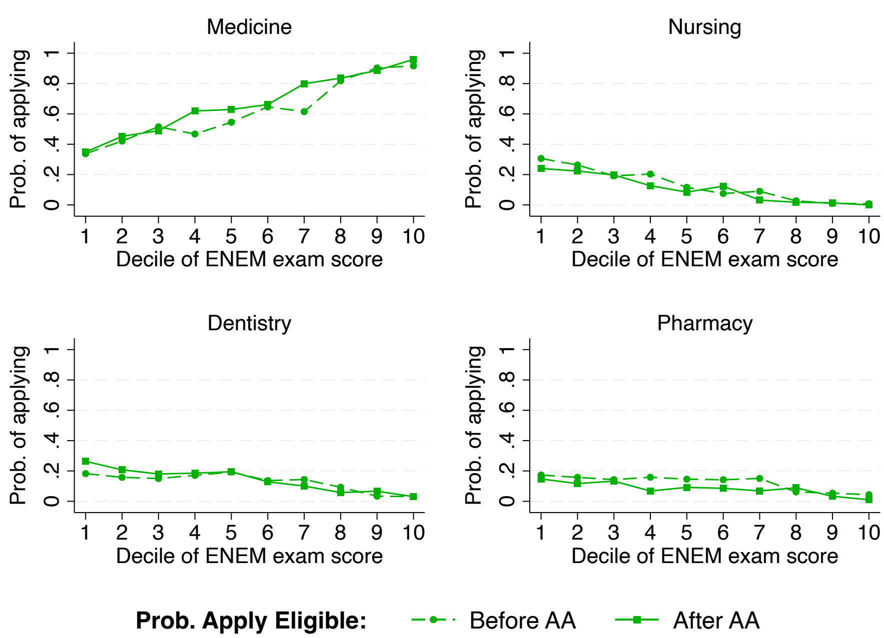
Note: This figure shows the proportion of applicants applying and passing the first stage, categorized by 5-point bins of ENEM scores. ENEM scores range from 0 to 100, with the mean indicated by the vertical lines. Results are averaged across pre-policy years 2006 and 2007.

Figure A.9: Probability of applying to a major within the Health field for eligible and non-eligible applicants, before and after the policy

(a) Eligible



(b) Non-eligible



Note: This figure shows the proportion of eligible and non-eligible applicants per decile of ENEM scores applying to Medicine, Nursing, Dentistry, and Pharmacy. Proportions are calculated across all majors in the field and sum to one within each decile across all majors.

B Additional tables

Table B.1: Summary of data restrictions, 2006-2009

	Obs.	Majors
All applicants (2006-2009)	103,933	87
Applicants in the regular cycle	87,014	78
Main campus (Vitória)	78,142	56
Majors with standard admissions	75,508	53
Majors existing prior to the policy	74,164	44
Regression analysis:		
Applicants reporting ENEM scores	54,639	44
Applicants with complete data and aged 15–60	51,565	44
Applicants from municipalities with more than one applicant	51,547	44

Table B.2: Comparing simulated eligibility with actual AA beneficiary status, post-policy

	Eligible			Non-eligible		
	AA	Non-AA	Δ	AA	Non-AA	Δ
Public school	1.00	1.00	0.00	0.47	0.03	0.44***
HH Income [Min. wage per capita]	0.72	0.81	−0.09***	2.02	2.56	−0.54***
Female	0.59	0.56	0.04	0.52	0.54	−0.02
Age	22.66	23.69	−1.03***	21.69	19.78	1.91***
URM	0.59	0.52	0.07***	0.48	0.40	0.07***
Works >30 hours/week	0.23	0.27	−0.04**	0.19	0.09	0.10***
First generation in college	0.84	0.79	0.05***	0.57	0.36	0.21***
From within state	0.96	0.90	0.06***	0.89	0.90	−0.01
From within commuting zone	0.72	0.69	0.03	0.65	0.75	−0.09***
First time applying	0.60	0.55	0.04*	0.64	0.57	0.07***
Previous college experience	0.15	0.22	−0.08***	0.20	0.16	0.04***
HH own home	0.77	0.72	0.05**	0.80	0.83	−0.03*
Reported ENEM scores	0.82	0.61	0.21***	0.67	0.77	−0.10***
ENEM score (s.d.)	-0.52	-0.56	0.04	-0.18	0.29	−0.47***
Observations	4,401	807		993	10,204	

Note: The "AA" columns refer to applicants who self-identified as quota-eligible post-policy. Eligible applicants are low-income and from public schools. Underrepresented racial minorities (URM) include Black, mixed-race, and Indigenous individuals. "First generation in college" refers to applicants whose parents did not attend college. The "Commuting zon" comprises five neighboring municipalities with inter-municipality public transportation. Data includes all applicants to 44 majors on the main campus under regular admissions for the post-policy year 2008. p-value levels: * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

Table B.3: Majors by field

Health Sciences	**STEM**
Physical Education	Computer Science
Nursing	Environmental Engineering
Pharmacy	Civil Engineering
Medicine	Computer Engineering
Odontology	Electrical Engineering
Psychology	Mechanical Engineering
	Production Engineering
Natural Sciences	**Humanities**
Biology	Philosophy
Physics	History
Geography	Pedagogy
Ocean studies	English
Chemistry	Portuguese
Social Sciences	**Arts &Media**
Archive Studies	Architecture
Library Studies	Plastic Arts
Accountability	Visual Arts
Economics	Journalism & Advertising
Social Science I	Music
Social Science II	Industrial Design
Law	
Social Services	
Business	

Notes: Majors listed twice are offered at different times (morning, afternoon, or evening).

Table B.4: Redistribution effects: comparing applicants pushed in and out by the policy, by field

	Health	STEM	Law & Applied SS	Natural Sc.	Humanities	Arts&Media
Public-school	0.95***	0.92***	0.85***	0.84***	0.87***	0.92***
Low-income	0.57***	0.69***	0.50***	0.50***	0.39***	0.65***
Standardized ENEM Score	−0.27**	−0.22***	−0.35**	−0.35***	−0.46***	−0.30**
First-time applicant	0.19**	0.16*	−0.03	0.06	−0.04	0.12
Previous college experience	−0.00	0.06	−0.04	0.03	0.13	−0.05
Female	−0.05	−0.06	−0.05	0.10	−0.04	−0.14
Age	0.96*	0.81**	2.22***	−0.29	3.89**	1.17**
Racial minority	−0.04	0.18**	0.15	0.14	0.04	0.14
Works >30hours/week	0.02	0.12**	0.09	0.00	0.24**	0.10*
First-generation college	0.41***	0.41***	0.36***	0.33***	0.30***	0.40***
HH homeownership	−0.04	−0.12*	−0.14*	−0.12	−0.09	0.03
Within state	−0.10**	0.01	0.03	−0.03	−0.02	0.00
Commuting zone	−0.21***	−0.16**	−0.09	−0.15*	−0.13	−0.11
Observations	220	230	152	160	108	126

Note: Public school and low-income values may not sum to 1 due to reporting discrepancies discussed in Section 3. "First-generation college" means neither parent attended college. Racial minorities include Black, mixed-race, and Indigenous applicants. The "Commuting zone" comprises five neighboring municipalities with inter-municipality public transportation. p-value (p) levels: * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

Table B.5: Simulated redistribution effects: comparing scenarios with and without strategic behavior

	Pushed-in			**Pushed-out**		
	2007	2008	Diff.	2007	2008	Diff.
Public-school	1.00	1.00	0.00	0.06	0.06	−0.00
Low-income	1.00	1.00	0.00	0.32	0.28	−0.04
Standardized ENEM Score	0.29	0.42	0.13**	0.67	0.72	0.05
First-time applicant	0.44	0.47	0.03	0.39	0.39	0.01
Previous college experience	0.16	0.15	−0.01	0.17	0.17	−0.01
Female	0.49	0.47	−0.02	0.49	0.50	0.01
Age	22.45	21.27	−1.18***	20.25	19.73	−0.52*
Racial minority	0.54	0.50	−0.04	0.44	0.41	−0.03
Works >30hours/week	0.20	0.16	−0.04	0.11	0.07	−0.03
First-generation college	0.81	0.77	−0.03	0.38	0.37	−0.01
HH own home	0.77	0.72	−0.05	0.84	0.81	−0.03
Within state	0.94	0.93	−0.01	0.94	0.97	0.04**
Commuting zone	0.71	0.69	−0.02	0.81	0.84	0.02
Observations	582	459	1041	582	459	1041

Note: This table compares applicants pushed in and out by the policy under two scenarios. Pre-policy year (2007) columns are unaffected by potential strategic behavior, while post-policy year (2008) columns reflect such incentives. Simulations use the Eligibility dummy based on self-reported data, as actual quota status was not observed before the policy. "Pushed-in" refers to applicants admitted solely due to the policy, while "Pushed-out" refers to those rejected because of the policy but who would have been admitted otherwise. Differences between "Pushed-in" and "Pushed-out" groups are tested, with p-value levels: * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

Table B.6: Pre-trends test

	Pre-trends Test							
	Applied	Applied	Ranking	Ranking	Passed 1st	Passed 1st	Accepted	Accepted
Eligible x 2006	-0.003	-0.008	-0.471	-0.336	0.000	-0.005	0.002	-0.001
	(0.01)	(0.01)	(0.29)	(0.22)	(0.01)	(0.01)	(0.00)	(0.00)
Eligible x 2007 (baseline)	-	-	-	-	-	-	-	-
Eligible x 2008	0.044***	0.035***	1.606***	1.416***	-0.011	-0.021***	0.022***	0.016***
	(0.01)	(0.01)	(0.33)	(0.30)	(0.01)	(0.01)	(0.00)	(0.00)
Eligible x 2009	0.043***	0.047***	1.785***	1.987***	-0.019***	-0.011	0.014***	0.014***
	(0.01)	(0.01)	(0.34)	(0.27)	(0.01)	(0.01)	(0.01)	(0.00)
Eligible	-0.209***	-0.099***	-8.427***	-3.626***	-0.127***	-0.024***	-0.022***	0.001
	(0.02)	(0.01)	(0.58)	(0.41)	(0.02)	(0.01)	(0.01)	(0.00)
Observations	51547	51547	51547	51547	51547	51547	51547	51547
R^2	0.037	0.150	0.087	0.254	0.037	0.268	0.003	0.085
ENEM; Ind. cntrls		x		x		x		x
Mun. and Year FE		x		x		x		x
Mean Dep. Var	0.297	0.297	29.713	29.713	0.119	0.119	0.020	0.020

Note: This table reports results testing pre-trends for various outcomes: applying to a most selective major, major selectivity ranking, applying to a most selective major and passing the first stage, and applying and being admitted to a most selective major. Estimates include a non-linear function of the applicant's ENEM score (polynomial of degree 4) and controls for the following observed characteristics: age, race, sex, first-generation status, whether the applicant is applying for the first time, previous college experience, and fixed effects for the municipality of residence. Pre-policy years include 2006 and 2007 (baseline). p-value levels: * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

Table B.7: Composition change for all applicants and those reporting an ENEM score

	All			Reports ENEM		
	2007	2008	Δ [2008 − 2007]	2007	2008	Δ [2008 − 2007]
Individual characteristics						
Low-income & public school	0.28	0.32	0.04***	0.28	0.32	0.04***
Low-income	0.51	0.53	0.02***	0.52	0.53	0.01*
Public school	0.33	0.37	0.04***	0.33	0.37	0.04***
First time applying	0.56	0.58	0.02***	0.52	0.56	0.04***
Previous college experience	0.16	0.16	0.00	0.11	0.12	0.01
Female	0.56	0.55	−0.01	0.58	0.57	−0.00
Age	20.94	20.89	−0.05	20.31	20.38	0.07
URM	0.47	0.46	−0.01	0.48	0.47	−0.01
Works >30 hours/week	0.14	0.14	0.00	0.12	0.13	0.01
First generation in college	0.52	0.52	0.00	0.52	0.52	0.00
Family characteristics						
HH own home	0.81	0.81	−0.01	0.81	0.81	−0.01
From within state	0.91	0.92	0.01*	0.93	0.93	0.00
From within commuting zone	0.74	0.73	−0.00	0.74	0.73	−0.01
Observations	19,026	16,928		19,026	16,928	

Note: This table compares the full population of applicants to the sub-population that reported an ENEM score with their application. Columns 3 and 6 compare pre- to post-policy changes in composition within all applicants and those reporting an ENEM score, respectively. Stars indicate the p-value of the test on mean differences between the years. p-value levels: * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

Table B.8: Composition change in eligible and non-eligible applicants before and after the policy

	Eligible			Non-eligible		
	2007	2008	Δ [2008 − 2007]	2007	2008	Δ [2008 − 2007]
Individual Characteristics						
ENEM score (s.d.)	-0.51	-0.52	−0.01	0.22	0.26	0.05**
First time applying	0.55	0.57	0.02	0.51	0.56	0.05***
Previous college experience	0.10	0.13	0.03***	0.12	0.11	−0.00
Female	0.63	0.61	−0.02	0.56	0.56	−0.00
Age	22.46	22.37	−0.09	19.41	19.40	−0.01
URM	0.59	0.58	−0.02	0.43	0.41	−0.01
Works >30 hours/week	0.22	0.22	−0.00	0.08	0.08	−0.00
Family Characteristica						
First generation in college	0.84	0.84	−0.01	0.38	0.37	−0.01
HH own home	0.77	0.76	−0.00	0.83	0.83	−0.00
Distance to College						
From within state	0.96	0.95	−0.01	0.91	0.91	−0.00
From within commuting zone	0.75	0.71	−0.04***	0.74	0.74	0.00
Observations	3,661	3,953		9,279	8,191	

Note: This table compares the composition of eligible and non-eligible applicants across observed socioeconomic characteristics. It examines changes in composition for both groups between 2007 (pre-policy) and 2008 (post-policy). Observations are limited to applicants included in the regressions—those who reported ENEM scores and did not have missing data on relevant variables. Stars indicate the p-value of the test on mean differences between the years. p-value levels: * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

Table B.9: The effects of AA on the socioeconomic gap in major selectivity (cutoff scores)

	Selectivity (cutoff)		
	(1)	(2)	(3)
Eligible x Post	0.629***	0.592***	0.498***
	(0.13)	(0.12)	(0.10)
Eligible	-3.545***	-2.134***	-1.488***
	(0.26)	(0.14)	(0.16)
Post	0.265***	0.239***	0.261***
	(0.09)	(0.08)	(0.07)
Observations	25084	25084	25084
R^2	0.074	0.193	0.259
ENEM Std Score		x	x
Mun. FE; Ind. controls			x
Mean Dep. Var	24.058	24.058	24.058

Note: This table shows OLS estimates for Equation (4.2), using pre-policy major cutoff scores as the dependent variable. The cutoff is the minimum score among applicants passing the first stage in pre-policy years. Column (2) includes a non-linear function of the applicant's ENEM score (polynomial of degree 4). Column (3) adds controls for the following observed characteristics: age, race, sex, whether the applicant is applying for the first time, previous college experience, and fixed effects for the municipality of residence. Errors are clustered at the municipality level. p-value levels: * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

Table B.10: The effects of AA on the socioeconomic gap in applications to a most selective major, by race

	Applied or accepted to college			
	(1)	(2)	(3)	(4)
	Ranking	Applied	Passed 1st	Accepted
URM	-0.544***	-0.014	-0.005	-0.006**
	(0.19)	(0.01)	(0.01)	(0.00)
URM x Post	0.133	-0.007	-0.005	0.008*
	(0.18)	(0.01)	(0.01)	(0.00)
Eligible	-3.583***	-0.109***	-0.032***	-0.002
	(0.35)	(0.01)	(0.00)	(0.00)
Eligible x Post	1.605***	0.041***	-0.021***	0.027***
	(0.25)	(0.01)	(0.01)	(0.00)
Eligible x URM	-0.100	0.016	0.010	0.007**
	(0.30)	(0.02)	(0.01)	(0.00)
Eligible x URM x Post	-0.353	-0.007	0.002	-0.019***
	(0.52)	(0.02)	(0.01)	(0.01)
Observations	25084	25084	25084	25084
R^2	0.249	0.150	0.267	0.087
ENEM	x	x	x	x
Ind. controls; Mun and Year FE	x	x	x	x
Mean Dep. Var	29.248	0.289	0.113	0.019

Note: This table presents results for a modified version Equation (4.2). The dependent variables are (1) major ranking, (2) a dummy indicating whether the applicant applied to a most selective major, (3) a dummy indicating whether the applicant applied and passed the first stage to a most selective major, and (4) whether the applicant applied and was accepted to a most selective major. The "racial minority" (URM) indicator includes applicants who self-declared as Black, mixed-race, or Indigenous. Results control for a non-linear function of the applicant's ENEM score (polynomial of degree 4) and observed characteristics: age, race, sex, first-generation status, whether the applicant is applying for the first time, previous college experience, and fixed effects for the municipality of residence. Errors are clustered at the municipality level. p-value levels: * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

Table B.11: The dynamic effects of AA on the socioeconomic gap in applications to a most selective major, by achievement levels

	Applied to a most selective major			
	Below	Below	Above	Above
Eligible x 2006	0.005	0.005	-0.000	-0.015
	(0.01)	(0.01)	(0.01)	(0.01)
Eligible x 2007 (baseline)	-	-	-	-
Eligible x 2008	0.050***	0.050***	0.056***	0.042***
	(0.01)	(0.01)	(0.02)	(0.02)
Eligible x 2009	0.040***	0.040***	0.077***	0.078***
	(0.01)	(0.01)	(0.02)	(0.01)
Eligible	-0.126***	-0.089***	-0.221***	-0.133***
	(0.02)	(0.02)	(0.01)	(0.01)
Observations	24570	24570	26311	26311
R^2	0.019	0.061	0.021	0.142
ENEM and Ind. controls		x		x
Mun. and Year FE		x		x
Mean Dep. Var	0.185	0.185	0.396	0.396

Note: This table reports results for Equation (4.2), by achievement levels, for years 2006 to 2009. The dependent variable is a dummy indicating whether the applicant applied to a most selective major. Achievement level is defined as a dummy indicating whether the applicant's ENEM score is above or below the mean, which reflects the likelihood of acceptance in a most selective major. Column (2) includes a non-linear function of the applicant's ENEM score (polynomial of degree 4). Column (3) adds controls for observed characteristics: age, race, sex, first-generation status, whether the applicant is applying for the first time, previous college experience, and fixed effects for the municipality of residence. Errors are clustered at the municipality level. p-value levels: * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.