How does affirmative action without quota work? Evidence from a large Brazilian university.*

Fernanda Estevan† Thomas Gall‡ Louis-Philippe Morin§

First Draft
August 2015

Abstract

This paper examines an affirmative action policy in college admission exams that awarded bonus points to applicants coming from public schools and visible minorities. Using administrative data from UNICAMP, a large, highly ranked Brazilian university, we assess the policy's effect on the composition of admitted students, accounting for possible behavorial responses at the extensive (participation) and intensive (preparation effort) margin. The policy was associated to sizable redistribution, shifting the composition towards unfavored backgrounds. There is surprisingly little evidence for behavorial adjustments, although exam participation but not performance of the favored increased and exam performance of private school alumni from minorities decreased.

Keywords: post-secondary education, affirmative action.

*This research was supported by the Social Sciences and Humanities Research Council in Canada. We would like to thank Gustavo Katague, Derek Rice, Duangsuda Sopchokchai, Bogdan Urban, and Pedro Feitosa for their excellent research assistance. All remaining errors are ours.

†Department of Economics, University of Sao Paulo, Av. Prof. Luciano Gualberto, 908, Sao Paulo, 05508-010, Brazil; email: festevan@usp.br.

‡Economics Division, School of Social Sciences, University of Southampton, Southampton, SO17 1BJ, UK; email: t.gall@soton.ac.uk.

§Department of Economics, University of Ottawa, 120 University, Ottawa ON K1N 6N5, Canada; email: lmorin@uottawa.ca.

1 Introduction

In many countries, developed and developing, the degree to which socio-economic background determines educational and occupational outcomes has been increasingly on the minds of policy-makers and academics alike. Especially countries that are characterized by high socioeconomic inequality, such as Brazil, have begun to examine the role of access to higher education for equality of opportunity and social mobility of its population. The perception that unequal access to university may indeed be contributing to unequal opportunities has led to various forms of affirmative action being employed in various countries. Whether such policies best achieve the policy goals and what kind of distortions they produce has been at the heart of a lively debate.

This paper aims to contribute to this debate by means of an empirical analysis of introducing a scoring policy in admission for places at a large public research intensive university in Brazil, UNICAMP.[1] The policy awarded students from disadvantaged backgrounds (public school attendants and visible minorities) a bonus on their entrance exam score. We assess the compositional effects of the policy in terms of broadening access to students from disadvantaged backgrounds. Using an original dataset with ample administrative information we are also able to take possible behavioral responses by applicants on the extensive (participation in the admission exam) and intensive (exam performance) margin.

Using a difference in difference framework we investigate the possible differential policy effects on students eligible for the bonus and those that were not, before and after the policy intervention. Our results indicate that the policy led to a sizable change in the composition of admitted students: compared to white private school alumni, our benchmark group, public school alumni, particularly those with visible minority status, were more likely to be admitted after the policy. Students with visible minority status who attended a private school were significantly less likely to be admitted after the policy. Hence, the policy successfully redistributed university places toward the intended beneficiaries. We do not find evidence, however, of sizable distortions resulting from behavioral response to the policy. On the extensive margin, the share of public school alumni among applicants increases, but only temporarily. On the extensive margin, behavioral response seems limited to the losers from the policy, minority students from private schools whose entrance exam performance deteriorated significantly, a possible sign of discouragement.

Our findings suggest that policy effects were well predicted using a naive expectation of no behavioral change either in participation or preparation effort. This is perhaps surprising in light of economic theory: with a fixed number of places going to the winning applicants, the

[1] *Universidade Estadual de Campinas*, located in Campinas, Sao Paulo, Brazil.

entrance exam seems a good example of a real effort tournament. Tournament theory would then tend to predict that a policy supporting contestants with weaker abilities levels the playing and thus raises effort spent, encourages agents favored by the policy and discourages those that are not, on both extensive and intensive margins (see e.g. Stein, 2002). On the other hand, policy debate often contends that those favored will reduce their efforts profiting from an implicit guarantee, while those not favored will work harder (see e.g. Coate and Loury, 1993a, for a formal version of this argument).

UNICAMP's policy is part of a recent surge in affirmative action policies in developing countries, such as Brazil and India. Given the large wage premium for college graduates in developing countries, these policies can have important redistributive consequences. Moreover, they may affect behavior both in terms of application decision and human capital accumulation. Therefore, it is essential to understand the impact of affirmative action in terms of granting or refusing access to university education and encouraging or discouraging college application and effort behavior by beneficiaries and non-beneficiaries of the policy.

Most of the empirical literature on affirmative action policies for college admission has concentrated on the US.[2] When several lawsuits have prohibited the use of affirmative action during the 1990s, a series of papers analyzed the impact of banning affirmative action on applicant behaviour and admission of minority students. Affirmative action bans in California and Texas led to a small reduction in the proportion of applicants from minority groups applying for selective and very selective colleges (Long, 2004) and taking college admissions tests, such as SAT or ACT (Dickson, 2006). However, the effect was nil for highly qualified minority students (Card and Krueger, 2005). In terms of college admission, Backes (2012) and Hinrichs (2012) show that the effects of affirmative action on enrollment of minorities were either modest or non-existent, even if they seem to impact overall graduations especially at the most selective institutions.

More recently, Bertrand et al. (2010) and Francis and Tannuri-Pianto (2012) investigate the impact of quota-based affirmative action policies for college admissions in India and Brazil, respectively. While the former investigates a policy targeting lower-caste groups in state-controlled engineering college admissions, the latter analyzes a program targeting racial groups implemented by University of Brasilia. Both papers show that the respective policies were successful in increasing admission by targeted groups, which is not surprising given that they were based on quotas. More importantly, both papers conclude that those who gained admission thanks to the policy were from lower (but not necessarily the lowest) socio-economic households than those who were not admitted due to the policy. While these papers suggest that quota based affirmative action policies increase admission of targeted

[2]See Holzer and Neumark (2000) for a review of the literature.

group and are redistributive, their results do not imply that alternative policy designs, such as the one implemented by UNICAMP, would reach similar outcomes.

An increasing number of papers has focused on the impact of affirmative action policies on applicants' effort behaviour. The theoretical literature is inconclusive, but warns to the possibility of desincentive effects in terms of skill acquisition by beneficiaries (Coate and Loury, 1993b; Fryer and Loury, 2013). While the experimental literature finds both positive and negative results (Schotter and Weigelt, 1992; Calsamiglia et al., 2013; Cotton et al., 2014), recent empirical papers suggest that the effects in terms of effort provision may be small. Antonovics and Backes (2014) find a modest impact of the abolition of affirmative action at the University of California system on GPA of college bound students. In the Brazilian context, Francis and Tannuri-Pianto (2012) detect a small increase in the number of attempts in the admission exam by mixed race students, a result they interpret as an increase in effort. Finally, Assuncao and Ferman (2013) shows that the effect of affirmative action at two Brazilian universities on students pre-college effort was negligible, but there was a negative impact on performance for black students in Rio de Janeiro, a group that benefitted from relatively large quotas (with respect to the applicant population).

The main contribution of our paper is to investigate the impact of UNICAMP's policy in terms of changing the pool of admitted students, applicants and their effort behaviour. UNICAMP's policy does not guarantee a fixed proportion of slots reserved for underprivileged individuals, but rather award them with bonus points on the admission exam. All else equal, doing so should increase the likelihood that these students are admitted in university. In this paper, we are particularly interested in the admission results following the affirmative action policy, but also the behavioural reactions of the beneficiaries (students from public high schools) relative to non-beneficiaries in terms of effort provision and application decision. The Brazilian university system is particularly interesting to study because admission is based on very objective criteria consisting entirely of test results. Therefore we can construct counterfactual scenarios if the policy was not in place and clearly identify the displacing and displaced applicants by such a policy. Moreover, our data provide a full set of background variables that allow us to control for relevant caracteristics of the applicants' pool.

Our results indicate that a higher proportion of underprivileged candidates were admitted to UNICAMP following the introduction of the affirmative action policy. We also do find sizeable results in terms of effort for majors where stakes are high, as in medicine. The program seems to be redistributive as displacing students were from more advantaged backgrounds than displaced students, even if minority students from private schools, who were not targeted by the program, were less likely to be admitted following its implementation.

We do not observe a significant increase in the number of applicants nor in the proportion of applicants coming from public high schools. These results are somewhat surprising given the size of the advantage given to applicants from public high schools on the admission test, following the affirmative action policy.

The paper is organized as follows. Section 2 discusses the main features of UNICAMP admission system and its affirmative action policy. Section 3 presents a theoretical framework and describes the expected impact of the policy. Section 4 explains the data sources used in this paper. Sections 5 and 6 investigate whether the pool of admitted students and applicants changed following the introduction of the affirmative action policy. Section 7 studies potential behavioural responses by applicants and Section 8 concludes.

2 UNICAMP's Admission System and its Affirmative Action Policy

UNICAMP is a public university located in the city of Campinas and state of Sao Paulo, Brazil. It is a large research-intensive university where more than half of the 37,000 students are at the graduate level. As most public universities in Brazil, UNICAMP does not charge tuition fees. Hence, its places are valued extremely highly by prospective students, in particular since UNICAMP is the only such higher education institution within a radius of 100km of Campinas.

Admission to UNICAMP for prospective students is governed by an entrance exam (*vestibular*). The exam registration takes place in September and successful candidates will start university in February of the following year. Note that also students who do not plan to join the university may take the *vestibular*. It is not unusual that students who will not finish high school in time for enrollment take the exam as "trainees" (*treineiros*) to practice.[3] When registering for the admission exam, candidates can apply to up to three majors (ranked first, second, and third option). An interesting aspect of the Brazilian university system is that, compared to North American universities, changing program is cumbersome and admission is based on program specific cutoff grades.

The *vestibular* consists of two parts taken in sequential order, Phase 1 and Phase 2 exams (henceforth referred as to P_1 and P_2, respectively). Only applicants who pass P_1 (about 30 percent of applicants) are admitted to take P_2. Both phases are the same for applicants for all majors and composed of short questions (no multiple choice questions) that are based on subjects compulsory in high school.[4]

[3] We exclude these students for the most part of our analysis.

[4] Additionally, some majors, like Dentistry and Performing Arts, require an aptitude test as part of P_2.

The first part P_1 consists of 12 general questions based on typical high school subjects and an essay. An applicant's score in P_1 is the maximum of (i) the raw performance in the questions and the essay, and (ii) a weighted average of that raw performance and the applicant's high school exit exam score, *ENEM*, with a weight of 20 %. An applicant automatically fails P_1 on obtaining a zero score in any of its components (i.e., essay and/or general questions) or an aggregate score of less than 50%. The pass score for P_1 is set to guarantee that the number candidates progressing to P_2 in each major is at most eight times the number of places offered in that major.[5] Hence, more popular majors will have P_1 pass scores higher than 50%. The P_1 pass scores (*nota de corte*) are announced publicly in December together with the list of candidates who passed P_1.

P_2 consists of eight tests based on (compulsory) high school material that are sat over four days. Applicants automatically fail P_2 if they receive zero on (or are absent from) at least one of the eight exams. While P_2 tests are identical for all majors, the P_2 score using different weighting of the tests depending on the major applied for. For instance, at least one of the tests is considered a priority subject for the major applied for and thus weighted more highly in the P_2 score.

The overall score of the entire exam comprised of P_1 and P_2 (NPO, for *nota padronizada de opção*) is computed using standardized scores of (i) the P_1 score (which may include *ENEM* scores) with a weight of 2, (ii) P_2 priority test scores with a weight of 2 each, (iii) P_2 non priority test scores with a weight of 1, (iv) aptitude test score for Architecture and Urban Studies and Arts with a weight of 2 and for Dentistry with a weight of 1. The overall score NPO is calculated for each major applied for (up to three).

The candidates are ranked in decreasing order of their NPO. For each major two cutoff scores are computed: one for the major specific P_2 test (NCP, for *nota de corte prioritária*) and one for the overall score NPO (NMO, for *nota mínima de opção*).[6] The admission rule considers first applicants with priority test scores higher than the NMO and then with an NPO higher than or equal to the NCP. Priority is given to applicants who ranked the major as their first choice. Only then are applicants considered who ranked it as second or third choice, up to a maximum of 20% of the total places in the major. In the unlikely event that any places remain, further details regulate admission.[7]

UNICAMP's affirmative action program was implemented in 2005. Under the policy applicants who spent their three last years of school *exclusively* in public schools can request

[5]The score also has to ensure that the number of successful applicants is at least three times the number of places. For calculation only applicants who chose a major as their first choice and who are not trainees are considered.

[6]NMO ranges from 12 to 24 and NCP from 12 to 18 depending on the major chosen.

[7]See Appendix A for more details on the admission rules.

to be subjected to the policy. Applicants have to state this explicitly when registering and to include official documentation as proof of their public high school attendance.

Applicants eligible for the affirmative action policy receive 30 additional points on their NPO score, which corresponds to 30% of a standard deviation. If additionally they declare themselves to be black, mulatto or native, they receive additional 10 points on their NPO score. In order to get a better idea of what an additional 30 points can represent, Figure 1 presents the distributions of NPO scores for both applicants from public and private high schools for the years prior to the affirmative-action policy (2001-2004). Applicants from public high schools were performing worse than applicants from private schools. Adding 30 points to the NPO scores of applicants from public institutions, the distribution of their NPO scores shifts to the right, so that its mode corresponds almost exactly to the mode of the distribution of scores of private school applicants. In the absence of any behavioural response from applicants this large shift in NPO distribution should lead to a sizable increase in the share of public high school alumni among UNICAMP students.

3 Theoretical Pointer: Tullock Contest

The college application game can be modeled as a contest. Suppose 4 students compete for a single slot at university. Each student i values the slot at a value V and is characterized by their innate ability of exam-taking α_i. Suppose that $\alpha_1 > \alpha_2 > \alpha_3 > \alpha_4 > 0$. This might capture representative applicants with majority background and from private high schools, with minority background and from private high schools, with majority background from public schools, and with minority background from public schools, respectively.

Exerting effort x_i for exam preparation translates into a winning probability p_i as follows:

$$p_i = \frac{\alpha_i x_i}{\sum_{j=1}^{4} \alpha_j x_j}.$$

That is, students compete in a Tullock contest for the slot. The functional form for the winning probability (contest success function) arises, if effort x_i produces a score y_i according to

$$\ln y_i = \ln \alpha_i x_i + \eta_i,$$

where η_i is a random variable that follows a type I extreme value distribution.[8] Suppose that the noise terms η_i are independently distributed (with mean equal to the Euler-Mascheroni constant).

[8]For the derivation of the micro-foundation see McFadden (1974), this is pointed out in, e.g., Fu and Lu (2012) and Jia (2008).

Following Stein (2002) we will examine the effects of an increase in the value of winning the contest V and contestants' strengths α_i on participation, effort choice and winning probabilities. This captures the working of the affirmative action policy in stage P_2 (by increasing the strength of the favoured) and P_1 (by increasing the continuation valuation for the favored).

Extensive Margin: Participation

For participation (i.e., registering for the *vestibular*) we consider the effect of an increase in the strength of some applicants, keeping the value of winning constant across agents. That is, we consider the two part entrance exam as one contest. Following Stein (2002) all agents whose rank i satisfies

$$\alpha_i V > (i-2)(\sum_{j \leq i-1} \frac{1}{\alpha_j V})^{-1},$$

will participate. Since the condition is monotone in rank, the threshold rank R is the highest rank for which the condition holds. This gives two testable implications.

Fact 1. *Suppose that $p_i < 1/2$ for all agents and that $\alpha_j' = (1+\delta)\alpha_j$ with $\delta > 0$ for all students who receive a bonus. Then (i) a bonus to non-participants increases participation, ceteris paribus, and (ii) a bonus to students who already participate decreases participation, ceteris paribus.*

These facts imply in particular that applicants whose strength does not increase will not become participators, and students who receive the maximum bonus will not drop out.

Intensive Margin: Effort

Turning to the intensive margin, i.e. effort, stage P_1 and P_2 are subtly different. In P_2 applicants receive a bonus while in P_1 the effect indirect through increasing the continuation value by increasing the winning probability in stage P_2 as we will show. Suppose that individual strengths and the change is such that indeed all students participate, before and after a policy intervention, and that student 1 remains the strongest student after the intervention. Denote parameters after the intervention by primes.

Following Stein (2002) again, if p_i is i's (equilibrium) winning probability, i's equilibrium effort is

$$x_i = p_i(1-p_i)V_i.$$

Winning probabilities $p_i = \frac{\alpha_i x_i}{\sum_{j=1}^4 \alpha_j x_j}$ depend on equilibrium effort levels, which in turn depend

on strengths α_i, so that in our setup

$$p_i = 1 - \frac{3}{\alpha_i V_i}(\sum_{j=1}^{4} \frac{1}{\alpha_j V_j})^{-1}.$$

The difference in winning probabilities before and after the policy intervention is

$$\Delta p_i = \frac{3}{\alpha_i V_i}(\sum_{j=1}^{4} \frac{1}{\alpha_j V_j})^{-1} - \frac{3}{\alpha_i' V_i'}(\sum_{j=1}^{4} \frac{1}{\alpha_j' V_j'})^{-1}.$$

That is, $\Delta p_i > 0$ if

$$\frac{\alpha_i' V_i'}{\alpha_i V_i} > \frac{\sum_{j=1}^{4} \frac{1}{\alpha_j V_j}}{\sum_{j=1}^{4} \frac{1}{\alpha_j' V_j'}}.$$

Hence, for any i whose strength α_i (value V_i) remains constant, increasing some α_j (V_j) will result in a decrease of p_i. If $p_i < 1/2$ this will also imply a decrease in effort x_i. For any i whose strength α_i (value V_i) increases, p_i will increase if the increase in α_i (V_i) is sufficiently great compared to the increase of other agents' strengths, e.g., if the strength (value) of some agents increases by the same proportion. Again, if $p_i < 1/2$ this will also imply an increase in effort x_i. Since expected performance y_i is monotone in effort and strength, performance increases for agents whose strength (value) increases and decreases for the remaining agents.

For our econometric approach it will be useful to determine the relative winning probability compared to the strongest student, i.e., $p_i - p_1$.

$$p_i - p_1 = \left(\frac{1}{\alpha_1 V_1} - \frac{1}{\alpha_i V_i}\right) \frac{3}{\sum_{j=1}^{4} \frac{1}{\alpha_j V_j}}.$$

The difference in differences is then $p_i' - p_1' - (p_i - p_1)$:

$$\left(\frac{1}{\alpha_1' V_1'} - \frac{1}{\alpha_i' V_i'}\right) \frac{3}{\sum_{j=1}^{4} \frac{1}{\alpha_j' V_j'}} - \left(\frac{1}{\alpha_1 V_1} - \frac{1}{\alpha_i V_i}\right) \frac{3}{\sum_{j=1}^{4} \frac{1}{\alpha_j V_j}}. \tag{1}$$

Setting $V_i' = V_i$ and supposing that $\alpha_1 = \alpha_1'$ this becomes:

$$\frac{1}{\alpha_i'} \frac{3}{\sum_{j=1}^{4} \frac{1}{\alpha_j}} - \frac{1}{\alpha_i} \frac{3}{\sum_{j=1}^{4} \frac{1}{\alpha_j'}} + \frac{1}{\alpha_1} \left(\frac{3}{\sum_{j=1}^{4} \frac{1}{\alpha_j'}} - \frac{3}{\sum_{j=1}^{4} \frac{1}{\alpha_j}}\right).$$

The term in brackets is always positive. If $\alpha_i = \alpha_i'$, the entire expression will be negative, meaning that the winning probability of i decreased in relation to p_1. If $\alpha_i' = (1+\delta)\alpha_i$ for all

i who receive a grade subsidy then the first difference is positive and the entire expression strictly positive. Hence, the winning probability of a recipient of the bonus will increase relative to p_1, and more so for lower α_j.

For P_1 suppose that $\alpha_i = \alpha'$, but V_i' differs fromV_i reflecting the change in winning probabilities in P_2 derived above, i.e., if 3 and 4 receive a bonus, $V_i' < V_i$ for $i = 1, 2$ and the opposite for $i = 3, 4$. Then (1) becomes

$$\left(\frac{1}{\alpha_1 V_1'} - \frac{1}{\alpha_i V_i'}\right) \frac{3}{\sum_{j=1}^{4} \frac{1}{\alpha_j V_j'}} - \left(\frac{1}{\alpha_1 V_1} - \frac{1}{\alpha_i V_i}\right) \frac{3}{\sum_{j=1}^{4} \frac{1}{\alpha_j V_j}}.$$

Since winning probabilities sum to 1, i.e. $\sum_{i=1}^{4} V_i' = \sum_{i=1}^{4} V_i$ and weak players get the bonus, $\sum_{j=1}^{4} \frac{1}{\alpha_j V_j} > \sum_{j=1}^{4} \frac{1}{\alpha_j V_j'}$. Therefore the expression is negative if $V_i' - V_i < V_1' - V_1$ and positive if $V_i' - V_i$ sufficiently great, i.e., the bonus in stage P_2 great enough.

As for effort, which is given by $x_i = p_i(1 - p_i)V_i$ the difference in differences is

$$x_i' - x_1' - (x_i - x_1) = p_i'(1 - p_i')V_i' - p_1'(1 - p_1')V_1' - [p_i(1 - p_i)V_i - p_1(1 - p_1)V_1].$$

For constant V_i across agents (corresponding to P_2), inspecting this expression shows that it is positive if $(p_i' - p_1') > (p_i - p_1)$ and decreasing in p_i', p_i, i.e. the strength of a student who receives a grade subsidy. Otherwise its sign is ambiguous. Hence, effort increases relative to student 1 for recipients of the bonus.

Turning to P_1, for $V_1' < V_1$ and $V_i' > V_i$ we know that $(p_i' - p_1') > (p_i - p_1)$ from above. Taken together this implies $x_i' - x_1' > (x_i - x_1)$. For $0 > V_1' - V_1 > V_i' - V_i$ we know that $(p_i' - p_1') > (p_i - p_1)$, but the sign is ambiguous.

The change in exam performance $\alpha_i x_i' - \alpha_i x_i$, not taking into account possible grade subsidies, follows the behavior of effort x_i. The difference in differences is

$$\alpha_i x_i' - \alpha_1 x_1' - (\alpha_i x_i - \alpha_1 x_1).$$

If $\alpha_i' > \alpha_i$ ($V_i' > V_i$) this expression must be positive (as $x_i' - x_i > 0 > x_1' - x_1$), though it does not necessarily decrease in students' strengths. Otherwise its sign is ambiguous.

The following statement summarises these properties.

Fact 2. *Suppose that $p_i < 1/2$ for all agents and that $\alpha_j' = (1 + \delta)\alpha_j$ with $\delta > 0$ for all students $j = 3, 4$ who receive a grade subsidy. Then both in stage 1 and 2*

(i) for students who do not receive a bonus winning probability and performance decrease; winning probability decreases relative to the strongest student,

(ii) for students who receive a bonus winning probability and performance increase (also relative to the strongest student).

4 Data

Our main data source is a rich administrative dataset provided by UNICAMP. This dataset contains information on all students who enrolled for UNICAMP's entrance exam (*vestibular*) in the years 2000 to 2008. For each student we observe their performance in each part of the exam they participated in (recall that passing phase 1 is a necessary prerequisite for sitting phase 2) and whether they were admitted and enrolled at UNICAMP (and the major they enrolled in). As the affirmative action policy was implemented in 2005, the dataset allows us to us to examine exam performance of applicants several years before and after the policy intervention. This is convenient, for instance, to detect potential differences between immediate and longer-run policy impacts.

Each year more than 40,000 applicants enroll for the admission exam. For each applicant the dataset contains background information such as gender, age, race (i.e., Asian, black, mulatto, native or white) and whether they went to a public secondary school (i.e., only private, only public, mainly public some private, mainly private some public, half and half, none). It also contains information on an applicant's family such as the number of family members he/she lives with, her/his family income, and both of her/his parents education levels as well as occupations. Less than a third of these applicants (between 26 and 32 % depending on the year) progress to the second stage of the admission exam.

We make a series of restrictions to concentrate on the population of interest. We discard applicants for which there is important information missing (i.e., missing gender, age, type of secondary school attended, affirmative-action information, or parental education). Doing so eliminate only a small portion of the initial population (4.8 percent). We next discard students who do not take the admission for immediate admission (i.e., who take the exam as a practice test) and applicants who registered but did not write the exam. These two groups of individuals represent 4.2 and 3.9 percent of the original population, respectively. Finally, we drop applicants who did not do their secondary education in Brazil (0.3 percent of the original population).

A more serious problem with our data is that we do not observe the applicants' race information from 2000 to 2002. Given that race is an important piece of information in our context, the main analysis was done for the years 2003-2008 with the race and secondary school information, but we have also conducted the analysis for 2000-2008 (and 2003-2008) without the race information to check the robustness of our results.

To assess the distributions of private and public high school leavers at the state level we use data from the Brazilian School Census. The information on the School Census is collected every March, covering the universe of all public and private schools in Brazil. We will focus on the School Census information for the state of Sao Paulo, which is where the large majority of applicants come from.

Tables 1 and 2 present descriptive statistics from our data. Table 1 considers the entire period 2003 to 2008 and Table 2 concentrates on the years immediately prior and after the policy intervention (2004 and 2005). While most of the applicant characteristics stayed relatively stable over time, the shares of visible minorities and public high school alumni among applicants have changed. Both tables suggest that the share of visible minority applicants increased after 2004. Although the share of applicants who attended a public high school increased in 2005 compared to 2004, interestingly this increase appears temporary, petering out in the years 2006 to 2008. We will return to this observation in Section 6.

5 Overall Outcome: Admission

The introduction of the policy was at least partially motivated by the conjecture that applicants who belong to visible minorities and/or come from public schools have lower probability of gaining admission controlling for their standardized ENEM score when leaving high school. A central political goal was thus to remedy disadvantages brought about by the secondary school system by extending a bonus to applicants from public schools and visible minorities. Therefore we focus first on possibly effects on the real allocation, i.e., admission of students.[9]

5.1 Individual admission probabilities

To do so we regress a binary variable equal to one if the applicant was accepted (zero otherwise), $A_{i,c,m,t}$, on whether the applicant is from a visible minority, V_i, or went to a public secondary school, P_i, as well as a set of interaction terms between these characteristics and a binary variable representing UNICAMP's affirmative-action years, AA_t. The main regression equation is given by:

$$\begin{aligned} A_{i,c,m,t} =& \alpha P_i + \delta V_i + \pi(P_i \times V_i) + \rho(P_i \times AA_t) + \beta(V_i \times AA_t) + \gamma(P_i \times V_i \times AA_t) \\ &+ \phi ENEM_i + \boldsymbol{X_i\Gamma} + u_{i,c,m,t}. \end{aligned} \tag{2}$$

[9]Our focus on admission rather than enrollment reflects the policy-makers concern with ensuring equal opportunities. Indeed an individual's decision to enroll conditional on being accepted may be affected by many variables completely unrelated to our model.

where $\boldsymbol{X_i}$ is a vector of applicant personal characteristics (i.e., gender, age, mother and father educational attainments) plus a constant term, and $u_{i,c,m,t} = \mu_m + \eta_c + \tau_t + \varepsilon_{i,c,m,t}$ represents municipality, career-choice, and time fixed effects, as well applicant-specific performance shocks.

Table 6 presents the results of estimating equation (2) for the years 2004 and 2005. Specifications (1) to (5) employ an increasing set of control variables to assess robustness. Since the specification allows also to check for background effects independently of the policy let us begin by verifying the conjecture that applicants of certain backgrounds were indeed disadvantaged. Specifications (1) and (2) give emphatic support to the conjecture as public school and visible minority status are negatively related to admission probability and the effect is sizable (the private-public difference was 2.4 percentage points for white students and more than double that for visible minorities, which is substantial given an overall admission rate of 10.5 percent in 2004, see Table 2). Most of this association can be explained by selection on observables, however: adding controls for parental education, ENEM score and major fixed effects, visible minority ceases to have a significant effect and the negative effect of a public school background diminishes somewhat, although the effect is still statistically and economically significant.

The coefficient estimate for the ENEM score is highly significant: A one standard-deviation difference in ENEM score is associated with a 12.4 percentage point difference in admission probability. This is reassuring and gives some confidence that the ENEM score is a good proxy for academic ability (to pass entrance exams).

Turning to actual policy effects, Table 6 suggests that introducing the affirmative action policy was followed by an increase in admission rates for students from public secondary schools (who received a bonus of 30 points). Before controlling for observables (specifications (1) and (2)) the effect size is similar to the size of the public school disadvantage above (the private-public difference decreases by 2.4 percentage points for white students). Controlling for observables and examining the policy effect for minority status in public high school (awarding the applicant a bonus of 40 points) explicitly, in specification (5) yields a more differentiated picture. After the intervention the private-public difference decreases by 2.8 percentage points for white students and becomes an advantage. Among public school alumni visible minority status is not associated with higher admission probability ($\beta + \gamma$ is not statistically different from zero at conventional confidence levels). Among private school alumni (who do not receive any bonus), however, visible minority status is related with significantly lower admission probability, and substantially so (the minority-majority difference in private schools is 1.6 percentage points after the intervention).

These results are remarkably similar to the ones obtained by extending the period of

analysis to the years 2003-2008, see Table 7, indicating that the measured effects are quite robust over time.[10]

5.2 Overall admission composition changes

The results so far indicate that, conditional on all observables, admission probabilities depended on applicants' backgrounds and that the policy was associated with a significant change of these conditional probabilities, increasing those of public with respect to private school alumni, in particular with respect to visible minority private school alumni. To complete the picture we examine now the change in actual composition of the applicants admitted to UNICAMP associated to the policy intervention.

To do so for the years 2004 and 2005 we identify those applicants who only gained admission in 2005 because of the affirmative action policy, and those who would have been admitted had the affirmative action policy not been in place, given the actual applicant composition and effort level exerted. Indeed, 247 applicants gained admission thanks to the policy in 2005, which represents 8.4% of the 2,934 available places.[11] The proportion is much higher for more competitive majors, as the fixed bonus generates a greater advantage when applicants' scores are more similar. For example, in medicine 15 applicants out of 110 slots and in electrical engineering 10 out of 70 admittees were admitted due to the policy.[12]

5.2.1 Policy effects not driven by behavioral response

From a policy point of view it is interesting to assess how well one could predict the policy effect when ignoring behavioral responses to the policy. To do so one needs to compare the actual effect of the policy to a "naive" counterfactual, taking that does not take into account adjustments of students on the intensive (effort) or extensive (participation) margin. To construct the counterfactual we use 2004 data and compute the number of displaced and displacing applicants based on actual exam performance in 2004. This resulting change in admission amounts to 261 applicants who would have gained admission in 2004, which represents 8.9% of the 2,934 available places.

That is, the naive prediction slightly over-estimates the true effect, if anything. This means that behavioral responses are small in comparison to the mechanic effect of the policy, and that they dampened the policy effect, if anything. This is perhaps surprising from a

[10]The impact on enrolment is very similar in magnitude, as shown in Tables 8 and 9.

[11]Note that 589 candidates admitted in the first list received the bonus associated with the affirmative action policy, but 58% of them would have been admitted even without the bonus points.

[12]The number of admitted candidates benefitting from the policy was 28 and 18 for medicine and electrical engineering, respectively.

theoretical point of view, as a levelling of the playing field in tournament models is typically associated with behavioral responses amplifying the mechanical effect, see Section 3.

5.2.2 Redistributive compositional effects

Table 5 compares displacing and displaced applicants with regard to several background variables. The policy is unambiguously progressive in terms of socioeconomic background: displacing applicants are more likely to belong to a visible minority and to come from a more disadvantaged background, reflected by parental education, occupation and income. For instance, 28% of displacing candidates' mother have a university degree, while this proportion increases to 56% in the displaced group. Also, nearly 58% of candidates' fathers had a mid-top or top occupation, while 26% of those in the displacing group had a similar background.

The ENEM score is nearly identical in both groups, however, and the propensity to enroll conditional on being accepted is larger for the displacing than the displaced, which may due to a difference in outside options. All this would suggest that the policy may be successful in enabling access to students with disadvantaged socio-economic background without compromising academic quality (as measured by ENEM).

6 Extensive Margin: Composition Effect

Section 5 suggests that the policy intervention was associated to a large increase in the representation of 'disadvantaged' students among UNICAMP's admitted students. Apart from the mechanical effect of the bonus system economic theory reviewed above points to two, mutually consistent effects: one on the extensive margin, as the policy could have attracted new applicants changing the composition of applicants, and one on the intensive margin as the policy could have led to a change in the competitive environment affecting applicants propensity to invest in preparation for the entrance exam.

6.1 Composition of Applicants

We will start by investigating possible changes in the composition of applicants. To account for possible demographic effects Figures 2 and 3 show the number of UNICAMP applicants and the share of public school alumni among them in relation to the respective variable at the level of Sao Paulo state. The vertical line separates the per- and post-affirmative-action periods. While there is no indication of a significant shift in the number of applicants following the policy intervention, the share of public alumni among applicants appears to

have increased significantly. This increase was only temporary, however, and the share returned to its pre affirmative action policy level by 2006. Time series regression results do not support a significant change in time trends associated to the policy intervention when allowing for different time trends in Sao Paulo state and for UNICAMP applicants.

While neither applicant numbers nor the share of public school alumni seem to have changed persistently, there are other characteristics that distinguish the pre policy applicant pool from the post policy one. Tables 1 and 2 summarise the applicant statistics before and after the intervention. After the policy change applicants were more likely to belong to a visible minority (though this characteristic was self reported implying considerable measurement error) and older (albeit statistically significant, the difference in means is about one month). Applicants also scored substantially higher in terms of parental education, but were less likely to have attended university before or an exam preparation course. Interestingly, also applicants' high school exit exam score ENEM was significantly higher after the the policy change. This is corroborated by comparing ENEM distributions by type of secondary school before and after the policy (Figures 4 and 5).[13] Indeed the composition of applicants appears to have significantly: the ENEM distributions of both private and public school alumni shift to the right (more so for private school alumni). Although the magnitude of the shifts are not large, they are all statistically significant (at the 1% confidence level) based on Kolmogorov-Smirnov Tests.

That is, applicants' academic abilities (as measured by ENEM scores and parental education) seem to have increased as a response to the policy chance, and there is an indication that the share of applicants from financially disadvantaged backgrounds grew (measured by having taken a costly exam preparation course). From a policy point of view this is consistent with the policy appears having encouraged applicants from financially disadvantaged backgrounds without crowding out applicants with high academic ability not favored by the policy. From a theoretical point of view, the simple contest model presented above predicts that high ability students, both the ones favored by the policy and the ones not favored, will still participate. For lower academic ability students who are favored may be encouraged, while those not favored may be discouraged, resulting in a weakly lower average academic ability of participants. This is consistent with increased average ENEM score, but decreased exam preparation.

[13]The ENEM scores were normalized such that, every year, the ENEM score distribution of all ENEM takers in the state of Sao Paulo has a mean of 0 and a variance of 1.

6.2 Composition of P_1 Survivors

Recall that the *vesibular* consist of two parts, P_1 and P_2, and progress to the decisive second stage (counting for about 80% of the overall score) requires a pass in P_1 (which was not subject to bonus points). Tables 3 and 4 allow us to examine possible changes in the composition of P_2 participants associated to the policy intervention.

The tables indicate that the absolute share of minority students among stage P_1 survivors, in particular at public schools, has increased. Conditional on the composition of applicants, however, public school alumni and visible minority status applicants are more under-represented among stage P_1 survivors after the policy intervention than before (the differences in shares among stage P_1 survivors and among participants decrease between 1.14 and 1.66 percentage points after the policy intervention). Average ENEM scores among stage P_1 survivors increase substantially in the short run, but not in the long run (2003-2008). While educational composition of the applicant pool changes, with more applicants having higher parental education, the over-representation of higher parental education applicants among stage P_1 survivors does not appear to change with the policy intervention (the differences in shares of any given parental education level among stage P_1 survivors and among participants does not change by more than .0068 percentage points).

That is, after the policy intervention applicants who are favored by the policy are more under-represented among stage P_1 survivors conditional on the overall applicant pool composition, while better socio-economic background characteristics remain or tend to be more over-represented. This observation is consistent with stiffer competition by private school alumni: as better parental educational background gives the same advantage in stage P_1, despite encouraged participation in stage P_1 the favored group becomes more under-represented among stage P_1 winners. It is also consistent with increased effort, e.g., in exam preparation, by applicants who are not favored by the policy. The next section examines this possibility in more detail.

7 Intensive Margin: Effort

This section examines applicants' possible behavioral responses to the policy intervention on the intensive margin. We focus on whether exam preparation[14] and thus performance

[14]Students typically prepare intensively for the exam. In an small scale survey conducted by Peluso et al. (2010), students' reported mean time studying reached up to 45 hours a week. Not surprisingly, their results reveal that admission exam preparation is associated with high levels of stress. Also, it is not uncommon that they follow preparatory classes in the year preceding the exam. In our sample, about 61% of students did a preparation course. While 67% followed the preparation course for less than a year, the remaining candidates followed it for several years.

differed between favored and not favored applicants, which would have to be expected from a theoretical point of view, see Section 3.

While we cannot observe effort directly, the dataset contains information on test scores and success for each stage of the *vestibular*. Our preferred measure of effort spent is the test score conditional on an applicant's ENEM score. This measure controls for academic ability (as far as reflected by the ENEM score) and will also capture effort adjustments by students who are not close to the pass score. The identifying assumption for this exercise is that the link between ability and the ENEM performance was not affected by UNICAMP's affirmative action policy. If true, conditional exam performance accurately reflects changes over time of effort in preparing for the admission exam. The assumption that ENEM scores are not affected by the policy is indeed very plausible for the first year after the implementation of the affirmative action policy (2004-2005). Registration for UNICAMP 2005 opened in August 30 of 2004 and lasted for one month. The main source of information regarding the policy that the candidates obtain upon registering is the applicant's manual, which was published on August 27, 2004.[15] Hence, we focus on the years 2004 and 2005.

7.1 Phase P_1

Our first specification then regresses applicant's performance in Phase 1 of the *vestibular* on the dummy variables and controls introduced above:

$$\begin{aligned} Y_{i,c,m,t} =& \alpha P_i + \delta V_i + \pi(P_i \times M_i) + \rho(P_i \times AA_t) + \beta(V_i \times AA_t)\gamma(P_i \times V_i \times AA_t) \\ &+ \phi ENEM_i + \boldsymbol{X_i}\boldsymbol{\Gamma} + u_{i,c,m,t}. \end{aligned} \tag{3}$$

Recall that by controlling for applicants' ENEM scores this specification picks up differences in effort and performance for a given initial academic ability level as measured by the ENEM score, removing the most important source of selection bias.

Table 15 presents the results for the whole sample containing all majors. Indeed, performance on Phase 1 strongly correlates with the applicant's ENEM score. Interestingly, even when using all controls including ENEM, candidates from public schools perform less well than those from private schools. This result indicates that public schools prepare students less well for the admission exam than private schools, which is very consistent with anecdotal evidence.

More importantly, introducing the affirmative action policy seems not to have had any discernable effect on students' effort and exam performance. While the sign of the coefficients

[15] Surprisingly, the newspapers were quite mute until registration was closed and the first news we could trace was published in November, right before the exam took place.

associated to the policy intervention go in the direction predicted by economic theory in Section 3 (encouraging the favored, discouraging the unfavored), the effect is not significant. Repeating the exercise for years 2003-2008 produces a significant and substantial decrease in performance for visible minority private school alumni after the intervention, however (see Table 16).

This may mask heterogeneous treatment effect by major. In particular, more competition in a major will induce higher stakes for individuals, leading us to expect a more pronounced behavioral response. Two such majors are Medicine and Biology, which have been oversubscribed after Phase 1 (i.e., the cap of eight times the number of available places was binding) in every year we observe.

Table 20 allows us to investigate where in the distribution these encouragement and discouragement effects took place. While the discouragement of minority students from private schools seemed to affect the whole distribution of medicine candidates, behavioural responses from beneficiaries resulting in increased effort were concentrated in the lower part of the distribution. Given that only ten percent of themedicine candidates makes it to Phase 2, these effort reactions do not really affect their admission prospects.

Table 27 extends this analysis to the years 2003-2008 (with the caveat that we can no longer rule out that ENEM results were affected by the policy). Results are in line with the results over all majors in Table 16).

7.2 Phase P_2

We can conducting the same for Phase P_2 exploiting the fact that applicants had to have passed P_1 in order to compete in P_2. Indeed, Table 15 does not suggest that the composition of contenders changed substantially in terms of observables after the policy intervention, except for a higher share of visible minority applicants and higher average ENEM score, which could well be due to annual variations. This gives a measure of confidence in our results from regressing second stage performance on the dummy variables and controls introduced above. The regression specification is:

$$\begin{aligned} Y_{i,c,m,t} =& \alpha P_i + \delta V_i + \pi(P_i \times M_i) + \rho(P_i \times AA_t) + \beta(V_i \times AA_t)\gamma(P_i \times V_i \times AA_t) \\ &+ \phi ENEM_i + \boldsymbol{X_i}\boldsymbol{\Gamma} + u_{i,c,m,t}. \end{aligned} \tag{4}$$

Table 22 extends this analysis to the years 2003-2008 (with the caveat that pre and post policy intervention background compositions of stage P_1 survivors differ significantly and that ENEM results may have been affected by the policy). Results are in line with the results over all majors in Table 17).

8 Conclusion

In this paper, we investigate whether UNICAMP's 2005 affirmative action policy is associated to a significant change in the pool of applicants and admitted students. Our results suggest that there was a large increase in the representation of 'disadvantaged' students among UNICAMP's admitted students following the instauration of their affirmative action policy. Despite benefiting from a large bonus on the admission test, we do not observe a significant increase in the proportion of applicants coming from public secondary schools, but we do observe a small change in the distribution of measured academic ability for those that apply. The policy does not seem to discourage effort provision, except for minorities in private schools. We do find that applicants to medicine, the most competitive program at UNICAMP, provided more effort in exam preparation after the implementation of the policy. However, these behavioral effects did not reflect in increased admission as they occurred at the bottom of the ability distribution.

References

Antonovics, K. and Backes, B. (2014). The effect of banning affirmative action on human capital accumulation prior to college entry. *IZA Journal of Labor Economics*, 3:5.

Assuncao, J. and Ferman, B. (2013). Does affirmative action enhance or undercut investment incentives? Evidence from quotas in Brazilian public universities. *mimeo*, pages 1–42.

Backes, B. (2012). Do affirmative action bans lower minority college enrollment and attainment?: Evidence from statewide bans. *Journal of Human Resources*, 47(2):435–455.

Bertrand, M., Hanna, R., and Mullainathan, S. (2010). Affirmative action in education: Evidence from engineering college admissions in India. *Journal of Public Economics*, 94(1-2):16–29.

Calsamiglia, C., Franke, J., and Rey-Biel, P. (2013). The incentive effects of affirmative action in a real-effort tournament. *Journal of Public Economics*, 98(0):15 – 31.

Card, D. and Krueger, A. B. (2005). Would the elimination of affirmative action affect highly qualified minority applicants? Evidence from california and texas. *Industrial and Labor Relations Review*, 58(3).

Coate, S. and Loury, G. C. (1993a). Antidiscrimination enforcement and the problem of patronization. *The American Economic Review*, 83(2):92–98.

Coate, S. and Loury, G. C. (1993b). Will affirmative-action policies eliminate negative stereotypes? *American Economic Review*, 83(5):1220–40.

Cotton, C., Hickman, B. R., and Price, J. P. (2014). Affirmative action and human capital investment: Evidence from a randomized field experiment. Working Paper 20397, National Bureau of Economic Research.

Dickson, L. M. (2006). Does ending affirmative action in college admissions lower the percent of minority students applying to college? *Economics of Education Review*, 25(1):109–119.

Francis, A. M. and Tannuri-Pianto, M. (2012). Using Brazil's racial continuum to examine the short-term effects of affirmative action in higher education. *The Journal of Human Resources*, 47(3):754–784.

Fryer, R. and Loury, G. (2013). Valuing diversity. *Journal of Political Economy*, 121(4).

Fu, Q. and Lu, J. (2012). Micro foundations of multi-prize lottery contests: a perspective of noisy performance ranking. *Social Choice and Welfare*, 38(3):497–517.

Hinrichs, P. (2012). The effects of affirmative action bans on college enrollment, educational attainment, and the demographic composition of universities. *Review of Economics and Statistics*, 94(3).

Holzer, H. and Neumark, D. (2000). Assessing affirmative action. *Journal of Economic Literature*, 38(3):483–568.

Jia, H. (2008). A stochastic derivation of the ratio form of contest success functions. *Public Choice*, 135(3-4):125–130.

Long, M. C. (2004). College applications and the effect of affirmative action. *Journal of Econometrics*, 121(1-2):319–342.

McFadden, D. (1974). The measurement of urban travel demand. *Journal of Public Economics*, 3(4):303 – 328.

Peluso, M. A. M., Savalli, C., Curi, M., Gorenstein, C., and Andrade, L. H. (2010). Mood changes in the course of preparation for the Brazilian university admission exam - a longitudinal study. *Revista Brasileira de Psiquiatria*, 32:30 – 36.

Schotter, A. and Weigelt, K. (1992). Asymmetric tournaments, equal opportunity laws, and affirmative action: Some experimental results. *The Quarterly Journal of Economics*, 107(2):511–539.

Stein, W. (2002). Asymmetric Rent-Seeking with More than Two Contestants. *Public Choice*, 113(3-4):325–336.

Appendix A – UNICAMP Admission Rules

The final ranking of the applicants depends on the final grade (*nota padronizada de opção* (NPO)), which is calculated using the standardized grades of: (i) final grade of Phase 1 (that may include ENEM) with a weight of 2; (ii) grades of Phase 2 priority discipline exams, each receiving a weight 2; (iii) grade of the aptitude test for Architecture and Urban Studies and Arts (but not Dentistry) with a weight of 2, if applicable; (iv) grade of other Phase 2 non priority disciplines exams and aptitude test for Dentistry with a weight of 1. NPO is calculated for each of the major choices (up to three) made by the applicant.

The grades (i)-(iv) are standardized using the formula:

$$NP = \frac{(N - M) \times 100}{D} + 500, \tag{5}$$

where NP is the applicant's standardized grade, N is the grade the applicant received in the exam, M and D are the average grade and the standard deviation of the grades in the exam. Until 2003, the standardization of Phase 2 exams was done separately for applicants of majors within the four areas. Starting in 2004, the standardization considers the grades of Phase 2 exams of all students who participated in the exam. For the final grade of Phase 1, only the grades of candidates who passed Phase 1 are considered. Once grades (i)-(iv) are standardized, the NPO of a candidate is calculated as the weighted average of the standardized grades, with the weights given above.

Until 2003, only the applicants who obtained the priority discipline cutoff grade (*nota de corte prioritária*, (NCP)) were admitted. Eligible candidates were then ranked in decreasing order of NPO and were admitted until all slots were attributed for candidates choosing the major as first choice. Once all the eligible candidates who ranked the major as first option were admitted, candidates who chose the major as second option (and then third option) were admitted if they had not been admitted to their first option (or second option, respectively). If there were still some slots remaining, then the candidates who applied for (and have not been admitted for) other majors within the same group would be admitted. After this has been done or if there is only one major in the group, then they would admit applicants with NPO larger than the last candidate admitted under the criterion just explained, even if they do not satisfy the NCP criterion. Finally, if there are still slots available, candidates for other majors who were not admitted can be called. This is be done by forming new groups and recalculating the standardized grade within these new groups.

Since 2004, there are two grades associated with the priority subjects, which are relevant for admission: priority discipline cutoff grade (*nota de corte prioritária*, (NCP)) and major

minimum grade (*nota mínima de opção* (NMO)). From 2004 to 2006, these cutoffs were defined in terms of the non-standardized grades. In 2007 and 2008, the thresholds were established in terms of the standardized grades.

The candidates are ranked in decreasing order of NPO and accepted based on the following rules:

1. those who opted for the major as first option and obtained, in the priority subjects, (non-standardized or standardized) grades that are larger or equal to the major's NMO.

2. If there are still slots available, applicants who opted for the major as second or third choice, with (non-standardized or standardized) grades in the priority subjects larger or equal to NMO, up to a maximum of 20% of the total slots available for the major.

3. If there are still slots available, applicants who opted for the major as first option and who obtained (non-standardized or standardized) grades that are larger or equal to the major's NCP.

4. If there are still slots available, applicants who opted for the course as second or third options and who obtained (non-standardized or standardized) grades that are larger or equal to the major's NMO.

5. If there are still slots available, applicants who opted for the course as second or third options and who obtained (non-standardized or standardized) grades that are larger or equal to the major's NCP.

6. If there are still slots available, candidates who opted for the major, independently of the choice rank.

7. If there are still slots available, applicants who opted for similar majors, as determined by the Office of the Vice-President, Research.

In case of a draw, the applicant admitted will be the one with the larger standardized grade in a priority subject in the order they are presented in the priority discipline list, or in the order the exams take place in the Phase 2.

Appendix B – Tables and Figures

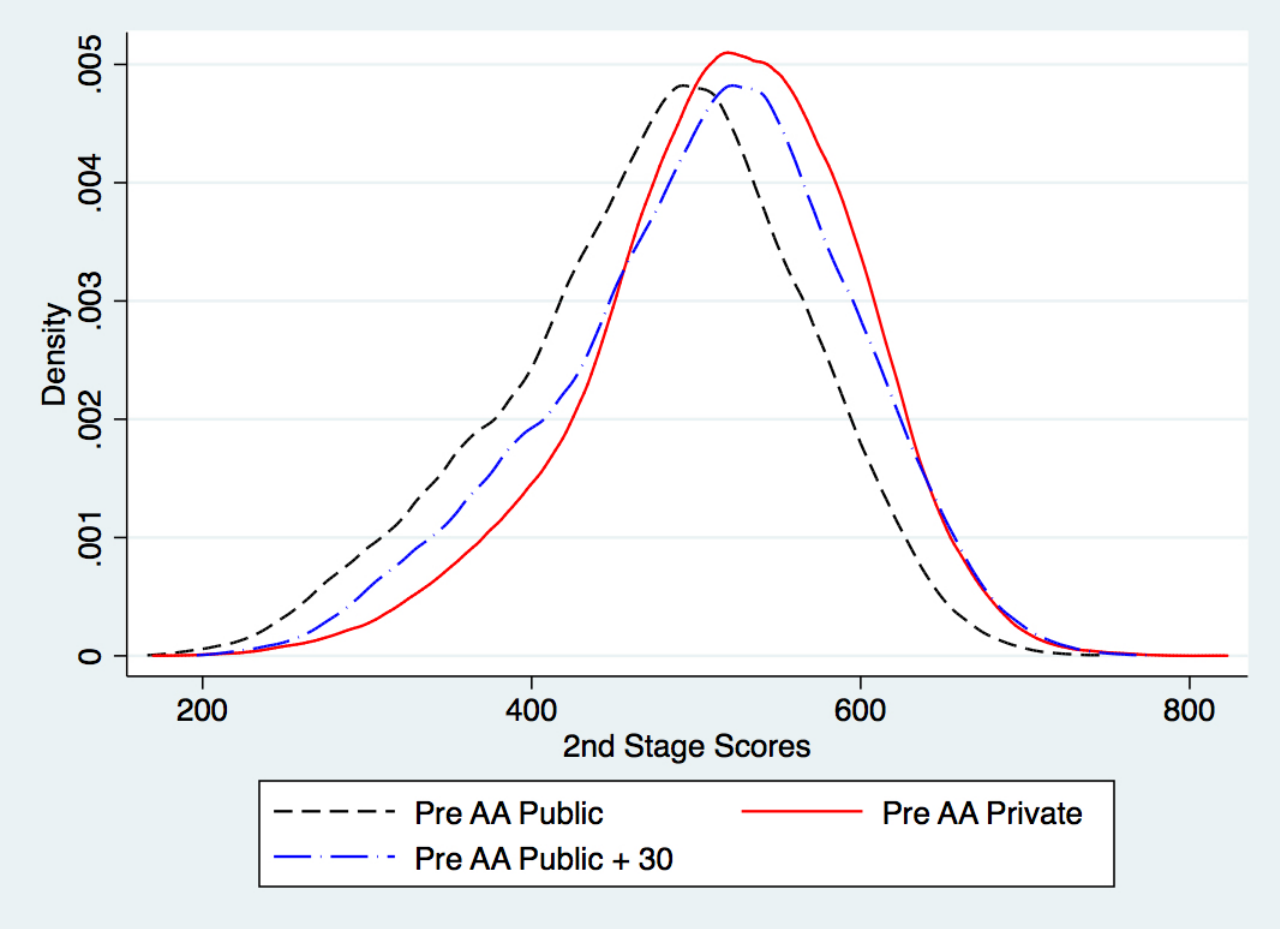

Figure 1: Distributions of Admission Exam Final Scores Prior to 2005

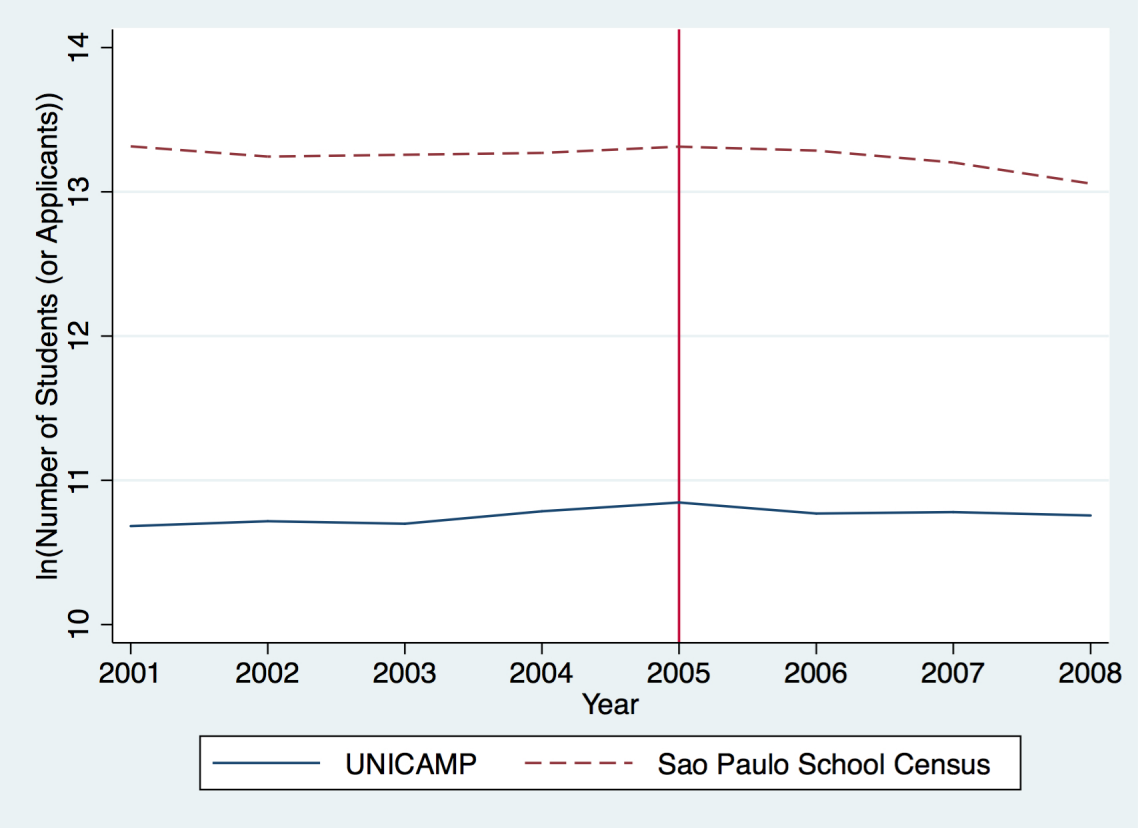

Figure 2: High School Seniors and UNICAMP Applicants

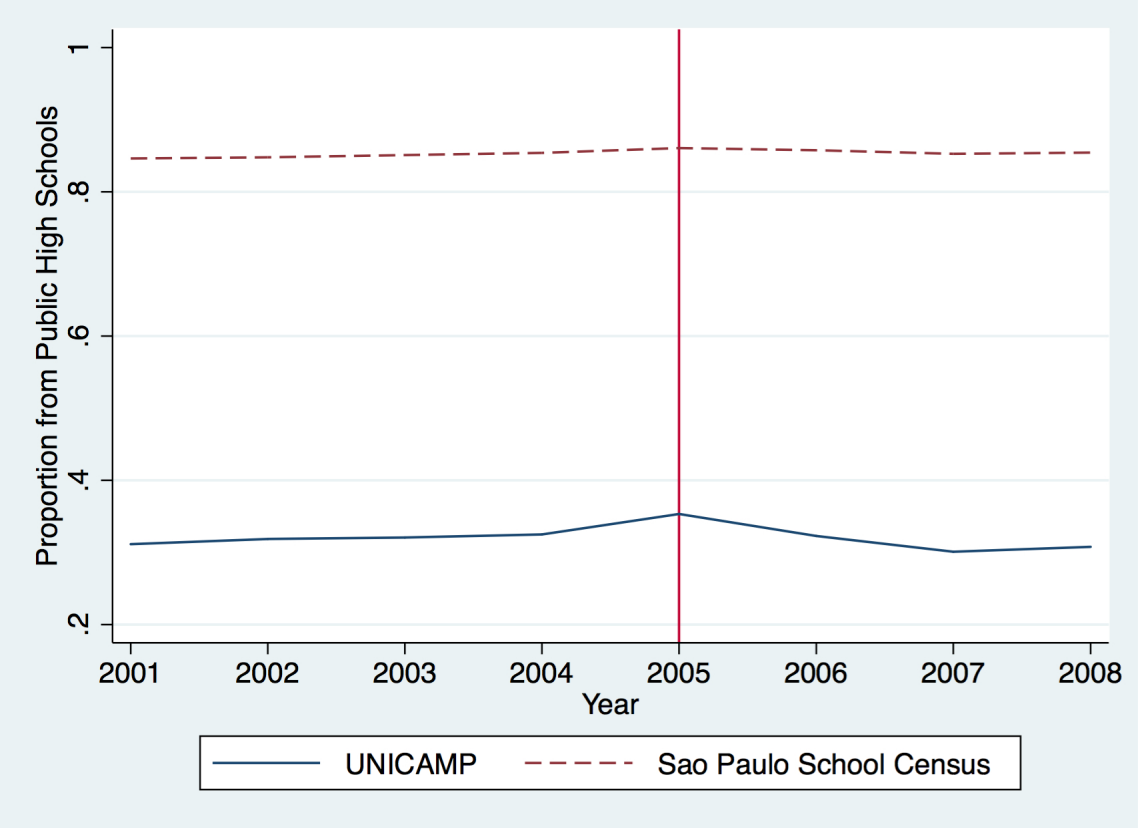

Figure 3: Composition of High School Seniors and UNICAMP Applicants

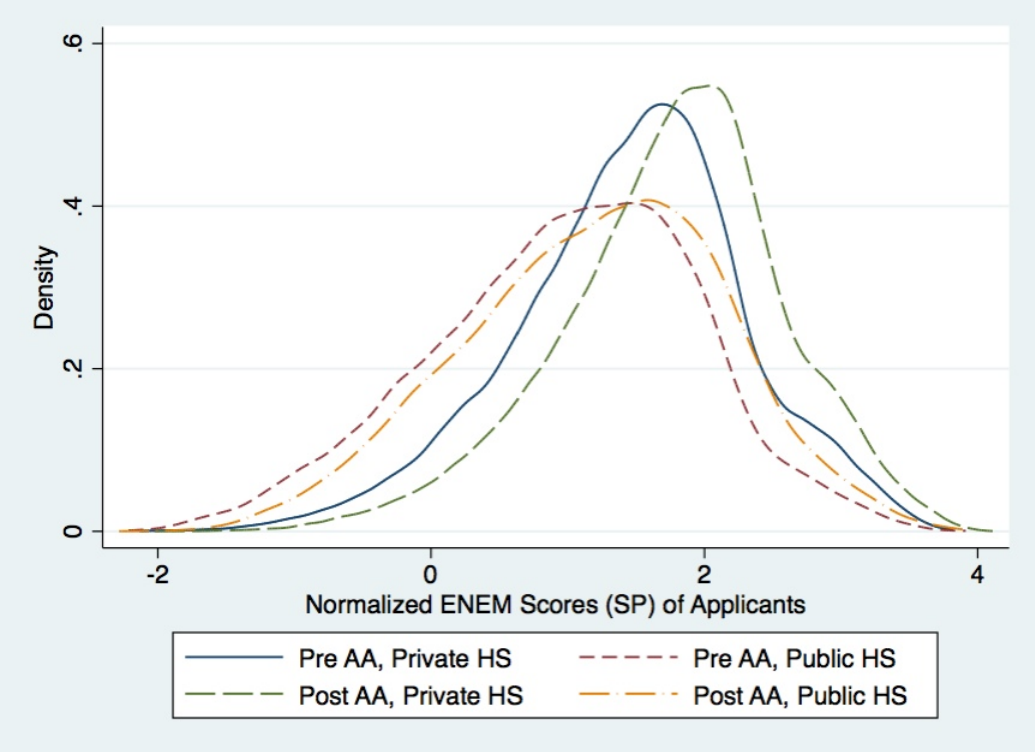

Figure 4: Normalized ENEM Scores by type of High School Attended (Pre- vs. Post-Affirmative Action)

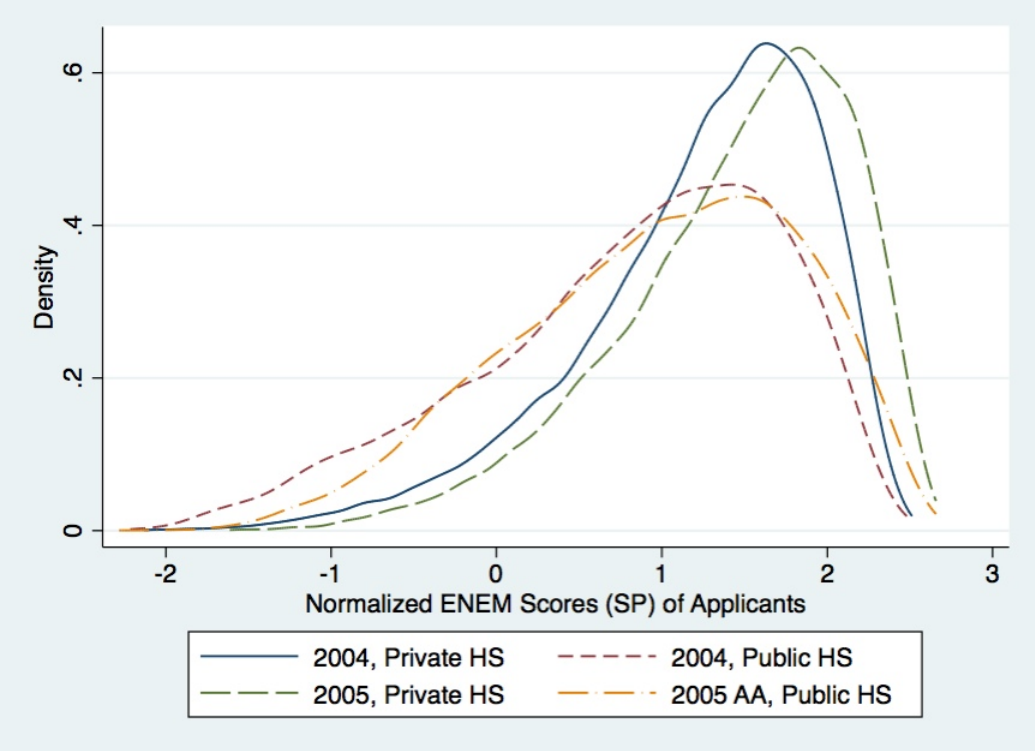

Figure 5: Normalized ENEM Scores by type of High School Attended (2004-2005)

Table 1: Descriptive Statistics 2003-2008

	Pre Aff. Action	Post Aff. Action	Difference
Public High School (%)	29.4	29.3	-0.1
Visible Minority (%)	11.8	16.7	4.9***
Public High School × Visible Minority (%)	6.1	8.9	2.8***
Female (%)	50.8	51.1	0.2
Age	19.2	19.3	0.02**
Mother without HS Degree (%)	24.6	21.4	-3.2***
Mother with HS Degree (%)	32.2	31.7	-0.4**
Mother with Univ. Degree (%)	43.2	46.9	3.7***
Father without HS Degree (%)	24.2	21.8	-2.4***
Father with HS Degree (%)	28.1	29.0	0.9***
Father with Univ. Degree (%)	47.7	49.2	1.5***
Previous University Attendance (%)	6.4	6.0	-0.4***
Exam Prepapration Course (%)	65.2	61.5	-3.7***
ENEM Score	82.1	82.7	0.6*
	(19.6)	(17.5)	
Pass Phase 1 (%)	32.4	31.3	-1.1***
Admitted (%)	10.3	12.3	2.0***
Enrolled (%)	6.6	6.9	0.3**
Observations	70,407	148,563	

Notes: 'Pre Affirmative Action' refers to 2003-2004 while 'Post Affirmative Action' refers to 2005-2008. Standard deviations are in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 2: Descriptive Statistics 2004-2005

	2004	2005	Difference
Public High School (%)	30.1	31.7	1.6***
Visible Minority (%)	13.1	17.8	4.7***
Public High School × Visible Minority (%)	6.7	9.6	2.9***
Female (%)	51.4	51.7	0.3
Age	19.2	19.3	0.0
Mother without HS Degree (%)	24.9	24.2	-0.6**
Mother with HS Degree (%)	32.1	31.8	-0.3
Mother with Univ. Degree (%)	43.0	43.9	0.9***
Father without HS Degree (%)	24.5	23.8	-0.7**
Father with HS Degree (%)	28.5	28.5	-0.1
Father with Univ. Degree (%)	47.0	47.7	0.7**
Previous University Attendance (%)	6.4	5.5	-0.9***
Exam Preparation Course (%)	63.8	61.4	-2.4***
ENEM Score	88.8	89.0	0.2**
	(17.9)	(18.0)	
Pass Phase 1 (%)	33.4	27.2	-6.2***
Admitted (%)	10.5	10.3	-0.2
Enrolled (%)	6.7	6.6	-0.1
Observations	38,700	39,399	

Notes: Standard deviations are in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 3: Changes in Applicant Characteristics (2004-2005)

	Did Not Pass Phase 1				Passed Phase 1					
	2004	2005	Difference		2004	2005	Difference		Diff.-in-Diff.	
Public High School (%)	32.5	34.1	1.6	***	25.1	25.1	0.0		-1.6	**
Visible Minority (%)	14.3	19.1	4.8	***	10.8	14.3	3.5	***	-1.4	**
Public High School × Visible Minority (%)	7.8	10.9	3.1	***	4.6	6.2	1.6	***	-1.5	***
Female (%)	55.6	55.1	-0.5		43.1	42.5	-0.7		-0.2	
Age	19.2	19.2	0.0		19.3	19.3	0.0		0.0	
	(2.2)	(2.2)	-0.1		(2.1)	(2.1)				
Mother without HS Degree (%)	27.4	26.2	-1.3	***	19.7	19.1	-0.6		0.7	
Mother with HS Degree (%)	32.5	31.8	-0.6		31.4	31.8	0.4		1.0	
Mother with Univ. Degree (%)	40.1	42.0	1.9	***	48.9	49.1	0.2		-1.7	**
Father without HS Degree (%)	27.1	25.8	-1.3	***	19.3	18.5	-0.8		0.5	
Father with HS Degree (%)	28.9	28.9	0.0		27.8	27.2	-0.5		-0.5	
Father with Univ. Degree (%)	44.0	45.3	1.3	***	53.0	54.3	1.4	**	0.1	
Previous University Attendance (%)	5.4	4.6	-0.8	***	8.4	7.7	-0.7	**	0.1	
Exam Preparation Course (%)	61.8	59.2	-2.6	***	67.9	67.4	-0.5		2.1	***
ENEM Score	83.4	84.8	1.3	***	99.6	100.5	0.9	***	-0.5	*
	(18.2)	(18.0)	0.1		(11.4)	(11.6)				
Normalized ENEM Score	0.9	1.1	0.2	***	1.6	1.8	0.2	***	0.0	***
	(0.8)	(0.8)	0.0		(0.5)	(0.5)			0.0	
Pass Phase 1 (%)	0.0	0.0	0.0				0.0			
Admitted (%)	0.0	0.0	0.0		31.3	37.7	6.4	***		***
Enrolled (%)	0.0	0.0	0.0		20.0	24.1	4.1	***		***
Observations	25,788	28,681			12,912	10,718				

Notes: Standard deviations are in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 4: Changes in Applicant Characteristics (2003-2008)

	Did Not Pass Phase 1				Passed Phase 1					
	Pre AA	Post AA	Difference		Pre AA	Post AA	Difference		Diff-in-Diff	
Public High School (%)	31.5	32.0	0.5	*	25.1	23.5	-1.6	***	-2.1	***
Visible Minority (%)	12.7	18.1	5.4	***	9.9	13.4	3.5	***	-1.9	***
Public High School × Visible Minority (%)	6.9	10.2	3.3	***	4.3	5.9	1.6	***	-1.7	***
Female (%)	54.7	54.7	0.0		42.7	43.0	0.3		0.3	
Age	19.2	19.3	0.1	***	19.3	19.3	0.0		-0.1	***
	(2.1)	(2.3)			(2.1)	(2.1)				
Mother without HS Degree (%)	26.9	23.5	-3.4	***	19.9	16.8	-3.1	***	0.3	
Mother with HS Degree (%)	32.4	32.1	-0.3		31.6	31.0	-0.6	*	-0.3	
Mother with Univ. Degree (%)	40.7	44.4	3.7	***	48.5	52.2	3.7	***	0.0	
Father without HS Degree (%)	26.5	23.9	-2.6	***	19.4	17.1	-2.3	***	0.3	
Father with HS Degree (%)	28.4	29.5	1.1	***	27.4	27.9	0.5		-0.6	
Father with Univ. Degree (%)	45.1	46.6	1.5	***	53.2	55.0	1.8	***	0.3	
Previous University Attendance (%)	5.2	5.0	-0.2	**	8.7	8.1	-0.6	***	-0.4	*
Exam Preparation Course (%)	62.9	59.5	-3.4	***	69.9	66.1	-3.8	***	-0.4	
ENEM Score	76.4	78.5	2.1	***	94.0	91.9	-2.1	***	-4.2	***
	(19.4)	(17.5)			(13.9)	(13.5)				
Normalized ENEM Score	1.0	1.4	0.4	***	1.9	2.1	0.2	***	-0.2	***
	(0.9)	(0.9)			(0.7)	(0.7)				
Pass Phase 1 (%)	0.0	0.0	0.0		100.0	100.0	0.0		0.0	
Admitted (%)	0.0	0.0	0.0		31.9	39.3	7.4	***	7.4	***
Enrolled (%)	0.0	0.0	0.0		20.3	21.9	1.6	***	1.6	***
Observations	47,622	102,041			22,785	46,522				

Notes: Standard deviations are in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 5: Descriptive Statistics of 'Displacing' and 'Displaced' (2005)

	Displacing	Displaced	Difference	Obs.
A. Applicant Characteristics				
Visible Minority (%)	34.44	10.08	24.36***	479
Female (%)	46.56	45.34	1.21	494
ENEM Score	100.5	101.7	-1.22	458
	(11.14)	(10.57)		
Missing ENEM Score	6.88	7.69	-.810	494
Enrolled	67.61	53.85	13.77***	494
Financed by Family (%)	80.42	95.74	-9.85***	474
Financially Help Family (%)	10.00	3.42	6.58***	474
Work 32+ Hours/Week (%)	14.52	6.41	8.11***	475
B. Applicant Family Characteristics				
Mother with Manual Occ. (%)	9.21	4.27	4.93**	473
Mother with 'Mid-Top Occ.' (%)	9.62	34.19	-24.56***	473
Mother with 'Top Occ.' (%)	1.26	2.14	-.882	473
Father with Manual Occ. (%)	21.85	3.86	17.99***	471
Father with 'Mid-Top Occ.' (%)	24.37	54.94	-30.57***	471
Father with 'Top Occ.' (%)	1.26	3.00	1.74	471
Mother without HS Degree (%)	34.60	13.19	21.41***	472
Mother with Univ. Degree (%)	28.27	56.17	-27.90***	472
Father without HS Degree (%)	35.17	15.88	19.29***	469
Father with Univ. Degree (%)	31.78	60.09	-28.31***	469
Family Income	2,346	4,633	-2,288***	463
	(2,128)	(5,942)		
Home Computer (%)	80.42	95.74	-15.33***	475
Applicants	247	247		

Notes: 'Top Occ.' is defined as an occupation in "high politics, business, or owner of a large company" while 'Mid-Top Occ.' is defined as "self-employed, manager, owner of a medium company." 'Manual O'cc. includes both specialized and non-specialized occupations. Standard deviations are in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 6: Admission and Affirmative Action 2004-2005 (Looking at Secondary School Type and Race)

	(1)	(2)	(3)	(4)	(5)
Public High School	-0.024*	-0.023*	0.017*	-0.011*	-0.014**
	(0.012)	(0.013)	(0.010)	(0.006)	(0.006)
Visible Minority	-0.013***	-0.011**	-0.000	0.001	0.002
	(0.004)	(0.005)	(0.004)	(0.004)	(0.005)
Visible Minority × Public HS	-0.013**	-0.017**	0.001	-0.001	0.001
	(0.006)	(0.008)	(0.007)	(0.008)	(0.009)
Public HS × AA Years	0.023***	0.021***	0.025***	0.027***	0.028***
	(0.006)	(0.007)	(0.006)	(0.006)	(0.006)
Visible Minority × AA Years	-0.003	-0.007	-0.012**	-0.013**	-0.016***
	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)
Visible Minority × Public HS × AA Years		0.008	0.010	0.015	0.015
		(0.008)	(0.007)	(0.010)	(0.010)
Normalized ENEM Score			0.101***	0.122***	0.124***
			(0.015)	(0.015)	(0.015)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Age and Gender Controls	No	No	Yes	Yes	Yes
Parental Education Controls	No	No	Yes	Yes	Yes
Test-Preparation Background Controls	No	No	Yes	Yes	Yes
Program Fixed Effects	No	No	No	Yes	Yes
Municipality Fixed Effects	No	No	No	No	Yes
Number of Observations	78,092	78,092	78,092	78,092	78,092
Number of Program Clusters	59	59	59	59	59
Number of Municipality Clusters	1,540	1,540	1,540	1,540	1,540

Notes: The dependent variable is a binary variable equal to one if the applicant was accepted to UNICAMP, zero otherwise. Public High School is a binary variable equal to one if the applicant was enrolled in a public Brazilian school for the duration of her/his secondary education, and zero otherwise. Visible Minority is a binary variable equal to one if the applicant is black, mulatto or native, and zero otherwise. AA Years is a binary variable equal to one if the year is 2005, zero otherwise. The sample consists of individuals who wrote UNICAMP's admission test between 2004 and 2005. 'Trainees' are excluded. Personal characteristics include: gender, age, as well as mother and father educational attainment. Two-way cluster-robust standard errors (at the program and municipality levels) are shown in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 7: Admission and Affirmative Action 2003-2008 (Looking at Secondary School Type and Race)

	(1)	(2)	(3)	(4)	(5)
Public High School	-0.019	-0.019	0.027***	-0.007	-0.010*
	(0.012)	(0.012)	(0.009)	(0.005)	(0.005)
Visible Minority	-0.009**	-0.007	0.003	0.004	0.004
	(0.005)	(0.007)	(0.004)	(0.005)	(0.005)
Visible Minority × Public HS	-0.014***	-0.018***	0.000	-0.002	-0.002
	(0.004)	(0.007)	(0.006)	(0.007)	(0.008)
Public HS × AA Years	0.020***	0.019***	0.024***	0.031***	0.031***
	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)
Visible Minority × AA Years	-0.010**	-0.013**	-0.015**	-0.015**	-0.017**
	(0.004)	(0.006)	(0.006)	(0.007)	(0.007)
Visible Minority × Public HS × AA Years		0.006	0.008	0.011	0.012
		(0.008)	(0.007)	(0.008)	(0.009)
Normalized ENEM Score			0.106***	0.130***	0.131***
			(0.016)	(0.016)	(0.016)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Age and Gender Controls	No	No	Yes	Yes	Yes
Parental Education Controls	No	No	Yes	Yes	Yes
Test-Preparation Background Controls	No	No	Yes	Yes	Yes
Program Fixed Effects	No	No	No	Yes	Yes
Municipality Fixed Effects	No	No	No	No	Yes
Number of Observations	218,917	218,917	218,917	218,917	218,917
Number of Program Clusters	62	62	62	62	62
Number of Municipality Clusters	2,076	2,076	2,076	2,076	2,076

Notes: The dependent variable is a binary variable equal to one if the applicant was accepted to UNICAMP, zero otherwise. Public High School is a binary variable equal to one if the applicant was enrolled in a public Brazilian school for the duration of her/his secondary education, and zero otherwise. Visible Minority is a binary variable equal to one if the applicant is black, mulatto or native, and zero otherwise. AA Years is a binary variable equal to one if the year is 2005 or above, zero otherwise. The sample consists of individuals who wrote UNICAMP's admission test between 2003 and 2008. 'Trainees' are excluded. Personal characteristics include: gender, age, as well as mother and father educational attainment. Two-way cluster-robust standard errors (at the program and municipality levels) are shown in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 8: Enrollment and Affirmative Action 2004-2005 (Looking at Secondary School Type and Race)

	(1)	(2)	(3)	(4)	(5)
Public High School	-0.004	-0.003	0.017**	-0.003	-0.006
	(0.008)	(0.008)	(0.008)	(0.005)	(0.005)
Visible Minority	-0.004	-0.001	0.005	0.006*	0.005
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)
Visible Minority × Public HS	-0.010**	-0.017***	-0.007	-0.009*	-0.004
	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)
Public HS × AA Years	0.015***	0.013**	0.015***	0.017***	0.018***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.004)
Visible Minority × AA Years	-0.003	-0.009*	-0.013**	-0.013**	-0.015**
	(0.003)	(0.005)	(0.005)	(0.005)	(0.006)
Visible Minority × Public HS × AA Years		0.013**	0.015**	0.018**	0.017**
		(0.006)	(0.006)	(0.008)	(0.007)
Normalized ENEM Score			0.058***	0.073***	0.075***
			(0.011)	(0.012)	(0.013)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Age and Gender Controls	No	No	Yes	Yes	Yes
Parental Education Controls	No	No	Yes	Yes	Yes
Test-Preparation Background Controls	No	No	Yes	Yes	Yes
Program Fixed Effects	No	No	No	Yes	Yes
Municipality Fixed Effects	No	No	No	No	Yes
Number of Observations	78,092	78,092	78,092	78,092	78,092
Number of Program Clusters	59	59	59	59	59
Number of Municipality Clusters	1,540	1,540	1,540	1,540	1,540

Notes: The dependent variable is a binary variable equal to one if the applicant was accepted to UNICAMP, zero otherwise. Public High School is a binary variable equal to one if the applicant was enrolled in a public Brazilian school for the duration of her/his secondary education, and zero otherwise. Visible Minority is a binary variable equal to one if the applicant is black, mulatto or native, and zero otherwise. AA Years is a binary variable equal to one if the year is 2005, zero otherwise. The sample consists of individuals who wrote UNICAMP's admission test between 2004 and 2005. 'Trainees' are excluded. Personal characteristics include: gender, age, as well as mother and father educational attainment. Two-way cluster-robust standard errors (at the program and municipality levels) are shown in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 9: Enrollment and Affirmative Action 2003-2008 (Looking at Secondary School Type and Race)

	(1)	(2)	(3)	(4)	(5)
Public High School	-0.003	-0.002	0.019**	-0.003	-0.007*
	(0.008)	(0.008)	(0.008)	(0.004)	(0.004)
Visible Minority	-0.000	0.002	0.007**	0.007**	0.006*
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Visible Minority × Public HS	-0.011***	-0.015***	-0.006	-0.007	-0.004
	(0.003)	(0.004)	(0.004)	(0.004)	(0.005)
Public HS × AA Years	0.020***	0.019***	0.022***	0.026***	0.025***
	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)
Visible Minority × AA Years	-0.007**	-0.010**	-0.011**	-0.011**	-0.013**
	(0.003)	(0.005)	(0.005)	(0.005)	(0.006)
Visible Minority × Public HS × AA Years		0.006	0.007	0.009	0.008
		(0.006)	(0.005)	(0.007)	(0.006)
Normalized ENEM Score			0.053***	0.069***	0.072***
			(0.011)	(0.012)	(0.013)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Age and Gender Controls	No	No	Yes	Yes	Yes
Parental Education Controls	No	No	Yes	Yes	Yes
Test-Preparation Background Controls	No	No	Yes	Yes	Yes
Program Fixed Effects	No	No	No	Yes	Yes
Municipality Fixed Effects	No	No	No	No	Yes
Number of Observations	218,917	218,917	218,917	218,917	218,917
Number of Program Clusters	62	62	62	62	62
Number of Municipality Clusters	2,076	2,076	2,076	2,076	2,076

Notes: The dependent variable is a binary variable equal to one if the applicant was accepted to UNICAMP, zero otherwise. Public High School is a binary variable equal to one if the applicant was enrolled in a public Brazilian school for the duration of her/his secondary education, and zero otherwise. Visible Minority is a binary variable equal to one if the applicant is black, mulatto or native, and zero otherwise. AA Years is a binary variable equal to one if the year is 2005 or above, zero otherwise. The sample consists of individuals who wrote UNICAMP's admission test between 2003 and 2008. 'Trainees' are excluded. Personal characteristics include: gender, age, as well as mother and father educational attainment. Two-way cluster-robust standard errors (at the program and municipality levels) are shown in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 10: First-Stage Success and Affirmative Action 2004-2005 (Looking at Secondary School Type and Race)

	(1)	(2)	(3)	(4)	(5)
Public High School	-0.067**	-0.067**	0.017	-0.046***	-0.046***
	(0.034)	(0.034)	(0.026)	(0.013)	(0.012)
Visible Minority	-0.037***	-0.036***	-0.014	-0.012	-0.020**
	(0.008)	(0.007)	(.)	(0.009)	(0.009)
Visible Minority × Public HS	-0.029***	-0.031**	0.010	0.003	0.012
	(0.010)	(0.014)	(0.009)	(0.009)	(0.010)
Public HS × AA Years	-0.001	-0.002	0.006	0.011	0.013
	(0.011)	(0.011)	(0.010)	(0.011)	(0.011)
Visible Minority × AA Years	0.005	0.004	-0.008	-0.007	-0.004
	(0.007)	(0.009)	(0.010)	(0.008)	(0.008)
Visible Minority × Public HS × AA Years		0.004	0.008	0.018	0.011
		(0.014)	(0.013)	(0.012)	(0.012)
Normalized ENEM Score			0.233***	0.276***	0.275***
			(0.030)	(0.026)	(0.025)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Age and Gender Controls	No	No	Yes	Yes	Yes
Parental Education Controls	No	No	Yes	Yes	Yes
Test-Preparation Background Controls	No	No	Yes	Yes	Yes
Program Fixed Effects	No	No	No	Yes	Yes
Municipality Fixed Effects	No	No	No	No	Yes
Number of Observations	78,092	78,092	78,092	78,092	78,092
Number of Program Clusters	59	59	59	59	59
Number of Municipality Clusters	1,540	1,540	1,540	1,540	1,540

Notes: The dependent variable is a binary variable equal to one if the applicant passed the first stage of UNICAMP's admission exam, zero otherwise. Public High School is a binary variable equal to one if the applicant was enrolled in a public Brazilian school for the duration of her/his secondary education, and zero otherwise. Visible Minority is a binary variable equal to one if the applicant is black, mulatto or native, and zero otherwise. AA Years is a binary variable equal to one if the year is 2005, zero otherwise. The sample consists of individuals who wrote UNICAMP's admission test between 2004 and 2005. 'Trainees' are excluded. Personal characteristics include: gender, age, a dummy variable equal to one if the applicant enrolled in an admission-exam preparation course (zero otherwise), a dummy variable equal to one if the applicant was enrolled in a post-secondary institution prior to writing the admission exam (zero otherwise), as well as mother and father educational attainment. Two-way cluster-robust standard errors (at the program and municipality levels) are shown in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 11: First-Stage Success and Affirmative Action 2003-2008 (Looking at Secondary School Type and Race)

	(1)	(2)	(3)	(4)	(5)
Public High School	-0.059*	-0.057*	0.028	-0.045***	-0.046***
	(0.033)	(0.033)	(0.025)	(0.011)	(0.011)
Visible Minority	-0.034***	-0.027*	-0.010	-0.010	-0.015
	(0.013)	(0.014)	(.)	(0.012)	(0.011)
Visible Minority × Public HS	-0.021***	-0.034***	0.004	-0.000	0.005
	(0.006)	(0.005)	(.)	(0.009)	(0.009)
Public HS × AA Years	-0.014	-0.017**	-0.004	0.007	0.006
	(0.009)	(0.008)	(0.009)	(0.008)	(0.008)
Visible Minority × AA Years	-0.006	-0.015	-0.019**	-0.016	-0.016
	(0.008)	(0.011)	(0.009)	(0.012)	(0.012)
Visible Minority × Public HS × AA Years		0.018*	0.022***	0.026***	0.024**
		(0.010)	(0.008)	(0.010)	(0.009)
Normalized ENEM Score			0.216***	0.263***	0.263***
			(0.031)	(0.026)	(0.026)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Age and Gender Controls	No	No	Yes	Yes	Yes
Parental Education Controls	No	No	Yes	Yes	Yes
Test-Preparation Background Controls	No	No	Yes	Yes	Yes
Program Fixed Effects	No	No	No	Yes	Yes
Municipality Fixed Effects	No	No	No	No	Yes
Number of Observations	218,917	218,917	218,917	218,917	218,917
Number of Program Clusters	62	62	62	62	62
Number of Municipality Clusters	2,076	2,076	2,076	2,076	2,076

Notes: The dependent variable is a binary variable equal to one if the applicant passed the first stage of UNICAMP's admission exam, zero otherwise. Public High School is a binary variable equal to one if the applicant was enrolled in a public Brazilian school for the duration of her/his secondary education, and zero otherwise. Visible Minority is a binary variable equal to one if the applicant is black, mulatto or native, and zero otherwise. AA Years is a binary variable equal to one if the year is 2005 or above, zero otherwise. The sample consists of individuals who wrote UNICAMP's admission test between 2003 and 2008. 'Trainees' are excluded. Personal characteristics include: gender, age, a dummy variable equal to one if the applicant enrolled in an admission-exam preparation course (zero otherwise), a dummy variable equal to one if the applicant was enrolled in a post-secondary institution prior to writing the admission exam (zero otherwise), as well as mother and father educational attainment. Two-way cluster-robust standard errors (at the program and municipality levels) are shown in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 12: First-Stage Success and Affirmative Action 2003-2008 Medicine UNICAMP (Looking at Secondary School Type and Race)

	(1)	(2)	(3)	(4)
Public High School	0.019***	0.019***	0.012**	0.011**
	(0.005)	(0.005)	(0.005)	(0.005)
Visible Minority	-0.001	-0.001	-0.001	-0.003
	(0.009)	(0.010)	(0.010)	(0.009)
Visible Minority × Public HS	0.023**	0.023	0.022	0.027*
	(0.010)	(0.015)	(0.015)	(0.015)
Public HS × AA Years	-0.016**	-0.016**	-0.014*	-0.016**
	(0.007)	(0.007)	(0.007)	(0.007)
Visible Minority × AA Years	-0.019**	-0.019*	-0.020*	-0.017
	(0.009)	(0.011)	(0.012)	(0.012)
Visible Minority × Public HS × AA Years		0.000	0.001	-0.003
		(0.017)	(0.017)	(0.017)
Normalized ENEM Score	0.135***	0.135***	0.131***	0.133***
	(0.006)	(0.006)	(0.007)	(0.007)
Year Fixed Effects	Yes	Yes	Yes	Yes
Age and Gender Controls	No	No	Yes	Yes
Parental Education Controls	No	No	Yes	Yes
Test-Preparation Background Controls	No	No	Yes	Yes
Program Fixed Effects	No	No	No	Yes
Municipality Fixed Effects	No	No	No	Yes
Number of Observations	41,083	41,083	41,083	41,083
Number of Municipality Clusters	2,076	2,076	2,076	2,076

Notes: The dependent variable is a binary variable equal to one if the applicant passed the first stage of UNICAMP's admission exam, zero otherwise. Public High School is a binary variable equal to one if the applicant was enrolled in a public Brazilian school for the duration of her/his secondary education, and zero otherwise. Visible Minority is a binary variable equal to one if the applicant is black, mulatto or native, and zero otherwise. AA Years is a binary variable equal to one if the year is 2005 or above, zero otherwise. The sample consists of individuals who wrote UNICAMP's admission test and chose medicine as first option between 2003 and 2008. 'Trainees' are excluded. Personal characteristics include: gender, age, a dummy variable equal to one if the applicant enrolled in an admission-exam preparation course (zero otherwise), a dummy variable equal to one if the applicant was enrolled in a post-secondary institution prior to writing the admission exam (zero otherwise), as well as mother and father educational attainment. Cluster-robust standard errors at the municipality level are shown in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 13: First-Stage Success and Affirmative Action 2003-2008 Medicine FAMERP (Looking at Secondary School Type and Race)

	(1)	(2)	(3)	(4)
Public High School	-0.001	-0.001	-0.008	-0.001
	(0.013)	(0.013)	(0.013)	(0.013)
Visible Minority	-0.028	-0.029	-0.025	-0.032
	(0.019)	(0.020)	(0.021)	(0.021)
Visible Minority × Public HS	0.024	0.027	0.027	0.017
	(0.023)	(0.036)	(0.037)	(0.039)
Public HS × AA Years	0.006	0.007	0.011	0.009
	(0.015)	(0.015)	(0.016)	(0.016)
Visible Minority × AA Years	-0.006	-0.005	-0.008	-0.015
	(0.018)	(0.021)	(0.021)	(0.023)
Visible Minority × Public HS × AA Years		-0.004	-0.000	0.011
		(0.043)	(0.043)	(0.047)
Normalized ENEM Score	0.229***	0.229***	0.222***	0.222***
	(0.008)	(0.008)	(0.008)	(0.008)
Year Fixed Effects	Yes	Yes	Yes	Yes
Age and Gender Controls	No	No	Yes	Yes
Parental Education Controls	No	No	Yes	Yes
Test-Preparation Background Controls	No	No	Yes	Yes
Program Fixed Effects	No	No	No	Yes
Municipality Fixed Effects	No	No	No	Yes
Number of Observations	14,177	14,177	14,177	14,177
Number of Municipality Clusters	2,076	2,076	2,076	2,076

Notes: The dependent variable is a binary variable equal to one if the applicant passed the first stage of UNICAMP's admission exam, zero otherwise. Public High School is a binary variable equal to one if the applicant was enrolled in a public Brazilian school for the duration of her/his secondary education, and zero otherwise. Visible Minority is a binary variable equal to one if the applicant is black, mulatto or native, and zero otherwise. AA Years is a binary variable equal to one if the year is 2005 or above, zero otherwise. The sample consists of individuals who wrote UNICAMP's admission test and chose biological sciences as first option between 2003 and 2008. 'Trainees' are excluded. Personal characteristics include: gender, age, a dummy variable equal to one if the applicant enrolled in an admission-exam preparation course (zero otherwise), a dummy variable equal to one if the applicant was enrolled in a post-secondary institution prior to writing the admission exam (zero otherwise), as well as mother and father educational attainment. Cluster-robust standard errors at the municipality level are shown in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 14: First-Stage Success and Affirmative Action 2003-2008 Biological Sciences (Looking at Secondary School Type and Race)

	(1)	(2)	(3)	(4)
Public High School	-0.010	-0.011	-0.004	-0.004
	(0.016)	(0.015)	(0.015)	(0.015)
Visible Minority	-0.030	-0.033	-0.027	-0.055
	(0.027)	(0.039)	(0.040)	(0.036)
Visible Minority × Public HS	0.037**	0.044	0.049	0.075*
	(0.016)	(0.045)	(0.048)	(0.046)
Public HS × AA Years	-0.023	-0.021	-0.021	-0.027
	(0.021)	(0.019)	(0.017)	(0.017)
Visible Minority × AA Years	-0.002	0.002	-0.003	0.022
	(0.024)	(0.041)	(0.042)	(0.040)
Visible Minority × Public HS × AA Years		-0.010	-0.013	-0.037
		(0.054)	(0.057)	(0.056)
Normalized ENEM Score	0.222***	0.222***	0.222***	0.222***
	(0.012)	(0.012)	(0.011)	(0.011)
Year Fixed Effects	Yes	Yes	Yes	Yes
Age and Gender Controls	No	No	Yes	Yes
Parental Education Controls	No	No	Yes	Yes
Test-Preparation Background Controls	No	No	Yes	Yes
Program Fixed Effects	No	No	No	Yes
Municipality Fixed Effects	No	No	No	Yes
Number of Observations	9,539	9,539	9,539	9,539
Number of Municipality Clusters	2,076	2,076	2,076	2,076

Notes: The dependent variable is a binary variable equal to one if the applicant passed the first stage of UNICAMP's admission exam, zero otherwise. Public High School is a binary variable equal to one if the applicant was enrolled in a public Brazilian school for the duration of her/his secondary education, and zero otherwise. Visible Minority is a binary variable equal to one if the applicant is black, mulatto or native, and zero otherwise. AA Years is a binary variable equal to one if the year is 2005 or above, zero otherwise. The sample consists of individuals who wrote UNICAMP's admission test and chose Biological Sciences as first option between 2003 and 2008. 'Trainees' are excluded. Personal characteristics include: gender, age, a dummy variable equal to one if the applicant enrolled in an admission-exam preparation course (zero otherwise), a dummy variable equal to one if the applicant was enrolled in a post-secondary institution prior to writing the admission exam (zero otherwise), as well as mother and father educational attainment. Cluster-robust standard errors at the municipality level are shown in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 15: Performance in Phase 1 2004-2005 (All majors)

	(1)	(2)	(3)	(4)	(5)
Public High School	-0.353***	-0.351***	-0.296***	-0.249***	-0.242***
	(0.020)	(0.018)	(0.019)	(0.011)	(0.012)
Visible Minority	-0.045	-0.039	-0.020	-0.017	-0.049*
	(0.042)	(0.050)	(0.050)	(0.041)	(0.029)
Visible Minority × Public HS	-0.008	-0.020	-0.009	0.000	0.022
	(0.018)	(0.035)	(0.038)	(0.032)	(0.021)
Public HS × AA Years	0.004	0.000	0.008	0.011	0.016
	(0.018)	(0.018)	(0.017)	(0.018)	(0.018)
Visible Minority × AA Years	0.003	-0.007	-0.010	-0.014	-0.010
	(0.016)	(0.029)	(0.030)	(0.027)	(0.023)
Visible Minority × Public HS × AA Years		0.021	0.020	0.021	0.014
		(0.031)	(0.031)	(0.023)	(0.018)
Normalized ENEM Score	0.864***	0.864***	0.834***	0.789***	0.782***
	(0.041)	(0.041)	(0.040)	(0.040)	(0.040)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Age and Gender Controls	No	No	Yes	Yes	Yes
Parental Education Controls	No	No	Yes	Yes	Yes
Test-Preparation Background Controls	No	No	Yes	Yes	Yes
Program Fixed Effects	No	No	No	Yes	Yes
Municipality Fixed Effects	No	No	No	No	Yes
Number of Observations	78,092	78,092	78,092	78,092	78,092
Number of Program Clusters	59	59	59	59	59
Number of Municipality Clusters	1,540	1,540	1,540	1,540	1,540

Notes: The dependent variable is the normalized score on the general questions of Phase 1 on the admission exam. This score is normalized such that, every year, the mean and the variance of these scores are 0 and 1, respectively. The ENEM score is normalized in the same way (i.e., with mean 0 and variance 1). Public High School is a binary variable equal to one if the applicant was enrolled in a public Brazilian school for the duration of her/his secondary education, and zero otherwise. Visible Minority is a binary variable equal to one if the applicant is black, mulatto or native, and zero otherwise. AA Years is a binary variable equal to one if the year is 2005, zero otherwise. The sample consists of individuals who wrote UNICAMP's admission test between 2004 and 2005 and chose medicine as first option. 'Trainees' are excluded. Cluster-robust standard errors at the municipality level are shown in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 16: Performance in Phase 1 2003-2008 (All majors)

	(1)	(2)	(3)	(4)	(5)
Public High School	-0.305***	-0.301***	-0.254***	-0.214***	-0.210***
	(0.020)	(0.017)	(0.019)	(0.013)	(0.012)
Visible Minority	-0.035	-0.023	-0.007	-0.003	-0.024
	(0.029)	(0.040)	(0.039)	(0.033)	(0.025)
Visible Minority × Public HS	0.002	-0.023	-0.016	-0.010	0.004
	(0.012)	(0.031)	(0.034)	(0.030)	(0.022)
Public HS × AA Years	-0.004	-0.010	-0.006	-0.006	-0.003
	(0.015)	(0.013)	(0.013)	(0.012)	(0.012)
Visible Minority × AA Years	-0.036**	-0.052*	-0.053*	-0.054**	-0.053**
	(0.015)	(0.030)	(0.030)	(0.027)	(0.024)
Visible Minority × Public HS × AA Years		0.034	0.033	0.033	0.032
		(0.035)	(0.035)	(0.032)	(0.029)
Normalized ENEM Score	0.812***	0.812***	0.792***	0.750***	0.744***
	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Age and Gender Controls	No	No	Yes	Yes	Yes
Parental Education Controls	No	No	Yes	Yes	Yes
Test-Preparation Background Controls	No	No	Yes	Yes	Yes
Program Fixed Effects	No	No	No	Yes	Yes
Municipality Fixed Effects	No	No	No	No	Yes
Number of Observations	218,917	218,917	218,917	218,917	218,917
Number of Program Clusters	62	62	62	62	62
Number of Municipality Clusters	2,076	2,076	2,076	2,076	2,076

Notes: The dependent variable is the normalized score on the general questions of Phase 1 on the admission exam. This score is normalized such that, every year, the mean and the variance of these scores are 0 and 1, respectively. The ENEM score is normalized in the same way (i.e., with mean 0 and variance 1). Public High School is a binary variable equal to one if the applicant was enrolled in a public Brazilian school for the duration of her/his secondary education, and zero otherwise. Visible Minority is a binary variable equal to one if the applicant is black, mulatto or native, and zero otherwise. AA Years is a binary variable equal to one if the year is 2005 or above, zero otherwise. The sample consists of individuals who wrote UNICAMP's admission test between 2003 and 2008 and chose medicine as first option. 'Trainees' are excluded. Cluster-robust standard errors at the municipality level are shown in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 17: Performance in Phase 2 2003-2008 (All majors)

	(1)	(2)	(3)	(4)	(5)
Public High School	-28.040***	-27.986***	-19.098***	-3.988**	-4.379**
	(4.803)	(4.595)	(3.778)	(1.739)	(1.709)
Visible Minority	-2.915	-2.746	0.777	1.335	-0.962
	(3.362)	(4.023)	(3.746)	(2.630)	(2.243)
Visible Minority × Public HS	-2.104	-2.516	-1.212	-3.287	-1.009
	(2.291)	(3.758)	(3.775)	(3.610)	(3.065)
Public HS × AA Years	-2.292	-2.376	-2.393	-3.756*	-3.126
	(2.122)	(2.265)	(2.250)	(2.210)	(2.159)
Visible Minority × AA Years	-4.349*	-4.583	-4.340	-3.457	-3.012
	(2.311)	(3.740)	(3.765)	(2.516)	(2.383)
Visible Minority × Public HS × AA Years		0.573	0.867	3.390	2.261
		(4.886)	(4.697)	(3.686)	(3.247)
Normalized ENEM Score	79.659***	79.659***	79.995***	55.494***	55.225**
	(5.498)	(5.498)	(4.817)	(2.262)	(2.162)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Age and Gender Controls	No	No	Yes	Yes	Yes
Parental Education Controls	No	No	Yes	Yes	Yes
Test-Preparation Background Controls	No	No	Yes	Yes	Yes
Program Fixed Effects	No	No	No	Yes	Yes
Municipality Fixed Effects	No	No	No	No	Yes
Number of Observations	64,503	64,503	64,503	64,503	64,503
Number of Program Clusters	62	62	62	62	62
Number of Municipality Clusters	1,241	1,241	1,241	1,241	1,241

Notes: The dependent variable is the normalized score on Phase 2 (excluding P1 score) of the admission exam. This scor is normalized such that, every year, the mean and the variance of these scores are 0 and 1, respectively. The ENEM score normalized in the same way (i.e., with mean 0 and variance 1). Public High School is a binary variable equal to one if the ap plicant was enrolled in a public Brazilian school for the duration of her/his secondary education, and zero otherwise. Visibl Minority is a binary variable equal to one if the applicant is black, mulatto or native, and zero otherwise. AA Years is a binar variable equal to one if the year is 2005 or above, zero otherwise. The sample consists of individuals who wrote UNICAMP admission test between 2003 and 2008 and chose medicine as first option. 'Trainees' are excluded. Cluster-robust standar errors at the municipality level are shown in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 18: Performance in Phase 2 2004-2005 (All majors)

	(1)	(2)	(3)	(4)	(5)
Public High School	-33.947***	-34.047***	-24.002***	-8.069***	-8.227**
	(5.351)	(5.216)	(4.295)	(1.534)	(1.571)
Visible Minority	-6.228**	-6.510*	-1.989	-1.703	-2.607
	(2.680)	(3.544)	(3.537)	(2.149)	(2.057)
Visible Minority × Public HS	-0.259	0.450	1.212	-1.701	0.151
	(2.450)	(4.408)	(4.376)	(3.394)	(3.164)
Public HS × AA Years	0.280	0.510	0.390	-0.456	-0.075
	(2.450)	(2.605)	(2.409)	(1.730)	(1.626)
Visible Minority × AA Years	-1.644	-1.091	-1.641	-0.768	-2.252
	(2.147)	(2.962)	(2.903)	(1.621)	(1.720)
Visible Minority × Public HS × AA Years		-1.396	-0.548	2.176	2.093
		(5.633)	(5.006)	(3.974)	(4.036)
Normalized ENEM Score	88.205***	88.206***	88.906***	56.743***	57.065**
	(8.292)	(8.293)	(7.387)	(3.021)	(2.936)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Age and Gender Controls	No	No	Yes	Yes	Yes
Parental Education Controls	No	No	Yes	Yes	Yes
Test-Preparation Background Controls	No	No	Yes	Yes	Yes
Program Fixed Effects	No	No	No	Yes	Yes
Municipality Fixed Effects	No	No	No	No	Yes
Number of Observations	21,959	21,959	21,959	21,959	21,959
Number of Program Clusters	59	59	59	59	59
Number of Municipality Clusters	827	827	827	827	827

Notes: The dependent variable is the normalized score on Phase 2 (excluding P1 score) of the admission exam. This scor is normalized such that, every year, the mean and the variance of these scores are 0 and 1, respectively. The ENEM score normalized in the same way (i.e., with mean 0 and variance 1). Public High School is a binary variable equal to one if the ap plicant was enrolled in a public Brazilian school for the duration of her/his secondary education, and zero otherwise. Visibl Minority is a binary variable equal to one if the applicant is black, mulatto or native, and zero otherwise. AA Years is a binar variable equal to one if the year is 2005 or above, zero otherwise. The sample consists of individuals who wrote UNICAMP admission test between 2003 and 2008 and chose medicine as first option. 'Trainees' are excluded. Cluster-robust standar errors at the municipality level are shown in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 19: Performance in Phase 1 2004-2005 (Medicine)

	(1)	(2)	(3)	(4)
Public High School	-0.304***	-0.293***	-0.269***	-0.252***
	(0.023)	(0.024)	(0.023)	(0.025)
Visible Minority	0.083	0.099	0.119*	0.033
	(0.069)	(0.074)	(0.069)	(0.050)
Visible Minority × Public HS	-0.034	-0.095	-0.096	-0.040
	(0.047)	(0.074)	(0.079)	(0.073)
Public HS × AA Years	0.087***	0.065**	0.070**	0.071**
	(0.027)	(0.028)	(0.029)	(0.029)
Visible Minority × AA Years	-0.095**	-0.122**	-0.134***	-0.110**
	(0.039)	(0.047)	(0.046)	(0.043)
Visible Minority × Public HS × AA Years		0.104	0.119*	0.113
		(0.066)	(0.070)	(0.073)
Normalized ENEM Score	1.021***	1.021***	0.973***	0.962***
	(0.017)	(0.017)	(0.018)	(0.023)
Year Fixed Effects	Yes	Yes	Yes	Yes
Age and Gender Controls	No	No	Yes	Yes
Parental Education Controls	No	No	Yes	Yes
Test-Preparation Background Controls	No	No	Yes	Yes
Municipality Fixed Effects	No	No	No	Yes
Number of Observations	14,451	14,451	14,451	14,451
Number of Municipality Clusters	1,540	1,540	1,540	1,540

Notes: The dependent variable is the normalized score on the general questions of Phase 1 on the admission exam. This score is normalized such that, every year, the mean and the variance of these scores are 0 and 1, respectively. The ENEM score is normalized in the same way (i.e., with mean 0 and variance 1). Public High School is a binary variable equal to one if the applicant was enrolled in a public Brazilian school for the duration of her/his secondary education, and zero otherwise. Visible Minority is a binary variable equal to one if the applicant is black, mulatto or native, and zero otherwise. AA Years is a binary variable equal to one if the year is 2005, zero otherwise. The sample consists of individuals who wrote UNICAMP's admission test between 2004 and 2005 and chose medicine as first option. 'Trainees' are excluded. Cluster-robust standard errors at the municipality level are shown in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 20: Quantile Regression Results for the Performance on Phase 1

Quantile	10th	25th	50th	75th	90th
Public High School	-0.325***	-0.329***	-0.306***	-0.260***	-0.177***
	(0.043)	(0.035)	(0.032)	(0.042)	(0.042)
Visible Minority	0.080	0.055	0.100**	0.136***	0.190***
	(0.053)	(0.048)	(0.043)	(0.044)	(0.054)
Visible Minority × Public HS	-0.014	-0.082	-0.071	-0.122	-0.289***
	(0.079)	(0.092)	(0.073)	(0.090)	(0.110)
Public HS × AA Years	0.159***	0.177***	0.111**	0.057	-0.057
	(0.051)	(0.042)	(0.045)	(0.054)	(0.060)
Visible Minority × AA Years	-0.125**	-0.087	-0.131**	-0.160***	-0.149**
	(0.061)	(0.056)	(0.052)	(0.052)	(0.074)
Visible Minority × Public HS × AA Years	0.091	0.125	0.146	0.141	0.222
	(0.095)	(0.115)	(0.093)	(0.104)	(0.138)
Normalized ENEM Score	0.887***	0.938***	0.950***	0.933***	0.872***
	(0.015)	(0.013)	(0.008)	(0.009)	(0.012)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Age and Gender Controls	Yes	Yes	Yes	Yes	Yes
Parental Education Controls	Yes	Yes	Yes	Yes	Yes
Test-Preparation Background Controls	Yes	Yes	Yes	Yes	Yes
Number of Observations	14,586	14,586	14,586	14,586	14,586

Notes: The dependent variable is the normalized score on the general questions of Phase 1 on the admission exam. The sample consists of UNICAMP Medicine Applicants who wrote the admission test between 2003 and 2008. 'Trainees' are excluded. Personal characteristics include: gender, age, as well as mother and father educational attainment. Bootstrapped standard errors (based on 100 replications), are shown in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 21: Performance in Phase 2 2004-2005 (Medicine)

	(1)	(2)	(3)	(4)
Public High School	-11.629***	-9.183*	-3.977	-3.494
	(4.470)	(4.763)	(4.621)	(4.614)
Visible Minority	3.069	5.677	7.114	2.820
	(7.817)	(6.989)	(6.931)	(6.586)
Visible Minority × Public HS	-0.430	-14.045	-8.372	-1.786
	(7.620)	(15.602)	(13.123)	(16.577)
Public HS × AA Years	6.286	1.552	-0.124	1.799
	(5.642)	(5.480)	(5.510)	(5.048)
Visible Minority × AA Years	-5.457	-10.182	-11.338	-8.616
	(8.049)	(7.729)	(7.657)	(7.534)
Visible Minority × Public HS × AA Years		23.666	20.927	14.171
		(18.942)	(14.980)	(19.014)
Normalized ENEM Score	64.327***	64.099***	63.952***	66.673***
	(5.896)	(5.861)	(6.720)	(6.934)
Year Fixed Effects	Yes	Yes	Yes	Yes
Age and Gender Controls	No	No	Yes	Yes
Parental Education Controls	No	No	Yes	Yes
Test-Preparation Background Controls	No	No	Yes	Yes
Municipality Fixed Effects	No	No	No	Yes
Number of Observations	1,570	1,570	1,570	1,570
Number of Municipality Clusters				

Notes: The dependent variable is the normalized score on the general questions of Phase 1 on the admission exam. This score is normalized such that, every year, the mean and the variance of these scores are 0 and 1, respectively. The ENEM score is normalized in the same way (i.e., with mean 0 and variance 1). Public High School is a binary variable equal to one if the applicant was enrolled in a public Brazilian school for the duration of her/his secondary education, and zero otherwise. Visible Minority is a binary variable equal to one if the applicant is black, mulatto or native, and zero otherwise. AA Years is a binary variable equal to one if the year is 2005 or above, zero otherwise. The sample consists of individuals who wrote UNICAMP's admission test between 2003 and 2008 and chose medicine as first option. 'Trainees' are excluded. Cluster-robust standard errors at the municipality level are shown in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 22: Performance in Phase 2 2003-2008 (Medicine)

	(1)	(2)	(3)	(4)
Public High School	-8.509**	-7.636**	-0.970	-0.588
	(3.363)	(3.531)	(3.293)	(3.385)
Visible Minority	-5.267	-4.157	-2.974	-1.287
	(5.031)	(5.025)	(4.487)	(4.394)
Visible Minority × Public HS	0.872	-5.536	-7.035	-4.047
	(5.552)	(10.570)	(10.897)	(11.898)
Public HS × AA Years	4.073	2.668	-1.279	-2.000
	(3.154)	(3.356)	(3.087)	(3.064)
Visible Minority × AA Years	2.553	0.984	0.522	0.353
	(5.692)	(5.731)	(5.399)	(5.255)
Visible Minority × Public HS × AA Years		8.940	11.936	11.083
		(9.853)	(9.364)	(9.168)
Normalized ENEM Score	54.375***	54.401***	55.256***	56.145***
	(2.190)	(2.189)	(2.313)	(2.174)
Year Fixed Effects	Yes	Yes	Yes	Yes
Age and Gender Controls	No	No	Yes	Yes
Parental Education Controls	No	No	Yes	Yes
Test-Preparation Background Controls	No	No	Yes	Yes
Municipality Fixed Effects	No	No	No	Yes
Number of Observations	4,684	4,684	4,684	4,684
Number of Municipality Clusters	402	402	402	402

Notes: The dependent variable is the normalized score on the general questions of Phase 1 on the admission exam. This score is normalized such that, every year, the mean and the variance of these scores are 0 and 1, respectively. The ENEM score is normalized in the same way (i.e., with mean 0 and variance 1). Public High School is a binary variable equal to one if the applicant was enrolled in a public Brazilian school for the duration of her/his secondary education, and zero otherwise. Visible Minority is a binary variable equal to one if the applicant is black, mulatto or native, and zero otherwise. AA Years is a binary variable equal to one if the year is 2005 or above, zero otherwise. The sample consists of individuals who wrote UNICAMP's admission test between 2003 and 2008 and chose medicine as first option. 'Trainees' are excluded. Cluster-robust standard errors at the municipality level are shown in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 23: Performance in Phase 1 2003-2008 (Medicine)

	(1)	(2)	(3)	(4)
Public High School	-0.259***	-0.247***	-0.233***	-0.224***
	(0.020)	(0.018)	(0.018)	(0.016)
Visible Minority	0.045	0.064	0.077	0.028
	(0.039)	(0.048)	(0.047)	(0.036)
Visible Minority × Public HS	-0.015	-0.089	-0.087	-0.031
	(0.024)	(0.062)	(0.064)	(0.050)
Public HS × AA Years	0.031*	0.013	0.022	0.020
	(0.018)	(0.017)	(0.016)	(0.016)
Visible Minority × AA Years	-0.097***	-0.124***	-0.128***	-0.111***
	(0.024)	(0.035)	(0.034)	(0.032)
Visible Minority × Public HS × AA Years		0.100	0.103	0.068
		(0.066)	(0.065)	(0.057)
Normalized ENEM Score	0.908***	0.908***	0.880***	0.871***
	(0.007)	(0.007)	(0.009)	(0.013)
Year Fixed Effects	Yes	Yes	Yes	Yes
Age and Gender Controls	No	No	Yes	Yes
Parental Education Controls	No	No	Yes	Yes
Test-Preparation Background Controls	No	No	Yes	Yes
Municipality Fixed Effects	No	No	No	Yes
Number of Observations	41,083	41,083	41,072	41,072
Number of Municipality Clusters	1,553	1,553	1,553	1,553

Notes: The dependent variable is the normalized score on the general questions of Phase 1 on the admission exam. This score is normalized such that, every year, the mean and the variance of these scores are 0 and 1, respectively. The ENEM score is normalized in the same way (i.e., with mean 0 and variance 1). Public High School is a binary variable equal to one if the applicant was enrolled in a public Brazilian school for the duration of her/his secondary education, and zero otherwise. Visible Minority is a binary variable equal to one if the applicant is black, mulatto or native, and zero otherwise. AA Years is a binary variable equal to one if the year is 2005 or above, zero otherwise. The sample consists of individuals who wrote UNICAMP's admission test between 2003 and 2008 and chose medicine as first option. 'Trainees' are excluded. Cluster-robust standard errors at the municipality level are shown in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 24: Performance in Phase 1 2004-2005 (Biological Sciences)

	(1)	(2)	(3)	(4)
Public High School	-0.295***	-0.293***	-0.259***	-0.246***
	(0.038)	(0.034)	(0.039)	(0.036)
Visible Minority	-0.022	-0.015	-0.005	-0.097
	(0.064)	(0.082)	(0.077)	(0.070)
Visible Minority × Public HS	-0.029	-0.044	0.009	0.108
	(0.059)	(0.116)	(0.118)	(0.117)
Public HS × AA Years	0.033	0.028	0.029	0.045
	(0.045)	(0.053)	(0.053)	(0.055)
Visible Minority × AA Years	0.042	0.030	0.017	0.041
	(0.082)	(0.084)	(0.082)	(0.075)
Visible Minority × Public HS × AA Years		0.029	0.009	-0.037
		(0.150)	(0.147)	(0.156)
Normalized ENEM Score	0.884***	0.884***	0.872***	0.873***
	(0.020)	(0.020)	(0.017)	(0.019)
Year Fixed Effects	Yes	Yes	Yes	Yes
Age and Gender Controls	No	No	Yes	Yes
Parental Education Controls	No	No	Yes	Yes
Test-Preparation Background Controls	No	No	Yes	Yes
Municipality Fixed Effects	No	No	No	Yes
Number of Observations	3,435	3,435	3,435	3,435
Number of Municipality Clusters	1,553	1,553	1,553	1,553

Notes: The dependent variable is the normalized score on the general questions of Phase 1 on the admission exam. This score is normalized such that, every year, the mean and the variance of these scores are 0 and 1, respectively. The ENEM score is normalized in the same way (i.e., with mean 0 and variance 1). Public High School is a binary variable equal to one if the applicant was enrolled in a public Brazilian school for the duration of her/his secondary education, and zero otherwise. Visible Minority is a binary variable equal to one if the applicant is black, mulatto or native, and zero otherwise. AA Years is a binary variable equal to one if the year is 2005 or above, zero otherwise. The sample consists of individuals who wrote UNICAMP's admission test between 2003 and 2008 and chose medicine as first option. 'Trainees' are excluded. Cluster-robust standard errors at the municipality level are shown in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 25: Performance in Phase 1 2003-2008 (Biological Sciences)

	(1)	(2)	(3)	(4)
Public High School	-0.238***	-0.239***	-0.209***	-0.198***
	(0.031)	(0.027)	(0.030)	(0.028)
Visible Minority	-0.067	-0.072	-0.063	-0.120
	(0.057)	(0.082)	(0.081)	(0.074)
Visible Minority × Public HS	-0.031	-0.020	0.008	0.070
	(0.043)	(0.106)	(0.110)	(0.105)
Public HS × AA Years	-0.051*	-0.049*	-0.050*	-0.039
	(0.026)	(0.027)	(0.027)	(0.027)
Visible Minority × AA Years	0.019	0.025	0.022	0.073
	(0.048)	(0.085)	(0.085)	(0.079)
Visible Minority × Public HS × AA Years		-0.014	-0.025	-0.085
		(0.117)	(0.117)	(0.114)
Normalized ENEM Score	0.791***	0.791***	0.781***	0.776***
	(0.015)	(0.015)	(0.012)	(0.014)
Year Fixed Effects	Yes	Yes	Yes	Yes
Age and Gender Controls	No	No	Yes	Yes
Parental Education Controls	No	No	Yes	Yes
Test-Preparation Background Controls	No	No	Yes	Yes
Municipality Fixed Effects	No	No	No	Yes
Number of Observations	9,539	9,539	9,539	9,539
Number of Municipality Clusters	1,553	1,553	1,553	1,553

Notes: The dependent variable is the normalized score on the general questions of Phase 1 on the admission exam. This score is normalized such that, every year, the mean and the variance of these scores are 0 and 1, respectively. The ENEM score is normalized in the same way (i.e., with mean 0 and variance 1). Public High School is a binary variable equal to one if the applicant was enrolled in a public Brazilian school for the duration of her/his secondary education, and zero otherwise. Visible Minority is a binary variable equal to one if the applicant is black, mulatto or native, and zero otherwise. AA Years is a binary variable equal to one if the year is 2005 or above, zero otherwise. The sample consists of individuals who wrote UNICAMP's admission test between 2003 and 2008 and chose medicine as first option. 'Trainees' are excluded. Cluster-robust standard errors at the municipality level are shown in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 26: Performance in Phase 1 2004-2005 (Medicine FAMERP)

	(1)	(2)	(3)	(4)
Public High School	-0.241***	-0.239***	-0.274***	-0.245***
	(0.037)	(0.037)	(0.038)	(0.038)
Visible Minority	-0.028	-0.025	-0.020	-0.037
	(0.066)	(0.066)	(0.066)	(0.068)
Visible Minority × Public HS	0.031	0.015	0.006	-0.044
	(0.067)	(0.124)	(0.115)	(0.122)
Public HS × AA Years	-0.029	-0.034	-0.025	-0.026
	(0.052)	(0.050)	(0.049)	(0.050)
Visible Minority × AA Years	0.083	0.077	0.069	0.024
	(0.066)	(0.071)	(0.074)	(0.082)
Visible Minority × Public HS × AA Years		0.028	0.057	0.112
		(0.154)	(0.153)	(0.169)
Normalized ENEM Score	0.931***	0.931***	0.890***	0.877***
	(0.016)	(0.016)	(0.016)	(0.020)
Year Fixed Effects	Yes	Yes	Yes	Yes
Age and Gender Controls	No	No	Yes	Yes
Parental Education Controls	No	No	Yes	Yes
Test-Preparation Background Controls	No	No	Yes	Yes
Municipality Fixed Effects	No	No	No	Yes
Number of Observations	4,815	4,815	4,815	4,815
Number of Municipality Clusters	1,553	1,553	1,553	1,553

Notes: The dependent variable is the normalized score on the general questions of Phase 1 on the admission exam. This score is normalized such that, every year, the mean and the variance of these scores are 0 and 1, respectively. The ENEM score is normalized in the same way (i.e., with mean 0 and variance 1). Public High School is a binary variable equal to one if the applicant was enrolled in a public Brazilian school for the duration of her/his secondary education, and zero otherwise. Visible Minority is a binary variable equal to one if the applicant is black, mulatto or native, and zero otherwise. AA Years is a binary variable equal to one if the year is 2005 or above, zero otherwise. The sample consists of individuals who wrote UNICAMP's admission test between 2003 and 2008 and chose medicine as first option. 'Trainees' are excluded. Cluster-robust standard errors at the municipality level are shown in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 27: Performance in Phase 1 2003-2008 (Medicine FAMERP)

	(1)	(2)	(3)	(4)
Public High School	-0.191***	-0.191***	-0.196***	-0.177***
	(0.027)	(0.028)	(0.029)	(0.027)
Visible Minority	-0.020	-0.020	-0.009	-0.032
	(0.053)	(0.053)	(0.053)	(0.049)
Visible Minority × Public HS	0.037	0.038	0.035	0.014
	(0.043)	(0.094)	(0.090)	(0.087)
Public HS × AA Years	-0.024	-0.023	-0.016	-0.008
	(0.027)	(0.029)	(0.030)	(0.029)
Visible Minority × AA Years	-0.014	-0.014	-0.024	-0.049
	(0.046)	(0.047)	(0.047)	(0.053)
Visible Minority × Public HS × AA Years		-0.001	0.002	0.014
		(0.100)	(0.096)	(0.100)
Normalized ENEM Score	0.862***	0.862***	0.836***	0.829***
	(0.008)	(0.008)	(0.007)	(0.009)
Year Fixed Effects	Yes	Yes	Yes	Yes
Age and Gender Controls	No	No	Yes	Yes
Parental Education Controls	No	No	Yes	Yes
Test-Preparation Background Controls	No	No	Yes	Yes
Municipality Fixed Effects	No	No	No	Yes
Number of Observations	14,177	14,177	14,177	14,177
Number of Municipality Clusters	1,553	1,553	1,553	1,553

Notes: The dependent variable is the normalized score on the general questions of Phase 1 on the admission exam. This score is normalized such that, every year, the mean and the variance of these scores are 0 and 1, respectively. The ENEM score is normalized in the same way (i.e., with mean 0 and variance 1). Public High School is a binary variable equal to one if the applicant was enrolled in a public Brazilian school for the duration of her/his secondary education, and zero otherwise. Visible Minority is a binary variable equal to one if the applicant is black, mulatto or native, and zero otherwise. AA Years is a binary variable equal to one if the year is 2005 or above, zero otherwise. The sample consists of individuals who wrote UNICAMP's admission test between 2003 and 2008 and chose medicine as first option. 'Trainees' are excluded. Cluster-robust standard errors at the municipality level are shown in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.