

The Redistributive Equity of Affirmative Action: Exploring the Role of Race, Socioeconomic Status, and Gender in College Admissions

Andrew M. Francis*
Emory University

Maria Tannuri-Pianto
University of Brasilia

This paper contributes to research on affirmative action by examining issues of equity in the context of racial quotas in Brazil. We study the experience of the University of Brasilia, which established racial quotas in 2004 reserving 20% of available admissions slots for students who self-identified as black. Based on university admissions data and a student survey conducted by the authors, we find evidence that race, socioeconomic status, and gender were considerable barriers to college attendance and achievement. For example, first-difference regressions involving pairs of siblings indicate that black identity and gender had a negative effect on entrance exam scores. Moreover, we compare displaced and displacing applicants and find that racial quotas helped promote equity to some extent. Nevertheless, the scale and scope of redistribution were highly limited, and the vast majority of Brazilians had little chance of attending college, suggesting that more still needs to be done.

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* Andrew M. Francis, Department of Economics, Emory University, Atlanta, GA (andrew.francis@emory.edu). Maria Tannuri-Pianto, Department of Economics, University of Brasilia, Brazil (tannuri@unb.br). We are extremely grateful to the Emory URC for funding, to CESPE/UnB for providing data and assistance, and to the Editor, Brian McCall, and two anonymous referees for wonderfully helpful comments.

I. Introduction

About ten times more slaves arrived in Brazil than in British Mainland North America (Eltis, 2001). As a result, Brazil has had a large black and mixed-race population. In 2009, about 48.2% of Brazil's population of 192 million was *branco*, or light-skinned, 44.2% *pardo*, or brown-skinned, and 6.9% *preto*, or dark-skinned (IBGE, 2010).¹ Even though the rate of ethnic intermarriage has remained relatively high, significant racial disparities in education, income, health, and other dimensions continue to exist (Telles, 2004). For this reason, a handful of universities have recently adopted racial quotas in admissions. Both the newness of these policies and particular features of the Brazilian context provide researchers an opportunity to examine important policy and academic questions about affirmative action in higher education. Specifically, this paper focuses on issues of equity: To what extent may race and other factors be barriers to college attendance and achievement? To what extent may affirmative action promote equity through the redistribution of university admissions slots?

Exploring these questions, we study the experience of the University of Brasilia (UnB), which established racial quotas in 2004 reserving 20% of available admissions slots for students who self-identified as *negro*, or black.² Based on university admissions data and a student survey conducted by the authors, we find evidence that race, socioeconomic status, and gender were considerable barriers to college attendance and achievement. Holding constant socioeconomic status and gender, *preto* and *negro* applicants had significantly lower college entrance exam scores than *branco* applicants. *Preto* applicants had especially lower math and science sub-scores. Measures of socioeconomic status influenced exam performance. Holding constant race

¹ The words "branco," "pardo," and "preto" are descriptors of race/skin tone. Although the three words are colors, their social meaning encompasses more than skin tone.

² The word "negro" is a descriptor of black identity. Most *pretos* and some *pardos* consider themselves *negro*, while most *brancos* and some *pardos* do not.

and gender, family income and maternal education significantly increased entrance exam scores, whereas public secondary school attendance decreased scores. Gender played a role as well. Female applicants had lower overall scores, mostly due to substantial differences in math and science sub-scores. Using within-family variation, we further isolate the effects of race and gender. First-difference regressions involving pairs of siblings indicate that black identity had a negative effect on entrance exam performance and college GPA but not on college attrition. Having darker race/skin tone was also associated with lower entrance exam scores. Relative to their brothers, female applicants had lower overall scores and lower math and science sub-scores.

To determine the extent to which affirmative action might promote equity through the redistribution of university admissions slots, we compare individuals who were not admitted but would have been if the quota system had not existed (displaced) with those who were admitted but would not have been if the quota system had not existed (displacing). We find that displacing applicants were considerably more black than displaced applicants and were, by many measures, from families with significantly lower socioeconomic status. We also contrast quotas for blacks with two hypothetical alternative policies. The first is to reserve 50% of admissions slots for applicants who had attended public secondary school, and the second is to reserve 20% of admissions slots for applicants who had monthly family income equal to or less than R\$ 500. Both alternative policies would increase racial diversity but not to the same extent as racial quotas. Quotas for public secondary school students would raise socioeconomic diversity to the same degree as racial quotas, while quotas for low income students would raise it even more.

Taken together, the evidence suggests that race, socioeconomic status, and gender continue to pose substantial barriers to college attendance and achievement, and that race-based quotas help promote equity to some extent. Nevertheless, the scale and scope of redistribution

are highly limited. While a number of universities have policies targeted to the underprivileged and a few have policies targeted to blacks specifically, the vast majority of Brazilians, both black and non-black, have little chance of attending college. This is manifest in the extreme selectivity of college admissions and the persistence of tremendous disparities between applicants and students despite the implementation of racial quotas. It is clear that much more needs to be done. For example, it may be necessary to have programs to improve the quality of public primary and secondary schooling, so that a wider range of individuals across racial groups and socioeconomic strata are well-positioned for success in college and in the labor market.

This paper contributes to the economics of educational attainment, particularly as it relates to race, socioeconomic status, and gender. One subset of the literature examines the socioeconomic determinants of college attendance (Liu et al., 2006; Pallais and Turner, 2006; Stanley, 2003; Vignoles and Powdthavee, 2009). Another subset investigates the sources of racial disparities in college attendance (Cameron and Heckman, 2001; Kane, 1994; Light and Strayer, 2002; Rivkin, 1995). One of the most cited papers, Cameron and Heckman (2001), finds that long-term parental background and family characteristics explain most of the racial disparities in college attendance in the US. Additionally, some studies demonstrate the importance of skin tone—beyond the influence of race—on schooling and labor (Bodenhorn, 2006; Goldsmith, Hamilton, and Darity, 2006, 2007; Hersch, 2006; Loury, 2009; Rangel, 2007). For example, Rangel (2007) finds evidence that Brazilian parents invest less human capital in darker-skinned children than lighter-skinned children.

This paper also contributes to the economics of affirmative action in higher education (Holzer and Neumark, 2006). Nearly all empirical papers about affirmative action in higher education focus on the US experience. Several examine the academic performance of minorities

and subsequent gains to minorities in the labor market (Arcidiacono, 2005; Loury and Garman, 1993; Rothstein and Yoon, 2008). Other studies investigate how the elimination of affirmative action and other state-level policy changes might impact the enrollment of minority students in college (Card and Krueger, 2005; Conrad and Sharpe, 1996; Dickson, 2006; Long 2004a, 2004b). Some research looks at affirmative action in developing countries (Darity, 2005). Bertrand, Hanna, and Mullainathan (2008) evaluate the efficiency of a quota system at an engineering college in India. They find that the program successfully targeted poorer students who, in spite of lower entrance exam scores, enjoyed substantial gains in the labor market. However, the gains for marginal upper-caste students were larger than those for marginal lower-caste students. Bertrand, Hanna, and Mullainathan (2008) is one of the only other papers able to identify and compare displaced and displacing applicants.

Studying affirmative action in Brazil, Ferman and Assunção (2005) investigate whether black secondary school students residing in states with a university adopting racial quotas had higher or lower scores on a proficiency exam. Cardoso (2008) finds, based on tabulations of academic records, that quota students at UnB exhibited lower attrition rates than non-quota students, and quota students had comparable grades to non-quota students except in selective departments. Francis and Tannuri-Pianto (2011) find that racial quotas raised the proportion of black and dark-skinned students at UnB. Racial quotas did not appear to reduce the pre-university effort of either applicants or students. Their findings also suggest that racial quotas induced some individuals to misrepresent their racial identity but inspired other individuals, especially the darkest-skinned, to genuinely consider themselves black.

The remainder of the paper is organized as follows. Section II provides background information on racial inequality in Brazil and racial quotas at UnB. Section III describes the data and empirical strategy. Section IV presents the results, and Section V concludes.

II. Background and Policy

Despite the historical notion of racial democracy in Brazil, significant racial disparities exist in education, income, and other dimensions. Table 1 compares *brancos*, *pardos*, and *pretos* with respect to various measures of socioeconomic status. In the top panel, estimates for young adults (15-24 year olds) living with their mothers in the state of Distrito Federal are based on a national survey of Brazilians analogous to the US Current Population Survey (PNAD, 2004). In the bottom panel, estimates for UnB students are based on data collected by the authors and described in the next section. Among young adults, 23.4% of *brancos*, 9.5% of *pardos*, and 1.1% of *pretos* had a college-educated mother, while 47.6%, 20.9%, and 12.8%, respectively, had access to the internet at home. Family income also reflects this pattern as 22.3% of *brancos*, 38.9% of *pardos*, and 37.4% of *pretos* had monthly family income less than R\$ 750, and 27.2%, 10.0%, and 6.1%, respectively, had monthly family income more than R\$ 5,000. Among UnB students, 61.1% of *brancos*, 44.7% of *pardos*, and 37.2% of *pretos* had a college-educated mother, while 90.6%, 87.0%, and 77.9%, respectively, had access to the internet at home. Likewise, 32.1%, 46.0%, and 65.6%, respectively, attended public secondary school. In summary, each of the samples demonstrates that racial disparities are substantial. *Brancos* tend to have higher socioeconomic status than *pardos* and *pretos*, and *pardos* tend to have higher socioeconomic status than *pretos*. Moreover, the table also demonstrates that disparities

independent of race prevail. It is apparent that UnB students are considerably more advantaged than the general population. We reflect further on this in the conclusion.

In response to the persistence of racial inequality, a handful of universities, including UnB, have recently adopted racial quotas in admissions. UnB is one of the best public universities in Brazil. Public universities are tuition-free and better quality than private universities. UnB is located in Brasilia, a city of about 3.5 million (metro area) in Distrito Federal and the capital of Brazil. Most undergraduate students are from Distrito Federal and live with their parents while they attend school. At UnB, most students are admitted through the "vestibular" system, and admission is highly competitive. Application fees are minimal and are waived for low income individuals. To apply to UnB, applicants select one department of study and take a UnB-specific entrance exam called the vestibular. Administered twice annually, it is a two-day exam with questions in a variety of subjects. There are three distinct parts to the exam: Portuguese language and social studies; math and science; and foreign language. The overall score on the vestibular is the primary basis for admission, and the minimum score for selection varies by department. Applicants are either admitted to study in their selected department or they are rejected. About 76% of those who are admitted matriculate.

UnB established racial quotas in July 2004 making it the first federal university in the country and the only university in the region to do so. The policy was announced on June 6, 2003. According to its architects, some of the major objectives of the policy are to fight racial inequalities, compensate for historical injustices, contribute to the diversity of experiences and perspectives on campus, and raise understanding of what it means to be black in Brazil. Twenty percent of each department's allotted vestibular admissions slots are reserved for students who self-identify as *negro* and choose admission through racial quotas. Upon registration for the

vestibular, individuals must select one department, self-identify as *negro*, and elect to apply under the quota system. Those who are selected for admission based on vestibular score are then required to attend an interview with a university panel to verify that they are "black enough" to qualify. Furthermore, UnB provides to those who matriculate as quota students an array of programs that reinforce and foster investments in black identity. For example, these include lectures and events on the value of blacks in society; an academic tutoring program for quota students; and a permanent space on campus for quota students to study, meet, and have cultural activities.

III. Data and Empirical Strategy

We focus on five admissions cycles between 2003 and 2005: two pre-quotas (2nd semester-2003 and 1st-2004) and three post-quotas (2nd-2004, 1st-2005, and 2nd-2005). There are two populations of interest. The first consists of individuals who took the UnB vestibular exam during the five-semester period. We refer to this population as "applicants." The second consists of individuals who took the vestibular, were admitted, and matriculated during the five-semester period. We refer to this population as "students." Two data sources are utilized—university records and a student survey conducted by the authors.

University Records (QSC)

Admissions records were provided to the authors by UnB. Records encompass all (more than 50,000) individuals who took the vestibular exam during the five admissions cycles between 2003 and 2005. Available data include anticipated department of study, anticipated semester of matriculation, quota/non-quota status, gender, place of residence, exam results, and selection

outcome. Using names and other information, we were able to link entries corresponding to siblings. Admissions records also include an optional 18-question survey, which applicants submitted upon registration for the vestibular (thus prior to taking the exam). This survey, the Socio-Cultural Questionnaire (to which we refer by its Portuguese acronym QSC), asks about family income, parental education, public/private secondary school, state of residence, among other questions. It was not until 1st-2004, one semester before the implementation of quotas, that multiple-choice questions about race ("what is your race/color?" and "do you consider yourself negro?") were added to the QSC. University academic records, grades by semester for all students, were provided to the authors as well. Grades range from zero to five, where five is the best grade possible. With this, we were able to calculate GPA, attrition, and other statistics.

Student Survey (PSEU)

The authors conducted a survey of students, the University Education Survey (to which we refer by its Portuguese acronym PSEU). There were several reasons why collecting additional data was necessary: to obtain more information about students than what the QSC and other university records could provide; to measure race in multiple ways; and to create panel data by asking some of the same questions as the QSC. Data collection is described in Francis and Tannuri-Pianto (2011). We conducted interviews online and face to face with an interviewer. The total number of observations was 2,286. The full PSEU questionnaire entailed approximately 200 questions and covered topics including family background, pre-university education, university admissions, university education, employment, expectations, and race. Regarding the survey design, our objective was to minimize awareness of race and affirmative action. For example, the title of the survey was general. Neither race nor affirmative action was

raised in any contacts with potential respondents. Questions about race appeared only in the final section of the face to face interview, and questions about affirmative action were asked on a separate, self-administered form at the end.

Race was measured in a number of different ways. First, with informed consent, the interviewer took a photo of the respondent's student identification card, which had a standardized photo taken by the university upon matriculation. We later cropped the photos and asked a panel of Brazilians to rate the skin tone of each of the respondents. Second, at the start of the interview, the interviewer recorded his or her rating of the respondent's race. Third, the respondent was asked about his or her race. The initial race question was open-ended. Respondents were simply asked to describe their racial identification in one or two words. They were then asked to place themselves into one of five standard race/skin tone categories and asked whether they considered themselves *negro*.

Empirical Strategy

To begin, we employ regression techniques to examine the determinants of performance on the university entrance exam (Table 3). We regress vestibular score on race, gender, and a number of family-level socioeconomic measures. Controls for semester and subject area are included in some specifications. Exploiting race and gender variation within families, we use siblings to distinguish the effects of race and gender from the effect of family socioeconomic status. Evidence suggests that there exists substantial intra-family heterogeneity in black identity (*negro*) and race/skin tone (*branco, pardo, preto*). In the QSC about 23% of pairs of siblings were discordant in terms of black identity, while in the PSEU about 16% of pairs of siblings were discordant. There are many reasons to believe that in the context of Brazil there is actual

variation in race within families. As Rangel (2007) explains, children born to parents either of different races or both of mixed-race are considerably more likely to have different race/skin tone from one another. In Brazil, the prevalence of interracial marriage has been historically high, and this accounts for the substantial proportion of *pardos* in the population. *Branco*s appear to have a complex genetic ancestry as well. Alves-Silva et al. (2000) examined genetic material from self-identified white Brazilians and found that 61% of matrilineal genes were from African or Amerindian origin. Indeed, in the PSEU about 70% of pairs of siblings reported that their biological parents were of different races or both of mixed-race. Family reformation might be an alternative explanation of racial variation within families, but there is little evidence for this. 80% of racially discordant pairs of siblings in the PSEU reported that they lived with both biological parents at age 14, while the overall sample average was 83%. Also, we identified pairs of siblings based on common address and family name, and in Brazil step- and half-siblings tend not to share the same family name.

Therefore, using pairs of siblings in the QSC and PSEU data, we implement a first-difference estimator (Tables 4 and 5). There were more than 500 pairs of siblings in the QSC and 45 pairs in the PSEU. We calculate the difference in black identity (*negro*) between siblings (black = 1, not black = 0) as well as the difference in race/skin tone (*branco* = 1, *pardo* = 2, *preto* = 3). The following regression is estimated for siblings i and j living in family h :

$(y_{ih} - y_{jh}) = \beta \cdot (r_{ih} - r_{jh}) + \theta \cdot (x_{ih} - x_{jh}) + (\varepsilon_{ih} - \varepsilon_{jh})$, where β is the effect of race, r is the race indicator, and x are controls for gender and quota status. This differences out observed and unobserved family-specific variables and isolates the effects of race and gender on the dependent variable.

We also compare displaced and displacing applicants—those who were affected by the policy at the margin (Table 6). The displaced are those applicants who were not admitted but would have been if the quota system had not existed, while the displacing are those who were admitted but would not have been if the quota system had not existed. Identifying the two groups involves certain assumptions. It was assumed that the counterfactual removal of the quota system would not have affected who applied or performance on the vestibular, and that the number of applicants admitted, by semester and department, would have remained identical.³ Thus, for each of the three admissions cycles following the implementation of quotas, all applicants were ranked by department and vestibular score; applicants who would have been admitted counterfactually (if the quota system had not existed) were identified by department in accordance with the actual number of admitted candidates; those applicants admitted counterfactually but not actually were designated as displaced, and those admitted actually but not counterfactually were designated as displacing. In this way, 352 displaced and 352 displacing applicants were identified based on comprehensive admissions records.

We also compare displaced and displacing applicants under hypothetical alternative policies. The displaced are those applicants who would have been admitted only if the hypothetical policy did not exist, while the displacing are those who would have been admitted only if the policy did exist. Two alternative policies are considered. The first is to reserve 50% of admissions slots for applicants who had attended public secondary school. Approximately half of all individuals who registered for the vestibular had attended public school. All in all, 483 displaced and 483 displacing applicants were identified under quotas for public school. The second policy is to reserve 20% of admissions slots for applicants who had monthly family

³ In support of these assumptions, the socioeconomic characteristics of high-performing applicants did not significantly change after the implementation of the quota system. Bertrand et al. (2008) make analogous assumptions to identify displaced and displacing applicants in India.

income equal to or less than R\$ 500.⁴ According to the PNAD, approximately 20% of families in Distrito Federal had an income of R\$ 500 or less. In the end, 369 displaced and 369 displacing applicants were identified under quotas for low income.

IV. Results and Discussion

Race, Socioeconomic Status, and Gender in Admissions

Using university admissions records, we investigate the determinants of performance on the college entrance exam in order to evaluate the extent to which race, socioeconomic status, and gender may be barriers to college attendance and achievement. Table 2 characterizes the profile of applicants by vestibular score percentile. Percentiles are defined based on the scores of all applicants during the three admissions cycles following the implementation of quotas. The table aggregates over departments of study, but recall that admission is solely determined by score and department, and the minimum score for selection varies by department. As expected, the admission rate increased steadily with vestibular score. For applicants with scores less than the 10th percentile, the likelihood of admission was less than 1%, whereas for applicants with scores above the 90th percentile, the likelihood was 42%. The table suggests that the profile of applicants—in terms of race, gender, and socioeconomic status—changes tremendously with respect to vestibular score. From the first to tenth decile, the proportion of *brancos* rose, and the proportion of *pretos* fell. The share of applicants who self-identified as *negro* decreased by approximately 15 percentage points, from 42% in the first decile to 27% in the tenth. The share of female applicants declined by about as many percentage points, from 53% in the first decile to 38% in the tenth. Dramatic differences in socioeconomic status across deciles also prevail. For applicants with scores less than the 10th percentile, with scores between the 50th and 70th

⁴ R\$ 500 represents two "minimum salaries" in 2004.

percentiles, and with scores above the 90th percentile, 43%, 25%, and 13%, respectively, had family income equal to or less than R\$ 1,500, and 11%, 20%, and 31%, respectively, had family income greater than R\$ 5,000. For these applicant groups, 31%, 18%, and 7%, respectively, had a mother with primary school education, while 31%, 47%, 64% had a mother with college education. Likewise, the share of applicants who attended a public secondary school decreased from 52% in the first decile to 19% in the tenth. This snapshot of applicants by vestibular score implies that performance on the vestibular exam may be closely related to race, gender, and socioeconomic status.

In order to disentangle these interrelated effects, we perform a regression analysis examining the determinants of overall score and sub-scores. Table 3 displays the regressions. All of the specifications include controls for semester of matriculation, and some of them include controls for department. Note that since black and disadvantaged applicants tend to choose departments with lower minimum scores for selection, regressions that include department controls will decrease estimates of differential performance on the vestibular. Sub-scores are defined as follows: "Lin" refers to the foreign language part of the exam; "Soc" refers to Portuguese language and social studies; and "Nat" refers to math and science. To contextualize the results, it is useful to know that the standard deviation of vestibular score is roughly 100 points.⁵ We find that holding gender and measures of socioeconomic status constant, *preto* and *negro* applicants had significantly lower overall scores relative to *brancos*. Indigenous applicants also had lower scores. Applicants who selected "no answer" on the QSC race question had significantly higher scores.⁶ *Preto* applicants had significantly lower sub-scores, and the differential was especially large in math and science. Gender plays a role as well. Female

⁵ Unlike overall score, vestibular sub-scores are unscaled. The standard deviation of Lin, Soc, and Nat is 13, 16, and 17, respectively.

⁶ On the PSEU, about half of these respondents self-identified as *branco* and about half as *pardo*.

applicants had lower overall scores in every specification. Although there was no significant difference between women and men on either the foreign language or Portuguese language and social studies parts of the exam, there was a substantial difference on the math and science part. Furthermore, holding constant race and gender, socioeconomic status appears to have an effect on exam performance. Vestibular score and sub-scores increased significantly with family income and mother's education. Public secondary school attendance decreased performance on the vestibular.

Nevertheless, unobserved family characteristics might make it difficult to distinguish the causal effects of race, gender, and socioeconomic status. For this reason, we take advantage of the fact that the QSC and PSEU data include a number of pairs of siblings. Using within-family variation, we are able to isolate the effects of race and gender. Table 4 displays the first-difference regressions of vestibular score and sub-scores. Controls for difference in quota status are included. The evidence indicates that having black identity is associated with significantly lower overall scores as well as lower Soc (Portuguese language and social studies) and Nat (math and science) sub-scores. Having darker race/skin tone is also related to decreased scores, although the magnitude of the coefficients is less. Relative to their brothers, female applicants had lower overall scores and lower math and science sub-scores. Quota status is negative and significant in some of the race/skin tone regressions perhaps because it is picking up the effect of black identity above and beyond the effect of race/skin tone. Table 5 displays the first-difference regressions of college GPA, enrollment discontinuity, and attrition. Enrollment discontinuity is defined as non-enrollment in at least one semester of study, and attrition is defined as non-enrollment in two or more consecutive semesters of study without subsequent re-enrollment or graduation. Difference in first semester GPA is included to control for pre-college differences in

academic performance. Having black identity is associated with slightly lower college GPA and higher enrollment discontinuity, but there is no significant difference in attrition between blacks and non-blacks. However, differences in race/skin tone are not related to college GPA, discontinuity, or attrition. Differences in gender are not significantly associated with college GPA or discontinuity, but women are somewhat less likely to experience attrition.

The findings on race are consistent with several explanations. Black and dark-skinned individuals may have encountered racial discrimination at various points in their life and, as a consequence, have lower performance. In support of this notion, Rangel (2007) finds that Brazilian parents tend to invest less human capital in darker-skinned children than lighter-skinned children. Another causal explanation is stereotype threat. Blacks may not do as well as non-blacks because the salience of race itself creates stress that distorts performance. However, there are alternative hypotheses. It is possible that individuals who tend to perform poorly on exams may be more likely to consider themselves black, or that some individuals not applying under the quota system might strategically self-identify as black because they expect to use quotas the next time they apply. But while some racial misrepresentation may exist (see Francis and Tannuri-Pianto 2011), the presence of racially discordant siblings in the PSEU, which minimizes incentives to misrepresent one's race, confirms that there is intra-family heterogeneity in racial identity and race/skin tone.

Displaced and Displacing Applicants under Actual and Hypothetical Policies

Examining the subset of applicants impacted by racial quotas at the margin, we aim to determine the extent to which affirmative action may promote equity through the redistribution of university admissions slots. After all, UnB's policy was not only intended to raise the

proportion of black students but also to extend economically disadvantaged individuals an opportunity to attend an elite college. Table 6 compares individuals who were not admitted but would have been if the quota system had not existed (displaced) with those who were admitted but would not have been if the quota system had not existed (displacing). We find that displacing applicants were considerably more black than displaced applicants and were, by many measures, from families with significantly lower socioeconomic status. About 71% and 27% of the displacing were *pardo* and *preto*, while about 31% and 2% of the displaced were. About 95% of the displacing identified as *negro* compared to 16% of the displaced.⁷ The family residence of displacing applicants was more likely to lie in Distrito Federal but outside of Brasilia, while that of displaced applicants was more likely to lie in Brasilia. This is indirect evidence that the displacing were more disadvantaged than the displaced, since the average household income of families living in Brasilia is multiple times higher than the average income of families living in Distrito Federal outside of Brasilia (PDAD, 2004). Consistent with this, 39.7% of displacing and 19.0% of displaced applicants had family income equal to or less than R\$ 1,500, whereas 8.5% of displacing and 30.7% of displaced applicants had family income greater than R\$ 5,000. Differences in parental education paint a similar picture since 25.7% of displacing and 9.8% of displaced applicants had a mother with primary school education, while 34.5% of displacing and 57.7% of displaced applicants had a mother with college education. Moreover, displacing applicants were significantly more likely to have attended a public secondary school.

⁷ Nearly all who applied for quotas were black, but not all blacks chose to apply for quotas. About 5% of displacing applicants reported they did not consider themselves *negro*. They may have made a mistake on the QSC, or they may have misrepresented their racial identity when applying under the quota system. It is difficult to know what to make of those displaced applicants who self-identified as *negro* but did not apply under racial quotas even though they could have. They may have declined to take advantage of quotas on principle. Or perhaps they may have reasoned ex-ante that the marginal chance of admission would be no higher under the quota system than under the non-quota system.

We are also able to evaluate two hypothetical alternative policies. The first is to reserve 50% of admissions slots for applicants who had attended public secondary school. Approximately half of all individuals who registered for the vestibular had attended public school, so this policy would correct the underrepresentation of public school applicants among those selected for admission. The second policy is to reserve 20% of admissions slots for applicants who had family income equal to or less than R\$ 500. According to the PNAD, approximately 20% of families in Distrito Federal had an income of R\$ 500 or less. Since individuals who attend public secondary school tend to be more black and more disadvantaged than those who attend private school and since individuals who live in low income households tend to be more black, the alternative policies might, in principle, achieve the same ends as quotas for blacks.

Table 6 compares individuals who would have been admitted only if the hypothetical policy did not exist (displaced) with those who would have been admitted only if the policy did exist (displacing). Under quotas for public school, 38% of the displaced and 46% of the displacing are *pardo*, 4% of the displaced and 11% of the displacing are *preto*, and 28% of the displaced and 43% of the displacing are *negro*. Under quotas for low income, 42% of the displaced and 47% of the displacing are *pardo*, 6% of the displaced and 18% of the displacing are *preto*, and 34% of the displaced and 55% of the displacing are *negro*. Thus, both alternative policies would increase racial diversity, especially the proportion of students who are *negro*, but racial quotas appear to do so to a much greater extent. Quotas for public secondary school would raise socioeconomic diversity in a manner comparable to racial quotas. For example, 11% of the displaced and 34% of the displacing have family income equal to or less than R\$ 1,500, and 35% of the displaced and 13% of the displacing have family income greater than R\$ 5,000. Likewise,

4% of the displaced and 28% of the displacing have a mother with primary school education, and 69% of the displaced and 34% of the displacing have a mother with college education. However, compared with quotas for blacks and public school students, quotas for low income students would substantially raise socioeconomic diversity. Strikingly, 11% of the displaced and 62% of the displacing have a mother with primary school education, and 50% of the displaced and 8% of the displacing have a mother with college education. About 38% of the displaced have attended a public secondary school, while 75% of the displacing have attended one.

Hence, the evidence suggests that both actual and hypothetical policies would promote equity through the redistribution of university admissions slots. If more importance is placed on raising socioeconomic diversity than raising racial diversity, then quotas for low income students may be preferred. If more importance is placed on raising racial diversity, then quotas for blacks may be preferred. Nevertheless, other considerations are relevant. As Francis and Tannuri-Pianto (2011) argue, racial quotas might induce significant changes in racial identity, particularly among *pardos*. Alternative policies may have unintended consequences as well. Under quotas for public school, some families that would have enrolled their children in private school might instead enroll them in public school. Under quotas for low income, some marginally poor families might underreport or choose to earn less income.

V. Conclusion

This paper contributes to research on affirmative action by examining issues of equity in the context of racial quotas in Brazil. Taken together, the evidence suggests that race, socioeconomic status, and gender continue to pose substantial barriers to college attendance and achievement, and that race-based quotas help promote equity to some extent. Nevertheless, the

scale and scope of redistribution are highly limited. While a number of universities have policies targeted to the underprivileged and a few have policies targeted to blacks specifically, the vast majority of Brazilians, both black and non-black, have little chance of attending college. This is manifest in the extreme selectivity of college admissions and the persistence of tremendous disparities between applicants and students despite the implementation of racial quotas. It is clear that much more needs to be done. For example, it may be necessary to have programs to improve the quality of public primary and secondary schooling, so that a wider range of individuals across racial groups and socioeconomic strata are well-positioned for success in college and in the labor market. Future work may be able to identify additional policies to foster equity in education, study the long-term impact of racial quotas on inequality, and disentangle the causal mechanisms by which race, socioeconomic status, and gender influence college attendance and achievement.

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Table 1
Race and Socioeconomic Status

	Branços	Pardos	Pretos	Difference in Means
<i>Young Adults in Distrito Federal</i>	%	%	%	
Raised with both parents	50.6	45.9	42.2	*
Mother college education	23.4	9.5	1.1	** ** *
Family has computer	55.8	29.3	18.6	** ** **
Family has internet	47.6	20.9	12.8	** ** **
Family has refrigerator w/ freezer	62.7	40.5	35.3	** **
Family has washing machine	71.5	49.7	40.2	** ** **
Low family income (<= R\$ 750)	22.3	38.9	37.4	** **
High family income (> R\$ 5000)	27.2	10.0	6.1	** **
<i>N</i>	633	808	99	
<i>UnB Students</i>				
Raised with both parents	74.7	74.4	67.7	** *
Mother college education	61.1	44.7	37.2	** ** *
Family has computer	93.4	88.5	85.9	** **
Family has internet	90.6	87.0	77.9	** ** **
Family has refrigerator w/ freezer	74.6	72.0	69.4	
Family has washing machine	94.8	93.2	83.7	** **
No domestic workers at home	36.6	50.2	66.0	** ** **
Attended public secondary school	32.1	46.0	65.6	** ** **
<i>N</i>	1,047	971	192	

NOTE. A double asterisk indicates significant difference in proportions at the 5% level, and a single asterisk indicates significance at the 10% level. The first column of asterisks refers to the comparison of *brancos* and *pardos*, the second refers to *brancos* and *pretos*, and the third refers to *pardos* and *pretos*. The sample of 15-24 year olds is restricted to those living with their mothers. Data sources: PNAD and PSEU.

Table 2
Applicants by Vestibular Score Percentile

	Vestibular Score Percentile					
	<10%	10%-30%	30%-50%	50%-70%	70%-90%	90%<
Admission rate	0.7%	1.9%	6.2%	14.9%	28.5%	42.0%
Race/skin tone						
Branco	34.4	34.5	35.0	39.7	41.2	43.6
Pardo	40.6	41.5	41.8	38.3	38.6	38.2
Preto	14.0	12.3	10.5	8.5	6.8	4.3
Asian	4.1	3.5	3.5	2.8	3.1	3.2
Indigenous	0.9	0.9	0.7	0.7	0.4	0.7
No answer	6.1	7.2	8.5	10.0	9.9	10.1
Black racial identity (negro)	41.5	39.9	37.4	33.2	29.9	26.5
Female gender	53.3	51.5	50.8	47.0	43.7	38.3
Family income						
Less than R\$ 500	12.4	10.6	6.8	4.6	3.1	1.9
R\$ 500-1,500	30.5	26.8	23.4	20.5	14.9	11.3
R\$ 1,500-2,500	16.2	20.3	19.1	18.2	16.1	12.8
R\$ 2,500-5,000	21.9	20.7	25.0	24.9	26.9	30.2
More than R\$ 5,000	10.5	12.1	15.9	19.9	27.4	30.8
Don't know	8.5	9.5	9.9	11.9	11.6	13.1
Mother's education						
Primary school incomplete	20.5	17.6	13.9	11.0	5.4	3.8
Primary school complete	10.5	9.1	7.7	6.6	4.7	3.3
Secondary school complete	36.5	36.1	36.1	33.7	32.5	27.4
College	31.2	36.1	41.3	47.3	56.3	64.2
Don't know	1.3	1.1	1.0	1.4	1.1	1.2
Public secondary school	51.8	46.4	39.3	34.8	23.4	18.8

NOTE. Vestibular score percentiles are defined using the admissions scores of all applicants (36,876) during the three admissions cycles following the implementation of quotas. With the exception of admission rate and gender, estimates are based on less than maximal sample sizes (more than 17,000) due to missing socioeconomic data. Data source: QSC.

Table 3
Determinants of Vestibular Score

Variable	Dependent Variable						
	Vestibular Score				Vestibular Sub-Scores		
	(1)	(2)	(3)	(4)	Lin (5)	Soc (6)	Nat (7)
Race/skin tone							
Pardo	2.941 (1.826)	-0.067 (1.976)			-0.330 (0.174) *	0.231 (0.178)	-0.038 (0.180)
Preto	-18.782 (2.638) **	-20.756 (2.833) **			-1.564 (0.279) **	-1.103 (0.268) **	-2.006 (0.256) **
Asian	-2.944 (4.279)	-4.363 (4.711)			-1.408 (0.416) **	-1.423 (0.425) **	0.700 (0.423) *
Indigenous	-15.783 (9.385) *	-22.732 (10.992) **			-2.075 (0.944) **	-1.937 (0.841) **	-1.445 (1.018)
No answer	18.969 (2.836) **	13.120 (3.122) **			0.899 (0.285) **	1.229 (0.274) **	0.689 (0.294) **
Black Identity (negro)			-7.675 (1.667) **	-10.371 (1.812) **			
Female gender	-18.673 (1.690) **	-17.973 (1.655) **	-19.295 (1.701) **	-18.536 (1.662) **	-0.125 (0.149)	-0.014 (0.150)	-2.457 (0.151) **
Family income							
< R\$ 500	-24.079 (3.278) **	-34.351 (3.484) **	-24.386 (3.279) **	-34.714 (3.485) **	-1.933 (0.369) **	-2.693 (0.344) **	-2.712 (0.307) **
R\$ 500-1,500	-17.262 (2.357) **	-23.169 (2.571) **	-17.173 (2.366) **	-22.928 (2.576) **	-1.207 (0.240) **	-1.919 (0.237) **	-1.794 (0.231) **
R\$ 1,500-2,500	-8.360 (2.397) **	-13.694 (2.617) **	-8.629 (2.413) **	-13.845 (2.631) **	-0.855 (0.236) **	-1.062 (0.237) **	-1.135 (0.237) **
> R\$ 5,000	18.482 (2.512) **	21.121 (2.755) **	18.183 (2.523) **	20.688 (2.764) **	2.438 (0.222) **	1.386 (0.238) **	1.575 (0.255) **
Don't know	0.677 (2.947)	-1.521 (3.188)	1.844 (2.957)	-0.531 (3.201)	0.821 (0.271) **	-0.722 (0.278) **	0.084 (0.294)
Mother's education							
Primary sch incomp	-10.101 (2.384) **	-19.270 (2.506) **	-11.566 (2.402) **	-20.396 (2.521) **	-0.585 (0.283) **	-0.518 (0.252) **	-2.315 (0.219) **
Primary sch comp	-7.804 (2.937) **	-11.571 (3.145) **	-8.647 (2.950) **	-12.348 (3.159) **	-0.290 (0.317)	-0.500 (0.305)	-1.290 (0.280) **
College	13.331 (1.877) **	17.743 (2.047) **	13.614 (1.889) **	18.075 (2.060) **	1.540 (0.178) **	1.216 (0.181) **	1.375 (0.188) **
Don't know	9.076 (7.752)	6.606 (8.718)	6.079 (7.558)	3.095 (8.391)	1.712 (0.693) **	0.403 (0.766)	0.393 (0.769)
Public secondary sch	-6.479 (1.893) **	-23.786 (2.023) **	-5.827 (1.910) **	-23.007 (2.039) **	-0.414 (0.185) **	-1.080 (0.185) **	-2.703 (0.183) **
Subject areas	Yes	No	Yes	No	No	No	No
N	17,193	17,193	17,074	17,074	17,193	17,193	17,193

NOTE. Numbers in parentheses are robust standard errors. A double asterisk indicates significance at the 5% level, and a single asterisk indicates significance at the 10% level. All regressions also include controls for semester. The sample includes applicants during the three admissions cycles following the implementation of quotas. Data source: QSC.

Table 4
Racial Determinants of Vestibular Score Using Siblings

Variable (First-Difference)	Dependent Variable (First-Difference Between Siblings)							
	Vestibular Score		Lin Sub-Score		Soc Sub-Score		Nat Sub-Score	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Black racial identity	-40.594 (10.920)**	-38.149 (12.202)**	-1.160 (1.049)	-0.508 (1.131)	-2.785 (1.082)**	-2.578 (1.188)**	-3.675 (1.021)**	-3.489 (1.146)**
Female gender		-34.828 (8.193) **		-1.190 (0.715) *		-1.530 (0.741)**		-3.425 (0.775)**
Quota status		-10.416 (13.795)		-1.737 (1.394)		-0.702 (1.308)		-0.893 (1.254)
<i>N</i>	689	689	689	689	689	689	689	689
Race/skin tone	-19.289 (10.387) *	-17.532 (10.510) *	-0.805 (0.905)	-0.699 (0.932)	-0.982 (0.971)	-0.728 (0.965)	-2.068 (0.945)**	-1.982 (0.960)**
Female gender		-35.678 (9.995) **		-0.925 (0.800)		-1.483 (0.902)		-3.545 (0.942)**
Quota status		-30.962 (14.329)**		-1.245 (1.379)		-2.611 (1.342) *		-2.431 (1.275) *
<i>N</i>	507	507	507	507	507	507	507	507

NOTE. Numbers in parentheses are robust standard errors. A double asterisk indicates significance at the 5% level, and a single asterisk indicates significance at the 10% level. Data source: QSC.

Table 5
Racial Determinants of College Outcomes Using Siblings

Variable (First-Difference)	Dependent Variable (First-Difference Between Siblings)					
	College GPA		Discontinuity		Attrition	
	(1)	(2)	(3)	(4)	(5)	(6)
Black racial identity	-0.839 (0.340)**	-0.420 (0.236) *	0.412 (0.196)**	0.423 (0.262)	0.137 (0.130)	0.044 (0.150)
Female gender		0.217 (0.221)		0.108 (0.135)		-0.102 (0.059) *
Quota status		-0.102 (0.213)		-0.060 (0.217)		0.026 (0.135)
First semester GPA		0.631 (0.188)**		-0.157 (0.113)		-0.084 (0.053)
<i>N</i>	45	45	45	45	45	45
Race/skin tone	-0.237 (0.222)	-0.023 (0.202)	-0.098 (0.129)	-0.168 (0.120)	0.044 (0.044)	-0.001 (0.052)
Female gender		0.219 (0.232)		0.091 (0.115)		-0.110 (0.063) *
Quota status		-0.241 (0.240)		0.189 (0.224)		0.041 (0.118)
First semester GPA		0.659 (0.194)**		-0.207 (0.130)		-0.086 (0.058)
<i>N</i>	43	43	43	43	43	43

NOTE. Numbers in parentheses are robust standard errors. A double asterisk indicates significance at the 5% level, and a single asterisk indicates significance at the 10% level. Data source: PSEU.

Table 6
Comparing Displaced and Displacing Applicants under Actual and Hypothetical Policies

	Actual Policy			Hypothetical Alternative Policies					
	Quotas for Blacks		Displacing	Quotas for Public School		Quotas for Low Income		Displaced	Displacing
	Displaced	Displacing		Displaced	Displacing	Displaced	Displacing		
Race/skin tone									
Branco	44.8%	**	0.3%	45.2%	**	28.0%	37.4%	**	22.6%
Pardo	30.7	**	70.5	38.0	**	45.7	41.5	**	46.6
Preto	1.8	**	27.2	3.9	**	11.3	6.0	**	17.6
Asian	3.1	*	0.7	2.9		2.7	3.0		4.7
Indigenous	0.6		0.7	0.8		0.4	0.5		0.8
No answer	19.0	**	0.7	9.1		11.9	11.7	*	7.7
Black racial identity (negro)	16.2	**	94.7	27.6	**	43.2	34.2	**	54.6
Female gender	40.5		44.5	46.2		42.2	44.2		44.4
Family residence									
Brasilia	52.1	**	32.3	45.8	**	37.7	40.9	**	12.9
Distrito Federal, not Brasilia	34.0	**	59.5	36.4	**	51.8	46.3	**	74.7
Outside of Distrito Federal	13.9	**	8.2	17.8	**	10.6	12.7		12.4
Family income									
Less than R\$ 500	3.7	**	9.2	1.5	**	7.3	0.0	**	100.0
R\$ 500-1,500	15.3	**	30.5	9.3	**	26.7	20.1	**	0.0
R\$ 1,500-2,500	11.0	*	18.0	14.5	**	22.3	17.9	**	0.0
R\$ 2,500-5,000	26.4		24.6	27.3		23.4	26.0	**	0.0
More than R\$ 5,000	30.7	**	8.5	35.2	**	12.9	25.2	**	0.0
Don't know	12.9		9.2	12.2	**	7.3	10.8	**	0.0
Father's education									
Primary school incomplete	9.3	**	17.4	4.6	**	17.9	8.4	**	51.2
Primary school complete	5.6	*	10.5	3.3	**	8.5	5.4	**	10.2
Secondary school complete	30.3		32.8	28.2	*	33.7	29.4	**	21.5
College	51.9	**	35.1	62.2	**	36.6	53.3	**	9.4
Don't know	3.1		4.3	1.7		3.3	3.5	**	7.7
Mother's education									
Primary school incomplete	4.9	**	16.6	2.3	**	17.5	6.0	**	46.3
Primary school complete	4.9		9.1	1.5	**	10.4	4.9	**	15.7
Secondary school complete	30.7	*	38.8	26.5	**	37.0	36.6	**	28.7
College	57.7	**	34.5	68.7	**	34.3	50.1	**	8.4
Don't know	1.8		1.0	1.0		0.8	2.4		0.8
Public secondary school	38.7	**	53.4	0.0	**	100.0	37.7	**	75.1

NOTE. A double asterisk indicates significant difference in proportions at the 5% level, and a single asterisk indicates significance at the 10% level. Under the actual policy, the displaced are those applicants who were not admitted but would have been if the racial quota system had not existed, while the displacing are those who were admitted but would not have been if the quota system had not existed. A total of 352 displaced and 352 displacing applicants were identified; the sample size in the table is about 466 due to missing socioeconomic data. Under the hypothetical policies, the displaced are those applicants who would have been admitted only if the hypothetical policy did not exist, while the displacing are those who would have been admitted only if the policy did exist. The first alternative policy reserves 50% of admissions slots for applicants who had attended public secondary school, and the second reserves 20% of admissions slots for applicants who had family income equal to or less than R\$ 500. A total of 483 displaced and 483 displacing applicants were identified under quotas for public school; the sample size is about 954 due to missing socioeconomic data. A total of 369 displaced and 369 displacing applicants were identified under quotas for low income; the sample size is about 725 due to missing socioeconomic data. Data source: QSC.