

# The Impact of Class-based Affirmative Action on Admission and Matriculation Outcomes in Israel

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## Abstract

In the early to mid-2000s, four flagship Israeli selective universities introduced a voluntary *need-blind* and *color-blind* affirmative action policy for students from disadvantaged backgrounds. The program allowed departments to offer admission to academically borderline applicants who were above a certain threshold of disadvantage. We examine the effect of eligibility for affirmative action on admission and matriculation outcomes using a regression discontinuity (RD) design. We show that students who were just barely eligible for this voluntary policy had a significantly higher probability of admission and enrollment, as compared to otherwise similar students. Furthermore, we show some evidence that eligibility for affirmative action is associated with higher grades and graduation rates, suggesting that any effect of stigma due to receiving affirmative action in Israel is limited.

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## 1. Introduction

There is a large and growing literature on affirmative action (AA) in higher education. Most of the attention has focused on questions related to the consequences of this policy for diversity (Alon and Tienda 2007; Alon 2011; Bowen and Bok 1998), the possibility of a mismatch between the beneficiaries and the academic rigor of the institutions they enrolled in (Alon and Tienda 2005; Bowen and Bok 1998; Kane 1998; Loury and Garman 1995; Rose 2005), or the effect of preferences on the applicants' behavior (Alon 2010; Brown and Hirschman 2006; Card and Krueger 2005; Long 2004a). This study contributes to this literature by addressing two questions: (i) what is the effect of receiving affirmative action on actual admission and enrollment rates under a voluntary policy, and (ii) what is the effect of receiving an edge in admission (as opposed to the disadvantage that led to affirmative action) on success in university. We use a regression discontinuity (RD) design to answer these questions in the context of a recent affirmative action policy introduced in selective Israeli universities.

The *first* question we examine concerns the causal effect of an affirmative action policy on actual admissions. In other words, do AA applicants get an edge in admissions? Although the answer to this question may appear trivial, it is only so in cases of policies based on quotas where the admission decision is mechanical (like, for example, under India's reservation policy (Bertrand, Hanna, and Sendhil 2010)). However, in cases where preferences are voluntary and institutions enjoy discretion of whether and whom to admit, the effect of the affirmative-action policy on actual admissions is the first-order issue in evaluating the policy. This is the case in admissions to selective institutions in the United States, especially after the recent rulings of the United States Supreme Court in the *Gratz v. Bollinger*, *Gutter v. Bollinger* cases that endorsed "flexibility" in admissions by upholding preferences for minorities only if they are achieved in a

flexible non-mechanical way. This question is therefore important in a variety of different settings.

Thus far, assessment of this question has been impeded by the difficulty in identifying AA applicants and admits in US datasets. Consequently, almost all the studies dealing with affirmative action use race or ethnicity as a proxy for AA eligibility. For example, in the most comprehensive study on the topic, Bowen and Bok (1998) report that approximately 42 percent of black applicants were admitted as compared to 25 percent of the white applicants in their sample of selective institutions. Other studies support this pattern showing that, after controlling for scholastic performance in high school and family background, black and Hispanic students are more likely to be admitted to elite institutions in the US (Alon and Tienda 2007; Kane 1998; Long 2004b). Yet such evidence is not necessarily conclusive because race and ethnicity are not perfect indicators for AA eligibility. Indeed, not every minority applicant receives an edge in admissions: highly qualified minority applicants do not need an edge in admission while minority athletes may be admitted because of preference for athletes, not because of preferences for blacks and Hispanics (Bowen and Bok 1998; Shulman and Bowen 2002).

The other issue that makes it difficult to assess of the effect of AA eligibility on admission decisions is the holistic nature of admission decisions at elite American institutions. In a complex process of picking and choosing, admission officers are “admitting the candidate who seems to offer something special by way of drive and determination, the individual with a set of skills that matches well the academic requirements of the institution, someone who will bring another dimension of diversity to the student body, or a candidate who helps the institution fulfill a particular aspect of its mission” (Bowen and Bok 1998:29). This means that even the most detailed empirical specifications cannot fully characterize the applicant’s admissibility as seen by

admissions officers. Thus, the estimation of group differences (i.e. blacks/Hispanics vs. whites/Asians) can only provide suggestive evidence of the impact of affirmative action policy on the probability of admission. Illustrating the nature of non-mechanical admission decisions is the evidence that significant numbers of high scoring black applicants are rejected from selective schools (Bowen and Bok 1998).

Another line of research that aims to assess the effect of AA policy on admissions exploits changes in racial and ethnic diversity in states that banned the use of racial and ethnic preferences. For example, after the approval of Proposition 209, which rendered illegal any consideration of race or ethnicity in public education, employment, and contracting in California, the share of black students at UCLA's Law School dropped from 7.4 percent in 1995 to 2.6 percent in 1997 (Karabel 1999). Likewise, Alon and Tienda (2007) report a decline in the likelihood of admission of under-represented minorities at the University of Texas at Austin, the most selective of Texas's public postsecondary institutions, after the Hopwood decision in 1996 that overturned race-based admissions policies at public universities in Texas. However, this strategy tackles the question only indirectly and can lead to a biased estimate for the effect of the AA policy on admissions due to confounding shifts in demographics over time or changes in application patterns resulting from the policy itself. A closely related study by Niu and Tienda (2010) uses a regression discontinuity approach to study the effect of the "10 percent law" which replaced the race-based admission policies in Texas. They find that eligibility for admission to flagship colleges under the 10 percent law led to higher rates of enrollment.

We contribute to this literature by obtaining causal estimates for the impact of a voluntary affirmative action program on application, admission, and enrollment outcomes. We draw on the unique design of an affirmative action program that was recently implemented in Israel and take

advantage of a rich dataset based on institutional administrative records from the four universities that practice this preferential treatment. Attractive aspects of the Israeli dataset include the availability of applicant transcripts and the institutions' decisions, as well as the ability to single out all affirmative action applicants, admits, and students. Moreover, the formulaic admission process in Israeli universities implies that we have access to (almost) all the application information which determined admission to university.

In order to obtain causal estimates, we exploit a discontinuity in the eligibility for the program and compare applicants just below and just above the cutoff point of eligibility. This strategy enables us to hold constant all observed and unobserved differences between AA and non-AA applicants. Furthermore, since application and admission to Israeli universities is major-specific, we explore whether eligibility for affirmative action increased the likelihood of getting admitted to the more selective programs, or, alternatively, its effect on admissions was limited to the least selective majors. This helps shed light on the influence of preferences in admission on social and economic mobility. We examine four outcomes at the application/admission stage: two of the outcomes capture the individual's decision – the likelihood of applying to a selective major and the likelihood of enrollment; the other two outcomes capture the institutional decisions – the likelihood of admission and the likelihood of admission to a selective major. This enables us to tease out the effect of the program on applicants' behavior (motivation and/or its stigmatizing influences) from that on the institutional decisions.

The *second* question concerns the effect of an affirmative-action policy on matriculation outcomes, such as grade point averages (GPA) and the likelihood of graduation. Previous studies have focused on the “mismatch hypothesis” by examining claims that affirmative action places black and Hispanic students in academic environments that exceed their capabilities, and thus

sets them up for failure (Alon and Tienda 2005). The main challenge in identifying the casual effect of receiving affirmative action on matriculation outcomes arises because of the spurious correlation between eligibility for affirmative action and socio-economic and academic disadvantage (which is also correlated with success in university). Most studies try to address this issue by adjusting for observed characteristics but it is likely that many unobserved differences remain (see Alon and Tienda 2005; Bowen and Bok 1998; Kane 1998; Loury and Garman 1995).

Moreover, as with the literature on the effect of affirmative action on application and admission outcomes, these studies generally use race or ethnicity as a proxy for AA eligibility. One notable exception to the use of a proxy is Rose (2005) who obtains information about which students are admitted to University of California, San Diego (UCSD) under a special category. Using administrative data from UCSD she finds that, conditional on high school GPA, SAT score, or parental income, these students were less likely to graduate and more likely to get lower grades than other students. Yet UCSD special admission students remained more likely to be socioeconomically and academically disadvantaged than regular students. Moreover, affirmative action students at UCSD were not studying the most rigorous fields at the same rate as regular students yet the analyses do not account for differences in major's selectivity or grading norms.

We exploit the regression discontinuity (RD) design to compare several matriculation outcomes of students above and below the threshold of eligibility for affirmative action. As in our analysis of admission outcomes, we assume that there are no initial pre-admission (observed or unobserved) differences between eligible and non-eligible students right around the cutoff point of eligibility. However, the process of admission and matriculation may introduce some differences because eligible students are more likely to enroll into university. Although we

cannot rule out the possibility of *unobserved* differences in composition around the cutoff for eligibility, we do verify that there are no *observed* differences in our background characteristics that arise through the admission and matriculation process. Thus, we address some of the potential for spurious correlation between eligibility for affirmative action and disadvantage that has plagued the previous assessments of the impact of affirmative action on students' success. Differences in matriculation outcomes can also be attributed to specific post-admission processes such as the selectivity of the major studied. For example, variation in the rigor of selective and non-selective majors may explain the difference in outcomes between the two groups – conditional on finding that eligible applicants are more likely to be admitted to more selective majors. To explore this possibility, we run the analyses separately for students in selective and non-selective majors.

The effects of affirmative action on students' behavior and, consequently, on matriculation outcomes can be related to two, not necessarily mutually exclusive, processes. First, it can be motivational: For example, AA eligible students may be more motivated to perform because they feel they were specially chosen or, alternatively, they may slack off because they believe they are protected from further difficulties. Second, the effect can be stigmatizing: AA students can underperform because of anxiety that they will conform to the negative stereotype that is attached to their status. In their seminal work on stereotype threat (Steele and Aronson 1998) show that a person will tend to underperform in a manner consistent with the stereotype, in our case this means lower grades and lower persistence rates are expected. As both of these psychological processes are linked to the AA status we attribute them to the effect of the AA program on students' success. Further research should aim to distinguish between them in order to advance our understanding of the channels through which an edge in

admission shapes students psyche, state of mind, and eventually academic and social performance in college.

## **2. Background: Affirmative Action in Israeli Universities**

The higher education system in Israel is mostly public. As of 2007/08, there were 75 institutions in two tiers. In the first tier, there are six research universities. These universities generally rely on a formulaic selection process for bachelor's admissions based entirely on an academic composite score, calculated by taking a weighted mean of an individual's high school grades and their psychometric test score (similar to an SAT score). The admission cutoff points are not institution-wide but rather major-specific; thus, within each institution there are departments that vary in their level of selectivity. The second tier consists of degree-granting non-research academic colleges, and specialized institutions or branches of foreign universities.

In the early to mid-2000s the four most selective and internationally recognized universities – Tel-Aviv University, The Hebrew University, Ben-Gurion University and The Technion – incorporated a comprehensive and standardized program of class-based affirmative action into their admission practices. This was instituted because, even after the spectacular expansion of the Israeli higher education system in 1995,<sup>1</sup> underprivileged populations remained under-represented in most of the first-tier universities. Socioeconomic eligibility for the program has been determined according to three parameters, all of which are based on an applicant's high school years: the structure of opportunity (neighborhood and high school attended); family socioeconomic status (parental education and family size); and individual and/or family adverse

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<sup>1</sup> Between 1990/91 and 2007/08 the total number of undergraduate students tripled from 58,000 in to 168,000, mostly due to the addition of 2<sup>nd</sup> tier institutions.



circumstances.<sup>2</sup> Yet the weighting algorithm emphasizes the two structural factors most prominently (they account for about 50 percent of the eligibility score). The program is need-blind and race-neutral: information about an applicant's financial situation and national or ethnic origin is neither requested nor considered. For more details about the implementation of this program see (Alon 2011).

The implementation of the policy involves three stages. First, socioeconomic eligibility is established outside of the universities. Applicants to all four universities are given the option to complete and submit a standard application for preferential treatment (substantiated with documents). The form is examined by a centralized nonprofit organization that weights the information and creates an index of socioeconomic disadvantage, and then reports each applicant's score to the universities. The score ranges from 0 to 85 and the threshold for socioeconomic eligibility used by the universities is 30 points. We exploit this discontinuity by comparing applicants just above or below the 30 points threshold. The design features additional aspects that bolster causal inference: the applicants do not know the weighting algorithm; it is very difficult to manipulate the score because eligibility is based on information on public records and on serious (documented) life events; and, finally, applicants still do not know their AA status at the application (and major selection) stage, i.e. whether they fall below or above the 30 points cutoff point.

In the second stage, academic eligibility is determined for those who passed the threshold for socioeconomic eligibility. The eligible pool consists of applicants with borderline achievements whose academic index score is around 0.5-1.0 standard deviations below the major-specific cutoff point of admissibility. The third stage is the admission decision. It is

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<sup>2</sup> 'Adverse circumstances' applies if the applicant is an orphan, an immigrant, divorced, a single parent, suffers from a health disability, experienced the death of a sibling, or has divorced parents. The definition also includes any applicant that has a parent with a disability or chronic illness.

important to note that admission is not guaranteed to applicants who pass the first two stages of eligibility and, as such, academic departments have the discretion to pick and choose their students or reject them all.<sup>3</sup> However, this decision is not holistic either: it is solely based on the information that is available in the application file, i.e. the individual's applicants' academic composite, matriculation diploma grades and psychometric test score. The department can admit applicants by their rank on the academic composite score or they may pay attention to its components (for example, give extra weight to test scores, the exam's quantitative part, or the grades in specific subjects in high school). To prevent the saturation of certain majors with AA-eligible admits, the cap on the share of affirmative action admits in each department is 5 percent of each department's entering class.

### 3. Data

We obtained institutional administrative data from the four Israeli universities which implemented the affirmative action program —Tel-Aviv University (TAU), The Hebrew University (HUJI), The Technion (TEC), and Ben-Gurion University (BGU). The affirmative action policy began in 2001 at HUJI; 2003 at TAU;<sup>4</sup> 2004 at TEC; and 2006 at BGU. For each university, we have data from the start of the affirmative action program and until 2008. Consequently, the data yields eight years of admission observations under the AA regime at HUJI, six at TAU, five at TEC, and three at BGU. There were about 10,457 applications for affirmative action status at any of the four universities between 2001 and 2008. However, a

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<sup>3</sup> All the applicants are grouped into one pool; the only difference is that eligible students may have a small edge over non-eligible applicants who are similarly academically situated. Moreover, the exact socioeconomic eligibility score of applicants above the 30-point threshold has no bearing on the admission decision.

<sup>4</sup> TAU's faculties of law and social sciences have experimented with the affirmative action program since 1997. However, due to the small scale of this local initiative (168 students), we deleted these observations and do not consider these years under the AA regime.

number of these represent multiple applications for the same individual. We restrict attention to the first application for affirmative action submitted by 8,031 unique individuals.

The analyses are limited to applicants under age 28 due to the different admissions criteria for older applicants and the fact that the affirmative action plan has the same age cap. Also excluded are 230 applicants who benefited from a relatively new program at TAU, which does not require the submission of test scores for applicants from disadvantaged schools who ranked at the top of their class. In addition, 290 applicants of Ethiopian origin who benefit from other types of preferential treatment are omitted from the analyses. International students and students enrolled in various programs that combine military service and academic studies are also not included in the sample. Finally, in order to consider a more homogenous group, we focus our attention on Jewish applicants.<sup>5</sup> These restrictions result in final sample of 5,999 individuals who applied for affirmative action at one of the four universities. For the sake of parsimony, we report aggregated results.<sup>6</sup>

Table 1 present summary statistics for the final sample. *AA score* is a continuous variable ranging from 1 to 85 which measures the degree of disadvantage that universities used to determine eligibility for affirmative action. Appendix Figure 1 shows a histogram of the AA grade, along with a line at the 30 point cutoff.<sup>7</sup> *AA eligibility* is a dichotomous variable that indicates whether an applicant applied for preferential treatment and passed the 30-point threshold. Approximately 58 percent of applicants were deemed eligible for affirmative action based on this cutoff. The fraction of applicants who were actually admitted to one of the four

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<sup>5</sup> The results for Arabs are generally consistent with those of the Jewish population, especially for the admission outcomes, but the specification tests do not hold up as well (the results are available from the authors upon request).

<sup>6</sup> The results for individual institutions look similar and are available from the authors upon request.

<sup>7</sup> In most of the empirical analysis, we normalize the AA score variable so that the 30 point cutoff for AA eligibility is centered at zero (and trim a few outlier observations with AA grade greater than 80).

universities was 57 percent and the fraction who ultimately enrolled was 45 percent.<sup>8</sup> Among applicants who did not apply for affirmative action, the fraction of applicants admitted and the fraction who enrolled to one of the four universities was 62 percent and 46 percent respectively. Appendix Table 1 report summary statistics by AA status and also for applicants who did not apply for affirmative action. Both the admission rate and the share of enrolled students is the lowest among those who applied to the AA program but found not eligible.

[Table 1 About Here]

We also created variables to measure the selectivity of majors to which students applied and to which they were accepted. As mentioned, application and admission are institution-major specific: altogether, the four institutions contained about 170 departments, representing approximately 50 different general fields of study. We use an index of selectivity created by Alon (2011). It is the sum of the standardized scores of the admission rate and mean test score of each department.<sup>9</sup> All the departments in the four institutions were ranked and then classified into selectivity quintiles; see Alon (2011) for details. In the current study we define selective majors as those in the top two selectivity quintiles, although we consider alternative definitions in the robustness section. The fraction of applicants who applied to a selective major was 73 percent while the fraction of applicants who were admitted to a selective major was only 21 percent.<sup>10</sup>

In sum, we consider four application/admission outcomes: the likelihood of admission, the likelihood of applying to a selective major, the likelihood of admission to a selective major

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<sup>8</sup> Among applicants who did not apply for affirmative action, the fraction of applicants admitted and the fraction who enrolled to one of the four universities was 62 percent and 46 percent respectively.

<sup>9</sup> For the period between 1997 and 2008 the department admission rate was 44 percent on average; the mean test score of admits was 636 (the national average of all test-takers in 2009 was 564).

<sup>10</sup> Since applicants can apply to multiple majors and students can have dual majors, each individual is classified according to the most selective major she applied to, was admitted to, and enrolled in.

and the likelihood of enrollment. Among those students who end up enrolling in one of the four universities, we also have a set of matriculation outcomes based on grades and graduation. First year GPA in the primary major and first year GPA across all majors both average 78 (out of 100). There is also information on the final GPA at graduation, although this outcome is only defined for students who applied and entered university by 2004 (since most courses at university are three or four years in duration). Similarly, an indicator for graduation status, showing that 67 percent of students graduated, is only defined for this restricted sample of students. Both AA groups have similar grades, on average, by the end of the first year and upon graduation although they are lower than those obtained by other students. On average, the non-AA eligible students are the group with the highest graduation rate followed by AA-eligible students.

Finally, we consider a small set of covariates in our empirical analysis. These include gender, age, as well as the matriculation diploma grades (Bagrut) and the psychometric test score which together form the composite score on which admission is determined.<sup>11</sup> These characteristics are defined for the vast majority of applicants. Noteworthy is the variation between the groups in terms of the psychometric test score: AA eligible applicants clearly are the group with the lowest scores. We also juxtapose the full distributions of the two academic indicators for these groups. The results, depicted in Appendix Figure 2, show that the two AA groups have similar distributions but differ substantially from those of all other applicants. Of course, we also have complete information about the institution and the year of application, which we control for in our regression analysis. In any case, the inclusion of these covariates

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<sup>11</sup> Although we also consider using the actual composite score, this measure varies across institutions. Consequently, we focus on the underlying components that are common across institutions. Using the percentiles of the composite score calculated within institutions does not alter any of our findings.

mainly serves to increase precision of our regression discontinuity (RD) estimates, and do not have much effect on the point estimates.

#### 4. Empirical Strategy

We employ a regression discontinuity (RD) design to estimate the effect of eligibility for affirmative action in the four selective universities in Israel. Since eligibility is determined according to a simple eligibility cutoff, we are able to compare outcomes across applicants and students with similar levels of economic disadvantage and other characteristics, but very different likelihoods of receiving affirmative action. This corresponds to a "sharp" RD design and the standard regression model used throughout the analysis is as follows:

$$outcome_{ijt} = X_{ijt}'\beta + \delta * AA\ Eligible_{ijt} + f(AA\ Score_{ijt}) + \lambda_j + \psi_t + \varepsilon_{ijt}$$

where  $outcome_{ijt}$  represents a particular admission or matriculation outcome for applicant/student  $i$  in university  $j$  of cohort  $t$ ,  $X_{ijt}$  represents a basic set of controls variables that includes gender, age, psychometric score, and average grades on the school-leaving matriculation exams.  $\lambda_j$  represents fixed effects for each institution and  $\psi_t$  represents fixed effects for each year of application.  $AA\ Eligible_{ijt}$  is equal to 1 if applicants received a score 30 or above on their affirmative action evaluations and were therefore eligible for receiving affirmative action. The coefficient  $\delta$ , our main coefficient of interest, indicates the effect of eligibility for affirmative action on any given outcome. Finally,  $f(AA\ Score_{ijt})$  is a smooth function of the affirmative action score, which is the forcing variable that determines the eligibility of affirmative action.

The central assumption underlying the RD design is that we have correctly specified the function of eligibility,  $f(AA\ Score_{ijk})$ . As in many recent studies employing this technique and as suggested by Imbens and Lemieux (2008), we specify a flexible parametric model by including higher order polynomials of  $AA\ Score_{ijk}$  which are allowed to vary on either side of the discontinuity. In particular, we consider specifications that use linear, quadratic and cubic trends in the affirmative action score, as well as linear, quadratic, and cubic splines where the trends are fully interacted with  $AA\ Eligible_{ijk}$ . We also consider non-parametric specification where we follow Hahn, Todd, and Van der Klaauw (2001) and Porter (2003) in using local linear regressions to estimate the left and right limits of the discontinuity, where the difference between the two is the estimated treatment effect. We estimate this in one step using a triangular kernel which has been shown to be boundary optimal (Cheng, Fan, and Marron 1997). Given the absence of a widely agreed-upon method for the selection of optimal bandwidths in the non-parametric RD context, we follow Ludwig and Miller (2007) and examine our results for a broad range of candidate bandwidths. However, we also use a recent approach suggested by Imbens and Kalyanaraman (2010) for estimating the optimal bandwidth.<sup>12</sup> Finally, all regressions cluster at the level of the  $AA\ Score$  in order to avoid the problems associated with specification error in the case of discrete covariates (Lee and Card 2008).

Another key assumption for the RD design is that applicants were not able to manipulate their AA score around the eligibility threshold. We have strong reason to believe that this assumption is maintained in our particular setting. As mentioned earlier, the threshold for receiving affirmative action was not known to applicants. Moreover, the specific formula used to construct the AA score was not known to either applicants or university officials. As shown in

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<sup>12</sup> The IK bandwidth selection procedure is implemented using the Stata ado file named `rdob.ado` available at [http://www.economics.harvard.edu/faculty/imbens/software\\_imbens](http://www.economics.harvard.edu/faculty/imbens/software_imbens). However, we remove the arbitrary tolerance for the 3<sup>rd</sup> derivative as suggested by Josh Angrist (private correspondence).

Appendix Figure 1, apart from the larger probability masses at certain regular intervals of the AA score (e.g. 20, 25, 30, 35, 40, etc.) there do not appear to be any systematic patterns in the density on either side of the original cutoff for AA eligibility. This provides some *prima facie* evidence for the absence of any manipulation of the AA score.

## 5. Results

### *Application and admission outcomes*

Table 2 presents regression discontinuity (RD) estimates for the effect of eligibility for affirmative action (i.e. the coefficient of AA eligibility) on admission and enrollment outcomes using alternative parametric specifications of the running variable (AA score). As mentioned earlier, all regressions include controls for gender, age, school-leaving matriculation diploma grades (Bagrut), and the psychometric test score, as well as institution and cohort fixed effects. Column (1) shows that applicants who were eligible for affirmative action were generally between 5.0 and 8.1 percentage points more likely to be admitted to university. These effects are highly significant in almost all specifications, with the exception of the cubic spline and the smallest local linear bandwidth. Given that the base probability of admission for non-AA eligible applicants was 0.535 (see Appendix Table 1), this represents a large effect of 10 to 15 percent. Column (2) indicates that students who were eligible for affirmative action were significantly more likely to enroll in university, with coefficients ranging from 9.2 to 12.4 percentage points. On a base probability of enrolling of 0.406 among non-AA eligible applicants, this represents an extremely large effect of 23 to 30 percent.

[Table 2 About Here]

At first glance, the impact of affirmative action on the likelihood of admission may not be at all surprising. After all, the affirmative action program was designed to admit academically



borderline applicants who would not otherwise have been accepted to university. However, it is important to remember that individual academic departments were not required to admit students who were eligible for affirmative action. It is possible that academic departments already had preferences for diversity and this program allowed them to express them. Or perhaps pressure from the central administration was brought to bear on academic departments. But, in any case, this result serves to confirm that capacity of voluntary affirmative action programs in the context of a decentralized university.

The fact that the effect of AA eligibility on enrollment is generally larger than the effect of AA eligibility on admission suggests that students eligible for affirmative action are more likely to respond by enrolling in university. Whether this is due to added motivation of receiving affirmative action or a simply a consequence of the types of applicants who are admitted is more difficult to discern. Indeed, a simple comparison indicates a larger yield (i.e. enrollment conditional on admission) among students eligible for affirmative action (74 percent) than those not eligible (69 percent). This difference is also large and significant when estimated in our regression discontinuity framework (although it is not shown here for brevity).

Columns (3) and (4) show the impact of eligibility for affirmative action on the probability of applying to, and getting admitted to, a selective major. There is no significant effect of eligibility for affirmative action on the likelihood of *applying* to a selective major in column (3) which is consistent with the fact that students were not aware of their eligibility for affirmative action at the time of application. This also serves as a useful check of our empirical strategy; a significant result would have cast some doubt on the assumptions underlying the regression discontinuity design. On the other hand, column (4) reveals that eligibility for affirmative action did increase the likelihood of getting *admitted* to a selective major by

approximately 5.7 to 8.5 percentage points; an effect of 30 percent to 44 percent on a base of 0.192). Thus, the affirmative action program led to higher rates of admission, not just to less selective majors but also to the most selective ones.

Figure 1 offers a graphical presentation of the main results from Table 2. The open circles represents raw averages for each level of the AA score variable. The solid lines are plots of the raw data using local linear regressions with the Imbens- Kalyanarman optimal bandwidths associated with each variable and a boundary-optimal triangle kernel (where the AA score is always normalized to be 0 at the 30 point cutoff for eligibility).<sup>13</sup> Panel A shows a clear discontinuity in the fraction of students admitted to one of the four universities at the AA score eligibility cutoff. The discontinuity is visibly larger in Panel B which shows the fraction of applicants who enroll in university. In contrast, there is no obvious discontinuity for the fraction of students who applied to a selective major, just as there is no significant difference by AA eligibility in the corresponding regression. Finally, the fraction of students admitted to a selective major also appears to jump at the AA score cutoff.

[Figure 1 About Here]

### *Matriculation Outcomes*

Table 3 presents estimates for the effect of eligibility for affirmative action on matriculation outcomes. As before, all regressions include controls for gender, age, matriculation diploma grades (Bagrut) and the psychometric test score as well as institution and cohort fixed effects. However, by necessity, these specifications are restricted to students who enrolled in university. This sample restriction may introduce selection bias, especially in light of the differences in the probability of enrollment around the cutoff for eligibility. We try to address at

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<sup>13</sup> Local linear regressions with data that has been residualized using our set of covariates yield similar graphs.

least some of this concern by showing that there are no significant differences in observed characteristics among enrolled students around the eligibility cutoff. Nevertheless, it is important to note that we cannot rule out the possibility of selection into enrollment based on unobserved characteristics.

Column (1) shows that students who were eligible for affirmative action received higher first-year GPAs in their primary major field of study as compared to those students deemed ineligible for affirmative action. The magnitude of the effect ranges from 1.2 to 2.1 points (with the exception of the cubic spline specification) and represents an effect size of 0.10 to 0.18 standard deviation units. The coefficients are significant in most of the parametric specifications, though they become insignificant in all but the largest local linear bandwidth specifications as the precision of the estimates declines. Column (2) indicates that the effect of AA eligibility on mean GPA in the first year across all majors is also positive but not significant in most specifications. One potential explanation for the difference in magnitudes between columns (1) and (2) is that AA eligible students put more effort into their primary major field of study relative to their other fields of study, although it is important to note these differences are statistically significant.

[Table 3 About Here]

As mentioned earlier, the effect of affirmative action on graduation outcomes in columns (3) and (4) is only defined for students who applied and entered university by 2004. The effect of eligibility for affirmative action on overall GPA at graduation is insignificant and substantially smaller than on measures of GPA in the first year. Similarly, students who are eligible for affirmative action do appear more likely to graduate but the coefficients are generally

insignificant.<sup>14</sup> Figure 2 presents graphical evidence for the results of Table 3. The discontinuities at the AA score cutoff for the GPA outcomes in Panels A and C are particularly visible. Taken together, these results suggest that eligibility for affirmative action may have led to an improvement in academic performance, or at least no decline in academic performance, for courses taken during university. By showing that the beneficiaries of preferences in admissions are doing as well academically as (if not better) other students these results are consistent with prior evidence discarding the “mismatch Hypothesis.”

[Figure 2 About Here]

We also examine the effect of eligibility for affirmative action on matriculation outcomes by selectivity of the department. Since admission and enrollment to selective majors was shown to be affected by eligibility for affirmative action, the results may shed some light on whether the effects on matriculation outcomes are mediated through the department’s selectivity. More selective departments can shape the matriculation outcomes of affirmative action students in different directions: they can help them thrive by providing better learning opportunities via better- prepared classmates or better teachers but they may also undermine the chances of academic success of these students by presenting a more rigorous academic environment. It is necessary, however, to use some caution in evaluating outcomes that are conditioned on these variables because of selection into enrollment and because we are conditioning on a post-treatment variable (selectivity) which is itself affected by AA status.

Table 4 shows the effect of eligibility for affirmative action on matriculation outcomes separately for selective departments (in the top two quintiles of our selectivity index) and non-selective departments (in the bottom three quintiles of our selectivity index). Interestingly, there

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<sup>14</sup> The negative coefficients for smaller bandwidths appear to be due to a few outliers close to the AA cutoff; see Panel D of Figure 2.

appears to be no effect of affirmative action on the alternative measures of GPA for students in selective departments, as seen in columns (1), (3), and (5). Moreover, there is a consistently negative effect of affirmative action on the probability of graduation for students in selective departments, although it is only significant in a couple of specifications.

[Table 4 About Here]

Among students in non-selective college-majors, eligibility for affirmative action is significantly associated with higher GPAs and a higher likelihood of graduation, especially in the parametric specifications. These are substantially larger in magnitude than the matriculation effects averaged across both selective and non-selective majors, as shown previously. For example, the coefficients for first-year GPA in one's primary major shown in column (2) range from 1.6 to 3.1, which correspond to effect sizes from 0.13 to 0.26 standard deviations. Similarly, the effect of affirmative action on the probability of graduation in column (8) includes significant effects of 10 to 16 percentage points, although this pattern is not robust across all specifications. These results suggest that the effect of the affirmative action policy on the matriculation outcomes of its beneficiaries vary by the selectivity of the program they enrolled in. AA students who are enrolled in the less selective departments achieve higher grades and are more likely to graduate than their non-AA-eligible peers. We do not find such an advantage among the students in selective, more rigorous, departments; some of the results actually point that AA students may fall behind their counterparts.

### *Robustness Checks*

We have performed a number of additional tests to check the robustness of our results. First, we sought to test the assumption that all applicant characteristics, other than eligibility for affirmative action, vary continuously around the AA score cutoff. While we cannot verify this

assumption for unobserved characteristics, Table 5 presents specifications showing the effect of eligibility for affirmative action on our observed covariates: gender, age, matriculation diploma grades (Bagrut), and the psychometric test score. The coefficients are not significant in any of the specifications and Figure 3 tends to confirm these patterns. Table 6 and Figure 4 present these same specifications for the sample of enrolled students. Again, the absence of any significant or visible discontinuities is evident for this sample. This reinforces the assumption that all observable characteristics, other than eligibility for affirmative action, vary continuously around the AA score cutoff even for the student sub-sample.

We also perform these tests separately for students in selective and non-selective departments (results available from the authors). There does seem to be some evidence of significant differences in observed characteristics for the students enrolling in non-selective departments. However, AA eligible students are observed to score worse on psychometric and Bagrut scores than non-AA eligible students. Insofar as the effects of AA on matriculation outcomes (at least for the non-selective majors) are positive, these differences in observed characteristics are likely work against detecting an effect of AA on these outcomes. Of course, these tests are insufficient if selection into enrollment is partly based on unobserved attributes.

[Table 5 About Here]

[Table 6 About Here]

[Figure 3 About Here]

[Figure 4 About Here]

## **6. Conclusion**

In most countries, affirmative action policy in higher education is not mandated by law. Indeed, in the United States, it is under constant legal attacks. Yet, as in the U.S., institutions in

Israel have adopted this voluntary policy. This can reflect administrative pragmatism in a response to demographic and social forces, isomorphism, or compliance with local pressures (Skrentny 1996). However, the adoption of this voluntary policy could have been merely symbolic (Meyer and Rowan 1977). For example, the institutions in Israel could have limited their admission decisions to the least selective majors. But as the results of this study demonstrate, this was not the case. Eligibility for affirmative action increased the likelihood of getting admitted to the more selective programs where demand and academic requirements are high but so are the labor market returns. Thus, our results suggest the potential for a long-lasting impact of preferences in admission on social and economic mobility. This is enhanced by the individual's decisions. Prior scholarship demonstrates how application behavior is affected by preferences in admission (Alon 2010; Brown and Hirschman 2006; Card and Krueger 2005; Long 2004a). We contribute by showing that it continues to shape the educational decisions of AA-eligible admits by increasing their likelihood of enrollment.

The findings of this study regarding the effect of an affirmative-action policy on matriculation outcomes, such as GPA and the likelihood of graduation, provide some support to scholarship refuting the “mismatch hypothesis.” We find no evidence that affirmative action places its beneficiaries in academic environments that exceed their capabilities, and thus sets them up for failure. Moreover, by using a regression discontinuity (RD) design, we are able to address many of the concerns about endogeneity that have plagued the assessment of AA policy. Most studies addressing this issue were only able to adjust for observed group differences, but we can account for any confounding factors associated with AA status by comparing students on either side of the eligibility cutoff who should be identical on *observed and unobserved* characteristics at the time of admission. To the extent that enrollment is determined by being on

either side of the cutoff, our analysis of matriculation outcomes is somewhat more complicated. We are able to show that observed characteristics do not seem to vary, but we cannot rule out the possibility of selection into enrollment on unobservable characteristics.

This is also the first study to examine the mismatch with respect to major's selectivity, in contrast to prior scholarship which has focused on the individual-institution mismatch. This is important because selective majors have higher admission requirements, scholastic intensity levels and more rigor grading policies and norms than non-selective majors and these structural arrangements that facilitate academic success and degree attainment (Alon and Gelbgiser 2011). Moreover, major selectivity determines future prospects like economic payoffs, prestige, and power (Carnevale, Strohl, and Melton 2011; Clark 1983; Davies and Guppy 1997; Hagstrom 1971; Rumberger and Thomas 1993). Because affirmative action students are not studying the most rigorous fields at the same rate as regular students (Bowen and Bok 1998; Rose 2005) it is important to test the "mismatch hypothesis" with a focus on the mismatch between the individual and the department's selectivity level.<sup>15</sup> Our results support the conclusion that AA-eligible students are not falling behind academically. The academic achievements of AA-eligible students surpass those of their counterparts in non-selective departments; they are equally likely to succeed in selective and lucrative departments.<sup>16</sup>

More generally, our results points to the success of a voluntary class-based race-neutral affirmative action policy. The discontent with race-sensitive admissions in higher education (in the US and elsewhere)—prompting, in recent years, public referenda as well as judicial bans and

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<sup>15</sup> There is strong evidence regarding the explanatory power of the variation between groups in fields of study on earning differential in the US although it is not clear whether the entire racial and ethnic gaps in earning are accounted for by this variation. Rumberger and Thomas (1993) find, for example, that minorities receive either the same or even higher initial salaries upon graduation from college as do whites - after controlling for differences in college majors and job characteristics, while Weinberger (1998) reports that controlling for college major narrows the racial and ethnic differences in earnings among graduates although some gaps still persist.

<sup>16</sup> The correlation between fields of study's selectivity and earnings is .50.



numerous lawsuits against such practices—has motivated the search for race-neutral measures to generate diversity. The Israeli program provides the first opportunity to empirically examine a full-fledged class-based affirmative action program. Further research is required to consider whether this and other innovative race-neutral measures help to expand educational opportunity, diversify bastions of privilege, and narrow social and economic inequality.

## References

- Alon, Sigal. 2010. "Racial Differences in Test Preparation Strategies." *Social Forces* 89(2):463-474.
- Alon, Sigal. 2011. "The Diversity Dividends of a Need-Blind and Color-Blind Affirmative Action Policy." *Social science research* 40(6):1494-1505.
- Alon, Sigal and Dafna Gelbgiser. 2011. "The Female Advantage in College Academic Achievements and Horizontal Sex Segregation." *Social science research* 40(1):107-119.
- Alon, Sigal and Marta Tienda. 2007. "Diversity, Opportunity, and the Shifting Meritocracy in Higher Education." *American Sociological Review* 72(4):487-511.
- . 2005. "Assessing the "Mismatch" Hypothesis: Differences in College Graduation Rates by Institutional Selectivity." *Sociology of Education* 78(4):294-315.
- Bertrand, Marianne, Rema Hanna and Mullainathan Sendhil. 2010. "Affirmative Action in Education: Evidence from Engineering College Admissions." *India Journal of Public Economics* 94(1-2):16-29.
- Bowen, William G. and Derek Bok. 1998. *The Shape of the River: Long-Term Consequences of Considering Race in College and University Admissions*. NJ: Princeton University Press.
- Brown, Susan K. and Charles Hirschman. 2006. "The End of Affirmative Action in Washington State and Its Impact on the Transition from High School to College." *Sociology of Education* 79(2):106-130.
- Card, David and Alan Krueger. 2005. "Would the Elimination of Affirmative Action Affect Highly Qualified Minority Applicants? Evidence from California and Texas." *Industrial and Labor Relations Review* 58(3):416-432.
- Carnevale, Anthony P., Jeff Strohl and Michelle Melton. 2011. *What's it Worth?: The Economic Value of College Majors*. Washington, DC: Georgetown University. Center on Education and the Workforce.
- Cheng, Ming-Yen, Jianqing Fan and J. S. Marron. 1997. "On Automatic Boundary Corrections." *The Annals of Statistics* 25(4):1691-1708.
- Clark, Burton R. 1983. *The Higher Education System: Academic Organization in Cross-National Perspective*. California: University of California Press.
- Davies, Scott and Neil Guppy. 1997. "Fields of Study, College Selectivity, and Student Inequalities in Higher Education." *Social Forces* 75(4):1417-1438.

- Hagstrom, Warren O. 1971. "Inputs, Outputs, and the Prestige of University Science Departments." *Sociology of Education* 44(4):375-397.
- Hahn, Jinyong, Petra Todd and Wilbert Van der Klaauw. 2001. "Identification and Estimation of Treatment Effects with a Regression-Discontinuity Design." *Econometrica* 69(1):201-209.
- Imbens, Guido W. and Karthik Kalyanaraman. 2010. "Optimal Bandwidth Choice for the Regression Discontinuity Estimator." *National Bureau of Economic Research*, NBER working paper 14726.
- Imbens, Guido W. and Thomas Lemieux. 2008. "Regression Discontinuity Designs: A Guide to Practice." *Journal of Econometrics* 142(2):615-635.
- Kane, Thomas J. 1998. "Racial and Ethnic Preferences in College Admissions." Pp. 431-456 in *The Black-White Test Score Gap.*, edited by C. Jencks and M. Phillips. Washington DC: The Brookings Institution.
- Karabel, Jerome. 1999. "The Rise and Fall of Affirmative Action at The University of California." *The Journal of Blacks in Higher Education* 25:109-112.
- Lee, David S. and David Card. 2008. "Regression Discontinuity Inference with Specification Error." *Journal of Econometrics* 142(2):655-674.
- Long, Mark C. 2004b. "Race and College Admissions: An Alternative to Affirmative Action?" *The Review of Economics and Statistics* 86(4):1020-1033.
- Long, Mark C. 2004a. "College Applications and the Effect of Affirmative Action." *Journal of Econometrics* 121(1-2):319-342.
- Loury, Linda D. and David Garman. 1995. "College Selectivity and Earning." *Journal of Labor Economics* 13(2):289-308.
- Ludwig, Jens and Douglas L. Miller. 2007. "Does Head Start Improve Children's Life Chances? Evidence from a Regression-Discontinuity Design." *Quarterly Journal of Economics* 122(1):159-208.
- Meyer, John W. and Brian Rowan. 1977. "Institutionalized Organizations: Formal Structure as Myth and Ceremony." *American Journal of Sociology* 83(2):340-363.
- Niu, Sunny X. and Marta Tienda. 2010. "The Impact of the Texas Top 10 Percent Law on College Enrollment: A Regression Discontinuity Approach." *Journal of Policy Analysis and Management* 29(1):84-110.
- Porter, Jack. 2003. "Estimation in the Regression Discontinuity Model." *Working Paper, Harvard University Department of Economics*.

- Rose, Heather. 2005. "The effects of affirmative action programs: Evidence from the University of California at San Diego." *Educational Evaluation and Policy Analysis* 27:263-289.
- Rumberger, Russell W. and Scott L. Thomas. 1993. "The Economic Returns to College Major, Quality and Performance: A Multilevel Analysis of Recent Graduates." *Economics of Education Review* 12(1):1-19.
- Shulman, James L. and William G. Bowen. 2002. *The Game of Life: College Sports and Educational Values*. Princeton, NJ: U.
- Skrentny, John D. 1996. *The Ironies of Affirmative Action: Politics, Culture, and Justice in America*. University of Chicago Press.
- Steele, Claude M. and Joshua Aronson. 1998. "Stereotype Threat and Test Performance of Academically successful African Americans." Pp. 401-428 in *The Black-White Test Score Gap.*, edited by C. Jencks and M. Phillips. Washington DC: The Brookings Institute.
- Weinberger, Catherine J. 1998. "Race and Gender Wage Gaps in the Market for Recent College Graduates." *Industrial Relations* 37:67-84.