Do Public Universities Give Admissions Preferences to Males When Faced with Large Increases in their Female Enrollments? Evidence from the Texas Top 10% Plan

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I. Introduction

An estimated 57 percent of enrollees in U.S. degree-granting postsecondary institutions are women, and the National Center for Education Statistics projects an enrollment increase of 21 percent for women relative to only 12 percent for men through 2019 (National Center for Education Statistics, 2011; Hussar & Bailey, 2011).[1] Much of the gender imbalance on college campuses appears to be driven by women's higher high school grades, high school graduation rates, and likelihood of applying to college (Jacob, 2002). Several college administrators have expressed concern over the imbalance to journalists and court officials because they fear that unequal gender ratios in enrollments reduce applications from top male and female high school graduates (Tierney, 2006). Some private colleges have also reported that they employ strategies to increase the male share of applicants and that they weigh male applicants differently from female applicants in the admissions process (Britz, 2006; Gibbs, 2008; Lewin, 2006).[2] These reports have sparked debate in the popular press of widespread "affirmative action for boys", which would imply that university admissions committees are accepting less qualified men in

[1] The 57 percent of current enrollees is calculated from the information provided in Table 200 of the Digest of Education Statistics 2011. The number is for students enrolled in 2010 at degree-granting institutions.

[2] For instance, the Dean of Admissions and Financial Aid at Kenyon College in Ohio wrote an op-ed piece in the *Washington Post* entitled "To All the Girls I've Rejected", where she reported that her university sometimes admitted less-qualified male applicants in an effort to maintain gender balance (Britz, 2006). The Vice President of Enrollment at Dickinson College in Pennsylvania reported to a *New York Times* journalist that the college sometimes give preference to males in admissions (Lewin, 2006).

order to lower the ratio of women to men in their entering classes (Bronson, 2009; Cardenas, 2007; Clayton, 2001; Gibbs, 2008; Marklein, 2005; Tierney, 2006).

Several federal and state statutes govern the legality of such practices. Most relevant is Title IX of the 1972 Education Amendments, which prohibits sex discrimination in educational institutions that receive federal monies. To date, there has been one lawsuit filed concerning gender sensitive admissions; in 2000, a case was brought against the University of Georgia for awarding additional points to minorities and males in the admissions process. The district court ruled against the university and the defendants chose not to appeal the decision regarding their use of gender in admissions, so gender-based affirmative action has not yet reached higher courts (see *Johnson I*, 106 F. Supp. 2nd at 1363).[3] In 2009, the U.S. Civil Rights Commission launched an investigation of gender sensitive admissions practices by requesting applications and admissions records from a sample of 19 public and private universities in the Washington D.C. metropolitan area. In March of 2011, the Commission voted to end the investigation due to the limited and poor quality of the data obtained from the subpoena (Greisemer, 2011; Kowarski, 2010).

In the meantime, the research community has produced only one study on the use of gender sensitive admissions policies. Using data on 13 private liberal arts colleges, Baum and Goodstein (2005) find higher rates of admission among males who apply to historically female-only colleges, but no evidence of gender sensitive practices among the remaining colleges. No other studies have examined the practice. This omission from the research literature is partially driven by the relative newness of the issue, but also by the empirical challenges in isolating

[3] See Franzese (2007) for one legal analysis of the constitutionality of gender sensitive admissions practices.

evidence that demographic characteristics play a role in admissions decisions. Few universities share data on their applicant pools, and even when made available to researchers, the data do not contain quantifiable measures of all applicant characteristics that inform admissions decisions.

In this study, we address this identification challenge with data on applicants to the two most selective public universities in Texas (Texas A&M at College Station (Texas A&M) and the University of Texas at Austin (UT-Austin)) where a state policy was enacted that provides an exogenous shock to the gender ratio of accepted students at both universities. House Bill 588 (H.B. 588) commonly called the Texas Top 10 percent plan, which was passed into law in 1997 and implemented in 1998, requires public universities to admit in-state students who graduate in the top 10 percent of their high school class. Given females' higher high school grades, this policy forced universities to guarantee acceptance to more females than males. At both institutions, automatically-admitted students comprised nearly 40 percent of the applicants after H.B. 588 and almost 60 percent of these students were women. The plan was designed to address racial imbalance in applications and enrollments (and not gender imbalance). Thus, we test whether university officials responded to the gender imbalance in automatic admits by loosening admissions requirements for males who are not eligible for automatic admission. Specifically, the empirical analysis uses data from applicants who do not meet the qualifications for acceptance under H.B. 588. We evaluate whether the probability of admission for males relative to females increases in years when the percent plan is in place and as the gender imbalance in the number of automatically admitted students increases. This is captured by a 3-way interaction term between: an indicator variable for male, an indicator variable for H.B. 588, and the number of women accepted under H.B. 588 minus the number of men accepted under H.B. 588. The main results, which hold under robustness checks, provide evidence of male preferences at Texas A&M, but not at UT-Austin. The primary identifying assumption of the estimation is that the deviations in the gender imbalance of students who qualify for automatic admission are orthogonal to unobserved differences in the characteristics of male and female applicants who do not qualify for automatic admission under H.B. 588. We evaluate this assumption with a falsification exercise.

The paper is organized into 4 additional sections. Section II describes the prior research on affirmative action in college admissions and describes our identification strategy in detail. Section III provides descriptive information on the applicants and presents preliminary tests of gender preferences in admissions. Section IV presents the main results as well as sensitivity and falsification tests. Section V discusses these results and Section VI concludes.

II. Background and Research Design

Public Policy and Research on Affirmative Action in College Admissions

Though the literature on gender-based affirmative action in higher education is slim, there is a large literature on the use of race in college admissions. In one of the first such analyses, Kane (1998) finds that black and Hispanic applicants are approximately 8 to 10 percentage-points more likely to be admitted to selective colleges than white applicants with the same observable qualifications. Recent legislative and judicial decisions prohibiting the use of race in college admissions in several states have created quasi-experimental conditions for further investigations into the effects of race on college admissions as well as the effect of affirmative action bans on college diversity. Most relevant to our inquiry, the *Hopwood v. University of Texas* decision in 1996 banned the practice of affirmative action for minority students in all Texas public post-secondary institutions. Long and Tienda (2008) examine application records from several Texas institutions and find evidence of affirmative action at selective universities prior to the ban as well as evidence that college administrators placed greater value on applicant characteristics that favored minority applicants after the ban, such as home language and neighborhood poverty. See also Card and Krueger (2005), Dickson (2006a), Hinrichs (2012), Howell (2010), and Long (2004a; 2004b) for other analyses of the effect of affirmative action bans on minority students' college-going behavior and admissions.

As a means to avoid using race in admissions, some states have passed percentage plans that guarantee acceptance to a public university for students who achieve a specific class rank.[4] The Texas legislature passed H.B. 588, which mandates public universities (beginning with the fall admission cohort of 1998) to admit students who graduate in the top 10 percent of a Texas high school. By basing admissions decisions on high school class rank, percent plans provide a possible means for colleges and universities to achieve racial diversity. In Texas, for example, the high degree of racial segregation across high schools contributes to a racially diverse pool of applicants in the top 10 percent (Tienda & Niu, 2006).

Several studies have evaluated the impact of the Texas top 10 percent rule on racial disparities in applications (Andrews, Ranchod, & Sathy, 2010; Harris & Tienda, 2010; Long & Tienda, 2010) and enrollments (Dickson, 2006b; Harris & Tienda, 2010; Long & Tienda, 2008; Niu & Tienda, 2010). In contrast, there have been no inquiries about the effects of the policy on

[4] Long (2007) provides a review of these percentage plans and other alternatives to affirmative action. The plans vary in their criteria for admission. California's plan is for the top 4% of the high school class, Florida's plan is for the top 20% and the Texas plan is for the top 10%. Unlike Texas, California and Florida guarantee admission to the public university system, but do not guarantee admission to a specific college or university within that system.

the gender composition of the applicant and admissions pools, despite reasons to expect such effects. To elaborate, it is well-documented that while females earn either equal or lower scores on college entrance exams, they typically earn much higher high school grades than males, both nationally and in Texas (Conger & Long, 2010; Jacob, 2002). Thus, the percent plans, which require universities to admit students at the top of their graduating classes irrespective of their test scores, may force universities to admit higher shares of females than they might have admitted if no such requirement existed. In Texas, the two public flagship institutions have been particularly impacted by H.B. 588 because most H.B. 588 eligible students seek enrollment at these institutions. In Section III, we demonstrate that a large, and increasing, share of these automatically-admitted students are female.

Identification Strategy and Estimating Equation

The identification strategy uses this shock to the gender ratio of admitted students to uncover signs of gender-sensitivity in admissions decisions among applicants who do not meet the requirements of H.B. 588. Students who do not meet the requirements are those who are either not in the top decile of a Texas high school or who obtained their high school degree from outside of Texas (irrespective of high school rank). We explore whether increasing female shares of automatically-admitted students increase the admissions probabilities of males who do not qualify for automatic admission. We assume that these increases in the female share of automatically-admitted students are uncorrelated with unobserved applicant characteristics (e.g., teacher recommendation letters, extracurricular activities) that might explain differential probabilities of admission for male and female students ineligible for admission under H.B. 588. The validity of this assumption is evaluated in Section IV. The main specification is as follows:

$$(1)\ Admit_{ijt} = \beta_0 + \beta_1(Male_i\ x\ Imb_t\ x\ H.B.588_t) + \beta_2(Male_i\ x\ Imb_t)$$
$$+ \beta_3(Male_i\ x\ H.B.588_t)$$
$$+ \beta_4(Imb_t\ x\ H.B.588_t) + \beta_5 Male_i + \beta_6 X_i + a_j + a_t + \epsilon_{ijt}$$

where $Admit_{ijt}$ equals 1 if applicant *i* from high school *j* whose year of desired admission *t* is admitted to the university. $Male_i$ is an indicator set to 1 if the student is male; Imb_t is equal to the imbalance in the gender of in-state students in the top decile (specifically, the number of female in-state, top decile students minus the number of male in-state, top decile students measured in 100s) in the admission year; $H.B.588_t$ is equal to 1 if the applicant applied after 1997; X_i is a vector of student academic and demographic characteristics, including highest combined SAT or ACT score (converted to the SAT scale),[5] high school class rank (where 1 indicates that the student is in the top 1 percent of her class and 100 indicates that she is in the bottom 1 percent), race/ethnicity, whether the student is a Texas resident, and desired major; a_j are high school fixed effects; and a_t are year of desired admission fixed effects.[6] Regressions

[5] Following Long & Tienda (2008), we combine students' verbal and math scores on the SAT and ACT exams. For students who only took the ACT, we then convert their scores to the SAT scale using a conversation table provided by the College Board (Dorans, 2002).

[6] According to H.B. 588 (http://www.legis.state.tx.us/tlodocs/75R/billtext/html/HB00588F.htm), in addition to the student's academic record, Texas public universities can consider many other student attributes in the admissions process, such as family income and parental education; whether the applicant would be the first generation in the family to attend or graduate from college; and "any other consideration the institution considers necessary to accomplish the institution's stated mission."(Page 3). Correspondingly, each university collects and uses a

are estimated separately for each university; hence, we omit institution-level variables from all equations.

The coefficient of primary interest is $\beta_{1,}$ which provides an estimate of the differential effect of more female automatic-admits on the probability of admission for non-automatic male admits after versus before H.B. 588. If the two universities are concerned about increasing gender imbalances in enrollments and respond by tipping the scales to favor men in years when the automatically-admitted female population increases, then we would expect the estimated β_1 to be positive and statistically significant. The inclusion of the students' academic qualifications, desired major, demographic characteristics, high schools, and year indicators should mitigate biases due to omitted variables. Any remaining biases on the 3-way interaction term in Equation (1) could be driven by unobservables that render gender differences in the quality of applicants in post H.B. 588 years when there is an increase in the female share of the automatically-admitted applicant pool different than previous years.

Equation (1) is estimated using linear probability models for most of the specifications and standard errors that are corrected for clustering of observations within year of desired admission. The small number of clusters/years in the analysis (11 years for Texas A&M and 13 years for UT-Austin) often yields cluster-robust standard errors that are downwards biased (see Bertrand, Duflo, & Mullainathan, 2004; Donald & Lang, 2007; Cameron, Gelbach, & Miller. 2008). To improve our inferences, we implement the wild cluster bootstrap-t procedure

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different set of criteria to determine admissions. We are unable to observe and control for all determinants of admission; our regressions include all of the variables that were provided by our data source (described in Section III), with the exception of a few for which the majority of students were missing data.

described in Cameron, Gelbach, and Miller (2008).[7] Cameron et al. (2008) demonstrate through Monte Carlo experiments that the wild cluster bootstrap-t technique provides more valid inferences than many alternative corrections to the small-cluster problem, including cluster-robust standard errors and other bootstrap methods. The approach works well in cases with as few as 6 clusters. One downside of using the bootstrap-t technique is that it generates rejection rates and p-values, but does not provide an estimate of the standard error. Thus, in presenting our results, we provide the standard errors computed using the cluster-robust technique along with the p-values using both the cluster robust and the wild bootstrap-t procedure. Though we present both, we rely primarily on the bootstrap p-values for determining statistical significance.

[7] This technique first involves OLS estimation of the model that imposes the null hypothesis (in this case, that the interaction of H.B.588, gender imbalance, and male is zero). From the resulting residual distribution, we draw 999 pseudo-samples from within cluster and with replacement to calculate new values of the dependent variable. Prior to calculating the new value of the dependent variable, the residual is weighted with a Rademacher weight of either +1 or -1, each with a probability of 0.5 (meaning the positive value of the residual is drawn half of the time, while the negative value of the residual is drawn the other half of the time). The weighting leads to asymptotic refinement of parameter estimates. Finally, for each bootstrap sample, the newly created dependent variable is regressed on all the independent variables in the model. Significance levels are determined based on the number of times the pseudo-sample coefficients differ from the null hypothesis.

III. Data and Descriptives

The Texas Higher Education Opportunity Project[8] supplied us with over 10 years of applicant data from the state's two most selective public universities: Texas A&M and UT-Austin. We use data on all in-state applicants from the top decile to generate aggregate numbers of females and males who meet the requirements of H.B. 588. We then restrict the estimating sample to the 195,552 applicants who do not meet the requirements of the law and who had complete data on all variables in Equation (1).

Table 1 provides summary statistics on applications, admissions, and enrollments at both universities in the years before and after H.B. 588. After H.B. 588, both universities experienced increases (approximately 2 to 3 thousand) in the average number of applicants. This growth was partially driven by increases in the college-eligible population (due to fertility and migration) in Texas (Tienda & Sullivan, 2009). However, at UT-Austin, the increases were also driven by more applications from in-state, top decile students (from 36.7 to 39.8 percent), while at Texas A&M, the in-state, top decile share of applicants actually decreased (from 36.8 to 36.1 percent). Long and Tienda (2010) document a similar trend and provide a straightforward explanation: H.B. 588 removed admissions uncertainties for students who met the requirements of H.B. 588, which likely reduced their probability of applying to both universities. The results suggest that UT-Austin served as the top choice for a larger number of H.B. 588-eligible applicants. As a

[8] The Texas Higher Education Opportunity Project is a multi-year study directed by Marta Tienda (Princeton University) and her collaborators to study the college planning and enrollment behavior of students in Texas. More information on the study and access to the administrative data can be found at http://www.texastop10.princeton.edu. Appendix Table 1 provides a list of all the data elements obtained from each university.

consequence of the increasing applicant pool, both universities lowered their admissions rates by approximately 3 percentage-points.

(Table 1 here)

The next set of figures in Table 1 focus on the gender composition of students at each university. In the years prior to H.B. 588, the admitted students who enrolled were slightly less likely to be female (49.3 percent male at Texas A&M and 48.4 percent male at UT-Austin). Yet, the enrolled population became disproportionately female in the years after H.B. 588 was enacted. This increase in female enrollments was driven by higher shares of female applicants overall, but particularly by high shares of females among in-state, top decile students. At both universities, the female share of in-state, top decile students increased from approximately 55 percent before the policy to approximately 58 percent after the policy while the female share of students who do not meet the requirements of H.B. 588 increased by approximately 1 percentage point.

In Table 1, we present the "gender imbalance" that translates these percentages into numbers of students. Before H.B. 588, Texas A&M received, in an average year, applications from 490 more in-state females in the top decile than in-state males in the top decile, while after the policy, the university received applications from an average of 820 more in-state, top decile females than in-state, top decile males. UT-Austin experienced an even larger increase pre to post H.B. 588 in the number of females eligible for automatic admission. Our identification relies on the variation in the imbalance across the years observed; at Texas A&M, the imbalance ranged from 210 to 610 females before H.B. 588 and from 650 to 1,020 females after H.B. 588. At UT-Austin, the respective minimum and maximum values are 140 to 610 before the policy and 710 to 1,170 after the policy. Though these numbers represent small shares of the total number of admitted students, we posit that the increases are large enough to affect gender imbalances in enrollments (and potentially influence admissions decisions), and that the variation in the imbalance is wide enough to generate precise estimates. In Section V below we provide and discuss aggregate enrollment trends for the two universities after the last year of data that we have observed (2002 and 2003) to provide a more recent picture of gender balance following H.B. 588.

We precede our primary analysis with two traditional approaches to examining whether the H.B. 588 policy may have led to gender sensitive admissions. First, we examine whether the qualifications (SAT/ACT score and class rank) of the males from the top ten ineligible pool who are admitted to each university differ from the qualifications of females in the ineligible pool, and whether those differences increased after the passage of H.B. 588. Suggestive evidence of preferences for males would be revealed if the marginal male applicant who is admitted is of observably lower quality than the marginal female applicant, particularly in the years after H.B. 588. Table 2 includes the results of regressions of SAT/ACT score and class rank on whether the student is male; admitted to the university; applies in a top ten year; the full set of interactions among these three variables; year fixed effects; high school fixed effects, and the controls listed in X_i of Equation (1). See Appendix Table 2 for descriptive statistics on the control variables for each university overall and by gender.

The estimated coefficients and linear combinations of coefficients from the regressions presented in Table 2 provide the relevant comparisons of means. For instance, the estimated coefficient on male *x* H.B. 588 provides the difference from before to after H.B. 588 in the average qualifications of males versus females who were rejected from the university. The sum of the coefficients on male *x* H.B. 588 year and male *x* admitted *x* H.B. 588 year provides the difference from before to after H.B. 588 in the average qualifications of males versus females who were admitted to the university. Correspondingly, the coefficient on the male *x* admitted *x* H.B. 588 year term tells us whether (and by how much) the qualifications of the males who were admitted after H.B. 588 differ from the females who were admitted after H.B. 588 and, further, how that mean difference departs from the mean difference among applicants who were rejected from the university. Evidence of less academically qualified male applicants being disproportionately admitted after H.B. 588 would be found in a positive and statistically significant coefficient on the 3-way interaction in the SAT/ACT regression and a negative and statistically significant coefficient on the 3-way interaction in the class rank regression (where a high score on rank indicates a lower relative GPA). Regressions are estimated for all H.B. 588 ineligible applicants as well as applicants in the bottom 10% of the SAT/ACT distribution and the bottom 10% of the class rank distribution to determine whether males among these less-qualified pools appear to be given an admissions boost.

(Table 2 here)

For Texas A&M, the results suggest no major differences between males and females in the SAT/ACT scores of those who are admitted relative to those who are rejected after versus before H.B. 588. The coefficients on the triple interaction terms are statistically insignificant for all applicants (Column 1) as well as applicants in the bottom 10% of the SAT/ACT distribution (Column 2) and class rank distribution (Column 3). Slightly larger differences are found on class rank (see Columns 4, 5, and 6). For all three samples, the coefficients on the 3-way interaction are positive and, for the full sample, statistically significant at conventional levels. Column (4) indicates that female applicants have higher class ranks than male applicants in the pre and post H.B. 588 years and that the male-female difference in class rank is smaller among students who are admitted relative to students who are rejected from the university. Relative to students who are rejected, the average rank of a male admitted student in pre H.B. 588 years is better than the average rank of a female (by 2.74 rank points); in other words, in the pre H.B. 588 years, the male admitted students appear to be more positively selected than the females (at least on class rank).[9] In the post H.B. 588 years, males were still more positively selected on rank, but the degree to which they were positively selected decreased by 0.92 of a point (from -2.74 to -1.82).[10] For UT-Austin, Columns (7) through (12) suggest that slightly less qualified male applicants (on SAT/ACT, but not class rank) are admitted after H.B. 588 (as indicated by the negative and statistically significant coefficient on the 3-way interaction term only in Column 7). These qualification differences provide some, but not overwhelming, evidence of males with lower grades being admitted to Texas A&M in post H.B. 588 years and lower SAT/ACT scores being admitted to UT-Austin in post H.B. 588 years.

Our second approach is to estimate a regression of admission as a function of all covariates included in Equation (1) and a full set of interactions between each covariate and H.B.

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[9] Prior to H.B. 588, the class rank difference between rejected males and females is 8.31 (the coefficient on the male indicator), while the class rank difference between admitted males and females is 5.57 (the sum of the coefficients on the male and male *x* admitted), leading to a difference of -2.74 (the coefficient on male *x* admitted).

[10] This latter number (-1.82) is calculated as follows: Post H.B. 588, the class rank difference between rejected males and females is 8.12 (the sum of the coefficients on male and male *x* post H.B. 588), while the class rank difference between admitted males and females is 6.30 (the sum of the coefficients on male, male *x* admitted, male *x* post, and male *x* admitted *x* post), leading to a difference of -1.82.

588 year (note, this regression excludes the gender imbalance variables); the results are provided in Table 3. This approach to identifying gender preferences is similar to that taken in earlier studies such as Kane (1998) and Long and Tienda (2008) to identify racial preferences. While the coefficients are separated into two columns for both universities, they are the result of one regression including the base term and the interaction term for each characteristic listed. The first column provides the effects of each characteristic on admissions' probabilities prior to H.B. 588 while the second column provides the change in the effect from pre to post H.B. 588. For Texas A&M, the results suggest that prior to H.B. 588, males had a higher probability of admission of 0.019 than females with similar application characteristics. After H.B. 588, the male advantage in admissions increased to 0.037, though the increase in the male advantage from pre to post is statistically insignificant even at the 10 percent level. At UT-Austin, a very different story emerges, with a small negative effect of being male pre H.B. 588 and a much larger negative effect in the post H.B. 588 years.

(Table 3 here)

While these basic analyses are suggestive, the differences in the probability of admission by gender may be affected by biases from unobserved applicant characteristics, such as recommendation letters or the difficulty of academic coursework. We know that the male-female top ten ineligible applicants changed on observables from before to after H.B. 588, particularly at UT-Austin. For instance, relative to females, males who applied to UT-Austin after H.B. 588 had slightly better SAT/ACT scores, worse class ranks, and were less likely to be white, non-Texas residents, and interested in Natural/Physical science majors (see Appendix Table 3 for the differences from before to after H.B. 588 between male and female top ten ineligible applicants). Given the nontrivial number of differences between male and female applicants in the post H.B. 588 years relative to the pre H.B. 588 years (again, primarily at UT-Austin), we suspect there are other differences that we have not observed that could be biasing the estimates in Table 3. We turn now to our main difference estimation, which aims to reduce some of these biases.

IV. Results

Difference Estimates

We motivate our results section with a set of difference-in-difference specifications where Equation (1) is modified to include only the male *x* imbalance variables and the regressions are estimated separately for pre and post H.B. 588 years (see Table 4). We also include results for the state's most selective private university (Rice University), which is unconstrained by the Top 10 percent rule and for which we only have post-H.B. 588 applicant data (2000 to 2004). The mean gender imbalance in in-state, top decile applicants was much smaller at Rice than at the two public flagships (an average of 80 more females than males), but the variation was wide (ranging from 20 to 150 students).

(Table 4 here)

The estimated effects for post H.B. 588 years indicate that at Texas A&M, a one hundred female increase in the gender imbalance associates with a 1.3 percentage point increase in a male's probability of admission, a coefficient that is highly statistically significant using the cluster-robust correction and marginally statistically significant using the bootstrap technique. In the pre-H.B. 588 years, the coefficient is negative for Texas A&M, but statistically insignificant using both p-values. For UT-Austin, the estimates suggest no relationship between increases in the gender imbalance and differential admission probabilities for males either before or after H.B.

588. And for Rice University, we see no relationship between gender imbalances and male's probability of admission in the post H.B. 588 years. Though the time series is short and the variation in the gender imbalance is small, the absence of an effect of the gender imbalance at Rice lends support to the assumption that there were no statewide changes in the quality of male and female applicants to selective universities in the years when the gender imbalances were large.

The primary identification relies on the difference in these difference estimates- that is, the difference between pre and post H.B. 588 in the interaction of gender imbalance and male. The results from these triple difference models are reported in Table 5. Column (1) provides the results from estimation of Equation (1) with only year fixed effects on the right hand side and the results match with those provided in Table 4 (0.025 approximately equal to the sum of 0.013 and 0.011), adding a test of significance between the two difference estimates. Column (1) results suggest that a 100-person increase in the gender imbalance of H.B. 588 eligible admits associates with a 0.025 higher probability of admission for males after passage of H.B. 588 relative to before. At UT-Austin, the gender imbalance has no effect on male/female admissions probabilities.

(Table 5 here)

Column (2) results adjust for the full set of controls; Column (3) results adjust for interactions between all of the student covariates and high school fixed effects with the H.B. 588 year variable to control for the possibility that universities adjusted their weighting of these characteristics in admissions over time; Column (4) results adjust for additional student controls available for each university (listed in the notes of the table); and Column (5) estimates result from dropping 1997, a year that exhibited a large change in the characteristics of students who applied to the state flagships due to the *Hopwood* decision. The addition of covariates (from Column 1 to Column 2) attenuates the triple interaction estimate slightly for both universities, yet across all specifications the estimated effect remains positive and statistically significant at Texas A&M and statistically and quantitatively insignificant at UT-Austin. The estimated effects vary at Texas A&M from a minimum of 0.017 to a maximum of 0.025 and are consistent with the interpretation that Texas A&M may be responding to the mandate to admit in-state, top decile females by disproportionately admitting males from the pool of applicants ineligible for automatic admission.

To further illustrate the effect of the gender imbalance on the likelihood of admission for top-ten ineligible male students, we compare the male percentage of the admitted students from the ineligible pool under three scenarios in each year. The first is the percent male of the ineligible pool that would need to be admitted to completely offset the gender imbalance among applicants accepted under the percent plan. The second is the percent male of the ineligible pool that is actually admitted in each year. The third is the predicted percent male of the ineligible pool that would be admitted if the gender imbalance in the top ten applicant pool impacted male and female H.B. 588 ineligible applicants equally. We generate these predictions from Equation (1) by constraining the estimated coefficients on the 2 variables that interact male with gender imbalance (the 3-way interaction of male, gender imbalance, and H.B. 588 year as well as the 2-way interaction of male and gender imbalance) to zero. In other words, our predictions apply the female coefficients on the gender imbalance variables to determine the male's probability of admission if the gender imbalance impacted them in the same way that it impacts females. Figure 1 provides the results for Texas A&M and Figure 2 provides the results for UT-Austin.

(Figure 1 and Figure 2 here)

The first bar in both figures illustrates the effect of the percent plan on the gender imbalance at both universities. If the universities sought to completely offset the effects of the percent plan on the gender ratio in admitted students, they would have to admit between 55 to 58 percent male among the ineligible applicant pool. Our estimate of how much gender preferences might affect admissions is demonstrated by the difference between the second and third bars in the figures. For UT-Austin, these differences are relatively small and, as demonstrated in our models above, the gender imbalance does not impact males and females differently at conventional levels of statistical significance. For Texas A&M, the percent male of admitted top ten ineligible students ranges from 53 percent to 55 percent across the years; we note that if we were to use our model to predict the percent male (instead of the actual percent admitted), we predict nearly the same percentages, ranging from 52 percent to 55 percent. The third bar in the figures indicates that the percent male of the admitted pool would range from 41 percent to 49 percent if the gender imbalance in the top ten pool did not impact males and females differently. The difference between the percent male who are admitted and the percent who would be admitted in the absence of a differential effect of the top ten gender imbalance on male/female admissions increases from 5 percentage points in 1998 to 13 percentage points in 2002.

Falsification Exercises

The main identifying assumption of the approach we use is that small increases in the number of women who are eligible for admission under H.B. 588 are uncorrelated with unobserved and admissions-relevant characteristics of the male and female applicants who are ineligible for admission under H.B. 588. A threat to the identification would arise if ineligible males became much more or less positively selected as the female share in the automatically-admitted pool increased. To partially test this assumption, we examine the correlation between the imbalance in the gender composition of in-state, top decile applicants and the observed characteristics of non H.B. 588 eligible females and males pre and post passage of H.B. 588. Table 6 provides the estimated coefficients on the interaction of male and gender imbalance from regressions of each characteristic on that variable along with year fixed effects and the male indicator in the pre and post H.B. 588 years. In addition to examining correlations between the observed student characteristics, we explore relationships between a set of high school attributes, including whether the high school is in-state, private, a feeder school (one that sends large shares of students to selective universities in Texas), or Longhorn Opportunity Scholar (LOS) or Century Scholar high school. The LOS program offers financial aid to students who enroll at UT-Austin while the Century Scholars program offers support to students who enroll at Texas A&M.

(Table 6 here)

The results from Table 6 indicate no relationship between increases in the automatically-admitted female population and differences in the characteristics of male and female applicants after H.B. 588. Panel A of Table 6, for instance, suggests that in the post H.B. 588 years, an increase in the gender imbalance in the top ten eligible pool associated with a 0.002 higher SAT/ACT score for ineligible males relative to ineligible females; yet this difference is statistically insignificant using both inferential approaches. Moving across the columns in Panel A of Table 6 (post H.B. 588 for Texas A&M) and Panel C (post H.B. 588 for UT-Austin) reveals a similar finding on the other applicant traits.

In the pre H.B. 588 years, however, there are some signs of changes in the male-female applicant pool that coincide with increases in the gender imbalance among students who graduate in the top decile of their high school class. Looking across all characteristics at A&M and focusing only on those that are statistically different from zero at conventional levels using the bootstrap p-values (Panel B), it appears that males who apply in highly gender-imbalanced years have slightly worse class ranks and choose different majors. They are more likely to choose Engineering majors and less likely to choose Natural/Physical science majors. At UT-Austin, in the pre H.B. 588 years, the gender imbalance also correlates with some of the characteristics of male and female applicants. The magnitudes of most of these patterns are relatively small and it is possible that the wild t-bootstrap technique still over-rejects the null hypothesis due to the small cluster size. When we separate our panel into pre and post H.B. 588 years, we have only 5 or 6 clusters. The magnitude of the coefficient (0.015) on the Engineering major for Texas A&M is nontrivial. Upon closer inspection of the data, we see that the percent of male applicants to Texas A&M who select Engineering majors increases substantially from 1992 to 1997 (from 42% to 52%), while the percent of female applicants who select these majors changes only modestly (from 13% to 14%). Given that the gender imbalance increased from 1992 to 1997, this produces a correlation between Engineering major and the male *x* gender imbalance interaction.

Table 7 presents the triple difference equivalent to Table 6 (the estimated coefficients on the interaction of male and gender imbalance, and H.B. 588) for the pooled (pre and post H.B. 588) samples. As shown, the largest difference is on the desired majors at Texas A&M, where male applicants in post-top ten, highly gender imbalance years are much less likely to select Engineering and much more likely to select Natural/Physical sciences. We should note that while Texas A&M does not use desired major in the admissions decision, it likely proxies for unobserved applicant traits that are relevant to the admissions process. Taken together, these results indicate some correlation between the gender imbalance and the majors selected by male and female applicants in pre H.B. 588 years, but no signs of changing applicant pools after the law was enacted.

(Table 7 here)

In a second falsification exercise, we estimate regressions of admission and replace the gender imbalance variable with other characteristics of the applicant pools, including the share of all applicants who are H.B. 588 admits, Hispanic, and black. The purpose of this exercise is to determine whether the patterns we observe could be driven by other changes in the applicant pools that are somehow correlated with the gender balance and with differences in male and female admissions probabilities (see Table 8). For reference, the first column of Table 8 provides a version of the primary specification that replaces the gender imbalance variable (which captures the difference in the number of female and male top ten applicants) with the share of top ten applicants who are female. Specifically, we interact the share of H.B. 588 applicants who are female with the male and H.B. 588 year indicators along with all relevant interactions and year fixed effects on the right-hand side (an unadjusted baseline equivalent to the results reported in Column (1) of Table 5). The results for Texas A&M indicate a 0.033 percentage-point increase in the male probability of admission relative to female as the share of top ten applicants who are female increases by 1 percentage point. Consistent with the results using the gender imbalance variable, the coefficient is statistically significant at conventional levels using both p-values. Moving across the columns of Panel A reveals small and statistically insignificant estimated coefficients when we replace the share female with other applicant characteristics, lending some support to the identification strategy. That is, the gender imbalance in each year likely correlates with other characteristics of the applicant pools, but the results in Table 8 suggest that these other characteristics do not differentially impact the admissions probabilities of males and females.

(Table 8 here)

V. Discussion

Different Results for the Two Universities

Our inquiry has led us to a finding that requires further discussion. We searched for signs of gender sensitivity in admissions at two selective public universities that are both faced with expanding enrollments and a state law that requires them to guarantee acceptance to more females than males. The results indicate evidence of gender sensitivity at only one of the institutions.

One possible explanation for the difference is that the characteristics of the male/female H.B. 588 ineligible applicant pools to Texas A&M (but not UT-Austin) may have changed in ways that are correlated with the gender imbalance in each year. We evaluated this possibility with a falsification test (shown in Tables 6 and 7). These falsification exercises suggest that male and female applicants to Texas A&M selected different majors in years when more top decile, in-state applicants were female. However, this was only true prior to the passage of H.B. 588 and there is no evidence of a correlation in the top-ten gender imbalance post H.B. 588 and the major choices (or other applicant traits) of students who apply to Texas A&M. We also see no signs of changes in the male/female applicant pools at UT-Austin that correlates with the gender imbalance in the top ten applicant pool. Thus, while changes in the applicant pools on unobservables are a possibility, there is not strong evidence of this in the observables.

A second possible explanation for the differential response between the two universities is the differences in their male and female enrollment yields (the percent of admitted students who enroll in the university). Table 9 reveals that the enrollment yield for males is lower than the enrollment yield for females at Texas A&M both before and after H.B. 588, while the reverse is true for UT-Austin. This means that Texas A&M has to admit more males than UT-Austin in order to achieve gender balance in enrollments. For UT-Austin, the higher male yield serves to reduce the gender imbalance in enrollments.

(Table 9 here)

To determine whether the ratio of the male to female enrollment yield explains why Texas A&M appears to over-admit males in years with more female automatic admits while UT-Austin does not, we incorporate the ratio of the male to female yield rate into the main regressions. Table 10 provides the results from two specifications: Column (1) presents our most basic specification without student covariates restricted to the years during which we can measure a lag yield rate (the first year is dropped for both institutions); and Column (2) presents the results when we add the interaction of male and the one-year lag in the male/female yield ratio multiplied by 100. The first column simply indicates that dropping 1992 from the regression results in a larger coefficient on the three-way interaction term primarily for Texas A&M (from 0.025 to 0.043). Of greater interest are the results in Column 2, where adding the interaction of the male/female lagged yield results in a 3-way interaction term that is close to zero and statistically insignificant. In addition, the estimate on the interaction of male with the lag yield ratio is statistically significant and negative indicating that higher male yields in the prior year leads to lower male admissions in the current year. The results from these regressions suggest that the previous year's yield rates may explain some of the admissions decisions and the differences in the patterns found at the two universities.

(Table 10 here)

Recent Trends for the Universities

The number of students applying to selective universities in Texas overall and under H.B. 588 has grown substantially since the policy was first enacted. The enrollment trends at the two institutions in this study have also changed since the last year of our panel, which is 2002 for Texas A&M and 2003 for UT-Austin. One might wonder whether the patterns we observe in the early 2000s have led to dramatic changes in the gender composition of the two institutions. To answer this question, we gathered aggregate information on the number of students applying, admitted, and enrolled at the two selective universities from the early 2000s to 2011 using publicly-available data from the Texas Higher Education Coordinating Board.[11] For each institution, Table 11 provides indicators for the post-H.B. 588 years that we used in the primary analysis along with the same indicators for the time that elapsed between the last year of observation and 2011. Panel A focuses on trends for all applicants, while Panel B focuses on the gender composition of the applicant and enrollment pools.

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[11] The Texas Higher Education Coordinating Board's information on applications, acceptances and enrollments is available here: http://www.txhighereddata.org/index.cfm?objectId=27282A55-A77E-2A0D-87B58BE320C6B099. The website for the coordinating board is available here: http://www.thecb.state.tx.us/

At Texas A&M, there is a substantial increase in the number of applicants from 1998-2002 to the 2003-2011 interval, with relatively small decreases in the percent of applicants who are eligible for H.B. 588 (36 to 34). At the same time, the percent of all H.B. ineligible applicants who are admitted decreased from 59 to 55, which results in a slightly higher share of the enrolled population who are automatically admitted under H.B. 588. Panel B also reveals that the female share of the automatic admits decreased slightly after 2003, from 58 to 57 percent as did the female share of non-automatic admits. Despite the decline in the female share of H.B. 588 applicants, the excess number of automatically-admitted females (the "top ten gender imbalance") increased due to the sizable increase in the number of applicants. In addition, while the overall yield decreased for both males and females, it decreased by much more for females rendering the two yield rates equivalent in the 2003-2011 years. In sum, the decrease in the percent of applicants from both the H.B. 588 eligible and ineligible pools who are female along with the decrease in the female yield rate led to an overall decline in the share of females among the enrolled students at Texas A&M.

(Table 11 here)

The UT-Austin trend is entirely different. The university experienced an even larger increase in applications after 2003 than Texas A&M with a 2 percentage-point decrease in the share of applicants from the H.B. 588 eligible pool. Yet, due to capacity constraints, UT-Austin's acceptance of H.B. 588 ineligible applicants decreased substantially (from 57 to 28 percent), leading to a large increase in the share of enrolled students from the automatic admit pool (48 to 69 percent). In fact, in 2009, the near saturation of UT-Austin by top ten admits led to the percent plan being amended by the Texas state legislature; one amendment to the law permits UT-Austin to accept students with the highest class ranks until it hits 75% of the entering freshman class. Moving down to Panel B, we see almost no change in the share of H.B. 588 eligible and ineligible applicants to UT-Austin who are female and no change in the male and female yield rates. Taken together, the increasing share of admits who are in the top ten (and disproportionately female) has led to an increase in the female composition of enrolled students at UT-Austin from 52 to 54 percent.

The trends reported in Table 11 indicate that while H.B. 588 may have increased the number of females that selective universities had to admit, it did not necessarily permanently alter their gender compositions. Texas A&M, for reasons we cannot explained, has experienced a decrease in the share of applicants who are female and the female yield rate. These two trends have reduced the share of females on campus. UT-Austin, in contrast, continues to experience increases in the share of females on campus because the automatically-admitted applicants have became a much larger share of the admitted pool.

Generalizability of the Findings

This analysis focuses on a fixed window of time for two selective institutions that are constrained by a relatively uncommon policy. In this section, we discuss the implications of the results for postsecondary institutions generally.

As noted in the introduction, approximately 57% of college students in the US are female and this share is expected to grow. This is a trend felt in many developed countries across the world and several college educators have reported concerns about the growing imbalance (UNESCO, 2009; Tierney, 2006). Most colleges and universities have considerable control over their admissions policies and set their policies in ways that maximize the goals of the institution. For selective universities and those universities seeking to increase their national rankings, one of the main goals is to recruit and admit students with the best academic qualifications. If females continue to receive higher GPAs and reach parity or exceed males in college-entrance exams, college admissions officers from selective institutions will increasingly admit more females and may encounter increasingly gender imbalanced enrollments. If the universities decide gender diversity is a goal, then they may choose to admit males with slightly lower academic qualifications. Our study focuses on two universities that are forced to admit more females than males due to a percent plan; only two other states in the nation, California and Florida, have similar percent plans. While the specific question we pose here may best generalize to selective universities in those states with similar constraints, the challenge of how best to achieve a highly qualified student body without sacrificing diversity is common to all colleges and universities. The analyses presented here merely show that the imposition of one standard for admitting students can have unintended consequences.[12] In this case, we show that a policy aimed at achieving racial diversity in admissions may have produced gender imbalance in admissions. We also reveal that at least one university may have responded to this imbalance by changing the probability of admissions for males so as to maintain gender diversity.

VI. Conclusion

Given the tremendous growth in female high school graduation and college enrollment rates over the past 30 years, concern is growing over the gender imbalance on college campuses across the country. Many college administrators have expressed concern over the new gender ratio and some in private colleges have conceded that they sometimes lower their admissions standards for

[12] Cullen, Long, and Reback (forthcoming) demonstrate the percent plan can also have the unintended consequence of students changing high schools so as to increase the probability of qualifying for admission under H.B. 588.

male applicants in order to maintain gender balance in enrollments (Gibbs, 2008). One study also provides empirical evidence that admissions favor male applicants to historically-female colleges when the female applicant pool increases (Baum & Goodstein, 2005).

In this paper, we use administrative data from applicants to the two most selective public institutions in Texas to determine whether the universities give preference to males in the admissions process when they experience exogenous increases in the number of females on campus. Our estimation takes advantage of the passage of H.B. 588 (commonly called the Texas Top 10 plan), which guarantees students who graduate in the top decile of their high school class from a Texas high school acceptance to any public university in Texas. Since the automatic admits are disproportionately women (due to their higher high school grades), we investigate whether universities respond to the imbalance in automatic admits by boosting acceptance rates for male students who do not qualify for the policy. We find evidence of increased admissions at one of the two universities and suggestive signs that the higher rate of acceptance was driven by a lower male yield rate in prior years. Recent trends also suggest that decreases in the share of applicants who are female as well as the female yield rate at this university may have increased gender balance independent of the admissions policies.

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Table 1: Summary Statistics on Applications, Admissions, and Enrollments

	Texas A&M		UT-Austin	
	Pre H.B. 588 policy	Post H.B. 588 policy	Pre H.B. 588 policy	Post H.B. 588 policy
Years available	1992-1997	1998-2002	1990-1997	1998-2003
# of applicants (in 1,000s)	14.1	15.8	14.8	17.9
% of applicants who are in-state and in the top decile	36.8	36.1	36.7	39.8
% of applicants admitted	75.8	72.3	70.9	67.6
% of enrolled who are female	49.3	51.4	48.4	52.4
% of in-state, top decile applicants who are female	55.1	57.9	54.5	57.5
# of female - # of males in-state, top decile applicants (in 100s): "Top ten gender imbalance"	4.9	8.2	4.0	8.7
(Minimum - Maximum)	(2.1 - 6.1)	(6.5 - 10.2)	(1.4 - 6.1)	(7.1 - 11.7)

Notes: i) Mean values across the years available are reported in cells. Minimum to maximum values across the years are reported in parentheses.

Table 2: Academic Qualifications of Applicants by Whether Admitted, Gender, and Pre/Post H.B. 588 Year

	Texas A& M						UT Austin					
	Combined SAT/ACT Score (in 100s)			Class Rank			Combined SAT/ACT Score (in 100s)			Class Rank		
	All	Bottom 10% on SAT/ACT	Bottom 10% on Rank	All	Bottom 10% on SAT/ACT	Bottom 10% on Rank	All	Bottom 10% on SAT/ACT	Bottom 10% on Rank	All	Bottom 10% on SAT/ACT	Bottom 10% on Rank
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Male *x* admitted	0.08	-0.02	-0.11	0.92**	1.12	0.89	-0.08**	0.06	0.16	0.57	1.60	-0.92
x H.B. 588 year	(0.06)	(0.08)	(0.18)	(0.36)	(0.66)	(1.42)	(0.04)	(0.05)	(0.14)	(0.50)	(1.52)	(1.23)
Admitted *x* H.B. 588 year	-0.18	-0.02	-0.01	-1.05	-2.72**	-1.39	-0.26***	-0.26***	-1.23***	1.95	5.57**	3.24**
	(0.04)	(0.03)	(0.14)	(0.65)	(0.87)	(0.99)	(0.05)	(0.05)	(0.13)	(1.30)	(2.14)	(1.12)
Male *x* H.B. 588 year	0.00	0.01	-0.06	-0.19	0.15	-0.03	0.14***	0.05*	0.06	-0.82**	-0.09	-0.22
	(0.05)	(0.04)	(0.09)	(0.31)	(0.69)	(0.54)	(0.03)	(0.02)	(0.04)	(0.35)	(0.69)	(0.64)
Male *x* admitted	0.01	-0.03	0.07	-2.74***	-2.71***	0.62	0.01	-0.15***	-0.02	-2.11***	0.32	-0.35
	(0.04)	(0.07)	(0.08)	(0.30)	(0.45)	(1.21)	(0.03)	(0.03)	(0.12)	(0.42)	(1.00)	(0.87)
H.B. 588 Year	0.13***	0.02	0.14	3.31***	2.68***	0.58*	0.56***	0.10***	0.55***	-2.12*	1.66***	-1.56**
	(0.04)	(0.02)	(0.09)	(0.52)	(0.60)	(0.27)	(0.03)	(0.02)	(0.07)	(0.99)	(0.55)	(0.58)
Admitted	0.81***	0.30***	0.72***	-10.01**	-7.73***	-3.96***	1.21***	0.37***	1.46***	-12.57***	-8.93***	-2.55***
	(0.04)	(0.03)	(0.11)	(0.60)	(0.79)	(0.80)	(0.06)	(0.04)	(0.11)	(0.87)	(0.82)	(0.76)
Male	0.46***	0.11**	0.58***	8.31***	8.98***	2.77***	0.49***	0.13***	0.64***	7.42***	6.99***	3.39***
	(0.03)	(0.04)	(0.06)	(0.22)	(0.45)	(0.35)	(0.03)	(0.02)	(0.04)	(0.26)	(0.47)	(0.41)
Number of observations	93097	10350	9258	93097	10350	9258	102455	11108	10525	102455	11108	10525

Notes: i) Sample restricted to applicants who do not meet the requirements of admission under H.B. 588. ii) Bottom 10% refers to being in the bottom 10% of the applicants to the university in the same year. iii) Higher scores on class rank indicate a lower (less qualified) ranking. iv) All regressions control for combined SAT/ACT score, class rank, Texas resident, race/ethnicity, desired major, year of desired admission, and high school fixed effects. v) * p<0.10; **p<0.05; ***p<0.01.

Table 3: Regression of Admission

	Texas A&M		UT-Austin	
	Main	Interacted with H.B. 588	Main	Interacted with H.B. 588
Male	0.019*	0.018	-0.008**	-0.027***
	(0.010)	(0.016)	(0.003)	(0.004)
Combined SAT/ACT score	0.122***	-0.031**	0.164***	-0.064***
	(0.010)	(0.012)	(0.011)	(0.013)
High school class rank	-0.012***	0.000	-0.012***	0.003*
	(0.001)	(0.001)	(0.000)	(0.001)
Hispanic	0.232***	-0.226***	0.190***	-0.188***
	(0.063)	(0.067)	(0.031)	(0.032)
Asian	-0.016	-0.038	-0.023***	0.052***
	(0.019)	(0.030)	(0.004)	(0.016)
Black	0.287***	-0.255**	0.222***	-0.191***
	(0.079)	(0.085)	(0.040)	(0.041)
Other non-international race	-0.023	0.011	-0.019**	-0.023
	(0.015)	(0.021)	(0.006)	(0.019)
International	0.069	-0.137**	0.126**	-0.151*
	(0.043)	(0.058)	(0.058)	(0.080)
Texas Resident	0.197***	-0.065**	0.255***	-0.091
	(0.012)	(0.023)	(0.027)	(0.074)
Desired Major = Engineering	-0.146***	-0.097*	0.042***	0.131**
	(0.021)	(0.047)	(0.013)	(0.059)
Desired Major = Nat/Phy Sci	-0.125***	-0.101*	0.025	0.147***
	(0.012)	(0.046)	(0.014)	(0.039)
Desired Major =Agriculture	-0.070***	-0.026		
	(0.011)	(0.029)		
Desired Major = Architecture	-0.173***	-0.173*	-0.081*	-0.029
	(0.019)	(0.079)	(0.042)	(0.070)
Desired Major = Business	-0.165**	0.072	0.051**	-0.126**
	(0.056)	(0.080)	(0.020)	(0.048)
Desired Major= Health	-0.134***	0.015	0.015	0.169***
	(0.020)	(0.028)	(0.031)	(0.045)
Desired Major =Social Science	-0.168***	0.001	0.029***	-0.123**
	(0.014)	(0.034)	(0.009)	(0.046)
Desired Major= Humanities	-0.157***	-0.002	-0.001	-0.080*
	(0.015)	(0.031)	(0.012)	(0.042)
Desired Major= Fine Arts	-0.257***	0.039	0.056**	0.232***
	(0.027)	(0.048)	(0.022)	(0.058)
Desired Major= Tech/Voc	-0.166***	-0.146		
	(0.016)	(0.085)		
Desired Major= Education			0.010	0.294***
			(0.031)	(0.076)
Observations	93097		102455	

Notes: i) Sample restricted to applicants who do not meet the requirements of admission under H.B. 588. ii) Regressions also control for year fixed effects and H.B. 588 *x* high school fixed effects. iii) The reference major group includes majors classified as "other", "general studies" (a major populated in some, but not all years for Texas A&M), "individualized", or "not listed" . iv) * p<0.10; **p<0.05; ***p<0.01.

Table 4: Regressions of Admission, Double Difference

	Post H.B. 588	Pre H.B. 588
Panel A: Texas A&M		
Male *x* gender imbalance	0.013	-0.011
	(0.001)	(0.007)
	[0.000]	[0.197]
	{0.068}	{0.128}
Observations	45544	47553
Panel B: UT-Austin		
Male *x* gender imbalance	0.005	-0.005
	(0.003)	(0.005)
	[0.204]	[0.368]
	{0.128}	{0.444}
Observations	50695	51760
Panel C: Rice University		
Male *x* gender imbalance	0.001	
	(0.019)	
	[0.954]	
	{0.949}	
Observations	11624	

Notes: i) Each cell provides the estimated coefficient on the interaction of male and gender imbalance, cluster-robust standard errors (in parentheses), cluster-robust p-values [in brackets], and wild bootstrap p-values {in curly brackets}. ii) All regressions also control for year fixed effects and a male indicator. Post H.B. 588 years for Rice University are 2000 through 2004; Pre H.B. 588 data were not available.

Table 5: Regressions of Admission, Triple Difference

	(1)	(2)	(3)	(4)	(5)
Panel A: Texas A&M					
Male *x* gender imbalance	0.025	0.018	0.018	0.020	0.017
x H.B. 588 year	(0.007)	(0.006)	(0.006)	(0.006)	(0.006)
	[0.007]	[0.010]	[0.008]	[0.006]	[0.029]
	{0.014}	{0.018}	{0.042}	{0.040}	{0.062}
Observations	93097	93097	93097	68809	62392
Panel B: UT-Austin					
Male *x* gender imbalance	0.009	0.007	0.007	0.003	0.002
x H.B. 588 year	(0.006)	(0.005)	(0.006)	(0.003)	(0.002)
	[0.122]	[0.200]	[0.226]	[0.302]	[0.528]
	{0.210}	{0.300}	{0.332}	--	--
Observations	102455	102455	102455	58264	52065
Baseline controls	No	Yes	Yes	Yes	Yes
Controls interacted with H.B. 588 year	No	No	Yes	Yes	Yes
Additional student controls	No	No	No	Yes	Yes
Exclude 1997	No	No	No	No	Yes

Notes: i) Each cell provides the estimated coefficient on the interaction of male, gender imbalance, and H.B. 588 year; cluster-robust standard errors (in parentheses); cluster-robust p-values [in brackets]; and wild bootstrap p-values {in curly brackets}. ii) All regressions also control for the following variables: male x gender imbalance, male x H.B. 588 year, gender imbalance x H.B. 588 year, year, and male. iii) Baseline controls include students' combined SAT/ACT score, class rank, race/ethnicity, Texas residency, and high school fixed effect. For Texas A&M, the "additional student controls" include in high school academics (whether took three or more years of math, two or more years of science, two or more years of foreign language) and extracurriculars (played sports, band,drama,student government,national honor society,yearbook, other hobby), and high school graduating quarter. For UT-Austin, the "additional student controls" include whether the student passed an Advanced Placement exam is math, science, foreign language, social sciences, or another subject as well as father and mother education level. There are substantial numbers of students missing values for these additional controls at UT-Austin, particularly before 1996. As a result, the bootstrap p-values are unestimable.

Table 6: Falsification on Covariates, Double Difference

	Student Characteristics						High School Characteristics				
Dependent Variable	Combined SAT/ACT	Class rank	White	Texas Resident	Engineering Major	Natural/Phys Science Major	Instate	Private	Feeder	Longhorn Opportunity Scholar	Century Scholar
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Panel A: Texas A&M, Post H.B. 588											
Male *x* gender imbalance	0.002	-0.07	-0.002	-0.006	-0.01	0.012	-0.002	-0.001	0.002	0.00002	0.002
	(0.014)	(0.102)	(0.003)	(0.003)	(0.007)	(0.004)	(0.003)	(0.000)	(0.002)	(0.000)	(0.001)
	[0.910]	[0.529]	[0.558]	[0.123]	[0.203]	[0.037]	[0.484]	[0.041]	[0.303]	[0.940]	[0.099]
	{0.959}	{0.767}	{0.585}	{0.462}	{0.416}	{0.112}	{0.767}	{0.114}	{0.238}	{0.990}	{0.292}
Panel B: Texas A&M, Pre H.B. 588											
Male *x* gender imbalance	-0.025	0.223	-0.001	0.006	0.015	-0.009	0.007	-0.003	0.004	0.000	0.000
	(0.013)	(0.066)	(0.001)	(0.003)	(0.005)	(0.002)	(0.002)	(0.001)	(0.004)	(0.001)	(0.000)
	[0.107]	[0.020]	[0.244]	[0.083]	[0.028]	[0.013]	[0.036]	[0.064]	[0.358]	[0.891]	[0.960]
	{0.106}	{0.028}	{0.807}	{0.633}	{0.026}	{0.054}	{0.557}	{0.372}	{0.805}	{0.903}	{0.965}
Panel C: UT-Austin, Post H.B. 588											
Male *x* gender imbalance	-0.006	-0.096	-0.002	0.003	-0.01	0.012	0.002	-0.002	-0.004	0.001	0.001
	(0.003)	(0.116)	(0.002)	(0.003)	(0.007)	(0.004)	(0.002)	(0.001)	(0.003)	(0.000)	(0.000)
	[0.124]	[0.447]	[0.362]	[0.268]	[0.203]	[0.037]	[0.294]	[0.131]	[0.263]	[0.092]	[0.115]
	{0.434}	{0.509}	{0.589}	{0.793}	{0.416}	{0.112}	{0.771}	{0.460}	{0.246}	{0.496}	{0.240}
Panel D: UT-Austin, Pre H.B. 588											
Male *x* gender imbalance	-0.011	0.098	-0.004	0.002	-0.005	-0.002	0.000	-0.003	0.004	0.000	0.001
	(0.009)	(0.033)	(0.001)	(0.000)	(0.001)	(0.020)	(0.000)	(0.002)	(0.003)	(0.001)	(0.001)
	[0.269]	[0.021]	[0.017]	[0.001]	[0.010]	[0.285]	[0.324]	[0.127]	[0.216]	[0.754]	[0.070]
	{0.364}	{0.026}	{0.060}	{0.012}	{0.042}	{0.314}	{0.378}	{0.166}	{0.258}	{0.839}	{0.090}

Notes: i) The dependent variable in each of the regressions is presented in the column headings. ii) Each cell provides the estimated coefficient on the coefficient on the interaction of male and gender imbalance; cluster-robust standard errors (in parentheses); cluster-robust p-values [in brackets]; and wild bootstrap p-values {in curly brackets}. iii) All regressions also control year fixed effects and a male indicator.

Table 7: Falsification on Covariates, Triple Difference

	Student Characteristics						High School Characteristics				
Dependent Variable	Combined SAT/ACT	Class rank	White	Texas Resident	Engineering Major	Nat/Phys Science Major	Instate	Private	Feeder	Longhorn Opportunity Scholar	Century Scholar
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Panel A: Texas A&M											
Male *x* gender imbalance	0.026	-0.293	-0.0005	-0.012	-0.026	0.022	-0.009	0.002	-0.002	-0.0001	0.002
x H.B. 588 year	(0.018)	(0.115)	(0.003)	(0.004)	(0.008)	(0.005)	(0.003)	(0.001)	(0.004)	(0.0001)	(0.001)
	[0.167]	[0.028]	[0.877]	[0.012]	[0.009]	[0.001]	[0.026]	[0.178]	[0.667]	[0.916]	[0.052]
	{0.398}	{0.154}	{0.887}	{0.186}	{0.022}	{0.004}	{0.240}	{0.362}	{0.778}	{0.935}	{0.382}
Panel B: UT-Austin											
Male *x* gender imbalance	0.005	-0.193	0.001	0.001	-0.01	0.007	0.002	0.002	-0.008	0.0003	-0.001
x H.B. 588 year	(0.009)	(0.114)	(0.003)	(0.002)	(0.004)	(0.002)	(0.002)	(0.002)	(0.004)	(0.0009)	(0.001)
	[0.597]	[0.115]	[0.596]	[0.653]	[0.018]	[0.003]	[0.367]	[0.424]	[0.078]	[0.781]	[0.254]
	{0.607}	{0.254}	{0.685}	{0.773}	{0.084}	{0.114}	{0.560}	{0.458}	{0.086}	{0.823}	{0.398}

Notes: i) The dependent variable in each of the regressions is presented in the column headings. ii) Each cell provides the estimated coefficient on the interaction of male, gender imbalance, and H.B. 588 year; cluster-robust standard errors (in parentheses); cluster-robust p-values [in brackets]; and wild bootstrap p-values {in curly brackets}. iii) All regressions also control for the following variables: male *x* gender imbalance, male *x* H.B. 588 year, gender imbalance x H.B. 588 year, male, and year fixed effects.

Table 8: Regression of Admission, Falsification on Other Applicant Characteristics

	Share of H.B. 588 applicants who are female	Share of applicants in top ten	Share of applicants who are Hispanic	Share of applicants who are black
	(1)	(2)	(3)	(4)
Panel A: Texas A&M				
Male *x* column variable *x* H.B. 588 year	0.033	-0.009	-0.001	-0.005
	(0.008)	(0.014)	(0.019)	(0.036)
	[0.002]	[0.550]	[0.950]	[0.900]
	{0.032}	{0.639}	{0.911}	{0.909}
Observations	93097	93097	93097	93097
Panel B: UT-Austin				
Male *x* column variable *x* H.B. 588 year	-0.007	-0.001	-0.025	0.013
	(0.014)	(0.008)	(0.012)	(0.019)
	[0.637]	[0.893]	[0.066]	[0.499]
	{0.691}	{0.901}	{0.310}	{0.539}
Observations	102455	102455	102455	102455

Notes: i) The dependent variable in each of the regressions is whether the student was admitted to the university. ii) Each cell provides the estimated coefficient, standard error, and p-values on the interaction of male, H.B. 588 year, and the variable shown in the column along with all relevant interaction terms. For instance, column (1) provides the results from a regression of admission on the following variables: male *x* share of H.B. 588 applicants who are female *x* H.B. 588 year, male *x* share of H.B. 588 applicants who are female, male *x* H.B. 588 year, share of H.B. 588 applicants who are female *x* H.B. 588 year, male, and year fixed effects. Cells also provide cluster-robust standard errors (in parentheses); cluster-robust p-values [in brackets]; and wild bootstrap p-values {in curly brackets}.

Table 9: Enrollment Yields

	Texas A&M		UT-Austin	
	Pre H.B. 588	Post H.B. 588	Pre H.B. 588	Post H.B. 588
Overall Yield	56.90	60.01	53.08	58.55
Male Yield	56.43	59.39	53.21	58.69
Female Yield	57.54	60.45	52.80	58.23
Male / Female Yield	0.98	0.98	1.01	1.01

Table 10: Regression of Admission with Lag Male/Female Yield Ratio

	Texas A&M		UT Austin	
	(1)	(2)	(1)	(2)
Male *x* gender imbalance	0.043	0.004	0.010	0.0004
x H.B. 588 year	(0.011)	(0.012)	(0.007)	(0.007)
	[0.003]	[0.739]	[0.151]	[0.953]
	{0.048}	{0.771}	{0.232]	{0.953}
One year lag of male-to-female		-0.019		-0.005
yield ratio *x* male		(0.006)		(0.003)
		[0.010]		[0.192]
Observations	86026	86026	96977	96977

Notes: i) Cells provides the estimated coefficient and cluster-robust standard errors (in parentheses), cluster-robust p-values [in brackets], and wild bootstrap p-values {in curly brackets}. ii) All regressions also control for the following variables: male x gender imbalance, male x H.B. 588 year, gender imbalance x H.B. 588 year, year, and male. Regressions exclude first year observations (1990 for Texas A&M and 1992 for UT-Austin) because lag yields were not observed.

Table 11: Summary Statistics on Applications, Admissions, and Enrollments, Post H.B. 588

	Texas A&M		UT-Austin	
Years	1998-2002	2003-2011	1998-2003	2004-2011
Panel A: Overall				
# of applicants (in 1,000s)	15.8	20.2	17.9	24.8
% of applicants who are H.B. 588 eligible	36	34	40	38
% of H.B. 588 ineligible applicants who are admitted	59	55	57	28
% of enrolled students who are H.B. 588 eligible	46	48	49	70
Panel B: Gender				
% of H.B. 588 eligible applicants who are female	58	57	58	57
"Top ten gender imbalance"	8.2	9.5	8.7	13.4
(Minimum - Maximum)	(6.5 - 10.2)	(7.97 - 11.21)	(7.1 - 11.7)	(12.7 - 15.4)
% of non H.B. 588 eligible applicants who are female	46	45	48	48
male yield	59	55	59	53
female yield	61	55	58	52
% of enrolled who are female	52	51	52	54

Notes: Data obtained from the Texas Higher Education Coordinating Board.

Appendix Table 1: Variable Names and Descriptions

Variable Name	Description	Available for Texas A&M	Available for UT-Austin
Application Characteristics			
Year Desired	A variable indicated the year the applicant desired admission	Yes	Yes
Admit	An indicator for whether the applicant is admitted	Yes	Yes
Enroll	An indicator for whether the applicant enrolls at the university	Yes	Yes
Male	An indicator for whether the applicant is male or female	Yes	Yes
Hispanic	An indicator for whether the applicant is Hispanic	Yes	Yes
Asian	An indicator for whether the applicant is Asian	Yes	Yes
Black	An indicator for whether the applicant is Black	Yes	Yes
American Indian or Other	An indicator for whether the applicant is American Indian or in another ethnic category	Yes	Yes
International	An indicator for whether the applicant is an international student	Yes	Yes
Texas Resident	An indicator for whether the applicant is a Texas resident	Yes	Yes
Applicant Qualifications			
College Admissions Test Score	The applicant's college admissions test score on the SAT scale. If the applicant took the ACT, we converted their score to the SAT scale.	Yes	Yes
Class Rank	The applicant's high school class rank where 1 indicates the student graduated in the top 1 percent of their high school and a value of 100 means the student is in the bottom 1 percent.	Yes	Yes
2 or more years of foreign language	An indicator for whether the student completed two or more years of a foreign language in high school	Yes	No
2 or more years of science	An indicator for whether the student completed two or more years of science in high school.	Yes	No
3 or more years of social science	An indicator for whether the student completed 3 or more years of social science in high school.	Yes	No
AP math test	An indicator for whether the student passed an AP math test	No	Yes
AP science test	An indicator for whether the student passed an AP science test	No	Yes
AP social science test	An indicator for whether the student passed an AP social science test	No	Yes
AP foreign language test	An indicator for whether the student passed an AP foreign language test	No	Yes
AP other	An indicator for whether the student passed another AP test not listed above	No	Yes
Major Choice			
Agriculture	Student indicated they wish to major in an agricultural field	Yes	No
Architecture	Student indicated they wish to major in architecture	Yes	Yes
Business	Student indicated they wish to major in business	Yes	Yes
Education	Student indicated they wish to major in education	Yes	Yes

Appendix Table 1 Continued: Variable Names and Descriptions

Engineering and Computer Science	Student indicated they wish to major in engineering or computer sciences	Yes	Yes
Fine Arts	Student indicated they wish to major in fine arts	Yes	Yes
Health	Student indicated they wish to major in a health-related field	Yes	Yes
Humanities	Student indicated they wish to major in the humanities	Yes	Yes
Natural and physical sciences	Student indicated they wish to major in the natural or physical sciences		
Social Science	Student indicated they wish to major in the social sciences	Yes	Yes
Other	Student indicated they wanted to major in another field	Yes	Yes
High School Characteristics			
High School name	The name of the applicant's high school.	Yes	Yes
Longhorn Opportunity Scholarship High School	The Longhorn Opportunity Scholarship program is offered for students who graduate from specific high schools in Texas that traditionally did not send many students to UT-Austin. This variable indicates whether the student attended a high school that was eligible for this program at one time.	Yes	Yes
Century Scholar Program	The Century Scholar program is offered for students who graduate from specific high schools in Texas that traditionally did not send many students to Texas A&M. This variable indicates whether the student attended a high school that was eligible for this program at one time.	Yes	Yes
Class Size	The size of the graduating high school class at the applicant's high school.	Yes	Yes
High School Activities			
High School Athlete	An indicator for whether the student played a sport in high school.	Yes	No
High School Band	An indicator for whether the student played in the high school band.	Yes	No
High School Drama	An indicator for whether the student performed in plays or musicals or other theater projects.	Yes	No
High School Hobby Club	An indicator for whether the student was a member of a club in high school.	Yes	No
High School Honor Society	An indicator for whether the student was a member of the National Honor Society	Yes	No
Student Government	An indicator for whether the student was a member of their high school student government.	Yes	No
High School Year Book	An indicator for whether the student helped to assemble the high school year book.	Yes	No

Appendix Table 2: Characteristics of Applicants Who Do Not Meet the Requirements of H.B. 588

	Texas A&M			UT-Austin		
	All	Male	Female	All	Male	Female
Male	0.55	1.00	0.00	0.53	1.00	0.00
Combined SAT/ACT score (in 100s)	11.07	11.29	10.82	11.42	11.69	11.12
	(1.42)	(1.43)	(1.36)	(1.49)	(1.48)	(1.44)
High school class rank	27.15	29.09	24.80	27.09	28.91	25.03
	(16.38)	(17.27)	(14.88)	(16.44)	(17.24)	(15.21)
White	0.76	0.75	0.77	0.66	0.65	0.67
Hispanic	0.11	0.11	0.11	0.15	0.15	0.15
Asian	0.06	0.06	0.05	0.13	0.13	0.12
Black	0.05	0.04	0.05	0.05	0.05	0.06
Other non-international race	0.02	0.02	0.02	0.01	0.01	0.01
International	0.01	0.01	0.01	0.01	0.01	0.01
Texas Resident	0.83	0.83	0.84	0.89	0.90	0.88
Desired Major = Engineering	0.22	0.33	0.08	0.14	0.22	0.04
Desired Major = Natural/Physical Sciences	0.32	0.30	0.35	0.10	0.09	0.11
Desired Major =Agriculture	0.04	0.04	0.04	0.00	0.00	0.00
Desired Major = Architecture	0.01	0.02	0.01	0.01	0.01	0.00
Desired Major = Business	0.00	0.00	0.00	0.07	0.08	0.06
Desired Major= Education	0.00	0.00	0.00	0.01	0.00	0.03
Desired Major= Health	0.03	0.03	0.04	0.02	0.01	0.03
Desired Major =Social Sciences	0.11	0.07	0.16	0.13	0.10	0.16
Desired Major= Humanities	0.01	0.01	0.02	0.03	0.02	0.04
Desired Major= Fine Arts	0.00	0.00	0.00	0.04	0.03	0.05
Desired Major= Technical/Vocation	0.01	0.01	0.00	0.00	0.00	0.00
Desired Major=Other	0.24	0.21	0.29	0.46	0.45	0.48
In state high school	0.85	0.85	0.85	0.88	0.89	0.88
Private high school	0.08	0.09	0.06	0.07	0.08	0.06
Feeder high school	0.22	0.21	0.24	0.28	0.27	0.28
Longhorn Opportunity Scholar high school	0.02	0.02	0.02	0.02	0.02	0.02
Century Scholar high school	0.02	0.02	0.02	0.02	0.02	0.02
Number of applicants	93,097	51,026	42,071	102,455	54,460	47,995

Notes: i) Students do not meet the requirements of admission under H.B. 588 if they are not in the top decile or if they are from out-of-state. ii) Means are reported in cells. Standard deviations are reported in parentheses. iii) International is a racial/ethnic category.

Appendix Table 3: Falsification on Covariates, Pre and Post H.B. 588

	Student Characteristics						High School Characteristics				
Dependent Variable	Combined SAT/ACT	Class rank	White	Texas Resident	Engineering Major	Nat/Phys Science Major	Instate	Private	Feeder	Longhorn Opportunity Scholar	Century Scholar
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Panel A: Texas A&M											
Male *x* H.B. 588 year	0.047	0.943	-0.003	0.006	0.01	-0.007	0.009	0.005	0.006	-0.001	0.002
	(0.031)	(0.208)	(0.004)	(0.008)	(0.016)	(0.011)	(0.006)	(0.003)	(0.007)	(0.001)	(0.002)
	[0.155]	[0.001]	[0.510]	[0.445]	[0.548]	[0.563]	[0.191]	[0.091]	[0.356]	[0.429]	[0.293]
	{0.170}	{0.002}	{0.510}	{0.488}	{0.573}	{0.599}	{0.202}	{0.116}	{0.378}	{0.444}	{0.420}
Panel B: UT-Austin											
Male *x* H.B. 588 year	0.036	0.631	-0.016	0.017	-0.003	-0.013	0.014	0.018	0.009	0.001	0.001
	(0.019)	(0.275)	(0.006)	(0.006)	(0.015)	(0.005)	(0.004)	(0.005)	(0.008)	(0.002)	(0.002)
	[0.074]	[0.039]	[0.013]	[0.009]	[0.860]	[0.015]	[0.004]	[0.003]	[0.307]	[0.547]	[0.546]
	{0.088}	{0.054}	{0.016}	{0.022}	{0.837}	{0.014}	{0.014}	{0.006}	{0.326}	{0.607}	{0.523}

Notes: i) The dependent variable in each of the regressions is presented in the column headings. ii) Each cell provides the estimated coefficient on the interaction of male and H.B. 588 year; cluster-robust standard errors (in parentheses); cluster-robust p-values [in brackets]; and wild bootstrap p-values {in curly brackets}. iii) The regressions also control for student gender and year fixed effects.

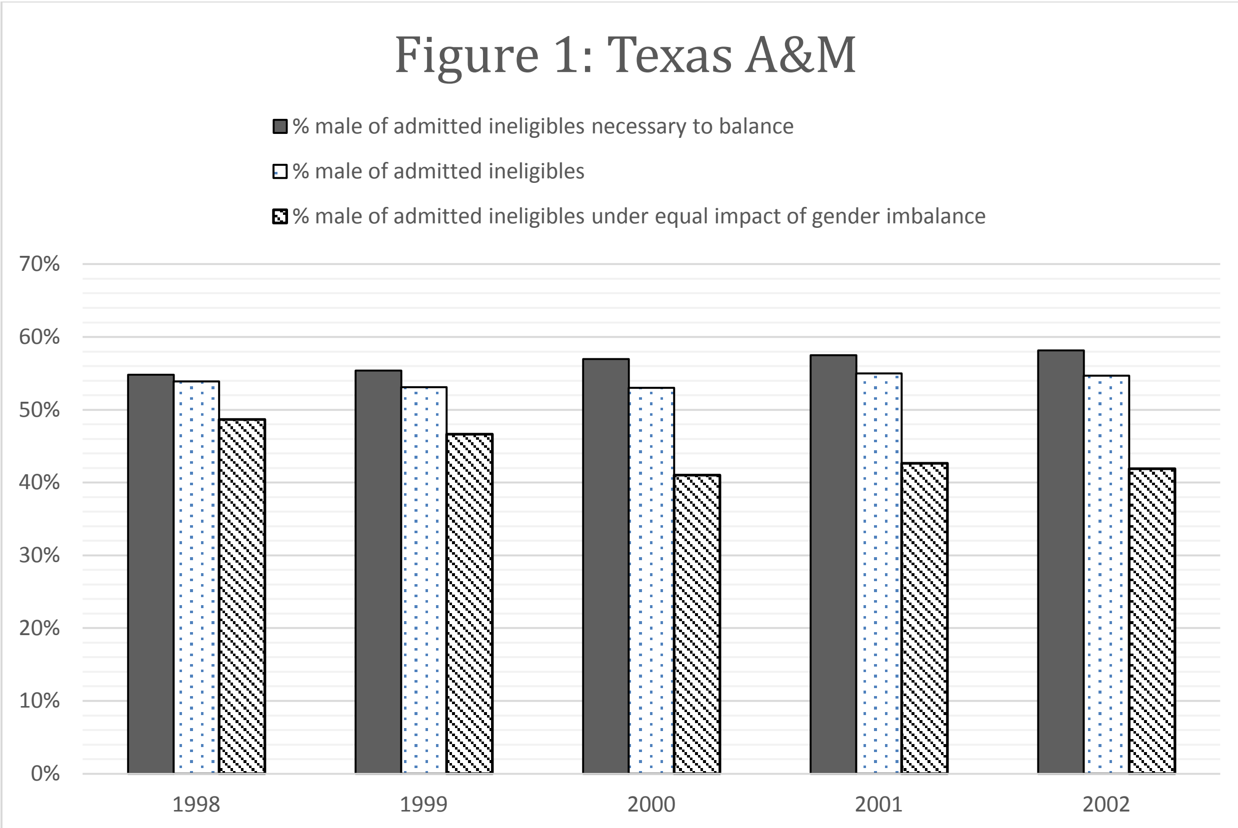
Figure 1: Texas A&M
% male of admitted ineligibles necessary to balance
% male of admitted ineligibles
% male of admitted ineligibles under equal impact of gender imbalance
70%
60%
50%
40%
30%
20%
10%
0%
1998
1999
2000
2001
2002

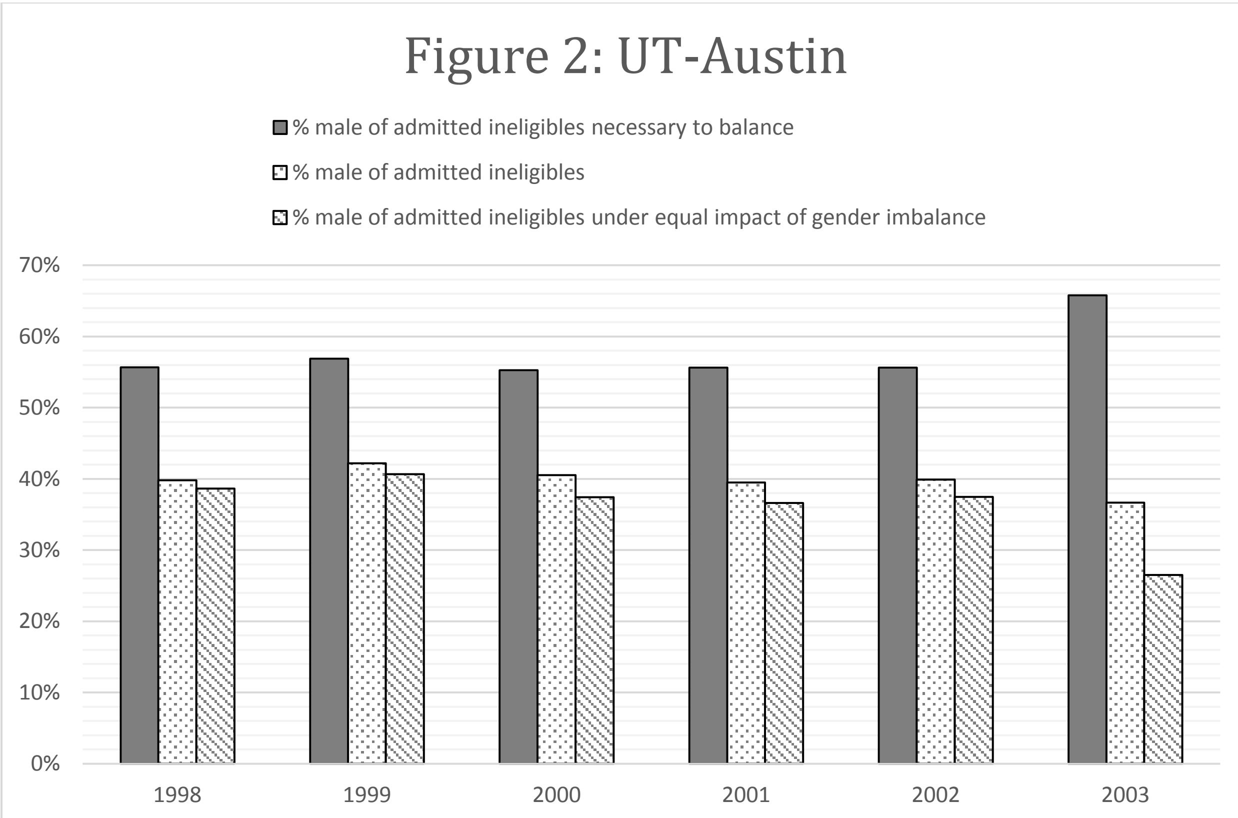
Figure 2: UT-Austin
% male of admitted ineligibles necessary to balance
% male of admitted ineligibles
% male of admitted ineligibles under equal impact of gender imbalance
70%
60%
50%
40%
30%
20%
10%
0%
1998
1999
2000
2001
2002
2003