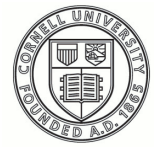



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# Title IX Compliance and Preference for Men in College Admissions

James Monks
*University of Richmond*

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## Abstract

Title IX has undoubtedly increased athletic opportunities for young high school and college women. What is less well understood is whether Title IX has had the unintended consequence of decreasing educational opportunities for young women relative to men. This paper examines the relationship between a university's compliance with Title IX via the proportionality standard and the subsequent admit rate difference by sex. I find that a lower proportionality measure, indicating a lack of Title IX compliance, results in an increase in preference for non-athlete males in college admissions.



## Keywords

Title IX, college athletics, gender inequality, admissions

# Title IX Compliance and Preference for Men in College Admissions

by

James Monks

Department of Economics
Robins School of Business
University of Richmond, 23173
jmonks@richmond.edu

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## Abstract

Title IX has undoubtedly increased athletic opportunities for young high school and college women. What is less well understood is whether Title IX has had the unintended consequence of decreasing educational opportunities for young women relative to men. This paper examines the relationship between a university's compliance with Title IX via the proportionality standard and the subsequent admit rate difference by sex. I find that a lower proportionality measure, indicating a lack of Title IX compliance, results in an increase in preference for non-athlete males in college admissions.

## I. Introduction

> No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance.

The above paragraph is taken from Title IX of the Education Amendments enacted in June, 1972. While this regulation applies to all educational activities and programs receiving federal funds it has been primarily applied to and is largely credited with increasing athletic opportunities for women. In 1971, only 294,000 girls participated in high school athletics, compared to 3.7 million boys. In 2002, over 2.8 million girls participated on high school athletic teams, compared to 4.0 million boys.[1] Similarly, in 1971, there were only 29,977 female athletes on college athletic teams compared to 170,384 male college athletes. By the 2000-2001 academic year, the number of female college athletes had grown by over 400 percent to 150,916, while the number of male athletes increased by 22.6 percent, from 170,384 to 208,866 over the same period.[2] This dramatic increase in female athletic participation at both the high school and college level was facilitated by the creation of additional female athletic teams. From 1981 to 1999 the number of women's college teams increased by 66 percent, representing approximately 3,800 new women's sports teams, with some arguing that this growth was coming at the expense of athletic opportunities for male athletes.[3,4]

The full text of Title IX of the Education Amendments of 1972 did not specify how institutions would be measured to be in compliance with the new law. The Office for Civil

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[1] National Federation of State High School Associations. 2002. NFHS Participation Survey, 2002.
[2] NCAA year-by-year sports participation 1982-2001; Sports and Recreation Programs of Universities and Colleges 1957-1982 (NCAA), as reported in "Open To All: Title IX at Thirty." The Secretary of Education's Commission on Opportunity in Athletics.
[3] Statement by Secretary of Education Roderick Paige before the Senate Committee on Health, Education, Labor, and Pensions. June 27, 2002 at www.ed.gov/speeches/06-2002/06272002.html.
[4] National Wrestling Coaches Association versus Department of Education. 2002.

Rights (OCR) of the Department of Education was charged with developing the details and metrics of compliance and with enforcing Title IX. After years of review and feedback from constituents the OCR issued policy interpretations in December of 1979 specifying how institutions were to be assessed to be in compliance with Title IX. The policy interpretations laid out a "three-prong" test of compliance. An institution need illustrate meeting only one of the following three tests:

(a.) provide participation opportunities substantially proportionate to the ratio of males to females in the student body (the proportionality standard);

(b.) show a history and continuing practice of upgrading girls' and women's programs;

(c.) meet the interests and abilities of women on campus

Although the 1979 policy interpretations consciously provided for a flexible three part means of complying with Title IX many institutions have indicated that their attorneys have advised them that the only safe way to be in compliance with Title IX is via the proportionality standard.[5] In fact, many federal courts have focused on the proportionality standard in Title IX litigation.[6] As a result the OCR has deemed the proportionality standard a safe-harbor in demonstrating compliance with Title IX. This means that if an institution can show substantial proportionality than the OCR will deem it in compliance with Title IX. Because the other two prongs are more ambiguous an institution may view its compliance based on these tests as placing it in a more vulnerable position in regards to Title IX litigation; thus, regardless of how an institution demonstrates compliance with Title IX it may feel substantial pressure to improve its proportionality measure. This measure is the percentage of the athletes that are female minus the percentage of the student body that are female. A negative proportionality measure indicates that

[5] The Secretary of Education's Commission on Opportunity in Athletics. 2003. "Open Access To All." Pg 23.
[6] Cohen v. Brown University; Horner v. Kentucky High School Athletic Association; Kelley v. Board of Trustees; Neal v. Board of Trustees of the California State Universities; and, Roberts v. Colorado State Board of Agriculture.

the institution has a smaller percentage of female athletes than female students. For example, an institution where women represent 45 percent of the athletes and 55 percent of the student body would have a proportionality measure of minus 10. While no specific number has been identified as indicating compliance, substantially proportionate has usually been defined as a proportionality measure of at least minus 5 (Anderson and Cheslock (2004), Stafford (2004), and Sigelman and Wahlbeck (1999)). While some institutions have an over representation of female athletes no institution has been found to discriminate against men, so non-compliance is defined as a low proportionality measure and not a high proportionality measure in this analysis.

Title IX and the subsequent regulations and policy interpretations are all clearly designed to increase the educational and athletic opportunities of women. The evidence outlined above and discussed in the following literature review reveal that has indeed been the result. Viewed as whether athletic opportunities have increased for women over the past 30 years, Title IX can only be viewed as a resounding success. Clearly, many more girls and women participate in athletics than was the case prior to 1972. Whether Title IX has restricted athletic opportunities for boys and men is less clear. What has not been examined in the vast discussion and analysis of Title IX is whether Title IX has had an impact on the college admissions of men and women outside of athletics.

In 1972, 44 percent of all bachelor's degrees were awarded to women. In 2000, 57 percent of all bachelor's degrees were awarded to women. This is the result of a growing trend of female enrollment in college that pre-dates the implementation of Title IX. Because the proportionality standard requires that the proportion of athletes that are female substantially matches the proportion of students that are female colleges may be faced with the problem of either continually increasing the number of female athletes and/or decreasing the number of male

athletes so that more than half of all athletes are women. Alternatively, institutions may feel pressure to comply with the proportionality standard by limiting enrollment of female students relative to men. An institution that enrolled the national proportion of women (57 percent) and had 50-50 female to male athletes would have a proportionality standard of minus 7, and may not be viewed by the OCR as complying with the proportionality standard. While a number of studies (discussed below) have examined the impact of Title IX on athletic opportunities for male and female athletes, none have examined whether Title IX has had the unintended consequence of limiting enrollment for female non-athlete students and encouraging the enrollment of more male non-athlete students. This effect may be increasingly prescient if the percentage of the college student body that is female continues to increase.

There is some anecdotal evidence that institutions are beginning to feel pressure to enroll more men and that this pressure is exacerbated by the Title IX proportionality standard. At a 1999 conference entitled "Fewer Men on Campus," a number of college presidents expressed concern that enrolling an increasing proportion of women would result in non-compliance in "federal gender-equity requirements in athletics."[7] Some institutions have reportedly begun to respond to the relative imbalance in applications by offering preference to men in college admissions. The University of Georgia, for example, eliminated in 1999 its admissions policy of providing men with preference in admissions, but only after it was sued by a woman who argued that she was denied admission based in part on her sex.[8]

While opportunities for male and female athletes is an important issue, the possible implications of Title IX on educational opportunities for male and female college students has the potential of influencing many more students in a much more important manner. Access to

[7] "Colleges Look for Ways to Reverse a Decline in Enrollment of Men." Chronicle of Higher Education. November 26, 1999. p. A73. chronicle.com/colloquy/99/gradrate/background.html.
[8] Johnson v. Board of Regents of the University of Georgia, U.S. 11th Circuit Court of Appeals.

high quality educational programs is more important from a policy standard point than whether one gets to play intercollegiate soccer. This paper will examine whether Title IX and the proportionality standard in an environment of increasing enrollment of women relative to men has had the unintended consequence of leading to preference for men in college admissions.

The paper will continue in Section II by outlining the existing literature on Title IX and its effects on higher education, followed by a theoretical model of college prestige maximization in Section III, a discussion of the data in Section IV, the empirical methodology in Section V, the regression results in Section VI, and finally the policy implications and conclusions in Section VII.

## II. Literature Review

There are a number of papers and articles that discuss the growing trend of female enrollment in higher education relative to men.[9] Mortenson's (1999) study provides a broad historical overview of the long-term growth in the percentage of postsecondary students who are female. His analysis shows that the trend of increasing female participation in tertiary education goes back to at least 1870, when women accounted for approximately 15 percent of bachelor's degrees awarded in the United States. By 1920 this percentage had increased to about 34 percent, and by 1940 it was 41 percent. With the exception of a post-World War II spike in enrollment among men, the percentage of bachelor's degrees awarded to women has followed a steadily increasing path so that today women receive approximately 57 percent of all bachelor's degrees.[10] This long term trend suggests that the more recent Title IX legislation played little or no role in the trend toward more female enrollment in college.

[9] There is a vast literature on many aspects of Title IX that go beyond the scope of this study. A thorough historical and legal overview of Title IX can be found in Carpenter and Acosta (2005), and a current state of the Title IX landscape and issues is outlined in The Secretary of Education's Commission on Opportunity in Athletics. (2003).
[10] National Coalition for Women and Girls in Education. 2002. Title IX at Thirty: Report Card on Gender Equity.

Similarly, Jacob (2002) using data from a nationally representative cohort of eighth graders in 1988 found that approximately 68 percent of the men and 73 percent of the women in his sample attended college. He concludes that 90 percent of this differential in enrollment rates can be attributed to differences between the sexes in non-cognitive skills and college premia.

In an investigation into preference for men in college admission Mark Clayton (2001) of the Christian Science Monitor examined data on 1,006 coed, four-year colleges and universities and found that 259 of them admitted men at higher rates than women for at least one of the three years examined (fall 1997-1999). He does not say by how much, nor does he say how many institutions had higher admit rates for women, nor does he say what the overall average admit rates for men and women were. Among 124 selective institutions with admit rates less than 50 percent only 15 institutions admitted men at higher rates than women all three years. Again he does not say on average by how much, nor how many institutions, if any, had higher admit rates for women. Nevertheless, he interviewed a number of admissions personnel who claim that men receive preference in college admissions at many institutions. According to Clark a spokesmen at the OCR reported that their office receives an average of 20 complaints a year about gender bias in college admissions. He did not report how many were from women or were undergraduate cases. Gose (1999) reported similar anecdotes from a meeting of college presidents and education experts at Goucher College in 1999. Both these articles cite numerous interviews with college administrators about preference for men in admissions, but neither provides concrete evidence indicating that this is indeed the case broadly.

Baum and Goodstein (2005) examine whether men in fact receive preference in college admissions at liberal arts colleges where the dearth of men in the most acute. They use detailed admissions information from 13 selective liberal arts colleges to investigate whether men are

given preferential treatment in college admissions. They conclude that men generally did not receive preference in admissions at this set of schools.

Other studies have focused more on the effects of Title IX and how institutions comply with the policy regulations and the impact it has had on athletic opportunities for men and women. For example, Anderson and Cheslock (2004) find that institutions were more likely to add female teams and female athletes than to cut male teams and reduce the number of male athletes in response to non-compliance with the proportionality measure. In a similar study, Cheslock and Anderson (2005) outline the general improvement in most institutions' proportionality measures from 1995 to 2001. They find that increases in women's athletic opportunities accounted for the overwhelming majority of the improvement in most institutions' proportionality measures. They note that male athletes and the female share of the undergraduate population both increased over this period causing the proportionality measures to improve less than they otherwise would have.

A series of related studies focuses on institutional characteristics that are correlated with compliance with the Title IX proportionality standard. Rishe (1999) reports that most institutions with large football programs are not in compliance with the proportionality standard. This result is echoed throughout a number of subsequent studies. Sigelman and Wahlbeck (1999) also find that football programs make it more likely that an institution will not meet the proportionality standard. They find that schools are more likely to be in compliance with the proportionality standard if they have few female students relative to men, more financial resources devoted to female athletes, smaller athletic programs, and do not field a football team.

Using a probit analysis of compliance with Title IX, defined as having a proportionality measure greater than minus 5, Stafford (2004) finds that institutions with fewer women

undergraduates relative to men are more likely to be in compliance. She also finds that larger institutions in terms of undergraduate enrollment are more likely to be compliant, while southern institutions are less likely to be compliant.

Anderson, Cheslock, and Ehrenberg (2004) find that while most institutions improved in terms of their proportionality measure from 1995/96 to 2001/02 most institutions are still not in compliance with the proportionality standard. Their results suggest that less selective, less wealthy, smaller institutions with a larger percentage of female students are less likely to be in compliance with the proportionality standard. They also find that institutions in the Midwest and South (relative to the West) and with a football team are less likely to be in compliance with the proportionality standard.

The primary consensus of the above studies is that smaller institutions, with a high percentage of female students, a large number of athletes, the presence of a football team, and located in the South are all associated with being less likely to be in compliance with the proportionality standard of Title IX. The above brief review of the literature illustrates that a number of studies have begun to examine differences in admissions treatment between the sexes, and an even larger number of studies have examined the influence of Title IX on athletic opportunities for both men and women. This paper will link the two areas of investigation and analyze whether Title IX has played a role in the admissions treatment of men and women in the overall student body.

## III. Theoretical Model

The university is modeled as a prestige or reputation maximizing agent. A university will devote resources to and attempt to attract inputs in an attempt to maximize the prestige of the institution. While university prestige is a function of a number of inputs including faculty

quality, administrative efficiency, and student characteristics, it is only the latter in this setting that will be examined. In this simplified framework a university's prestige is assumed to be a function of student academic quality and student athletic quality. That is a student can increase the prestige of an institution by either enhancing the academic profile of the university or by raising the athletic standing of the university. In the context of Title IX and preference for men in admissions I allow male and female students and athletes to enter into the prestige production function separately. Of course all universities, no matter how wealthy, face a budget constraint, so the university's objective is to obtain inputs in an attempt to maximize prestige subject to its budget constraint. This constrained prestige maximization as a function of student inputs problem can be written as:

$$\max P = f(S_f, S_m, A_f, A_m)$$
$$\text{subject to} \quad (1)$$
$$B = P_{S_f} * S_f + P_{S_m} * S_m + P_{A_f} * A_f + P_{A_m} * A_m$$

where $S_f$ are female students, $S_m$ are male students, $A_f$ are female athletes, and $A_m$ are male athletes. For simplicity each individual is assumed to contribute to the prestige of the institution as either an athlete or a student. The total university budget for students is assumed fixed in the short term at B, and the price of each input is represented by P and the appropriate subscript. As virtually all students receive a subsidy from their universities of some magnitude (Lewis and Winston (1997)) a student's or an athlete's price is the difference between the costs to the university, of that student, and the revenue that they receive from that student. It is further assumed that all student inputs increase the prestige of the university, but at a declining rate. In the absence of a corner solution, that is if prestige maximization occurs where at least some male and female students and athletes are enrolled, then the solution to the above constrained

objective function has the familiar result of enrolling student inputs up to the point where the marginal prestige of each input divided by its price are equal across all inputs. That is:

$$(2) \qquad \frac{MP(S_f)}{P_{Sf}} = \frac{MP(S_m)}{P_{Sm}} = \frac{MP(A_f)}{P_{Af}} = \frac{MP(A_m)}{P_{Am}}$$

where MP indicates the marginal prestige of that input. If the price of male and female students is the same, $P_{Sf}=P_{Sm}$, then an institution will enroll male and female students up to the point where their marginal prestige is the same. Assuming that male and female students of comparable quality increase the prestige of an institution at the same rate, then conditional on their academic credentials, and assuming that their prices are the same, universities should be just as likely to admit female applicants as male applicants. In the event where the price of male and female students are different or the marginal prestige of comparable male and female students are different than universities may be more likely to admit one group over the other.

Similarly, universities should enroll male and female athletes such that the marginal prestige of each group of athletes divided by its price are equal (and equal to the marginal prestige divided by the price of male and female student inputs). In the case where the price of male and female athletes are not equal, $P_{Af} \neq P_{Am}$ , either because the costs to the university for enrolling male and female athletes may be different or because the revenue from male and female athletes may be different, or both, or because the marginal prestige of each group of athletes may be different due to student, alumni, or customer discrimination, then a university will maximize prestige by enrolling different levels of male and female athletes.

The Title IX legislation adds an additional constraint to the university prestige maximization objective. Institutions now feel pressure to comply with the proportionality standard of enrolling female athletes in proportion to their representation in the overall student

body, $A_f/A_m = S_f/S_m$. The institution's Lagrangian function now contains both a budget constraint and a proportionality constraint:

$$L = f(S_f, S_m, A_f, A_m) + \lambda(B - P_{Sf} * S_f - P_{Sm} * S_m - P_{Af} * A_f - P_{Am} * A_m) \quad (3)$$
$$\mu(A_f * S_m - A_m * S_f)$$

Taking the first partial derivatives with respect to $S_f$ and $S_m$ and solving for $\lambda$ results in:

$$MP(S_m) = MP(S_f) * \frac{P_{Sm}}{P_{Sf}} - \mu(S_f + S_m * \frac{P_{Sm}}{P_{Sf}}) \quad (4)$$

As long as either $S_f$ or $S_m$ are not equal to zero, that is as long as some athletes are enrolled, then the impact of the proportionality constraint on the marginal prestige of male students depends on the sign of $\mu$.

Taking the first partial derivatives of the Lagrangian with respect to $A_f$ and $A_m$ and solving for $\mu$ results in:

$$\mu = (\frac{P_{Sm} * P_{Sf}}{S_f * P_{Sf} + S_m * P_{Sm}}) * (\frac{MP(A_m)}{P_{Am}} - \frac{MP(A_f)}{P_{Af}}) \quad (5)$$

The first term in parentheses must be positive, so the sign of $\mu$ depends upon the sign of the second term in the parentheses. If the marginal prestige of male athletes divided by its price is equal to the marginal prestige of female athletes divided by its price, then the proportionality constraint is non-binding, $\mu=0$, and equation (4) reverts to the solution in the absence of the proportionality constraint. On the other hand, if Title IX prompts institutions to either enroll more female athletes or to enroll fewer male athletes than they otherwise would in order to comply with the standard, then the marginal prestige of female athletes divided by its price will be less than the marginal prestige of male athletes divided by its price and $\mu$ will be positive. The evidence of substantially more female athletic opportunities on college campuses following

Title IX in 1972 suggests that in fact Title IX has prompted institutions to provide more athletic opportunities for females than they otherwise would have.

If $\mu$ is positive, as seems likely, then the marginal prestige of male students divided by its price will be less than the marginal prestige of female students divided by its price in equation (4). This implies that more male students and fewer female students will be enrolled than would be the case in the absence of the Title IX proportionality standard.

The intuition behind this result lies in the construction of the proportionality standard, which states not that the number of female athletes has to equal the number of male athletes, but rather that the proportion of female athletes has to equal the proportion of female students. In order to comply with this standard, institutions can increase the number of female athletes, as evidence overwhelming suggests is often the case, reduce the number of male athletes, as some evidence suggests is the case (and some does not), or reduce the number of female students relative to the number of male students. This latter approach to complying with the proportionality standard has become increasingly prescient as the numbers and percentage of female undergraduates has grown to the point where female undergraduates now out number male undergraduates. At some institutions with a large percentage of female applicants, complying with the Title IX proportionality standard requires either having more female athletes than male athletes or limiting the number of female undergraduates, or both. This suggests that those universities struggling to comply with the proportionality standard, ceteris paribus, would be more likely to provide preference for male students in admissions.

## IV. Empirical Methodology

The above theoretical model predicts that institutions confronted with non-compliance with the proportionality standard should be more likely to provide preference for males in the

general admissions process. Of course, institutions may be interested in preserving a balance between the sexes in the student body even in the absence of Title IX. If university administrators perceive that most students would prefer to attend an institution with approximately equal numbers of men and women (with the exception of those individuals who prefer to attend a single-sex institution), they may attempt to enroll a class not just based on academic merit, but also based on sex. As a result the admit rate of a particular group may depend not just on its qualifications but also on its numbers relative to the other group. As a result the admit rate of sex j (j=female, male) at institution i, in year t will be:

$$(6) \qquad \text{admit rate}_{j,i,t} = \alpha + \alpha_i + \alpha_{j,i} + B_1(\text{no. applicants}_{j,i,t}) + B_2(\text{average SAT}_{j,i,t}) + \nu_t + \varepsilon_{j,i,t}$$

where $\alpha_i$ are institution specific effects, $\alpha_{j,i}$ are institution-sex-specific effects, $\nu_t$ are year specific effects, and $\varepsilon_{j,i,t}$ are random error effects. The degree of preference for one sex over the other in admissions, if any, can be assessed by taking the difference in equation (6) across sexes within institutions in a given year, such that:

$$(7) \qquad (\text{admit rate}_{m,i,t} - \text{admit rate}_{f,i,t}) = (\alpha_{m,i} - \alpha_{f,i}) + B_1(\text{no. applicants}_{m,i,t} - \text{no. applicants}_{f,i,t}) + B_2(\text{ave. SAT}_{m,i,t} - \text{ave. SAT}_{f,i,t}) + (\varepsilon_{m,i,t} - \varepsilon_{f,i,t})$$

Institution fixed effects and year effects cancel out in this equation. It is expected that $B_1$ is negative. The more applicants from one group relative to the other the lower the expected admit rate of that group relative to the other. $B_2$ is expected to be positive. The more qualified one group is relative to the other the greater the admit rate of that group. The constant term in this equation reflects a set of institution specific preference for men in admissions effects. Equation (7) is an institution fixed effects regression, where the fixed effects terms capture institution

specific preference for men. These terms are "fixed" only in the sense of being average effects over the time period estimated, and may adjust over longer periods of time.

The hypothesis to be tested here is whether these institution specific effects, conditional on the relative gender mix of the applicant pool and the male versus female quality of the institution's applicant pool, are related to an institution's Title IX compliance. Of course, institutions that do provide preference for males (or females) in admissions are more (less) likely to be in compliance with the proportionality standard. In other words, an institution's proportionality measure is endogenously determined by its preference for one sex over the other. An institution that provides preference for male students, for whatever reason, in admissions is more likely to be in compliance with the proportionality measure, holding the mix of athletes constant, while an institution providing preference for female students in admissions is less likely to be in compliance. Two steps are taken to account for the endogeneity of the proportionality measure and the estimated institutional difference in admit rates by sex. First, the estimated institution specific fixed effects from equation (7) are saved and regressed against the institutions' lagged proportionality measures as outlined in Greene (2002) and Lazear (2000). This treats an institution's average admissions decisions from time period t to t+4 as a function of its proportionality measure at t-1. This accomplishes two things. One, because each institution's preference for one sex over the other is averaged over multiple years noisy fluctuations in admit rates between the sexes is averaged out over time. Two, the average difference in admit rates between the sexes is regressed against a lagged value of the proportionality measure limiting possible endogeneity; however, because an institution's proportionality measure is a function of previous admissions decisions this may only partially solve the endogeneity problem if admissions decisions and policies are correlated over time. The second step in attempting to

account for endogeneity is to utilize two stage least squares. The first stage regresses an institution's lagged proportionality measure against the exogenous variables in the equation including institutional characteristics that are thought to be correlated with the proportionality measure but not otherwise the overall preference for men versus women in admissions, such as the number of men's and women's sports teams, a dummy variable for having a football team, and total athletic department revenue. The fitted value from this first stage regression is then used in estimating the relationship between preference for men in admissions and compliance with the proportionality measure.

## V. Data

The bulk of the data for this analysis comes from the College Board's Annual Survey of Colleges for the academic years 1999/2000 to 2002/2003. The College Board conducts an annual survey of U.S. colleges, universities, vocational and technical institutions, and graduate schools. The survey asks a series of questions about admissions and operating policies at the institutions. Included among the questions is the number of applicants and admitted students by gender to each institution. From this information I am able to calculate institution level admit rates by sex for each of the survey years. Additionally, the survey provides information on the number of men's and women's athletic teams, the total number of undergraduates, the Carnegie classification of the institution, and whether the institution is private or publicly controlled.

This institutional data is merged with additional information provided from the College Board on average SAT I scores by sex requested by test takers to be sent to each institution. Admit rates by sex and other institutional attributes from the Annual Survey of Colleges are matched with average scores by sex that test takers requested to be sent to the institution in the previous year. Additionally, this data was merged with institution level proportionality measures

taken from the online Chronicle of Higher Education. The online Chronicle provided information on the proportionality measure, NCAA division, and total athletic department revenue taken from each institutions Equity in Athletics Disclosure Act report.

There were a number of restrictions made on the data before forming the final sample of institutions (see Table 1). There were originally 1,325 four year, coed, non-technical institutions in the data set providing 3,977 institution-year observations, over the 1999/2000 to 2002/2003 academic years. Because I am only interested in preference in admissions by sex I limit the sample to those institutions that are at least modestly selective in admissions and admit 67 percent of their applicants or less. This results in 423 institutions and 1,068 observations. Additionally, 32 institutions and 61 observations were eliminated either because average sent SAT scores were not available or fewer than 30 individuals per sex requested that their scores be sent to the institution. This restriction was made in order to assure that the average sent SAT scores adequately capture the differences in academic credentials between the male and female applicant pools within an institution. Because both the theoretical model and the estimation strategy rely on identifying the admissions preference for male versus female non-athletes, and not the preference given to male versus female athletes, I limit the sample to institutions large enough that their overall difference in admit rates for men versus women overwhelmingly reflects preferences between non-athletes by sex. For example, at a number of small, selective institutions like the Ivy League or the Pentagonal Group athletes represent between one quarter and one third of the overall student body (Shuman and Bowen (2001)). Clearly, at these types of institutions preferences for male versus female athletes taints the overall admit rates for male versus female students. In order to reduce this effect I limit the sample to institutions where athletes likely represent a small fraction of the overall student body. Initially this restriction is

made by eliminating institutions with fewer than 10,000 full-time equivalent undergraduates (alternative restrictions are examined and discussed below). This also has the effect of limiting the sample to those institutions that are large enough to garner the most attention in regards to Title IX compliance and to face the most vulnerability in terms of potential litigation as discussed in the existing literature. This restriction results in a sample of 80 institutions and 220 institution-year observations. Finally, there were 4 institutions which did not report a proportionality measure prior to the sample period and thus were removed from the sample leaving 76 institutions and 212 observations.

Table 2 provides summary measures for selected variables from this sample of institutions. Perhaps most interesting is the result that among this set of large selective institutions the average admit rate for men is 50 percent, while the average admit rate across institutions for women is 52.7 percent.[11] Also, on average 9,410 men and 11,081 women applied to each of these institutions; thus the average institution received 54 percent of its applications from women. It is also interesting to note that the average sent SAT-math score for men across institutions was 564.4 versus 529.5 for women (plus 34.9), and the average sent SAT-verbal score for men was 526.6 versus 520.6 for women (plus 6). These scores compare to an overall difference in results across gender for the 2000 SAT of plus 35 for men on math, and plus 3 for men on the verbal sections of the SAT I test. This suggest that neither sex over or under applies in terms of institutional quality based on SAT scores.

The bottom section of Table 2 provides summary measures of the athletic profile of each institution. Only initial survey year or lagged year values are provided as this is the only information used in the following regressions. The average lagged proportionality measure was minus 7.4 indicating that the difference in the percentage of the athletes that were female from

[11] All summary measures are weighted using the total number of applicants to the institution that year.

the percentage of the student body that was female was over 7 percentage points. This under-representation of women among the athletes seems to persist despite approximately equal numbers of male and female athletic teams, 10.2 versus 9.9, respectively. This gap in female athletes may be because approximately 72 percent of the institutions had football teams that usually require many more athletes than most other teams.

## VI. Regression Results

The estimation strategy relies on first estimating the institution-level difference in admit rates for men versus women conditional on academic qualifications and the gender mix of the applicant pool as specified in equation (7) above. Table 3 presents the results of the regression of the difference in male versus female admit rates on differences in average sent math SAT scores, average sent verbal SAT scores, and the number of male versus female applicants. A Lagrange multiplier test suggests the presence of error components consistent with institution-specific differences in admit rates across genders. A Hausman test suggests the use of random effects over fixed effects in estimating the regression coefficients and their standard errors. Specification (1) of Table 3 presents GLS estimates of the regression of the difference in admit rates across gender on the difference in SAT scores and the number of applicants by gender.

It appears that differences in academic qualifications, at least as measured by differences in average SAT scores, do not play a statistically significant role in determining differences in admit rates of one sex over the other. While the coefficients of both the math and verbal SAT scores are the expected positive sign, neither coefficient is significant at conventional levels. Quadratic terms in both average SAT scores were also found not to be significant. On the other hand, differences in the applicant pool sizes by sex are significant. The more applicants there are from a particular sex the lower the admit rate of that sex, conditional on average SAT scores.

This negative relationship between the applicant pool size and the sex specific admit rate becomes even more negative as the difference in applications between sexes becomes larger (a cubic term in application differences was not significant). Because women outnumber men in most institutional applicant pools and in overall applications this effect tends to increase the admit rate for men and decrease the admit rate for women. The average institution in this sample had approximately 1,672 more female applicants than male applicants, resulting in approximately one percent higher predicted admit rate for men than women, ceteris paribus.

The objective of this analysis is to estimate the institution specific differences in admit rates by sex. Estimating these fixed effects with a complete set of dummy variables allows one to identify each institution's average difference in admit rates by sex conditional on SAT scores and the applicant mix. The weighted (by total number of applicants) average institutional fixed effect is -2.4 percent, indicating that men have admit rates that are approximately two and a half percentage points lower than would be expected based on differences in average sent SAT scores and the mix of applicants across gender. The constant term in an OLS regression provides an additional estimate of the average difference in admit rates across genders and is estimated to be -2.3 percent. Similarly, the constant in the GLS regression estimates an average difference in admit rates of -3.8 percent. All three estimates indicate that men are admitted at lower rates on average than would be expected based on their SAT scores and number of applicants. The same qualitative results were found in specification (2) of Table 3 when excluding the difference in the number of applications among the regressors and just estimating admit rates based on average sent SAT scores. This approach mimics a gender-blind admissions policy and eliminates any preference that men might be receiving due to their smaller applicant base. Still men were less likely to be admitted than women.

This result appears contradictory to the conventional wisdom that men are sometimes provided preference in college admissions (see Mortensen (1999), Clayton (2001)) and is worth examining in more detail. To test the robustness of this result I limited the sample of institutions to those with more than 8,000 full-time equivalent undergraduates (98 institutions, and 275 observations) and then again with more than 12,000 (62 institutions, and 180 observations) undergraduates and found similar results (see specifications (3) and (4) of Table 3). In both cases men are less likely to be admitted than women conditional on average sent SAT scores and number of applications, but even more so at the smaller institutions. It appears that at the sufficiently large, selective institutions that make up this sample that men are less likely to be admitted than women, both unconditionally when comparing raw admit rates by sex and conditional on average standardized test scores and applicant pool sizes by sex. Similar results were found when using the natural log of the ratio of admit rates by sex (Appendix A, Table 1A). Men were once again less likely to be admitted than women conditional on average SAT scores and applicant pool size. This result appears robust to sample construction and functional form of the regression equation.

Of the 76 institutions included in the primary sample, 55 had higher unconditional average admit rates for women than men, and 21 institutions had higher unconditional average admit rates for men. Additionally, 22 institutions had unconditional average admit rates for women that were 5 percentage points higher or more than the male admit rate, while only 5 institutions had unconditional admit rates that were 5 percentage points or more higher for men than women. Controlling for differences in average sent SAT scores and the mix of applicants by sex results in institution fixed effects that revealed higher conditional admit rates for women at 56 institutions (and higher average admit rates for men at 20), and 22 institutions with fixed

effects of 5 percentage points or more in favor of women and only 3 with 5 percentage points or more in favor of men. The conventional wisdom that men are receiving preference in the general admissions pool at least at large selective institutions does not seem to be the case. In fact, just the opposite appears to be true. Despite representing only 46 percent of the average applicant pool and having higher average math and verbal SAT scores men have lower acceptance rates at most institutions in this sample of selective institutions.

It may be the case that average sent SAT scores do not adequately reflect the academic qualifications of the applicant pool, and that men and women differ systematically in other measures of academic preparedness, such as high school grade point average and extra-curricular activities. In fact, there is evidence to support the claim that women over-perform and men under-perform in terms of college grade point average conditional on SAT scores (Rothstein (2004), Burton and Ramist (2001), and Leonard and Jiang (1999)). If this is the case, then men's lower average admit rates, conditional on average sent SAT scores, reflect differences in the true underlying academic credentials of the applicant pools by sex and should not by themselves be interpreted as accurate measures of preferences in admissions based on sex. As long as the difference in these other measures of academic preparedness, conditional on average SAT scores, are not correlated with an institution's proportionality measure one is able to estimate the influence of non-compliance with the proportionality standard on the difference in admit rates by sex.[12] The average admit rate difference between the sexes for institutions in compliance with the proportionality standard (proportionality measure greater than minus 5) is -.0402, while the average admit rate difference for institutions with proportionality measures less than minus 5 is -.0139, or 2.63 percentage points higher. This result is statistically significant at the 5 percent

[12] The intercept in this equation will no longer be unbiased, but the slope coefficient estimates will be (see Greene (2000) pg. 219).

level, suggesting that institutions that are not compliant with the proportionality standard display higher average admit rates for men relative to women in subsequent years than institutions that are compliant with the proportionality standard.

Column (1) of Table 4 present OLS estimates of the difference in estimated admit rates regressed on a quadratic in the lagged proportionality measure, the overall admit rate of the institution, the number of full-time equivalent undergraduates, and a dummy variable for public control. The coefficients on the proportionality measure and its square are significant at least at the 10 percent level. The lower the proportionality measure the more likely are men to be admitted relative to women. Evaluated at the mean proportionality measure (-7.4) men are approximately 3 percentage points more likely to be admitted than women relative to an institution in complete compliance with the proportionality standard (proportionality measure equals zero). Additionally, men are less likely to be admitted to public institutions than private institutions. The size and selectivity of an institution do not have a significant impact on the relative admit rates by sex.

Because of the possible endogeneity of the proportionality measure in determining the difference in admit rates by sex two-stage least squares estimation is utilized. In the first stage the proportionality measure is regressed on dummy variables for public control, masters university (versus research or doctoral), NCAA division, and the continuous variables of the overall admit rate as a measure of institutional quality, the number of male applicants, the number of female applicants, the number of full time equivalent undergraduates, the number of men's teams, the number of women's teams, and a quadratic in total athletic department revenue. This first stage regression in Table 4 reveals a number of interesting results. The only statistically significant effects are the size of the institution as measured by the number of

undergraduates, public control, and the number of male and female applicants. While institutions clearly have control over their Title IX compliance the primary factors in determining an institution's proportionality measure are things that are largely outside of their control. Consistent with earlier studies the more undergraduates an institution has the more likely it is to comply with the proportionality standard (a negative proportionality standard indicates that women are a smaller percentage of the athletes than they are of the student body). Public institutions have on average a proportionality measure that is 4.9 points lower than comparable private institutions. This suggests that public institutions are less likely to be complying with the proportionality standard than private institutions. The number of male applicants increases an institution's likelihood of compliance with the proportionality standard while the number of female applicants decreases an institution's likelihood of compliance with this measure. The more male applicants an institution has to choose from the more likely it will be able to enroll a sufficient number of men to keep the percentage of male athletes approximately equal to the percentage of men in the overall student body. Institutions with a large number of female applicants are less likely to be able to have enough athletic opportunities for women to match their representation in the student body. An institution's mix of applicants plays a significant role in its ability to meet the proportionality standard.

As expected the more male athletic teams an institution has the less likely it is to be compliant with the proportionality standard, while the more female athletic teams an institution has the more likely it is to meet the proportionality standard, although neither of these results are statistically significant. Similarly, the existence of a football team lowers an institution's proportionality measure by 2.5 percentage points, although this effect is also not significant. None of the other regressors were found to be statistically significant, but were included in order

to help increase the accuracy of the fitted value for the proportionality measure. The R-squared in this regression is approximately .44.

The second-stage regresses the estimated conditional difference in admit rates across sexes against the fitted proportionality measure from the first-stage, the overall admit rate, the number of undergraduates, and the dichotomous public control variable. The dependent variable measures the average of the admit rate for men minus the admit rate for women conditional on the difference in average sent SAT scores and number of applicants. An increase in the dependent variable indicates preference for men relative to women. At publicly controlled institutions the difference in admit rates for men versus women is 5 percentage points lower than at private institutions. Men are less likely to be admitted, relative to women, at public institutions than at private institutions. This result is significant at the one percent level. On the other hand, the selectivity of the institution as measured by the overall admit rate and the size of the institution as measured by the number of full time equivalent undergraduates are not statistically significant in explaining variation in institutional differences in admit rates by sex.

The result of primary interest here is the effect of the proportionality measure on the relative admit rates of men versus women. As expected, institutions with lower lagged proportionality measures, indicating less compliance with Title IX, are subsequently more likely to provide preference for men in college admissions. A quadratic term in the proportionality measure was found to be significant indicating that the effect increases as the level of non-compliance increases. An institution with the average proportionality measure is approximately 9 percentage points (-.017*(-7.4) -.0006*(7.4^2)) more likely to admit men relative to women than an institution in complete compliance with the proportionality standard (proportionality measure equals zero). This result is significant at the one percent level. Because complete

compliance overstates the proportionality measure that is usually deemed to be in compliance with the proportionality standard, and because only a rare few institutions have a proportionality measure that is quite close to zero, the above calculation probably overstates the level of preference for men that results from the average non-compliance. A better measure compares the relative admit rate difference for the average institution with an institution within the -3 to -5 proportionality range that is usually deemed compliant with Title IX. An institution with a proportionality measure of -7.4 is estimated to have an admit rate for men that is approximately 3.5 percentage points higher than the admit rate for women, relative to an institution that is has a proportionality measure of -4.

The proportionality measure was interacted with each of the other independent variables and was only found to be significant when interacted with the number of undergraduates (and in this case the quadratic term was no longer significant). The effect of the proportionality measure on the relative difference in admit rates between the sexes is more pronounced at institutions with more undergraduates. The effect is negative at institutions of more than approximately 10,000 students (almost the entire sample in this case). This is consistent with the hypothesis that those institutions with the most visible athletic programs based of the size of the institution are most sensitive to the importance of complying with the proportionality standard of Title IX.

As an alternative examination of the importance of institutional size in this relationship I performed two-stage least squares estimation on the sample of institutions including those with only eight thousand students or more and then again on the sample with twelve thousand students or more (see Table 5). While the coefficients on the proportionality measure (and its quadratic) were still negative in the sample with the smaller institutions, the coefficients were both smaller in magnitude and no longer statistically significant. The smaller the institutions

included in the sample the more "contaminated" is the dependent variable with preferences for male versus female athletes rather than just male versus female students, and so additional caution is warranted in interpreting these results. On the other hand, the effect of the proportionality measure on the difference in admit rates between sexes is even larger in the sample of institutions with more than twelve thousand students. Moving from the average proportionality measure (-7.4) to compliance (-4) increases the predicted admit rate for men relative to women by approximately 4.5 percentage points at larger institutions. Taken together these results support the finding from the previous regression that the impact of the proportionality measure on differences in admit rates is more pronounced at larger institutions, although the alternative explanation that the decline in preference for men at smaller institutions is due to the combining of athletes and non-athletes in the data can not be ruled out.

An institution's Title IX exposure as measured by the proportionality standard appears to play a significant role in explaining the relative admit rate of men versus women conditional on the mix of applicants and their relative academic qualifications at least as captured by average sent SAT scores. A relatively large, selective institution that receives many more applications from women than men, based on the results found here, is going to have a lower admit rate for women than men. Furthermore, that institution is more likely to have a lower proportionality measure than an institution that receives approximately equal numbers of applications from men and women, and thus is more likely to provide additional preference for men in admissions. A male student hoping for admittance into a selective university would do well to apply to a large, private university with a disproportionate number of female applicants relative to male applicants, with a low proportionality measure.

## VII. Conclusion

A number of studies have examined the growing trend of more female students enrolling in college than male students. Another set of studies have analyzed the institutional factors associated with Title IX compliance via the proportionality standard. This study has linked these two areas and investigated the relationship between Title IX compliance and the difference in admit rates of men relative to women. The results presented here support the hypothesis that Title IX and the proportionality standard of compliance has had the unintended consequence of resulting in higher admit rates for men relative to women than would otherwise be the case. That is, institutions with lower proportionality measures, indicating potential non-compliance with Title IX, are subsequently more likely to admit men relative to women than an institution with a comparable mix of applicants which is compliant with the proportionality measure.

This leads to the question of whether Title IX is really providing enhanced opportunities for women. Clearly, since the inception of Title IX in 1972, athletic opportunities for women in high school and college have increased substantially. The results of this analysis provide evidence that these athletic opportunities may be coming at the cost of fewer academic opportunities for women at some institutions than would have otherwise been the case. If so, Title IX may be more about creating opportunities for certain groups of women (and men), while limiting opportunities for other groups of women (and men).

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**Table 1**
**Sample Construction**

| | No. of Institutions | No. of Observations |
|---|---|---|
| Total Sample<br>No. Institutions=1339 | 1,325 | 3,979 |
| Less: | | |
| Admit Rate > .67 | (902) | (2911) |
| Missing SAT by gender | (4) | (13) |
| Less than 30 scores for each gender | (28) | (48) |
| No. of undergraduates less than 10,000 | (311) | (787) |
| Missing Proportionality Measure | (4) | (8) |
| Final Sample | 76 | 212 |

**Table 2**
**Summary Measures**

**Institution-Year** (n=212)

| Admit Rate for: | Mean | St. Deviation | Minimum | Maximum |
|---|---|---|---|---|
| Men | 0.5 | 0.134 | 0.221 | 0.895 |
| Women | 0.527 | 0.139 | 0.2 | 0.83 |
| Ave. Sent SAT - Math Score | | | | |
| Men | 564.4 | 47.4 | 435 | 673 |
| Women | 529.5 | 45.1 | 409 | 631 |
| Ave. Sent SAT - Verbal Score | | | | |
| Men | 526.6 | 40.9 | 401 | 623 |
| Women | 520.7 | 41.2 | 412 | 613 |
| Number of Applications | | | | |
| Men | 9,410 | 4,233 | 1,638 | 19,519 |
| Women | 11,081 | 5,035 | 2,035 | 23,924 |
| **Institutional Averages** (n=76) | | | | |
| Proportionality Measure | -7.4 | 5.5 | -26.6 | 2.6 |
| No. of FTE Undergraduates | 18,734 | 6,662 | 10,016 | 36,164 |
| Public Control | 0.86 | 0.35 | 0 | 1 |
| Research/Doctoral University | 0.84 | 0.37 | 0 | 1 |
| Masters University | 0.16 | 0.37 | 0 | 1 |
| Athletic Program Revenue (in thousands $) | 16,620 | 1,549 | 0 | 56,112 |
| Football Team | 0.72 | 0.27 | 0 | 1 |
| No. of Men's Teams | 10.2 | 2.7 | 5 | 18 |
| No. of Women's Teams | 9.9 | 2.6 | 4 | 17 |

**Table 3**
**Regression Results**

| | Spec (1) | | Spec (2) | 8k plus Spec (3) | | 12k plus Spec (4) | |
|---|---|---|---|---|---|---|---|
| Constant | -0.038 | | -0.034 | -0.058 | *** | -0.038 | |
| | (0.028) | | (0.027) | (.022) | | (.038) | |
| Ave. SAT Math Score | 0.0004 | | 0.0002 | 0.001 | | 0.0003 | |
| | (0.001) | | (0.001) | (0.001) | | (0.001) | |
| Ave. SAT Verbal Score | 0.0012 | | 0.0011 | 0.0003 | | 0.0013 | |
| | (0.001) | | (0.001) | (0.001) | | (0.001) | |
| Ave. No. of Applicants | -0.0051 | | | -0.0074 | * | -0.0095 | * |
| | (0.0037) | | | (.0038) | | (.0054) | |
| Ave. No. of Applicants Squared | -0.0018 | ** | | -0.0019 | ** | -0.0027 | ** |
| | (0.0009) | | | (0.0009) | | (0.0012) | |
| No. of Observations | 212 | | 212 | 275 | | 180 | |
| LM test | 28.98 | | 30.35 | 39.73 | | 23.68 | |
| (p-value) | (0.001) | | (0.001) | (0.001) | | (0.001) | |
| Hausman Test | 2.38 | | 1.88 | 6.35 | | 1.55 | |
| (p-value) | (0.666) | | (0.39) | (0.17) | | (0.82) | |
| Average Fixed Effects | -0.0237 | | -0.0525 | -0.068 | | -0.01 | |
| (wghted by total no. of applications) | 76 | | 76 | 98 | | 62 | |

**Table 4**
**Two-stage least squares**

| | | | | | 2nd-stage | | | |
|---|---|---|---|---|---|---|---|---|
| | OLS | | 1st-stage | | spec (1) | | spec (2) | |
| Constant | .014 | | -9.35 | * | -0.045 | | 0.061 | |
| | (0.03) | | (5.03) | | (0.039) | | (0.050) | |
| Proportionality Measure | -0.006 | ** | ----- | | -0.017 | *** | 0.014 | ** |
| | (0.002) | | | | (0.005) | | (0.007) | |
| Proportionality Measure squared | -0.0002 | * | ----- | | -0.0006 | *** | ---- | |
| | (0.0001) | | | | (0.0002) | | | |
| Proportionality*No. FTE Undergrad (000s) | ----- | | ----- | | | | -0.0013 | *** |
| | | | | | | | (0.0005) | |
| Overall Admit Rate | -0.038 | | 7.17 | | -0.028 | | -0.019 | |
| | (0.043) | | (6.18) | | (0.048) | | (0.056) | |
| Public Control | -0.041 | ** | -4.89 | *** | -0.050 | *** | -0.047 | ** |
| | (0.016) | | (1.67) | | (0.019) | | (0.022) | |
| No. of FTE Undergraduates (000) | -0.0003 | | 0.278 | *** | 0.0003 | | -0.0056 | ** |
| | (0.0009) | | (0.124) | | (0.0011) | | (0.0011) | |
| Athletic Revenue | | | 0.232 | | | | | |
| | | | (.197) | | | | | |
| Athletic Revenue Squared | | | -0.0045 | | | | | |
| | | | (0.0034) | | | | | |
| No. of Men's Teams | | | -0.502 | | | | | |
| | | | (0.420) | | | | | |
| No. of Women's Teams | | | 0.125 | | | | | |
| | | | (0.442) | | | | | |
| No. of Male Applicants (000) | | | 2.09 | *** | | | | |
| | | | (0.450) | | | | | |
| No. of Female Applicants (000) | | | -1.56 | *** | | | | |
| | | | (0.353) | | | | | |
| Football Team | | | -2.457 | | | | | |
| | | | (2.021) | | | | | |
| Division III | | | -1.849 | | | | | |
| | | | (2.620) | | | | | |
| Division II | | | 0.615 | | | | | |
| | | | (2.321) | | | | | |
| Division IA | | | -2.137 | | | | | |
| | | | (2.37) | | | | | |
| Master's University | | | 0.435 | | | | | |
| | | | (1.958) | | | | | |
| No. of observations | 76 | | 76 | | 76 | | | |

Notes:
Weighted by the total number of applications.
*** (**, *) indicates significance at the 1% (5%, 10%) level.

**Table 5**
**Two-stage least squares by institution size**

| | Smaller Institutions (8K-plus) | | | | Larger Institutions (12k plus) | | | |
|---|---|---|---|---|---|---|---|---|
| | 1st-stage | | 2nd-stage | | 1st-stage | | 2nd-stage | |
| Constant | -11.202 | *** | -0.040 | | -13.265 | ** | -0.064 | |
| | (4.25) | | (0.055) | | (5.922) | | (0.050) | |
| Proportionality Measure | ----- | | -0.00001 | | ----- | | -0.022 | *** |
| | | | (0.009) | | | | (0.009) | |
| Proportionality Measure squared | ----- | | -0.0001 | | ----- | | -0.0007 | * |
| | | | (0.0003) | | | | (0.0004) | |
| Overall Admit Rate | 12.26 | ** | 0.048 | | 12.32 | * | -0.008 | |
| | (4.99) | | (0.053) | | (6.53) | | (0.059) | |
| Public Control | -3.33 | ** | -0.053 | *** | -4.91 | ** | -0.053 | ** |
| | (1.43) | | (0.017) | | (2.11) | | (0.024) | |
| Athletic Revenue | 0.149 | | | | 0.109 | | | |
| | (.179) | | | | (.225) | | | |
| Athletic Revenue Squared | -0.0021 | | | | -0.0014 | | | |
| | (0.0030) | | | | (0.0037) | | | |
| No. of Men's Teams | -0.578 | | | | -0.247 | | | |
| | (0.359) | | | | (0.492) | | | |
| No. of Women's Teams | 0.256 | | | | 0.110 | | | |
| | (0.370) | | | | (0.495) | | | |
| No. of Male Applicants (000) | 2.11 | *** | | | 1.87 | *** | | |
| | (0.390) | | | | (0.517) | | | |
| No. of Female Applicants (000) | -1.37 | *** | | | -1.13 | *** | | |
| | (0.308) | | | | (0.415) | | | |
| Football Team | -3.475 | ** | | | -1.618 | | | |
| | (1.682) | | | | (2.509) | | | |
| Division III | -2.548 | | | | -2.771 | | | |
| | (2.096) | | | | (3.717) | | | |
| Division II | 0.024 | | | | -0.630 | | | |
| | (1.995) | | | | (2.720) | | | |
| Division IA | -0.084 | | | | -0.057 | | | |
| | (2.04) | | | | (2.611) | | | |
| Master's University | 1.88 | | | | 3.527 | | | |
| | (1.616) | | | | (2.260) | | | |
| No. of observations | 98 | | 98 | | 62 | | 62 | |

Notes:
Weighted by the total number of applications.
*** (**, *) indicates significance at the 1% (5%, 10%) level.

**Appendix A**
**Table 1A**
**Regression Results**
Dependent Variable = natural log (male admit rate/female admit rate)

| | Admit Rate Differential | |
|---|---|---|
| Constant | -0.122 | ** |
| | (0.048) | |
| Ln (Ave. SAT Math Score Ratio) | 1.174 | |
| | (0.838) | |
| Ln(Ave. SAT Verbal Score Ratio) | 0.297 | |
| | (0.771) | |
| Ln (Ave. No. of Applicants Ratio) | -0.023 | |
| | (0.035) | |
| No. of Observations | 212 | |
| LM test | 36.98 | |
| (p-value) | (0.001) | |
| Hausman Test | 2.04 | |
| (p-value) | (0.564) | |
| Average Fixed Effects | -0.055 | |
| (wghted by total no. of applications) | 76 | |

Notes
*** (**, *) indicates significance at the 1% (5%, 10%) level.

**Appendix A**
**Table 2A**
Two-Stage Least Squares
Second-stage dependent variable is natural log of admit rate ratios by sex
First-stage dependent variable is proportionality measure

| | 1st-stage | | 2nd-stage | |
|---|---|---|---|---|
| Constant | -9.35 | * | -0.168 | ** |
| | (5.03) | | (0.071) | |
| Proportionality Measure | ----- | | -0.027 | *** |
| | | | (0.009) | |
| Proportionality Measure squared | ----- | | -0.0008 | * |
| | | | (0.0004) | |
| Overall Admit Rate | 7.17 | | 0.094 | |
| | (6.18) | | (0.086) | |
| Public Control | -4.89 | *** | -0.086 | ** |
| | (1.67) | | (0.034) | |
| No. of FTE Undergraduates (000) | 0.278 | *** | 0.00004 | |
| | (0.124) | | (0.0019) | |
| Athletic Revenue | 0.232 | | | |
| | (.197) | | | |
| Athletic Revenue Squared | -0.0045 | | | |
| | (0.0034) | | | |
| No. of Men's Teams | -0.502 | | | |
| | (0.420) | | | |
| No. of Women's Teams | 0.125 | | | |
| | (0.442) | | | |
| No. of Male Applicants (000) | 2.09 | *** | | |
| | (0.450) | | | |
| No. of Female Applicants (000) | -1.56 | *** | | |
| | (0.353) | | | |
| Football Team | -2.457 | | | |
| | (2.021) | | | |
| Division III | -1.849 | | | |
| | (2.620) | | | |
| Division II | 0.615 | | | |
| | (2.321) | | | |
| Division IA | -2.137 | | | |
| | (2.37) | | | |
| Master's University | 0.435 | | | |
| | (1.958) | | | |
| No. of observations | 76 | | 76 | |

Notes:
Weighted by the total number of applications.
*** (**, *) indicates significance at the 1% (5%, 10%) level.