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Abstract: Universities provide consumption amenities to students in addition to their educational services. Collegiate sports programs have been characterized one of these consumption amenities. Previous research has shown that athletic success has a positive impact on both the quantity and quality of students attending a university. Alternatively, we analyze if athletic malfeasance, as measured by NCAA postseason bowl bans of football programs, negatively affects either the quantity or quality of student applications or enrollment. Our findings suggest that athletic malfeasance that results in a postseason football bowl ban lowers the quantity of applications, admittances, and enrollment. We do not, however, detect any reduction in student quality at the sanctioned university. Our results demonstrate that impropriety by an athletics program directly impacts a university's non-athlete student enrollment by influencing the amenity mix provided by the university.

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Introduction

A recent study by Jacob et al. (2018) found that students place a high value on consumption amenities, such as student activities, sports and dormitories when choosing a college. In their view, universities serve as country clubs that not only provide academic services, but also consumption amenities to students as well. In particular, they find that heterogeneity in student preferences account for the variation of academic amenity spending across universities. These different preferences have led some schools to draw students to their door by offering football and basketball programs that enhance the student experience. In addition, university athletic programs are uniquely situated to serve as a visible and accessible liaison between a school and the general public. Since it can be difficult for people outside a university to discern if an institution is being managed or operated efficiently, members of the public could view a school's athletic successes or failures as a signal regarding the overall quality of a college. This association between sports and education provides an explanation on why institutions of higher learning invest significant monetary resources in athletics as opposed to more traditionally academic endeavors.

The purpose of our study is to examine the impact of athletic malfeasance on the academic profile of a university. Our findings indicate that the imposition of an NCAA men's football postseason bowl ban negatively impacts the quantity of applications, admittances and enrollment of students choosing to attend the university but does not affect the academic quality of the students enrolled at the school.

Related Literature

Jacob et al. (2018) found that for every dollar spent on academics a university spends from forty-five to eighty cents on other consumption amenities. This result suggests that many universities may allocate significant resources to athletic programs as a consumption amenity, hoping to attract students with a preference for attending a sports-oriented school.

The impact of an athletics program on a university has a long history in economics. For instance, Baade and Sundberg (1996) discovered that a postseason bowl game appearance by a university's football team increased alumni donations. Humphreys (2006) found that when a university fields a "big-time" college football program, state appropriations also increased. Fisher (2009) and Mulholland, Tomic and Scholander (2014) detected that NCAA football success increased peer assessment scores as ranked by US News and World Report College Rankings. Focusing on students currently attending a university, Mixon and Trevino (2002) found a positive and significant relationship between a university's winning percentage in football and overall graduation rates.

Conversely, Lindo, Swensen and Waddell (2012) and Hernandez-Julian and Rotthoff (2014) both found that athletic success in football lowers non-athlete student performance during successful seasons. White, Cowan and Wooten (2017) discovered that current students increased alcohol consumption when their university team participates in the NCAA postseason basketball tournament. Lastly, Lindo, Siminski and Swensen (2018) found that there are increased incidents of reported rapes in the 17 to 24 year-old range on the home team's campus during football games. All of these results, and their subsequent impact on their respective schools, are consistent with the view that athletics are considered a consumption amenity for students.

Studies have also indicated that athletics have the tendency to bolster the quality of students that enroll at a university. Smith (2009) found that increases in student quality are a

function of the sports culture and tradition surrounding a school. He posited that prolonged success in athletics is more beneficial for a university than a single upset win or the acute advertising effects generated from playoff berths or bowl games. Therefore, it can be argued that sustained athletic success leads to a higher perceived quality of the institution and thus a greater amenity value for potential students.

Furthermore, McCormick and Tinsley (1987) detected a positive correlation between a winning football season and an increase in the incoming year's freshman SAT scores. Murphy and Trandel (1994) also discerned that an improvement in a school's football record increased the number of applicants to that school. Mixon, Trevino and Minto (2004) and McEvoy (2005) both found a positive and significant relationship between football win percentages and applications received, supporting the idea that collegiate football impacts the institution's admissions process.

In a recent study, Segura and Willner (2018) found that Bowl Game invitations served to increase the median SAT scores at the participating universities. Additionally, their study outlined that regular season wins had little effect on admissions, but the advertising effect from a FBS Bowl Game increased total number of applications and median SAT scores by 8-21 points. Therefore, they concluded that football win percentage is not as important as Bowl appearances in attracting students to a university. Similarly, Jones (2009) found that simply appearing in a Bowl Game caused an increase in applications received and admission yield, but only for male students. He further found that the applications received and admission yield for both male and female students were positively correlated with the Nielsen Rating of the Bowl Game.

Several studies have also examined the impact that playoff and championship victories have on a university. Toma and Cross (1998) analyzed the effects of winning a NCAA National

Championship in football or men's basketball on the number of applications submitted to a school. They subsequently detected a significant positive increase in the number of applications received by a school after a National Championship win. In an expansive study, Pope and Pope (2008) reported that a school's success in football or men's basketball, as measured by being ranked in the top 16 in basketball and the top 20 in football, is often accompanied by an increase of 2% to 8% in applications received. Then focusing on the SAT scores of these applicants, Pope and Pope (2008) found that the increase was comprised of both low and high scoring applicants, allowing schools to be more selective in the makeup of their incoming freshman class.

Further examining the impact of athletic success on student quality, Segura and Willner (2018), focused on football Bowl Game invitations and discovered that these invitations served to increase the median SAT scores at the participating universities. Smith (2008), however, found that success in Division One basketball did not influence the proportion of students from the top ten percent of their class, or the proportion of National Merit Scholars, choosing to attend the university. Additionally, Tucker and Amato (2006) indicated there was no consistent evidence to suggest a highly successful basketball team influenced average SAT scores at a university. Pope and Pope (2014), further studying SAT scores, determined that when a university has a stellar year in either football or basketball the average SAT test scores sent to that university increased by ten percent. They further found that Black students, male students and students who played sports in high school were more influenced by athletic success. Chung (2013), focusing on SAT score distributions, expressed that lower scoring students have a higher preference for athletic success than do high achieving SAT students. Lastly, Caudill, Hourican and Mixon (2018) determined that when a university eliminates a football team, their applicant pool shrinks and their average ACT test scores fall.

The literature in this area of study suggests that athletic success positively influences both the quantity and quality of students at a university. To our knowledge only Chressanthis and Grimes (1993), Smith (2015) and Groothuis, Eggers and Redding (forthcoming) have analyzed the influence of athletic malfeasance on a university's academic profile. The Chressanthis and Grimes (1993) study followed only one school and found that a when the NCAA sanctioned the school, freshman enrollment decreased. Smith (2015) measured the effect that various NCAA sanctions levied against both football and basketball programs had on student applications and detected no significant change in number of applications received by a school. Groothuis, Eggers and Redding (forthcoming) , however, discerned that probations levied against a basketball program, while having no influence on applications, did lower the average SAT scores of incoming freshman students.

Our research differs from both Groothuis, Eggers and Redding (forthcoming) and Smith (2015) by focusing solely on postseason bowl bans in football, one of the harshest and most publicized penalties imposed by the NCAA. Studying only NCAA post season bowl bans, we can then analyze the impact of this significant penalty on student applications, student admissions, student enrollment and student quality**.** Additionally, instead of including all potential categories of NCAA sanctions as in Smith's study, our research focuses solely on football postseason bowl bans to isolate the influence of this severe penalty on both the quantity and academic quality of incoming students.

Methods and Results

To test the impact of detected athletic malfeasance as measured by NCAA football bowl bans on a university, we use data on 120 Division I football programs for thirteen seasons from

2000 to 2013. The sample represents all NCAA Division I FBS (formally D-IA) schools from the Atlantic Coast Conference (ACC), the Big 12 Conference, the Big 10 Conference, Conference U.S.A., the Mid-American Conference (MAC), the Mountain West Conference, the PAC 12, the Southeastern Conference (SEC), the Sun Belt Conference, the Western Athletic Conference and the Ivy League Conference. These schools represent the universities with the highest athletic budgets as well as the majority of NCAA bowl bids each year.

We identify the post season tournament ban using a dummy variable equal to one if a school received an NCAA postseason bowl ban. A bowl ban occurs when an athletics program at a university violates one or more of the rules outlined in the NCAA Division I Manual (NCAA rules). During the period of our study, only nine Division I football bowl bans occurred. The schools sanctioned with postseason tournament bans are listed in table 1 along with the year of the ban.[1]

These bowl ban can occur from one to many years after the detected athletic infraction at a university, and only occur when gross malfeasance is detected at a university. Barnhart (2012) outlined four stages that are part of a major infractions case brought by the NCAA against a university. The first stage involves investigating the infraction, the second is charging the athletic program, the third is a hearing conducted by the NCAA Committee of Infractions (COI), and finally a deliberation phase during which the COI can impose sanctions. Given the protections afforded by the NCAA to a university, the lag between the detected malfeasance and the subsequent ban can be substantial. The types of malfeasance that have led to a postseason bowl ban include academic fraud, improper payment of student athletes, recruitment violations, as

[1] Although the number is small, this is not drastically different from a measure of championships (as there would only be one per year). It is also good that there are not many schools that receive bans suggesting that gross malfeasance is rare in college athletics.

well as loss of institutional control. Given that the detection of the impropriety occurs before the imposition of the ban, we include one lead variable in our analysis to measure the influence of the detected malfeasance on both the quality and quantity of students at a university that might occur before the ban. We also include two lag variables after the ban to measure if the detected malfeasance has a lasting effect on the university. We include only one lead and two lags because preliminary analysis found there are no statistically significant effects two years before or three years after the ban.

To control for team quality, we also include win percentages along with the post season tournament ban data statistics as our independent variables. For our dependent variables we used data from the NCAA with the Peterson Undergraduate data set, which provided our measure of both male and female freshman applications, admissions, and enrollment. We also examine the student quality at these universities by the percentage of the incoming freshman class that were in the top ten percent and in the top twenty-fifth percent of their high school class, as well as the high school grade point average of the incoming freshman class and their average SAT score.

Using a fixed effect regression technique to control for differences between universities and over time, we analyzed how NCAA football bowl bans influenced applications, admissions, and enrollment as well as both the quality of students enrolled at these schools. The university fixed effect controls for all university characteristics that are time invariant including whether the school is religious, private or public. Given the small number of postseason bans, we are unable to split our sample into private and public schools. The year fixed effects control for changing demographics of students and macro economic conditions that change over time. In addition, we

do not include control variables for university quality that changes over time because our hypothesis suggests that the athletic malfeasances serves as a signal for university quality.[2]

The model we estimate is:

$$Yit = \beta 1 leadBan + \beta 2 Ban + \beta 3 lagBan + \beta 4 lag2Ban + BiUniversity + BtTime + \varepsilon$$

We report the means and standard deviation of both the dependent and independent variables in table 2. The mean football win percentage at the schools was .505 (slightly higher than .500 because these schools also play some games against other schools outside our dataset). The mean number of postseason bans in any given year was one half a percent of the universities studied, indicating that seven percent of schools received a postseason tournament ban during the time of our study.

The means show that the average number of applications received were 6,360 men and 7,086 women. The number of freshman admitted is on average 3,644 males and 4,275 females. The number of average freshman enrolled is 1,554 males and 1,716 females. To account for differences in size between the universities studied, we log the number of applications, admissions, and enrollment. In terms of measuring student quality, we found that 34% of freshman enrolled came from the top ten percent of their high school class and 58% of freshman came from the top twenty-five percent of their high school class. We also found that the mean grade point average of enrolled freshman was 2.57 and the mean SAT score was 998.[3]

We report the results of football bowl bans on students in tables 3 through 5. In table 3, we delineate the influence of bowl bans on male applications, acceptance rates, and enrollments.

[2] As a robustness check we included university endowment as a control variable and the results were essentially the same.

[3] The mean score was determined by summing the mean SAT verbal score of 490 and the mean SAT mathematical score of 508. When the analyzing the scores separately the results did not change.

To help clarify our results, we convert the coefficient on the log variable to a percentage using the formula $100[\exp(\beta) - 1]$, where β is the coefficient on the relevant dummy variable.

Our results show that football bowl bans lower male applications by 10% one year before the ban, 9% the year of the ban, 13% a year after the ban and 12% two years after the ban. In addition, the ban lowers male admittance to a university by 9% one year before the ban, 8% the year of the ban and 10% the year after the ban with no significant effect two years after the ban. Lastly for males, the ban lowers male enrollment by 10% the year before the ban and 15% the year of the ban, 11% a year after the ban and 12% two years after the ban. Our results indicate that athletic malfeasance leading to a NCAA football bowl ban significantly influences the number of applications, admittances, and enrollment of males at a sanctioned university. These findings further suggest that a bowl ban leads fewer male students to apply to the university, and with the smaller pool of applicants, the university chooses to admit fewer students. Subsequently, a smaller portion of these students then choose to enroll in the university. In terms of magnitude, a bowl ban leads to an average of 233 fewer male students enrolling at a university the year of the ban when evaluated at mean enrollment.

In table 4, we report the influence of an NCAA football bowl ban on female applications, acceptance rates, and enrollment. For females, we find the ban lowers applications by 9% one year before the ban, 12% the year of the ban, 15% a year after the ban and 13% two years after the ban. In addition, the ban lowers female admittance to a university by 8% one year before the ban, 7% the year of the ban, 11% the year after the ban and no significant effect two years after the ban. The ban further lowers female enrollment 8% the year before the ban, 13% the year of the ban, 12% the year after the ban and 9% two years after the ban. Our results suggest that athletic malfeasance as measured by a postseason bowl ban in football profoundly reduces the

number of female freshman applications, admittances, and enrollment at the sanctioned university. In terms of magnitude, a bowl ban leads to an average of 224 fewer female students enrolling at a university the year of the ban when evaluated at mean enrollment.

In table 5, we report the results of a postseason bowl ban on the quality of freshman enrolled at an infracting university. For all measures of student quality, we find no statistically significant effects.[4] Interestingly, when focusing on the percent of students from the top ten or top twenty-five percent of their high-school class the results indicate that football win percentage is negatively correlated with top student quality. This result, however, is consistent with Jacob et al.'s (2018) theory that a university functions like a country club, and given heterogeneous preferences, they suggest the most academically able students are less likely to view sports as an important amenity in their college choice decision.[5]

Overall, our results illustrate that gross malfeasance in a football program, to the point that results in a postseason bowl ban, lowers the quantity but not quality of students enrolling in the school. In particular, we find that a postseason football ban lowers male applications up to fifteen percent and up to thirteen percent for females, both translating to fewer students enrolling in the school.

[4] The magnitudes of the coefficients on both lead and lags ban variables on mean SAT scores ranging from a 23 to 116-point reduction, although not statistically significant, is suggestive that NCAA bowl bans lower student quality since our data is essentially population data.

[5] We are not suggesting that a university can increase their enrollment of more academically qualified students by having their football team lose. Instead, we are suggesting that universities that choose to specialize in the academic quality amenity spend less resources on football and therefore have a lower quality football team as reflected in the lower win percentage.

Discussion and Conclusion

The results of this study demonstrate that an NCAA postseason football bowl ban significantly reduces the quantity of students opting to attend the sanctioned university. Given the negative media attention surrounding a postseason bowl ban, these events may serve as a signal to prospective students regarding the overall quality of the university, which in turn could lead students to seek other institutions of higher learning. These statistics show that malfeasance in college athletics can have significant negative effects on non-athlete students and the university as a whole, and further supports the theory that university athletics are indeed an amenity or a signal that students use in their college choice decision.

Our research also helps answer the question posed by Sanderson and Siegfried (2018) "How have over 100 of the top 128 athletics departments persuaded their university presidents and trustees to continue devoting scarce general funding to intercollegiate sports? When these institutions incur financial losses on athletics, universities seem to double down, spending even more on salaries for coaches and improving physical facilities, rather than viewing losses as a signal to redeploy assets and efforts." Sanderson and Siegfried (2018) offer three answers to the above question: first, intercollegiate athletics might attract greater appropriations from state legislators; second, intercollegiate athletics may boost private donations; and third, high-profile sports programs, like other campus amenities, may attract more applicants and thus additional enrollment. Ultimately, our findings suggest that football is an important amenity that draws students to enroll at a university, and when the sports amenities at a school are diminished many students choose to enroll elsewhere.

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Table 1: List of NCAA Football Postseason Bowl Bans

University	Year of Ban
University of Alabama	2002
University of Alabama	2003
University of California	2002
University of Kentucky	2002
Mississippi State University	2004
University of North Carolina	2012
Pennsylvania State University	2012
University of Southern California	2010
University of Southern California	2011

Table 2: Means

Independent Variables	**Mean (Standard deviation)**
Football Win Percentage	.515 (.224)
Bowl Bans	6% of Universities
Dependent Variables	**Means (Standard deviation)**
Male Application	6360 (4328)
Female Application	7086 (4890)
Male Admissions	3644 (2231)
Female Admissions	4275 (2586)
Male Enrollment	1554 (814)
Female Enrollment	1716 (893)
Top 10% High School	34% (25)
Top 25% High School	58% (27)
Grade Point Average High School	2.57 (1.53)
Mean S.A.T. Scores	998 (423)

Colleges = 120 years=10

Table 3: Influence of Postseason Bowl Bans on Males

	Log Male Applications	Log Male Admissions	Log Male Enrollment
Football Win Percentage	-.009 (.023)	-.013 (.019)	.017 (.021)
Lead: Bowl Ban	-.105** (.052)	-.096** (.044)	-.102** (.036)
Bowl Ban	-.094* (.058)	-.080* (.047)	-.164** (.038)
Lag: Bowl Ban	-.144** (.063)	-.105** (.054)	-.116** (.043)
Lag2: Bowl Ban	-.129* (.069)	-.082 (.058)	-.127** (.042)
School fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
R-sq Within Between Overall	 .605 .002 .042	 .507 .001 .028	 .303 .000 .009

Schools=120 Years=10 (standard error in parentheses)

Table 4: Influence of Postseason Bowl Bans on Females

	Log Female Applications	Log Female Admissions	Log Female Enrollment
Football Win Percentage	.007 (.031)	-.019 (.027)	.003 (.016)
Lead: Bowl Ban	-.096* (.057)	-.087* (.046)	-.085** (.038)
Bowl Ban	-.129** (.053)	-.076 (.045)	-.133** (.039)
Lag: Bowl Ban	-.167** (.064)	-.121** (.056)	-.130** (.046)
Lag2: Bowl Ban	-.139** (.070)	-.061 (.060)	-.096** (.044)
School fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
R-sq Within Between Overall	 .583 .003 .042	 .455 .004 .019	 .196 .001 .003

Schools=120 Years=10 (standard error in parentheses)

Table 5: Influence of Postseason Bowl Bans on Student Quality

	Top 10% High School	Top 25% High School	Freshman High School GPA	Mean S.A.T. Scores
Football Win Percentage	-5.95** (1.61)	-8.02** (2.51)	-.078 (.146)	49.45 (40.41)
Lead: Bowl Ban	.76 (3.75)	1.32 (5.87)	.477 (.341)	-106.30 (94.26)
Bowl Ban	.25 (3.91)	3.45 (6.20)	.030 (.356)	-23.60 (98.38)
Lag: Bowl Ban	-.20 (4.07)	3.93 (6.38)	.129 (.370)	-65.78 (102.38)
Lag2: Bowl Ban	-3.48 (4.39)	2.53 (6.87)	.209 (.399)	-116.70 (110.26)
School fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
R-sq Within Between Overall	 .051 .013 .001	 .040 .017 .002	 .013 .007 .005	 .051 .000 .001

Schools=120 Years=10 (standard error in parentheses)