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Does Success on the Grid-Iron and Court Increase Applications to Football Bowl Subdivision (FBS) Schools?

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ABSTRACT. Division I athletics require a substantial financial commitment from a university. Previous research suggests that athletic success may provide benefits to a university. These benefits might include advertising, which may lead to increased applications. I used 2000-2010 application data from the Integrated Postsecondary Education Data System (IPEDS) to investigate if athletic success for Football Bowl Subdivision (FBS) football and basketball programs affects the number of applications these universities receive. Key independent variables used are past values of Sagarin ratings, Associated Press Top 20 College Football Poll ratings, and NCAA Basketball Tournament performance. I find that some measures of athletic success do not increase applications for a university at all, whereas other measures of athletic success increase applications only marginally.

I. Introduction

In 1984, Boston College quarterback Doug Flutie threw a last-second 48-yard touchdown pass to beat the University of Miami, one of the nation's best football programs that year. Flutie went on to win the Heisman Trophy, an award that goes to the best NCAA Division I football player every year. Over the next two years, Boston College experienced a 30 percent increase in applications for undergraduate admissions (McEvoy 2005, 18). This increase in applications due to athletic success has often been termed the "Flutie Effect" (also known as the advertising effect).

Proponents of athletics often cite increased applications as a justification for athletic spending. By receiving more applications, a university can operate at capacity, can select higher quality students, and can admit more students, which may lead to increased revenue. I set out to determine if the advertising effect exists for Football Bowl Subdivision (formerly Division I-A) schools and if so, how large the effect really is. If the advertising effect does exist, then universities' athletic spending may be justified. Although athletics may provide some other benefits to a university, I found that some measures of athletic success do not increase applications for a university at all, whereas other measures of athletic success increase applications only marginally.

II. Literature Review

Athletics require a substantial financial commitment from a university, and for this reason many question if athletics actually contribute to the academic mission of a university. Previous studies have examined the effects of athletic success on graduation rates, donations, and quality of incoming students. Irvin Tucker (1992) examined the relationship between athletic success and the graduation rate. D. Randall Smith (2007), Tucker and Amato (1993), and McCormick and Tinsley (1987) examined the relationship between athletic success and the quality of students applying to a university.

Although many studies focus on graduation rates or quality of students, other studies examine the effects of athletic success on the quantity of students enrolling at a university or the number of applications a university receives. I am focusing on applications and for that reason focus primarily on previous studies that have studied the effect of athletics on applications.

J. Douglas Toma and Michael Cross (1998) attempted to determine if winning a Division I football or basketball national championship between 1979 and 1992 increased the number of applications a school received in following years. Toma and Cross also examined peer institutions for each championship school to determine if the effect was due to athletics or another independent cause. Of the 13 schools that won a football championship between 1979 and 1992, seven saw an increase in applications of ten percent or more and two saw an increase of 20 percent or more (University of Miami saw a 34 percent increase and the Georgia Institute of Technology saw a 21 percent increase) (Toma and Cross 1998, 639). For basketball championship schools, nine of the 13 schools saw an increase in applications of nine percent or more (Michigan saw a 29 percent increase in applications following its 1989 championship) (Toma and Cross 1998, 645).

Chad McEvoy (2005) investigated the relationship between differences in an NCAA Division I team's athletic performance over time and the quantity of undergraduate admissions applications the university received. McEvoy analyzed four sports: football, men's basketball, women's basketball, and women's volleyball. Due to application deadlines, McEvoy used one year lags in his regressions for men's and women's basketball. He analyzed six major NCAA Division I conferences from 1994 to 1998. McEvoy used the change in winning percentage from

year to year as a measure of athletic success. In order to control for strength of schedule, winning percentage was limited to games played against opponents in one's own conference. The annual change in winning percentage was grouped into three categories: increased by .250 or greater, did not change, or decreased by .250 or greater. McEvoy found that only football improvement was a significant determinant of applications received. For schools whose football teams improved their winning percentage by .250 or greater, applications rose on average by 6.1 percent the following year (McEvoy 2005, 20).

Stephen Perez (2012) hypothesized that football and basketball success positively affects the number of California high school students enrolling in their local California State University. Perez used admission and athletic data for the eight Division I California State Universities who played Division I sports between 1986 and 2009. Perez used data from the California Post-Secondary Education Commission to compute the percentage of California students who enroll in their local state university. He used football wins, basketball wins (only against Division I opponents), and the Director's Cup Rankings (where schools are awarded points for success in all men's and women's sports) to measure athletic success. Due to application deadlines, Perez used one and two year lags in his regressions. Football wins lagged two years and basketball wins lagged one year were statistically significant at the ten percent level. An additional football win led to a 0.057 percentage point increase in enrollment of local students and an additional basketball win led to a 0.036 percentage point increase in enrollment (Perez 2012, 203). The effect of the Director's Cup Ranking was statistically insignificant.

Devin and Jaren Pope (2012) used data on the number of SAT scores universities receive to investigate if athletic success increases applications to a university. Pope and Pope used athletic data for all 332 schools that participate in NCAA Division I basketball or FBS (Division I-A) football. To measure football success, they used the Associated Press end of the year college football poll rankings from 1991 to 2001. For basketball success, they used each team's NCAA tournament performances. Specifically they used four dummy variables for how far each team went in the tournament (round of 64, 16, 4, and champion). Pope and Pope used one, two, and three year lags in their regressions. For control variables, they used the log of cost of attendance, log of average professor salary, log of average income in the state the school is located in, and the

number of high school diplomas awarded in the state the school is located in.

Pope and Pope found that applications do increase when a university's football or basketball team does well. If a university's basketball team makes the NCAA tournament, the university sees a 2.2 percent increase in applications the following year (nine percent if the team wins the NCAA Championship) (Pope 2012, 11). Similarly, if a football team ends the season ranked in the Associated Press Top 20, their university sees a two percent increase in applications the following year (11 percent if the team wins the FBS Championship). Pope and Pope also separated their sample by sex and race. They found that males respond more to athletic success than females, and also found that if a basketball team makes it to the "Final Four", black student SAT scores sent to that university increase by 13 percent (compared to a 5.7 percent increase for the total population) (Pope 2012, 11).

III. Theory Review

Economic theory assumes that students are rational and that they make a decision on whether to attend college (and what college to attend) only after they have considered the costs and benefits of every school. Students then choose to apply to the schools that maximize their overall utility. Hossler and Gallagher (1987) provided a framework for the college search process (Pope 2012, 7). The process is divided in to three stages: predisposition, search, and choice. Predisposition is when a student decides whether or not to pursue further education; search is when a student searches for schools that have the characteristics he wants; and choice is when a student finalizes a list of schools to apply to and then decides which school to attend. Because high school students have limited resources, they are often unable to learn about every alternative school.

Many additional factors also influence a student's decision on where to attend college. These factors include tuition costs, location, quality of faculty, and financial aid received. The purpose of this study is to determine whether athletic success provides an advertising effect for a university, which might lead to increased applications. Presumably the advertising effect exists because some students receive additional utility from attending a school that has successful athletic programs.

IV. Data

For application data, I used the Integrated Postsecondary Education Data System (IPEDS). IPEDS is an annual survey conducted by the U.S. Department of Education's National Center for Education Statistics (NCES). Information is gathered from every college, university, and vocational school that participates in a federal financial aid program. Application data was limited because IPEDS only had application data available between 2000 and 2010. For my study, I restricted the data to FBS (Division I-A) football schools. I also limited my dataset to schools that played FBS football for the entire period between 2000 and 2010. FBS is solely a football classification and has nothing to do with basketball. Rather than using all of Division I basketball, I used only Division I basketball teams from universities that have FBS football teams. I did this because I wanted to see if the advertising effect exists for larger universities, as athletic spending is typically higher at these institutions.

In addition to data on number of applications received, I also collected data on male and female applications, real cost of in-state tuition, real cost of room and board, average real institutional aid received, student to faculty ratio, and the average real instructor's salary from IPEDS. Real values were computed using the Consumer Price Index. I hypothesize that as costs of tuition, costs of room and board, and student to faculty ratio increase, the number of applications received will decrease, as I believe students prefer to pay less for school, and also prefer to receive individual attention from professors. I also hypothesize that as average instructor salary and average institutional aid received increase, applications received will also increase. I hypothesize this because I believe students prefer to apply to universities that have high quality instructors, and also prefer to apply to universities that offer significant financial aid.

For athletic data, I used 1997 to 2010 end of the year football and basketball Sagarin ratings, which are created independently by Jeff Sagarin and have been archived by USA Today. These measures have not been used in previous studies. The Sagarin ratings are used by the NCAA Tournament Selection Committee to help determine who is invited to play in the NCAA Men's Division I Basketball Tournament. The Sagarin ratings are also used for Bowl Championship Series (BCS) bowl selections. Jeff Sagarin uses two measurements for his rating: Elo-Chess

and Predictor. Elo-Chess (which is based on the Elo ranking system in chess) is calculated only from wins and losses. Predictor is calculated from score margins and is often considered to be a more accurate predictor of future games than Elo-Chess. Both rankings account for strength of opponents and home field advantage. A higher Sagarin ranking should correspond to a more successful (and notable) season. Jeff Sagarin does not publish his methodology, but he does say that the Sagarin rating is a synthesis of Elo-Chess and Predictor. Sagarin ratings range from 0 to 100.

In addition to the Sagarin ratings, I gathered additional data to measure athletic success. As in Pope and Pope (2012), a dummy variable was used for four rounds of the NCAA Basketball Tournament (round of 64, 16, 4, and champion). I also used the end of the year Associated Press Top 20 and Top 10 Poll rankings as measures of football success. The Associated Press ranking is gathered by polling sports writers across the nation about who the top football teams are. I also used dummy variables for winning the FBS National Championship and for producing the Heisman winner, as I suspect schools that win the FBS Championship or produce the Heisman winner may be recognized more than other schools. Football and basketball winning percentages of 75, 80, and 85 percent were also used as measures of athletic success. I hypothesize that for all measures of athletic success, an increase in athletic success will increase applications for a university, as I believe some students pay attention to athletics and may be drawn to schools that have successful athletic programs.

V. Econometric Model

The econometric model employed in this study closely follows the model employed by Pope and Pope (2012). The econometric model is as follows:

$$Y^{j}_{i,t} = \alpha_{1i} + \alpha_{2i}t + \alpha_{3}tX_{i,t} + \alpha_{4}S_{it-1} + \alpha_{5}S_{it-2} + \alpha_{6}S_{it-3} + \varepsilon_{i,t}$$

Where $Y^{j}_{i,t}$, the dependent variable, represents the log of applications received by school i in year t for the population group j. I used the log of applications to observe the percentage change in applications from year to year. α_{1i} accounts for fixed effects and is a school specific constant. $\alpha_{2i}t$ is a school-specific time trend. S_{it-1} is a vector of dummy variables that

indicates the athletic success of school i at time t-1. One, two, and three year lags are employed to measure the delayed effects of athletic success. $X_{i,t}$ is a set of control variables commonly used to control for quality of school. The variables include log of student to faculty ratio, log of real in-state costs, log of real average instructor salary, and log of real average institutional aid received. The log was used in case there were non-linear relationships. Each control variable is lagged once, as I hypothesize students often view the previous year's information for a school. $\varepsilon_{i,t}$ is the error term.

VI. Regression Results

TABLE 1–Pope and Pope Replica Regression Results

	All	Male	Female
Average Instructor Salary	-.119 (-0.68)	-.097 (-0.57)	-.149 (-0.80)
Student-Faculty Ratio	.032 (0.58)	.020 (0.36)	.044 (0.79)
Real In-State Cost	-.096 (-0.96)	-.107 (-1.13)	-.093 (-0.86)
Average Institutional Aid Percent	-.015 (-0.72)	-.014 (-0.65)	-.016 (-0.76)
NCAA64	.001 (0.09)	.004 (0.39)	-.002 (-0.19)
NCAA16	-.001 (-0.08)	.002 (0.19)	-.004 (-0.37)
NCAA4	-.012 (-0.80)	-.020 (-1.09)	-.011 (-0.53)
NCAA1	.000 (0.02)	.006 (0.29)	-.004 (-0.25)
AP Top 20	.001 (0.11)	.001 (0.12)	.001 (0.11)
AP Top 10	.002 (0.13)	.004 (0.26)	-.001 (-0.08)
BCS Champ	-.006 (-0.23)	-.002 (-0.08)	-.010 (-0.34)
Adj R^2	0.844	0.843	0.833

Table 1 is a regression that includes the same athletic variables used in Pope and Pope's study. All measures of athletic success in Table 1 are lagged one year. A regression was run for three population groups: all applicants, male applicants, and female applicants. The coefficient is listed on top, while the t-statistic is shown in parenthesis. To conserve space, fixed effects and school-specific time trends are not shown. The first four variables listed are control variables. All four control variables (average instructor salary, student to faculty ratio, real in-state costs, and average institutional aid received) were statistically insignificant.

The measures of basketball success are listed next. NCAA64 indicates that a basketball team made the NCAA Tournament; NCAA16 indicates that the team made it to the "Sweet 16"; NCAA4 indicates that the team made it to the "Final 4"; and NCAA1 indicates that the team won the NCAA Championship. All measures were statistically insignificant.

The measures of football athletic success include AP Top 20, which indicates that the football team ended the year ranked in the Associated Press Top 20 Poll; AP Top 10, which indicates that the football team ended the year ranked in the Associated Press Top 10 Poll; and BCS Champion, which indicates that the team won the BCS National Championship. Once again, all measures were statistically insignificant.

The R^2 may seem large when no variables are significant, but this is due to how the model was estimated. Due to the fixed effects and school-specific time trends, I would expect a high R^2 regardless of the significance of the independent variables. Because of this, the R^2 does not have much explanatory power and one should look only at the significant independent variables.

The results seem startling when compared to Pope and Pope's results, but there are a number of reasons why my results differ. First, Pope and Pope used SAT scores sent as a proxy for applications, whereas I used actual application data from IPEDS. Second, the years observed in my sample differ from the years Pope and Pope observed. I used application data from 2000 to 2010 whereas Pope and Pope used SAT data from 1994 to 2001. Third, I only used basketball programs from universities who have FBS football programs, whereas Pope and Pope included all Division I basketball schools. Last, Pope and Pope used two control variables which I did not use (log of average real income in the state the school is located in and the number of high school diplomas awarded in the state the school is located in).

TABLE 2–Sagarin Ratings Regression Results

	All	Male	Female
Average Instructor Salary	-.122 (-.69)	-.097 (-.57)	-.151 (-.81)
Student-Faculty Ratio	.071 (1.08)	.058 (0.84)	.089 (1.28)
Real In-State Cost	-.051 (-0.57)	-.037 (-0.39)	-.069 (-0.74)
Average Institutional Aid Percent	-.003 (-0.17)	-.000 (-0.03)	-.005 (-0.28)
Football Sagarin (Lag 2)	.002* (3.98)	.002* (4.06)	.002* (3.70)
FootballSagarin (Lag 3)	.001* (2.46)	.001* (2.47)	.001* (2.33)
NCAA Basketball Champ (Lag 1)	.025 (1.79)	.033* (2.07)	.019 (1.29)
Adj R^2	0.841	0.841	0.829

* Significant at 5 Percent Level

Table 2 is a regression that includes the Sagarin ratings, which were not used by Pope and Pope. Regressions were once again run for all applicants, male applicants, and female applicants. The first four variables shown (average instructor salary, student to faculty ratio, real in-state costs, and average institutional aid received) are all control variables. All four were statistically insignificant.

The next variables shown are the football Sagarin ratings, lagged two and three years. The football Sagarin rating lagged two years was statistically significant at the five percent level for all population groups. The effect was virtually the same for all population groups. By increasing the football team's Sagarin rating by ten points (i.e. increasing from 70 to 80), a university typically sees a two percent increase in applications two years later. Football Sagarin rating lagged three years was also statistically significant for all population groups. By increasing the football team's Sagarin rating by ten points, a university typically sees a 1 percent increase in applications three years later. Although the effect is small, it does appear that the Sagarin ratings have an effect on applications received.

The next variable, NCAA Basketball Champion lagged one year,

indicates that the university's basketball team won the NCAA Basketball Championship the previous year. This variable was statistically significant for male applicants only. If a university's basketball team wins the NCAA Tournament, male applications increase by 3.3 percent the following year. I am unsurprised by this, as I suspect male high school students pay closer attention to the NCAA Basketball Tournament than female high school students. In fact, I am surprised that the effect of the Sagarin rating was not more pronounced for male applicants than female applicants.

In addition to the athletic success variables shown in the regressions, the other measures of athletic success were also tested. The Heisman winner was not significant in any of the regressions. Basketball and football winning percentages of 75, 80, and 85 percent were also not significant in any of the regressions.

VII. Conclusion

The results from my regressions are mixed. It appears that some measures of athletic success do not increase applications, whereas other measures of athletic success increase applications only marginally. I was surprised to see that even when applications increased, it was typically only by a small percent. Based on my results, it appears that the advertising effect may exist but in a limited form.

Although my results may provide some evidence of the advertising effect, additional research must be conducted for a number of reasons. First, the time period used for this study is relatively small (only 11 years). I would be more confident in my results if I was able to get application data for additional years, although I am currently limited by IPEDS. Additional control variables should also be added. Specifically, I would like to include two additional variables Pope and Pope used (high school diplomas awarded in the state the university is located in and the average real income in the state the university is located in). Last, I would like to see this study conducted using enrollment data. I believe enrollment data should be used to see if more students are actually attending universities who have successful athletic programs, or if students are just applying and not actually enrolling. As Division I athletic spending increases, research should continue to look for tangible benefits to see if this spending is justified.

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