

The Upset: Unlikely Sports Success and its
Effect on Incoming Student Quality and Quantity

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Abstract

The role of college athletics in the University system has long been a topic of interest. Previous studies have addressed the effects of general success in athletics on incoming student quantity and quality at a university, finding that there is some positive correlation. This study focuses on a specific type of sports success, an upset, and attempts to explain its effects on the quantity and quality of incoming students. This research suggests a strong positive correlation between upset wins and the quantity of incoming students. This study does not find any statistically significant correlation between an upset and the incoming student quality at a University. These findings suggest that prospective students perceive a University's athletics program as a form of signal regarding the quality of the institution.

Keywords: NCAA, Upset, Division I Football

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Introduction

At the beginning of each football season, there are a few “warm-up” games before conference play starts. Large market teams pay smaller programs to play them at home. These games are commonly seen as an opportunity to showcase the larger team’s skill. The discrepancy in competitive parity between the teams is so great that smaller team almost never wins. Almost never.

In 2007, Appalachian State University played one of these “warm-up” games at the University of Michigan, in the stadium commonly known as the “Big House”. A blocked field goal in the final seconds of the game secured Appalachian State’s win over Michigan and the game became an iconic upset. The effect of that win was felt almost immediately. The marginal change in applications increased 15% the year after the upset and was sustained through 2010. (Trivette, n.d.) This massive change in application numbers lends credence to a comment made by Scott Barnes, the University of Pittsburgh Athletic Director, who said, “Athletics truly is a front porch to the University. It is not the most important room in the house, but it is the most visible and what comes with that is opportunity and responsibility.”

This study will attempt to analyze the effects of an upset win in football on both the incoming quantity and quality of students for universities in general.

Literature Review

There has been limited research on the effects of an upset win on college admissions. Studies conducted on quantity or quality of admissions after a university’s athletic success frequently use winning seasons or deep playoff berths as indicators. Results from these studies are difficult to compare because there is no agreed upon subject or method of measurement. This

literature review will analyze the methods of measurement and standards of success used in other studies.

Playoff Berths and National Championships

Pope and Pope (2008), the most comprehensive study to date, measured athletic success in terms of playoff berths. The duo utilized a sample of 330 universities over a period from 1983 to 2002. When measuring success in these terms of playoff success, Pope and Pope found that a school's success in football or basketball is often accompanied by an increase of 2% to 8% in applications. By analyzing the increase in applications along with SAT scores, Pope and Pope found that the increase in applicants was comprised of both low and high scoring applicants, allowing schools to be more selective in the makeup of incoming freshman. Their study also revealed that short term boosts in admissions are correlated to slower growth rates in the long term.

A 1998 study by Toma and Cross analyzed the effects of winning a NCAA National Championship in basketball or football on the number of applications submitted to the winning institutions. This study claims that college athletics are a "front-door" to the institutions because sports are the only aspect of the institutions that reach outside the academic world. For this study, admission statistics were taken from the 30 different National Championship winners from 1979 to 1992 and compared against four to five "peer" schools. This allowed Toma and Cross to not only reveal absolute changes in applications, but also changes relative to an institution's peers. The study found a significant positive correlation in both absolute and relative changes in applications given a National Championship win.

Bowl Games and Media Exposure

Segura and Willner (2016) used a unique measure of athletic success and influence on universities. In their study, success is defined by Bowl Game invitations and this success' influence shown in median SAT scores. Their study found that regular season wins had little effect on admissions, but the advertising effect from a FBS Bowl Game increased the total number of applications and median SAT scores by 8-21 points. While regular season football wins had little effect on the applicant pool, they were correlated to a higher 6-year graduation rate.

Athletics, Applications, & Yields by A. Jones (2009) delved deeper into the benefits of an institution's football team playing in a Bowl Game. Bowl Games from 2002 to 2008 were ranked by the game's television rating and compared to the school's applications received and that year's admission yield. Jones found that just appearing in a Bowl Game led to a positive correlation with applications received and admission yield, but only for male students. However, the applications received and admission yield for both male and female students were positively correlated with the Nielsen Rating of the Bowl Game. Jones also stated that while the findings were statistically significant, the changes were relatively small in magnitude.

Win Percentage

One of the first studies on win percentage and its effects on applicant quality was conducted in 1987 by McCormick and Tinsley. This study used a data set consisting of quartiles of SAT scores of applicants for 150 schools for the period of 1971 to 1984. Of the 150 schools, the study focused on 63 schools that were to be considered "big-time" football programs. Those schools' win percentages were then analyzed against changes in applicant quality indicated by changes in SAT scores. The study found a positive correlation between a winning football season and an increase in the incoming year's freshman SAT scores.

A study conducted in 1994 by Murphy and Trandel sought to find a correlation between a University's football record and the size of its applicant pool. Their research analyzed admission and sports data from 55 schools spanning a period from 1978 to 1987. The results of this study show "improvement in a school's football winning record appears to boost a school's advertising in a way that produces an increase in the number of applicants to that school. One possible result of this increase is that the school in question might then choose to be more 'selective' in admitting students."

Research conducted by McEvoy (2005), perhaps most closely related to the instant question, attempted to define a relationship between dramatic changes in team performance and undergraduate applications. McEvoy analyzed data from 62 Division I-A schools in the six major NCAA conferences from 1994 to 1998. Changes in win percentage were measured and compared against the number of applicants for the following school year. This research found a positive correlation between the positive change in win percentage and total number of applicants. An area of concern in this study is the measurement of marginal change in win percentage. Not all wins are the same and while the marginal change in wins from 0-3 and 7-10 are statistically equivalent, the results from the latter are much more likely to garner a larger number of applications.

Hansen (2010) analyzed athletic success and the accompanied media exposure as it affects college choice decisions in prospective students. This study defined success as an increase in win percentage from the previous season. Hansen used a stated preference survey to gather information from the 2009 Freshman class at Texas Tech to measure the effect of the previous season's athletic performance on college choice decision. While the study resulted in a

significant correlation between past athletic performance and college choice preference, the survey is limited to Texas Tech and a single Freshman class.

Other Indicators

Most of the literature in this area of study indicates that university success is limited to win percentages or playoff performance in football and basketball. Lawrence, Li, Regas, and Kander (2012) suggest that athletic success should be defined as final ranking in a measurement known as the Athletic Directors' Cup Standing. This measurement attempts to rank colleges and universities on overall athletic achievement rather than achievement in a specific sport. Their study focused on optimal allocation of funds to achieve high ranking in the Athletic Directors' Cup Standing but makes a good argument for using the system for measuring institutional athletic success.

D. Randall Smith (2009) alleged that positive changes in student quality are not attributable to wins or other commonly used measures of athletic success but are a function of the sports culture and tradition surrounding a school. The study also claims that the advertising effect from on-field success is minimal when compared to non-athletic indicators. Smith finds that continued success is much better for the culture than single upsets or acute advertising effects from playoff berths or bowl games. The contention here is that continued success leads to a more solid sports culture and higher perceived quality of the institution.

Upsets

There have been no studies that have empirically analyzed the influence of upsets. Trivette (n.d.) explored the effects on student enrollment stemming from the Appalachian State University v. University of Michigan game in 2007. Trivette studied the influence of athletic success on applications by measuring the marginal change in total number of applicants at

Appalachian State. Trivette found a 25% marginal change in total applicants in the two years succeeding the win and diminishing marginal change each year after. Trivette's findings are limited by utilizing only a single observation.

Data

Two primary data sets were used in this study. The first data set is trimmed from a master table of upset wins for Division I football schools for 12-year period and ranked by a system developed and published by a well-known Sports Mathematician Kenneth Massey. The second was a data set licensed from Peterson's Data and contained data such as SAT and ACT scores, applications, admissions, enrollment, and class make up for 4,200 public and private colleges, and other educational institutions.

The Massey Upset dataset was cross referenced with the Peterson Institutional dataset to create a master dataset from which the descriptive statistics and analyses are derived. When trimmed to include only FBS Division I schools for the 12 years of longitudinal data, the dataset included 21 upset wins. In the Massey dataset, upsets are ranked in order of an upset coefficient labeled "Massey Rank". This coefficient was developed by Kenneth Massey and assesses an upset on the winners' rank at the end of the season, strength of schedule, and competitive parity. A comprehensive list of the upset winners can be found in Table 1.

Independent Variables

Independent variables used in this study consist of upset wins for Division I FBS schools. Prolonged exposure due to an upset win will also be accounted for by using lag variables within a fixed-effects model.

Dependent Variables

Dependent variables observed in this data set consist of measures of both quantity and quality of incoming students.

Quantity. Total applications show the presence of a University in a student's evoked set. It signals to the institution that the student is aware of the University and involved enough to likely pay an application fee. Total applications are the broadest indicator of choice in this data set and are more of a popularity variable than a choice decision. The variable is further broken down into male and female applicants to observe variances in correlation due to gender.

Quality. Measures of quality are recorded in this data for incoming freshmen. These indicators are incoming freshmen high school GPA, the weighted average ACT score for incoming freshmen, and the weighted averages for both Verbal and Math SAT scores. Incoming freshman GPA is the weakest of the indicators of incoming student quality. GPA is a subjective measure largely relying on non-standardized course curriculum and grading criteria unique to every teacher. Other problems such as grade inflation can create inherent biases in this variable that are impossible to mitigate.

Incoming ACT score is a more reliable measure of quality. Scores range from 1 to 36 and represent aggregate performance on english, mathematics, reading, and science sections. The scores from the dataset are reported in percentage of student scoring within a score band instead of individual score. This may prevent observations of specific areas in which incoming student quality is gained or lost.

The SAT and its components allow for the most precise measurement of incoming student quality. While administered in three parts, Verbal, Math, and Writing, only Verbal and Math are included in this data set. The writing portion suffers from the same subjective

interpretation as GPA. The Math and Verbal sections range in score from 200 to 800 and change in increment by 10's, giving each section almost twice the precision as the ACT.

Methods

Alterations in Quantity Variables

To account for the vast range in number of applicants and enrollments across public and private colleges, the variables relating to measures of quantity were transformed by generating log variables for each. This standardizes the quantity variables by changing the output from raw data to comparisons of geometric means. Comparing the geometric means expresses marginal effects as a percentage change rather than numeric magnitudes.

Fixed-Effects Model

The nature of this data does not lend itself to simple linear regression analysis. The data sets consist of panel data for 120 schools over a 12-year period. There are two main factors that need to be accounted for with this type of data: time effects and factors unique to the individual institutions.

Factors such as location, tuition, prestige, and other college choice variables could skew the results within a simple linear regression analysis. The unobserved heterogeneity altering results is immeasurable because of its inherent nature. However, these factors can be compensated for by using unique dummy variables for each institution. Using dummy variables controls for the average differences across institutions in regard to any observable or unobservable predictors. This fixed-effects model compensates for all across-group action and leaves only intra-group actions to be observed.

Finally, college application deadlines vary, and effects from sports success may be inherently time-barred for the year or season in which they occurred. Historical success of a team is also expected to play a role in college choice decision. To see these time-relative effects, the regression formula will account for 1) the year of the success, 2) one year after the success, and 3) two years after the success.

Results

Measures of Quality

Descriptive statistics of quality variables can be found in Table 2. Full tables of coefficients and p-values for all variables measuring student quality can be found in Table 3. None of the quality variables measured in this study showed any statistically significant correlation to upset wins.

Freshman GPA. The GPA variable showed no statistically or economically significant correlations with an upset win. A possible reason for this is that GPA is a subjective variable that can vary by school. The lowest p-value was 0.406, occurring the year after an upset win, with an average p-value over the fixed effects lags of 0.678.

Weighted ACT Score. Similar to the GPA variable, the lowest p-value recorded was 0.198 and occurred the year after the upset. The average p-value for this variable was 0.621. The coefficients ranged from positive to negative figures with no economic significance.

Weighted SAT Verbal Score. While not statistically significant, that variance of the coefficient and p-values decrease compared to other variables measuring quality. The variable exhibited negative values in the years after upset wins, but none were significant at even the 10% level.

Weighted SAT Math Score. This variable has both high variance in coefficients and in p-values. P-values range from 0.485 to 0.877, so no finding is statistically significant.

Measures of Quantity

Descriptive statistics of both raw and logged variables can be found in Table 1. Full tables of coefficients and p-values for all variables measuring student quantity can be found in Table 4. In the analyses, the change in geometric mean generated by the logged variables were translated back into the average percentage change.

Total Applicants. This variable exhibited a statistically and economically significant correlations to upset wins. Two years after an upset win, a school can expect to receive 6.96% more applications, significant at the 5% level.

Male Applicants. Male applicants showed no statistically significant correlation to upset wins. The p-values recorded both the year after and two years after an upset were were borderline statistically significant but not reportable.

Female Applicants. Applications from females, on average, increased 6.94% two years after an upset win, significant at the 5% level. The year after an upset win showed promise, but only reportable at the 10% level.

Total Freshman Enrollment. Total enrollment was significant for every the two lagged variables in the fixed effects model. The year after an upset win, total enrollment increases by 5.55% reportable at the 5% significance level. Two years after an upset, winning schools saw an increase of 6.71% in total enrollment significant at the 1% level.

Male Freshman Enrollment. Male enrollment also saw statistically significant positive correlation with winning an upset. The year after an upset win was correlated to an increase of

5.49% at the 5% significance level. Two years after an upset win, a school could expect to see an increase in male enrollment of 5.13%, also at the 5% significance level.

Freshman Female Enrollment. Correlations between upsets and female enrollment were statistically significant for the year after, and two years after an upset win. The year after was correlated with a 6.00% increase significant at the 5% level, and two years after was correlated with an increase of 7.92% reportable at the 1% significance level.

Conclusions

These findings suggest that an upset win in football has a positive correlation impacting the quantity of applications received and enrollment decisions, but does not have any correlation to the quality of those students entering the institution. The findings also show that winning an upset has some continuous benefits for the University, as the increases in student quality extend for subsequent years. Interestingly, the effect of an upset win on female applicants and enrollments is both more economically and statistically significant than an upset win's effect on their male counterparts.

Winning an upset in college football also causes increased media attention which allows the university to be the beneficiary of an advertising effect. This advertising effect translates into measurable increases in applications and enrollment. Increases in enrollment decisions of 6% or more due to winning an upset can translate into 1,000's of new students for even mid-sized schools. This research suggests that college athletics really are the "front porch" of a University. Winning an upset serves as a signal to prospective students to the quality of an Institution. These findings can help both administrative and athletic personnel see direct benefits attributable to winning an upset in college football.

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Tables

Table 1: Upsets

<u>Massey Rank</u>	<u>Date</u>	<u>RankW</u>	<u>Winner</u>	<u>ScoreW</u>	<u>RankL</u>	<u>Loser</u>	<u>ScoreL</u>
4	11/16/02	114	Army	14	66	Tulane	10
11	10/6/07	62	Stanford	24	2	USC	23
27	10/13/01	33	Auburn	23	2	Florida	20
28	11/17/11	34	UAB	34	24	Southern Miss	31
30	12/1/07	52	Pittsburgh	13	3	West Virginia	9
34	10/11/08	114	New Mexico State	48	69	Nevada	45
36	9/20/03	49	Marshall	27	12	Kansas State	20
51	10/22/11	41	Texas Tech	41	8	Oklahoma	38
54	9/1/08	79	Fresno State	24	30	Rutgers	7
60	9/22/07	99	UNLV	27	32	Utah	0
65	10/11/03	21	Florida	19	2	LSU	7
66	9/29/12	70	MTSU	49	41	Georgia Tech	28
70	8/31/02	98	Louisiana Tech	39	30	Oklahoma State	36
71	10/21/00	111	Connecticut	38	90	Akron	35
80	10/24/09	59	Iowa State	9	17	Nebraska	7
80	11/11/00	110	Central Michigan	21	49	Western Michigan	17
83	11/18/11	37	Iowa State	37	3	Oklahoma State	31
83	10/24/09	57	Texas A&M	52	24	Texas Tech	30
87	10/6/01	87	Kansas	34	41	Texas Tech	31
88	9/22/07	88	Syracuse	38	41	Louisville	35
89	11/24/01	60	Oklahoma State	16	10	Oklahoma	13

Table 2: Descriptive Statistics

Variable	Description	Obs	Mean	Std. Dev.	Min	Max
Applications Received	log of Total Applications Received	1604	9.356134	0.6491301	7.247793	11.02783
Male Applications Received	log of Applications Submitted by Men	1537	8.603696	0.6614834	6.22059	10.25058
Female Applications Received	log of Applications Submitted by Women	1537	8.712233	0.6564771	6.804615	10.41226
Total Enrolled	log of Total Incoming Full-Time Freshmen	1577	7.986253	0.530456	6.177944	9.11405
Males Enrolled	log of Incoming Freshmen Men Choosing to Enroll Full-Time	1577	7.240838	0.5274417	5.521461	8.414495
Female Enrolled	log of Incoming Freshmen Women Choosing to Enroll Full-Time	1577	7.319078	0.603993	5.147494	8.427268
GPA	Incoming Freshman GPA	1612	2.568127	1.539056	0	4.5
Weighted ACT Score	Incoming Freshman ACT Weighted Average	1612	18.88542	7.948957	0	29.208
Weighted SAT Math	Incoming Freshman SAT Math Weighted Average	1612	465.094	197.1337	0	684
Weighted SAT Verbal	Incoming Freshman SAT Verbal Weighted Average	1612	447.4868	194.8633	0	676

Table 3: Measures of Incoming Student Quality

	<u>Incoming Freshman GPA</u>	<u>Weighted ACT Score</u>	<u>Weighted SAT Verbal Score</u>	<u>Weighted SAT Math Score</u>
Upset Win --	0.0219722	0.2915963	-16.18694	-17.13393
<i>p-value</i>	<i>0.919</i>	<i>0.83</i>	<i>0.610</i>	<i>0.567</i>
Upset Win L1	-0.1705794	-1.557006	-27.73941	4.390698
<i>p-value</i>	<i>0.406</i>	<i>0.198</i>	<i>0.355</i>	<i>0.877</i>
Upset Win L2	0.0781284	-0.6248474	-23.72242	-20.13922
<i>p-value</i>	<i>0.708</i>	<i>0.605</i>	<i>0.436</i>	<i>0.485</i>

* Denotes Significance at the 5% Level.

** Denotes Significance at the 1% Level.

Table 4: Measures of Incoming Student Quantity

	<u>Log Total Applicants</u>	<u>Log Male Applicants</u>	<u>Log Female Applicants</u>	<u>Log Freshman Enrollment</u>	<u>Log Freshman Male</u>	<u>Log Freshman Female</u>
Upset Win --	0.0072317	- 0.0007621	0.0063674	0.0550798	0.0387947	0.0317501
<i>p-value</i>	<i>0.833</i>	<i>0.983</i>	<i>0.857</i>	<i>0.179</i>	<i>0.134</i>	<i>0.236</i>
Upset Win L1	0.0618725	0.0496478	0.0630368	*0.0540292	*0.0534871	*0.0582218
<i>p-value</i>	<i>0.064</i>	<i>0.148</i>	<i>0.066</i>	<i>0.023</i>	<i>0.033</i>	<i>0.025</i>
Upset Win L2	*0.067329	0.0542321	* 0.0671178	**0.064937	*0.0499848	**0.0761926
<i>p-value</i>	<i>0.041</i>	<i>0.110</i>	<i>0.048</i>	<i>.003</i>	<i>0.032</i>	<i>0.002</i>

* Denotes Significance at the 5% Level.

** Denotes Significance at the 1% Level.