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The "Cinderella Effect": The Value of Unexpected March Madness Runs as Advertising for the Schools

Trevor Collier[1], Nancy Haskell[1], Kurt W. Rotthoff[2], and Alaina Baker[1]

Abstract

This study looks at the impact of a university making a surprise ("Cinderella") run in the men's NCAA basketball tournament. Our results suggest that surprise success in the tournament has little to no impact on the quantity of applications in subsequent years. However, we find that freshmen enrollments increase for private schools two academic years after a Cinderella run (with mixed results on the quality of freshmen—although not worse). Given an average private school, with 1,253 freshmen and paid tuition of $24,428 (each year) plus room and board, a Cinderella run is worth approximately $7.3 million in 2012-dollars.

Keywords

university advertising, NCAA basketball, Cinderella runs, academic outcomes

Introduction

Media pundits, university administrators, and fans of collegiate athletics often debate whether collegiate athletics support the academic missions of colleges and

[1] University of Dayton, OH, USA
[2] Seton Hall University, South Orange, NJ, USA

Corresponding Author:
Kurt W. Rotthoff, Seton Hall University, 400 South Orange Ave, JH 674, South Orange, NJ, USA.
Emails: kurt.rotthoff@shu.edu; rotthoff@gmail.com

universities. There are numerous academic studies linking athletics, both positively and negatively, with a school's academic mission. This study expands the research by looking at the impact of a surprise "Cinderella" run in the NCAA Men's Division 1 Basketball Tournament. For example, Imbert (2015) says, "After Butler reached the national championship game in 2010, its student applications rose about 40 percent . . . [a]pplications at Florida Gulf Coast increased by nearly 40 percent after that school reached the Sweet 16 in 2013, and applications at Gonzaga rose nearly 12 percent from fall of 1998 to fall of 1999." Each of these instances occurred after that team made a "Cinderella" run in the basketball tournament. This study adds to the literature by answering the question: Does a surprise basketball tournament performance positively impact the institution in measurable ways? With our detailed data, we are also able to estimate the magnitude of the impact.

Prior academic studies suggest that athletic successes can have a positive influence on post-secondary institutions in a number of ways: increased quantity and quality of applicants (Chung, 2013; McCormick & Tinsley, 1987; Pope & Pope, 2009), better facilities for both athletes and non-athletes (Maloney & McCormick, 1993), increased alumni giving (Rhoads & Gerking, 2000; Tucker, 2004), and improved position in published rankings based on peer assessments (Mulholland et al., 2014). Unfortunately, athletics have the potential for negative impacts as well. Academic studies have also found lower grades can result from participation in athletics and from fielding successful athletic teams (Hernández-Julián & Rotthoff, 2014; Lindo et al., 2012; Maloney & McCormick, 1993). Additionally, when a school has an athletic team that engages in impropriety, it can lead to lower enrollments and quality of incoming students (Eggers et al., 2019, 2020).

The previous evidence suggests that sporting success provides positive advertising for institutions of higher education. However, these positive outcomes are mostly generated by well-known universities that have persistent success (and given that they are already well known, it is not clear how this impact translates to other, less-well-known, teams that also have this type of success). For example, the national champions in the NCAA Division 1 Football Bowl Subdivision (FBS) over the past 10 years (2009-2018) were: Alabama (5 times), Auburn, Florida State, Ohio State, and Clemson (twice). These are all large, public institutions that are well known to almost all college sports fans. These successes in football obviously provide positive media exposure for the schools, and previous research suggests they lead to increases in applications and enrollments (see Chung, 2013; Pope & Pope, 2009). However, it is much more surprising when a school like Bradley University, a private school in Peoria, Illinois with less than 5,000 undergraduate students, makes a run into the "Sweet Sixteen" of the men's NCAA basketball tournament, as they did in 2006 by defeating the higher ranked teams from Kansas and Pittsburgh. We would expect to see a much larger impact (relative to a commonly known school that is expected to perform well in the tournament) in the number of high school students interested in learning more about Bradley. This success garnered widespread attention, with

articles in multiple national media outlets, including ESPN and CBS News (Dakss, 2006; Vitale, 2006).

In this study, we take a closer look at measures of this advertising impact for surprise successes in the NCAA Division I men's basketball tournament. Schools themselves spend a lot of money on advertising (estimates range from 1.5% to 6.0% of a university's budget, which has been increasing over time), but the national attention that a school can get from making a run during March Madness brings schools the type of advertising that cannot be bought easily (Zinkan, 2017). Generally, we find that these surprise runs have little impact on the quantity of applications, but we do find that incoming freshman enroll at a higher rate at private schools (2 years after the Cinderella run). With the average private school costing $24,428 (plus room and board), and enrolling 1,253 freshmen, this translates to approximately $7.3 million, in 2012-dollars, to each school that makes a Cinderella run.

Related Research

McCormick and Tinsley (1987) find that schools can increase the quantity and quality of students through their investment in athletics, stating "[t]his implies that athletic success can often go hand in hand with academic success, and, insofar as this study goes, critics of athletic success are misguided if their motive is the academic improvement of the university." A number of studies followed, attempting to empirically measure the relationship between athletic performance and the college admission decisions of high school students.[1] While these studies certainly advanced the body of knowledge in this area, most of them use a single year of cross-sectional data (with the exception of Murphy & Trandel, 1994), leaving questions as to whether unobserved school-level attributes are correlated with sports success, potentially biasing the estimates from these models.

Pope and Pope (2009), utilizing panel fixed effects methods (controlling for unobserved school-level attributes and avoiding the bias potentially present in most previous studies), find that success in Division 1 football and basketball in one season can significantly increase the quantity of applications to that school (with a larger impact to private schools than public schools) in subsequent years and that these extra applicants are from both low and high SAT scoring students. Following this increase in applications, they find that schools exploit these additional applications by increasing the number and quality of incoming students. Similarly, Chung (2013) finds that success at the highest level of college football can improve the quality (as measured by SAT scores) and quantity of applicants in subsequent years. He likens this to a "stock of goodwill that decays over time" and finds that, while quality does increase in response to football performance, lower quality students are more responsive to football performance. Both of these studies are in line with the results in Jacob et al. (2018), who find that there is a higher demand for consumption spending in

college than there is for academic spending. Thus, this athletic success impacts the quality of students who attend a given institution.

Pope and Pope (2014) delve into the mechanism through which this athletic success influences student application decisions. Their study provides substantial evidence that athletic success influences college application decisions because the successful athletics programs increase attention on their respective schools. This suggests that athletic success serves to increase awareness of their institution to the high school population (i.e. more advertising).

Caudill et al. (2018) find that when a university chooses to discontinue their collegiate football team, it reduces the size of its applicant pool by 32% and reduces the quality of the incoming class. Whereas Murphy and Trandel (1994) find that "improvement in a school's football winning record appears to boost a school's advertising in a way that produces and increase in the number of applicants to that school." Additionally, Smith (2009) posits that positive changes in student quality are not attributable to wins or other commonly used measures of athletic success. Instead, he argues that increases in student quality are a function of the sports culture and tradition surrounding a school. This study claims that the advertising effect from on-field success is de minimus when compared to non-athletic indicators. Although Smith (2015) claims that the advertising effect from on-field success is minimal when compared to non-athletic indicators, he finds prolonged success in athletics is much more beneficial for a university than a single upset win or acute advertising effects from playoff berths or bowl games.

We extend this literature to look at how *surprise* performances in the NCAA's annual basketball tournament (called March Madness) impacts the quantity and quality of applicants at that specific school, as well as the resources of the university (tuition revenue and freshmen enrollment). If the primary influence of athletic success is through increased awareness (as argued in Pope & Pope, 2014), then **un**expected athletic success should provide a greater influence. If the University of Alabama finishes the college football season ranked in the top 10 every year, then their athletic success in any 1 year should provide very little increased awareness of the university. However, when a school like Florida Gulf Coast University makes a run into the Sweet 16 of the NCAA basketball tournament (as they did in 2013), high school students around the country are suddenly exposed to a university they may never have otherwise known. We want to determine if these unexpected March Madness successes—and brief moments of fame—can translate into legitimate increases to the quality of academics, students, or other resources at Cinderella schools.

Data and Methodology

Data

Teams that advance surprisingly far during the NCAA basketball tournament are affectionately dubbed Cinderella stories. These moments of fame generate publicity

for the school through additional televised tournament games and media mentions of their underdog success during March Madness—often an advertisement for that school that cannot be purchased. Although there is no technical definition for a Cinderella team, we attempt to formalize the term for the purpose of this study. We search news archives for all teams referred to as Cinderella stories during the NCAA men's basketball tournament from 1985-2017.[2] Our primary list of Cinderella runs can be seen in Table 1.

To measure the impact of these Cinderella runs, we combine data from multiple sources. The largest source of information in this study comes from the Peterson's Undergraduate Database, a comprehensive source of admissions, enrollment, and financial information for thousands of undergraduate institutions in North America. This proprietary database includes information on the number of applicants received, freshmen undergraduate student enrollment, total undergraduate student enrollment, and tuition from 1983 through 2017.[3] We supplement this with the number of high school graduates by state, collected from the National Center for Education Statistics (NCES) for each year in our sample. Finally, we collect per capita income by state from the Bureau of Economic Analysis (BEA) and a personal consumption expenditure (PCE) deflator from the Federal Reserve Economic Data (FRED).[4] We convert all dollar values used in this study into real 2012-dollars using this PCE deflator.

The Associated Press has conducted and published its AP College Football Poll annually since 1936. We use the final poll taken after all college football bowl games have been concluded and generate indicator variables for whether a school's football team finished in the top 20, top 10, or as the national champion in each year.[5] The football performance information comes from College Poll Archive of the final AP NCAA Division I football poll.

The National Association of Basketball Coaches hosted the first post-season tournament for college basketball teams in 1939. The NCAA took control of the tournament in the next year and it has grown into an incredibly popular television event in the United States, known as March Madness. The tournament, which originally included only 8 teams, is a single elimination contest among 68 teams from the NCAA Division I men's basketball league. The most dramatic increase in the tournament came in 1985, when they increased the number of teams qualifying for the tournament from 52 to 64. The NCAA allowed 65 teams from 2001-2010 (where two teams competed in a "play-in" game) and 68 teams since 2011 (where eight teams compete in "play-in" games). We utilize men's NCAA Division I basketball tournament results from the Washington Post to generate indicator variables for the furthest a school's basketball team advanced in the tournament. With this we focus on whether a school's basketball team made it to the "Sweet Sixteen" (third round/regional semi-finals), "Elite Eight" (fourth round/regional finals), "Final Four" (semifinals), or won the tournament championship.[6]

Table 2 displays the mean and standard deviation for all of the data used in our regression models over the full sample period of 1985-2017, with the exception of

Table 1. Cinderella Runs.

Year	School	Seed	Tournament Finish
1985	Boston College	11	Sweet Sixteen
1985	Villanova University	8	Champion
1986	Cleveland State University	14	Sweet Sixteen
1986	Louisiana State University and Agricultural & Mechanical College	11	Final Four
1986	United States Naval Academy	7	Elite Eight
1987	Providence College	6	Final Four
1988	The University of Kansas	6	Champion
1988	University of Richmond	13	Sweet Sixteen
1989	Seton Hall University	3	Final Four
1989	University of Minnesota, Twin Cities Campus	11	Sweet Sixteen
1989	University of Virginia	5	Elite Eight
1990	Loyola Marymount University	11	Elite Eight
1991	Eastern Michigan University	12	Sweet Sixteen
1992	The University of Texas at El Paso	9	Sweet Sixteen
1993	The George Washington University	12	Sweet Sixteen
1994	Boston College	9	Elite Eight
1994	Marquette University	6	Sweet Sixteen
1994	The University of Tulsa	12	Sweet Sixteen
1994	University of Maryland, College Park	10	Sweet Sixteen
1997	The University of Tennessee at Chattanooga	14	Sweet Sixteen
1998	Valparaiso University	13	Sweet Sixteen
1999	Gonzaga University	10	Elite Eight
1999	Miami University	10	Sweet Sixteen
2000	Gonzaga University	10	Sweet Sixteen
2000	University of Wisconsin–Madison	8	Final Four
2001	Penn State University Park	7	Sweet Sixteen
2002	Indiana University Bloomington	5	Final Four
2002	Kent State University	10	Elite Eight
2002	Southern Illinois University Carbondale	11	Sweet Sixteen
2002	University of California, Los Angeles	8	Sweet Sixteen
2002	University of Missouri	12	Elite Eight
2003	Marquette University	3	Final Four
2004	The University of Alabama at Birmingham	9	Sweet Sixteen
2004	Vanderbilt University	6	Sweet Sixteen
2005	University of Louisville	4	Final Four
2005	West Virginia University	7	Elite Eight
2006	Bradley University	13	Sweet Sixteen
2006	George Mason University	11	Final Four
2008	Davidson College	10	Elite Eight
2009	The University of Arizona	12	Sweet Sixteen
2010	Butler University	5	Final Four
2010	Cornell University	12	Sweet Sixteen
2010	Saint Mary's College of California	10	Sweet Sixteen

(continued)

Table 1. (continued)

Year	School	Seed	Tournament Finish
2010	University of Northern Iowa	9	Sweet Sixteen
2011	Butler University	8	Final Four
2011	Virginia Commonwealth University	11	Final Four
2012	North Carolina State University	11	Sweet Sixteen
2012	Ohio University	13	Sweet Sixteen
2012	Xavier University	10	Sweet Sixteen
2013	Florida Gulf Coast University	15	Sweet Sixteen
2013	La Salle University	13	Sweet Sixteen
2013	Wichita State University	9	Final Four
2014	University of Dayton	11	Elite Eight
2016	Syracuse University	10	Final Four
2017	University of Michigan	7	Sweet Sixteen
2017	University of South Carolina	7	Final Four
2017	Xavier University	11	Elite Eight

Notes: We define a Cinderella run as any team that won at least 2 games (excluding "play-in" games, which started in 2011), did not enter the tournament as a 1-seed or 2-seed, and was referred to in the media as a having a "Cinderella," "upset," "underdog," "surprise", "darling" or "sweetheart," run in the tournament. We have 57 instances of Cinderella performances by 52 different teams in the dataset.

Table 2. Summary Statistics.

Panel A: Dependent Variables

Sample:	Years	All	Private	Public
Applicants	1985-2017	9,408.57	8,696.63	9,809.24
		(8,631.82)	(8,571.69)	(8,640.44)
Real Tuition	1985-2017	11,778.54	24,428.34	4,690.60
		(11,226.83)	(9,461.26)	(2,552.71)
Freshman Enrollment	1998-2017	2,227.69	1,253.10	2,765.65
		(1,577.54)	(804.33)	(1,640.65)
Yield	1998-2017	0.386	0.319	0.423
		(0.150)	(0.149)	(0.136)
% SAT-Math 500-599	1985-2017	34.34	32.36	35.74
		(12.72)	(14.60)	(10.99)
% SAT-Math 600-699	1985-2017	26.53	30.86	23.48
		(14.37)	(14.25)	(13.66)
% SAT-Math 700+	1985-2017	10.70	15.95	7.00
		(15.57)	(20.37)	(9.35)
% SAT-Verbal 500-599	1985-2017	35.14	34.36	35.68
		(12.99)	(14.33)	(11.93)
% SAT-Verbal 600-699	1985-2017	22.03	26.99	18.52
		(14.43)	(15.24)	(12.71)
% SAT-Verbal 700+	1985-2017	7.69	12.17	4.52
		(12.73)	(17.61)	(5.78)

(continued)

Table 2. (continued)

Panel B: Independent Variables				
Sample:	Years	All	Private	Public
NCAA Round of 64	1985-2017	0.099	0.092	0.102
		(0.298)	(0.289)	(0.303)
NCAA Round of 32	1985-2017	0.051	0.046	0.053
		(0.219)	(0.209)	(0.224)
NCAA Sweet Sixteen	1985-2017	0.025	0.021	0.028
		(0.157)	(0.142)	(0.164)
NCAA Elite Eight	1985-2017	0.013	0.009	0.015
		(0.113)	(0.097)	(0.121)
NCAA Final Four	1985-2017	0.010	0.005	0.012
		(0.098)	(0.072)	(0.109)
NCAA Tournament Champion	1985-2017	0.003	0.002	0.004
		(0.056)	(0.046)	(0.061)
Cinderella	1985-2017	0.006	0.007	0.005
		(0.074)	(0.083)	(0.067)
Non-Media Cinderella	1985-2017	0.024	0.023	0.025
		(0.153)	(0.149)	(0.156)
AP Football Poll Top 20	1985-2017	0.032	0.013	0.042
		(0.175)	(0.115)	(0.200)
AP Football Poll Top 10	1985-2017	0.029	0.012	0.039
		(0.168)	(0.108)	(0.193)
Football National Champion	1985-2017	0.003	0.002	0.004
		(0.057)	(0.046)	(0.063)
Most Difficult Acceptance	1985-2017	0.055	0.146	0.004
		(0.229)	(0.353)	(0.065)
Very Difficult Acceptance	1985-2017	0.123	0.196	0.081
		(0.328)	(0.397)	(0.274)
Moderate Difficult Acceptance	1985-2017	0.698	0.629	0.737
		(0.459)	(0.483)	(0.441)
Real State Income Per Capita	1985-2017	37,718	40,787	35,991
		(8,486)	(9,223)	(7,509)
State Public High School Graduates	1985-2017	89,819	111,322	77,718
		(79,988)	(88,570)	(71,962)
Number of Schools		352	120	232
Number of Conferences		40	34	36

Notes: The data represent all colleges and universities participating in NCAA Division I Men's Basketball during the time period 1985-2017. Means (with the standard deviation in parentheses) of dependent variables are reported for each respective regression sample, with slight variation in sample sizes due to missing observations. All means and standard deviations of independent variables are reported for the applicant regression sample, which contains 9,147 observations. All real variables are reported in 2012-dollars. Freshman enrollment and yield are only reported starting in 1998 in our dataset, thus reducing the number of observations for these regressions. We report summary statistics for the full data sample and separately for the subset of private schools and public schools. The data include 352 unique institutions representing 40 different conferences.

freshmen enrollment and yield, which are only reported in the dataset from 1998 onward.[7] As one can see, it is more common for a school's football team to finish in the AP top 20 (3.2%) or for a school's basketball team to make it to the "Sweet

Sixteen" (2.5%) than it is for a school's basketball team to make what is considered a Cinderella run in the NCAA tournament (0.6%). While this occurrence is quite rare, the buzz surrounding these incredible performances in the popular media is extensive and often believed to be quite valuable.

We also split the sample into private and public schools. Public schools are more likely to make and advance in the NCAA men's basketball tournament, and they have substantially more successful football teams. However, private schools are slightly more likely to be named as a Cinderella. While private schools comprise one-third of the data sample, they account for 45% of the Cinderella runs from 1985-2017. Among these schools with Division I basketball programs, private schools have 50% fewer freshmen enroll and list tuition costs almost 6 times larger than public schools, on average.[8] Private schools in the sample also have slightly higher acceptance difficulty and a larger percentage of students with math and verbal SAT scores above 600. This acceptance difficulty is consistent with the fact that despite having 50% smaller entering classes, on average, private schools receive only 12% fewer applications than public schools.

Empirical Model

When game announcers and sports analysts discuss a basketball team's miraculous journey through the tournament, the school receives a wave of national advertising that typically cannot be bought. We measure the impact of this Cinderella advertising shock on applicants, real tuition, and freshmen enrollment using a fixed effects regression model. The model measures the added returns to a Cinderella run, beyond the returns to a successful finish in the NCAA basketball tournament. Pope and Pope (2009) show that, on average, universities tend to see an increase in applicants after a successful finish in men's basketball or men's football. The returns to national media attention from *unexpectedly* advancing through the NCAA basketball tournament should be even larger because these Cinderella stories are often small schools, largely unknown outside their locale.

We employ a fixed-effects estimator (with school, year, and conference fixed effects), control for school-specific time trends, and cluster standard errors by University. The regression specification takes the following functional form:

$$\ln(y_{i,j,t}) = \alpha + \sum_{k=0}^{4} C_{i,j,t-k+1}\beta_k + \sum_{k=0}^{4} B_{i,j,t-k+1}\gamma_k + \sum_{k=0}^{3} F_{i,j,t-k+1}\theta_k + X_{i,j,t-1}\xi + Z_{i,j,t}\omega + S_t\varphi + \tau_t + \mu_j + \nu_i + \lambda_i t + \varepsilon_{i,j,t} \quad (1)$$

The dependent variable, $\ln(y_{i,j,t})$, represents the natural log of either applicants, freshmen fall enrollment, or real tuition for university i, in athletic conference j, and year t. Each dependent variable serves as a measure of demand for the university. An NCAA men's basketball tournament Cinderella run is represented by the dummy variable (C), where we include a 1-year lead, a contemporaneous effect, and 1-, 2-,

and 3-year lags. To identify the effects of an unexpected Cinderella run separate from a successful basketball program, we account for the team's finish in the NCAA tournament with the same leads and lags for a vector of dummy variables (B), representing the furthest round of the tournament in which a team appears.[9]

We additionally control for a number of other university athletic and academic factors that affect student demand. Athletic success in football (F) is measured by a 1-year lead, a contemporaneous effect, and 1- and 2-year lags of indicator variables for whether the team won the national championship or finished the season ranked in the AP Poll Top 10 or Top 20.[10] We also include a vector of indicator variables for categories of a school quality index measuring acceptance difficulty (Z) and the natural log of real tuition (X) to account for academic quality.[11] Finally, we include a vector of variables measuring statewide potential demand (S). These include the natural log of real income per capita and the natural log of public high school graduates in the state.[12] The model also controls for year fixed effects (τ_t), NCAA Division I athletic conference fixed effects (μ_j), school-specific fixed effects (ν_i), and school-specific linear time trends ($\lambda_i t$).[13] The error term is represented by $\varepsilon_{i,j,t}$.

Timing of Events and Identification

Merging data on collegiate sporting events, reported by calendar year, with academic year data from universities requires some discussion. In our dataset, the year refers to the spring term of the academic year (e.g., 2016 refers to the 2015-2016 academic year). Universities generally approve tuition rates between April and July for the upcoming academic year. Freshmen enrollment occurs in August, and applications for the following academic year are due between January and February for most institutions. The football national championship and associated end-of-season AP rankings occur in January, while the NCAA basketball tournament begins in March. We label all variables that occur during the 2015-2016 academic year as dataset year 2016, as shown by all variables to the left of the dashed line in Figure 1. Football performance could have a contemporaneous effect on applications received the same month. However, performance in the NCAA basketball tournament can only affect tuition, enrollment, and applicants in the following year since it is the last event that occurs in a given dataset year.

These differences in timing are important for the regression specification. Our empirical strategy exploits a threefold approach to identify the effects of a Cinderella advertising shock. First, we control for school, conference, and year fixed effects, as well as school-specific time trends. These account for any idiosyncratic features of the school or conference, and any national factors such as recessions that affect college applicants, tuition, and enrollment. Second, we control for the highest round played in the NCAA tournament. This guarantees that our coefficient estimates on the Cinderella indicator variables are identifying the *added effect* of being an *unexpected* team in that round of the tournament, and not merely capturing the media attention that comes with televised tournament games. Third, we include contemporaneous and 1-year

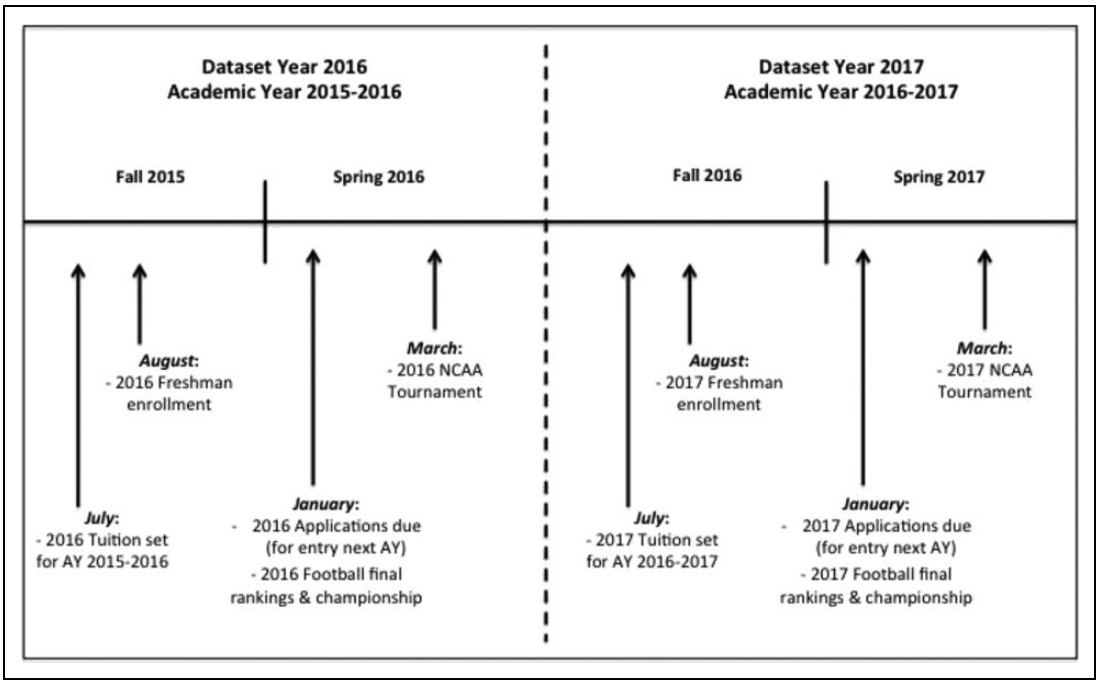

Figure 1. Timing of Events.

leads of the athletic variables (Cinderella, basketball performance, and football ranking) as a falsification test. If growth in university demand is driving athletic recruiting and success, then we might expect to find positive effects on the leads of athletic performance. However, if the advertising shock from unexpected athletic success causes an increase in demand for the university, we will only find lagged effects due to the timing of the NCAA tournament relative to application, enrollment, and tuition deadlines.

We offer one caveat to these falsification tests. In some cases, a school has a NCAA tournament performance that leads to a Cinderella run the following year. A tournament appearance in a given year could cause a Cinderella run the following year under two common scenarios. (1) The school has a very strong (expected) performance, but is not expected to do as well the following year after a number of star players leave. The remaining returners, however, lead the team to exceed expectations in the tournament. (2) A young team makes it to the tournament, perhaps for the first time in many years. These players build on this experience and mount a Cinderella run in the following year.

Additionally, we split the sample into private and public schools, and re-estimate the model in equation (1) for each subsample. Given the differences in average size, typical market, and institutional rules (e.g., state funding, in-state acceptance policies, and tuition-setting leeway) we hypothesize that a Cinderella run might have differential impacts on private and public institutions. In particular, private schools tend to be smaller and less well known, on average, while also drawing from out-of-state markets (no difference in tuition by state). Thus, we might expect these schools to benefit the most from a sudden wave of national advertising.

Results

Our results are mostly consistent with the previous literature in regard to the impact of sporting success on college applications. As you can see from Columns 1 to 3 in Table 3, we find that better outcomes in the NCAA basketball tournament and higher ranking in the AP college football poll all lead to increased applications in subsequent years.[14] Our contribution to the literature comes from the inclusion of a variable measuring unexpected success in college basketball (Cinderella runs). Interestingly, we find no change in the number of applications in subsequent years resulting from these surprise, Cinderella runs in the NCAA basketball tournament. Cinderella runs also appear to have no relationship with real tuition. However, we do find a positive and statistically significant relationship between Cinderella runs and a school's freshmen undergraduate enrollment two academic years following this surprise performance in the NCAA basketball tournament (columns 1–3 in Table 4).[15]

At first glance, it might be quite puzzling as to how a school could see no increase in applications, but still experience an increase in freshmen enrollment. This could be explained by one of two possibilities: (i) although application numbers did not change,

Table 3. Applicants and Tuition (Select Coefficient Estimates).

Dependent Variable:	ln(Applicants)			ln(Real Tuition)		
	All	Private	Public	All	Private	Public
School Sample:	(1)	(2)	(3)	(4)	(5)	(6)
(Cinderella Run)$_{t+1}$	−0.060*	−0.096***	−0.038	−0.020	−0.000	−0.025
	[0.033]	[0.035]	[0.051]	[0.014]	[0.011]	[0.020]
(Cinderella Run)$_{t}$	−0.037	−0.085**	0.000	0.003	0.011	0.000
	[0.025]	[0.033]	[0.030]	[0.013]	[0.010]	[0.018]
(Cinderella Run)$_{t-1}$	−0.037*	−0.048*	−0.030	0.021	0.010	0.028
	[0.021]	[0.026]	[0.027]	[0.015]	[0.011]	[0.023]
(Cinderella Run)$_{t-2}$	−0.010	−0.058*	0.008	0.012	0.009	0.017
	[0.021]	[0.034]	[0.029]	[0.014]	[0.010]	[0.022]
(Cinderella Run)$_{t-3}$	−0.011	−0.044	0.005	0.017	0.010	0.028
	[0.022]	[0.035]	[0.030]	[0.015]	[0.011]	[0.023]
(NCAA Sweet Sixteen)$_{t+1}$	0.029**	0.014	0.033**	0.000	−0.001	−0.003
	[0.011]	[0.019]	[0.014]	[0.008]	[0.009]	[0.011]
(NCAA Sweet Sixteen)$_{t}$	0.019*	0.004	0.023*	−0.003	0.004	−0.007
	[0.011]	[0.020]	[0.013]	[0.008]	[0.006]	[0.010]
(NCAA Sweet Sixteen)$_{t-1}$	0.030***	0.006	0.037***	−0.004	0.001	−0.007
	[0.011]	[0.020]	[0.013]	[0.009]	[0.006]	[0.012]
(NCAA Sweet Sixteen)$_{t-2}$	0.043***	0.038	0.043***	0.008	0.003	0.010
	[0.012]	[0.025]	[0.013]	[0.008]	[0.006]	[0.010]
(NCAA Sweet Sixteen)$_{t-3}$	0.024*	0.019	0.025	0.012	0.001	0.016
	[0.013]	[0.021]	[0.015]	[0.009]	[0.007]	[0.011]
(NCAA Elite Eight)$_{t+1}$	−0.003	0.050	−0.028	0.024	−0.003	0.031
	[0.018]	[0.042]	[0.018]	[0.021]	[0.006]	[0.028]
(NCAA Elite Eight)$_{t}$	−0.006	0.050	−0.027	0.009	−0.007	0.011
	[0.020]	[0.050]	[0.018]	[0.014]	[0.009]	[0.019]
(NCAA Elite Eight)$_{t-1}$	−0.007	0.031	−0.016	0.010	−0.007	0.014
	[0.015]	[0.033]	[0.016]	[0.014]	[0.008]	[0.020]
(NCAA Elite Eight)$_{t-2}$	0.015	0.053	0.002	0.024*	0.011	0.024
	[0.014]	[0.034]	[0.014]	[0.013]	[0.008]	[0.017]
(NCAA Elite Eight)$_{t-3}$	−0.006	−0.002	−0.011	0.013	0.000	0.013
	[0.015]	[0.033]	[0.017]	[0.011]	[0.012]	[0.015]
(NCAA Final Four)$_{t+1}$	0.009	0.008	0.007	0.010	−0.008	0.016
	[0.012]	[0.028]	[0.014]	[0.013]	[0.007]	[0.016]
(NCAA Final Four)$_{t}$	0.002	0.044	−0.006	−0.009	−0.004	−0.007
	[0.014]	[0.033]	[0.016]	[0.013]	[0.008]	[0.015]
(NCAA Final Four)$_{t-1}$	0.014−	0.034	0.015	−0.013	0.004	−0.009
	[0.015]	[0.027]	[0.018]	[0.014]	[0.011]	[0.015]
(NCAA Final Four)$_{t-2}$	0.044−***	0.085***	0.037**	−0.014	0.006	−0.011
	[0.013]	[0.021]	[0.016]	[0.013]	[0.010]	[0.015]
(NCAA Final Four)$_{t-3}$	0.030*	0.025	0.028	0.008	0.002	0.012
	[0.016]	[0.035]	[0.018]	[0.010]	[0.011]	[0.013]
(NCAA Tournament Champion)$_{t+1}$	0.021	−0.004	0.024	0.015	−0.021**	0.032
	[0.022]	[0.031]	[0.030]	[0.019]	[0.009]	[0.026]
(NCAA Tournament Champion)$_{t}$	−0.009	−0.023	−0.007	0.000	−0.020**	0.011
	[0.022]	[0.040]	[0.025]	[0.021]	[0.010]	[0.030]
−	0.018	0.006	0.039	−0.035	−0.013*	−0.040
	[0.022]	[0.043]	[0.026]	[0.029]	[0.006]	[0.041]
(NCAA Tournament Champion)$_{t-2}$	0.056***	0.037	0.065***	−0.040	0.009*	−0.048
	[0.019]	[0.029]	[0.022]	[0.029]	[0.005]	[0.036]

(continued)

Table 3. (continued)

Dependent Variable:	ln(Applicants)			ln(Real Tuition)		
	All	Private	Public	All	Private	Public
School Sample:	(1)	(2)	(3)	(4)	(5)	(6)
(NCAA Tournament Champion)$_{t-3}$	0.038**	−0.019	0.043**	−0.024	−0.021	−0.018
	[0.016]	[0.032]	[0.018]	[0.022]	[0.028]	[0.029]
(AP Football Top 20)$_{t+1}$	0.010	0.020	0.006	0.014	0.024	0.015
	[0.008]	[0.022]	[0.009]	[0.011]	[0.021]	[0.012]
(AP Football Top 20)$_{t}$	0.005	−0.001	0.000	0.014	0.020	0.016*
	[0.008]	[0.027]	[0.009]	[0.009]	[0.018]	[0.010]
(AP Football Top 20)$_{t-1}$	0.029***	0.006	0.030***	0.018**	0.024	0.019**
	[0.008]	[0.034]	[0.008]	[0.008]	[0.018]	[0.008]
(AP Football Top 20)$_{t-2}$	0.020**	−0.002	0.022***	0.006	0.005	0.008
	[0.008]	[0.032]	[0.008]	[0.009]	[0.005]	[0.010]
(AP Football Top 10)$_{t+1}$	−0.001	0.016	−0.005	−0.018*	−0.001	−0.021*
	[0.010]	[0.019]	[0.011]	[0.011]	[0.011]	[0.012]
(AP Football Top 10)$_{t}$	−0.003	−0.015	−0.001	−0.003	0.008	−0.004
	[0.009]	[0.022]	[0.010]	[0.010]	[0.008]	[0.011]
(AP Football Top 10)$_{t-1}$	0.023**	0.027	0.026**	−0.009	−0.000	−0.009
	[0.010]	[0.025]	[0.011]	[0.011]	[0.008]	[0.012]
(AP Football Top 10)$_{t-2}$	0.018	−0.002	0.026**	−0.015	−0.005	−0.015
	[0.011]	[0.030]	[0.012]	[0.013]	[0.010]	[0.015]
(AP Football Champion)$_{t+1}$	0.037	0.081	0.025	−0.030	0.006	−0.037
	[0.031]	[0.053]	[0.035]	[0.029]	[0.014]	[0.035]
(AP Football Champion)$_{t}$	0.017	0.023	0.014	0.032	0.027	0.039
	[0.025]	[0.026]	[0.030]	[0.025]	[0.017]	[0.030]
(AP Football Champion)$_{t-1}$	0.102***	0.082**	0.118***	0.017	0.010	0.023
	[0.028]	[0.032]	[0.033]	[0.024]	[0.025]	[0.028]
(AP Football Champion)$_{t-2}$	0.078***	0.033	0.097***	0.014	0.007	0.024
	[0.024]	[0.036]	[0.028]	[0.020]	[0.011]	[0.024]
Constant	3.338	7.818**	0.943	16.097***	8.395***	17.694***
	[2.032]	[3.139]	[2.646]	[1.161]	[1.250]	[1.729]
Observations	9,147	3,294	5,853	9,183	3,296	5,887
R-squared	0.841	0.891	0.799	0.914	0.974	0.901
Number of Schools	352	120	232	353	121	232

Notes: Columns (1)–(3) report select coefficient estimates from regressions of the natural log of applicants, while real tuition is the dependent variable for the regression results reported in columns (4)-(6). In each panel of three regressions, the first column listed includes all schools, the second includes only private schools, and the third includes only public schools. In addition to the variables listed in the table, all regressions also control for leads and lags of NCAA tournament round of 64 and round of 32 appearances, three indicator variables for categories of a school quality index measuring acceptance difficultly (most difficult, very difficult, and moderately difficult), the natural log of public high school graduates in the state, and the natural log of real state per capita income. The applicant regressions also include the natural log of real tuition. Additionally, all specifications control for school fixed effects, year fixed effects, conference fixed effects, and school-specific linear time trends. Coefficient estimates are reported with standard errors clustered by university in parentheses. One, two, and three asterisks denote statistical significance at the 10%, 5%, and 1% levels respectively. A complete set of coefficient estimates is available upon request. We report the within R^2 for the school fixed effects estimator in the table.

Table 4. Freshman Enrollment (Select Coefficient Estimates).

Dependent Variable:	ln(Freshman Enrollment)			Yield		
	All	Private	Public	All	Private	Public
School Sample:	(1)	(2)	(3)	(4)	(5)	(6)
$(\text{Cinderella Run})_{t+1}$	0.007	−0.030	0.038*	0.025	−0.002	0.045
	[0.017]	[0.033]	[0.020]	[0.030]	[0.008]	[0.050]
$(\text{Cinderella Run})_{t}$	0.009	−0.004	0.035	0.004	0.010	0.004
	[0.016]	[0.020]	[0.022]	[0.008]	[0.007]	[0.013]
$(\text{Cinderella Run})_{t-1}$	0.017	−0.006	0.035	0.002	0.005	−0.005
	[0.016]	[0.022]	[0.022]	[0.006]	[0.008]	[0.011]
$(\text{Cinderella Run})_{t-2}$	0.033***	0.038***	0.030*	0.003	0.015**	−0.011
	[0.012]	[0.014]	[0.017]	[0.006]	[0.006]	[0.010]
$(\text{Cinderella Run})_{t-3}$	−0.009	0.014	−0.021	−0.015	0.007	−0.033*
	[0.013]	[0.018]	[0.015]	[0.012]	[0.008]	[0.019]
$(\text{NCAA Sweet Sixteen})_{t+1}$	0.004	−0.004	0.006	0.001	0.001	0.001
	[0.009]	[0.010]	[0.012]	[0.006]	[0.005]	[0.008]
$(\text{NCAA Sweet Sixteen})_{t}$	0.005	0.002	0.006	0.002	0.002	0.002
	[0.007]	[0.011]	[0.010]	[0.005]	[0.006]	[0.007]
$(\text{NCAA Sweet Sixteen})_{t-1}$	0.019**	0.034**	0.013	0.004	0.008*	0.003
	[0.009]	[0.013]	[0.013]	[0.004]	[0.004]	[0.005]
$(\text{NCAA Sweet Sixteen})_{t-2}$	0.011	0.011	0.010	−0.003	−0.002	−0.002
	[0.009]	[0.012]	[0.012]	[0.003]	[0.005]	[0.004]
$(\text{NCAA Sweet Sixteen})_{t-3}$	0.018*	−0.003	0.024*	0.003	−0.004	0.007
	[0.009]	[0.010]	[0.013]	[0.005]	[0.006]	[0.006]
$(\text{NCAA Elite Eight})_{t+1}$	0.002	−0.006	0.005	−0.001	0.003	0.001
	[0.009]	[0.018]	[0.011]	[0.004]	[0.010]	[0.005]
$(\text{NCAA Elite Eight})_{t}$	−0.014	−0.057***	0.004	0.005	−0.003	0.009
	[0.011]	[0.021]	[0.012]	[0.006]	[0.008]	[0.007]
$(\text{NCAA Elite Eight})_{t-1}$	0.004	0.002	0.005	0.006	0.015	0.002
	[0.008]	[0.014]	[0.011]	[0.004]	[0.010]	[0.005]
$(\text{NCAA Elite Eight})_{t-2}$	0.000	−0.023	0.011	0.002	0.004	0.000
	[0.010]	[0.018]	[0.013]	[0.005]	[0.009]	[0.007]
$(\text{NCAA Elite Eight})_{t-3}$	0.006	−0.025	0.014	0.003	0.001	0.005
	[0.009]	[0.017]	[0.012]	[0.005]	[0.009]	[0.006]
$(\text{NCAA Final Four})_{t+1}$	−0.000	0.009	0.002	−0.004	0.009	−0.007
	[0.009]	[0.022]	[0.011]	[0.007]	[0.007]	[0.008]
$(\text{NCAA Final Four})_{t}$	−0.009	−0.022	−0.003	0.002	0.000	0.002
	[0.010]	[0.016]	[0.012]	[0.005]	[0.007]	[0.005]
$(\text{NCAA Final Four})_{t-1}$	−0.004	0.001	−0.007	0.006	0.013	0.003
	[0.011]	[0.015]	[0.013]	[0.005]	[0.009]	[0.006]
$(\text{NCAA Final Four})_{t-2}$	−0.006	−0.009	−0.001	−0.005	0.003	−0.008
	[0.012]	[0.019]	[0.015]	[0.006]	[0.009]	[0.007]
$(\text{NCAA Final Four})_{t-3}$	0.005	−0.023	0.009	−0.009	−0.004	−0.009
	[0.011]	[0.015]	[0.014]	[0.007]	[0.007]	[0.008]
$(\text{NCAA Tournament Champion})_{t+1}$	−0.003	0.002	−0.009	−0.007	−0.031**	−0.002
	[0.019]	[0.024]	[0.021]	[0.006]	[0.013]	[0.007]
$(\text{NCAA Tournament Champion})_{t}$	0.011	−0.000	0.013	−0.002	−0.026**	0.004
	[0.013]	[0.025]	[0.015]	[0.009]	[0.012]	[0.011]
$(\text{NCAA Tournament Champion})_{t-1}$	0.002	−0.009	−0.001	0.008	−0.005	0.009
	[0.012]	[0.028]	[0.014]	[0.010]	[0.017]	[0.011]
$(\text{NCAA Tournament Champion})_{t-2}$	−0.024**	−0.057*	−0.028**	−0.004	−0.016	−0.005
	[0.011]	[0.032]	[0.012]	[0.011]	[0.019]	[0.011]

(continued)

Table 4. (continued)

Dependent Variable:	ln(Freshman Enrollment)			Yield		
	All	Private	Public	All	Private	Public
School Sample:	(1)	(2)	(3)	(4)	(5)	(6)
(NCAA Tournament Champion)$_{t-3}$	0.004	0.009	0.000	0.003	−0.016	0.009
	[0.014]	[0.029]	[0.015]	[0.007]	[0.010]	[0.008]
(AP Football Top 20)$_{t+1}$	−0.001	0.010	−0.002	−0.003	0.005	−0.005*
	[0.005]	[0.010]	[0.007]	[0.003]	[0.007]	[0.003]
(AP Football Top 20)$_{t}$	0.001	0.003	0.002	0.002	−0.001	0.003
	[0.007]	[0.010]	[0.008]	[0.004]	[0.008]	[0.004]
(AP Football Top 20)$_{t-1}$	0.017**	0.023***	0.015*	0.004	0.004	0.004
	[0.007]	[0.008]	[0.008]	[0.004]	[0.008]	[0.004]
(AP Football Top 20)$_{t-2}$	0.002	0.009	0.000	−0.003	0.013	−0.007*
	[0.006]	[0.010]	[0.007]	[0.004]	[0.009]	[0.004]
(AP Football Top 10)$_{t+1}$	0.005	−0.011	0.009	−0.005	−0.003	−0.007
	[0.007]	[0.008]	[0.008]	[0.007]	[0.005]	[0.008]
(AP Football Top 10)$_{t}$	0.003	0.008	0.005	−0.003	0.001	−0.002
	[0.006]	[0.014]	[0.007]	[0.004]	[0.006]	[0.005]
(AP Football Top 10)$_{t-1}$	0.024***	0.023	0.024***	0.010	0.015	0.011
	[0.007]	[0.014]	[0.008]	[0.006]	[0.009]	[0.007]
(AP Football Top 10)$_{t-2}$	−0.009	−0.005	−0.007	−0.002	0.016	−0.005
	[0.006]	[0.016]	[0.007]	[0.005]	[0.010]	[0.005]
(AP Football Champion)$_{t+1}$	−0.010	−0.020	−0.003	0.007	−0.006	0.009
	[0.019]	[0.021]	[0.024]	[0.014]	[0.010]	[0.017]
(AP Football Champion)$_{t}$	−0.004	0.050*	−0.001	0.007	0.020**	0.007
	[0.018]	[0.026]	[0.026]	[0.013]	[0.008]	[0.017]
(AP Football Champion)$_{t-1}$	0.008	−0.007	0.015	−0.002	0.010	−0.007
	[0.018]	[0.029]	[0.021]	[0.011]	[0.012]	[0.014]
(AP Football Champion)$_{t-2}$	−0.020	−0.029	−0.012	−0.000	0.001	−0.001
	[0.021]	[0.020]	[0.023]	[0.011]	[0.014]	[0.013]
Constant	4.603***	5.741***	2.714	2.126**	2.136	2.502**
	[1.521]	[2.158]	[2.017]	[0.907]	[1.696]	[1.186]
Observations	6,284	2,235	4,049	6,233	2,227	4,006
R-squared	0.674	0.657	0.690	0.388	0.411	0.391
Number of Schools	349	118	231	349	118	231

Notes: Columns (1)–(3) report select coefficient estimates from regressions of the natural log of freshman enrollment, while yield (freshman enrollment divided by acceptances) is the dependent variable for the regression results reported in columns (4)-(6). In each panel of three regressions, the first column listed includes all schools, the second includes only private schools, and the third includes only public schools. Data on freshman enrollment are only recorded in the dataset starting in 1998, thus reducing the sample sizes in these regressions relative to other outcomes. In addition to those listed in the table, all regressions also include leads and lags of NCAA tournament round of 64 and round of 32 appearances, three indicator variables for categories of a school quality index measuring acceptance difficultly (most difficult, very difficult, and moderately difficult), a 1 year lag of the natural log of average real tuition, the natural log of public high school graduates in the state, and the natural log of real state per capita income. Additionally, all specifications control for school fixed effects, year fixed effects, conference fixed effects, and school-specific linear time trends. Coefficient estimates are reported with standard errors clustered by university in parentheses. One, two, and three asterisks denote statistical significance at the 10%, 5%, and 1% levels respectively. A complete set of coefficient estimates is available upon request. We report the within R^2 for the school fixed effects estimator in the table.

the school decided to admit more of these students after their surprise success, or (ii) a larger percentage of students decided to accept their admittance to the school after the surprise basketball performance (in admissions terms, yield increases). We find no impact on the number of admitted students following a Cinderella performance, but we do find a positive and statistically significant relationship between Cinderella runs and a school's yield two academic years following this surprise performance in the NCAA basketball tournament.[16] Yield measures the percentage of admitted students who actually choose to matriculate to a given institution. This is something that college administrators struggle to predict and leads to much consternation on campuses, worrying about the actual size of the next incoming class of students (Marcus, 2019).

Splitting our data into sub-samples of public and private institutions shows that the bump in yield and enrollment resulting from a Cinderella run only occurs for private schools. This result suggests that a surprise run in the NCAA basketball tournament by a private institution can lead to a 3.5% increase in freshmen enrollment. This increase in enrollment appears to be driven by a higher yield, as a surprise run by a private school generates a two percentage point increase in an institution's yield in the same year that their freshmen enrollment increases. Given an average private school freshmen enrollment of 1,253 students who will pay the average cost of tuition at a private institution of $24,428 for 4 years, these surprise basketball tournament performances are worth approximately $4.3 million (in 2012-dollars) of additional revenue for each of these private schools.[17]

We also analyze SAT scores in math and reading in an attempt to see what happens to the quality of the increased number of incoming students at these institutions with surprise basketball tournament success. In the interest of space, we briefly describe the findings but omit the full tables from the paper.[18] Overall, there is weak evidence that the percentage of students scoring in the 600–699 range on SAT Math and Verbal exams increase by 1–2 percentage points. However, we find that the percentage of students scoring over 700 on SAT Math and Verbal exams decreases by about 2 percentage points. Some of the decline in the number of exceptionally bright students (scoring over 700) can be attributed to the larger denominator (increased freshmen enrollment) that comes with a larger incoming class. While there is a small decrease in the absolute number of students scoring over 700, many schools are likely willing to accept this trade-off for students in the 600-699 range, with negligible changes elsewhere in the SAT score distribution 2 years after a Cinderella performance. Overall, Cinderella performances appear to increase freshman enrollment without substantially altering the quality distribution of students across SAT scores.

Robustness

In this section we analyze four robustness checks on our main results from Table 4. In the first three columns of Panel A in Table 5, we look at the impact of Cinderella runs (using the original definition of Cinderella) on freshmen enrollment after also

Table 5. Alternative Definitions of Cinderella (Select Coefficient Estimates for Freshman Enrollment).

Panel A: Original Cinderella Definition

Dependent Variable:	ln(Freshman Enrollment)					
Cinderella Definition:	Original definition, with added controls for tournament seed			Original definition, excluding schools from Power 5 conferences		
	All	Private	Public	All	Private	Public
School Sample:	(1)	(2)	(3)	(4)	(5)	(6)
$(\text{Cinderella Run})_{t+1}$	0.005	−0.039	0.039*	−0.003	−0.035	0.038
	[0.018]	[0.032]	[0.021]	[0.024]	[0.040]	[0.028]
$(\text{Cinderella Run})_{t}$	0.014	−0.006	0.041*	0.001	−0.000	0.027
	[0.017]	[0.021]	[0.023]	[0.022]	[0.024]	[0.034]
$(\text{Cinderella Run})_{t-1}$	0.019	−0.001	0.037	0.009	0.002	0.023
	[0.017]	[0.022]	[0.024]	[0.019]	[0.026]	[0.030]
$(\text{Cinderella Run})_{t-2}$	0.027*	0.036**	0.021	0.037**	0.044***	0.034
	[0.014]	[0.015]	[0.019]	[0.015]	[0.015]	[0.024]
$(\text{Cinderella Run})_{t-3}$	−0.017	0.012	−0.031*	−0.001	0.015	−0.013
	[0.015]	[0.019]	[0.017]	[0.016]	[0.019]	[0.019]
Observations	6,284	2,235	4,049	6,284	2,235	4,049
R-squared	0.674	0.657	0.690	0.673	0.657	0.689
Number of Schools	349	118	231	349	118	231

Panel B: Non-Media Cinderella Definition

Dependent Variable:	ln(Freshman Enrollment)					
Cinderella Definition:	No media-mention requirement			No media-mention requirement, excludes Power 5 schools		
	All	Private	Public	All	Private	Public
School Sample:	(1)	(2)	(3)	(4)	(5)	(6)
$(\text{Cinderella Run})_{t+1}$	0.002	−0.024	0.017	0.004	−0.033	0.044**
	[0.009]	[0.017]	[0.011]	[0.018]	[0.022]	[0.022]
$(\text{Cinderella Run})_{t}$	0.001	0.004	0.010	0.008	−0.007	0.041**
	[0.009]	[0.013]	[0.012]	[0.013]	[0.014]	[0.020]
$(\text{Cinderella Run})_{t-1}$	0.001	−0.018	0.011	0.007	−0.013	0.030
	[0.010]	[0.014]	[0.014]	[0.014]	[0.014]	[0.024]
$(\text{Cinderella Run})_{t-2}$	0.021**	0.008	0.028*	0.030**	0.015	0.045**
	[0.010]	[0.013]	[0.015]	[0.013]	[0.016]	[0.020]
$(\text{Cinderella Run})_{t-3}$	0.015	0.004	0.019	0.008	−0.007	0.028
	[0.009]	[0.016]	[0.012]	[0.013]	[0.016]	[0.018]
Observations	6,284	2,235	4,049	6,284	2,235	4,049
R-squared	0.674	0.656	0.689	0.674	0.657	0.690
Number of Schools	349	118	231	349	118	231

Notes: The original Cinderella definition in Panel A includes the 57 that schools listed in Table 1 that receive a media mention as a "Cinderella" school, enter the tournament as a 3-seed or worse, and win at least two games. All teams meeting these criteria advance at least one tournament round beyond seed predictions. The first 3 columns in Panel A follow the same regression model as Table 4, with the addition of a dummy variables controlling for whether a team entered as a 9–16 seed, and whether a team entered as a 5–8 seed in the NCAA tournament. Columns 4–6 in Panel A exclude schools in Power 5 Conferences (Atlantic Coast Conference, Southeastern Conference, Big Ten Conference, Big 12 Conference, and Pac-12 Conference) from the original Cinderella definition, which leaves 41 non-Power 5 Cinderella schools. The non-media Cinderella definition in the first three columns of Panel B includes 253 tournament performances that meet the round appearance relative to seed criteria in the original Cinderella definition, but are not necessarily mentioned as Cinderella runs in national media. Columns 4–6 of column B use the same round relative to seed criteria but exclude schools from Power 5 conferences, defining 121 Cinderella runs. The regression models are otherwise identical to Table 4. Select coefficient estimates are listed with standard errors clustered by university shown in parentheses. One, two, and three asterisks denote statistical significance at the 10%, 5%, and 1% levels respectively. A complete set of coefficient estimates is available upon request. We report the within R^2 for the school fixed effects estimator in the table.

controlling for the seed with which a team entered the tournament. One might wonder if the number of games a Cinderella team wins in the tournament has a different impact on enrollment. All of the Cinderella teams in our data win between two and four games, thus the amount of variation that can be picked up by separating these is very limited. Here, we separately control for the 9–16 seeded teams and the 5–8 seeded teams (relative to better seeds), and find that the Cinderella effect remains unchanged. We find Cinderella effects of the same magnitude and significance (compared to what is reported in Table 4), conditional on both the furthest round and the team's starting seed, suggesting that the effects are not driven merely by low seeds winning a couple of games. Rather, the media attention garnered by the Cinderella label generates an average increase in freshman enrollment even conditional on seed and number of tournament games played.

In columns 4–6 of Panel A in Table 5, we omit any schools from Power 5 Conferences from our original definition, leaving 41 Cinderella runs over the time period.[19] This is done because, arguably, schools from Power 5 Conferences are already well known for being collegiate sports powerhouses (e.g. the University of Michigan). Thus, the effect of a well-known university's basketball team having an unexpected tournament run during a down year is patently different from an unknown school (e.g. George Mason, Seton Hall, the University of Dayton, or Butler) making a run and establishing a name for itself in the NCAA tournament. We find similar, even slightly stronger effects on freshman enrollment for private schools 2 years after a Cinderella run when identified off of only schools from non-Power 5 Conferences.

The original Cinderella definition requires that the school enter the tournament as a 3-seed or worse, win at least two games, and be mentioned as a "Cinderella" run (or similar phrase) in national media. The definition results in 57 Cinderella runs from 1985-2017. Every team meeting these criteria in our dataset also advances at least one game beyond seed expectations.[20] In Panel B of Table 5, we introduce an alternative definition of Cinderella that does not require the school to receive national media attention. We find that there are 253 Cinderella runs that meet the following requirements: the team must enter the tournament as a 3-seed or worse, win at least 2 games, and advance at least one round beyond seed expectations. All 57 of our original Cinderella schools are encompassed in this non-media definition. Using the non-media definition of Cinderella, we find similar effects on enrollment (relative to those found with the original definition in Table 4), although slightly smaller in magnitude for the full sample. These results are presented in columns 1-3 of Panel B in Table 5. Interestingly, the effects now appear to be concentrated among public school Cinderellas. When we further refine this non-media definition to exclude any schools from Power 5 Conferences, we are left with 121 Cinderella runs over the period. These results (in columns 4–6 of Panel B in Table 5) show that freshman enrollment increases by 4.5% 2 years after a Cinderella run among public schools, with no noticeable effect among private schools. This contrasts with our definition based on

national media mentions, where the benefits were concentrated among private schools.

We hypothesize that media mentions at the national level overwhelmingly benefit private schools that tend to draw students from larger geographic regions. Merely using teams that advance beyond seed expectations covers more schools, many of which do not get the same national attention. These schools are still likely to have major local coverage touting their tournament successes, thus public schools will yield a larger benefit from local areas that draw heavily from their in-state student population. Although we cannot identify this with our current data, we think this avenue will make for a worthwhile next phase in this research. Future work might identify from which peer institutions a Cinderella school might be gaining additional freshman enrollment.

Conclusion

Making the NCAA's March Madness basketball tournament provides a national spotlight and advertising effect that is good for any school. Winning in the tournament is even better. But being a smaller, lesser-known private school that advances surprisingly far (winning at least two unexpected games) in the tournament is especially fruitful. While Pope and Pope (2009) find that advancing through the tournament increases applicants and allows universities to be more selective, added applicants may not necessarily increase matriculation to the institution.

We find that making a Cinderella run in the tournament provides promotional buzz that increases freshmen enrollment by somewhere between 2.1% and 4.5% 2 years after the successful performance, depending on the chosen definition of Cinderella and the sample of schools included. Our low-end estimate uses our non-media definition of Cinderella for all schools (including schools from Power 5 conferences), while our high-end estimate uses our non-media Cinderella for public schools that do not come from the Power 5 conferences. Using our media definition of Cinderella for non-Power 5 schools, we find that making a Cinderella run in the tournament increases freshmen enrollment by 4.4%, on average, for private schools 2 years after the successful performance. With an average entering class of 1,253 students who pay an average tuition of $24,428 for 4 years, this 4.4% increase generates about $5.4 million (in 2012-dollars) of added revenue. This figure translates to about $7.3 million in additional revenue after including average room and board with the tuition figure over the 4 years of these additional enrollments. In addition, our results indicate that the added freshmen enrollment does not decrease academic quality at the university, as measured by math and verbal SAT scores of the entering class.

These findings add to the existing literature that documents successful basketball and football performances increasing applications (to which universities may respond by increasing the quality and/or quantity of admitted students; Chung, 2013; McCormick & Tinsley, 1987; Pope & Pope, 2009). We find, by contrast, that *unexpected*,

Cinderella basketball performances increase yield (the percent of admitted freshmen who choose to enroll) for private universities, which tend to be smaller and less well-known. The effect on enrollment from unexpected March Madness success is akin to the decline in enrollment following athletic team impropriety (and likely subsequent sanctions; Eggers et al., 2019, 2020). Taken together, perhaps potential students respond to advertising from expected athletic success in applications, while unexpected changes to athletic team status affects enrollment decisions. It may also be the case that unexpected events such as Cinderella runs or sanctions affect school spirit, which alters the preferences of prospective, admitted students who visit the campus.

Getting sports casters to talk about a university for multiple weeks, or a month, has an amazing advertising effect for that school. Furthermore, this advertising translates into added enrollment and thus tuition dollars. The emotional buzz surrounding a Cinderella run successfully increases private university yield (the percent of admitted students that enroll). As far as we know, this is the first study to provide an estimate of this advertising impact on these schools. While we recognized the effect is small and relatively short-lived, we find nontrivial financial impacts on private schools that make a Cinderella run. This is likely driven by the fact that these Cinderella teams are generally smaller, less well-known schools. There is also some evidence that public schools that make unexpected runs draw more from their local markets – which we leave open for further research.

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ORCID iD

Kurt W. Rotthoff https://orcid.org/0000-0001-7874-2088

Notes

1. Studies attempting to measure the influence of athletic success on university admissions include: Tucker and Amato (1993), Bremmer and Kesselring (1993), Mixon and Hsing (1994), Murphy and Trandel (1994), Mixon (1995), Mixon and Ressler (1995), Mixon et al. (2004), Tucker (2004, 2005), Mixon and Trevino (2005), Goidel and Hamilton (2006), McEvoy (2006), and Tucker and Amato (2006).
2. This involves a Google search and a Proquest database search of *New York Times* archives. We also search the following synonymous terms: “darling,” “sweetheart,” “underdog,” “upset,” “unexpected run,” “knockoff,” and “surprise.” We then require

teams mentioned in these articles to also win more than a single first-round upset to qualify as a "Cinderella" run in the tournament.

3. While most variables exist for the entire period from 1983-2017, freshmen enrollment is only reported in the second wave of Peterson's Undergraduate Database, which spans 1998-2017.
4. We use the core personal consumption expenditure (PCE) deflator, which excludes food and energy.
5. The indicator variables are mutually exclusive such that the AP Top 20 indicator includes teams ranked 11–20, AP Top 10 includes teams ranked 2–10, and the top ranked team in the final AP Poll is the national champion.
6. We also include indicator variables for whether the team only played in the first round of the tournament (the round of 64) or only advanced to the round of 32 (second round). We do not consider "play-in" games, as those only occur in the later part of our sample.
7. Dependent variable summary statistics are reported for their respective regression samples. All independent variable summary statistics are reported for the regression sample for applicants. Summary statistics for the freshmen enrollment regressions sample (post-1998) are available upon request. Regression results for all variables post-1998 are similar to the full time period, and are available upon request.
8. Note, we use tuition at private schools and in-state tuition for public schools. We recognize that out-of-state students at a public institution are often paying much closer to private school tuition rates. However, we use in-state tuition for public schools because that is the most salient price for the majority of applicants and enrollees.
9. Note, these tournament finish dummy variables (B) are mutually exclusive, meaning that a team which advances to the Sweet 16 will have a one for that round, but will have zeros for all prior rounds (despite playing both the round of 64 and the round of 32). This is consistent with the variable definitions used in Pope and Pope (2009).
10. These indicator variables for being ranked Top 10 or Top 20 are mutually exclusive, such that the AP Poll Top 20 indicator only includes schools ranked 11-20.
11. We omit the measure of tuition from the independent variables for the regressions specifications in which tuition is the dependent variable. In most other specifications we use 1-year lagged tuition because freshman generally commit to an institution in early May before many schools publish sticker price tuition for the upcoming academic year. However, results are robust to using contemporaneous tuition
12. We are unable to find consistent data on total (public and private) high school graduates for each state over the time period.
13. Athletic conference is defined for the men's basketball team. For the majority of schools, all sports participate in the same conference.
14. These results are very much in line with the findings in McCormick and Tinsley (1987), Pope and Pope (2009), and Chung (2013).
15. This result technically occurs two academic years after the basketball tournament. However, the basketball tournament occurs at the end of an academic year and freshmen

enrollment is measured at the beginning of the academic year. For example, our results indicate that a Cinderella run in the spring of 2018 (2017-2018 academic year) increase first-year enrollment in the fall of 2019 (2019-2020 academic year).

16. The regression results with the natural log of the number of students admitted as the dependent variable are not shown here, but are available upon request. The results are quite similar to the model with the natural log of applications as the dependent variable and show that sporting success in football and basketball is generally associated with more students being admitted in subsequent years.
17. Furthermore, while we only use tuition in our regression sample due to better data coverage, private schools charge approximately $33,381 (in 2012-dollars) for combined tuition room and board. A 3.5% increase in freshmen enrollment paying tuition, room, and board generates almost $6 million in additional revenue.
18. Results are available upon request.
19. Power 5 Conferences are: the Atlantic Coast Conference, the Southeastern Conference, the Big Ten Conference, the Big 12 Conference, and the Pac-12 Conference.
20. Teams seeded 9–16 are expected to lose in the first round (i.e., they represent the lower seed in their first-round matchup). As such, a 9–16 seed that reaches the round of 32 has advanced one game beyond seed expectations, and each subsequent round is an additional game beyond expectations. By the same logic, teams seeded 5–8 reaching the Sweet 16 have advanced one game beyond expectations, while teams seeded 3–4 reaching the Elite 8 have advanced one game beyond expectations.

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Author Biographies

Trevor Collier is an associate professor of economics at the University of Dayton. His research interests are applied microeconomics, economics of education, economics of sports, and environmental economics.

Nancy Haskell is an assistant professor of economics at the University of Dayton. Her research interests cover a wide range of topics in applied microeconomics, with emphasis on labor, education, environmental economics, and public finance.

Kurt W. Rotthoff is a professor of economics and finance in the Stillman School of Business at Seton Hall University. His research interests are applied microeconomics, financial economics, and industrial organization; with a special interest in the economics and finance of sports and the economics of education.

Alaina Baker (formerly Smith) was an undergraduate student at the University of Dayton when this project was started. She is now a Digital Financial Analyst for the Kroger Co. in Cincinnati, OH.