Heisman v. Goldwater: Athletic Success and Academic Recruitment

MARK EGGE

29 April 2010

Assuming intercollegiate athletic success leads to increased university applications, is this effect similar between research universities and non-research universities? To find out, 2001 through 2009 applicant statistics for 115 universities with NCAA Division 1-A football teams are analyzed. Athletic success at non-research institutions is found to increase subsequent applications by nearly 10%. Athletic success at research institutions, by contrast, produces a negative, non-significant effect.

Introduction

At least three academic benefits are commonly ascribed to intercollegiate athletics. First, athletics promote a sense of university community, camaraderie, and unity. Second, athletic success is believed to induce alumni charitable giving. Last, a successful athletics season is believed to increase a university's number of applications for admission (Denhart et al., 2009).

That athletics promote a sense of community appeals to reason. University students demonstrate a significant willingness to pay for big-budget athletics programs: operating budgets for intercollegiate athletics account for an average 3.5 to 4 percent of total higher education spending (Litan et al., 2003). Of this, nearly half is funded by student fees or other institutional revenue unrelated to athletics (Brand, 2006).

Alumni donations have been variously illustrated to follow athletic success. Whether this benefits academics is less certain. Rhoads and Gerking find winning a football bowl game to be worth about $35.55 per student in additional alumni donations (2000). Though some positive spillover to instruction has been demonstrated (Grimes and Chressanthis, 1994), most increases in alumni donations are earmarked for athletics, and are properly considered as part of athletics revenues (along with ticket sales, branded apparel, etc.). One NCAA estimate states that, with full accounting for depreciation, fewer than ten of its one-thousand-plus member institutions

generate net revenue from their athletics department (Brand, 2006). Moreover, as Robert Frank has argued (2004), if there were considerable profits to be had from alumni donations, these would quickly be competed away in the form of bigger and more expensive athletics programs.

This study analyzes the affect of intercollegiate athletics success on the subsequent quantity of applications submitted. It extends existing literature by comparing the effect of athletics on applications between research and non-research institutions.

Substantial anecdotal evidence suggests athletic success can lead to an increase in quantity of applicants the following spring. The so-called "Flutie Factor" is one such example. In the final minutes of a championship game, Boston College quarterback Doug Flutie threw a 48 yard touchdown pass, winning Boston a sensational upset victory over the heavily favored University of Miami. Following the win, Flutie won a Heisman Trophy. But the bigger winner was Boston College: for the next two years, applications for admission to BC increased by some 30% (Marklein, 2001).

Previous quantitative studies investigating this relationship support the idea that athletic success can increase the quantity of university applicants (McCormick and Tinsley, 1987; Murphy and Trandel, 1994; Toma and Cross, 1998; Litan et al., 2003; Pope and Pope, 2009).

This study analyzes a panel of the115 universities with NCAA Division 1-A[1] football teams between 2001 and 2009. (Universities gaining or losing Division 1-A status between 2001 and 2009 have been excluded.) The 115 universities are divided into research and non-research universities, according to the Carnegie Foundation (CF) 2005 Basic Classification system. Universities with a CF "Research University / Very High Activity" designation (indicating high

[1] In 2007, the NCAA renamed its Division 1-A and 1-AA subdivisions to Division 1 Football Bowl Subdivision (FBS) and Division 1 Football Championship Subdivision (FCS), respectively. This redesignation had no effect on division membership (Russo 2007). Despite this official change, the divisions are still commonly referred to as 1-A and 1-AA.

aggregate and high per-capita research expenditures and staff) are assigned to the research group. All others are assigned to the non-research group. A summary of Division 1-A institution classifications is presented in Table 1.

TABLE 1
Carnegie Classification 2005: Basic

	Frequency	Percent
Research Universities (very high research activity)	55	47.83
Research Universities (high research activity)	41	35.65
Doctoral/Research Universities	6	5.22
Master's Colleges and Universities (larger programs)	8	6.96
Master's Colleges and Universities (medium programs)	1	0.87
Baccalaureate Colleges--Arts & Sciences	2	1.74
Baccalaureate Colleges--Diverse Fields	2	1.74
Total	115	100.00

This paper confirms the findings of previous quantitative studies: a successful football season is found to be associated with a statistically significant increase in subsequent number of university applicants. However, this effect is strongest for universities that do not engage in high levels of research activity. Research universities, by contrast, show a negative effect of athletic success on applications, though this effect is not statistically significant.

Section I summarizes a selection of existing literature on the effect of athletic success on subsequent applications. Section II describes the economic theory tested. Section III identifies the data and methods used. Section IV presents the analysis results. Section V concludes.

Section I - Literature Review

Studies of the effect of collegiate athletics on enrollment can be broadly categorized as investigating either changes in the absolute number of applicants (quantity effects) or changes in the academic quality of students admitted (quality effects, typically measured by standardized

test scores). Most quantity studies have found small but consistent increases in the number of applicants following athletic success (variously defined). The results of quality studies have produced inconsistent results. To the best of the author's knowledge, no previous study compares either effect between research and non-research universities.

In their widely cited study, McCormick and Tinsley (1987) theorize that athletic success advertises a school, leading to a larger pool of applicants. A university can then either be more selective in its admission decisions, or admit more applicants. They derive a hedonic equation predicting average applicant SAT score. Their result finds a 33 point (or 3%) positive coefficient for their dummy variable indicating a major football or basketball team.

Murphy and Trandel (1994) examined 46 schools for improvement (one to three wins). Their data shows that a 0.250 percent increase in within-division win percentage correlates with a 1.370 percent increase in the number of applicants.

In 1998, Toma and Cross studied the 30 universities that won either a football or basketball national championship between 1979 and 1992. Admissions data for three years on either side of winning a championship is analyzed. Of the 16 universities to win or share a football championship, they find that 14 enjoyed a subsequent increase in the quantity of applications received. Seven universities witnessed an increase of 10% or more. Two increased in their number of applicants by more than 20%. The effect of winning a championship could persist for as long as three to five years.

The authors note that the schools experiencing the most dramatic increases were associated with "Cinderella stories"—seasons combining good football with sensational stories.

In 2003, the NCAA commissioned a study on the empirical effects of collegiate athletics (Litan et al., 2003). Using a panel dataset combining Integrated Postsecondary Education Data

System (IPEDS) data with data released under the Equity in Athletics Disclosure Act, the study finds no statistically significant relationship between changes in athletics spending and incoming SAT scores or admissions yield.

The authors identify a general *quantity effect* consensus (a small but consistent increase in applications) but a lack of consensus on quality effect. To reconcile the two, the authors hypothesize that athletic success may correlate with an increased number of applicants, but applicants of a lower quality.

In 2004, the Knight Foundation Commission on Intercollegiate Athletics produced an updated report, partially in response the NCAA's 2003 report (Frank, 2004). The author provides a very descriptive (though not exhaustive) literature review.

The report argues that institutions invest inefficiently too much in their athletics programs (more than can be justified by a quality effect or alumni donations, at any rate), based on overly optimistic expectations in a winner-take-all market.

The author argues convincingly that the quality effect is more important than the quantity effect. Given that tuition and fees typically pay for only a portion of the total cost to educate a student, increasing enrollments may actually make a university's financial position worse off. Improving the quality of students enrolled, however, increases an institution's prestige.

Pope and Pope (2009) have written the most recent and exhaustive study of sports success and enrollment. Using a panel of all NCAA Division I schools (football or basketball) from 1983 – 2002, they find both a quantity effect and a quality effect. Winning either a basketball or football championship is found to be associated with an average 7-8% increase in quantity of applications. This effect persists for up to three years. The authors report, however,

that students with low SAT scores respond to sports success much more than those with high scores.

They find schools with football success increase enrollment in subsequent periods, while schools with basketball success increase the quality of admitted students.

Section II - Theory

What factors influence university selection?

Despite the problems inherent to stated preference polls, their results may nevertheless be suggestive. In 2000, studentPOLL conducted in-depth telephone interviews with 500 college-bound high school seniors. The poll found that only 10 to 15% of respondents indicated intercollegiate athletics as affecting their college decision. Consistent with Pope and Pope's results, those identifying intercollegiate athletics as an important factor in college selection also reported significantly lower standardized test scores and household incomes.

College selection can be described using a choice model where a perspective student assigns a value or expected utility to each considered university, based on numerous university characteristics. Previous work has indicated that such value assignment is often based on limited reputation information about a university—especially university prestige and the competitiveness of other applicants (Zemsky et al., 2005).

University prestige may be approximated by a vector of name recognition and school rankings. Harvard is prestigious by virtue of being "Harvard University". Similarly, Monks and Ehrenberg (1999) show that changes in school rankings—such as those published by *U.S. News & World Report*—can significantly affect the quantity of applications received.

Manski and Wise (1983) present evidence that potential applicants are sensitive to the competitive quality of other applicants. Applicants, they find, prefer schools whose quality

slightly exceeds their own. An average student is most likely to apply to a university with an average SAT score about 100 points greater than the student's. The same student is indifferent between a school with an SAT average equal to the student's and a school with an SAT average 300 points higher.

The authors demonstrate that cost matters—ceteris paribus, students prefer universities with lower tuition—though increased financial aid can perfectly offset higher tuition, and students seem well-informed about financial aid availability. Students prefer schools that are closer to home over more distant schools.

Applicants may also assign value based on athletic success or research opportunities.

Athletic success can attract potential students in one of two ways. First, athletic success will attract "sports fanatics"—potential applicants who assign high value to attending a school with a winning Division 1-A football or basketball team. Second, athletic success acts as a national marketing campaign, increasing name recognition and attracting compatible applicants who otherwise would not have considered a given school (Frank, 2004). Compatibility, however, is key: the opportunity cost of application fees and time requirements should be sufficient to deter students from applying to schools they have little interest in, athletics aside.

Applicants to research universities may be less susceptible to both effects of athletic success. Students choosing to apply to research universities may (1) place a lower value on athletics success, relative to research prominence and (2) tend to be better informed in their selections (and thus less responsive to "brand name recognition" marketing). Consistent with (2), for example, Siegfried and Getz (2006) propose that children of professors are better informed consumers of higher education, and find they apply disproportionately to either research universities (which tend to be selective) or selective liberal arts institutions.

If applicants to research universities are less influenced by athletic success, a smaller applications return to athletic success is predicted for research universities, relative to non-research institutions.

Section III – Data and Methods

Recruitment can show either a quantity effect (a change in total number of applicants), or a quality effect (a change in quality of applicants, using SAT scores as a proxy). Schools, in turn, can increase enrollment, be more selective, or both.

To test for an applications-return-to-athletic-success differential, research and non-research universities are separated. Then, athletics success is regressed on the number of submitted applications for each group.

The dataset is a balanced panel of university characteristics and football statistics. University characteristics, including yearly number of applicants, instructional and research expenditures, and cost of attendance, are retrieved from the Integrated Postsecondary Education Data System (IPEDS). All institutional control variables (instruction expenditures, research expenditures, average instructor salary) are normalized to CPI $2008.

Three separate measures of a university's football team success (*sports* variables) are tested: a dummy variable equal to one if the university football team finishes in the top ten by win percentage; a continuous end-of-season win percentage; and, a dummy variable equal to one if the team is ranked in the top 15 teams by the end of season AP Poll.

Each team's season win percentage is calculated from NCAA records, available on the NCAA's website (www.ncaa.org) or, more conveniently, www.stassen.com. I use the NCAA's calculated win percentage, which computes a tie as ½ win and ½ loss.

The Associated Press (AP) College Poll is an influential ranking of college football teams, compiled from ballots submitted by over sixty national sportswriters. The final (end of season) rankings provide a proxy for the teams' national exposure. AP Poll results are freely available from http://www.appollarchive.com and other online sources.

As shown in Table 1, approximately half (55) of the 115 universities in the dataset with a Division 1-A football team are designated by the Carnegie Foundation as Very High Activity Research Universities. This makes intuitive sense—many of the universities large enough to gain a very high activity research designation are also the universities that are large enough to support a Division 1-A football team.

Economic Specification

The economic specification used is given by:

$$\ln(applcn)_{i,t} = \beta_0 + \beta_1 Sports_{i,t} + \beta_2 Sports_{i,t-1} + \beta_3 Yr_t + \beta_4 Uni_{i,t} + a_i + u_{i,t} \qquad (1)$$

where $\ln(applcn)_{i,t}$ is natural logarithm of applicants to school *i* during year *t*. Using the natural logarithm controls for differences in school size. It is assumed that sports success will produce a percentage effect, rather than an identical quantity effect across universities of varying size.

Sports is a measure of athletic success. The three *Sports* variables, describe above, are regressed separately. The football season concludes by the second week in January; application deadlines, where applicable, are concentrated in the three months following. As such, the effect of football success in the fall is expected to first appear the following spring (the base year). Though point estimates suggest the effect may persist for up to four years, only the base year and one lag year are statistically significant. Year two lag coefficients were substantially consistent

with the base year and year one coefficients, but were not statistically significant and have been omitted (see Table 4 for comparisons between lag lengths).

Yr indicates the number of U.S. high school graduates in year *t*. Other time variables, including national and state-level per capita income statistics, national unemployment, and state high school graduation rates were tested and found to have no significant explanatory power. Results for these and other intentionally omitted variables are summarized in Table 3.

Uni is a vector of university characteristics: instructional expenditures, research expenditures, admission rate, and total cost of attendance. Since total cost of attendance differs for students with in-state and out-of-state residence, the regressed total cost of attendance is weighted by the school's residence ratio. Average instructor salary and residence status enrollment ratio variables were tested but excluded from the final specification for lack of significant explanatory power (see Table 3).

A fixed effects estimator is used to control for any unobserved and arbitrary correlation between the error term and explanatory variables. a_i is the university fixed effect, which captures unobserved constants about a university (geographic location, ancient prestige, etc.). Using a fixed effects specification, a_i may be arbitrarily correlated with any of the other explanatory variables. $u_{i,t}$ is the idiosyncratic error term, representing unobserved factors that change over time affecting the number of applications received. Changes in the idiosyncratic error are assumed to be uncorrelated with changes in any explanatory variable.

A Hausman test firmly rejects (p-value = 0.0000) a random effects specification for equation (1) (treating sources of university and time heterogeneity as part of the error component).

Section IV – Results

Table 2 presents results for the specification in Equation (1). The results and interpretation presented use the Top Ten by Win Percentage dummy variable (columns 1 – 3) as the measure of athletics success. Explanatory variable coefficients are jointly significantly different from zero at a 1% significance level. Results using end of season win percentage (columns 4 – 6) and AP Poll data (columns 7 – 9) produced larger standard errors and are included for comparison only.

For all universities (column 3), being in the top ten teams (by win percentage) for a given year is associated with an estimated 4.62%[2] increase in quantity of applications received the following spring, relative to not finishing in the top ten by win percentage. This estimate is significant at a 1% level. The second year coefficient is positive, but not statistically significant.

This paper hypothesizes that research universities attract different students than non-research universities. Although this hypothesis is not tested directly, the dataset contains consistent indicators. Research universities admit higher quality students (as measured by standardized test scores.) The data show a 1% increase in real research expenditures corresponds with an average 0.21% increase in a university's 75th percentile ACT enrollee score. This correlates with a higher quality student body: being a research university is associated with an average 10.4% higher 75th percentile composite ACT score (9.72% higher mathematics SAT 75th percentile) and a 14.6% higher 25th percentile composite ACT score (13.2% higher mathematics SAT 25th percentile) relative to non-research universities. Research universities are more selective: the median admissions rate for research universities in the dataset is 64.7%— 9.3 percentage points lower than the median 74.0% admissions rate for non-research universities.

[2] Dummy variable coefficients are exponentiated, as they indicate the change in the natural log of the number of applications (e.g. $e^{0.0452} - 1 = 0$ .046237)

To test the hypothesis that athletics success has a different effect at research universities than non-research universities, the regression in Equation (1) is performed for each group separately. Results for non-research universities are presented in column 1. Results for research universities are presented in column 2.

An F Test is performed to determine if an applications-return-to-top-ten-placement differential exists between non-research and research institutions. The null hypothesis that research and non-research universities have identical returns to athletic success is decisively rejected (p-value = 0.0000).

The effect of athletic success is much more pronounced for non-research universities than for the combined (all universities) estimate. For non-research universities only, finishing in the top ten teams by win percentage is associated with an estimated 9.92% increase in applicants in the base year, and a 5.35% increase the year following (significant at $\alpha = 0.01$ and $\alpha = 0.1$, respectively).

Point estimates for research universities are not statistically significant, but may nevertheless be suggestive. For research universities only, finishing in the top ten teams by win percentage is associated with an estimated 0.07% *decrease* in base year applicants and a 2.44% decrease the year following (p-values and 95% confidence intervals, respectively: 0.967, [-0.320, 0.308] and 0.111, [-0.055, 0.006]).

Section V – Conclusion

Consistent with existing literature, a successful football season is found to have a significant and positive effect on the quantity of subsequent applications received. But, as the data clearly demonstrates, this effect is significantly and substantially different between research and non-research universities.

A non-research university with a football team finishing in the top ten Division 1-A teams (by win percentage) expects an estimated 9.5% increase in applications the following spring, and a 5.2% increase the year after—relative to not finishing in the top ten. For a research university, however, similar athletic success produces *no* expected change in applications the following spring, and a 2.5% *decrease* the year after (though neither estimate is statistically significant at traditional levels)—relative to not finishing in the top ten.

This paper extends existing literature by demonstrating a differential quantity effect between research universities and non-research universities. In light of the results presented, previous studies have likely both overstated and understated the effect of athletic success on subsequent applications: understated in the case of non-research institutions, and overstated in the case of research institutions.

The results are consistent with (but do not prove) the hypothesis that students who apply to research universities assign less value to athletics programs or are less susceptible to the "brand name" marketing produced by athletic success.

Large football programs, as with large research programs, require significant resources to operate. The results of this study suggest institutions who seek to maximize applications (either to increase enrollment or improve the quality of enrolled students) would do well to establish an identity as a football school or a research institution—but not both.

TABLE 2
Results

	Top Ten by Win Percentage			**Win Percentage**			**Top 15 by AP Poll**		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	*Non-research*	*Research*	*Pooled*	*Non-research*	*Research*	*Pooled*	*Non-research*	*Research*	*Pooled*
Sports Base Year	**0.0946****	**-0.0007**	**0.0452****	**0.0890***	**-0.0199**	**0.0364**	**0.0674***	**-0.0010**	**0.0273+**
	(0.026)	(0.016)	(0.015)	(0.042)	(0.029)	(0.026)	(0.031)	(0.015)	(0.015)
Sports Lag 1 Year	**0.0522+**	**-0.0247**	**0.0089**	**0.0839***	**0.0091**	**0.0513+**	**0.0314**	**-0.0069**	**0.0066**
	(0.027)	(0.015)	(0.015)	(0.042)	(0.030)	(0.026)	(0.034)	(0.014)	(0.015)
U.S. High School Graduates	0.3793**	0.3863**	0.3903**	0.3963**	0.3856**	0.3966**	0.3836**	0.3848**	0.3932**
	(0.074)	(0.058)	(0.049)	(0.075)	(0.058)	(0.049)	(0.076)	(0.058)	(0.049)
Log instruction spending ($ m)	0.3334**	0.2502**	0.2716**	0.3278**	0.2519**	0.2676**	0.3089*	0.2520**	0.2684**
	(0.117)	(0.072)	(0.068)	(0.119)	(0.073)	(0.068)	(0.119)	(0.072)	(0.068)
Log research spending ($ m)	-0.0829*	-0.0584	-0.0740*	-0.1048**	-0.0667	-0.0806**	-0.0938*	-0.0647	-0.0767**
	(0.036)	(0.063)	(0.029)	(0.036)	(0.062)	(0.029)	(0.036)	(0.063)	(0.029)
Admissions Ratio – Lag 1	-0.7317**	-0.2017*	-0.5749**	-0.7498**	-0.1929*	-0.5752**	-0.7521**	-0.1945*	-0.5786**
	(0.095)	(0.085)	(0.065)	(0.096)	(0.085)	(0.066)	(0.097)	(0.085)	(0.066)
Weighted Total Cost of Attendance ($1000's)	0.0126**	0.0034	0.0090**	0.0115**	0.0039	0.0085**	0.0120**	0.0037	0.0088**
	(0.004)	(0.004)	(0.003)	(0.004)	(0.004)	(0.003)	(0.004)	(0.004)	(0.003)
Constant	6.7233**	7.3574**	7.1483**	6.7339**	7.3782**	7.1515**	6.8967**	7.3709**	7.1770**
	(0.470)	(0.376)	(0.302)	(0.476)	(0.377)	(0.302)	(0.479)	(0.377)	(0.303)
Observations	338	322	660	338	322	660	338	322	660
R-squared	0.539	0.523	0.500	0.530	0.520	0.498	0.522	0.519	0.495
Number of unitid	57	55	112	57	55	112	57	55	112

** p<0.01, * p<0.05, + p<0.1

Standard errors in parentheses. Dollar figures given in $2008 CPI

TABLE 3
Specifications

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Model 1	Model 2	Model 5	Model 6	Model 7	Model 8
Sports Base Year	**0.0452****	**0.0455****	**0.0454****	**0.0454****	**0.0454****	**0.0452****
	(0.015)	(0.015)	(0.015)	(0.015)	(0.016)	(0.016)
Sports Lag 1 Year	**0.0089**	**0.0077**	**0.0075**	**0.0073**	**0.0074**	**0.0073**
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
U.S. High School Graduates	0.3903**	0.3823**	0.3848**	0.3833**	0.3833**	0.3545**
	(0.049)	(0.049)	(0.049)	(0.049)	(0.053)	(0.069)
Log instruction spending ($2008 m)	0.2716**	0.2731**	0.2763**	0.2747**	0.2741**	0.2736**
	(0.068)	(0.068)	(0.068)	(0.068)	(0.069)	(0.069)
Log research spending ($2008 m)	-0.0740*	-0.0726*	-0.0708*	-0.0692*	-0.0669*	-0.0656*
	(0.029)	(0.029)	(0.029)	(0.029)	(0.030)	(0.030)
Admissions Ratio – Lag 1	-0.5749**	-0.5749**	-0.5774**	-0.5779**	-0.5838**	-0.5835**
	(0.065)	(0.065)	(0.065)	(0.066)	(0.066)	(0.066)
Weighted TCA	0.0090**	0.0119**	0.0116**	0.0118**	0.0114**	0.0114**
	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Log weighted per-capita income		-0.0890	-0.0830	-0.0909	-0.0839	-0.0921
		(0.082)	(0.082)	(0.083)	(0.084)	(0.085)
Avg instructor salary			-0.0011	-0.0011	-0.0007	-0.0007
			(0.001)	(0.001)	(0.001)	(0.001)
Residence Ratio Lag 1 Year				-0.0007	-0.0008	-0.0009
				(0.001)	(0.001)	(0.001)
State high school graduates					0.0000	0.0000
					(0.000)	(0.000)
National Unemployment Rate						-0.0090
						(0.014)
Constant	7.1483**	7.4164**	7.4628**	7.4984**	7.4369**	7.5967**
	(0.302)	(0.390)	(0.394)	(0.397)	(0.403)	(0.471)
Observations	660	660	660	660	653	653
R-squared	0.500	0.501	0.502	0.503	0.505	0.505
Number of unitid	112	112	112	112	112	112

** p<0.01, * p<0.05, + p<0.1

Table 3. Comparison of specifications. All universities. Income, instructor salary, residence ratio, state high school graduates and national unemployment all found to have no statistically significant effect. Standard errors in parentheses. Dollar estimates in thousands of $2008 CPI, unless otherwise indicated.

TABLE 4
Comparison of Sports Variable Lag Lengths

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Log Applications	Log Applications	Log Applications	Log Applications	Log Applications
Lead One (Top 10)					0.0229 (0.017)
Base Year (Top 10)	0.0444** (0.015)	0.0452** (0.015)	0.0468** (0.016)	0.0461** (0.016)	0.0498** (0.016)
Lag One (Top 10)		0.0089 (0.015)	0.0098 (0.015)	0.0093 (0.015)	0.0127 (0.016)
Lag Two (Top 10)			0.0119 (0.015)	0.0117 (0.015)	0.0137 (0.015)
Lag Three (Top 10)				-0.0048 (0.016)	-0.0021 (0.016)
U.S. High School Graduates	0.3908** (0.048)	0.3903** (0.049)	0.3912** (0.049)	0.3911** (0.049)	0.3901** (0.049)
Log instruction spending ($ m)	0.2709** (0.068)	0.2716** (0.068)	0.2713** (0.068)	0.2714** (0.068)	0.2738** (0.068)
Log research spending ($ m)	-0.0741* (0.029)	-0.0740* (0.029)	-0.0728* (0.029)	-0.0727* (0.029)	-0.0721* (0.029)
Admissions Ratio – Lag 1	-0.5761** (0.065)	-0.5749** (0.065)	-0.5706** (0.066)	-0.5725** (0.066)	-0.5725** (0.066)
Weighted Total Cost of Attendance ($1000's)	0.0089** (0.003)	0.0090** (0.003)	0.0088** (0.003)	0.0089** (0.003)	0.0088** (0.003)
Constant	7.1546**	7.1483**	7.1412**	7.1419**	7.1275**
	(0.301)	(0.302)	(0.302)	(0.302)	(0.302)
Observations	660	660	660	660	660
R-squared	0.500	0.500	0.501	0.501	0.503
Number of unitid	112	112	112	112	112

** p<0.01, * p<0.05, + p<0.1

Table 4. Comparison of effect of finishing in the top ten by win percentage. All universities. Fall football season on spring applications as base year. Column (1) – base year only. Column (2) – base year and the year after. Column (3) Base year and two years following. Column (4) – base year and three years following. Column (5) – One year lead, base year, and three years following. Standard errors in parentheses. Dollar figures converted to $2008 CPI

References

Brand, Miles (13 November 2006). NCAA Response to the House Committee on Ways and Means concerning the NCAA's tax-exempt status [letter from NCAA President Myles Brand in response to a letter received from The Honorable William Thomas, Chairman of the Committee on Ways and Means of the U.S. House of Representatives concerning the Association's tax-exempt status]. Retrieved 15 April 2010 from http://www.ncaa.org/wps/portal/ncaahome?WCM_GLOBAL_CONTEXT=/wps/wcm/connect/ncaa/NCAA/Media+and+Events/Press+Room/News+Release+Archive/2006/Official+Statements/20061115_ways_means_rls

Denhart, Matthew, Villwock, Robert and Vedder, Richard. "The Academics Athletics Trade-off: Universities and Intercollegiate Athletics." Center for College Affordability and Productivity, 2009.

Frank, Robert H. "Challenging the Myth: A Review of the Links Among College Athletic Success, Student Quality, and Donations. Miami:" Knight Commission on Intercollegiate Athletics, 2004.

Grimes, Paul W., and Chressanthis, George A. "Alumni Contributions to Athletics: The Role of Intercollegiate Sports and NCAA Sanctions." *American Journal of Economics and Sociology*, 53 (1),1994. 27-40

Litan, Robert E., Jonathan M. Orszag, and Peter R. Orszag. "The Empirical Effects of College Athletics: An Interim Report," Commissioned by the NCAA, 2003.

Manski, Charles F., and Wise, David A., *College Choice in America*. Cambridge: Harvard University Press, 1983. 18 – 25

McCormick, R., and M. Tinsley. "Athletics versus Academics? Evidence from SAT Scores," *Journal of Political Economy*, 95, 1987. 1103-1116.

Marklein, M. B. "Colleges' sports success is not a major draw for applicants." USA Today, 20 March 2001. Retrieved 7 March 2010 from http://www.usatoday.com/life/2001-03-20-college-sports.htm

Monks, J., & Ehrenberg, R. G. "US News and World Report college rankings: Why do they matter?" *Change*, 31(6), 1999. 42–51

Murphy, R. G., & Trandel, G. A. "The relation between a university's football record and the size of its applicant pool." *Economics of Education Review*, 13, 1994. 265-270.

Pope, Devin G. and Pope, Jaren C. "The Impact of College Sports Success on the Quantity and Quality of Student Applications" Working paper. Forthcoming publication in Southern Economic Journal, 2009.

Rhoads, Thomas A., and Gerking, Shelby. "Educational Contributions, Academic Quality, And Athletic Success." *Contemporary Economic Policy*, 18(2), 2000. 248 – 258.

Russo, Ralph D. "COLLEGE FOOTBALL PACKAGE: Division I name game: I-A and I-AA out; FBS and FCS in." USA Today, 29 August 2007. Retrieved 5 April 2010 from http://www.usatoday.com/sports/college/football/2007-08-29-2474662757_x.htm

Siegfried, John, and Getz, Malcolm. "Where do the children of professors attend college?" *Economics of Education Review*, 25, 2006. 201–210

studentPOLL. "Intercollegiate athletics have little influence on college choice -- intramural and recreational opportunities matter more." Art & Science Group, 4(4), 2001. Retrieved 12 April 2010 from: http://www.artsci.com/studentpoll/archivedissues/4_4.pdf

Toma, J. D., & Cross, M. E. "Intercollegiate athletics and student college choice: Exploring the impact of championship seasons on undergraduate applications." *Research in Higher Education*, 39, 1998. 633-661.

Zemsky, Robert, Wegner, Gregory R., and Massy, William F. "Remaking the American university: market-smart and mission-centered." Piscataway: Rutgers University Press, 2005. pp. 33-37

Other Data Sources

Consumer price index information and national is provided by the U.S. Bureau of Labor Statistics, using the U.S. city average for all items.

National unemployment data is derived from Labor Force Statistics from the Current Population Survey (U.S. Bureau of Labor Statistics).

National high school graduation data is retrieved from U.S. Department of Education, National Center for Education.

State-level high school graduation data are provided by the National Center for Education Statistics, Common Core of Data.

National and state-level per capita income data are provided by the U.S. Department of Commerce, Bureau of Economic Analysis, Regional Income Division.