The Relationship Between Big-Time College Football and State Appropriations to Higher Education

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Abstract

I investigate the relationship between big-time college football programs and state appropriations to public institutions of higher education. Estimation of a linear reduced form model of the determination of state appropriations to higher education, using a panel of financial, athletic, and state-specific economic data from 570 public institutions of higher education at the Baccalaureate level or higher from 1976-1996 shows that schools with Division I-A football programs receive about 6% more in state appropriations than schools that do not field a Division I-A football team. Institutions with successful football teams receive 3% to 8% increases in state appropriations the following year. Defeating an in-state rival in a prominent football game is also associated with an increased level of appropriation in the following year. These results support the predictions of the model of competition for political influence among pressure groups developed by Becker (1983) and suggest that the total economic benefit associated with big-time athletic programs may be larger than previously thought.

JEL Keywords: H720 - State and Local Budget and Expenditures; I280 - Education: Government Policy; L830 - Sports.

Introduction and Motivation

What benefits do intercollegiate athletics provide to colleges and universities? The size of the economic impact of intercollegiate athletics is a hotly debated topic among economists and decision makers at universities, as well as in the popular press. The issue turns on whether or not intercollegiate athletics drain or contribute to university budgets. This debate is important because intercollegiate athletics are large visible parts of universities, commanding considerable economic resources. In many instances, claims of large indirect benefits are the primary justification for large expenditures on high profile intercollegiate athletic programs.

Intercollegiate athletics produces both direct and indirect economic benefits. The direct benefits include ticket, concession and parking revenues associated with hosting games, television and radio

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revenues, payments for postseason appearances, and the sale of licensed merchandise bearing the institution's name and logo. Prior research on the indirect economic benefits of intercollegiate athletics has focused primarily on the effect of success in intercollegiate athletics on charitable giving and on enrollment and the quality of students. Here, I examine the effect of intercollegiate athletics on the size of state government's appropriation to institutions of higher education.

Becker (1983) developed a model of competition among political pressure groups for political influence. In this model, the influence gained by pressure groups depends, in part, on the efficiency of each group at producing political pressure. In the context of Becker's model, universities, alumni, and athletic boosters can be interpreted as pressure groups vying for influence in state legislatures with other pressure groups. A big-time intercollegiate athletic program, as well as success on the playing field, can be viewed as methods for generating political pressure in state legislatures. Thus this paper can also be thought of as a limited test of Becker's model of political influence, applied to state appropriations to higher education.

Supporting the idea that intercollegiate athletics can have an important effect on state funding, Zimbalist (1999) recently discussed the possibility of intercollegiate athletics "arousing legislative largess among sports-crazed representatives" (page 152). Also, Shapiro (1983) documented the important role played by big-time athletics in the growth of Michigan State University.

No clear consensus has emerged in the academic literature on the relative magnitude of the benefits and costs associated with intercollegiate athletics. Zimbalist (1999) argued that because some costs are hidden and only the most extreme positive revenues are reported in the popular press, most athletic departments at large universities operate in the red. Goff (2000) performed a careful case study of the overall financial impact of intercollegiate athletics at a relatively low-profile Division I school, Western Kentucky University. After accounting for various accounting peculiarities, Goff concluded that the athletic department at Western Kentucky ran modest surpluses in most years and argues that if this is true at Western Kentucky, it may also be true at other similar institutions, suggesting that many Division I athletic departments operate in the black on average. The idiosyncratic nature of the accounting practices used at universities makes the assessment of the total economic impact of intercollegiate athletics difficult. Typical accounting inconsistencies include assigning the revenues and expenses generated by athletic events to a variety of non-athletic accounts within the institution, or in some cases to other outside entities like booster clubs. Despite the disagreement in the net impact, both these studies agree that intercollegiate athletic programs generate some indirect economic benefits.

Prior research on the indirect economic benefits generated by intercollegiate athletics focus on the impact on donations and on the quantity and quality of students enrolled in the institution. This research looks for evidence that athletic success leads to more giving by alumni and fans and attracts more and better students to the institutions. Both Goff (2000) and Zimbalist (1999) provide extensive surveys of this literature, which has found little evidence of significant positive indirect benefits.

The research on indirect benefits of intercollegiate athletics has overlooked one important potential source of indirect benefits, appropriations from state governments. To date, no detailed study of the relationship between intercollegiate athletics and government appropriations has been carried out. This relationship may be important because most big-time college athletic programs are public institutions and public institutions receive a large portion of their revenues in the form of appropriations from state governments. Over the period 1974-2000 150 institutions sponsored a Division I-A football team, the largest classification of schools in the NCAA, for two or more seasons.[1] 80% of these 150 big-time athletic programs are public universities. Over this 26 year

[1]NCAA records indicate that five Historically Black Colleges and Universities (HBCUs), Alcorn State, Grambling,

period appropriations from state governments accounted for 32% of each institution's current fund revenues, a larger share than revenues from tuition and fees, 19%, or revenues from charitable donations, 4.7%, the primary focus of previous research on indirect economic benefits from intercollegiate athletics. Also, appropriations from state government are part of the state budgeting process and may not be affected by the irregular accounting practices that plague other athletic accounts.

There are many reasons to believe that an institution's annual appropriation from the state government could be affected by the presence of intercollegiate athletics. A number of these explanations emerge from the predictions of Becker's (1983) model of competition for political influence among pressure groups. Many residents and state legislators are alumni of a state's public institutions of higher education and other residents of a state who are not alumni may follow the big-time athletic teams in that state; these individuals can be interpreted as a pressure group competing with other groups - perhaps including alumni and boosters of another rival university in a state - for political influence in state legislatures. In this model, the political influence obtained by each pressure group depends on how efficient each group is in producing pressure. Prominent and successful athletic programs can be interpreted as one way of efficiently generating political pressure.

For states without major professional sports teams, like Nebraska, Oklahoma, Alabama, Iowa, Arkansas, Kentucky, and others, the big-time athletic programs at public universities may be the only prominent local sports teams. Larger state subsidies for the major college teams in these states may play a role similar to the subsidies given to professional sports teams for stadium construction in large cities.

Intercollegiate athletics may also be interpreted as a signal of overall quality of the output of a school by state legislators. The benefits of an outstanding department in the humanities or a Nobel Prize winning chemist might not be apparent to the state legislators deciding on the annual appropriation to the state university, but fielding a successful Division 1-A football team puts the university in the news frequently and prominently. Also, football games are a likely place for administrators to lobby key legislators, providing schools with big time athletic programs with a competitive advantage in lobbying legislators.

These factors all suggest that state appropriations to individual institutions of higher education may be affected by the presence of big-time intercollegiate athletics. In this paper I investigate the possibility that such an effect exists, and is economically important.

Empirical Modelling Approach

I use a linear reduced form empirical model of the annual state appropriation to individual institutions of higher education to assess the impact of intercollegiate athletics. Although I do not develop a formal economic model of the determination of appropriations, simple linear reduced form models like this one can be motivated by the optimality conditions from a wide variety of economic models either in a general equilibrium setting or from a public choice perspective. See, for example Garvin (1980), Creedy and Francois (1990), (1993) and the discussion in Hoenack and Pierro (1990). The general form of this empirical model is

$$A_{i,j,t} = \beta X_{i,t} + \gamma Z_{j,t} + \epsilon_{i,j,t} \tag{1}$$

where $A_{i,j,t}$ is the state government's appropriation to institution i in state j in year t, $X_{i,t}$ is a vector of institution-specific factors that might affect state appropriation to the institution in a

Jackson State, Southern University, and Texas Southern, played Division I-A football for a single season, 1977. In this case I treat these schools as members of the smaller Division I-AA throughout the sample period.

given year, $Z_{j,t}$ is a vector of state specific economic controls that might affect year is appropriation to higher education, $\epsilon_{i,j,t}$ is a mean zero, constant variance equation error term capturing other factors that affect annual state appropriation to public institutions of higher education, and β and γ are vectors of unknown parameters to be estimated. Although a few large public institutions of higher education receive direct appropriations from the federal and local governments, state appropriations constitute the largest source of appropriated government funds.

Humphreys (2000) showed that aggregate state appropriations to higher education are sensitive to business cycle conditions. Because tax revenues are procyclical and many state governments face annual balanced budget constraints, state appropriations to higher education tend to rise and fall with the business cycle. For this reason, it is important to control for the effects of the business cycle on state appropriations to individual institutions.

Other institution-specific factors also affect the level of state appropriations to institutions of higher education. Many states have adopted formal funding formulas that link the level of appropriation to enrollments or other factors like the size of the physical plant. In other states, informal funding formulas are used. However, considerable latitude exists in the relationship between state appropriation and enrollments even in states with formal funding formulas. For this reason I include a vector of observable institution-specific variables in the empirical model rather than explicitly modelling the funding formulas.

Other factors, like the mission of the institution and the market served by each institution, may also affect the level of state appropriation given to institutions. Institutions with significant research missions, or comprehensive land-grant universities charged with providing education in a wide variety of disciplines may have different funding than institutions located in the suburbs of large cities with large numbers of non-resident part-time students including working adults. In any event, the variables in $X_{i,t}$ should reflect the factors specific to each institution that affect the level of state appropriation.

$X_{i,t}$ also contains variables related to the intercollegiate athletic offerings at each institution. The parameters estimated on these variables will be used to assess the impact of intercollegiate athletic offerings on the level of state appropriations.

Data

The US Department of Education conducts an annual survey of enrollment and financial conditions at institutions of higher education.[2] I created a panel of enrollment and financial data for all public U.S. institutions of higher education at the Baccalaureate level or higher over the period 1975-1996. The Financial Statistics survey results are not available for years after the 1996-1997 academic year at this time. Using only public institutions that were in the surveys for the entire 1976-1996 period produced a balanced panel with 570 institutions. Omitting institutions with missing observations over this period eliminates less than 5% of the observations for public colleges and universities at the Baccalaureate level or higher in the HEGIS/IPEDS survey universe.

The National Center for Educational Statistics also publishes price indexes appropriate for use with data for institutions of higher education. These include the Higher Education Price Index (HEPI) and a version of the Consumer Price Index (CPI) calculated on an academic year (July-to-July) basis. The HEPI was used to deflate the nominal state appropriation data for each institution.

[2]Since 1986, this survey has been called the Integrated Postsecondary Educational Survey (IPEDS). Prior to 1986, it was called the Higher Education General Information Survey (HEGIS). Both are actually annual censuses of all accredited postsecondary educational institutions. These data are available on-line at the National Center for Educational Statistics (http://nces.ed.gov).

Table 1: Variables in Model, Means, and Sources

Variable	Definition	Mean	Source
$A_{i,j,t}$	Annual Real State Appropriation	$31,400,000	IPEDS Financial Characteristics Survey
$UGE_{i,t}$	Undergraduate Enrollment	1,050	IPEDS Fall Enrollment Survey
$GRE_{i,t}$	Graduate Enrollment	6,194	IPEDS Fall Enrollment Survey
$INC_{i,t}$	State Personal Income Per Capita	$12,995	BEA Regional Accounts Data
$D1_{i,t}$	=1 if Football Team is Division 1-A	0.16	*NCAA Football*, various years
$W_{i,t}$	Football Wins	5	*NCAA Football*, various years
$BG_{i,t}$	Team appeared in Bowl Game	0.29	*NCAA Football*, various years
$BR_{i,t}$	=1 when team beat primary in-state rival	0.23	*NCAA Football*, various years

Detailed data on the performance of NCAA Division I-A football teams can be found in the annual publication *NCAA Football*. I extracted the performance measures for NCAA Division 1-A football teams from these annual publications. The Bureau of Economic Analysis (BEA) of the US Census Bureau publishes data on state personal income and state population.[3] I obtained estimates of state personal income and state population from the BEA. Personal income was deflated using the Consumer Price Index. Table 1 shows the relevant variables, their means, and the source of each variable.

Empirical Estimation and Results

The vector $X_{i,t}$ contains variables that reflect the effects of factors specific to each institution on the level of state appropriation. Among the most important of such factors are those related to the specific mission of each institution and the markets served by each institution. For this analysis, I use two variables to capture these effects. The number of Full-Time Equivalent (FTE) undergraduates and FTE postgraduate students enrolled in the Fall semester of each academic year at each institution. FTE enrollment counts three part-time students as one full-time student, thus in a rough sense correcting for the propensity for some institutions to attract part-time students, who are typically non-resident and working, and may also be outside the traditional 18-22 year old age bracket of undergraduates. Including undergraduate and postgraduate enrollment separately also reflects the scale and intensity of research activities at each institution, as those institutions with extensive research missions will tend to enroll more postgraduate students than institutions with more intensive educational missions. Enrollment also proxies for the size of the institution.

$X_{i,t}$ also contains variables that reflect the intercollegiate athletic offerings of each institution. Initially, I use a simple dummy variable that is equal to 1 if the institution is a member of the NCAAs Division 1-A, the largest classification of NCAA athletic programs.

$Z_{j,t}$ is a vector of state specific economic controls. Economic conditions affect state budgets, primarily through their effect on revenues. Changes in state government revenues may also affect state appropriations to higher education. I used real state per capita personal income as a proxy for the economic conditions in each state. For the service academies in the sample, I use the federal appropriation to each as the measure of government appropriation and real gross national income as the control for business cycle effects.

[3]Available on line at http://www.bea.doc.gov/bea/regional/spi/.

Pooling

The first issue that must be addressed is the pooling of the data in this panel. In this setting, the most important issue is how to model the intercepts, or group-specific effects. Testing for pooling is a straightforward process. The null hypothesis of homogenous intercepts for all groups in the sample versus the alternative of heterogeneous intercepts can be tested with an F-test. Following the procedure suggested by Hsao (1986), I considered three alternative formulations for Equation (1). A pooled model

$$A_{i,j,t} = \alpha^* + \beta X_{i,t} + \gamma Z_{j,t} + \epsilon_{i,j,t} \tag{2}$$

where all groups in the panel have a homogeneous intercept, a institution-mean corrected model

$$A_{i,j,t} = \alpha_i^* + \beta X_{i,t} + \gamma Z_{j,t} + \epsilon_{i,j,t} \tag{3}$$

where each institution has a separate intercept, and a state-mean corrected model

$$A_{i,j,t} = \alpha_j^* + \beta X_{i,t} + \gamma Z_{j,t} + \epsilon_{i,j,t} \tag{4}$$

where each state has a separate intercept. Because the level of state appropriation is determined by each state legislature in each year, the state-mean corrected model is an important alternative to the institution-mean model.

Note that these empirical models are nested, in that the state-mean corrected model and the pooled model can be expressed in terms of the institution-mean corrected model with a series of linear restrictions placed on the intercept parameters. In particular the pooled model imposes the restriction that $\alpha_j^* = \alpha^*$ for all j and the state-mean model imposes the restriction that $\alpha_h^* = \alpha_k^* = \alpha_j^*$ for all $h = k$. These restrictions can be tested using an F-test. The results of these tests provide guidance about the appropriate way to empirically model the intercepts.

The F-test of the institution-mean corrected model vs. the pooled model clearly favors institution specific effects. The value of the F-statistic is 145, and the P-value is 0.00, clearly rejecting pooling in favor of institution-specific effects. The F-test of the state-mean corrected model vs. the institution specific model has a value of 15.2 and a P-value of 0.00, implying that institution-specific effects are rejected in favor of state-specific effects. The reason for this may be that the undergraduate-graduate composition of the student body, along with the size effects, captured by the enrollment variables adequately proxy for the institution-specific effects. Based on the the results of these tests, I estimated all empirical models with state-specific intercept terms. The parameter estimates for these terms are not included in the tables, but they are available from the author by request.

I also included state-specific time trends and year dummy variables in the empirical models. The state-specific time trends capture any systematic state-specific changes in higher education over the sample period. The year dummy variables capture any factors that affect all institutions in the sample in a particular year. These factors include national business cycle effects, federal government policy changes, and factors common to the entire cohort of students entering higher education in a particular year. I also included an overall time trend in the model to capture any systematic changes in funding to higher education funding that affect all institutions in the sample.

The level of state appropriation to higher education is typically set before the start of the academic year in states, although the exact timing varies somewhat across states. This raises the possibility that explanatory variables dated in period t will be correlated with the equation error term. To avoid this endogeneity problem, I lag all of the explanatory variables to period $t-1$ in the model. Lagging these variables two years produced similar results to those reported here.

Results

Table 2 shows the results of estimating the linear reduced form model of the determination of state appropriation to institutions of higher education defined by Equation (4) using OLS.[4] Model (1) uses a simple dummy variable as a proxy for the effect of intercollegiate athletics on state appropriation to higher education. All variables in Model (1) are statistically significant using a two-tailed test at the 5% level or better. The parameter on the dummy variable for participation in Division I-A football is positive, suggesting that public institutions with big-time college football programs receive a larger annual state appropriation than public institutions that play football at lower levels or have no intercollegiate football program. One explanation for this increase in appropriation is that a big-time football program allows a universities' administration, alumni, and athletic boosters to produce political pressure more efficiently, because of the visibility of the team and the lobbying opportunities generated by home football games. The size of the estimated impact of Division I-A football on state appropriation is modest, about 6% of the sample average annual appropriation.

The other parameters are correctly signed and significant. The real per capita income variable suggests that state appropriations are pro-cyclical and that each $1 increase in real per capita income increases state appropriation to an institution of higher education by $3,160; the annual state appropriation rises and falls with the previous year's level of real state income per capita. Again, the explanation for this is that state tax revenues also rise and fall with state per capita income and many state legislators face annual balanced budget requirements. States tend to balance their budgets in periods of falling tax revenues by reducing appropriations to higher education. The elasticity of this estimated parameter is 1.31 at the sample means, suggesting that the increase (decrease) in state appropriation to institutions of higher education is more than proportionate to the increase (decrease) in state real per capita income the previous year. This elasticity is close to the elasticity reported by Humphreys (2000), 1.42, using data aggregated to the state level.

The enrollment variables are positive, suggesting that state appropriation rises with the size of the student body. The parameters on the FTE graduate and undergraduate variables suggest that institutions receive considerably more state funding for a FTE postgraduate student than for a FTE undergraduate. I interpret this as evidence of greater state funding for institutions of higher education with research missions and comprehensive land grant institutions with many programmatic offerings at the postgraduate level. Also note that the parameter on the overall time trend is negative and significant, reflecting a general downward trend in state financing to higher education over the sample period. The size of this parameter suggests that real state appropriations have fallen by about 2.5% per year over the sample period.

Model (2) uses a different metric for intercollegiate athletic offerings, the total number of regular season football wins in the previous season for Division I-A teams. This variable reflects not only the presence of a Division I-A football team but also the on-field success of the team. I included both wins and wins squared to control for the possibility of a diminishing marginal impact of additional wins on state appropriations. The results from Model (2) suggest that more successful athletic programs are rewarded with additional state funds, although the marginal impact of additional wins declines rapidly.[5]

Model (3) uses a richer set of football success variables. In essence, Model (3) posits that all

[4] I also applied the Newey-West estimator to correct for heteroscedasticity and AR(1) serial correlation. This correction had no impact on the sign or significance level of the estimated parameters, so I have reported the OLS results. The asymptotic standard errors from the Newey-West correction are available by request.

[5] I also estimated the model using winning percentage instead of wins. The results are identical to those using wins.

Table 2: Results of OLS Estimation of Equation (1)

Variable		Model 1	Model 2	Model 3
Real State Per Capita Income	$INC_{j,t-1}$	3161†	3167†	3163†
		(536)	(537)	(536)
FTE Graduate Enrollment	$GRE_{i,t-1}$	16151†	16072†	15958†
		(164)	(165)	(167)
FTE Undergraduate Enrollment	$UGE_{i,t-1}$	1685†	1649†	1662†
		(52)	(52)	(52)
D1	$D1_{i,t-1}$	1929341†	–	–
		(668535)	–	–
Football Wins	$W_{i,t-1}$	–	1062865†	1194790†
		–	(309638)	(317506)
Football Wins Squared	W^2_{t-1}	–	-75076†	-137801†
		–	(34743)	(39205)
Bowl Game	$BG_{i,t-1}$	–	–	4012800†
		–	–	(1267306)
Won "Big Game"	$BR_{i,t-1}$	–	–	2160939†
		–	–	(1018705)
Overall Time Trend		-824040†	-820201†	-813528†
		(206561)	(206499)	(206375)
N		10,816	10,816	10,816
R^2		0.84	0.84	0.84

Standard errors in parentheses. †: Significant at 5% level.

wins are not equal when it comes to their impact on state appropriations. Model (3) includes a dummy variable for appearances in post-season bowl games in the previous season and a dummy variable that is equal to 1 if team i won "the big game" in the previous season. I define "the big game" as an annual or very frequently scheduled game between two large and prominent public universities in the same state.[6] The NCAA calls these "Trophy Games" and many have symbols or names associated with them: Michigan vs. Michigan State (the "Paul Bunyon Game"), Alabama vs. Auburn (the "Iron Bowl"), Mississippi-Mississippi State (the "Golden Egg"), etc. Table 4 in the appendix lists these games. Note that some personal judgement was used to identify these "big games." The general criteria used were that the institutions had to be public and in the same state and had to play regularly through the sample period.[7]

The empirical results suggest that winning the "big game" is associated with an increase in appropriation of about $2.1 million in real 1982 dollars in the following year, an increase of just under 7%. This can be viewed as empirical support for the predictions of Becker's (1983) model of competition for political influence among pressure groups. In states with two prominent public institutions of higher education, these two institutions and their alumni and boosters, will be continually competing for political influence in the state legislature and other bodies governing higher education. Head-to-head competition in a high profile football game might provide one pressure group with an edge in the following year, allowing the winner to produce pressure more efficiently.

The parameter estimate on the "big game" variable shows some sensitivity to the teams included in the list of rivals. As an alternative, I used an expanded group of games that also meet the criteria, including about 15 additional games involving Fresno State vs. San Jose St., Mississippi vs. Southern Mississippi, etc., but the parameter estimate on this variable was not statistically significant. Perhaps these games do not sufficiently capture the attention of the relevant agents, or perhaps they are not rivalries in the sense of the games listed in the appendix.

The results from Model (3) suggest that all college football games are not equal in terms of their impact on annual state appropriation to higher education. Making an appearance in a postseason bowl game has an impact on the following year's appropriation, as does winning the "big game." Table 3 summarizes the total impact of on-field success at the Division 1-A level on annual state appropriation to the institutions of higher education in the sample. The first column shows the financial impact of wins on state appropriations, in percentage terms. From this column alone, it appears that the most successful seasons are punished by lower appropriations in the following year. However, column two adds in the impact of appearing in a postseason bowl game. The first five rows in column three are empty because, under NCAA rules, teams must have a winning record to qualify for a bowl appearance. Column three adds the effect of winning the "big game" to the impact of wins, and column four adds both the bowl and "big game" impacts.[8]

Notice that the overall impact of wins and a bowl appearance is relatively flat for all but the best and worst seasons. Football teams with between 3 and 10 wins in a season, and with a postseason bowl appearance for the most successful, result in an increase in appropriation of between 2.5% and 7% the following year - a relatively modest increase. Winning the "big game" increases the

[6]Games between such rivals accounted for slightly less than 4% of the 27,286 college football games played by Division I-A teams between 1976 and 1996.

[7]Two rivalries are asymmetric. North Carolina State is the rival for East Carolina - they played 14 times in the sample period - but North Carolina is State's rival; Navy is the rival for Air Force but Army is Navy's rival. The results are unchanged if Navy is replaces Army as Air Force's rival.

[8]I also estimated a model that included a dummy variable for years when an institution's football team was on probation, but that variable was not significant. Apparently the relevant agents are not concerned with cheating by football teams.

Table 3: Average Annual Impact
Percent Change in Real Annual State Appropriation

# Wins	Wins Only	+ Bowl	+ Big Win	+ Both
1	1.2%	–	3.6%	–
2	2.1%	–	4.5%	–
3	2.6%	–	5.1%	–
4	2.9%	–	5.3%	–
5	2.9%	–	5.3%	–
6	2.5%	7.0%	4.9%	9.5%
7	1.8%	6.4%	4.3%	8.8%
8	0.8%	5.4%	3.3%	7.8%
9	-0.5%	4.1%	2.0%	6.5%
10	-2.1%	2.5%	0.4%	4.9%

benefit to between 3.6% and 5.3%. Very bad teams - those that win only 1 or 2 games - get a smaller increase in appropriation in the following year.

Conclusions

Public colleges and universities with big-time intercollegiate athletic programs receive a larger annual appropriation from state governments than those that do not have such programs and successful programs generate larger increases in appropriations than unsuccessful ones. Defeating an in-state rival public institution on the field also leads to increases in appropriations. However, the indirect financial benefits flowing from big-time football programs appear to be modest. A successful football season might increase state appropriations by 5% to 8% in the following year, and a team with a respectable losing record might garner a 2% to 4% increase, other things equal. These increases in appropriation support the predictions of Becker's (1983) model of competition among political interest groups.

In terms of the ongoing debate on the profitability of intercollegiate athletic programs, this research shows that the overall economic benefits generated by big-time athletic programs are larger than previously thought. A larger number of athletic programs at public universities probably generate positive economic returns for the institution in any given year. Furthermore, the indirect economic benefits described here go into the general revenue fund at institutions, not directly to the athletic program. In this sense, they may help to further the broader educational and research missions of public colleges and universities.

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Appendix

Table 4: In-State Public Rivals

Air Force*-Navy	Arizona St.-Arizona
Army-Navy	Auburn-Alabama
California-UCLA	Cincinnati-Miami OH
Clemson-South Carolina	Colorado St.-Colorado
East Carolina*-North Carolina St.	Florida-Florida St.
Georgia-Georgia Tech	Indiana-Purdue
Iowa -Iowa St.	Kansas St. - Kansas
Memphis St.-Tennessee	Michigan St.-Michigan
Mississippi St. -Mississippi	New Mexico - New Mexico St.
North Carolina St.-North Carolina	Oklahoma - Oklahoma St.
Oregon - Oregon St.	Penn St. - Pittsburgh
Texas - Texas A&M	Utah-Utah St.
Virginia - Virginia Tech	Washington-Washington St.
Louisville-Kentucky	

*: Rivalry not symmetric, only for first team.