

# **THE PHYSICAL CAPITAL STOCK USED IN COLLEGIATE ATHLETICS**

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## ABOUT THIS REPORT

This study was commissioned by the National Collegiate Athletic Association (NCAA) as an independent analysis of the physical capital stock used in intercollegiate athletics. It represents an extension of a previous analysis of operating expenditures associated with intercollegiate athletics. The project was funded in part by the Mellon Foundation.

The views and opinions expressed in this study are solely those of the authors and do not necessarily reflect the views and opinions of the NCAA, the Mellon Foundation, or the institutions with which the authors are or have been associated.

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## Executive Summary

The NCAA commissioned this study as part of an ongoing effort to gather more accurate and timely financial information on the role of intercollegiate athletics in higher education. In a previous interim report released in 2003 (“The Effects of Collegiate Athletics: An Interim Report”), we explored the financial effects of operating expenditures associated with collegiate athletics. One key finding of that study was that operating athletic expenditures in the aggregate are a small share of total higher education spending for Division I-A schools; another key finding was that increased spending on football did not lead to increased winning percentages or increases in net revenues during the 1990s.

However, the previous study concluded that a thorough understanding of athletics spending, including the potential presence of an “arm’s race,” would require data on capital costs. This paper therefore focuses on capital costs, which are defined as the cost to own or lease facilities, practice fields, and parking lots associated with athletics. It represents an important supplement to the interim report on operating expenditures.

Based on a survey of 56 institutions from Divisions I, II, and III, this paper reaches the following key conclusions:

- *Annual capital costs represent a significant share of total athletic expenditures.* The lack of accurate data on capital costs represented a significant limitation of previous studies, including our interim report. This report highlights the potential bias in excluding capital costs. For example, the \$24 million average annual capital cost for intercollegiate athletic facilities in Division I-A is roughly equal to the average operating cost for intercollegiate athletics of more than \$27 million.
- *However, including capital costs does not alter the basic conclusion that athletic spending represents a relatively small share of total institutional spending.* The 2003 study found that the average operating cost for a Division I-A athletics program is roughly 3.5 percent of total institutional operating spending. At those schools where institution-wide capital data are available, capital costs increase athletic spending by about one percentage point of total institutional spending (including operating and capital expenditures). Therefore, including capital costs does not alter the qualitative result that athletic spending represents a relatively small share (less than five percent) of total institutional spending, at least for the schools for which data were available.
- *Football stadium capacity is the most important driver of annual athletic capital costs in Division I; the total number of varsity teams appears to be the most important driver for Divisions II and III.* The evidence shows that total capital costs are primarily explained by replacement costs of athletic facilities. Within Division I, furthermore, replacement costs of athletic facilities are primarily explained by the replacement costs of football stadiums, and replacement costs of football stadiums are primarily explained by football stadium capacity. In other

words, among Division I schools, football stadium capacity is the key variable in explaining total athletic annual capital costs. Since football stadium capacity is widely and easily available, analysts can monitor, to a first approximation, overall athletic capital costs in Division I-A simply by following changes in football stadium capacity. Outside of Division I, however, it is harder to find a single variable that explains a majority of the variation in replacement costs across schools. In Divisions II and III, the total number of varsity teams appears to be the strongest single explanatory variable of annual athletic capital costs.

- *Division I-A schools may be engaged in an arm's race over football stadium capacity, but the statistical evidence is weak and, to the extent that it exists, the magnitude of the arm's race appears modest.* The data suggest the possible presence on an arm's race in football capital spending within the major conferences of Division I-A: The expansion of a stadium at one school within a conference appears to make it more likely that other schools within that same conference will expand their stadiums. This finding, however, is sensitive to specific assumptions employed in the statistical analysis. Moreover, even in statistical analyses suggesting the possible presence of an arm's race, the practical implications appear to be limited because the magnitude of the effect is small.

## Introduction

In a previous interim report (“The Effects of Collegiate Athletics: An Interim Report”), we explored the financial effects of operating expenditures associated with collegiate athletics.<sup>1</sup> That report drew upon a comprehensive database linking information collected by the National Collegiate Athletic Association (NCAA) in conjunction with the Equity in Athletics Disclosure Act (EADA) to a variety of other data sources. The report, however, underscored a substantial concern with the existing data: poor measurement of capital expenditures and the capital stock used in collegiate athletics.

The previous report highlighted two significant problems with data on the capital stock used to support intercollegiate athletics. First, the value of the outstanding athletic capital stock is not recorded anywhere on the NCAA/EADA forms. Second, new capital expenditures are not adequately reflected in the NCAA/EADA data. For example, in a survey of chief financial officers from 17 Division I schools, roughly half the respondents indicated that all athletic capital expenditures were captured by the NCAA/EADA data, and the other half indicated that at least part of athletic capital spending was not. It is thus impossible to estimate in any rigorous fashion the value of the capital services used in the “production” of intercollegiate athletics with the NCAA/EADA data.

As a result of these shortcomings in athletic-related capital data, the previous interim report was forced to focus mostly on operating expenses. Although this approach was reasonable for the purposes of the interim report, the exclusion of capital costs nonetheless represented a gap in the analysis. For example, more than half of all Division I-A schools have either opened a new football stadium or undertaken a major renovation of their old stadium since 1990. The exclusion of capital costs may be particularly important in areas such as analyzing the potential “arm’s race” in college athletics.

To remedy the shortcomings in the data on intercollegiate physical capital, the NCAA has taken two major steps. First, in conjunction with National Association of College and University Business Officers (NACUBO), the NCAA has devised a new annual financial survey that will better capture ongoing capital expenditures.<sup>2</sup> Second, with funding from the Mellon Foundation, the NCAA commissioned this study to examine the existing physical capital stock used in intercollegiate athletics. Our analyses suggest that the survey data, combined with other readily available information (e.g., on stadium capacity), could be used on an ongoing basis as a rough historical measure of annual capital costs in Division I-A, even though such estimates will need to be viewed with some caution given the inherent difficulties in such extrapolation.

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<sup>1</sup> Robert E. Litan, Jonathan M. Orszag, and Peter R. Orszag, “The Empirical Effects of Collegiate Athletics: An Interim Report,” August 2003, available at <http://www.ncaa.org/databases/baselineStudy/baseline.pdf>

<sup>2</sup> See, for example, [http://www1.ncaa.org/membership/ed\\_outreach/eada/forms/procedures.pdf](http://www1.ncaa.org/membership/ed_outreach/eada/forms/procedures.pdf).

## II. Estimating the Capital Stock Used in Intercollegiate Athletics

The analytically correct measure of the value of capital services used in intercollegiate athletics,  $C$ , is equal to the replacement value of the capital stock,  $K$ , used in intercollegiate athletics multiplied by the depreciation rate ( $\delta$ ) plus the opportunity cost of capital ( $r$ ):

$$C = K(\delta + r)$$

The key to this calculation is  $K$ ; a range of reasonable values for  $\delta$  and  $r$  can then simply be assumed based on evidence from other sources. Obtaining a value for  $K$  by school, however, requires a current estimate of the replacement value of the capital stock – including stadiums, training facilities, fields, and other capital – used in intercollegiate athletics.<sup>3</sup> In this section, we focus on estimating the current value of  $K$ .

### A. Capital survey

To collect information on  $K$ , we constructed a survey and, working with the NCAA, sent it to selected university officials. The survey is reproduced in the appendix. It collected information on the replacement value of facilities if the institution owned the facility; the lease cost if the institution did not own the facility; the share of time the facility was used for different purposes; and the land for the facilities, practice fields, and parking lots.

The survey was completed by 56 schools, including 28 Division I (with 8 in Division I-A), and 28 schools in Divisions II and III. Table 1 provides the number of responses and representation rate (responses as a percentage of schools) in each Division.

| <b>Table 1: Survey response rate</b> |                                   |                             |
|--------------------------------------|-----------------------------------|-----------------------------|
| <b><u>Division</u></b>               | <b><u>Number of responses</u></b> | <b><u>% of Division</u></b> |
| I                                    | 28                                | 8.6%                        |
| I-A                                  | 8                                 | 6.8%                        |
| II                                   | 11                                | 4.0%                        |
| III                                  | 17                                | 4.0%                        |
| Total                                | 56                                | 5.5%                        |

The 56 respondent schools provided information on a total of 362 athletic facilities. Table 2 shows the distribution of facilities by sport. Roughly 7.5 percent of the facilities were used for football, roughly 14 percent were used for men’s basketball, and more than 15 percent were used for women’s basketball. One potential explanation for the greater prevalence of women’s basketball facilities than men’s basketball facilities is that men’s teams may be more likely to practice and play in the same facility.

<sup>3</sup> See, for example, Gordon C. Winston, “A Guide to Measuring College Costs,” Williams College, DP-46, January 1998.

| <b>Table 2: Facilities by sport</b> |               |
|-------------------------------------|---------------|
| <b>Sport</b>                        | <b>Number</b> |
| Football                            | 27            |
| Men's basketball                    | 51            |
| Women's basketball                  | 56            |
| Total                               | 362           |

B. Survey data on capital stock used in intercollegiate athletics

The capital stock used in intercollegiate athletics can be owned or leased by the university. In practice, however, the vast bulk of the relevant capital stock used by intercollegiate athletics is owned, not leased. Table 3 shows the mean survey responses by division for total replacement values, and total annual lease costs (for leased facilities). These two figures are not immediately comparable, just as the value of a house is not immediately comparable to annual rent payments. To make them comparable, we transform the annual lease payments into an estimated replacement value for the underlying facility. If the annual lease payment equals five percent of the replacement value, the mean replacement value of owned facilities represents more than 99 percent of the owned and leased “facility capital stock” used in intercollegiate athletics for the schools completing the survey. (If the lease payments are more than five percent of the replacement value, the share of total facility capital stock that is owned is even higher than 99 percent.) We therefore focus our attention on athletic facilities owned by the universities.

| <b>Table 3: Average replacement values and lease payments by Division</b> |  |   |
|---|--|---|
| <b>Division</b>   | <b><u>Average replacement values per institution</u></b><br><b><u>(\$ thousands)</u></b> | <b><u>Average annual lease payments per institution</u></b><br><b><u>(\$ thousands)</u></b> |
| I   | \$94,301   | \$42.4  |
| <i>I-A</i>  | \$240,627  | \$68.8  |
| II  | \$10,944   | \$1.4   |
| III   | \$23,482   | \$0.2   |
| All Divisions   | \$56,429   | \$21.5  |

Note: Three schools did not provide replacement values for facilities they own. Other schools did not provide replacement costs for all their owned facilities. Such facilities are, therefore, excluded from the table.

In addition to facilities, another element of K is the land, such as practice fields and parking lots, devoted to intercollegiate athletics. Table 4 shows the land used in intercollegiate athletic activities, as estimated by the size of practice fields and number of parking spots (both weighted by the share of the time they are estimated to be used for

intercollegiate athletics). We assume that parking spaces average 350 square feet each, including aisle space.<sup>4</sup> The final column in Table 4 therefore adds 350 times the weighted-average number of parking spots to obtain the total land used for practice fields and parking spots combined.

| <b>Table 4: Average land use by Division</b> |  |   |   |
|--|--|---|---|
| <b><u>Division</u></b>                       | <b><u>Practice fields used for intercollegiate athletics, weighted by estimated time use, in square feet</u></b> | <b><u>Parking spots used for intercollegiate athletics, weighted by estimate time use</u></b> | <b><u>Square footage of practice fields and parking spots, weighted by estimated time use</u></b> |
| I  | 368,193  | 1,598   | 927,510   |
| I-A  | 411,036  | 4,351   | 1,933,894   |
| II   | 204,407  | 115   | 244,795   |
| III  | 266,703  | 196   | 335,328   |
| All Divisions                                | 305,211  | 881   | 613,636   |

To assess the impact of including land use in evaluating the capital employed for intercollegiate athletic activities, we must assume an opportunity value of such land for each university. We estimate the opportunity value per square acre in two different ways. In our first approach, we use data from the Integrated Post-Secondary Education Data System (IPEDS) on land values, combined with campus acreages from *U.S. News and World Report*. In our other approach, we assume an average land value of \$15,000 per acre based on an estimate of the value of all land in the United States.<sup>5</sup> We then scale this land value by the ratio of average housing values within five miles of the university’s zip code to the national average housing value. The results are shown in Table 5. Using either approach, land values are substantially smaller than facilities values; indeed, land values are such a small share of the total that they can be ignored for practical purposes. Reasonable variation in the assumed value of land per acre will not affect this basic finding.

<sup>4</sup> A variety of estimates suggest an average size between 300 and 350 square feet (including aisle space) per parking spot. We choose the high end of this range to produce an upper-bound estimate. See, for example, <http://www.nuggetnews.com/archives/20040317/front13.shtml>, <http://www.ci.bloomington.mn.us/meetings/pc/synopsis/1996/092696pcs.htm>, [http://64.233.161.104/search?q=cache:l0vj7QSePacJ:gulliver.trb.org/publications/tcrp/tcrp\\_rpt\\_35.pdf+%22AVERAGE+PARKING+SPACE+%22&hl=en](http://64.233.161.104/search?q=cache:l0vj7QSePacJ:gulliver.trb.org/publications/tcrp/tcrp_rpt_35.pdf+%22AVERAGE+PARKING+SPACE+%22&hl=en), or <http://pen.ci.santa-monica.ca.us/cityclerk/council/agendas/1989/s89121211-E.html>

<sup>5</sup> J. Ted Gwartney and Nicolaus Tideman. “The Jerome Levy Economic Institute Conference: land, wealth and poverty.” *The American Journal of Economics and Sociology*, July, 1996. The paper states that there is no consistent estimate of land value for the U.S., but cites an estimate that results in a total US land value of \$30 trillion. We divide this by the 2,271,343,360 acres in the United States to get an estimate of \$13,208 per acre, and round up to produce an overestimate and account for inflation.

| <b>Table 5: Average facility value and land value by Division</b> |  |  |  |   |  |
|---|--|--|--|---|--|
| <b>Division</b>   | <b><u>Average replacement values for facilities</u></b><br><b>(\$ thousands)</b> | <b><u>Average land values using approach #1</u></b><br><b>(\$ thousands)</b> | <b><u>Land value as percent of total capital using approach #1</u></b> | <b><u>Average land value using approach #2</u></b><br><b>(\$ thousands)</b> | <b><u>Land value as percent of total capital using approach #2</u></b> |
| I   | \$94,301   | \$2,514  | 2.6%   | \$448   | 0.5%   |
| I-A   | \$240,627  | \$2,852  | 1.2%   | \$937   | 0.4%   |
| II  | \$10,944   | \$232  | 2.1%   | \$62  | 0.6%   |
| III   | \$23,482   | \$254  | 1.1%   | \$128   | 0.5%   |
| All Divisions   | \$56,429   | \$1,392  | 2.4%   | \$276   | 0.5%   |

Our conclusion from Tables 3 and 5 is that the replacement value of facilities used in intercollegiate athletics represents the overwhelming majority of overall capital used in those sports. Since the other components appear to represent a very small share of total athletically related capital, we focus our attention in the rest of this paper on the replacement value of facilities.

### **III. Estimating the Cost of Capital Used in Intercollegiate Athletics**

To obtain an annual capital *cost* for intercollegiate athletics, we combine the estimated replacement value of facilities with different estimates of depreciation and financing costs. Winsten (1998) assumes a depreciation rate for college facilities (not just athletic ones) of 2.5 percent per year; we adopt that depreciation rate here.<sup>6</sup> The value of financing costs should depend on the institution’s alternative investment opportunities; we assume that the alternative investment opportunities would earn 7.5 percent per year.<sup>7</sup> Our central estimate of depreciation and financing costs combined is therefore 10 percent; we also show the results for 7.5 percent and 12.5 percent.

Table 6 shows that under our central estimate, the annual capital costs associated with intercollegiate athletics averages \$9 million at Division I schools and \$24 million at Division I-A schools. The average annual capital cost at Division II and Division III schools is significantly lower; an average of about \$1 million at Division II schools, and an average of about \$2 million at Division III schools.

To provide some points of comparison for these figures, we initially consider the Division I-A results. The \$24 million average annual capital cost for intercollegiate

<sup>6</sup> Gordon C. Winsten, “A Guide to Measuring College Costs,” Williams College, DP-46, January 1998.

<sup>7</sup> If anything, this estimate may be slightly too high, but it is possible that the depreciation estimate is slightly too low. A central estimate of 10 percent for the combined capital costs provides insight into the order of magnitude; as shown below, small variations above and below that central estimate do not change our fundamental conclusions.

athletic facilities is roughly equal to the average operating cost for intercollegiate athletics in Division I-A of more than \$27 million. In other words, the largely unrecorded annual cost associated with intercollegiate capital facilities is roughly equal to the reported annual operating expenditures on intercollegiate athletics.

| <b>Table 6: Annual capital costs from intercollegiate athletic facilities, \$ thousand</b> |   |  |  |
|--|---|--|--|
| <b><u>Division</u></b>   | <b><u><math>\delta+r=7.5\%</math></u></b> | <b><u><math>\delta+r=10\%</math></u></b> | <b><u><math>\delta+r=12.5\%</math></u></b> |
| I  | \$7,073                                   | \$9,430                                  | \$11,788                                   |
| <i>I-A</i>   | <i>\$18,047</i>                           | <i>\$24,063</i>                          | <i>\$30,078</i>                            |
| II   | \$821                                     | \$1,094                                  | \$1,368                                    |
| III  | \$1,761                                   | \$2,348                                  | \$2,935                                    |
| All Divisions  | \$4,232                                   | \$5,643                                  | \$7,054                                    |

One of the key findings from the interim report was that operating athletic expenditures were a relatively small share of total operating spending for the institution as a whole – on average, roughly 3.0 percent to 3.5 percent for Division I-A schools. The data from the capital survey, combined with data from the Department of Education, can be used to compute the athletic share of overall institutional spending, including capital costs both in the athletic and overall figures.<sup>8</sup> Of the Division I respondents to the capital survey, we were able to obtain data on total institutional capital values for eight public universities.<sup>9</sup> For these eight schools, operating athletic spending represented 2.6 percent of total operating spending for the institutions. Including athletic and overall institutional capital costs, athletic spending represented 3.7 percent of total institutional spending. In other words, including capital costs does not alter the qualitative result that athletic spending represents a relatively small share of total institutional spending in Division I, at least for the schools for which data were available.

Other comparisons may provide further insight into the magnitude of annual athletic capital costs. (Data on annual non-athletic expenditures for these comparisons were obtained directly from financial reports posted on institutional websites.) The estimated \$5 million average annual capital cost for intercollegiate athletic facilities at one Division I school is roughly equal to half of its academic support and student aid expenses. At another Division I school, the average annual capital cost is about one-third the cost of annual library collection purchases. At one Division I-A school, the \$23 million average capital cost for intercollegiate athletic facilities is roughly equal to the annual expenses associated with its libraries. At one Division III school, the \$5 million average capital cost for intercollegiate athletic facilities is roughly equal to one-third the cost of research.

<sup>8</sup> The most recent available total institutional capital values were for 2001. We converted those figures into 2003 dollars using the Consumer Price Index. To compute the annual capital costs, we adopt the same assumptions as athletic capital costs (i.e., depreciation plus financing costs equal 10 percent of the capital stock).

<sup>9</sup> The Department of Education does not publish data on total institutional capital values for private universities.

Table 7 and Table 8 provide the annual capital costs by division for football and men’s basketball. Table 7 shows that average annual capital costs for football facilities are roughly \$10.6 million for Division I-A, \$69,000 for Division II, and \$49,000 for Division III. By comparison, in 2003, average operating expenditures on football were roughly \$7 million, \$0.5 million, and \$0.2 million in Divisions I-A, II, and III, respectively. Table 8 shows that average annual capital costs for basketball facilities are roughly \$1.1 to \$1.2 million for Division I, \$224,000 for Division II, and \$177,000 for Division III.

| <b>Table 7: Annual capital costs from intercollegiate football facilities, \$ thousand</b> |   |  |  |
|--|---|--|--|
| <b><u>Division</u></b>   | <b><u><math>\delta+r=7.5\%</math></u></b> | <b><u><math>\delta+r=10\%</math></u></b> | <b><u><math>\delta+r=12.5\%</math></u></b> |
| I  | \$2,454                                   | \$3,272                                  | \$4,090                                    |
| I-A  | \$7,979                                   | \$10,639                                 | \$13,298                                   |
| II   | \$52                                      | \$69                                     | \$87                                       |
| III  | \$37                                      | \$49                                     | \$61                                       |
| All Divisions  | \$1,248                                   | \$1,664                                  | \$2,081                                    |

| <b>Table 8: Annual capital costs from intercollegiate men’s basketball facilities, \$ thousand</b> |   |  |  |
|--|---|--|--|
| <b><u>Division</u></b>   | <b><u><math>\delta+r=7.5\%</math></u></b> | <b><u><math>\delta+r=10\%</math></u></b> | <b><u><math>\delta+r=12.5\%</math></u></b> |
| I  | \$862                                     | \$1,150                                  | \$1,437                                    |
| I-A  | \$1,854                                   | \$2,472                                  | \$3,091                                    |
| II   | \$168                                     | \$224                                    | \$280                                      |
| III  | \$132                                     | \$177                                    | \$221                                      |
| All Divisions  | \$504                                     | \$673                                    | \$841                                      |

Table 9 shows that these two sports represent a significant share of athletically related capital costs: For all schools combined, they represent more than 40 percent of the total. These two sports represent an even higher share of total capital costs among Division I-A schools: 55 percent of capital costs in Division I-A are associated with football and men’s basketball.

Football and basketball facilities play an even larger role in explaining the *variation* of replacement costs across schools than may be suggested by Table 9. To understand how this could occur, assume that every school has similar facilities for sports such as baseball, soccer, and field hockey, but have substantially different facilities for football and men’s basketball. In this situation, football and basketball may, on average, represent a significant share of total costs, but explain even more of the differences in total replacement costs across schools. This is indeed what the data show: football and men’s basketball facilities explain between 80 and 90 percent of the variation in total

capital costs across schools; nearly all of this explanatory power comes from football facilities. These findings highlight the benefits of focusing on these two sports, especially football, in explaining the variation in capital costs across athletic programs either for all divisions or within Division I.

Outside of Division I, however, the replacement costs for football and basketball stadiums account for a much smaller share of total costs and explain a much smaller share of the variation of such costs across schools. In Divisions II and III, it is harder to find a single variable that explains a majority of the variation in replacement costs across schools. In those divisions, the total number of varsity teams appears to be the strongest single explanatory variable of total replacement costs.

| <b>Table 9: Annual capital costs of football and men's basketball facilities as a percent of total annual capital costs for all athletic facilities</b> |  |   |
|---|--|---|
| <b>Division</b>   | <b><u>Annual capital costs of football as a percent of total</u></b> | <b><u>Annual capital costs of football and men's basketball as a percent of total</u></b> |
| I   | 34.7%  | 46.9%   |
| <i>I-A</i>  | 44.2%  | 54.5%   |
| II  | 6.3%   | 26.8%   |
| III   | 2.1%   | 9.6%  |
| All Divisions   | 29.5%  | 41.4%   |

#### **IV. Potential Applications of Capital Survey Data**

The key role of football in the overall cost of athletic capital (at least when Division I schools are included in the analysis) warrants further examination of the underlying factors affecting capital costs for that sport. In this section, we show that the annual football capital costs are largely driven by the capacity of the stadiums. Since stadium capacity is available for all schools, not just those schools in our sample, this finding may provide a mechanism for assessing changes in annual capital costs over time.

Under the assumption that the relationship between the key observed characteristics of football stadiums and the replacement costs of such stadiums is the same for those schools that completed the survey and those schools that did not complete the survey, and that the relationship holds over time, a statistical relationship can be used to estimate the value of other football stadiums.<sup>10</sup> That, in turn, can be used in two key settings.

<sup>10</sup> In particular, to predict the replacement cost of facilities used for football, we first attempted to explain the variation in the replacement costs for football stadiums across the schools completing our survey based on a number of key observable characteristics of the football stadiums. We estimated regressions that

First, analysts can monitor the most significant component of athletic capital costs simply by observing changes in stadium capacity. The data show that replacement costs are the key driver of total capital costs for Division I schools, that the replacement costs of football stadiums are the key driver of total replacement costs, and that football stadium capacity is the key driver of the replacement costs of football stadiums. Indeed, variation in the level or natural log of football stadium capacity alone explains between 60 and 75 percent of the variation in total replacement costs (in either levels or natural logs) for all athletic facilities. This key finding may provide a simple and cost-effective means of tracking historical athletic capital costs.

Second, for Division I-A schools, football capacity can be used to examine whether an “arm’s race” has taken place in capital expenditures. An arms race appears to mean different things to different observers. For example, some observers define an arms race as an increase in inequality in athletic capital spending or merely an absolute increase in aggregate capital spending. A somewhat more precise definition of an “arms race” is that increased spending at School A triggers increased capital spending at School B, which then feeds back into pressure on School A to further raise its own capital spending.

To examine this definition of an arms race, we examined whether an increase in football stadium capacity by other members of a school’s conference statistically increased the likelihood that the school itself expanded stadium capacity. We use data on football stadium capacity for all Division I-A schools from 1991 to 2004, not just for those schools completing our survey. The analysis suggests the possible, albeit weak, presence of an arm’s race in football capital spending within Division I-A: The expansion of a stadium at one school within a conference appears to make it more likely that others schools within that same conference will expand the capacity of their stadiums, although this finding is sensitive to specific assumptions employed in the statistical analysis.<sup>11</sup>

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included characteristics of the schools (e.g., enrollment) and additional characteristics of the facilities (e.g., number of luxury boxes). We concluded that a parsimonious specification that explains a substantial degree of the variation in football stadium replacement costs (in thousands) is:

$$\ln(\text{replacement cost}) = 6.61 + 1.25 * \ln(\text{capacity}) - 0.33 * \ln(\text{age})$$

where  $\ln$  is the natural log of each variable, capacity is the stadium’s seating capacity, and age is its age. The coefficients sensibly imply that larger stadiums have higher replacement costs; older stadiums have smaller replacement costs. The coefficient on  $\ln(\text{capacity})$  is statistically significantly different from zero at the one percent level and the coefficient on  $\ln(\text{age})$  statistically significantly different from zero at the 10 percent level. (The impact of age is relatively modest and reflects differences in stadium characteristics (e.g., luxury boxes, number of bathrooms, etc.) based on date of construction.) These variables explain 76 percent of the variation in the natural log of the reported replacement costs; the key variable is stadium capacity, which alone explains 72 percent of the variation in the natural log of the reported replacement costs. Age and capacity also play a key role in explaining men’s basketball replacement costs, but are less effective in explaining the variation of men’s basketball replacement costs than football replacement costs.

<sup>11</sup> For example, some schools reported relatively small changes in stadium capacity from year to year that may not reflect true underlying changes in the stadium. If the analysis ignores these small and potentially

The evidence that does exist to suggest an arm's race in football stadium capacity appears to be present in particular within the six major football conferences.<sup>12</sup> The magnitude of the effect even within the major conferences appears to be relatively weak. In other words, even in the regression specifications where the effect is statistically significant, the practical implications appear to be limited because the magnitude of the effect is small.<sup>13</sup>

## V. Conclusion

The absence of reliable data on the capital costs associated with intercollegiate athletics has significantly limited a full understanding of the finances of college sports. This study represents a useful step toward better understanding athletically related costs. In the future, analysts and university officials will have even more insight into athletically related capital spending because of the improved accounting and data collection devised by the NCAA and NACUBO.

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erroneous changes, the evidence for an arm's race, which is not overwhelming in the first instance, is attenuated.

<sup>12</sup> We classified as "major" conferences the SEC, Big Ten, Big 12, ACC, Big East, and Pac-10 (and their predecessors).

<sup>13</sup> For example, under one specification, the data suggest that if the maximum capacity within one of the major conferences increases by 10,000 seats, the average predicted increase at other schools within that same conference is roughly 500 seats.

## Appendix: Capital Survey Form

### Athletic Capital Survey of NCAA Schools

*The NCAA is collecting data on the capital stock (facilities) used in intercollegiate athletics. As part of that effort, the NCAA requests that each school complete this survey. The information provided in this survey will be kept **strictly confidential** and will not be released to the public on a school-level basis. The information will be used as part of an ongoing analysis of the effects of intercollegiate athletic spending – and more specifically for a better understanding of capital expenditures – on a variety of factors.*

#### INSTRUCTIONS:

- PLEASE COMPLETE THIS SURVEY BY JANUARY 23, 2004.
- THE SURVEY SHOULD BE RETURNED TO: Jim Isch, P.O. Box 6222, Indianapolis, In 46206-6222 or emailed to [jisch@ncaa.org](mailto:jisch@ncaa.org).
- IF THERE ARE ANY QUESTIONS REGARDING THIS SURVEY, PLEASE CALL Katherine Beirne at (202) 263-1435.
- IF YOU WANT TO ATTACH ADDITIONAL INFORMATION OR EXPLANATIONS, PLEASE DO SO.

1. For each facility utilized by an intercollegiate athletic team, please complete Table 1. If your university has more than 10 intercollegiate athletic facilities, please download additional forms from [http://www.ncaa.org/financial/facility\\_form.pdf](http://www.ncaa.org/financial/facility_form.pdf)

**TABLE 1: INSURED VALUE, REPLACEMENT COSTS, AND CHARACTERISTICS OF INTERCOLLEGIATE ATHLETIC FACILITIES**

\* all are based on insured values

| (A)<br>Facility Name | (B)<br>Please List Each Sport That Uses The Facility Along With The Percentage of Time The Facility Is Utilized by Each Sport | (C)<br>If Facility is Owned, Estimated Full Replacement Cost of the Facility (e.g., based on insured value) * | (D)<br>If Facility Is Leased, Annual Lease Payment | (E)<br>Seating Capacity of The Facility | (F)<br>Seating Capacity of Luxury Boxes (if any) | (G)<br>Year Facility Constructed (If Major Renovation, Also Provide Year Of Last Major Renovation In Parentheses) |
|----------------------|---|---|--|---|--|---|
|                      |   |   |  |   |  |   |
|                      |   |   |  |   |  |   |
|                      |   |   |  |   |  |   |
|                      |   |   |  |   |  |   |

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|--|--|--|--|--|--|--|
|  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|

Instructions:

*Column A:* Please insert the name of the facility used for intercollegiate athletics. For example, the University of North Carolina would fill in "UNC Dean Smith Center" for its basketball arena.

*Column B:* If, for example, an arena is used for men's basketball, women's basketball, men's volleyball, and women's volleyball, please provide an estimate of what proportion of time the facility is utilized by each sport. If the facility is also used for non-intercollegiate athletic/intramural sports or other non-athletic activities, please include an estimate of the total share of time the facility is used for those activities. For example, if an arena is used 20 percent of the time for intercollegiate men's basketball, 20 percent for intercollegiate women's basketball, 40 percent for intramural sports, and 20 percent for other uses (including university or outside events), then the figures reported should be 20 percent for men's basketball, 20 percent for women's basketball, and 60 percent for all other activities. If precise utilization figures are unavailable, please use your best judgment in estimating the relative use of the facility by each sport.

*Column C:* Ownership includes any facility that is owned directly or indirectly by the University or through any affiliated or related entity. The full replacement cost of the facility is the cost associated with reconstructing the facility *today*. If a full replacement cost estimate is unavailable, please use your best judgment in estimating the full replacement cost of the facility.

*Column E:* If facility has standing room only section, please include that figure in parentheses.

*Column F:* The seating capacity of luxury boxes, if any, should also be included in the total seating capacity listed in Column E.

*Column G:* If the facility has undergone a major renovation, please provide the year of the original construction of the facility and the year of the major renovation in parentheses.

2. Please provide information about the parking lots available for athletic facilities and events.

**TABLE 2: INFORMATION ABOUT PARKING LOTS AVAILABLE FOR ATHLETIC FACILITIES/EVENTS**

|  |  |
|--|--|
| Estimate of The Number of Parking Spaces Available for Athletic Facilities and Events (If The Number of Parking Spaces Are Unavailable, Please Provide The Estimated Square Footage of the Parking Lots) |  |
| (A) Percent of Time Parking Lots Are Used for <u>Football</u> Activities   |  |
| (B) Percent of Time Parking Lots Are Used for <u>Men's Basketball</u> Activities   |  |
| (C) Percent of Time Parking Lots Are Used for Other Intercollegiate Athletic Activities  |  |
| (D) Percent of Time Parking Lots Are Used for Non-Intercollegiate Athletic Activities  |  |

Instructions:

If, for example, a parking lot is only used for football games, the football allocation should be 100%. If it is used for both football and men's basketball games, allocate the relative annual proportions between sports. Rows A-D should sum to 100%; Row C should exclude football and men's basketball.

3. Please provide information about the practice and playing fields used by intercollegiate athletic teams. Fields that were included in Table 1 above should not be included here.

**TABLE 3: INFORMATION ABOUT PRACTICE/PLAYING FIELDS AVAILABLE FOR INTERCOLLEGIATE ATHLETIC TEAMS**

|  |  |
|--|--|
| Estimate of Aggregate Square Footage of Practice and Playing Fields Available for Athletic Teams       |  |
| (A) Percent of Time Practice and Playing Fields Are Used for <u>Football</u> Activities                |  |
| (B) Percent of Time Practice and Playing Fields Are Used for Other Intercollegiate Athletic Activities |  |
| (C) Percent of Time Practice and Playing Fields Are Used for Non-Intercollegiate Athletic Activities   |  |

Instructions:

If, for example, a practice field is only used for football, the football allocation should be 100%. If it is used for both football and soccer, allocate the relative annual proportions between football and other intercollegiate athletic activities. Rows A-C should sum to 100%; Row B should exclude football.

4. Do you have an estimate of cost of land (e.g., per acre or per square foot) in the area of the college/university? If so, please provide that estimate and the source of the estimate. If a formal estimate is not available, please use your best judgment in estimating the value of the land.

TABLE 4: INFORMATION ABOUT THE COST OF LAND

| Estimate of Per Acre or Per Square Foot Cost of Land | Source of Estimate |
|--|--------------------|
|  |                    |