# Athletics Subsidies and College Costs: Are Students Paying for Rising Costs in Intercollegiate Athletics Spending?

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## Abstract

In recent years, many in higher education have condemned the millions of dollars in subsidies received by intercollegiate athletics departments on the premise that colleges and universities pass the costs of these subsidies to students in the form of higher tuition and fees. The evidence supporting this argument, however, has been largely anecdotal. This study used fixed effects regression analyses to explore whether changes in institutional funds allocated to athletics were correlated with student costs, controlling for other factors. The findings of this study call into question the argument that athletics subsidies lead directly to higher student charges.

# Athletics Subsidies and College Costs: Are Students Paying the Price for the Rising Costs in Intercollegiate Athletics?

Despite calls from many within the higher education community to curtail spending on intercollegiate athletics, research indicates that college/university athletics costs continue to increase rapidly. Median expenditures on intercollegiate athletics among National Collegiate Athletic Association (NCAA) Division I institutions has increase from 14.6 million dollars in 2004 to 31 million dollars in 2014 (Fulks, 2015). Among the 48 athletics programs in college sport's wealthiest conferences, total spending on intercollegiate athletics increased from 2.6 billion to 4.4 billion between 2004 and 2014 (Hobson & Rich, 2015). According to the Delta Cost Project, athletic spending per student-athlete from 2005 to 2010 increased 51% among Football Bowl Subdivision (FBS) institutions, 61% among Football Championship Subdivision (FCS) institutions, and 39% among NCAA Division I institutions with no football program (Desrochers, 2013).

While expenditures on college athletics have continued to increase rapidly, generated athletics revenues at many institutions have increased at a much slower rate. As a result, very few athletics departments earn sufficient revenue to cover their expenses (Knight Commission on Intercollegiate Athletics, 2010). To cover budget shortfalls, many athletics departments receive external financial subsidies (Denhart & Ridpath, 2011). According to the USA Today, subsidies account for $1 of every $3 spent on athletics at the NCAA Division I level (Berkowitz & Upton, 2011). These subsidies are generally derived from two sources. Student athletic fees (henceforth called athletics fees) are mandatory fees assessed primarily to full-time undergraduate students which are used to support intercollegiate athletics. Direct school funds (henceforth called school funds) are state support, direct support from the university's general fund, and indirect facilities

or administrative support provided to intercollegiate athletics programs. Nearly 130 NCAA Division I athletics departments rely on subsidies for over half their total athletic department revenue (Wolverton, Hallman, Shifflett, & Kambhampati, 2015).

Many commentators have suggested that athletic department subsidies are partially responsible for the escalating costs of a college education. Miller (2003) notes that while not solely responsible for the increasing costs of higher education, "to say that athletics are completely free from any blame would also be a great error" (p. 40). In his study of selective private colleges and universities, Ehrenberg (2000) states that conscious decisions by institutions of higher education to add sports programs and build new athletics facilities contribute to the rising costs of a college education. The Center for College Affordability and Productivity (CCAP) in September 2010 released a report listing 25 ways institutions can make college more affordable for students. Number eight in the report was to end what they called the "Athletics Arms Race" currently taking place among colleges and universities (Center for College Affordability and Productivity, 2010). At the heart of these arguments is the belief that when colleges and universities are forced to dedicate more financial resources to subsidize athletics programs, institutions will look to recapture this money by increasing student tuition and fees (Berkowitz & Upton, 2011; Knight Commission on Intercollegiate Athletics, 2010; Miller, 2003; Suggs, 2009).

The evidence supporting this argument, however, has been largely anecdotal. To date, little empirical research has attempted to explore whether a statistical relationship exists between athletics department subsidies and student costs. This study looked to quantitatively explore this relationship. Specifically we examined whether athletics subsidies directly correlated with published institutional tuition and fees the following year, controlling for other factors.

## Literature Review

The few studies which have explored intercollegiate athletics subsidies fall primarily into two categories. The first group of studies has explored the rising expenditures at athletic departments and the subsequent need to cover these expenditures through subsidies (Desrochers, 2013; Stanley Eitzen, 2001; Stinson, Marquardt, & Chandley, 2012). Cheslock and Knight (2015), for example, used data on athletics subsidies and university finances to develop a empirically supported three-part conceptual model illuminating elements promoting financial strain within college athletics. This framework argues that a small set of athletics programs have been able to increase externally generated revenues and therefore have increased their athletics expenditures. Increased expenditures among these 'elite' programs subsequently led other programs to increase their expenditures (what the authors call the expenditure cascade). As these non-elite athletic programs increase expenditures, they simultaneous fail to increase external revenues, which results in increased athletics subsidies. Cheslock and Knight question the sustainability of this system "if subsidy levels grow too high and/or the financial situation of the institution and its students deteriorates" (p. 439).

A second area of focus with regard to subsidies research has been on student knowledge and perceptions of athletics subsidies. Denhart and Ridpath (2011) conducted a case study at Ohio University during the 2010-2011 school year to explore student's understanding of intercollegiate athletic fees. Upon surveying over 1,100 undergraduate and graduate students, the researchers found that while generally aware of the proportion of student fees that go towards athletics, students believed athletics should receive less funding relative to other to other general fee supported units. Most students also underestimate the amount of money they were contributing to intercollegiate athletics and around 63% of the sample desired that the current

intercollegiate athletic fees be reduced in the future. Ridpath, Smith, Garrett, and Robe (2015) conducted a similar study of student perceptions of intercollegiate athletic fees across multiple institutions competing in the Mid-American Conference (MAC). They found that few students at these institutions knew the amount of their tuition and fee bill accounted for by intercollegiate athletics fees. Nearly 99% of study participants stated they did not know how it was determined how much the athletics fee would be at their institution (Ridpath, Porto, et al., 2015).

What has been missing in research on athletics subsidies is an analysis of actual student cost relative to athletics subsidies. Research on the correlation between athletic success and student costs, however, might provide a window into the athletics subsidies-student cost relationship. Alexander and Kern (2009) used data from 1987-2007 to examine the impact of athletics success, as measured by win-loss records in football and men's basketball, on in-state and out-of-state tuition rates. The researchers collected data from 181 NCAA Division I and Division II public colleges and universities for the study. While the estimations differed slightly based on the type of regression model used, Alexander and Kern concluded that team success appeared to positively correlate with an institution's published tuition and fee charges. In one estimation, the authors found that each additional football win correlated with a $28 per student increase in in-state tuition and a $54 per student increase in out-of-state tuition and fees. Basketball wins correlated with a $7 per student increase in in-state tuition and fees and a $16 per student increase in out-of-state tuition and fees.

Pope and Pope (2009) in their study of the relationship between college sports success and student applications also sought to determine whether success correlated with tuition charges. Using a fixed effects regression model on data obtained from 332 NCAA Division I colleges and universities from 1983 to 2002, the authors found that private institutions increase

tuition around 6% the year after their men's basketball program participated in the NCAA Men's Final Four. Football success, however, was not found to have a statistically significant correlation with private school tuition. No consistent evidence was found by Pope and Pope of a relationship between football or basketball success and student charges at public NCAA institutions.

Most recently Smith (2012) looked to reexamine the relationship between athletics success and student costs using a more inclusive definition of student costs and more robust estimation models. Smith examined data from 348 NCAA Division I colleges and universities over a 16 year time period (the author does not specify what 16 years were covered). Smith defined the dependent variable as published tuition, fees, and room/board charges for an institution. Smith included a number of state and institution covariates in his estimation model including undergraduate enrollment, average faculty salary, Carnegie classification, conference affiliation, portion of the state population between 18 and 24 years of age, and state per-capita income. Smith found that the relationship between various forms of football success and increases to tuition, room, board, and fees (considered together) was significant and institutions raised student costs substantially following a successful season. However, few significant relationships were observed between basketball success and student charges. Importantly, the relationship between football success and tuition increases alone was not significant. Only after all student charges were considered together did significant relationships emerge.

The aforementioned studies suggest various forms of intercollegiate athletics success in football and/or men's basketball may be correlated with greater in-state and/or out-of-state tuition and fees. The explanation often proposed for this positive relationship involves price elasticity and demand. Athletics success is believed to increase the popularity and reputation of

an institution of higher education. As the popularity of an institution increases, administrators anticipate that the price elasticity of tuition and fees at that institution will lower. In other words, the increased demand for an institution among students created by sports success will make the students less responsive to price increases. Institutional administrators seek to maximize revenue in these situations by raising the sticker price for potential students, and therefore one observes a positive correlation between athletics success and student costs (Alexander & Kern, 2009; Smith, 2012).

A second explanation for previous research findings on the athletics success-student costs relationship could be that successful athletics leads to greater athletics department expenditures and subsequently a greater need for subsidies. Research has shown a positive relationship between athletics department expenditures and team on-field success (Jones, 2013). Increased expenditures, however, do not necessarily translate into increased revenues (Berkowitz & Upton, 2011; Knight Commission on Intercollegiate Athletics, 2010). Therefore, it is possible that a situation emerges where athletics departments are spending more in order to increase the likelihood of fielding successful teams. The revenues to cover these expenditures, however, are being provided by central administration in the form of subsidies. To recapture the money used to subsidize athletics, institutions might be forced to increase student tuition and fees. Research exploring the validity of this athletics subsidies-student costs relationship has not been conducted. Therefore, this study looked to address the following research questions:

- Among public NCAA Division I institutions of higher education, is there a significant correlation between subsidies given to intercollegiate athletics departments and in-state student tuition/fee charges in the following year, controlling for other factors?

- Among public NCAA Division I institutions of higher education, is there a significant correlation between subsidies given to intercollegiate athletics departments and out-of-state student tuition/fee charges in the following year, controlling for other factors?
- Among public NCAA Division I institutions of higher education, is there a significant correlation between subsidies given to intercollegiate athletics departments and the average net price for instate students in the following year, controlling for other factors?

## Conceptual Framework

This project was grounded in Bowen's (1980) revenue theory of organizational budgeting. As a non-profit enterprise, colleges and universities do not necessarily seek to maximize the difference between costs and revenue in the way for-profit firms would. If costs were to continuously exceed revenue, however, an institution would fail to exist. Therefore, post-secondary institutions seek to maintain a balance between revenues and expenditures over time (Massy, 1996). From the perspective of central college/university administration, expenditures occur through the resource allocation process. Resource allocation occurs when available institutional revenue is distributed among various units within a college/university. These allocation decisions are often driven less by market forces and more by the perceived value of a unit or department (Massy, 1996). Therefore, programs with lower enrollments or non-profitable auxiliary services may receive subsidies from central administration to cover department-level budget shortfalls if the units are considered valuable aspects of the organization.

As these budget shortfalls grow and more institutional subsidies are needed to support a particular program, an institution must take steps to ensure that it remains financially stable. One way of accomplishing this would be to reduce expenditures by asking other organizational

programs to curtail spending. The revenue theory of budgeting (Massy, 1996), however, suggests that colleges and universities are more likely to respond to financial exigencies by increasing revenue rather than reducing expenditures. As noted by Bowen (1980) "universities will raise all the money they can and spend all the money they raise" (p. 19).

Regarding athletics, institutions could choose to recover the revenue lost via increased athletics subsidies by reducing expenditures in other areas such as student services, faculty hiring, or building maintenance. On the other hand, following the logic of Bowen (1980) and Massy (1996), it may be that when faced with having to increase subsidies for athletics, institutions attempt to increase revenue by raising tuition and fees. Focusing on tuition and fees would also be consistent with the theory of optimal commodity taxation, which suggests that taxes are more efficient when levied on goods with low demand elasticity (Sherlock, 2011).

Based on this conceptual framework, evidence from studies on the relationship between athletics success and student costs, and statements from Miller (2003), Ehrenberg (2000), and the Center for College Affordability and Productivity (2010), it was hypothesized that a positive, statistically significant correlation exists between athletics subsidies and student costs.

## Study Methodology

The base empirical model used in this study was a fixed effects regression model of the following form:

$$\text{Student Costs}_{it} = \beta_0 + \beta_1 \text{Athletics Subsidies}_{it-1} + \sum \beta_2 X_{it-1} + \gamma i + \eta t + \mu_{it} \quad (1)$$

Three measures of student cost (Student Costs$_{it}$) were used as dependent variables in this study. In our first research question, in-state student cost was the outcome variable. In-state student costs was operationalized as published tuition and required fees for full-time, first time undergraduate students meeting the school's residency requirements for in-state status. For our

second research question, the outcome variable was the published tuition and required fees for full-time, first time undergraduate out-of-state students (students who do not meet the institution's or state's residency requirements for in-state status). The final measure of student costs used for research question three was published average net price. Average net price, was defined as the total costs of attendance (tuition, fees, books, room, other expenses) for full-time, first-time in-state undergraduates who received grant or scholarship aid from the federal government, state government, local government, or the institution. Student cost data in this study were obtained from the Integrated Postsecondary Data System (IPEDS) administered by the US Department of Education.

The independent variable of interest ($\beta_1$Athletics Subsidies$_{it-1}$) represents the total amount of subsidies in the form of school funds and student fees received by an institution's intercollegiate athletics department in year *t*-1. As noted earlier, school funds are state support, direct support from the university's general fund, and indirect facilities/administrative support provided to support an intercollegiate athletics department. Student fees are mandatory fees assessed primarily to full-time undergraduate students which are used to support intercollegiate athletics. Because college/university tuition for a given year is typically set using largely information from the previous academic year, the independent variable of interest in model estimations was lagged by one year. For example, student cost for the 2006-2007 academic year were examined in relation to subsidies given to athletics during the 2005-2006 academic year. This lag strategy is common among researchers looking to predict university tuition and fees (Alexander & Kern, 2010; Pope & Pope, 2009; Smith, 2012).

Athletics department subsidies were obtained from the Knight Commission on Intercollegiate Athletics' Athletic & Academic Spending Database for NCAA Division I

colleges and universities. Since the 2004-2005 academic year, the *USA Today* has sent public records requests to state supported institutions of higher education competing at the NCAA Division I level asking for detailed athletics financial information ranging from ticket sales revenue to game day expenses (Upton & Gillum, 2010)[1]. These data are compiled by the Knight Commission on Intercollegiate Athletics and made available to the public in the Athletic & Academic Spending Database for NCAA Division I (Knight Commission Athletic & Academic Spending Database for NCAA Division I, 2016).

Covariates ($\sum \beta_2 X_{it-1}$) were included in model (1) in an effort to obtain an uncontaminated measure of the relationship between athletics subsidies and student costs. We specifically focused on observable variables and institutional characteristics which could create endogeneity bias in our independent variable of interest. After conducting a literature review on the determinants of in-state and out-of-state tuition levels among public colleges and universities (Burgess, 2011; Delaney & Kearney, 2014; Doyle, 2012; Ehrenberg, 2000; Koshal & Koshal, 2000; Rizzo & Ehrenberg, 2004), it was decided that eight covariates lagged by one year would be included in model estimations.

We first included controls for various sources of institutional revenue. One might suspect that institutional revenue in the previous year would be a significant predictor of both student cost and the amount of money in the general fund which could be used to subsidize athletics. To address this in our estimation models, we controlled for the amount of institutional funding received from state appropriations, state grants, Pell grants, and tuition. State appropriations revenue was defined as funding received by the institution through acts of a state legislative body, except grants, contracts, and capital appropriations. Funds reported as state appropriation were for meeting current operating expenses, not for specific projects or programs. State grants

were money provided by the state government including expenditures for scholarships and fellowships that were funded by the state. Pell grant revenue was the gross amount of Pell grants disbursed or otherwise made available to recipients by the institution. Tuition revenue was operationalized as revenues from all tuition and fees assessed against students net of refunds, discounts, and allowances for educational purposes.

Given that institutional expenditures are commonly accepted as an important determinate of student cost, it could create endogeneity concerns if institutional expenditures in other areas of the university correlated with the amount of subsidies provided to athletics. The address this concern, our estimation model included a composite measure of institutional expenditures in the areas of instruction, research, and service. Instructional expenditures were all operating expenses associated with the colleges, schools, departments, and other instructional divisions of the institution. Research expenditures were all operating expenses associated with activities specifically organized to produce research outcomes at a university. Service expenditures were all operating expenses associated with activities established primarily to provide non-instructional services beneficial to individuals and groups external to the institution. Given the importance of teaching, research, and service to the institutional mission of public universities, we believe a composite of these expense categories serves as a valid proxy for overall institutional expenditures in a given academic year. All institutional level revenue and expenditure data for this study were obtained from IPEDS.

The final three control variables used in the model were undergraduate enrollment, football success, and men's basketball success. Basic economic principles of supply and demand suggest that increased demand will cause tuition levels to move upwards (Rizzo & Ehrenberg, 2004). One could also reasonably assume that increased enrollment at an institution (a common

measure of institutional demand) would lead to a greater number of student-athletes participating in intercollegiate athletics and therefore increase the need for subsidies to support the athletics program. To address this, we controlled for the number of full-time undergraduates enrolled at an institution in a given year. These data were obtained from IPEDS.

As noted in our literature review, previous research suggests that football and men's basketball success is correlated with institutional tuition and fees (Alexander & Kern, 2009; Pope & Pope, 2009; Smith, 2012). Athletics success could also correlate (negatively or positively) with athletics subsidies. For example, it could be that success in these sports increase athletics department revenues and result in a school giving money to athletics. To account for this in our estimations, two sets of dummy variables were used. The first set accounted for football success by indicating whether a school's team participated in post-season play (either a FBS bowl game or a Football Championship Series (FCS) playoff game) or did not did not participate in post-season play. The second set of dummy variables accounted for men's basketball success by indicating whether a school's team participated in the NCAA Division I Basketball Tournament or did not participate in the NCAA Division I Tournament. If an institution in the dataset did not field NCAA Division I football or basketball program, they were treated as having not participated in post-season play. Athletics team success measures were obtained from the College Football Warehouse (http://www.cfbdatawarehouse.com/ ) and Sports Reference (http://www.sports-reference.com/cbb/schools/).

The remaining variables in equation 1 represented institution-specific dummy variables ($\gamma i$) and a time fixed effect ($\eta t$). Institutional specific dummy variables control for time-invariant or very slowly changing institutional characteristics that could correlate with student costs and athletics subsidies such as institutional location, "flagship" designation, or academic reputation.

The time fixed effect captures any systematic changes to higher education (such as national economic conditions or federal aid policy) that could impact student costs in a given year. Given the panel nature of our data, this fixed effects strategy helps minimize omitted variable bias by allowing us to control for unobserved heterogeneity due to stable unmeasured variables that differ across colleges and universities.

Throughout the analyses, all financial data were inflation adjusted to 2004 values using the Consumer Price Index (CPI) published by the US Bureau of Labor Statistics. Natural logs were used for all dollar values and all enrollment measures in order to address skewness in the distribution of these variables.

Some important limitations of the methodology and data used in this study should be taken into account. The accuracy of publically reports athletics finance data deserves mention as some have argued that it can be misleading (Dosh, 2013; Wunderlich, 2013). Every university does its accounting somewhat differently. When it comes to revenues and expenditures, what is and is not 'put on the books' may lack consistency across institutions. Therefore, the definition of athletics subsidies can vary greatly from school to school. Because the parameters estimated in this study focus on within-institution changes over time, however, cross institutional variations in the operationalization of subsidies to athletics would be captured by the institutional fixed effect and should not greatly impact our findings. We do note, however, that not every college/university in our dataset will have the same definition of athletics subsidies. It is also possible that an individual institution's method of accounting or reporting athletics financial data may vary as a result of personnel changes from year to year.

Our empirical model makes the assumption that, after controlling for covariates, there is no correlation between the independent variable of interest and the error term. This exogeneity

assumption, however, is violated if an unmeasured (or unmeasurable) institutional characteristics captured in error term correlate with the amount of subsidies provided to athletics. For example, an unmeasurable 'prestige push' initiated by a new university president could lead to an institution to simultaneously invest more in its athletics program and raise institutional tuition and fees. We are unable to capture this in our model. So while we include time-varying controls and fixed effects in our estimation model in an effort to obtain an unbiased estimation of the athletics subsidies-student cost relationship, we acknowledge that unmeasurable variables could lead to the violation of our strict exogeneity assumption.

## Findings

A total of 231 colleges and universities reported at least one year of data to the Knight Commission on Intercollegiate Athletics' Athletic & Academic Spending Database between 2004-2005 and 2013-14. Two of those institutions (United States Air Force Academy and United States Military Academy) were dropped from our analysis because they are military academies were student cost are covered upon admission. Two other institutions (Pennsylvania State University and University of Delaware) were dropped because they did not report institutional revenue and expenditure data to IPEDS. The University of Massachusetts-Lowell was also dropped because only one year of data on the institution is available in the Knight Commission database. The remaining 226 institutions served as the analytic sample for this study. Descriptive statistics for the dataset can be found in Table 1 (Appendix A). Inflation adjusted average in-state tuition and fees were $6,155 in this dataset with a range of $2,438 to $13,607 and a standard deviation of $2,032. For out-of-state student, inflation adjusted average tuition and fees in this dataset were $15,381 ranging from $3,279 to $35,136 with a standard deviation of $5,120. Inflation adjusted average net price was $10,316 with a range of $1,310 to

$20,779 and a standard deviation of $2,597. With regard to our independent variable of interest, the average institution in this dataset provided $7.65 million (inflation adjusted) in subsidies per year to intercollegiate athletics with a standard deviation of $4.64 million.

Overall, we found little evidence of a significant correlation between institution funds provided to intercollegiate athletics and college student cost. Table 2 displays the results of our estimation models. Model 1 presents the results for in-state student costs, model 2 presents results for out-of-state student cost, and model 3 presents findings for net student cost. In model 1 we find a near statistically significant correlation between subsidies and in-state student cost after controlling for other factors ($\beta = .007$, $p = .053$). The magnitude of this coefficient, however, is very small. Our findings suggest that a 1% within institution increase in the amount of general fund money given to athletics correlates with a .007% increase in in-state student cost the following year. If a school were to double the amount it subsidized athletics in a given year, our estimations suggest that tuition and fees for in-state students would go up only .7%. The direct effect of subsidies on in-state student costs appeared to be very minimal.

Findings from model 2 in Table 2 (Appendix B) show no statistically significant relationship between athletics subsidies and out-of-state student cost ($\beta = -.001$, $p = .790$). Model 3 shows a statistically significant relationship between subsidies and the net price for in-state students ($\beta = -.0007$, $p = .048$). The sign on this coefficient, however, was unexpectedly negative. This suggests that among the institutions in this sample, increases in athletics subsidies led to lower in-state student cost. The magnitude of this coefficient, however, again led to the conclusion that the direct effect of subsidies on cost was minimal.

We also estimated fixed effects regression models using total subsidies per student-athlete at the independent variable of interest. The Knight Commission defined this as the total

amount of institutional subsides to athletics per unduplicated student-athlete. The inflation adjustment mean subsidy per student-athlete among the school in this study was $20,820 with a standard deviation of $11,793. Table 3 (Appendix C) displays the findings of these analyses. In no estimation model did we find a statistically significant correlation between subsidies per student and student cost. In sum, the findings from Tables 2 and 3 suggest there is no significant direct correlation between athletics subsides and published institutional tuition and fees, controlling for other factors.

We next considered the relationship between athletics subsidies and student costs at different institutional types. Using the 2005 Carnegie classification system, we grouped institutions based on their status as research focused universities. A dummy variable was created and institutions classified by Carnegie as very high research activity research universities or high research activity universities were assigned a value of zero. All other institutions in the dataset (research/doctoral universities, masters colleges and universities, baccalaureate colleges) were assigned a value of 1. Because these institutional types are likely to have different budgeting structures and place different levels of emphasis on intercollegiate athletics, it was predicted that there would be significant differences in the athletics subsidies-student cost relationship by institutional type. Table 4 provides the findings of estimations that included an institutional type by total athletics subsidies interaction term. In model 1, we see that among research-focused institutions there is a statistically significant relationship between subsidies and in-state student cost ($\beta = .009$, $p < .01$). Among other types of institutions, however, the relationship between subsidies and student cost is not statistically significant. This interaction was statistically significant [$F(2, 225)=4.30$, $p<.05$]. So while the magnitude of the correlation remained fairly small, we did find that the positive correlation between athletics subsides and in-state student

cost is larger at research-focused universities. In models 2 and 3 of Table 4 (Appendix D) the interaction terms were not statistically significant.

Several robustness checks were performed to explore the validity of our estimation models. We ran random effects models and tested them against our fixed effects estimation to investigate the endogeneity of time-varying covariates. These findings suggested that fixed effects models were appropriate for our data. We also estimated lagged response models which produced similar finding those presented in the tables. All of the estimations ran largely came to the same conclusion; there was little direct correlation between athletics subsides and student cost the following year.

## Discussion and Conclusion

The primary objective of this study was to examine the relationship between athletics subsidies and student costs at public NCAA Division 1 colleges and universities. Between 2001 and 2011, prices for undergraduate tuition, fees, room, and board at public institutions rose 40% after adjusting for inflation (National Center for Education Statistics, 2012). A number of commentators have suggested that institutional spending on intercollegiate athletics is at least partially to blame for rising student costs (Center for College Affordability and Productivity, 2010; Ehrenberg, 2000; Miller, 2003). However, this argument has been largely untested. Our study is among the first to quantitatively examine whether schools look to recover revenue used to aid intercollegiate athletics by raising student tuition and fees.

Based on the revenue theory of budgeting and findings from previous research on the athletics-student costs relationship, it was hypothesized that there would be a positive and significant correlation between athletics subsidies and student tuition/fees after controlling for other factors. The findings from our fixed effects regression models, however, did not support

this hypothesis. Across various measures of student costs, we found very little evidence that athletics subsidies are directly correlated with what students are charged the following year. In instances where did find statistically significant direct effects of subsidies on student cost, the magnitude of the relationship was very small. The popular notion that institutions of higher education are increasingly subsidizing athletics programs on the backs of students was not supported in this study. Faculty, administrators, students, and commentators concerned with college affordability should somewhat tempter the direct blame they assign to athletics programs with regards to rising student costs.

It is also important that athletics programs and other supporters of college athletics do not take these findings as evidence that athletics subsidies have absolutely no negative impact on the costs or educational experiences of students. It could be that constraints on colleges and universities not controlled for in our model estimations impacted the findings presented here. State level governing or coordinating boards often restrict year-to-year tuition increases at public universities, so it could be that significant correlations were not observed in this study because the public institutions in our sample lacked the freedom to raise student costs in response to athletics subsidies. Furthermore, a number of states have instituted tuition freezes in recent years in response to political backlash against tuition hikes (Boatman & L'Orange, 2006; Kiley, 2013). Other states have implemented incentive plans to minimize tuition increases or have attempted to link tuition and institutional aid policies (Boatman & L'Orange, 2006; Kim & Ko, 2014). It is possible that these efforts to limit tuition increases are partially driving our findings. We do note, however, that researchers have found that state tuition caps do not significantly limit institutional ability to increase student costs (Kim & Ko, 2014). Therefore, we believe state efforts to limit tuition have a minimal impact on our findings. One way to test whether state

tuition setting regulations impacts the athletics subsides-student cost correlation would be to examine the relationship between athletics subsidies and student tuition/fees among private institutions, which lack external governance constraints on what they can charge students. Unfortunately, the only comprehensive source for subsidies data on private colleges and universities is maintained by the NCAA and is not publicly available.

If public institutions are not compensating for athletics subsidies by raising student prices, they may instead engage in cost-cutting strategies that could impact the quality of the education they can provide. For example, it could be that when institutions are forced to allocate additional funds to subsidize athletics, they reduce the amount of funding for other areas such as student services, facilitates maintenance, or instructional support in the form of tenure-track faculty. Schools may also do what the University of Michigan did in 1991. Through creative financing, the University of Michigan used money from a National Science Foundation research grant to aid athletics department expenditures related to their football team's Rose Bowl appearance (Cooper, 1991). This represents an interesting and important area of future research. While we show that athletics subsides do not directly impact what students pay, subsidies could indirectly impact the quality of the education students receive.

Another explanation for our findings could be fundraising. As donative-commercial non-profits, public colleges and universities have two primary strategies for increasing revenue (Hansmann, 1980). Institutions can increase the prices of their goods/services or they can seek greater charitable donations from individuals supportive of the institution. It is possible that when schools are forced to provide greater subsidies to athletics programs, fundraising efforts are increased to make up for any potential budget shortfall. Again, further research is needed to address this question.

Our findings should serve as a first step in changing how the higher education community looks at intercollegiate athletics in relation to student costs. There is plenty to criticize with regard to the money involved in college sports and the amount some institutions must invest for big-time athletics to be sustainable. Making a direct link between athletics subsidies and students costs, however, appears to be spurious. By helping to better pinpoint the variables which do and do not lead to higher student costs, it is hoped that this study will lead to policies and practices that better address the causes of rising tuition and fees and reduced college affordability.

## Footnotes

[1] Requests are sent only to public colleges and universities because most public institutions are obligated to release this information upon request. Private institutions and public institutions covered under a state exemption are not obligated to release this information.

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APPENDIX A

Table 1: Descriptive statistics for variables used

| Variable | | Mean | Std. Dev. | Min | Max | Observations |
|---|---|---|---|---|---|---|
| In-state cost (logged) | overall | 8.672532 | 0.324539 | 7.799059 | 9.518354 | N = 2257 |
| | between | | 0.291224 | 7.967799 | 9.378129 | n = 226 |
| | within | | 0.145151 | 8.127789 | 9.127584 | T-bar = 9.98673 |
| Out-state cost (logged) | overall | 9.582879 | 0.352962 | 8.09543 | 10.46701 | N = 2257 |
| | between | | 0.330918 | 8.267156 | 10.32584 | n = 226 |
| | within | | 0.124844 | 8.562321 | 10.10536 | T-bar = 9.98673 |
| Net price (logged) | overall | 9.205246 | 0.284906 | 7.178427 | 9.941736 | N = 1807 |
| | between | | 0.268264 | 7.549941 | 9.800481 | n = 226 |
| | within | | 0.104697 | 8.479619 | 9.74179 | T = 7.99558 |
| Subsidies to athletics (logged) | overall | 15.40456 | 1.832937 | 4.60517 | 17.47757 | N = 2193 |
| | between | | 1.694474 | 4.60517 | 16.97836 | n = 226 |
| | within | | 0.655021 | 6.668141 | 22.47155 | T-bar = 9.70354 |
| State appropriations (logged) | overall | 18.26714 | 0.903765 | 14.61123 | 20.30685 | N = 2260 |
| | between | | 0.894087 | 14.9689 | 20.07448 | n = 226 |
| | within | | 0.143479 | 17.7406 | 19.31167 | T = 10 |
| Pell grant revenue (logged) | overall | 16.38247 | 0.677895 | 12.88327 | 18.25414 | N = 2260 |
| | between | | 0.588328 | 13.3383 | 17.70616 | n = 226 |
| | within | | 0.338808 | 15.40336 | 17.28948 | T = 10 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Tuition revenue (logged) | overall | 18.25307 | 0.935858 | 13.74977 | 20.47818 | N = 2260 |
| | between | | 0.921066 | 15.16425 | 20.30108 | n = 226 |
| | within | | 0.175636 | 16.83859 | 18.99287 | T = 10 |
| State grants (logged) | overall | 14.05227 | 3.66735 | 4.60517 | 19.26954 | N = 2260 |
| | between | | 3.315212 | 4.60517 | 19.04525 | n = 226 |
| | within | | 1.581963 | 3.052436 | 24.16651 | T = 10 |
| Institution expenditures (logged) | overall | 18.89535 | 1.046924 | 16.51253 | 21.47267 | N = 2260 |
| | between | | 1.039891 | 16.70953 | 21.27975 | n = 226 |
| | within | | 0.13778 | 18.39368 | 19.53211 | T = 10 |
| Full-time undergrads (logged) | overall | 9.340226 | 0.62794 | 7.21671 | 10.82941 | N = 2260 |
| | between | | 0.623629 | 7.306589 | 10.5693 | n = 226 |
| | within | | 0.083334 | 8.286589 | 9.826371 | T = 10 |
| Football success | overall | 0.311062 | 0.463031 | 0 | 1 | N = 2260 |
| | between | | 0.318624 | 0 | 1 | n = 226 |
| | within | | 0.336571 | -0.58894 | 1.211062 | T = 10 |
| Men’s Basketball success | overall | 0.192035 | 0.393988 | 0 | 1 | N = 2260 |
| | between | | 0.241529 | 0 | 1 | n = 226 |
| | within | | 0.311645 | -0.70796 | 1.092035 | T = 10 |

APPENDIX B

Table 2: Fixed effect regression findings of the between institution correlation between total subsidies to athletics and student costs from 2004-2014

| | Model 1: In-state cost (logged) | Model 2: Out-of-state cost (logged) | Model 3: Net price (logged) |
|---|---|---|---|
| Athletics subsides (logged) | 0.007 | -0.001 | -0.007* |
| | (0.00) | (0.00) | (0.00) |
| State appropriations (logged) | -0.129*** | -0.091** | -0.024 |
| | (0.03) | (0.03) | (0.04) |
| Pell grant revenue (logged) | 0.020 | -0.044 | 0.030 |
| | (0.03) | (0.04) | (0.04) |
| Tuition revenue (logged) | 0.290*** | 0.232*** | 0.073 |
| | (0.05) | (0.04) | (0.06) |
| State grants (logged) | 0.002 | 0.001 | 0.002 |
| | (0.00) | (0.00) | (0.00) |
| Institution expenditures (logged) | -0.057 | -0.022 | -0.047 |
| | (0.04) | (0.04) | (0.05) |
| Full-time undergrads (logged) | -0.179** | -0.166* | -0.038 |
| | (0.06) | (0.07) | (0.09) |
| Football success | -0.006 | 0.003 | 0.001 |
| | (0.01) | (0.01) | (0.01) |
| Men's Basketball success | 0.007 | 0.002 | 0.002 |
| | (0.01) | (0.01) | (0.01) |
| Constant | 7.892*** | 9.589*** | 9.155*** |
| | (0.98) | (1.75) | (1.47) |
| *N* | 2190 | 2190 | 1759 |
| *Institutional Fixed Effects* | Yes | Yes | Yes |
| *Year Fixed Effects* | Yes | Yes | Yes |
| *Adjusted* $R^2$ | 0.953 | 0.935 | 0.875 |

Robust standard errors shown in parentheses. $*$ $p < 0.1$. $**$ $p < 0.05$. $***$ $p < 0.01$.

APPENDIX C

Table 3: Fixed effect regression findings of the between institution correlation between subsidies per student-athlete and student costs from 2004-2014

| | Model 1: In-state cost (logged) | Model 2: Out-of-state cost (logged) | Model 3: Net price (logged) |
|---|---|---|---|
| Subsidies per athl. (logged) | 0.013 | -0.002 | -0.013 |
| | (0.01) | (0.01) | (0.01) |
| State appropriations (logged) | -0.131*** | -0.091** | -0.023 |
| | (0.03) | (0.03) | (0.04) |
| Pell grant revenue (logged) | 0.021 | -0.044 | 0.029 |
| | (0.03) | (0.04) | (0.04) |
| Tuition revenue (logged) | 0.290*** | 0.232*** | 0.073 |
| | (0.05) | (0.04) | (0.06) |
| State grants (logged) | 0.002 | 0.001 | 0.002 |
| | (0.00) | (0.00) | (0.00) |
| Institution expenditures (logged) | -0.057 | -0.022 | -0.047 |
| | (0.04) | (0.04) | (0.05) |
| Full-time undergrads (logged) | -0.179** | -0.166* | -0.038 |
| | (0.06) | (0.07) | (0.09) |
| Football success | -0.006 | 0.003 | 0.001 |
| | (0.01) | (0.01) | (0.01) |
| Men's Basketball success | 0.007 | 0.002 | 0.002 |
| | (0.01) | (0.01) | (0.01) |
| Constant | 7.881*** | 9.589*** | 9.180*** |
| | (0.98) | (1.75) | (1.46) |
| *N* | 2190 | 2190 | 1759 |
| *Institutional Fixed Effects* | Yes | Yes | Yes |
| *Year Fixed Effects* | Yes | Yes | Yes |
| *Adjusted* $R^2$ | 0.953 | 0.935 | 0.875 |

Robust standard errors shown in parentheses. $*$ $p < 0.1$. $**$ $p < 0.05$. $***$ $p < 0.01$.

APPENDIX D

Table 4: Fixed effect regression findings of the between-institution correlation between athletics subsides and student costs from 2004-2014, with subsidies by institutional type interaction

| | Model 1: In-state cost (logged) | Model 2: Out-of-state cost (logged) | Model 3: Net price (logged) |
|---|---|---|---|
| Subsi (logged) by res univer | 0.009** | -0.001 | -0.005 |
| | (0.00) | (0.01) | (0.00) |
| Subsi (logged) by non-res univer | -0.007 | -0.003 | -0.058 |
| | (0.01) | (0.01) | (0.05) |
| State appropriations (logged) | -0.129*** | -0.091** | -0.020 |
| | (0.03) | (0.03) | (0.04) |
| Pell grant revenue (logged) | 0.019 | -0.044 | 0.027 |
| | (0.03) | (0.04) | (0.04) |
| Tuition revenue (logged) | 0.292*** | 0.232*** | 0.072 |
| | (0.05) | (0.04) | (0.06) |
| State grants (logged) | 0.002 | 0.001 | 0.002 |
| | (0.00) | (0.00) | (0.00) |
| Institution expenditures (logged) | -0.055 | -0.022 | -0.044 |
| | (0.04) | (0.04) | (0.06) |
| Full-time undergrads (logged) | -0.176** | -0.166* | -0.027 |
| | (0.06) | (0.07) | (0.08) |
| Football success | -0.006 | 0.003 | 0.001 |
| | (0.01) | (0.01) | (0.01) |
| Men's Basketball success | 0.007 | 0.002 | 0.001 |
| | (0.01) | (0.01) | (0.01) |
| Constant | 7.894*** | 9.589*** | 9.371*** |
| | (0.97) | (1.75) | (1.43) |
| *N* | 2190 | 2190 | 1759 |
| *Institutional Fixed Effects* | Yes | Yes | Yes |
| *Year Fixed Effects* | Yes | Yes | Yes |
| *Adjusted* $R^2$ | 0.953 | 0.935 | 0.876 |

Robust standard errors shown in parentheses. $*$ $p < 0.1$. $**$ $p < 0.05$. $***$ $p < 0.01$.