COLLEGE ATHLETICS:
FINANCIAL BURDEN OR BOON?

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ABSTRACT

The information commonly supplied by many university accounting procedures regarding college athletics is inadequate for decision making purposes. We highlight the central issues to understanding the true economic revenues and costs from athletics in a university setting. Also, we provide estimates for the case of one university and descriptive evidence for several other schools. Overall, our estimates show that the Western Kentucky University athletic program, alleged to be "losing" $1.5 million per year, is a net contributor to university revenues once enrollment impacts of athletics are taken into account. Moreover, the enrollment impacts required for the program to break even are quite small.

The discrepancy between the reported and actual financial impact at many universities stems from internal transfer pricing practices which mask the true

Advances in the Economics of Sport,
Volume 1, pages 215-235.

ISBN: 1-55938-574-X

marginal revenues and costs of athletics. In addition, alleged "losses" often arise simply because of a confusion between budget overruns (expenditures exceeding budget allocations) and economic losses (attributable costs exceeding attributable revenues).

INTRODUCTION

In recent years college athletics, due to recruiting scandals, low graduation rates, and controversial new eligibility rules, have come under heavy criticism. The unrest skips across many campuses. In addition to these problems, questions have surfaced as to the fiscal soundness of college athletic programs, especially at medium sized and smaller universities. In fact, an athletic giant, the University of Michigan, is alleged to be incurring losses at the rate of about $3 million per year.[1] Such cost overruns prompted faculty on many campuses to call for a reduction in or the elimination of college athletics. Yet, as we will show, the supposed unprofitability stems more from accounting procedures and the non-profit organizational environment than it does from accurately defined costs and revenues attributable to athletics.

In this paper we do not come to grips with all of the ethical or even economic issues related to college sports. Instead, we concentrate solely on the financial aspects. In particular, we examine the revenues and costs attributable to a particular university's athletic program, Western Kentucky University (WKU). However, many of the problems associated with evaluating costs and revenues at WKU are common across universities.[2] As we proceed, we point out some of these common problems. Our focus on WKU data stems from the difficulty of obtaining the raw, disaggregated figures necessary to accomplish our objectives.

On the whole, WKU provides a lower bound on net fiscal success by major college athletic producers. While the university has enjoyed a long tradition of successful college basketball teams, including a Final Four appearance in 1971, WKU is not a financial giant in college athletics. It has an enrollment of about 15,000 students. Most significantly, the school had an alleged athletic deficit of about $1.5 million dollars. The findings presented in this paper dispel this notion. Moreover, once impacts of athletics on general student enrollment are included, athletics at WKU provide, in total, a net subsidy to the university.

The next section considers the relevant economic costs and revenues for college athletic programs in general and some of the misperceptions related to this topic. The third section applies these principles to the case of WKU's athletic program on the whole and for specific sports. This section does not attempt to estimate enrollment impacts, but it does provide an indication of how large the enrollment impacts must be to cover an operating deficit. The

fourth section uses ARIMA methodology to measure the general student enrollment impact of WKU athletics. The fifth section generalizes these results beyond WKU. The last section offers some concluding remarks.

IDENTIFYING MARGINAL COSTS/REVENUES IN GENERAL

Our purpose in this section is to lay out the pertinent issues for analyzing relevant costs and revenues for a college athletic program. We first make clear that we are taking the institution and its chief executive as the decision making unit. We are not concerned, here, with the state legislature's perspective nor with that of a particular department.

At the outset, we must deal with a simple yet common misperception. To most economists, this may appear elementary; yet is so often the initial source of confusion that we are compelled to address it: the concept of a budget deficit. Commonly, budget deficits are defined as the excess of actual expenditure outlays above budget allocations. However, the same term, deficit, is used to refer to the excess of total costs above total revenues, a quantity more accurately referred to as a loss. Budget deficits for particular divisions of a firm are quite irrelevant. Yet, the reported "losses" of many college athletic programs are no more than expenditures above budget allocations. The irrelevance follows from the fact that expenditure outlays, while related to costs, may not attempt to estimate accurately the actual costs. Moreover, the link between budget allocations and revenues may be very weak if it exists at all.

The equating of "losses" with budget deficits becomes even more misleading when coupled with the second important point about college athletics, that is, its organizational structure. Universities and their athletic departments are typically non-profit institutions in which no residual claimants exist. Managers have little incentive to show a surplus, and, therefore, they turn any expected surpluses into expenses. Because of this, some expenditures which are treated as "costs" would more accurately reflect part of the surplus of revenues over true costs. Plush training, weight, and dining facilities, as well as many athletic department offices, illustrate this shuffling of surpluses into expenditure categories. A specific example would be the new $12 million "Hall of Champions" at the University of Michigan.

A third problem common across universities is that institutions' accounting procedures are not designed to allocate revenues and costs to their ultimate sources. Internal transfer prices are not necessarily designed to distribute accurately revenues and costs. What really matters for a particular division is how its attributable total revenues compare with its attributable total costs. For instance, concession revenues at athletic events may only partially acrue to athletic department financial statements, and sometimes these revenues may be completely attributed to other budgetary units. For example, at WKU the

university Food Service receives credits for these revenues. At probably every university, the athletic department does not receive credit for non-athlete students attracted by that school's athletics. As we see later, a few students can have large impacts on revenues. Similarly, the revenues appropriated by the state legislature because of enrolled athletes and athletically enticed non-athletes is usually omitted from consideration. Our concern is not whether this is a good or bad accounting procedure by university executives; our position is that such procedures confound the true fiscal status of athletic programs.

A fourth but crucial concern is again an elementary principle. In order to attribute accurately revenues and costs to athletics, we must distinguish between marginal and fixed costs, or, more narrowly, sunk costs. Costs which would be present whether or not athletics operates are irrelevant for decision making. A quantitatively important and common example in college athletics is grant-in-aid, "scholarship," to athletes. Most athletic departments are assigned a cost between $3,000 and $5,000 for each scholarship. If the university is below full capacity though, the additional cost of adding 1 or even 200 students is very low. In fact, the additional instructional costs are close to zero, if no new faculty are required, and the athletes do not force a tuition paying student to go elsewhere, and no new classrooms must be built. Similarly, the marginal food costs are not the "retail" cost of the food, but rather, the cost to the university.

This list of issues and problems related to the costs and revenues of college athletics does not exhaust every topic or example. Because accounting procedures at universities are often school specific, an exhaustive list would require much more space. These common pitfalls indicate the danger of taking reported deficit figures as representative of economic losses.

COSTS AND REVENUES IN THE CASE OF WKU

In this section we apply the general principles discussed above to the particular case of WKU. Of course, we do not make a claim that WKU is perfectly representative of all schools. Nonetheless, estimation of WKU's revenues and costs provides insight into the nature and scope of the problem of estimating the financial position of other athletic programs. We ask, is WKU's athletic program a financial success, or is it a net drain on the University's resources? Are specific sports self-financing or not?

Marginal Costs (MC)

Some important distinctions must be made between marginal and sunk costs in athletic programs. Because we are considering WKU as it now exists, the football stadium, basketball arena, baseball field, and other structures are already in place; hence any mortgage payments on such buildings are sunk costs. MC includes only the maintenance resulting from annual use. Moreover,

because WKU is not operating at full capacity, the MC of accepting an additional student is close to zero; no new buildings need be built, empty seats are available during lectures, and no additional faculty need be hired to accommodate one more student. The excess capacity at WKU is evidenced in several ways. Empty halls and classrooms in the afternoons and on Saturdays is one. Empty chairs in existing classes is another. Also, continuing enrollment increases and acceptance of all qualified applicants over the past few years suggests available capacity. The fact that some individual sections may be at or near capacity or the fact that faculty would prefer to have smaller class sizes does not alter the conclusion that excess capacity is present.

Thus, if WKU gives a tuition grant-in-aid to a student athlete, or a tuition scholarship to a non-athlete, then this is practically costless to the school—assuming that the student would not have attended WKU without the grant-in-aid. Similarly, food grants-in-aid must be scrutinized to obtain the true MC to the university. At WKU the food costs, on average, are about 40% of the retail price of the item.[3] Another example concerns a room (or dorm) grant to a student athlete. If the dorm is not 100% occupied, then the MC of such a grant-in-aid is close to zero; only the extra increase in utilities should be considered as MC. Note that because WKU residence halls are presently 100% occupied, a dorm grant-in-aid does impose a MC on the University; a student athlete replaces a paying student in the dorm and therefore WKU experiences an opportunity cost equal to the dorm rental.[4] On the reverse side of the marginal cost question, some costs are not included in the athletic program's budget but do represent marginal costs of the program. The most glaring example is that of any additional costs incurred by the physical plant division in preparing or cleaning venues before and after athletic events.

Of course, a given cost is marginal for some decisions, while sunk for others.[5] For example, if WKU were to eliminate the *entire* athletic program, the salaries of the athletic director and the trainers would be eliminated, and MC would fall by such amounts. On the other hand, if just one sport were eliminated from the athletic program, then it is unlikely that the athletic director's job would be eliminated; his or her salary would be a sunk cost. If, for example, football were eliminated, then WKU might be able to hire an athletic director for less money and MC would fall by the salary difference. We deem a salary reduction in such an event to be too speculative to estimate. We treat trainer salaries but not training expenses in a similar fashion: MC falls by the salary amounts when the decision is made to eliminate the entire athletic program, but MC is unaffected with respect to salary, when an individual sport is considered for termination. For ease of exposition, however, we allocate the entire training expense to basketball and football.

Table 1 summarizes the costs attributable to the athletic program from these budget entries and other sources, based on the foregoing discussion. In total,

Table 1. Costs of Athletic Programs, 1988-89

Division	*Amount*
Athletic Director	$156,636
Trainer	234,614
Football	623,227
Men's Basketball	487,037
Baseball	101,769
Track & Field	59,488
Men's Tennis	14,682
Men's Golf	24,501
Swimming	30,520
Soccer	9,433
Women's Basketball	283,462
Women's Golf	21,908
Women's Tennis	11,822
Women's Volleyball	55,045
Maintenance Man-hour and Material Costs	77,333
Total	$2,191,477

Notes: [a] Note that tuition grants-in-aid are not counted.
[b] Food grants-in-aid are at 40% of listed expenditure.

Sources: WKU Detailed Statement of Current Funds-Realization of Revenues for the Period July 1, 1988 to June 30, 1989, WKU Office of Budgetary Control. Maintenance Man-hour and Materials costs information were provided by the Physical Plan Administrator. Allocations were made to Football, Basketball (suballocated by us based on relative attendance), Baseball, Soccer, Volleyball, and Track.

the athletic program costs a little over $2 million per year. A list of the budgetary line items included in these costs appears in an appendix.

Marginal Revenues (MR)

We limit our calculations of revenues to the change in total revenues subsequent to a particular decision. We ignore, and thus value at zero, non-tangible benefits to the University community. An additional issue that we neglect in the analysis is consumer surplus. To the extent that the change in consumer surplus for those students who would have enrolled at WKU in the absence of its athletic program is positive, there is additional benefit associated with the University athletic program—although not estimated by our model. We estimate, therefore, the MR of the entire athletic program as the reduction in total revenues to WKU as a result of eliminating that program.

WKU is a state institution and receives revenue from the state that is, at least in part, dependent on the number of students enrolled, including those to whom it has extended grants-in-aid. Because our analysis is from WKU's

point of view—not the state's—total revenues would fall if WKU eliminated all or any of its athletic programs. The exact amount by which revenues would fall is determined by a state formula funding equation. Even for state universities not on a strict formula, state appropriation is almost certainly some increasing function of student enrollment.[6] In general the exact reduction in revenues depends on the number of athletes who are in-state and out-of-state residents and on the specific courses taken by such students.[7] For each of our decision categories, we estimate a typical reduction in total revenues, based on the assumption that athletes pursue a course of study not atypical from that of non-athletes—with respect to state formula funding.

Before making this computation, two related issues warrant attention. First, this source of revenue should be counted as part of MR only if the athlete's enrollment hinged on receiving a grant-in-aid. Both from the student's and university's point of view, this assumption seems reasonable. For athletic personnel, using a scarce resource, a grant-in-aid, on athletes who would attend anyway is not a rational maximizing strategy. Second, including this revenue as part of MR assumes that an athletic grant-in-aid has not eliminated a non-athletic grant-in-aid to some student who would attend the university only if offered the grant. At present, the university does not face a binding constraint in the number of grant-in-aids, nor has it acted upon suggestions to increase the number of non-athletic grants.[8]

Assuming 32 student credit hours per student per year, and assuming that students take the typical courses, we obtain an estimate for the total revenue reduction from this source at $2956.21 per in-state student and at $1263.72 for each out-of-state student. We were provided information regarding the in-state/out-of-state status of each student athlete.

We also consider as a marginal revenue the fact that many student athletes receive only partial tuition grants-in-aid, or receive non-tuition grants-in-aid but pay tuition. Because this information exists for each sport, we are able to calculate these marginal revenue effects. Thus, even if a non-revenue generating sport such as tennis is terminated, WKU's total revenue would fall. Total revenues would fall due to (a) a reduction in the formula funding allocation from the state for each student athlete and (b) a reduction in tuition payments made by some of the athletes themselves. By assumption such students would not have attended WKU in the absence of the relevant sport. One of our more interesting findings is that, for some of the "non-revenue generating" sports, total revenues to WKU would fall faster than total costs to WKU if those sports were dropped.

Table 2 summarizes the revenues attributable to WKU athletic programs before the impact of state appropriations for athletes or enrollment impacts are taken into account. These revenues sum to over $1.2 million.

Another source of marginal revenue comes from the effects on enrollment of the athletic program. To the extent that enrollment is a function of

Table 2. Revenues Attributable to WKU Athletic Programs, 1988-89 (State Appropriations and Enrollment Effects not Included)

Division	*Amount*
Student Fees	$571,925
Basketball Ticket Sales	285,955
Football Ticket Sales	85,697
Other	3,714
Basketball Guarantees	45,349
Football Guarantees	110,510
Radio Network	5,500
Basketball (women) Ticket Sales	18,890
Insurance Reimbursement	36,589
Concessions (net)	39,000
Food Service (est.)	7,800
Total	$1,210,929

Sources: WKU Detailed Statement of Current Funds—Realization of Revenues for the Period July 1, 1988 to June 30, 1989. WKU Office of Budgetary Control.

the existence and/or performance of the athletic program, such total revenue changes should be considered.

For each in-state and out-of-state student attracted to WKU by the relative performance of its football and men's basketball teams, we estimate (a) state formula funding appropriation, and (b) registration fees, exclusive of the $30 student athletic fees which are already included in athletic revenues in Table 2. For each resident student thereby attracted, the typical revenue generated to WKU is $4109.27. For each out-of-state student attracted by those sports, the typical revenue gained by WKU is $4582.88.

In the following section we analyze the effects on enrollment of WKU's football and men's basketball programs. Note that no attempt was made to estimate the enrollment effects of the other programs; nor have we estimated the revenues gained by WKU as a result of "walk-ons" in the non-revenue generating sports. To the extent that such revenue-generating effects exist, which may be relatively important for some of the minor sports, our model is biased against the self-financing ability of those sports. Also, we do not include revenues and expenditures of the Hilltopper Athletic Foundation. These amounted to over $600,000 in 1988-89. Over 40% of this amount was spent directly on recruiting and grant-in-aid expenses. As is common at many universities, expenses incurred for the tutoring of athletes are covered by the foundation. At some institutions, this is a large amount of money, while at WKU it is relatively small. We exclude these revenues because they are held

in essentially off-budget accounts, and the revenues are equal to expenditures. The net effect to the University is 0. However, WKU has 21 "endowed" scholarships which are or will be funded within 10 years at levels of $35,000 or more each. Once funded fully, the interest from these endowments will accrue to the University and represent net revenues to it because such scholarships have marginal costs close to 0. We also do not include revenues from parking or bookstore sales attributable to athletics.

Marginal Costs v. Marginal Revenue Comparisons

We apply our MR/MC model to an analysis of the economic impact (in the school year 1988-89) of not having: the entire athletic program, the football program, men's basketball, women's basketball, baseball, men's tennis, women's tennis, men's golf, women's golf, soccer, women's volleyball, men and women's track and field, and swimming.

The Entire Athletic Program

What would have happened in the school year 1988-89 had there been no athletic program? As Table 3 shows, total costs, found from summing the entries in Table 1, would have fallen by $2,191,477. On the other hand, total revenues from three basic sources would have fallen. First, direct total revenue, found in Table 2, would have fallen by $1,210,929. Next, revenues would have fallen because the student athletes themselves would not be at WKU; the school would have lost revenues from state formula funding and registration fees, net of student athletic fees, paid by student athletes. If student athletes take the typical courses, then revenues would have fallen by $650,512. The net subtotal of direct and state appropriated revenues is $1,861,441.

To this point, WKU marginal costs exceed marginal revenues by $330,036 on athletics for that school year. However, the athletic program in general and men's basketball and football in the main induces students to enroll at WKU. In order for WKU to break even on its entire athletic program, the program would have to attract only 79.5 students. The next section returns to this issue.

Football

Table 4 indicates the financial effects of WKU's not having a football team, assuming no enrollment impact, in the 1988-1989 school year. Marginal costs would have fallen by $117,307 from a saving in trainer costs.[9] Additionally, marginal costs would have fallen by another $649,439 in Table 1 for a total cost reduction of $766,746.

Total revenue, however, would have fallen by $335,291 from Table 2. Additionally state formula funding revenues and net registration revenues from football players themselves would have fallen by $186,246 had football players

Table 3. The Entire Athletic Program

A. Marginal Costs	
From Table 1	$ 2,191,477
B. Marginal Revenues	
(i) From Table 2	$ 1,210,929
(ii) From Student Athletes	
Formula funding plus net registration[a]	
Typical	
$650,512	
(iii) From Enrollment Enhancement[b]	
Typical	
$6,089,866	

Notes: [a] Net of student fees.
[b] 1,118 from men's basketball, and 341 from football multiplied by typical student formula funding plus registration tuition and fees less athletic fees.

Table 4. Football

A. Marginal Costs	
Trainer[a]	$117,307
From Table 1	649,439
Total	$ 766,746
B. Marginal Revenues	
(i) From Table 2	
Ticket Sales	$ 85,697
Guarantees[b]	110,510
Student Fees	125,824
Net Concessions[c]	13,260
Radio	NA
Parking	NA
Total	$335,291
(ii) Revenues from Team Members	
Formula funding plus net registration[c]	
Typical	
$186,246	
(iii) Enrollment Impact on Revenues[d]	
Formula funding plus net registration[c]	
Typical	
In State	$1,205,005
Out of State	218,744
Total	$1,423,749

Notes: [a] We allocate 50% of total trainers costs to football; the ratio of total football players to total student athletes is approximately 32%.
[b] The ratio of football ticket sales to total ticket sales (22%), times total student fees of $571,925. See Table 2.
[c] Net of student fees.
[d] Our estimated enrollment impact (341 students) is allocated 86% in state and 14% out of state—the same as the overall student proporation.
[e] We allocate 34% of net concessions to football, based on attendance.

taken the typical courses. The subtotal from these two sources is $521,537. At this point in our analysis, football costs would have fallen by $766,746, and football revenues would have fallen by $521,537 for a net loss of $245,209.

In order to break even, therefore, the football program would have to increase non-athlete, student enrollment by about 59 students. We analyze the enrollment-enhancement effects of the football program in the next section. We pause here merely to stress that a net loss of $245,209 generated by the football program in one year is a much lower figure than is commonly believed. It follows that a break-even point of 59 enrollment-enhanced, non-athletes students associated with the football team in also a very small number.

Men's Basketball

Table 5 indicates the financial impact of the men's basketball team for the 1988-89 school year. Had there been no basketball team, total costs would have

Table 5. Men's Basketball

A. Marginal Costs	
Trainer[a]	$ 58,654
From Table 1	514,980
Total	$ 573,634
B. Marginal Revenues	
(i) From Table 2	
Ticket Sales	$285,955
Guarantees	110,510
Student Fees[b]	417,505
Net Concessions[c]	17,550
Radio	NA
Parking	NA
Total	$831,520
(ii) Revenues from Team Members	
Formula funding plus net registration[d]	
Typical	
$23,124	
(iii) Enrollment Impact on Revenues[e]	
Formula funding plus net registration[d]	
Typical	
In State	$3,950,721
Out of State	717,174
Total	$4,667,895

Notes: [a] 25% of total training costs.
[b] The ratio of men's football ticket sales to total basketball and football tickets sales (73%), times total student fees.
[c] Mens basketball acoounts for about 45% of total men's and women's basketball plus football; 45% of total net concessions equals $17,550. This is based on relative attendance.
[d] Net of student athletic fees.
[e] We estimate that in this year 1,118 students were included to enroll due to the men's basketball program; 86% are assumed to be in state, and 14% out of state.

fallen by $573,634 in Table 1. Total revenues would have fallen by $831,520 from direct sources in Table 2. Formula funding and net registration revenue losses emanating from the members of the men's basketball team itself would have been $23,124 under the typical scenario. The subtotal revenue loss under the typical scenario is $854,644, which exceeds the total cost reduction of $573,634. Thus, the men's basketball program is a net revenue producer of $281,010, even before enrollment effects are included.

Other Sports

We continue with this methodology for all the so called "minor" sports. Table 6 summarizes the results. In Table 6 the marginal revenues from any ticket sales and state funding is compared to the marginal cost incurred by the specific program. Also, we computed the number of non-athletes needed to be attracted by the sport in order for the sport to be self-financing. Women's basketball lost about $270,000 dollars in 1988-89. To cover this loss, the program would have needed to attract about 65 additional students to campus. Baseball, Men's Golf, and Women's Volleyball lost small sums. In contrast, Track, Women's Golf, Men's and Women's Tennis, Soccer, and Swimming actually increased net revenues, when state funding is taken into account.

Table 6. Marginal Revenue/Marginal Cost Comparison for "Minor" Sports[a]

Program	*MR-MC*	*Enrollment Impact Needed to Offset Loss*
Women's Basketball	−$272,548	65.0
Baseball	−15,739	3.8
Track (M & W)	46,814	—
Women's Golf	13,662	—
Men's Golf	−798	—
Men's Tennis	6,504	—
Women's Tennis	8,310	—
Soccer	29,840	—
Swimming	24,442	—
Women's Volleyball	−10,789	2.5

Notes: [a] We did not allocate the remaining 25% of training expenses to among the minor sports due to little information on their distribution. The reader should be advised that the net position for the sum of all minor sports would need to be revised downward by $58,684 in order to be consistent with the prior allocation of training expenses to football and basketball.

ENROLLMENT EFFECTS OF FOOTBALL AND MEN'S BASKETBALL

Students who opt to attend college view the experience partly as an investment and partly as consumption. Athletic programs provide one source of consumption. The existence and success of athletics will have a marginal impact on enrollment decisions by prospective college students. Additionally, athletic programs provide a large amount of the newspaper and television advertising for many schools. As a source of references to a school in the media, athletics is one of the single most important sources. As a consequence, we hypothesize that college athletics has an impact on a specific school's enrollment.

Statistical Model

What impact does athletics have on enrollment? We examine the link between actual athletic success and actual enrollment changes, while controlling for systematic changes in enrollment that are unrelated to athletics. Given that WKU has not dropped athletics, we must be content with focusing on the link between performance and enrollment.

We use both ARIMA methodology and a structural regression to examine movements in the enrollment time series. The ARIMA technique allows us to account for systematic factors that may be driving enrollment over time and to look at athletic impact without assuming we know all specific variables driving enrollment.[10] The structural model attempts to identify all important regressors.

Data on enrollment of full-time students for the fall semesters, 1960-1988, were employed.[11] Using the ARIMA technique, we found an ARIMA (1,1,0) model best fit the series. Therefore, we fit the following equation:

$$\text{Enroll}_t - \text{Enroll}_{t-1} = b_0 \text{ Constant} + b_1 (\text{Enroll}_{(t-1)} - \text{Enroll}_{(t-2)}) + E_t$$

Next, to determine the impact of athletics, we form a transfer function to include winning percentages for football and basketball for the two previous seasons, along with binary variables to indicate whether or not the teams had participated in post-season play in the prior two seasons.[12] Overall we found that higher basketball winning percentages in the two previous years and football post-season participation increased enrollment.

We report below the results of the statistical model with two-year lagged basketball winning percentages and football post-season play in either of the two previous seasons (t-statistics are in parentheses).

$$\text{Enroll}_{(t)} - \text{Enroll}_{(t-1)} = -276.0 + 0.67\,(\text{Enroll}_{(t-1)} - \text{Enroll}_{(t-2)})$$
$$(4.20)$$
$$+ 1723.4 \times \text{B-ball WPCT} + 341.0 \times \text{F-Ball Post-season}$$
$$(2.79) \qquad (1.71)$$
$$R^2 = .55 \qquad D/W = 2.02$$

The values for the estimated coefficients in the statistical model imply the following: A 0.500 average winning percentage in basketball over the two prior seasons is associated with an 862 increase in full-time student enrollment versus a season with no wins; post-season football participation in either of the two prior seasons is associated with 341 more full-time students if no post-season play had occurred. The t-test result is that the football coefficient is significantly greater than 0 at the 5% level, and the basketball coefficient is significant at the 1% level, using one-tailed tests.[13] Including enrollment at other Kentucky universities as a regressor, lengthening to include the mid-1950s, or shortening to include only post 1960s did not change the order of magnitude of the results. Also, if the model is estimated in enrollment levels rather than differences with an additional lagged term, the explanatory power is 98%.

Given the size of the athletic impact and common responses to these results, a few clarifications are in order. The results do not imply that these 1200 students chose to attend WKU solely on the basis of athletic consumption value. We emphasize that this is the *marginal* impact. The decision to attend a particular university is a function of many variables such as tuition, program quality, program availability, distance from home and so on. To the extent that variables such as tuition are constant across the choices for a particular student, the marginal variable may be distance from home. If distance is constant for a given student, the marginal variable may be athletic consumption. Yet, because athletic consumption may provide the marginal impact, this does not imply that it is the sole reason for enrollment—instead, what may be viewed as more important variables offset each other across the relevant campuses.[14] Also, these students may not have avid athletic interests. As we suggest earlier, athletics carries with it an advertising component which tends to be greater when teams are more successful.

In addition to the ARIMA model, we briefly develop and present the results from a reduced form structural model of enrollment. In general, we expect enrollment at WKU over time to be a function of price, tuition and fees relative to competitors' tuition and fees, income of the population of potential students, the size of the pool of potential students, and athletic performance at WKU.

Although the price of going to college is clearly important in a student's decision, tuition rates at WKU relative to its main competitors, other in-state

universities, has remained almost constant. In fact, tuition rates for WKU and the other regional Kentucky universities are legislatively mandated at a prescribed and equal level. Therefore, we omit relative tuition as an explanatory variable. We measure income by per capita income in Kentucky by year (PCY). We use the number of high school graduates (GRADS) to measure the size of the pool of potential students. We use the same athletic variables. Also, we include the performance of the University of Kentucky basketball team in the previous year (UK) to adjust for the negative impact of a competitor's athletic success (UK's basketball team being the most visible athletic program statewide).[15]

The model is estimated with enrollment in levels 1960-1988 and a correction made for autocorrelation. The results appear below:

$$\text{Enroll}_t = -4403 + 305\ \text{GRADS}_t - 0.05{*}\text{PCY}_t + 1574{*}\text{B-ball WPCT}$$
$$(6.88) \qquad (0.05) \qquad (1.53)$$
$$- 325{*}\text{F-ball Post Season} + 0.18{*}\text{UK}_{t-1}$$
$$(0.81) \qquad (0.25)$$
$$R^2 = 0.93 \text{ (t-statistics are in parentheses).}$$

When the insignificant variables, income and UK basketball are dropped, and the model is reestimated with only graduates and athletic variables the results are:

$$\text{Enroll}_t = -4398 + 305{*}\text{GRADS} + 1948{*}\text{B-ball WPCT}$$
$$(8.63) \qquad (2.04)$$
$$- 179{*}\text{F-ball Post Season}$$
$$(0.55)$$
$$R^2 = 0.92.$$

In this structural model of enrollment, the size of the pool of new potential college students has the most important impact. Basketball winning percentages maintain their magnitude and sign, although the significance level drops below 5% in the first estimation. Football post season play does not sustain its significant impact nor its sign in either estimation. These results, at least with respect to the impact of basketball, support the results found using the ARIMA methodology.

As noted at the start of this section, these tests are not direct tests of the impact of dropping intercollegiate athletics, but they provide strong evidence of a link between athletics and enrollment. The most reasonable inference to

draw from them is that the impact of actually eliminating intercollegiate athletics would be larger than the impact of a losing season.

Based upon the coefficients in the ARIMA model, we compute the estimated increase in student enrollment for 1988-89. Basketball had an average winning percentage of 0.649 for the two prior seasons. This translates into 1118 extra students. (See the estimated equation p. 14.) The football team played in post-season play in 1987, so this translates into 341 extra students in the model. The total increase in WKU enrollment implied by the statistical model is 1459.

Enrollment and Revenues

The previous section shows that the entire athletic program at WKU experienced a net revenue drain, according to our model, of $330,036 for 1988-89, and that it would have had to have induced 79.5 students to enroll in order to break even.

Our statistical model, in fact, estimates that in the 1988-1989 school year the men's basketball team attracted 1,118 students and the football team attracted 341 students. Assuming that such athletically-enticed students are 86% in-state and 14% out-of-state, which is the same proportion as the rest of the student body, and assuming that they take the typical courses, we estimate a third source of revenues at $6,089,866. In short, given its current situation, if WKU had had no athletic program in 1988-89, its total costs would have fallen by about $2,191,477, and its total revenues would have fallen by $7,951,307. Stated differently, WKU's net revenues would have fallen by $5,759,831.

For football the enrollment revenue effect is estimated at $1,423,334. When added to the other revenues and compared with costs, the football program that year was a net revenue contributor of $1,178,125. The previous section indicated that men's basketball contributed net revenue of $281,010 even without considering its effects on enrollment. Our statistical model, however, estimates that the basketball performance had a marginal impact of 1,118 students to WKU in the 1988-89 school year. Thus enrollment revenues emanating from the men's basketball team are $4,666,532. When added to revenues from earlier section and compared with costs, the basketball team's net revenue gain would have been $4,947,542 in 1988-89. Of course, based on the statistical models, the basketball estimates are substantially more reliable.

GENERALIZING BEYOND WKU

Even though we have made references to other universities, our study has centered on economic revenues and costs at WKU. As with any such case study, the potential for selection bias is present. In this section we address the question,

how general are the preceding results? Data problems prohibit collection of accurate figures across a wide number of schools; yet, based on some descriptive statistics and facts drawn from other universities, athletics is much more lucrative for universities, especially "big-time" programs, than self-reported figures might lead one to accept.

First, the influence of the non-profit setting and concomitant funneling of surpluses into costs is certainly not unique to WKU or even to college athletics. The NCAA's self-study of athletic revenues and costs (Raiborn, 1985) reports that over 57 universities exceeded $5 million in revenues and over 25 schools exceeded $9 million in 1985. These self-reported figures most likely understate true revenues as in the case of WKU. In 1989, the NCAA distributed over $34 million to schools and conferences from its basketball tournament alone. As we mentioned earlier, the Michigan program reports revenues in the neighborhood of $20 million per year. With no residual claimants these revenues always find some expense category whether it is athletic staff salaries, facilities, grant-in-aid expenses, and so on. Fleisher et al. (forthcoming) provide a more detailed analysis of these expenses.

Second, the accounting practices, which lead to the overestimation of economic costs and the underestimation of revenues, are not unique to WKU. For instance, the costing of grants-in-aid at the average cost rather than the marginal cost appears almost universally. Michigan's figures allocate over $3.5 million to these costs. Illinois in its "football program" cites these costs at the same level. At Utah State the same practices prevailed as Skousen and Condie (1988) show. More broadly, the NCAA's own self-study of finances lists the average annual cost of a full grant in 1985 to be $5,930 per student for Division I-A and I-AA schools. Clearly, this number reflects the average costs of tuition, room, board, fees and the like rather than the marginal cost. While a few rapidly growing universities may be at full capacity, such a claim for most universities seems unlikely.

The underallocation on the revenue side would most likely be greater at many other institutions than at WKU. WKU is a relatively "small time" producer of college athletics. Some of the revenues which are trivial or non-existent (at present) in the WKU case are far from trivial at the "big time" programs. These additional revenue sources include endowment funds for athletic grants-in-aid, parking fees, and an assortment of revenues from sales of items ranging from sweatshirts to coffee mugs. In the case of alumni gifts, for instance, the Fleisher et al. study shows that past studies of these gifts underestimate their magnitude.

Third, the impact of athletics upon enrollments and other variables of benefit to the university can be extended beyond WKU. For instance, in the case of Clemson University, the link between athletics and general alumni contributions as well as even the quality of new students has been established. Coughlin and Erekson (1984) find broader support for the relationship between contributions and winning. Also, applying the ARIMA methodology to the

case of Georgia Southern, a school which added football in 1982, indicates that this 2-time Division I-AA champion can attribute close to 1000 students to its athletic success.[16]

CONCLUDING REMARKS

Describing the financial contribution or loss from athletics in the case of any specific university requires a wealth of school-specific information. We have highlighted the central issues to such inquiries and provided estimates for the case of one university for which we could obtain most of the relevant data. Overall, our estimates show the Western Kentucky University athletic program to be a net contributor to school revenues. The net contribution estimate runs into the millions of dollars and contradicts the alleged $1.5 million "loss" implied by the athletic budget deficit. The discrepancy between the reported and actual financial impact stems largely from internal transfer pricing practices, which make mask the true marginal revenues and costs of athletics. In this regard, many of the factors at work and their impact on financial reporting are similar to those found in major league baseball (Scully 1989).

Due to the fact that the athletes themselves generate revenues to WKU in the form of direct tuition payments, full or partial, and state formula funding, even the "non-revenue" sports are not as much a drain on revenues as one might think. Indeed, such sports as track and field, men's and women's tennis, soccer, and swimming actually contribute to net revenues; the men's golf team is close to breaking even.

Our study also has implications for the oft suggested and sometimes practiced strategy of dropping to lower competitive levels, i.e., to Division II or Division III. For the most part, such a class reduction entails giving fewer grants-in-aid; where the true marginal cost of grants-in-aid are low, dropping to a lower classification most likely means a sharper reduction in revenues than in costs. In short, such a step would be more costly, in purely financial terms.

We have not addressed the question of why so much misinformation exists with respect to college athletic finances. A number of factors ranging from technical accounting issues to faculty opinions may be at work. However, the common use of transfer prices which mask the true returns from college sports may, in large part, owe itself to the large returns gained by major producers within the college sports cartel. These prices may help minimize publicity about the "profitability" of this production and actually increase the perception of "need" in order to attract larger booster gifts.

Finally, we stress that our study has been confined merely to a financial analysis of university athletic programs. We have avoided the normative issues concerning college athletics. Still, in terms of the utility gained from college athletics we would be remiss if we did not note that because college athletics

is voluntary, college athletes (and their families) perceive a gain. As a consequence it is not only athletic and central administrators, alumni, faculty, and townpeople who benefit from college athletics.

APPENDIX

Line Item Entries in Budgetary Athletic Expenditures

Salaries-Regular	Office Supplies
Salaries-Administrative	Janitorial and Maintenance Supplies
Salaries-Student	Rec, Athletic, Theatre, & Music Supplies
Employer's FICA	Photographic and Related Services
Employer's Retirement-KTRS	Data Processing Supplies
Employer's Health Insurance	Other Supplies and Parts
Employer's Life Insurance	Food Products
University Disability	Furniture-Office Equipment
Workmen's Compensation	In-State Travel
Faculty/Staff Tuition	Travel for non-state employees
Uniforms	Coaches' Travel
Honoraria	Team Travel
Maintenance of Equipment	Game Guarantees to visitors
Postage and Post Meters	Game Officials
Freight	Subscriptions
Other Parcel Delivery	Miscellaneous
Printing	Grant-in-aid (Food)[a]
Printing Paid to Vendor	Grant-in-aid (Books)
Laundry and Cleaning	Grant-in-aid (Rent)
Telephone to Vendor	Grant-in-aid (Reg. Fees)
Telephone-Long Distance	Buildings and Fixed Equipment
Overtime Pay to Security	Athletic Equipment

Note: [a] In our analysis, we use only the cost to WKU, not the full value listed in the budgetary data.

ACKNOWLEDGMENTS

We gratefully acknowledge helpful comments and suggestions from several of our colleagues in economics and accounting at Western Kentucky University as well as Kevin Grier, Bob Tollison, Bill Shughart, and Gerald Scully.

NOTES

1. See U.S. News and World Report, January 8, 1990, p.52.

2. For example, two accountants found similar difficulties in the accounts at Utah State University. See Skousen and Condie (1988). Our studies goes deeper into the problems in that, among other things, we directly address the enrollment impacts.

3. This figure was obtained from the Director of WKU Food Services.

4. 100% dorm occupancy in itself is a curiosity. Hotel and motel chains find it optimal to set prices that encourage less than complete occupancy. It may be that full occupancy suggests a non-revenue maximizing pricing policy at WKU; to attribute the costs of such a policy to the athletic department,therefore, is misleading. Alternatively, it may be that in the legislative funding process, full dorms may serve a purpose. Whatever the explanation, we include dorm rentals as an MC.

5. An important example is the cost of athletic buildings. If WKU decides to refurbish or build a new facility, clearly a MC is involved if this reduces funds which WKU would have had for use elsewhere.

6. In fact, estimation of the relationship between WKU funding and enrollment before a formula was used yields a positive relationship.

7. The Kentucky Council on Higher Education has phased in formula funding so as not to reduce any schools allotment. WKU has been at about 80 to 85% of full formula funding. In using the formula, we assumed that a typical athlete took a typical course of study. We note that even if athletes focus in particular areas of study, this does not necessarily reduce funding, since physical education, for instance, is not the lowest funded area. We would be glad to provide anyone with a detailed account of our calculations based on the formula. While they are not complicated, they are too detailed and tedious to explain fully here.

8. WKU administrators maintain that it is too difficult to ascertain which non-athletes would attend WKU only with a scholarship; the athletic department views no such difficulty with respect to athletes.

9. Table 1 indicates that total trainer's costs equal 234,614. To be conservative, we allocate 50% of that figure to football even though football players are about 32% all of athletes. (Football uses large amounts of tape which is a significant amount of training costs.)

10. See Pankratz (1983) and Abraham and Ledolter (1983) for explanations of ARIMA methods.

11. Data obtained from WKU Office of Institutional Research.

12. Data obtained from WKU Press Guides for these sports.

13. It is important to note that student-athlete's are not counted twice (in state funding and enrollment). Because athlete enrollment is relatively constant from year to year, the enrollment impact does not measure fluctuations in the number of athletes. At school with a variable number of "walk-ons," double counting might become a problem.

14. Prospective students who rule out the University of Kentucky or the University of Louisville for some reason (city size; location) may opt for WKU because its won/loss record compares favorably with the other schools under consideration.

15. Income figures are from *Statistical Abstract of the U.S.* and the report of the Kentucky Council of Economic Advisors. High School graduates are from *Statistical Abstract of the U.S.* University of Kentucky basketball data are from the Southeastern Conference basketball yearbook.

16. This result uses and ARIMA (1,1,1) model with a dummy variable to control for pre- versus post football periods.

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