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Explaining the Graduation Gap - Athletes vs. Non-Athletes: A Study of the Big Ten and Missouri Valley Conferences

MALLORY HEYDORN

I. Introduction

Recently, the low rate of student-athlete graduation success has become a concern of the NCAA, individual universities, and the public. Although more recent studies have found that there has been a slight increase in the graduation rates of NCAA athletes, they are still sub-par and usually below those of the non-athlete undergraduates. The primary reasoning behind this phenomenon is that NCAA Division I athletics are treated more like a professional business than a collegiate sport. This leads to the problem of exploitation of college athletes by coaches, athletic programs, and universities. A study by Robert W. Brown (1996) shows that “a premium college athlete, one eventually drafted by a professional sports team, produces over \$500,000 in annual revenues for his college team (Brown, 1996). This finding indicates that there are additional incentives for athletic programs to acquire top athletes. In the past, these additional economic incentives seemed to overshadow athletic programs’ priority of obtaining top athletes who were also successful in academics. Due to the growing concern of this issue, it has been the topic of multiple studies. However, the results are not uniform for all studies, and the independent variables used vary.

This study proposes several factors that potentially affect the graduation rates of NCAA Division I athletes. Several previous studies have attempted to predict and determine the factors that affect the graduation rates of athletes by using predictive academic achievement variables such as SAT scores. The primary independent variable of this study is the athletic program’s revenue. This study is different from previous studies that focused on athletes’ academic ability. This study instead focuses on the characteristics of college athletic programs such as

revenue generated and team success, and examines how those variables affect athlete graduation rates. College athletics seem to be systematically becoming more businesslike, and athletes are transforming from student-athletes to athletes. If so, graduation rates should be lower in schools where producing wins and revenue are emphasized.

Section II introduces the underlying theory behind this study along with previous studies that discuss many factors associated with determining athlete graduation rates that are important to this study. Section III provides the data sources used to complete this study. Section IV lays out the empirical model and explains the variables that will be used to test the hypothesis. Section V discusses the results and important findings from the study. Section VI draws conclusions from the results and suggests possible corrections or improvements for future research. Section VI also addresses policy implications to be made from the results of the study.

II. Theory and Literature Review

Theoretical Literature

The theoretical framework of this study combines Gary Becker’s allocation-of-time model and human capital theory. The idea of exploitation of athletes arises from this framework, which is also an important component of this study. Previous research and the underlying theory of this study lead to the hypothesis that athletic programs that generate more revenue will have a larger gap in graduation rates between athletes and non-athletes because of the incentive to recruit the best athletes regardless of their academic ability.

Long and Caudill (1991) present Becker's allocation-of-time model to study the effects of athletic participation on graduation. This theory suggests that student athletes can divide their time into three categories: athletics, academics, and leisure. Because of the businesslike nature of Division I athletics, college athletic programs require a large time commitment due to various activities such as weightlifting, practice, meetings, games, interviews, and travel, which implies that athletes spend a disproportionate amount of time in athletics compared to academics. The time allocation theory suggests that academic activities such as attending class, studying, and completing assignments decrease at the expense of athletic activities. NCAA Division I athletic programs notoriously place very little importance on the acquisition of academic-related human capital and allocating time to academics, which can negatively affect graduation rates.

The allocation-of-time theory leads to the inclusion of human capital theory. Athletes have to decide how much time they are able to invest in academic-related human capital. However, athletes at larger schools with prominent athletic teams will have a more difficult time devoting their efforts to academics (Long and Caudill, 1991). Another problem that occurs with Division I athletes is that students recruited based on athletic skills lack motivation and aptitude to succeed in college-level academics (Sack, 1998). This suggests that although college athletes are supposed to be in control of their own time allocation and human capital, this is not really the case. Due to the scholarships they receive, Division I athletes are ultimately under the control of coaches and athletic programs that put pressure on them to perform athletically, thereby compromising academic achievement, such as successfully graduating (Sack, 1998; Suggs et al., 2003).

Therefore, regardless of time allocated to academics, many athletes enter college at a disadvantage because they are under-prepared and are often accepted regardless of their academic qualifications. This suggests that the low graduation rates of athletes is not due to the amount of academic effort of the athletes, but due more to the fact that "the pecuniary rewards associated with acquiring premium college athletes induce schools to lower academic standards for incoming players" (Brown, 1996, pp. 807). Brown's study (1996) indicates that there are large revenues to be made by schools that lower admission standards and grant special-authority admissions for athletes. This emphasizes the aspect of college sports as a profitable business, which is a primary factor that can negatively affect graduation rates of athletes.

Empirical Literature

Revenue gained by teams is mainly a function of the teams' success. Logically, especially in Division I, the greater success a team has, the more revenue it is able to earn. Amato et al. (1996) find that football team success is inversely related to academic success for players in Division I-A. Although this study examines football, it is possible that the same relationship occurs with all successful sports, or all successful revenue-earning sports.

Graduation rates are a good indicator of academic success, but when comparing student-athletes to all other undergraduates the graduation gap is a better indicator. Rische (2004) finds that although the graduation rates of athletes and all other undergraduates are not affected by athletic success, the graduation gap between student athletes and all other undergraduates is. Athletic success is shown to be an important factor when determining differences in athlete and non-athlete graduation rates (Rische, 2004). The graduation gap makes more sense because it is a more standardized measure of relative success.

Theory suggests my hypothesis that schools and sports that generate large amounts of revenue have a wider graduation gap.

III. Data

I will use data from the National Collegiate Athletic Association (NCAA) Division I Federal Graduation Rate database and the Office of Postsecondary Education Equity in Athletics database to test my hypothesis. The data consist of all NCAA schools and breaks them down by individual sports (football, men's basketball, baseball, men's track and cross country, men's other sports combined, women's basketball, women's track and cross country, and women's other sports combined), gender, and race. The data also consist of the average graduation rates of all athletes at schools as compared with the non-athlete population. The data available use freshmen cohorts who entered college during the 2000-2001 academic year and graduated within 6 years. Instead of using graduation rate percentages, I will be using the graduation gap which is the difference between the non-athlete graduation rate and athlete graduation rate (Non-athlete - Athlete) for my dependent variable. The office of postsecondary education database contains revenue data for all NCAA sports, which will be used as the primary independent variable of my study. Revenue data from 2004 will be used because it is assumed that a large amount of the 2000-2001 freshmen cohort will be graduating in that year.

The academic rank data comes from the *U.S. News and World Report "Best Colleges" of 2005*. The 2005 edition is used for these data because the academic rank is measured using criteria from the 2004 school year. The numeric academic ranking is based on several factors—namely by a peer assessment score, graduation rate, and selectivity rank. The ranking begins at one, the “best college”, and continues through the top 110 national universities.

Also, a post-season variable is implemented to account for athletic teams’ success. Post-season includes all teams that made it to the NCAA tournament and the football teams that made a bowl appearance in 2004. This data is obtained from the official ESPN website that contains the brackets for the 2004 national tournaments.

I will use data from athletic programs in the Big Ten Conference and the Missouri Valley Conference in

order to account for regional differences. Using these conferences will allow me to compare larger, more prominent Division I schools to smaller, less well-known Division I schools, all in the Midwest region.

IV. Empirical Model

This study will examine several factors that impact the graduation rate differential between athletes and non-athletes. The main hypothesis of this study is that athletic programs that generate greater amounts of revenue will have a greater graduation gap between athletes and non-athletes. Table 1 provides definitions of the variables used in this study, their predicted signs, and descriptive statistics of those variables. Table 2 uses a different approach and compares the descriptive statistics of the Big Ten and Missouri Valley Conferences. The implications of the descriptive statistics are discussed in further detail in Section V.

Table 1: Variable Definitions, Predicted Signs, and Descriptive Statistics

Variable	Definition	Mean	Std. Deviation
Dependent Variable -			
GRAD GAP	Undergraduate Graduation Rate – Sports’ Team Graduation Rate	5.15	32.75
Independent Variables -			
+ REV	Generated revenue greater than \$1 million in 2004: Yes = 1; No = 0	.461	.495
+ POST	Post-season appearance in 2004: Yes = 1; No = 0	.185	.389
+ ACRNK	Academic rank in 2004	NA***	NA***
+ CONF	Conference: Big Ten = 1; MVC = 0	.524	.501
+ FB	Football Program: Yes = 1; No = 0	.125	.333
+ MB	Men’s Basketball Program; Yes = 1; No = 0	.125	.333
- BB	Baseball Program; Yes = 1; No = 0	.125	.333
+ MTCC	Men’s Track and Cross Country Program; Yes = 1; No = 0	.125	.333
+ MOTH	Men’s Other Sports Program; Yes = 1; No = 0	.125	.333
- WB	Women’s Basketball Program; Yes = 1; No = 0	.125	.333
- WTCC	Women’s Track and Cross Country Program; Yes = 1; No = 0	.125	.333
- WOTH	Women’s Other Sports Program; Yes = 1; No = 0	.125	.333

*** NA indicates unavailable data

Table 2: Variable Definitions, Predicted Signs, and Descriptive Statistics by Conference – Big Ten and Missouri Valley Conference (MVC)

Variable	Mean Big Ten	Std. Deviation Big Ten	Mean MVC	Std. Deviation MVC
Dependent Variable-				
GRAD GAP	11.60	26.945	-2.14	37.113
Independent Variables-				
REV	.46	.498	.38	.487
POST	.307	.464	.05	.219
ACRNK	51.18	20.13	NA***	NA***
FB	.125	.331	.125	.333
MB	.125	.333	.125	.333
BB	.125	.331	.125	.333
MTCC	.125	.333	.125	.333
MOTH	.125	.333	.125	.333
WB	.125	.333	.125	.333
WTCC	.125	.333	.125	.333
WOTH	.125	.333	.125	.333

*** NA indicates unavailable data

Empirical Model:

$$\text{GRAD GAP} = \alpha + \beta_1(\text{REV}) + \beta_2(\text{CONF}) + \beta_3(\text{POST}) + \beta_4(\text{ACRNK}) + \beta_5(\text{FB}) + \beta_6(\text{MB}) - \beta_7(\text{BB}) - \beta_8(\text{MTCC}) - \beta_9(\text{MOTH}) - \beta_{10}(\text{WB}) - \beta_{11}(\text{WTCC}) - \beta_{12}(\text{WOTH})$$

Revenue generated by each sport (REV) is one of the key variables in this study because it is the basis of the hypothesis. The REV variable is expressed as a dummy variable in order to incorporate all eight sports programs. Athletic programs are given a value of one if they generated over \$1 million in 2004. If it was expressed as a monetary number, several data points would be missing and degrees of freedom would be a large issue. REV is expected to have a positive effect on the graduation gap because sports that generate large amounts of revenue are hypothesized to have a larger graduation gap. This expectation is counterintuitive because in most cases a positive effect indicates a favorable outcome. However, in this case a large positive effect indicates that athletes' graduation rates are well below those of non-athletes, which is an unfavorable outcome to athletes, universities, and society as a whole.

Schools in the Big Ten and the Missouri Valley Conference differ in several ways just on the basis of their conference. Big Ten schools are generally bigger and place a greater importance on athletics. The variable for conference (CONF) is used to control for this difference and to see the impact that conference

alone has on the graduation gap. The dummy variable is assigned to Big Ten schools, with the MVC schools being omitted. The expected sign of this variable is positive due to the fact that Big Ten schools are larger and traditionally have more prominent, prestigious athletic programs striving towards success.

Post-season appearance (POST) is included in the model to account for the athletic success of each program. POST is measured by a dummy variable based on whether or not a team made it to the national tournament in 2004. This variable is also expected to have a positive effect on the graduation gap due to the extended length of season and additional revenue that comes with making the national tournament. The extended season causes athletes to allocate even more time to athletics at the expense of academics, which logically will reduce graduation rates of athletes and increase the graduation gap.

The academic rank of the schools (ACRNK) represents the success and difficulty of academics at each school. The academic rank is from the *U.S. News and World Report "Best Colleges" of 2005*. The year 2005 is used because the criteria used to generate the rankings were from 2004, which is the time period of focus and is consistent with the other data gathered for this study. All of the Big Ten schools are included in this ranking, but the MVC schools are not. This is due to the smaller size of

MVC schools and the fact that several of them are not national universities. It would have been ideal to construct a ranking for MVC schools using the same criteria as the *U.S News and World Report* and rank the schools accordingly, beginning where the national ranking ended. However, the attempt to do so and the data available produced arbitrary and inaccurate rankings that were not sufficient or effective. It will be beneficial for future studies to acquire an efficient ranking system to rank all schools, regardless of conference or size. For this ranking, a smaller number indicates a higher rank. For example, Harvard has a ranking of one and is considered the best national university. Therefore, the expected sign for the ACRNK variable is positive because it is hypothesized that top academic universities will admit top athletes with lower academic ability, so they will struggle academically, thus lowering the graduation rates of athletes and increasing the graduation gap. To conceptualize the effect of this ranking on the graduation gap, a one-unit increase in ranking will actually cause a small, positive increase in the graduation gap because the schools will be decreasing in degree of academic difficulty.

The remaining variables are dummy variables for each of the eight sports. Out of all eight sports, only football (FB) and men's basketball (MB) are predicted to have positive effects on the graduation gap. They are expected to have large positive effects on the graduation gap because those sports programs generate the largest amounts of revenue. The remaining sports, however, usually generate very

little revenue. Women's basketball is the one women's variable that could have a positive effect on the graduation gap due to the recent increase of interest in women's basketball, but since the data is from 2004, that interest is not represented in this study.

V. Results

The preliminary descriptive results are in agreement with the hypothesis of this study. According to the descriptive statistics in Table 1, the mean of the graduation gap between athletes and non-athletes in the Big Ten and Missouri Valley Conference is 5.15. That means that on average, the graduation rate of non-athletes is 5.15 percentage higher than athletes. When separated by conference in Table 2, the mean graduation gap at Big Ten schools is 11.60, while the mean graduation gap at MVC schools is negative at -2.14. These results are important because they support the hypothesis that Big Ten schools, which are known for generating large amounts of revenue, have a graduation gap that is considerably higher than MVC schools that generate little revenue. On average Big Ten athletic programs have graduation rates that are 11.6 percentage points less than their non-athlete population. On the other hand, MVC athletic programs graduate their athletes at a rate that is 2.14 percentage points above their non-athlete population. This difference between conferences is very drastic and the following regressions will attempt to explain it.

Table 3: Regression Results for both conferences combined

Variable	Model A	Model B	Model C
Independent Variables-	Adjusted R2= .125		Adjusted R2= .025
REV	-1.26 (-.162)	---	---
CONF	15.340 (2.929) ***	11.847 (2.43)***	11.847 (2.312)**
POST	-13.432 (-1.880) *	---	---
ACRNK	---	---	---
FB	14.755 (1.513)	26.762 (3.468)***	---
MB	---	13.286 (1.721)*	---
BB	4.381 (.372)	20.667 (2.678)***	---
MTCC	-11.623 (-.964)	---	---
MOTH	-8.593 (-.852)	---	---
WB	-19.451 (-1.733)*	-5.905 (-.765)	---
WTCC	-15.447 (-1.289)	---	---
WOTH	-26.415 (-2.621)***	---	---

* Significant at .10 level

** Significant at .05 level

*** Significant at .01 level

Values in parenthesis are t-statistics

In order to get more satisfactory results, several models were used. Table 3 reports the complete results of regression models using data from both conferences. From the data, three models were constructed using different combinations of variables. Model A attempts to explain the variation in the graduation gap using ten explanatory variables. In this model, CONF is highly significant, which indicates that being in the Big Ten Conference increases the graduation gap by 15.34 percentage points.

The coefficients for women's other sports (WOTH) and women's basketball (WB) are also significant in this model. WOTH has a very large, negative result, which implies that female athletes on teams other than basketball and track and cross-country, generally graduate at a rate that is 26.4 percentage points higher than non-athletes. Women's basketball (WB) also has a large negative coefficient, which means that the graduation rate of women's basketball teams, across both conferences, is 19.5 percentage points higher than that of non-athletes. These results are consistent with the hypothesis because all women's athletic programs are considered non-revenue earning, so they are more likely to have smaller, or in this case, negative graduation gaps. The remaining variables used in Model A were either insignificant, had the incorrect sign, or both, so they will not be discussed in detail.

Model B was then constructed to produce more substantial results. Model B uses variables that are considered revenue sports in addition to conference to explain the variations in graduation rates. The significance of several variables improved in Model B compared to Model A. The variable for conference is still highly significant, however, its coefficient decreased slightly. With the removal of several variables from Model A, the football (FB), men's basketball (MB), and baseball (BB) coefficients all became significant and larger. This improvement in the results could largely be due to multicollinearity, namely, the revenue variable.

It is important to mention, that although revenue was initially the primary focus of this study, it was consistently insignificant, and most often had the wrong sign. There are several possible reasons for this. First, revenue may be correlated with the conference. In general, Big Ten athletic programs will generate large amounts of revenue because of their popularity, size, and tradition. Therefore, teams in the Big Ten will, in most cases, generate over one

million dollars of revenue. Another possible explanation is the use of the dummy variable instead of actual revenue. The revenue generated by athletic programs differs greatly. Some football programs, especially in the Big Ten, have the potential to generate tens of millions of dollars, whereas MVC football programs generate much less. This large variation in the revenue data could explain the poor results of the revenue variable in this study.

To supplement the lacking results of the revenue variable, the variable for conference was tested in Model C to see how much of the variation in the graduation gap was due to conference alone. Conference alone explains away only 2.5 percent of the variation. However, the coefficient did not differ from that in Model B and was still significant.

The results of the models presented in Table 3 are consistent with the theories drawn from the allocation-of-time model and human capital model. The results show that athletes at larger schools, with more prominent athletic programs, have a more difficult time acquiring academic-related human capital and succeeding academically.

Model D, E, F, and G are used to separate the conferences in order to better examine the effects of the independent variables on the graduation rate gap. Using the separate models attempts to more efficiently control for the differences of the conference each team is in and also allows for the introduction of the academic rank variable into the Big Ten regressions. Table 4 shows the regression results for the two models run with data from only the Big Ten.

In Model D, academic rank and dummy variables for the assumed "revenue sports" are used to explain the variations in the graduation rate gap. The coefficient for men's basketball (MB) is highly significant with a very large, positive number. In the Big Ten, men's basketball teams have graduation rates that are almost 30 percentage points lower than those of non-athletes. Football (FB) is significant as well, indicating that football teams in the Big Ten graduate their players at a rate that is almost 15 percentage points lower than the rest of the universities' non-athletes. These results support the hypothesis because men's basketball and football are both considered high revenue sports, and they both increase the graduation gap, as predicted by the hypothesis and related literature.

Table 4: Regression Results for Big Ten Conference

Variable	Model D	Model E
Independent Variables-	Adjusted R ² = .125	Adjusted R ² = .135
REV	---	---
POST	---	---
ACR NK	-.192 (-1.408)	-.192 (-1.416)
FB	14.773 (1.716)*	14.418 (1.719)**
MB	29.864 (3.468)***	29.509 (3.518)***
BB	17.773 (2.064)**	17.418 (2.077)**
MTCC	---	---
MOTH	---	---
WB	1.773 (.206)	---
WTCC	---	---
WOTH	---	---

* Significant at .10 level

** Significant at .05 level

*** Significant at .01 level

Values in parenthesis are t-statistics

Baseball (BB) is also significant in this model, which was not consistent with the hypothesis because baseball is not assumed to be a “revenue sport.” Therefore, the large positive effect is unexpected. A possible explanation for this result stems from the related literature in that it is possible for baseball programs in the Big Ten to relax admission standards in order to get top athletes who are not academically qualified, admitted.

Academic rank (ACR NK) is insignificant with a very small, negative coefficient. This result implies that a one-unit increase in academic rank will decrease the graduation rate gap by a small amount. Although the coefficient is insignificant and unexpected, there are possible explanations for this result. A logical

explanation is that since a higher number implies a lower rank, as the number of ranking increases, the quality of the school decreases. Therefore, if the quality of the school is decreasing, then the graduation gap should also be decreasing because the academics, hypothetically, will be easier. This potentially reduces the chance that athletes will struggle academically, thus reducing the graduation rate gap.

Model E is essentially the same as Model D, with the exception of women’s basketball (WB) being removed. All of the coefficients of the remaining variables were virtually unchanged and still significant. The coefficient for football increased in significance.

Table 5: Regression Results for MVC

Variable	Model F	Model G
Independent Variables-	Adjusted R ² = .146	Adjusted R ² = .146
REV	---	---
POST	-24.676 (-1.275)	---
ACR NK	---	---
FB	42.418 (3.323)***	43.167 (3.542)***
MB	-.015 (-.001)	---
BB	26.318 (2.062)**	27.067 (2.221)**
MTCC	---	---
MOTH	---	---
WB	-14.350 (-1.137)	---
WTCC	---	---
WOTH	---	---

* Significant at .10 level

** Significant at .05 level

*** Significant at .01 level

Values in parenthesis are t-statistics

Model F and G represent the results for the Missouri Valley Conference (MVC), described in Table 5. Model F is similar to the Big Ten models, with the exception of academic rank. In this model, football (FB) and baseball (BB) are significant with extremely large, positive coefficients. These results indicate that athletes in MVC football programs and baseball programs graduate at a rate that is 42 percentage points less and 26 percentage points less, respectively, than non-athletes. Unlike in the Big Ten, men's basketball (MB) in the MVC has a very small, negative coefficient that is insignificant. This is surprising because men's basketball, regardless of school or conference, is usually considered a "revenue sport".

Model G includes only the significant variables from Model F. The results are almost identical, with the coefficients for football (FB) and baseball (BB) remaining significant.

VI. Conclusions

Some of the results of the regressions are accurate and consistent with the hypothesis and related literature. Previous studies have found that football team success is inversely related to academic success. However, a major finding of this study is that participation in football programs, without any measure of success, is inversely related to academic success. This study shows that athletes in football programs across both conferences graduate at lower rates than their non-athlete counterparts. However, there are several variables that are insignificant and have the wrong sign.

The results of the first set of models in Table 3 indicate a large discrepancy in graduation rates between athletes in the Big Ten and non-athletes. According to the models, athletes in the Big Ten graduate at a rate that is 12 percentage points lower than non-athletes. This finding supports the issue that big-time Division I schools in the NCAA are becoming too much like professional businesses and not placing enough emphasis on obtaining an education, which used to be the main priority of college student-athletes. This is consistent with the findings in the related theoretical literature that athletes in Division I schools have a more difficult time devoting their efforts to academics for a variety of reasons.

The models in Tables 4 and 5 account for the naturally existing differences between the Big Ten and Missouri Valley conferences. However, the results for football and baseball variables are consistent throughout both models. Football and baseball programs at schools in the Big Ten and

MVC are consistently graduating their athletes at a rate that is drastically lower than the non-athlete population. These prominent results lead to implications for future policies.

Although the regression results of this study do not lead to specific policy implications, general policy implications can be made because football and baseball programs are consistently producing graduation rates well below the non-athlete population. Policies can be made to provide more academic aid and tutoring to football and baseball athletes to increase their graduation rates and decrease the graduation gap.

The results of the descriptive mean statistics also provide evidence that new policies are needed to decrease the graduation gap between athletes and non-athletes. In general, athletes graduate at a rate that is about five percentage points lower than non-athletes. As stated before, this difference is much greater in the Big Ten, and therefore policies need to be implemented to place greater importance on the academic success of athletes.

Future studies on this topic are necessary because there are many more avenues to explore. The data are lacking in completeness in some aspects due to availability, so that is an appropriate place to begin further research. Also, there may be other factors, or more appropriate measures of the variables that explain a larger portion of the variance in the graduation gap that can be used in future research. Exploring other independent variables would help to increase the depth of this topic and provide a better understanding of why this graduation gap exists between athletes of various sports and non-athletes.

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