What Are The Monetary Effects Of Education In The Market For Major League Baseball Players?

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ABSTRACT

In this article, we test the relationship between college attendance and earnings for Major League Baseball players. Using a cross-section of non-pitchers from the 2005 season, we find that schooling does not influence earnings. These results seemingly contradict the schooling-earnings theory and suggest that the market for baseball players may be purely talent-driven.

Keywords: Human capital, baseball, wage, earnings

I. INTRODUCTION

Human capital theory postulates that individuals attend school and on-the-job training programs to gain skills and knowledge that are valuable in the working world in order to increase one's earning power in the labor market (see Polachek and Seibert, 1993). Choosing how much of an investment to make in human capital accumulation is a net present value decision, where an economic agent weighs the additional income stream anticipated to be generated by attending school or training against the costs of obtaining it. For most people, this type of investment activity isn't free because participants may have to forgo earnings from a job, pay tuition, or otherwise give up some other economic opportunity to accumulate human capital. Overall, economic agents are expected to make decisions which will maximize their lifetime earnings.

One such human capital investment decision is whether or not to attend college. For most students, the empirical evidence overwhelmingly suggests that regardless of career, the discounted additional income stream generated by such a degree is greater than the costs of acquiring that degree. However, there exists a select group of individuals who need to decide between going to college to play baseball or entering the minor leagues. For individuals drafted in the first few rounds of the amateur draft, the signing bonus and wage offered by Major League Baseball teams makes the decision to play minor league baseball sufficiently obvious. For other drafted players who do not have the academic requirements to enter college, the decision to play minor league baseball is also clear. But there is a group of individuals who are drafted and face the prospect of a relatively low paying minor league contract or can choose to forgo those earnings for an athletic scholarship to attend college. For example, in the 2005 draft, 561 of the 1,501 players drafted were from high schools. Of those 561 players, almost half were drafted in rounds 34 to 50 (see Czerwinski 2005). Conventional wisdom suggests that professional sports are purely talent driven labor markets, but very little research exists which explores a statistical link between education and earnings in professional sports leagues.

Barros (2001) found that Portugeuese soccer players have no returns to schooling, but it is not clear how applicable his results are overall since his data used amateurs, semi-professional, and professional players from four different soccer divisions located near Lisbon. Olbrecht (2007) examined the schooling effects for baseball players. He found that free agents, a sub-group of all Major League players, who attended college earned higher valued contracts, all else constant. However, it is not clear how applicable his results are, in general.

The main contribution of this paper is that we test the statistical correlation between schooling and wages for all non-pitching Major League Baseball players for the 2005 season. We improve upon previous research by investigating the effects of two types of schooling (4-year colleges versus community colleges) and focus our attention on players operating under the constraints of the reserve system in addition to those players who are free-agent eligible.

Our results suggest that additional schooling after high school is not associated with higher earnings in professional baseball, suggesting that annual wages are determined by talent. However, it may still be worthwhile to attend college if an individual plans to pursue a career after their playing days. The paper is organized as follows: In section II, we discuss the data; in section III, we discuss the econometric results; and we conclude the paper in the last section.

II. DATA

One of the advantages to using sports data is that compensation, and more importantly, performance (measures of output) data is both readily available and reliable because statistics are uniformly collected and calculated, leaving little subjective interpretation (see Kahn, 2000). This characteristic of the data is particularly useful because it allows for a direct comparison of observations, which helps minimize the potential for the schooling estimate to be biased when estimating an earnings function.

In addition to the motivation for this study, which is mentioned in the introduction, baseball data is used because this league does not have salary caps which could influence a player's wage. Furthermore, the existence of a monopsony work environment (known as baseball's reserve clause system), an arbitration system, and free agency (where player movement between teams is not restricted once a player reaches six years of service), makes the investigation into schooling effects more interesting. The inclusion of non-pitchers only in the data is due to the plethora and agreement of wage function specifications made available by previous authors such as Scully (1974), Kahn (1993), and Krautmann (1999). However, these authors did not include a schooling variable in their earnings functions.

The question then becomes how to measure schooling if information as to how many years a student-athlete attended college (or whether they earned a degree) is unavailable (Mincer (1974) and others suggest that schooling should be measured in years). Fortunately public information is available as to which school, if any, all Major League Baseball players attended. Overall, schools attended by players fall into two categories: four-year degree granting institutions and junior colleges. Given this information, we created two binary variables to measure schooling. The first variable, COLLEGE, takes a one value if an individual attended at least one year of any type of college, and zero otherwise. The second variable, FOUR YEAR, takes a one value if a player attended a four year collegiate institution, and zero otherwise.

The provisions of the collective bargaining agreement between Major League Baseball and the Player's Association are important when understanding the nuances of the differences between the two schooling variables. In the case of players who chose to attend junior college, the agreement specifies that those players can re-enter the draft at the end of their freshman seasons. However, players who go on to four-year schools must complete at least three seasons before re-entering the draft. Essentially, the variable, FOUR YEAR, measures a more intense schooling experience than the COLLEGE variable. However, we will focus our discussion on the more general schooling variable, COLLEGE, since the results for both schooling variables are similar.

In this sample, 227 of the 419 players (approximately 55 percent) attended at least one year of college. Tables IA and IB show the variable means and standard deviations for the sample. Additionally we further compare the cohorts who went to college and those who did not in Table IA. We do the same for the four year college attendees in Table IB.

On average, the hitters in this sample earned $2,999,340 per season. While this number is slightly higher than the $2,476,414 average salary for all pitchers and hitters reported by Major League Baseball's Players Association, it is intuitive because hitters generally are paid better than pitchers. The income information in this data

is the player's annual wage, not including performance incentives reached or whether they received a signing bonus. Information was collected from various publicly available sources (such as *USA Today, Espn.com, etc.*) and as much as possible figures were verified for accuracy among different sources.

In this sample, players who attended at least one year of college earned annual salaries on average $1,092,016 lower than players who did not attend at least one year of college. Upon first glance, it might seem that attending college is associated with lower annual earnings, however one must control for performance on the field before making any such claims. In this paper, we use career numbers for homeruns, stolen bases and the popular variable of career slugging average added to the career on-base-percentage, which Lewis (2003) argued is a better measure of a player's performance on the field.

To control for demographic differences among the players, we use a player's age at the start of the 2005 season, how many years of experience they have in the major leagues, and their primary position of play (coded as the traditional positions one through nine).

On average, the cohort which went to college has lower career homeruns and stolen bases, fewer years of major league experience, and is slightly older. Further, Table IB tells a similar story in that individuals who attended four year institutions earn less, but also have lower career numbers. Overall, it seems that there are differences in wages between those who attended institutions of higher learning and those who did not. The question is how much of those differences can be attributed to performance on the field, and whether education has any role in explaining the variation among player wages.

III. REGRESSION RESULTS AND DISCUSSION

Generally, economists estimate a version of Mincer's (1974) log-linear earnings function using ordinary least squares (OLS) to establish the statistical correlation between schooling and earnings. The percentage change interpretation of the coefficient for schooling is rather straightforward but there exists one important consideration. For the coefficient to be unbiased, schooling must be truly exogenous, or otherwise randomly assigned. However, it is possible that individuals with greater academic abilities are more likely to attend college, and since these factors are usually unobservable, estimating the regression by OLS often means that explanatory variables or the schooling measure is correlated with the unobserved disturbances in the equation.

There exist several innovative methodologies to deal with this issue. First, one can ignore the effects of motivation and unobserved abilities when estimating the earnings function (see Long, 1995). Second, one could follow the approach of Ashenfelter, Harmon, and Oosterbeeck (1995) and estimate the regression using data which compares twins or siblings. However, given that few twins or family members ever play professional sports, this approach is not feasible. Another alternative, proposed by Long (1995), is to include measures which control for motivation and academic abilities, but this also is not a feasible approach given the limitations of this data.

The final approach, which we use, is to employ an instrumental variables (IV) technique by choosing instruments which are sufficiently correlated with schooling but uncorrelated with earnings (for a discussion of this approach, see Card, 1995). The instrument used depends upon the data available. In this paper, we use the player's country of birth. Intuitively, players born in the United States have a predisposition to go to college, but it seems unlikely for baseball teams to engage in wage based discrimination against foreign born players.[1]

Having discussed the empirical strategies, it is now appropriate to discuss our results. We present the estimates for our models in Table II. In model 1, which is estimated by OLS, we find that the coefficient for COLLGE is negative but insignificant, meaning that attending college is not associated with higher or lower wages. While Barros (2001) used significantly different data than we do, he also found a negative but insignificant coefficient when estimating this type of mincerian model.

[1] We found no statistical correlation between a player's birth country and wages in this data.

However, given our concern that the estimates for this variable may be inconsistent, we report the results for the IV approach in column 3. Once again, we find that college attendance seemingly has no effect on the annual wages of baseball players. Further, if we examine those individuals who attended a four-year college, we still find similar results. In model 2 (estimated by OLS) and model 4 (IV), the estimate on the four year degree schooling variable is insignificant.

The estimates for the other variables are as expected. As a player gets older, his earnings are lower. Like Mincer (1974), we find that earnings increase with experience, but decrease with the square of experience. Further, we find that players who are arbitration eligible earn higher wages than those players under the reserve system and those free agent eligible players earn more also. The estimates for career performance are also intuitive. Players with more stolen bases, more homeruns and better offensive statistics earn higher wages, all else constant.

Finally, our models do not control for a player's race because previous research suggests that a player's racial characteristics are not significant determinants of earnings.[2] For example, Cymrot (1985) argued that the competition to win is a strong deterrent against discrimination, and furthermore, Kahn (200)) argued it would be counterintuitive to assume that the first professional sports league to become racially diverse would be discriminatory in its compensation to its players (see also Jibou, 1988).

Overall, the high R-square values in all four regressions using this type of cross-section data suggest that the explanatory power of our models are strong and we are led to conclude that baseball does seem to contradict the human capital model.

IV. CONCLUSION

The implications of human capital theory are that investments in education will make a worker more productive, and thus more valuable to employers. Employees should receive returns on their investments in the form of higher wages. Perhaps the most important time in a person's life is upon high school graduation, when an individual must decide between entering the workforce and attending college, assuming one has the academic credentials to do so.

For many high school baseball players drafted by Major League Baseball teams, their decision is whether to play baseball on an athletic scholarship at a four year institution or a junior college, or enter the minor leagues. Fortunately, many teams have eliminated the mutual exclusiveness nature of this decision by including provisions to pay for the college educations of the players once they complete their professional careers. However, the more pressing concern for this group of players is which choice will ultimately lead to the highest wages when playing professional baseball.

Using an OLS approach, we found that the estimate for the return to schooling is negative but insignificant. Given the limitations in accurately measuring schooling and the inherent motivational and ability biases present in those OLS estimates, we used an IV technique to correct for these issues. The results outlined in this paper suggest that professional baseball is a purely talent driven labor market and that education seems to play no significant role. Given this information, we can speculate that baseball players most likely make decisions as to whether or not to enter college based on non-pecuniary factors, such as their career aspirations after their playing days are done.

However, testing the effect of schooling on annual wages is just one approach to trying to understand the effect of education in this particular type of labor market. An alternative methodology would be to investigate the statistical correlation between schooling and endorsement income (when this data becomes available), holding on-the-field performances constant.

[2] Nonetheless, we estimated all our models with a race variable and found the estimates to be insignificant.

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Table IA. Variable Means and Standard Deviations

	Full Sample		College		No College	
Variable	*Mean*	*Std. Dev*	*Mean*	*Std. Dev*	*Mean*	*Std. Dev*
Income (2005 Salary)	$2,999,340.00	4,051,843.00	$2,498,941.00	3,463,421.00	$3,590,957.00	4,591,997.00
Age at start of 2005 season	29.909	4.257	30.524	4.100	29.182	4.336
Arbitration Eligible	0.284	0.451	0.304	0.461	0.260	0.440
Attended a Four-Year College	0.458	0.499	0.846	0.362	0.000	0.000
Attended College	0.542	0.499	1.000	0.000	0.000	0.000
Career Homeruns	89.970	107.590	83.106	104.875	98.089	110.433
Career OBP + Slugging	0.754	0.090	0.753	0.088	0.756	0.093
Career Stolen Bases	53.009	80.179	48.423	85.729	58.432	72.925
Free Agent Eligible	0.530	0.500	0.502	0.501	0.563	0.497
Years of Major League Experience	7.539	4.396	7.352	4.355	7.760	4.445
Number of Observations	419		227		192	

Table IB. Variable Means and Standard Deviations

	Full Sample		Four Year College		No Four Year College	
Variable	*Mean*	*Std. Dev*	*Mean*	*Std. Dev*	*Mean*	*Std. Dev*
Income (2005 Salary)	$2,999,340.00	4,051,843.00	$2,480,072.00	3,437,329.00	3438544	4467294
Age at start of 2005 season	29.909	4.257	30.755	4.154	29.194	4.221
Arbitration Eligible	0.284	0.451	0.276	0.448	0.291	0.455
Attended a Four-Year College	0.458	0.499	1.000	0.000	0.000	0.000
Attended College	0.542	0.499	1.000	0.000	0.154	0.362
Career Homeruns	89.970	107.590	87.141	109.042	92.366	106.526
Career OBP + Slugging	0.754	0.090	0.755	0.086	0.754	0.094
Career Stolen Bases	53.009	80.179	51.099	91.305	54.626	69.562
Free Agent Eligible	0.530	0.500	0.521	0.501	0.537	0.500
Years of Major League Experience	7.539	4.396	7.542	4.465	7.537	4.346
Number of Observations	419		192		227	

Table II: Regression Results

Dependent Variable: Log of Income (2005 Salary)

	Model 1 (OLS)		**Model 2 (OLS)**		**Model 3 (IV)**		**Model 4 (IV)**	
Variable	*Estimate*	*T-statistic*	*Estimate*	*T-statistic*	*Estimate*	*T-statistic*	*Estimate*	*T-statistic*
Age at start of 2005 season	-0.046	-2.25	-0.039	-1.93	-0.021	-0.70	-0.021	-0.70
Arbitration Eligible	0.435	3.09	0.418	2.95	0.407	2.82	0.380	2.53
Career Homeruns	0.006	9.67	0.006	9.71	0.006	9.63	0.006	9.69
Career OBP + Slugging	2.051	3.69	2.066	3.72	2.135	3.77	2.108	3.76
Career Stolen Bases	0.003	6.74	0.003	6.76	0.004	6.72	0.004	6.75
Free Agent Eligible	1.395	6.23	1.364	6.08	1.320	5.60	1.292	5.31
Position Dummy (1-9)	-0.017	-1.16	-0.016	-1.12	-0.017	-1.19	-0.015	-1.02
Years of Major League Experience	0.168	3.10	0.168	3.10	0.160	2.89	0.166	3.05
Years of Experience Squared	-0.012	-5.19	-0.013	-5.28	-0.013	-5.26	-0.013	-5.27
Attended College	-0.019	-0.26			-0.021	-1.11		
Attended a Four-Year College			-0.078	-1.08			-0.223	-1.12
Number of Observations	419		419		419		419	
R-Square	0.748		0.749		0.744		.746	

NOTES