
Top Prospects and Minor League Baseball Attendance

Journal of Sports Economics

12(3) 341-351

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DOI: 10.1177/1527002511404780

<http://jse.sagepub.com>



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Abstract

Minor League Baseball attracts over 40 million fans a year. One potentially important attendance draw is the ability for a fan to see a future major league baseball star. Each year Baseball America, a leading industry publication, ranks 100 top prospects that have yet to play substantially in the major leagues. Many of these top prospects continue to develop for a year or more in the minor leagues, which gives fans an opportunity to see potential future Major League Baseball (MLB) stars at their local minor league club. The authors use a data set encompassing all AA and AAA minor league baseball teams from 1992 to 2009 to estimate the impact of having a top 100 Baseball America prospect on a minor league team's attendance. Their results suggest that only those prospects ranked in the top 5 and at the highest level (AAA) have an impact on their team's attendance and their impact on attendance is small.

Keywords

minor league baseball, attendance, top prospects

Introduction

Drafts in the major professional sports leagues have attracted popular attention in recent years as is evidenced by increased media coverage. Of the major North American professional sports leagues, baseball is somewhat unique in that many top draft selections often take at least a few additional years of development at

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the minor league level before they make the major league squad. During this time of developing in the minor leagues, baseball fans have a chance to watch these future stars. This article explores whether having a higher chance of seeing a future Major League Baseball (MLB) star increases attendance at minor league baseball games.

The first overall draft pick in the 2009 first year player draft was Stephen Strasburg who was listed as the second best prospect in 2010 by *Baseball America*. Before the start of each baseball season, *Baseball America*, a leading baseball publication, ranks the top 100 prospects (or minor league players) identified as having the greatest potential to be future MLB stars. Strasburg received a great deal of media attention in his early professional career, with one outlet asking if he was the best prospect ever (DiFino & Clark, 2010). In his first three games pitching for the AAA Syracuse Chiefs, attendance was about three times greater than games when he did not pitch and two of these games became the top 2 attendance days for his team. While the case of Stephen Strasburg is uncommon, many minor league baseball teams market all of their players as potential future MLB players. For example, the Baltimore Orioles Advanced A affiliate, the Frederick Keys, offers baseball camps where youngsters can “learn from the future stars of the Baltimore Orioles.” These observations suggest a more general speculation: if the impact of prospects on minor league baseball attendance is based on the likelihood of their becoming a future MLB star, should we expect top-ranked players to have a greater impact on attendance than those ranked lower? We test this hypothesis in this article.

Top rated prospects since 1992 have included Alex Rodriguez, Andruw Jones, Josh Beckett, Mark Teixeira, and Joe Mauer who have since become very successful MLB players. A cursory look at the top 100 prospects show that a better ranking is often an indicator of a player’s future MLB success, but it is worth noting that a few quality players such as Chris Carpenter and Livan Hernandez have been the 100th ranked prospect. While not every fan reads *Baseball America*, local media covering minor league teams likely promote these rankings. We use the *Baseball America* rankings as a way to identify players that could potentially influence fans’ perception about seeing a current minor league baseball star that is also a possible future major league star and use these rankings to test if star prospects increase attendance at minor league baseball games.

We use a data set of every minor league team at the AA and AAA level from 1992 to 2009 and the corresponding rankings of prospects from *Baseball America* and find some evidence that top 5 prospects can increase attendance by a couple percentage points but only at the AAA level. Beyond the top 5, there appears to be no significant impact on attendance from top prospects. The potential increased revenue from these fans at the minor league level does not appear to offset the bonuses that some of these prospects are receiving but can bring down the net training costs of these players (Krautmann, Gustafson, & Hadley, 2000).

Literature Review

The best prospects can help generate wins at the major league level, which can lead to even more fans when those prospects turn into star players (see Berri, Schmidt, & Brook 2004 for an example from the National Basketball Association [NBA]). But even before these prospects reach the major leagues, they could help generate revenue at the minor league level if fans want to see potential future major league stars at the start of their professional career. Gitter and Rhoads (2010a, 2010b) have found that factors such as winning and new stadium construction can increase minor league attendance, but the research regarding minor league prospects has mostly focused on the relationship of the minor league team to its major league parent through the draft and ignores the effect on minor league attendance. Our article aims to fill this gap by estimating the more immediate impact prospects can have on minor league attendance.

Minor league prospect research has so far evaluated how efficient markets are in estimating the value of drafted players by measuring the benefits generated by these drafted players at the major league level to determine whether the draft selection was a good one. Spurr (2000) finds that markets eventually eliminated inefficiency in undervaluing college experience, and Winfree and Molitor (2007) suggest that success in major league baseball is closely linked to draft round for high school draftees. Note that the value of players at the major league level comes from the additional gate attendance generated by wins that flow from a player's play at the major league level and not at the minor league level.

While top prospects in baseball are only potential future MLB stars, they can reasonably be considered stars in their current minor league. Berri et al. (2004) have already found that established top players in the NBA increase gate attendance. But a possible legacy effect from the more established stars on gate attendance in a major league could be present and would distort the measured effect of star power on gate attendance. Because top minor league baseball players generally move through a team rather quickly, a legacy effect would not be expected to show up when examining top prospects in minor league baseball. Without this legacy effect, our study thus provides another test in estimating the effect of star power on gate attendance.

Promotions and marketing at the minor league level seems to be a primary means for attracting fans to the stadium (Cebula, 2009; Cebula, Toma, & Carmichael, 2009; Gifis & Sommers, 2006) although rules regarding beer sales do not seem to influence attendance (Chupp Stephenson, & Taylor, 2007). But it is unlikely that marketing departments for minor league teams stop at just offering promotions to bring the fans to the stadium. Noll (2002) suggests that the minor leagues may be increasingly tied to the major league through a promotion mechanism in order to increase total revenue. This suggests that minor league teams may be more likely to market their best prospects as a way to tie their team to the major league team. Rhoads (2010) notes that the PGA TOUR and Nationwide Tour (the minor league for the PGA TOUR)

have established policies in recent years consistent with this view. It is certainly possible, then, for minor league baseball and major league baseball to become increasingly tied together through marketing. This can occur through promoting the best prospects in the organization that would be expected to make an impact for the major league organization.

Econometric Model

The regression model on attendance is shown below in Equation 1. The dependent variable of interest is total home attendance. To estimate the effect of a top prospect, we group the prospects into five categories (Top 5, Top 6–10, Top 11–25, Top 26–50, and Top 51–100) based on their Baseball America ranking (the rankings are described in more detail in the next section). We then total the number of games played by prospects ranked in those categories to test for an effect of having a top prospect and the influence of the prospects rank. If attendance is tied to quality of play or the presence of future MLB players, these variables should be positive, with larger coefficients for better ranked prospects.

We also include other variables that have been found to affect minor league attendance in previous works (Gitter & Rhoads, 2010a, 2010b). The first variable of interest controls for honeymoon effects from new stadiums (Age_{kjt}). This variable is an indicator variable and equals 1 if the stadium is “ k ” years old for team “ j ” in year “ t .” Gitter and Rhoads (2010b) found that the impact was largest in the stadium’s first year ($k=0$) and by Year 10 ($k=10$) the effects on attendance were minimal.

The next variable is the team’s winning percentage ($Win\%$). Gitter and Rhoads (2010a) found that winning teams had slightly higher attendance. One concern with this variable is that having more top prospects could influence winning percentage, which would bias the estimates of the prospect and winning percentage measures. However, a regression using winning percentage as the dependent variable does not show a statistically significant effect of the top prospect variables used in the analysis on winning.¹ This is likely because baseball players have smaller individual impacts on winning than other sports like basketball or hockey. Additionally, MLB teams do not place prospects to maximize winning for minor league teams, so top prospects may play in leagues where other players are more experienced.

Several other variables are included. Two indicator variables for the years 1994 and 1995 ($Year94$ and $Year95$) to control for the impact of MLB’s strike on minor league attendance. A trend term ($Trend$) that equals 0 in the first year of the sample and adds one for each subsequent year controls for rising minor league attendance over the period. Gitter and Rhoads (2010a) found that the team’s MLB affiliate’s winning percentage positively affect attendance so it is also included.

We use team fixed effects to control for local taste for baseball as well as controlling for time invariant population and income. Winfree and Fort (2008) and Gitter and Rhoads (2010a) use the same strategy in their estimation of attendance in

minor league hockey and baseball. Team fixed effects are represented by the variable ($Team_j$), where $Team_j = 1$ for team “ j ” and 0 for all others. Given that our 18-year sample is a much shorter period than most MLB estimations, time variation in population and income is likely to be less important.

$$\begin{aligned}
 \text{Total Attendance}_{jt} = & \beta_0 + \beta_1 \text{Top5} + \beta_2 \text{Top10} + \beta_3 \text{Top11} - 25 + \beta_4 \text{Top26} - 50 \\
 & + \beta_5 \text{Top51} - 100 \\
 & + \sum_{k=0}^{10} \beta_{6+k} \text{Age}_{kjt} + \beta_{17} \text{Win}\%_{jt} \\
 & + \beta_{18} \text{Year } 94_t + \beta_{19} \text{Year } 95_t + \beta_{20} \text{Trend}_t + \beta_{21} \text{Affiliate_Win}\% \\
 & + \sum_{j=1}^n \alpha_j \text{Team}_j + \varepsilon_{jt}.
 \end{aligned} \tag{1}$$

We utilize Equation 1 for four different estimation specifications. The first specification pools the AA and AAA data. The second specification adds in a quadratic term for the number of games played by Top 5 prospects to test for nonlinearities. One issue that the quadratic term may capture is that quality players who are more likely to reach and succeed in the major leagues will likely be promoted before they play a full season in one level. Therefore, fewer games played may also be an indicator of prospect quality. We estimate the first specification separately for AA and AAA providing our third and fourth specification, respectively. Finally, we performed a Woolridge (2002) test for autocorrelation and rejected the null hypothesis that the errors are not correlated (F statistic = 13.9, $p = .0004$) for the pooled model. Autocorrelation is common in sports attendance data (Lee & Smith, 2008). Therefore, each model was assumed to have an AR(1) error process.

Data Description

Sport Reference LLC (2009) provided attendance data for minor league baseball teams’ attendance and information on MLB performance. In order to identify star players, we utilize Baseball America’s top 100 prospects list (Baseball America Prospect Handbook, 1992–2009). Baseball America is a leading baseball publication and since 1990 has created a list that ranks the 100 best potential future MLB players that is released a month or so before the start of the baseball season. These players must have not exceeded 130 at-bats, 50 innings, or 30 pitching appearances in the major leagues. Sports Reference (2009) also provided a separate database on the top 100 prospects including their rank (1–100), their fielding position and statistics of games played in both the minor and the MLB leagues in the season they appeared.

Our main independent variable of interest is prospect games, which measures the number of games that featured top prospects. Since higher rank prospects have a

Table 1. Percentage of Teams with at least 30 games from a Top Prospect

Level	Top 5	Top 6–10	Top 11–25	Top 26–50	Top 51–100
A	0.2%	0.2%	0.9%	2.4%	5.6%
AA	1.9%	1.9%	8.9%	11.6%	16.0%
AAA	2.1%	2.7%	6.4%	14.4%	17.4%

higher chance of success at the MLB level, we group the prospects in five categories (Top 5, Top 6–10, 11–25, 26–50, and 51–100). Each variable represents the number of games played by a top prospect in each of the five categories. In some cases, teams had more than one prospect in a category and their games may come from multiple players. Table 1 above shows the percentage of teams with at least 30 prospect games in each of the five categories. At AA and AAA in each level, there were about 2–3% of the teams had a Top 5 prospect and a similar number had a Top 6–10 prospect. With 30 teams at both levels, this is equivalent to about one observation each year for each level. We have omitted A level from the analysis because there were very few top prospects at the A level. This is likely because prospects usually become highly ranked after a good year in A ball or highly rank prospects that play at A level quickly are promoted.

The dependent variable of interest is total home attendance for a minor league baseball team. Below Table 2 provides the descriptive statistics for the variables used in the analysis with separate mean and standard deviations at the AA and AAA level. The average number of fans at the AA and AAA was just over 277,000 and 431,000 at the two levels, respectively. This complete data set includes data on all minor league teams from AA-AAA for every year in the sample. See Gitter and Rhoads (2010a, 2010b) for more details on data sources. About 3–4% of teams built a new stadium in any given year at each level. Not surprisingly the average winning percentage in both leagues was 50% and the standard deviations do not differ substantially.

Results

Limited evidence exists that Top 5 prospects can improve attendance. The results below in Table 3 show positive significant results in the linear model for the pooled data set, although the relative size is small. When AA and AAA are separated or a quadratic model is used, we do not find statistically significant positive effects, although at the AAA level p values approach significance at the 5% level ($p = .051$). Top 6–10, Top 11–25, and Top 26–50 variables do not show statistically significant impacts. Finally, Top 51–100 prospects show negative impacts that could be a result of being affiliated with an MLB team with recently poor performance.

The main variable of interest is Top 5 prospect games, which measures the number of games played by Top 5 Baseball America prospects for their minor league

Table 2. Descriptive Statistics

	AA		AAA	
	M	SD	M	SD
Total attendance	277234	108428	431382	149996
Top 5 prospect games	1.80	13.62	1.81	14.18
Top 6–10 prospect games	1.98	14.81	2.09	13.51
Top 11–25 prospect games	8.71	30.04	5.75	24.09
Top 26–50 prospect games	11.71	36.80	12.33	35.12
Top 51–100 prospect games	17.04	43.01	17.02	41.43
Team winning percentage	50%	0.0617	50%	0.0597
Age0 (new stadium)	4.4%	0.206	3.6%	0.186
Age1 (1-year-old stadium)	4.6%	0.210	3.4%	0.182
Age2 (2-year-old stadium)	4.8%	0.214	3.4%	0.182
Age3–4 (3- or 4-year-old stadium)	9.2%	0.290	8.3%	0.277
Age5–6 (5- or 6-year-old stadium)	9.1%	0.287	8.5%	0.279
Age7–8 (7- or 8-year-old stadium)	8.1%	0.273	8.0%	0.271
Age9–10 (9- or 10-year-old stadium)	7.1%	0.258	7.8%	0.268
Year 1994	5.2%	0.222	5.3%	0.224
Year 1995	5.4%	0.226	5.3%	0.224
Trend (Year-1992)	8.753	5.123	8.691	5.149
Affiliate winning percentage	0.501	0.070	0.499	0.070

baseball teams. In the first model with a linear specification, the Top 5 prospect games variable is positive and significant at the 10% level. The coefficient suggests a top player adds 161 fans a game. For example, Jay Bruce and Matt Weiters were #1 prospects in 2008 and 2009, respectively, the results estimate their presence added about 7,900 and 6,300 fans, respectively, for Bruce's 49 games in Louisville and Weiters' 39 games in Norfolk.² These increases are small and represent less than a 2% increase in attendance.

When a quadratic term is added in the second specification, Top 5 prospects increase attendance but we lose statistical significance. In the third and fourth specifications, we separate the data by the two levels and return to the linear model. Similar results are found for the quadratic model. The coefficient for Top 5 prospects in AAA is larger; however, it is no longer statistically significant at the 5% level ($p = .051$), while the AA coefficient on Top 5 prospects is insignificant and substantially smaller. This result is consistent with fans wanting to see players with the highest potential to become future stars. Even with the larger coefficient at the AAA level, a player like Bruce or Weiters would increase attendance less than 3%. We also reran the models using log attendance and dual log function and obtain results of similar magnitudes.

Finally, it is worth noting that in AA having more Top 51–100 prospects is associated with lower attendance. One possibility is that teams affiliated with MLB

Table 3. Estimated Impact of Top Prospect Seasons

Variable	Pooled Data	Pooled Data	AA	AAA
Top 5 Prospect Games	161 (78)*	325 (251)	24 (85)	245 (125)+
Top 5 Prospect Games Squared		-1 (2.00)		
Top 10 Prospect Games	13 (79)	16 (79)	34 (77.00)	0 (143)
Top 11-25 Prospect Games	-1 (41)	-2 (41)	44 (40.00)	-23 (74)
Top 26-50 Prospect Games	-48 (33)	-44 (33)	-20 (34)	-40 (56)
Top 51-100 Prospect Games	-31 (29)	-31 (29)	-70 (29)*	19 (50.00)
New Stadium	147,215 (9,361)**	147,212 (9,364)**	71,808 (10,863)**	193,319 (13,811)**
Age1 (1-year-old stadium)	142,919 (10,329)**	142,862 (10,332)**	81,059 (11,005)**	183,276 (16,296)**
Age2 (2-year-old stadium)	132,595 (10,857)**	132,559 (10,860)**	83,267 (11,232)**	166,559 (17,365)**
Age3-4 (3- or 4-year-old stadium)	107,779 (10,861)**	107,746 (10,863)**	69,111 (11,173)**	127,059 (17,232)**
Age5-6 (5- or 6-year-old stadium)	79,453 (10,310)**	79,515 (10,312)**	43,171 (10,708)**	101,079 (16,138)**
Age7-8 (7- or 8-year-old stadium)	43,619 (9,315)**	43,538 (9,317)**	25,233 (9,672)**	51,531 (14,678)**
Age 9-10 (9- or 10-year-old stadium)	23,374 (7,529)**	23,391 (7,531)**	18,205 (7,834)*	22,565 (12,060)
Team Winning Percentage	50,955 (20,363)*	51,114 (20,372)*	33,710 (20,651)	64,345 (34,342)
Year 1994	10,775 (5,635.00)	11,185 (5,668)*	17,916 (6,162)**	9,424 (8,859)
Year 1995	8,646 (5,500)	8,715 (5,503)	15,368 (5,948)*	7,520 (8,749)
Trend	3861. (1,311)**	3861 (1,311)**	1692 (1,237)	5143 (1,954)**
Affiliate Winning Percentage	25,803 (21954)	26,257 (21971)	50,909 (23,576)*	15,387 (34644)
Constant	240,534 (5,544)**	240,169 (5,548)**	193,152 (6,059)**	291,328 (9,132)**
Observations	954	954	467	484
Cities	74	74	42	34
Overall R ²	0.10	0.10	0.13	0.18
F-Stat of Fixed Effects = 0	6.9**	6.9**	7.5**	5.4**

Notes: Standard errors in parentheses +significant at 10% level, * at 5%; ** at 1%.

franchises with poor recent performance might have lower attendance and more top prospects. The relationship between MLB franchise's winning percentage and attendance was found to be positive in Gitter and Rhoads (2010a), but we do not find statistical significance in this estimation. Poor performing MLB teams have the opportunity to draft higher and therefore should have more top prospects. This may also downwardly bias the results found for Top 5 prospects.

A review of the variables shows similar impacts in magnitude and significance to two previous studies (see Gitter & Rhoads, 2010a, 2010b). Winning has weak impacts at the AA level and no impact at the AAA level. Building a new stadium increases attendance 25% and 40% in the first year in AA and AAA, respectively, and novelty effects diminish over time. Increased winning percentage of the team also increases attendance in some models. The final line of the table supports the use of fixed effects as the F test always rejects the joint test the coefficients on the team fixed effects are equal to zero.

Conclusions

Increasingly, attention has focused on the process by which professional sports leagues draft players. Recent innovations have the National Football League (NFL) running a scouting combine billed as "an annual job fair for prospective new NFL players," while the NBA draft lottery has been tweaked to try to prevent teams from tanking at the end of a season in order to achieve a better chance of attaining a number one draft pick. The best players drafted into the NFL or NBA often have a chance to make an immediate impact at the major league level. Most often, this impact is measured on the field or on the court.

In contrast, the best players drafted by MLB teams typically spend 1 year or more at the minor league level before playing in the major league. This player development structure in professional baseball means that a top draft pick's immediate impact is mainly seen in increased attendance at minor league baseball games. Within this framework, we carefully measure the impact that top prospects have on attendance at the minor league level and provide a more complete picture of the link between minor and major league baseball.

We find that a minor league baseball player rated by *Baseball America* as a Top 5 prospect increases attendance for his minor league team by a minimal amount (less than 2%). But we find no positive effect on attendance for players rated any lower. Our findings suggest that the best minor league baseball players have limited ability to bring in revenue at the minor league level. This result is similar to Berri et al. (2004) who find that NBA stars have limited impacts on attendance. These results further suggest that the strong link between minor and major league baseball must be modeled carefully to precisely measure the overall financial impact of drafted baseball players. This can include examining the impact on minor league attendance with game-by-game data to see prospect's influence on a given game or controlling

for the MLB team's recent performance that influences draft position and prospects. However, the initial results of this study do not suggest that prospects will ever increase attendance enough at the minor league level to offset signing bonuses and training costs.

Acknowledgments

We would like to thank Sean Forman for help in obtaining the data for this project. We would like to thank John Solow, the participants of the Western Economics Association meetings, and two anonymous reviewers for their comments. All errors remain our own.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interests with respect to the authorship and/or publication of this article.

Funding

The author(s) received no financial support for the research and/or authorship of this article.

Notes

1. These results are available on request from the authors.
2. Both clubs had lower attendance than the previous year in the prospect's time with the club; however, average attendance was down in AAA in general.

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