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## Similarities in fan preferences for minor-league baseball across the American Southeast

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### Abstract

Three Minor League Baseball leagues across the Southeastern United States are studied in order to determine what drives fan attendance. Individual game attendance and game characteristics are examined for three leagues located in the American southeast, the Florida State League, the Southern League, and the South Atlantic League. Despite the three leagues encompassing different levels of play (from A to AA), the determinants of attendance are similar across leagues. Factors affecting attendance such as winning percentage, weather conditions, local income and population, and individual game promotions, such as fireworks, are explored.

**Keywords:** Baseball, Forecasting Attendance, Promotions, Team Performance, Scoring

The study of fan attendance in sports has always been particularly interesting to many economists. Attempting to decipher the factors which influence fan demand for sporting events offers an intriguing laboratory for the study of consumer behavior. Baseball has been the most often studied sport, in this regard, due to the availability of data and the general statistical interest common to many baseball fans and economic researchers alike.

This study attempts to determine if fan interest is similar across different baseball leagues in the American southeast. The southeastern part of the United States tends to take a great interest in sports, with many major league teams scattered throughout its major cities and a general intense interest for college sports, particularly college football. This area is also home to a variety of baseball teams and leagues. The American south east is home to the Southern League, the Florida State League, and the South Atlantic (Sally) League.

Although these three leagues are all developmental baseball leagues, they offer fans an opportunity to see talent at different stages of player progression. The Southern League offers AA baseball, one step below the highest of the minor league levels (AAA), and includes teams in Tennessee, Alabama, Florida, Mississippi, and North Carolina. The Florida State League is a class A advanced league, a notch below the AA competition. The Florida State League has teams scattered across the state of Florida. The South Atlantic League, often referred to as the SALLY league, is also a class A league, but does not earn the “advanced” status. Teams in the South Atlantic League are located in North and South Carolina, Georgia, Kentucky, West Virginia, Maryland, and New Jersey. A full listing of the location of teams in each league and their nicknames are given in the Appendix to this paper.

Given that these leagues exist in similar geographic areas, but are played across different levels of competition (talent-wise), these three leagues offer the possibility of providing some insight into similarities and differences, if any, of fan preferences across these leagues. Through the official website of minor league baseball, [www.minorleaguebaseball.com](http://www.minorleaguebaseball.com), game-by-game statistics were available for each of these leagues for the 2009 season. Game attendance, dates, scores, demographic data, including population and income, and weather conditions were available for each game through individual box scores and other sources. In addition to this data, the promotional events for each day were available on the individual team websites. Therefore, through the accumulation of this data and its transformation into dummy variable categories, it is possible to study the determinants of attendance for these three minor leagues in the American south east as it relates to winning, scoring, weather condition, day of the week, month of the year, and promotions.

Given that there are three leagues in this area of the country, it is possible to compare and contrast how important specific factors are to attendance at minor league baseball games. Do fans respond in the same way to winning across all three levels of competition? Are higher-scoring teams rewarded with more fans? How do the success of certain promotions compare across leagues? All of these questions, and others, are possible to address through the availability of this data.

We specifically wish to test the null hypotheses that winning is an important determinant for fan attendance, that fans prefer more scoring to less, that the day, month, and weather conditions are important, and that promotional success is similar across these levels of competition. We investigate these issues by using regression models individually for each of the leagues and through a pooled regression of all three leagues together. The combination of these methods should allow for a greater understanding of what factors actually influence fan attendance for minor league baseball games.

The paper proceeds as follows. The second section briefly reviews past literature on attendance studies. The third section outlines the regression model and presents the results for each league. The fourth section presents and summarizes the pooled regression results. Section five concludes the paper.

### **1. Past literature on attendance in major and minor league baseball**

Economists have studied fan (consumer) behavior and demand for baseball game attendance through a multitude of model specifications describing the demand for baseball game attendance. A non-exhaustive sampling of independent variables includes population, income per capita, star players, and recent success (Noll 1974) and, televised games, quality of the team, and availability of substitutes (Demmert 1973), expected probabilities of winning a championship (Whitney 1988), salary structure (Richards and Guell 1998), turnover in team rosters (Kahane and Shmanske 1997), impacts of interleague play (Butler 2002; Paul et al. 2004), new stadium effects (Coates and Humphreys 2005; and Depken 2006), team performance as well as the impact of MLB affiliate proximity and pricing on minor league baseball attendance (Gitter and Rhoads 2010).<sup>1</sup>

For specific tests of the link between team performance and minor league baseball attendance, research by Siegfried and Eisenberg (1980), and Gifis and Sommers (2006) found no link between individual team performance and game attendance. Gitter and Rhoads (2010), examining a longer sample of average game attendance, concluded that better team performance did lead to higher attendance in minor league baseball at the A and AA levels, which they report as similar to the results found in minor league hockey by Winfree and Fort (2008). Gitter and Rhoads (2010) also found home runs to increase attendance for teams at the AA level.

### **2. Regression model of attendance for the southern, Florida State, and South Atlantic leagues**

The regression model used for this study is least squares estimation with per-game attendance as the dependent variable. The model was run in levels. The model was also tried in log-level form and yielded similar results. The independent variables fall into three different categories; external factors, team performance and opponent, and promotions. Teams are assumed to be profit-maximizers, setting prices to maximize expected profits before the start of the season. Therefore, ticket price is assumed endogenous in this model.

For each league, the first category of independent variables is demographic variables related to the cities. Population and Income Per Capita were taken from [www.city-data.com](http://www.city-data.com) for each of the minor league cities in this study. We would expect that larger population areas would attract a greater number of fans, therefore showing a positive and significant effect of this variable. If minor league baseball is a normal good, which is not a given, the effect of income per capita should be positive. If this is an inferior good along the entertainment spectrum for fans, this variable will have a negative effect on attendance.

Stadium capacity is also included as an independent variable. Given that the minor league teams in this sample seldom sold out for individual games, capacity does not appear to play a significant role as a binding constraint. However, the size of the stadium may play a role in the decision of fans to attend a game. If the stadium is rather large (perhaps oversized), compared to normal game-day attendance, fans may not enjoy the experience as much as if the stadium was close to capacity. A number of sports teams, at the college and professional level, often cover seats (reducing capacity) to keep the fans in the same general area of the stadium. If fans truly enjoy the feeling of being in a more closely-populated fan atmosphere, the stadium capacity variable will have a negative effect.

Dummy variables for the days of the week and months of the year are also included in the regression model. Wednesday is the excluded day of the week and June is the excluded month. Logically, we would expect that weekend days would be more popular than mid-week days and that attendance may increase during the summer months and may increase at the end of the season in the race to make the playoffs.

The next category of independent variables includes the effects of game-day weather. These variables were taken directly from game box scores. The variables include the game day temperature and the wind speed. To allow for non-linear effects of these variables, the temperature-squared and wind speed-squared are also included in the

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<sup>1</sup> For a more complete review of the literature, we refer interested readers to the overviews provided by Schofield (1983), McDonald and Rascher (2000), Coates and Harrison (2005), Villar and Guerrero (2009), and the references therein.

model. These variables should give some insight into the optimal temperature level and level of wind (which could cool off a warm evening or could be disrupting) for an outdoor baseball game. In addition to the continuous variables of temperature and wind, the category of game-day weather, taken from the box score, is also included as dummy variable categories. These categories include Clear, Cloudy, Overcast, Rain, Sunny, Drizzle and Partly Cloudy. The excluded dummy variable category in the regression is Partly Cloudy and all other categories are compared to this omitted category.

Another category of independent variables in the regression model accounts for on-field baseball performance by the home team. These variables are the win percentage and the total runs per game average. The win percentage is calculated on a running basis, with the win percentage of the home team (going into the current game) included in the regression model. If fans prefer winning teams, this variable should have a positive and significant effect on attendance. If fans of minor league baseball do not care about winning, caring about non-baseball factors such as promotions and events, then this variable will not have a significant effect.

To capture the effect of scoring, which we believe serves as a proxy for in-game excitement in a baseball game, we decided to use the total runs per game average of the home team as this independent variable. This measure is calculated for each game based on results prior to that game. Although we considered using the runs-for average of the home team, this variable is highly correlated with winning and therefore creates multicollinearity problems within the regression. By taking the sum of the runs-for average and runs-against average (calling it total runs per game average of the home team), we hope to distinguish between teams which play high scoring games as opposed to low-scoring games. If fans do prefer more scoring to less, this variable should have a positive and significant effect on attendance.

We were able to obtain promotions and events for each game from the websites of the leagues and individual teams studied. To incorporate these into a regression model, we decided to classify each of the types of promotions and events into distinct categories and create dummy variables to include in the regression. After observing all of the types of promotions and events, we decided upon the following categories for promotions and events, which are summarized in Table 1.

The promotions and events are presumably aimed at increasing fan attendance at games. Therefore, the expected signs on these dummy variables are positive. If any of these promotions detracted from the experience at the ballpark, or inadvertently drove one group of fans away as it attracted other groups of fans, it is possible that the impact of some of these variables could be negative. In any event, given the attention and detail shown to promotions and events at minor league baseball stadiums, it is likely these factors will impact per-game attendance.

Table 2 presents some simple descriptive statistics related to all three leagues studied. Statistics are included for the non-binary variables included in the regression model. Means, medians, and standard deviations of the variables are noted in the table.

Table 3 presents the regression results, side-by-side, for the Southern League, Florida State League, and the South Atlantic League. Coefficients are presented for each independent variable along with t-statistics in parentheses. Due to heteroscedasticity being present in the regressions, White's heteroskedasticity-consistent standard errors and co-variances were used and are shown in the table below.

To discuss the findings of these regression results, some similarities are immediately apparent among the three Southeastern U.S.-based leagues. From the demographic data, all three leagues exhibit similar results with respect to population and income per capita. Larger cities attract greater crowds at minor-league baseball

**Table 1** Dummy variable classifications for promotions and events

| Promotion or event   | Description   |
|----------------------|---|
| Food/Drink           | Reduced price or free food or drink at games (not including beer)                 |
| Beer                 | Reduced price or free beer at games   |
| Merchandise          | Giveaway item including shirts, hats, towels, bobbleheads, trading cards, etc.    |
| Free tickets         | Free Tickets or reduced price tickets for game (i.e. buy one ticket get one free) |
| Fireworks            | Fireworks display following the game  |
| Concerts             | Pre- or Post-game concerts at the game  |
| Group nights         | Special prices and/or activities for Groups                                       |
| Family nights        | Special prices and/or activities for Families                                     |
| Athlete appearance   | Special Appearance by Athlete for Autographs, etc.                                |
| Theme night          | Special Theme for evening—70s night, Star Wars night, etc.                        |
| College night        | Special prices and/or activities for College Students                             |
| Religious theme      | Special prices and/or activities on a Religious Theme                             |
| Scout sleepover      | Scouts were able to camp and sleep at the park following the game                 |
| Dogs to park         | Dogs were welcome at the game—special activities for pets and owners              |
| Other promo          | Promotions which could not fit into other categories                              |
| Opening night        | First home game—opening night activities for fans                                 |
| Double header game 1 | Game 1 of double header   |
| Double header game 2 | Game 2 of double header   |

**Table 2** Descriptive statistics

|                           | Attendance | Population | Income per capita (USD) | Temperature (°F) | Wind (MPH) | Total runs average |
|---------------------------|------------|------------|-------------------------|------------------|------------|--------------------|
| Southern League (AA)      |            |            |                         |                  |            |                    |
| Mean                      | 3386.53    | 260784.99  | 23958.47                | 81.29            | 7.43       | 8.79               |
| Median                    | 2,927      | 191,022    | 22,531                  | 82               | 7          | 8.70               |
| Standard deviation        | 1885.92    | 200036.19  | 3451.95                 | 8.05             | 3.95       | 0.64               |
| Florida State League (A)  |            |            |                         |                  |            |                    |
| Mean                      | 1457.58    | 78814.92   | 28418.80                | 83.82            | 8.57       | 8.14               |
| Median                    | 1042.5     | 48,208     | 26,802                  | 84               | 8          | 8.07               |
| Standard deviation        | 1278.24    | 73735.24   | 6732.30                 | 4.8968           | 4.49       | 0.90               |
| South Atlantic League (A) |            |            |                         |                  |            |                    |
| Mean                      | 3520.28    | 87808.30   | 24500.98                | 77.53            | 6.79       | 8.46               |
| Median                    | 3,165      | 55,097     | 24,448                  | 79               | 6          | 8.56               |
| Standard deviation        | 1943.48    | 76400.56   | 4605.76                 | 9.93             | 4.45       | 1.07               |

games in the American Southeast, as the size of the population was shown to have a positive and significant (at the 1% level) effect on per-game attendance. Per capita income, on the other hand, was shown to have a negative and significant (at the 1% level) effect in all three leagues. It appears that these minor baseball leagues are considered to be an inferior good in the minds of consumers in the Southeastern U.S. Higher-income populations appear to attend fewer minor league baseball games and likely substitute into other forms of entertainment (sports or otherwise).

Stadium capacity was only found to have a significant effect on attendance in the Florida State League. Its effect on per-game attendance was negative and significant at the 1% level. All but one of the teams (Daytona Cubs) in the Florida State League play in a stadium that also houses a major league team during spring training baseball. Therefore, many of these stadiums are built with capacities far exceeding the normal audience for single-A baseball. The stadiums are built to handle the peak-demand season of the month of March for the many people who travel to attend spring training games. It may be the case that the seemingly disproportionately smaller crowds for regular season Florida State League games detract from the fan experience. In the South Atlantic and Southern leagues, stadium capacity was not found to have a significant effect on attendance.

The day of the week dummy variables revealed somewhat consistent results, similar to what is seen in other sports and predicted by economic theory. Games on Friday and Saturday attracted a significantly higher crowd compared to the omitted day category—Wednesday) in the three leagues studied. This likely stems from the opportunity cost of the fan's (consumer's) time being less on weekends than on weekdays due to work and school. Thursday nights were also popular at the ballpark, as the Thursday dummy was shown to have a positive and significant effect across all three leagues. The only other significant results related to the days of the week were in the Florida State League, where Sunday and Monday were found to have a negative and significant effect.



**Table 3** Regression results for Southern (AA), Florida State (A-ADV) and South Atlantic (A) leagues  
dependent variable: per game attendance

| Independent variable                       | Southern League (AA)   | Florida State League (A-ADV) | South Atlantic League (A) |
|--|------------------------|------------------------------|---------------------------|
| Intercept                                  | -2.6115 (-0.0007)      | 27901.41*** (2.6186)         | -6113.144*** (-3.1941)    |
| Population                                 | 0.0042*** (10.8204)    | 0.0046*** (6.6017)           | 0.0079*** (12.5551)       |
| Per capita income                          | -0.0872*** (-4.1148)   | -0.0239*** (-3.7401)         | -0.0457*** (-3.5282)      |
| Stadium capacity                           | 0.0323 (1.1960)        | -0.2415*** (-5.8535)         | -0.0341 (-1.0558)         |
| Sunday                                     | 276.6553 (1.1351)      | -371.7398*** (-2.6505)       | -144.4494 (-0.7850)       |
| Monday                                     | -78.4567 (-0.3928)     | -321.4808*** (-3.3737)       | 56.7389 (0.3227)          |
| Tuesday                                    | 276.3820 (1.0873)      | -189.3400* (-1.6628)         | 33.5465 (0.8557)          |
| Thursday                                   | 1133.287*** (4.6774)   | 399.2077*** (2.9146)         | 1216.411*** (5.5243)      |
| Friday                                     | 1218.959*** (4.3251)   | 580.8304*** (3.8422)         | 1104.120*** (5.3753)      |
| Saturday                                   | 1817.307*** (7.0976)   | 580.8304*** (3.4098)         | 1294.113*** (6.3550)      |
| April                                      | 304.5467 (1.2888)      | 100.5245 (0.7262)            | -722.3583*** (-3.7430)    |
| May  | 278.3822 (1.5211)      | 222.7404** (2.0194)          | -474.6828*** (-2.8761)    |
| July                                       | 551.8531*** (2.9036)   | 148.2097 (1.4845)            | 136.9157 (0.9558)         |
| August                                     | -28.8067 (-0.1662)     | 31.1287 (0.3353)             | 262.1470* (1.7399)        |
| September                                  | -225.2020 (-0.8188)    | 164.3862 (0.9887)            | -452.3937** (-2.2995)     |
| Temperature                                | 27.7748 (0.9004)       | -637.3382** (-2.5324)        | 158.3659*** (3.1412)      |
| Temperature <sup>2</sup>                   | -0.0739 (-0.1242)      | 3.7886** (2.5276)            | -1.2874*** (-3.7943)      |
| Wind                                       | 43.6971 (0.9281)       | 25.1381 (1.0121)             | 135.4212*** (4.5858)      |
| Wind <sup>2</sup>                          | -4.7038* (-1.7376)     | -0.5099 (-0.4185)            | -4.3507*** (-2.6222)      |
| Clear                                      | 247.8351* (1.6786)     | -45.9743 (-0.4725)           | 119.3245 (0.9862)         |
| Cloudy                                     | -627.4979*** (-4.2235) | 235.8495** (2.0920)          | -318.3952** (-2.3627)     |
| Overcast                                   | -86.8105 (-0.2917)     | -217.8989 (-1.6176)          | 21.1734 (0.1085)          |
| Rain                                       | 721.2143 (1.4909)      | -269.8842 (-1.0089)          | -417.8687 (-0.8379)       |
| Sunny                                      | 713.9943** (2.0044)    | 170.4017 (1.0953)            | 636.7728*** (2.9533)      |
| Drizzle                                    | -1353.887*** (-4.8042) | -399.7905 (-1.5568)          | -1198.505** (-2.4962)     |
| Total runs per game average <sub>t-1</sub> | 129.0412 (1.2960)      | 99.03717* (1.8250)           | 348.4172*** (6.8552)      |
| Win percentage <sub>t-1</sub>              | 469.9999 (0.9003)      | 1811.767*** (3.1011)         | 3423.298*** (5.1941)      |
| Food/Drink                                 | -203.2987 (-1.2522)    | 67.0568 (0.8018)             | -242.5192* (-1.7030)      |
| Beer                                       | 217.1576 (0.7959)      | -108.8467 (-0.9839)          | -38.7683 (0.1890)         |
| Merchandise                                | -145.2193 (-0.7059)    | 3.6673 (0.0281)              | 273.4728* (1.7945)        |
| Free tickets                               | 86.3379 (0.3909)       | -18.8699 (-0.2070)           | 27.2758 (0.1434)          |
| Fireworks                                  | 937.8749*** (4.1245)   | 1544.963*** (5.9724)         | 985.1860*** (6.0251)      |
| Concerts                                   | 846.4304** (2.0697)    | 672.0086 (1.0442)            | 425.9700** (2.0017)       |
| Group nights                               | 160.6228 (1.0259)      | 134.1822 (1.4383)            | -320.1108*** (-2.6468)    |
| Family nights                              | -224.6936 (-0.8429)    | 272.1542** (2.4723)          | 108.9853 (0.7745)         |
| Athlete appearance                         | 444.8449 (1.4933)      | 662.2616** (2.1229)          | 571.3460 (1.6397)         |
| Theme night                                | -277.7530 (-1.3960)    | -266.6543 (-0.8458)          | -223.6514 (-0.9721)       |
| College night                              | -414.9218 (-1.1400)    | -241.3530 (-1.4087)          | -636.4487 (-0.5973)       |
| Religious theme                            | 592.0871 (0.9797)      | -314.5132* (-1.7281)         | 262.0217 (0.6305)         |

**Table 3** (continued)

| Independent variable | Southern League (AA)   | Florida State League (A-ADV) | South Atlantic League (A) |
|----------------------|------------------------|------------------------------|---------------------------|
| Scout sleepover      | 1128.975 (1.5001)      | -476.4415 (-1.3771)          |                           |
| Dogs to park         | -110.4453 (-0.3456)    | -256.1422 (-0.9273)          | 53.5088 (0.8459)          |
| Other promo          | -62.0183 (-0.3924)     | 0.4507 (0.0025)              | -176.9546 (-1.0039)       |
| Opening night        | 1513.316*** (3.6030)   | 974.3662 (1.4238)            | 1042.748** (2.4181)       |
| Double header game 1 | -691.1375** (-2.0916)  | -20.0506 (-0.1556)           | -238.8215 (-1.0106)       |
| Double header game 2 | -673.7778*** (-2.7473) | -159.0689 (-1.2644)          | -235.3050 (-0.9861)       |
| R-squared            | 0.5129                 | 0.4323                       | 0.4032                    |

\*\*\*Indicates significance at the 1% level, \*\* indicates significance at the 5% level, and \* indicates significance at the 10% level

The monthly dummy variables, with June being the excluded category month, showed some similarities and differences across leagues. There did not appear to be a major boost in attendance at the end of the season in any of the leagues, as the hunt for the playoffs did not appear to be a major deciding factor for fans in these leagues. Attendance was particularly poor in the South Atlantic league early in the season, as games in April and May were shown to have a negative and significant effect.

Weather appeared to play a role in per-game attendance across these leagues, with some similarities. In relation to the subjective listing of weather conditions in the box score (converted to a dummy variable), Sunny days appeared to be the most popular days to attend a minor-league baseball game. Significant results were found for sunny days for the Southern League (5%) and the South Atlantic League (1% level). The drizzle category fared the worst in relation to attendance, as negative and significant results were found for the Southern League (1% level) and South Atlantic League (1% level and the Florida State League had negative, but insignificant results. Game weather listed as drizzle fared far worse than game weather conditions listed as rain. This could be due to the drizzle days being more of a steady, gloomy day with light rain which is expected to last as opposed to the rain category, which particularly in Florida, could represent a heavy storm which could pass through the area quite quickly then return to its normal nice weather. Cloudy days had the expected result of a negative effect (similar to the findings of sunny and drizzle, mentioned above) in the Southern League and the South Atlantic League (1% and 5% levels respectively), but was found to have a positive and significant effect in the Florida State League. This result could have something to do with the subjective coding by those responsible for the box scores in these leagues, or it could represent something to do with the relative degree of heat seen in certain cities, where a cloudy day could make the conditions more amiable for fans to attend games.

In relation to the non-dummy variable factors relating to weather, some differences between leagues did exist. The Southern League appeared to be least affected by temperature and wind conditions, with only the wind speed-squared variable being statistically significant at the 10% level. In the other two leagues, temperature during the game revealed some interesting results. The South Atlantic League is the most straight-forward to explain as temperature was shown to have a positive and significant (at the 1% level) effect on attendance, while temperature squared was shown to have a negative and significant effect (1% level). Simply put, in South Atlantic League games, fans enjoyed warmer temperature days up to a point where the heat became oppressive, which at that point, the high temperatures decreased attendance. The signs on these two variables were flipped for the Florida State League as temperature was found to have a negative and significant effect (5% level), while temperature squared was found to have a positive and significant effect (5% level). Given the range of temperatures during the 2009 season in the Florida State, league, however, these combined effects revealed an increase in attendance on higher temperature days. Wind conditions also appeared important to the South Atlantic League as wind speed had a positive and significant effect and wind speedsquared having a negative and significant effect, both at the 1% level, suggesting that light at lower speeds, a breeze had a positive impact on attendance.

The baseball team-related variables were found to be consistent across the three leagues in terms of signs of the coefficients on Win Percentage and Total Runs Per Game Average. Win percentage was shown to have a positive and significant effect on attendance in the Florida State League and the South Atlantic League and a



positive, yet insignificant, effect in the Southern League. Fans appear to respond by attending more games for winning teams in these leagues. This shows, for the most part, that winning does matter in the American Southeast when it comes to minor league baseball and that on-field performance, not just promotions and gimmicks, plays a key role in determining the number of fans attending games.

Scoring and excitement, proxied by the sum of the Runs-For and Runs-Against averages of the home team, was also shown to have a positive effect across the three leagues and a significant effect in the Florida State League (5% level) and the South Atlantic League (1% level). Fans appear to enjoy more scoring, compared to less, when they attend a minor league baseball game in this region. On-field performance appears to play a significant role in attendance in minor league baseball in these Southeastern U.S. leagues.

As was expected, the promotional and event dummy variables revealed some similar effects across leagues and some individually significant factors for each league. To begin with the similar effects across these three Southern leagues, Fireworks were shown to be quite popular, as post-game firework shows were shown to have a positive and significant effect (at the 1% level) in all three leagues. This was, by far, the most popular promotion throughout the season across leagues. In addition to fireworks, positive and significant effects were shown in two of the three leagues (Florida State League being the exception) for concerts and opening day festivities.

The Southern league did not show much sensitivity to promotions or events, as doubleheaders were the only significant event other than fireworks, concerts, and opening day. The negative effect of doubleheaders may have something to do with the opportunity cost of time of staying for both games. This may discourage some fans from turning out altogether. The South Atlantic League showed a few other significant effects of promotions as merchandise giveaways were shown to positively increase attendance (at the 10% level), while group nights were not popular as they led to a significant decline in attendance. This could be due to nongroup fans lacking a positive connection to the specific group linked to the promotion, and therefore avoiding that game, negating the effect of the group in question in terms of attendance. Specials involving food or (non-alcoholic) drinks appeared to decrease attendance for the South Atlantic League teams as this promotion was shown to have a negative and significant effect (10% level). While it is unclear why this might be the case, one possible explanation for such a result may be an aversion to (anticipated or actual) exceptionally long lines for food or drinks.

The Florida State League appeared to have the most sensitivity to promotions as, in addition to fireworks, family nights and athlete appearances led to positive and significant increases in attendance. Religious-themed promotions did not fare as well in the Florida State League as these promotions led to a significant (10% level) decrease in per-game attendance. Although religious-themed promotions may attract a certain group of baseball fans, others appear to stay away, countering any positive effects on individual game attendance.

Other promotions which people might thought have been popular were not shown to have a significant effect on attendance. These promotions include food/drink nights, reduced priced beer, free tickets, theme nights, scout sleepovers, and bring your dog to the park night. None of these promotions appeared to have the desired effect as significant increases in attendance were not found.

## **2.1 Pooled regression results of all 3 leagues**

Another way to illustrate these results is through a pooled regression of the three leagues. The regression model is the same as outlined for the individual league regressions above, with the fixed effect of the individual league dummies. These results are shown in Table 4 below.

The pooled regression results illustrate the similarities of these leagues in the South, despite the difference in class of the level of development of the players. As shown in the individual regression results above, the pooled results reveal that higher population areas attract a greater number of fans in attendance and the income per capita variables shows that minor league baseball is an inferior good in the Southeastern United States. Other results which are reinforced by the pooled regression is that fans prefer weekend days, games during the summer months, and prefer sunny days to other days.

The pooled results also affirm the idea that fans prefer winning teams and teams which play in higher scoring games. In terms of promotions, fans enjoy fireworks, concerts, family nights, athlete appearances, and opening day festivities across these leagues. Fans were shown to react negatively to non-family oriented group nights and college nights. Although these promotions likely attracted fans of these individual groups, other fans appeared to stay away due to the game festivities not being aimed at them or due to externalities caused by those groups (i.e. college student actions at the game).

Overall, these results suggest that fans of minor league baseball in the Southeastern United States are quite similar across different leagues. Whether the league is class A or AA, the people who choose to purchase tickets to these games appear to be influenced by similar factors related to demographics, day/month of game, weather, team performance, and promotions.

**Table 4** Pooled regression of the three southern minor baseball leagues

| Independent variable                       | All 3 minor leagues in Southeast – dependent variable – attendance |
|--|--|
| Intercept                                  | -4936.575*** (-3.2682)   |
| Population                                 | 0.0038*** (13.3029)  |
| Per Capita Income                          | -0.0303*** (-5.4275)   |
| Stadium Capacity                           | 0.0108 (0.6093)  |
| Sunday                                     | -251.4643** (-2.2871)  |
| Monday                                     | -213.1338** (-2.1273)  |
| Tuesday                                    | -70.0787 (-0.6460)   |
| Thursday                                   | 885.3256*** (7.4529)   |
| Friday                                     | 837.8701*** (6.9312)   |
| Saturday                                   | 1128.093*** (9.1055)   |
| April                                      | -206.0135* (-1.8270)   |
| May  | -106.4900 (-1.1246)  |
| July                                       | 197.6622** (2.2642)  |
| August                                     | 133.5079 (1.5536)  |
| September                                  | -195.9398 (-1.6026)  |
| Temperature                                | 98.0316** (2.5108)   |
| Temperature <sup>2</sup>                   | -0.6907*** (-2.7134)   |
| Wind                                       | 96.8311*** (5.1126)  |
| Wind <sup>2</sup>                          | -3.7520*** (-3.7495)   |
| Clear                                      | 99.0976 (1.3446)   |
| Cloudy                                     | -219.3509*** (-2.7323)   |
| Overcast                                   | 19.8315 (0.1765)   |
| Rain                                       | 19.9601 (0.0752)   |
| Sunny                                      | 511.5027*** (3.8340)   |
| Drizzle                                    | -591.2209*** (-2.7050)   |
| Total runs per game average <sub>t-1</sub> | 202.5305*** (6.1618)   |
| Win percentage <sub>t-1</sub>              | 1877.755*** (5.7212)   |
| Food/Drink                                 | -79.8189 (-1.2078)   |
| Beer                                       | -135.4670 (-1.4242)  |
| Merchandise                                | 81.6474 (0.8644)   |
| Free tickets                               | 36.9078 (0.3839)   |
| Fireworks                                  | 1152.412*** (10.4020)  |
| Concerts                                   | 525.5488*** (2.9292)   |
| Group nights                               | -129.3543 (-1.221)   |
| Family nights                              | 192.0102** (2.3164)  |
| Athlete appearance                         | 634.8776*** (2.6086)   |
| Theme night                                | -263.4263* (-1.7983)   |
| College night                              | -672.3018*** (-2.6653)   |
| Religious theme                            | 274.4654 (0.8601)  |
| Scout sleepover                            | 320.0240 (0.6047)  |
| Dogs to park                               | -36.0976 (-0.2121)   |

**Table 4** (continued)

| Independent variable        | All 3 minor leagues in Southeast – dependent variable – attendance |
|-----------------------------|--|
| Other promo                 | -151.1610 (-1.3592)  |
| Opening night               | 1013.247*** (3.5671)   |
| Double header game 1        | -211.6687 (-1.6236)  |
| Double header game 2        | -185.7339 (-1.4805)  |
| Southern league dummy       | 905.7962*** (9.2839)   |
| South Atlantic league dummy | 1704.634*** (21.9545)  |
| R-squared                   | 0.5040   |

\*\*\*Indicates significance at the 1% level, \*\* indicates significance at the 5% level, and \* indicates significance at the 10% level

### 3. Conclusions

Three baseball minor leagues were examined across the American south east. These three leagues consisted of AA (Southern), A-Advanced (Florida State), and A (South Atlantic) leagues. For each league a variety of information was gathered on a game-by-game basis. This information included attendance per game, current team records and game scores, day of the week, month of the year, demographic data, weather conditions, and promotions. Attendance was studied for each league for the 2009 season and similarities and differences across leagues were explored through regression models for the individual leagues and for a pooled regression across leagues.

For the most part, the regressions across the leagues revealed many similarities in fan preferences for baseball. Population was shown to have a positive and significant effect on attendance, while income per capita was shown to have a negative and significant effect across leagues, implying these minor leagues are an inferior good for fans in the southeast. Winning and scoring were shown to have a positive and significant effect on attendance in the pooled regression and for both A-level leagues (Florida State and SALLY).

Games on Thursday, Friday, and Saturday were shown to be the most popular with fans. The month, temperature, and weather conditions were shown to have mixed effects, although the positive impact of sunny days and the negative impact of a drizzle were shown to be significant. Some of the individual weather effects across leagues, such as wind conditions and certain weather categories, may have to do with the relative heat in some of the more-southern areas compared to those more positioned in the mid-south.

In relation to the promotions, the allure of fireworks cannot be denied as it was shown to have the largest positive impact on attendance. Fireworks shows were shown to have a significant effect in all three individual regressions and in the pooled regression. Other promotions were somewhat mixed, however, in the pooled regression positive impacts of concerts, family nights, and athlete appearances were seen, while theme nights and college nights led to more fans staying home rather than attending these games.

Overall, fans of minor league baseball in the southeast U.S. appear to have similar preferences. There do not appear to be major differences across the levels of play, AA to A, with respect to fans enjoying team success, scoring, fireworks, etc. It appears baseball fans in the Southeastern part of the U.S. have clearly well-defined preferences for the factors which attract them to the ballpark. Future research may focus on if these preferences are similar across different areas of the country or to Major League Baseball.

## Appendix

**Table 5** Team locations and nicknames for each league

| South Atlantic League (A)            | Florida State League (A)                   | Southern League (AA)                      |
|--------------------------------------|--|---|
| Asheville (NC) Tourists              | Bradenton Marauders                        | Birmingham (AL) Barons                    |
| Augusta (GA) Green Jackets           | Brevard County Manatees                    | Carolina (Zebulon, NC) Mudcats            |
| Bowling Green (KY) Hot Rods          | Charlotte (Port Charlotte, FL) Stone Crabs | Chattanooga (TN) Lookouts                 |
| Charleston (SC) Riverdogs            | Clearwater Threshers                       | Huntsville (AL) Stars                     |
| Delmarva (Salisbury, MD) Shorebirds  | Daytona Cubs                               | Jacksonville (FL) Suns                    |
| Greensboro (NC) Grasshoppers         | Dunedin Blue Jays                          | Mississippi (Pearl, MS) Braves            |
| Greenville (SC) Drive                | Fort Myers Miracle                         | Mobile (AL) Bay Bears                     |
| Hagerstown (MD) Suns                 | Jupiter Hammerheads                        | Montgomery (AL) Biscuits                  |
| Hickory (NC) Crawdads                | Lakeland Flying Tigers                     | Tennessee (Kodak, TN) Smokies             |
| Kannapolis (NC) Intimidators         | Palm Beach Cardinals                       | West Tennessee (Jackson, TN) Diamond Jaxx |
| Lake County (OH) Captains            | St. Lucie Mets                             |   |
| Lakewood (NJ) BlueClaws              | Tampa Yankees                              |   |
| Lexington (KY) Legends               |  |   |
| Rome (GA) Braves                     |  |   |
| Savannah (GA) Sand Gnats             |  |   |
| West Virginia (Charleston, WV) Power |  |   |

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