

Is baseball recession-proof?

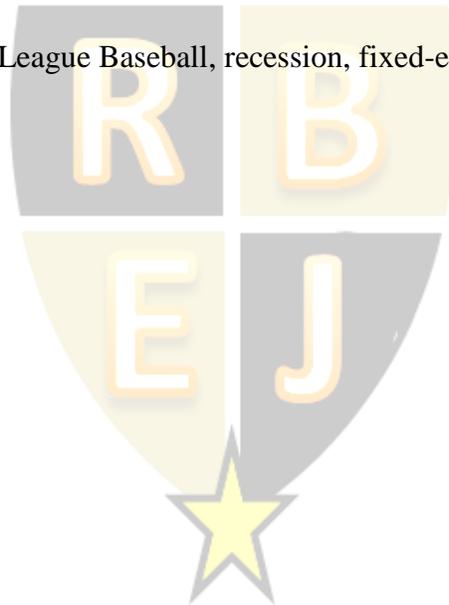
Carl A. Kogut
University of Louisiana at Monroe

Paul S. Nelson
University of Louisiana at Monroe

ABSTRACT

Attendance at Major-League Baseball games sets new records nearly every year despite increasing ticket prices and a lagging national economy. Using MSA-level data on economic conditions the response of attendance on area economic variables as well as traditional factors such as won-loss records and division standings is explored. The research shows that in the face of a secular trend toward greater attendance, local economic variables generally do not have a statistically significant influence on attendance, thus making Major-League Baseball seemingly recession-proof.

Keywords: attendance, Major League Baseball, recession, fixed-effects mode



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INTRODUCTION

Major League Baseball (MLB) is entertainment that has grown more popular over the years. This growth in popularity has occurred in defiance of prognosticators who have predicted the game's demise. Reasons for this negative forecast include the games are too long, fans are disgusted from player strikes, or other forms of entertainment are faster paced. Yet, attendance numbers at ballparks have increased over the years despite the construction of new stadiums often with lower seating capacity than their predecessors. Most games are now televised at least regionally. Despite the emergence of a substitute, televised games, more fans still want to come out to the ballgame.

MLB has been said to be recession-proof. Someone who is unemployed has a lower opportunity cost to going to the game. So while being unemployed reduced income, the full cost of going to a game is also lower. However, in the modern era, most games are now played in the evenings; outside of normal working hours. Hence, going to a game no longer requires a sacrifice of labor income for most workers. So scheduling games in the evening has broadened the potential market while at the same time it may have made baseball more responsive to the business cycle. This paper investigates if economic variables such as income play a substantial role in controlling MLB attendance.

LITERATURE REVIEW

The literature exploring determinants of baseball attendance is quite large and a complete survey would result in the death of many trees. Presented here is an overview of some of the better known papers in this area. In general, authors have tended to focus on team or player factors to determine attendance. This emphasis is not surprising since economists are baseball fans and the available performance data is so comparably rich. While this paper focuses on external economic factors driving attendance, the internal factors such as team performance cannot be ignored as doing so would lead to specification bias.

Noll (1974) and Scully (1974) were the pioneers in economic analysis of sports. Noll set forth the basic theoretical econometric model that has been employed by numerous researchers. Scully's emphasis was on the marginal revenue product of players; determining if they were under or overpaid.

Baade and Tiehen (1990) concluded that star players as well as metropolitan population were associated with large attendance but stadium capacity was unrelated. Coffin (1995) found that new stadiums increased attendance. Coffin also found that winning was becoming more important over time. The importance of winning cited by Coffin was in contrast to the results by Whitney (1988) who found that reaching the playoffs mattered for attendance, not the outcome of regular season games. Whitney argued that baseball is inherently more balanced than other sports. Winning 80% of games is common in football or basketball (obviously not for all teams) but does not happen in MLB. Yet, Schmidt and Berri (2006) argued that winning really was becoming, a la Vince Lombardi, the only thing. A team must continue to show on-field success or fans will rapidly desert.

Recent papers that included economic variables such as price and income include Rivers and DeSchrive (2002), Winfree, McCuskey, Mittelhammer, and Fort (2004) and Zygnont and Leadley (2005). Rivers and DeSchrive (2002) studied the role of star players and payroll. They found star players themselves, independent of their team contribution, do not increase attendance but overall team payroll does. Rivers and DeSchrive also included variables on income,

population and price and found unexpected signs of negative, negative and positive respectively. In contrast to Rivers and DeSchrive, Winfree *et. al.* found the expected signs for income, population, and price; positive, positive, and negative respectively. Zygnont and Leadley, using a simultaneous model found that unemployment was inversely related to attendance which also would be consistent with baseball being a normal good. Zygnont and Leadley also determined that new stadium construction drew more fans for a number of years after completion. Given the variety of research results, the impact of economic variables such as price and income on baseball attendance is uncertain.

RESULTS

The demand for baseball, or more specifically the demand for a seat at a baseball game, depends on many factors of which price and income are only a part. Drawing on previous work, team performance data is included in the estimating equation shown below.

A number of models using different sets of variables were run. Canadian teams were excluded since the income variable in the SMSA as well as the definition of what constitutes a Standard Metropolitan Statistical Area is not comparable to the USA. Two time frames were used; 1969-2010 and 1985-2010. The reason for the two sample sizes was player payroll data is only available from 1985 on. Not all teams were in existence for the entire period. Additionally, ticket price data are missing from 1986-1990 so those years are excluded from both samples. Teams were added as they were created or in the case of the Washington Nationals, when they left Montreal. Two dependent variables, team annual attendance and average attendance as a percentage of stadium capacity were employed. Table 1 (Appendix) provides the means of key variables. Attendance, ticket prices and income have all risen.

Turning to the explanatory variables, WINS is the number of games won in the current season. To be consistent with other studies, the sign should be positive indicating that attendance will rise with the number of wins. FINISH is the division rank at the end of the season. The expected sign on FINISH is negative since the numerical ranking is inversely related to success. NEWSTADIUM is a dummy variable equal to 1 if the team moved to a new stadium that year. Previous research shows that new stadiums draw fans, thus a positive sign is expected. REAL TICKET PRICE is the average ticket price adjusted for inflation using the CPI. This coefficient is expected to be negative although previous studies, i.e. Rivers and DeSchrive found otherwise. PERCAPITA INCOME is real personal income per capita in the team's SMSA. PERCAPITA INCOME is expected to be positive since the *a priori* assumption is that baseball attendance is a normal good. RUNS are the total number of runs scored by the respective team that season. Despite the truism that "real" baseball fans prefer pitcher's duels, it is likely that the average fan favors offense, so the anticipated sign is positive. LAGPLAYOFFS is a dummy variable equal to 1 if the team was in the playoffs in the previous season. LAGPLAYOFFS is expected to be positive due to the carryover excitement of last year's success raising attendance early in the season. STRIKE is a dummy variable equal to 1 if there was a strike that year. Each of the baseball strikes resulted in losing part of the season so STRIKE is expected to be negative. LAGSTRIKE another dummy variable equal to 1 in the year after the strike is settled was also added. After every professional sports strike there are news reports of fans claiming to be through with their team. If this talk is accompanied by action, LAGSTRIKE is expected to be negative. CAPACITY is stadium seating capacity. While feeling like you are the only person in your section might deter people from coming to the games, greater capacity is expected to result in higher attendance since near or complete sellouts are less common. Finally

REALPAY is total team payroll for the 25-man roster deflated by the CPI. REALPAY is expected to be positive since more successful, longer tenured players earn higher salaries and build team loyalty. REALPAY therefore is a proxy for team quality. REALPAY was only available from 1985 forward so models with and without REALPAY are used.

A fixed effects OLS regression technique (Kennedy, 2003) was used. Capacity constraints imply a limited dependent variable but unlike the NFL, it is uncommon for regular season MLB games (at least outside Fenway Park) to sell out. In addition to the variables mentioned above, there was included a dummy variable for each team with no intercept. The coefficients of the team dummy variables are presented in Tables 4 and 5 (Appendix). Some of the independent variables were missing for some teams in various years. An observation with missing data was excluded from the analysis.

Table 2 (Appendix) reports the results of three different models. Model 1 utilizes observations from 1969-2010 but excludes REALPAY. Data on player payroll was only available from 1985 onward. Model 2 utilizes observations from 1985-2010 but also excludes REALPAY. Hence, comparing models 1 and 2 somewhat replicates the analysis of Schmidt and Berri on the changing importance of winning for attendance. Models 3 also runs from 1985-2010 but includes real team payroll adjusted for inflation (REALPAY). Models 2 and 3 then describe the influence of REALPAY.

Looking at the results from Table 2 for models 1 and 2, regressions without real payroll, one can see that as suggested by Coffin as well as Schmidt and Berri, WINS increases in magnitude. FINISH is insignificant in Model 1 but the sign flips and becomes marginally significant in Model 2 but the sign is positive which is unexpected. NEWSTADIUM is positive and significant as expected. TICKET PRICE is positive and significant in both models. As will be discussed later, it could be that there is/are missing variable(s) causing this unexpected result. PERCAPITA INCOME is positive and significant in Model 1 but becomes insignificant in Model 2. CAPACITY is insignificant in both models. RUNS is highly significant in Model 1 but like PERCAPITA INCOME becomes insignificant in Model 2. LAGPLAYOFFS is positive and significant, showing that team success spills over to next season. A result which is most surprising, STRIKE is positive and significant in both models 1 and 2. The strikes in 1981 and 1994-95 caused the cancellation of multiple games for each team. Perhaps the threat of a strike brought fans out before the strike occurred and in the case of 1981 after. While STRIKE had an odd sign, LAGSTRIKE was negative, becoming significant in model 2. This negative sign is consistent with fans becoming disgusted with baseball or simply breaking a habit of going to games.

Models 2 and 3 are distinguished by the existence of REALPAY in Model 3. The hypothesis is that REALPAY is a proxy for team quality. With the arrival of a (semi-) free market in labor, player salaries are positively correlated with performance. Hence, an increase in team payroll is an indicator of a higher quality product. Skipping to the bottom of Table 2 one can see that REALPAY is indeed positive. If the magnitude of the variable appears small, realize that REALPAY is measured in dollars so an increase in team payroll of \$1 increases annual attendance by 0.018 persons.

A notable difference between models 2 and 3 is the magnitude and significance of TICKET PRICE. This coefficient is highly significant in model 2 but becomes insignificant in model 3 with a corresponding reduction in the magnitude of the coefficient. This change is consistent with the hypothesis that TICKET PRICE captures team quality measures that REALPAY supplants. Another distinction between models 2 and 3 is a sign flip on

PERCAPITA INCOME. In model 3, PERCAPITA INCOME becomes negative though insignificant. PERCAPITA INCOME was highly significant in Model 1 then fades to insignificance in models 2 and 3 suggesting that while economic conditions might have mattered in earlier times, changes in income have little impact on attendance in more modern times.

The second group of models uses average game attendance as a percent of stadium capacity as the dependent variable. The models and explanatory variables remain the same as before with the obvious exception of CAPACITY which is excluded.

Looking over Table 3 (Appendix), one characteristic jumps out, the coefficients are far smaller in magnitude. The coefficients are the change in average attendance as a *percentage* of capacity. For example in Model 1 an additional win increases utilization of capacity by 0.00327%.

Comparing Models 1 and 2, the coefficients are robust over the two time frames. The coefficient on RUNS is positive and significant in Model 1 but flips to negative but insignificant in Model 2. TICKET PRICE is positive and significant. Besides the effect of REALPAY mentioned above, ticket prices are often raised with a new stadium. This effect is captured with the NEWSTADIUM dummy which is equal to 1 the first year of a new stadium is open, yet Zygnont and Leadley reported a new stadium effect lasting up to 15 years. PERCAPITA INCOME is positive in both models.

Models 2 and 3 which differ due to the presence of REALPAY are more consistent with each other than Models 1 and 2. PERCAPITA income is positive in both models but becomes insignificant in Model 3. The p-value on TICKET PRICE is larger in Model 3 but still highly significant.

CONCLUSION AND SUGGESTIONS FOR FUTURE RESEARCH

Using the longest time period 1969-2010, real per capita income was positive and significant. This result is consistent for a good that responds to the business cycle, i.e. not recession-proof. Yet, when the time period was shortened, 1985-2010 the coefficient on PERCAPITA INCOME remained positive but became statistically insignificant. This result suggests, given this dataset, MLB has become more insensitive to the business cycle. Adding real team payroll caused the coefficient during the shorter time period to change signs and become negative though statistically insignificant. Given these results, MLB is, in fact, recession-proof. Indeed this business cycle insensitivity has occurred in spite of the movement to mostly evening games, which was well underway by 1969 but not complete.

Regarding future research, this study employed an average income measure. Yet, the distribution of income is becoming more unequal over time. A different income measure or the addition of a measure of income inequality might produce different results. It could be, for example, that increases in income in the upper quintile could be increasing demand for MLB by those consumers. At the same time, stagnant income growth in the lower quintiles, in conjunction with increasing ticket prices, are driving away those fans. Hence average incomes slowly rise yet holding other factors constant total demand falls.

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Table 1: Means of Key Variables

Variable	1969-2010	1985-2010
ATTENDANCE	1,959,873	2,255,913
PERAVGATTENDANCE	0.518	0.596
REALTICKETPRICE	\$8.11	\$9.39
PERCAPITAINCOME	\$17,156	\$19,109
REALPAY		\$28,218,953

Table 2: Attendance Regression With and Without Payroll

Model	1		2		3	
Time Frame	1969-2010		1985-2010		1985-2010	
Variable	Parameter Estimate	p-Value	Parameter Estimate	p-Value	Parameter Estimate	p-Value
WINS	15,419	< 0.0001	19,355	< 0.0001	18,296	< 0.0001
FINISH	-16,219	0.3318	9,834.56	0.0647	7,750.15	0.7001
NEWSTADIUM	343,258	< 0.0001	323,303	0.0003	381,325	< 0.0001
TICKET PRICE	24,227	0.0006	62,907	< 0.0001	12,614	0.2168
PERCAPITA INCOME	105.01	< 0.0001	6.649	0.6056	-16.285	0.1876
CAPACITY	1.38	0.5958	-4.296	0.2382	-3.627	0.2878
RUNS	945.92	< 0.0001	425.08	0.1608	293.95	0.3010
LAGPLAYOFFS	343,950	< 0.0001	327,116	< 0.0001	255,177	< 0.0001
STRIKE	166,289	0.0336	78,539	0.4097	16,338	0.8552
LAGSTRIKE	-45,683	0.4112	-192,232	0.0072	-156,610	0.0197
REALPAY					0.0183	< 0.0001
F-Value	596.88	< 0.0001	524.32	< 0.0001	584.45	< 0.0001
N	942		570		570	
R-square	0.9627		0.9747		0.9778	

Table 3: Average Attendance as a Percent of Stadium Capacity With and Without Payroll

Model	1		2		3	
Time Frame	1969-2010		1985-2010		1985-2010	
Variable	Parameter Estimate	p-Value	Parameter Estimate	p-Value	Parameter Estimate	p-Value
WINS	0.00327	< 0.0001	0.00435	< 0.0001	0.00409	< 0.0001
FINISH	-0.01206	0.2628	-0.00805	0.2029	-0.00847	0.1619
NEWSTADIUM	0.1202	< 0.0001	0.130	< 0.0001	0.14391	< 0.0001
TICKET PRICE	0.0129	< 0.0001	0.0228	< 0.0001	0.01.41	0.0006
PERCAPITA INCOME	.0000288	< 0.0001	0.00000871	0.0019	0.000003	0.4119
RUNS	0.000108	0.0267	-0.0000354	0.6906	-0.0000661	0.4390
LAGPLAYOFFS	0.084	< 0.0001	0.0799	< 0.0001	0.0625	< 0.0003
STRIKE	0.123	< 0.0001	0.11345	< 0.0001	0.0986	< 0.0001
LAGSTRIKE	-0.0357	0.0217	-0.0804	0.0002	-0.0718	0.0004
REALPAY					4.466×10^{-9}	< 0.0001
F-Value	558.59	< 0.0001	444.47	< 0.0001	473.43	< 0.0001
N	942		570		570	
R-square	0.9592		0.9695		0.9720	

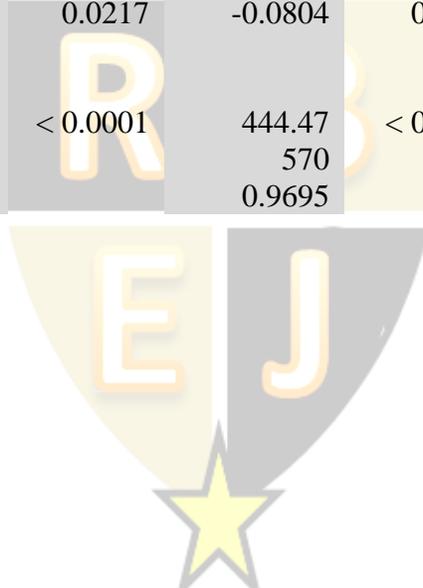


Table 4: Intercept estimates for ATTENDANCE models

<u>Team</u>	<u>Model 1†</u>	<u>Model 2</u>	<u>Model 3</u>
Angels	-1,770,085	166,553	508,333
Astros	-2,025,835	-247,401	275,171
Athletics	-3,102,125	-789,833	-39,833
Braves	-1,943,044	-43,920	305,877
Brewers	-2,045,319	-235,965	311,771
Cardinals	-1,535,783	286,849	781,721*
Diamondbacks	-1,568,232	77,816	382,654
Cubs	-1,794,126	28,385	605,056
Dodgers	-1,053,390	789,015*	1,089,145**
Giants	-2,603,287	-109,845	502,229
Indians	-2,188,368	-267,594	286,539
Mariners	-2,064,676	-18,198	500,972
Marlins	-2,426,751	-631,054	-26,517
Mets	-2,005,605	-44,207	418,216
Nationals	-4,352,452	-830,956	408,761
Orioles	-1,863,738	430,116	921,719**
Padres	-1,975,852	-150,851	404,529
Phillies	-1,799,176	-66,035	430,772
Pirates	-2,272,030	-527,452	64,095
Rangers	-1,945,221	-15,120	416,958
Rays	-2,406,378	-787,682*	-223,242
Red Sox	-2,184,558	-638,904	73,833
Reds	-1,846,623	-219,936	194,285
Rockies	-1,401,340	714,006	1,232,877***
Royals	-2,124,044	-490,041	-5,529
Tigers	-1,972,931	-323,458	147,368
Twins	-2,527,675	-515,836	82,598
White Sox	-2,284,752	-576,912	-1,790
Yankees	-2,141,586	-97,766	201,140

†All coefficient estimates are significant at greater than 0.001 level.

*Significant at the 0.10 level.

**Significant at the 0.05 level.

***Significant at the 0.01 level.

Table 5: Intercept estimates for PERAVGATTENDANCE models

<u>Team</u>	<u>Model 1†</u>	<u>Model 2</u>	<u>Model 3</u>
Angels	-0.34587	0.00713	0.10006
Astros	-0.36867	-0.08010	0.05661
Athletics	-0.66754	-0.24931*	-0.05691
Braves	-0.40554	-0.09000	0.00505
Brewers	-0.39927	-0.07604	0.06670
Cardinals	-0.29420	0.00898	0.13919
Diamondbacks	-0.30530	-0.03355	0.05011
Cubs	-0.21946	0.11435	0.26309**
Dodgers	-0.25689	0.02646	0.11034
Giants	-0.51289	-0.04713	0.11152
Indians	-0.44550	-0.06444	0.08015
Mariners	-0.45844	-0.11185	0.02507
Marlins	-0.47928	-0.16937	-0.01323
Mets	-0.48965	-0.19564	-0.07166
Nationals	-1.06969	-0.42857**	-0.11441
Orioles	-0.37629	0.04547	0.17499
Padres	-0.43392	-0.15795	-0.01183
Phillies	-0.38773	-0.10640	0.02494
Pirates	-0.43252	-0.10975	0.04281
Rangers	-0.34902	-0.04071	0.07385
Rays	-0.47214	-0.19619*	-0.05013
Red Sox	-0.22300	0.01679	0.19852
Reds	-0.35523	-0.07305	0.03694
Rockies	-0.30425	0.06385	0.20068*
Royals	-0.34281	-0.07184	0.05418
Tigers	-0.37619	-0.07775	0.04592
Twins	-0.50475	-0.15483	0.00012
White Sox	-0.42524	-0.14445	0.00463
Yankees	-0.54561	-0.25131**	-0.16691

†All coefficient estimates are significant at greater than the 0.005 level.

*Significant at the 0.10 level.

**Significant at the 0.05 level.

***Significant at the 0.01 level.