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Abstract

Previous research has concluded that the 1981 and 1994/95 Major League Baseball (MLB) strikes have caused short-term losses in attendance but have not resulted in any long-term effects on attendance. While total attendance at MLB games following the 1994/95 strike has recovered to its pre-strike levels, this has been done only through the construction of new stadiums at an unprecedented pace which cannot continue into the future. After accounting for stadium effects, average MLB baseball attendance has dropped significantly since the 1994/95 strike.

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Introduction

In a March 2004 article in the *American Economic Review* as well as their previous work (Schmidt and Berri, 2002), Martin B. Schmidt and David J. Berri question whether labor strikes in professional sports in the United States have resulted in permanent shifts in consumer demand. Their analysis of the 1981 and 1994/5 strikes in Major League Baseball (MLB) as well as the 1994 National Hockey League (NHL) and 1982 and 1987 National Football League (NFL) strikes suggest that these events have had only a temporary effect on attendance and not permanently harmed the leagues. The apparent conclusion is that sports teams are deeply ingrained into consumer preferences and that leagues sell a relatively unique product with no close substitutes so that strikes have little bearing on future demand. This result is surprising in that it contradicts the popularly held notion that millionaire players arguing with billionaire owners about compensation is inherently distasteful to the average sports fan, and therefore strikes lead to consumer dissatisfaction and lower future attendance. For example, while the popular media suggest that the 2004-05 NHL lockout may result in a significant weakening or even the death of the NHL, Schmidt and Berri's results suggests no such long-run concerns.

The evidence is relatively clear that in most cases sports strikes have caused only temporary disruptions in demand. For example, the 1981 MLB strike resulted in the loss of 717 games (34% of the season total). The average attendance per team fell from 1,654,390 in 1980 to 1,020,938 in 1981. With the full resumption of games in the 1982 season, however, attendance more than recovered to an average of 1,714, 918 per team. A cursory examination of the two NFL strikes and the NHL strike also confirm Schmidt and Berri's claims.

The 1994/5 MLB strike appears to be an exception. The league has never recovered to

the attendance record of 2,509,159 set in 1993, the season immediately prior to the strike. The 1994/95 strike was unusual in several ways. First, the strike was the second one for the league that resulted in a significant loss of games. Second, the strike was exceptionally long, indeed the longest in major American professional sports history, and spanned parts of two seasons. Third, the strike resulted in the loss of the 1994 post-season and the cancellation of the World Series for the first time since 1904. No other strike in any of the major American sports has resulted in the loss of post-season games.

Even despite the lack of recovery to the 1993 attendance heights, Schmidt and Berri argue that the 1994/95 strike still had no permanent effects on MLB attendance. They suggest that the 1993 season was an anomaly due, in part, to a remarkably successful expansion in the league. In 1993, the league added teams for the first time in 16 years including the Colorado Rockies who drew a league record 4.5 million fans in their inaugural season. Instead, the post-strike period should be compared to the comparatively normal 1992 season when MLB drew only 2,148,934 fans per team. While average attendances fell by 350,000 in both 1994 and 1995 compared with 1992, league attendances had recovered to their 1992 levels by the 1996 season and continued to grow from there. By this reasoning, fans' threats to stay away from the game following labor unrest are again shown to not be credible. Overall, Schmidt and Berri conclude that "the evidence presented suggests that although the most protracted periods of labor discord had short-term impacts on attendance, there is no empirical evidence that these exogenous shocks had any long-term effects."

The Stadium Effect

While it is undeniable that MLB attendances in the period after the 1994/95 strike did, in fact, rise to nearly their pre-strike levels, it is not nearly so clear that the strike had no permanent effects on attendance after accounting for other factors affecting professional baseball in the past decade, in particular the construction of new MLB infrastructure during the 90s and early 00s. The past fifteen years have witnessed an unprecedented transformation of baseball's infrastructure, and by the 2004 season, 19 of MLB's 30 teams were playing in facilities constructed or significantly renovated since 1989. This pace of construction cannot possibly continue into the future. Indeed, by the end of 2004, only one new facility was under construction (in St. Louis), the lowest number since the early 90s. See Table 1 for a list of newly built or renovated stadiums.

New stadiums nearly always lead to at least a temporary increase in attendance for the host city. The duration of the increase in attendance varies from team to team. When a new stadium is combined with renewed success by the home team on the field of play (as in the case of the Cleveland Indians following the 1994 construction of Jacob's Field), the increase in attendance may last for many years while the "novelty effect" of a new facility can be as little as a single year when the host team is unable to improve its win/loss record (as in the case of the Detroit Tigers and Milwaukee Brewers in 2000 and 2001). In all cases, new stadiums result in at least a one season significant attendance boost. In the 14 stadiums constructed for non-expansion teams between 1989 and 2004, the increase in attendance (after accounting for strike years) between the debut season and the previous season averaged 780,000 fans or roughly 34%. This figure even understates the true impact of new stadiums on attendance since franchises, particularly older teams such as the Chicago White Sox, Cleveland Indians, and Detroit Tigers,

often experience a bump in attendance, or a “nostalgia effect,” in the last season played in an old stadium. Over the same period, the increase in attendance between the debut season for a new stadium and the season two years prior averaged over 1,050,000 fans or over 50%. See Table 1.

It is possible that Major League Baseball has managed to avoid declining attendance due to fan dissatisfaction with labor/management strife only through the provision of expensive new stadiums. If the novelty effect from new stadiums is temporary in nature, MLB has only managed to postpone the inevitable decline in attendance as a result of baseball’s frequent strikes as the recent pace of stadium construction cannot continue into the future. Furthermore, the strikes may have resulted in a wasted opportunity for MLB to solidify its hold on the American sports psyche. Instead of increasing the popularity of the sport, the \$5 billion in new stadium construction (two-thirds of which was provided by the public sector) simply allowed MLB to keep from falling backwards. In the next sections, the 1981 and 1994/95 strikes are reexamined more closely paying special attention to the issue of stadium construction or renovation.

A post-1994 strike model: 1902-2003

Data on team by team and total MLB attendance were obtained from Major League Baseball for the 1901 through 2003 seasons. As in Schmidt and Berri (2004), to account for expansion, the total MLB attendance data are divided by the number of teams in the leagues, and the first difference of the data is taken for each season in order to correct for non-stationarity of the original time series. With the exception adding three seasons at the end of the of the data set, the data are roughly comparable to that used by Schmidt and Berri.

Again following the procedure outlined in Schmidt and Berri, the attendance data are

analyzed using intervention analysis as in Box and Tiao (1975). Schmidt and Berri consider the following equation

$$y_t = \alpha_0 + \alpha_1 * z(46) + \alpha_2 * z(81) + \alpha_3 * z(82) + \alpha_4 * z(93) + \alpha_5 * z(94) + \alpha_6 * z(96) + \epsilon_t \quad (1)$$

where y_t represents the first-differenced average attendance, $z(46)$ is a dummy variable representing the exogenous shock of American servicemen returning from WWII to the baseball stands, and $z(81)$ and $z(82)$ are dummy variables representing the 1981 strike year and the 1982 return to normalcy year. $z(93)$ is a dummy variable accounting for the unusual expansion year in 1993 immediately prior to the strike, $z(94)$ is a dummy variable modeling the effect of the strike in 1994, and $z(96)$ is a dummy variable for the strike recovery in 1996. The results of OLS regression on the data are found in Table 1 and listed as Model 1.

While the magnitude of the of $z(96)$ coefficient is much smaller than that of the $z(94)$ coefficient, indicating that the size of the attendance recovery in 1996 was less than that of the initial attendance drop in 1994 due to the strike, Schmidt and Berri argue that the size of the attendance drop in 1994 was exaggerated due to usually large attendances in 1993. A Wald test performed on the $z(93)$, $z(94)$, and $z(96)$ coefficients finds that a null-hypothesis that the absolute value of the $z(94)$ coefficient is equal to the sum of the $z(93)$ and $z(96)$ coefficients cannot be rejected. In other words, as found by the previous authors, it is reasonable to conclude that the size of the attendance drop in 1994 was matched by a combined attendance gain of an equal magnitude in the years 1993 and 1996.

An alternative model that answers whether the attendance effects of the 1994/95 strike were permanent in nature is tested by adding to model 1 an additional intervention dummy variable, $z(94-03)$, that takes a value of 1 for the entire 1994-2003 period and 0 elsewhere. The

coefficient on the $z(94-03)$ variable shows that average attendance during the 1994-03 period, after accounting for the actual strike and recovery years, grew at a statistically insignificant rate of 108 fans per year faster following the strike than before the strike. A comparison of model 1 and model 2 clearly shows model 1 as the superior explanatory model lending credence to Schmidt and Berri's hypothesis that the 1994/95 strike likely had only temporary effects on MLB attendance.

Next, the two competing models can be reexamined while considering the effects of stadium construction on average attendance. An additional "Stadiums" variable is added to equation (1) representing the number of new stadiums opened in MLB during the corresponding year. An analysis of the data shows that prior to 1960, the construction of new stadiums seems to have had no effect on attendance for the tenant team, perhaps due to the limited number of additional amenities provided by new stadiums prior to this period, and, therefore, only the construction of stadiums since 1960 are included in the stadiums variable. When expansion franchises enter into the league, the stadium is counted as a new stadium only if it was newly constructed as a permanent facility for the new franchise.

The data in Table 1 for models 3 and 4 represent OLS regression results for equation (1) plus the stadiums variable for a models with and without the $z(94-03)$ variable, respectively. In both models, the coefficient on the stadium variable is positive and statistically significant at the 1% level, and the inclusion of the stadium variable improves model fit. The magnitude of the stadium coefficients in models 3 and 4 predicts that each stadium built between 1960 and 2003 has resulted in a permanent increase in average league-wide attendance of 30,000 to 40,000 fans per team.

What is particularly interesting is the fact that the intervention variable in equation 4 for the 1994-2003 period is now statistically significant at the 10% level. This indicates that over the entire strike, recovery, and post-strike period, attendance growth has been significantly lower, by over -50,000 fans per team per year, than experienced by MLB over the 1902-1993 period. Since 14 new stadiums were constructed over this period, however, each of which contributed to an increase in average attendance of 41,000 fans, the decline in the underlying attendance was masked by the attendance boost provided by new playing facilities. While a Wald test on the combination of the 1993 shock, 1994 strike, and 1996 recovery still fails to reject the hypothesis that the combination of 1993 and 1996 coefficients is equal to the absolute value of the 1994 coefficient, model 4 lends strong support to the conclusion that MLB has suffered not only temporary but permanent effects from the labor troubles in 1994/95.

The 2002 season presents clear evidence of MLB's problem. That season's average attendance of just under two-and-a-quarter million was the lowest since 1996 and over one-quarter million fewer fans per team than in the record year of 1993. Not coincidentally, the 2002 season was also the first since 1996 in which no team opened a new stadium. As the stadium pipeline dries up, MLB may be doomed to ever lower average attendances. The threat of a mid-season player's strike also hung over the 2002 season. While last-minute negotiations averted a walk-out, fans apparently stayed away from baseball nonetheless. As noted by Schmidt and Berri (2002), previous episodes of labor/management strife which did not result in the loss of regular season games did not seem to have any significant effects on attendance. The 153,000 reduction in average attendance between the 2001 and 2002 seasons is by far the largest during any period of labor troubles which did not lead to a loss of a significant number of regular season games.

Conclusion and suggestions for future research

The primary limitation of intervention model examined in this paper is the simplistic manner in which new stadiums are assumed to affect average attendance. The model presented in this paper presumes that the construction of a new stadium will result in a one-time change in average attendance with no subsequent effects. In other words, the new stadium results in an immediate and permanent increase in average league-wide attendance. While intervention analysis can be modified to allow for effects that either appear or dissipate over time as in Box and Tiao (1975), such modifications are generally *ad hoc* in nature.

A more advanced technique would be to use the existing time-series data to generate reaction functions that would allow for a more detailed examination of the construction of a new stadium on attendance and would have the secondary benefit of allowing a test of whether the most recently constructed stadiums have experienced a shorter “novelty effect” than stadiums constructed earlier in the 90s. Such a model, however, is beyond the scope of this short research note.

The purpose of this paper has been to determine whether Major League Baseball’s frequent period of labor disputes have resulted in permanent or temporary reductions in average attendance at games. Previous research has concluded that the 1994/95 Major League Baseball strike caused short-term losses in fan interest but did not result in any long-term effects on attendance. While total attendance at MLB games following the 1994/95 strike has recovered to its pre-strike levels, this has been done only through the construction of new stadiums at an unprecedented pace, which cannot continue into the future. After accounting for stadium effects, average MLB baseball attendance has dropped significantly since the 1994/95 strike.

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Table 1: *New stadiums and attendance effects since 1989*

<u>Stadium</u>	<u>City</u>	<u>Year</u>	<u>Attendance(t)</u>	<u>Attendance (t-1)</u>	<u>Attendance (t-2)</u>
Citizens Bank Park	Philadelphia	2004	3,250,092	2,259,948	1,618,467
PetCo Park	San Diego	2004	3,016,752	2,030,084	2,221,230
Great American	Cincinnati	2003	2,355,259	1,855,787	1,879,757
PNC Park	Pittsburgh	2001	2,435,867	1,748,908	1,638,023
Miller Park	Milwaukee	2001	2,811,041	1,573,601	1,701,790
Comerica	Detroit	2000	2,533,753	2,008,670	1,409,391
Minute Maid Park	Houston	2000	3,056,139	2,707,017	2,450,451
Pac-Bell Park	San Fran.	2000	3,319,340	2,078,365	1,925,634
Edison Park	Anaheim	1998	2,519,107	1,767,330	1,820,521
Safeco Park*	Seattle	1999	3,148,317	2,915,908	2,644,305
Bank One Park**	Phoenix	1998	3,600,412	-	-
Tropicana Field**	Tampa Bay	1997	2,261,158	-	-
Turner Field	Atlanta	1997	3,464,488	2,901,242	2,561,831*** (2,882,060)
Coors Field**	Denver	1995	3,390,037*** (3,813,792)	3,281,511*** (4,663,200)	4,483,350
Jacobs Field	Cleveland	1994	1,995,174*** (3,168,806)	2,177,908	1,224,274
Arlington Ballpark	Dallas area	1994	2,503,198*** (3,218,397)	2,244,616	2,198,231
Camden Yards	Baltimore	1992	3,567,819	2,552,753	2,415,189
Cellular One	Chicago	1991	2,934,154	2,002,357	1,045,651
SkyDome*	Toronto	1989	3,885,384	3,375,883	2,595,175
Average (no expansion)			3,042,795	2,262,524	1,979,384

*Stadium opened mid-season. Attendance figures are for first full season in new park, the opening season, and last full season in old park, respectively.

**Expansion franchise.

***Strike season. Number in parentheses is the extrapolated attendance assuming a full 81 game home season.

Table 2: (*Sample 1902-2003*) intervention analysis: the 1994/95 strike

Dependent variable: $y_t = d(\text{attendance})$

Model	Constant	z(46)	z(81)	z(82)	z(93)	z(94)	z(96)	z(94-03)	Stadium	Diagnostics
1	15,725* (2.041)	464,410** (6.121)	-649,178** (-8.556)	678,255** (8.939)	344,500** (4.540)	-738,813** (-9.737)	328,137** (4.325)	-	-	Adj. R ² = .761 SSE = 75,482
2	15,716* (1.943)	464,419** (6.086)	-649,169** (-8.507)	678,264** (8.888)	344,401** (4.279)	-738,912** (-9.181)	328,037** (4.076)	108.2 (0.004)	-	Adj. R ² = .759 SSE = 75,882
3	5,458* (0.665)	474,678** (6.491)	-638,910** (-8.737)	657,720** (8.963)	354,768** (4.851)	-790,152** (-10.517)	338,405** (4.628)	-	30,803** (2.916)	Adj. R ² = .779 SSE = 72,666
4	6,377* (0.783)	473,759** (6.543)	-639,829** (-8.837)	646,509** (8.862)	406,044** (5.177)	-759,460** (-9.921)	389,681** (4.968)	-52,195* (-1.700)	41,096** (3.401)	Adj. R ² = .783 SSE = 71,946

Notes: All attendance figures have been first-differenced.

The coefficients are reported with their associated t-statistic for the null hypothesis that the estimated value is equal to zero. ** and * represent statistical significance at the 1% and 10% significance levels respectively.