How Long a Honeymoon? The Effect of New Stadiums on Attendance in Major League Baseball

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Abstract:

Using panel data of MLB team attendance from 1950-2002, we determine that the attendance "honeymoon" effect of a new stadium – after separating quality-of-play effects – increases attendance by 32-37 % the opening year of a new stadium. Attendance remains above baseline levels for only two seasons for multipurpose stadiums built during 1960-1974, but for 6-10 seasons at newer ballparks. Contrary to expectations, there is no systematic interaction between new venues and team performance upon attendance or stadium revenues. This non-complementarity implies that a profit-maximizing team owner would not use a new stadium's revenue stream to increase team quality of play.

I. INTRODUCTION

Longstanding, classic baseball parks such as Yankee Stadium, Fenway Park, and Wrigley Field are increasingly becoming an anomaly in Major League Baseball. Of the thirty current Major League Baseball (MLB) franchises, fourteen have had new ballparks debut since 1990, with two more scheduled to open in 2003-2004 and plans for numerous others in the works.

These stadiums represent enormous investments to both baseball franchises and their surrounding communities. For privately undertaken capital investments to be worthwhile, the net present value of returns on the investment should outweigh the net present value of the investment's costs. But due to MLB's monopoly power over the quantity of top-level franchises, teams are often (with rare exceptions, such as with San Francisco's Pacific Bell Park) able to obtain public funds to assist in stadium construction (Noll and Zimbalist, 1997; Zimbalist, 2003). A typical example is Great American Ballpark, which opened in 2003 as the new home of the Cincinnati Reds. The stadium cost an estimated $297 million, and was funded, in part, through the approval of a half-cent-per-dollar sales tax increase by Cincinnati voters.[1]

Team attendance figures clearly show that when new ballparks are opened, attendance increases sharply for at least one year, and often for several seasons thereafter. But the magnitude and timing of the attendance impact (and revenue effects, by extension) of these new stadiums, and how these impacts influence the subsequent success of the team on the field, has yet to be carefully estimated.

Conventional wisdom holds that the length of a new ballpark's honeymoon corresponds with the success of the franchise at converting the facility's cash flow into improving the quality of the team on the field. As Zimbalist (2003) states in the midst of a compelling critique on community funding of sports facilities:

> New stadiums only represent the potential for new revenue. [...] Whether it succeeds will depend in part on its marketing efforts and skills and in larger part on the playing field success of the team. A star player generally attracts more fans to the ballpark, because of both his personal achievement and the improved performance of the team. If these additional fans pay more for their seats in a new park, spend more on concessions, and stimulate more company advertising, then the value contributed by this player (his marginal revenue product) increases. With a new ballpark, therefore, team ownership should be able to bid more aggressively for talent and improve the quality of a team.
>
> Herein is the potential for synergy between a new stadium and team quality. If this potential is realized, the new stadium will provide a significant revenue boost for the team that lasts several years. If the ownership, however, stands on its heels and expects revenues to pour in without improving team quality, it is likely to experience what the Detroit Tigers, Milwaukee Brewers, and Pittsburgh Pirates did in the second year of their new facilities. The first year, fans were attracted by curiosity about the new stadiums. By year two, the stadiums themselves were insufficient to keep them coming. (pg. 132)

The testable hypothesis in this statement is that an improvement in team quality will produce a greater increase in fan interest for a team in a new stadium than for a team in an older facility. We will show below that, contrary to our prior expectations, this is not the case.

The objective of this study is to analyze the effects a new ballpark has on the demand for a franchise's games, as measured by attendance and stadium revenues. While previous studies have estimated the effects that secondary attractions (that add to or detract from consumption of the actual game) have on fan demand, this paper seeks to advance the literature in two key ways. First, as Section II relates, no previous work has been done specifically on the duration of attendance effects from building a new stadium, although the use of a new ballpark has been a control variable in other baseball demand equations. Secondly, after discussing our model and data in Section III, we estimate the extent to which team on-field performance affects the duration of the attendance honeymoon period with new stadiums in Section IV. Section V concludes the paper and describes avenues for future research.

II. THE DEMAND FOR BASEBALL

Several researchers have studied variation in either seasonal or game-level attendance of baseball games. One line of this literature seeks to determine whether pricing of baseball tickets is efficient. As an example, Salant (1992), elaborating upon the work of Noll (1974) and Scully (1989), attempts to explain why ticket prices to sports events are set below unit price elasticity of demand, despite the team having a great deal of pricing power and negligible marginal costs. Sales figures suggest that teams under-price tickets, leading to frequent sellouts and lucrative resale markets for tickets by third parties. Salant develops a simple demand equation that serves as the basis for the models in this paper, Q = Q (p, z), where Q is the demand function for tickets, p is price, and z is a vector of other relevant influences on demand such as population and team performance. With this model, he verifies that, as expected, fans do respond both to the price and quality of the baseball games they wish to attend. Salant's results do not refute his "insurance" hypothesis of price-setting, which proposes that since teams sell season tickets, they want to ensure that their fans will buy those tickets both in successful years and in bad years.[2]

Porter (1992) uses an attendance model to determine whether fan loyalty influences team quality of play. He is one of the first to analyze franchise differences in game demand, and his adaptation of Scully's (1974) model is a simpler version of the approach adopted in our analysis. Porter models attendance as a function of city population, wins, and wins in the previous year independently for each franchise, in order to measure fan responsiveness to the team's on-field success. The logic of his approach leads to the ironic conclusion that loyal fans, who come to the park win or lose, give dis-incentive to profit-maximizing owners to spend on high payrolls, thus lowering the probability of a winning team on the field.

Depken (2000) uses a combination of ordinary least squares regression and the stochastic frontiers technique to estimate the demand to attend ballgames and the relative team loyalty of the fans of different teams. After estimating the relationship between price and team quality in attracting fans to games, fan loyalty is isolated from the residual terms of his model. Depken then demonstrates the usefulness of the fan loyalty estimates at predicting the outcomes of referendums for the construction of new baseball stadiums.

Butler (2002) uses a log-lin model to explain game-by-game attendance in the 1999 season. He isolates the effect of a determinant of demand (in his case, the effect of interleague play as opposed to new stadiums) by controlling for expected quality variables (such as team wins, visiting team wins, starting pitcher wins, etc.), time and weather variables (such as day of the week, month, and temperature), special circumstances variables (such as the final home-stand of parks that were replaced in 2000 and team streaks), and indicator variables for interleague play and team interactions. Our model has an analogous goal, although our hypothesis is better suited to season-level attendance data.

III. METHODS AND DATA

A. Limitations

A complete demand model for baseball games, Q = Q (p, z), will include all the factors that influence an individual consumer's decision to attend a baseball game. For ease of exposition, these factors are categorized into four types: the price of the good, on-field game quality factors, off-field venue factors, and general market factors.

Porter (1991) and Depken (2000) showed that teams have fan bases with heterogeneous preferences. Accordingly, fans in different cities may react to different extents to changes in team quality of play, or to new amenities provided in a venue. The representative fan in one city may be relatively inelastic to changes in stadium amenities. These "pure" baseball fans, of either the fickle or diehard variety, know the infield fly rule, how to keep score, the league standings, starting lineups and player statistics, etc. Other teams may be frequented by more casual fans who care less for the game on the field than for what longtime Cubs broadcaster Harry Caray often described as "fun at the old ballpark." As such, their demands are less elastic with respect to home team quality of play, but should be more elastic with respect to other demand factors, such as food and merchandise concessions, picnic areas, and the entire circus of off-field entertainment amenities that surround an MLB game. Examples of these entertainment amenities include the bar in the outfield at Turner Field, the pool at Bank One Ballpark, or the Sausage Races at Miller Park.

Despite these differences, a sacrifice must be made for the sake of statistical estimation. As the franchises in the sample have rarely changed venues more than once while remaining in the same city,[3] there are insufficient degrees of freedom to simultaneously estimate the attendance effects of a new stadium for a franchise and franchise-specific attendance responses to changes in amenity level, even if these amenity levels could be quantified accurately. Therefore we must be satisfied with estimating the average effect of a new stadium upon a franchise, controlling for quantifiable external influences such as team winning percentage.[4]

B. Data: Overview and Dependent Variable

The panel data records annual statistics for franchise i ($i \in 1, \ldots, n$) in year t ($t \in 1950, \ldots, 2002$), where n is the number of franchises in existence in year t.[5] In cases where teams left stadiums, but were replaced by a new team in the stadium, the team and the player rosters were followed, not the city or the ballpark. For example, in 1960, the Washington Senators moved to Minnesota and became the Twins. The following year an expansion team, also known as the Senators, was awarded to Washington D.C. (and eventually became the Texas Rangers). The statistics for the 1960 Washington Senators appear in the Twins time series, while the statistics for the 1961 Senators are in the time series of the current Rangers.

The dependent variable is the natural logarithm of per game attendance for major league team *i* in year *t*, $LNATTENDPG_{it}$. Per game, as opposed to annual, attendance is used to control for the shift from 154 to 162 games in 1962, as well as the effect of strike shortened seasons in 1972, 1981, and 1994. The natural logarithm is used so that the slope coefficients will report percent changes in per game attendance.

Since the concern of a profit-maximizing team facing negligible marginal costs will be to maximize revenues, and since seating capacity, ticket prices, and prices for other stadium goods (parking, concessions, etc.) are endogenously chosen by a franchise (or third parties who reach contract agreements with the franchise) designing a new ballpark, it would be theoretically preferable to estimate stadium-related revenues than attendance. But due to data limitations described below, we have opted to estimate attendance effects, which are consistent with the results from what little accurate revenue data is available.

C. On-field Game Quality Variables

Team quality of play is measured by centered win percentage in the given season, $CWPCT_{it}$.[6] As many tickets, especially season tickets, are purchased prior to the start of the season, the previous season's centered win percentage, $CLAGWPCT_{it}$, is included to proxy for the information set season ticket buyers use to estimate expected team quality of play. Although complete observations extend back only to 1950, 1949 centered win percentages were used for the 16 MLB teams in existence in 1950. In an expansion team's first year, the centered win percentage for that year was used to proxy for the previous season's centered win percentage.

A measure of a team's marquee drawing power from having top-quality players, after controlling for win-loss record, will be the number All-Stars on the team, $ALLSTARS_{it}$.[7] Although many productive players with star power do not make the All-Star team each year because of the limited number of roster spots or because of early season injury, the measurement error should be minimal.

Ballparks of different dimensions and geographic settings produce games with varying dominant characteristics, and these characteristics may influence the enjoyment of a typical game. The high elevation of Coors Field in Denver leads to higher scoring games, on average, than games played at Dodger Stadium in Los Angeles. These effects would not be important if these park factors were constant for a stadium, but teams occasionally move fences in or out, or change playing surfaces, in the absence of a renovation to the ballpark as a whole. To account for the effects of these changes upon scoring, and estimate the effects of scoring upon attendance, the variable $PARKFACTOR_{it}$ is included. Following the convention used by the data source, Retrosheet, the park factor is equal to the total runs scored in a given team's home park divided by the total runs scored in the team's road games.[8] A "pitcher's park" will thus have a park factor < 1, while a "hitter's park" will have a park factor >1. To the extent that increased scoring increases fan interest, as conventional wisdom holds, the expected coefficient on this variable will be positive.

D. Market Factors and Ticket Prices

Several variables are included to control for the economic and general market factors affecting ticket demand. To control for the time trend of popularity in baseball, the time counter variable $YEAR_t$ is included. Preliminary regressions also estimated models with season fixed-effects, but the time pattern in attendance is close enough to linear that the trend model provides a higher adjusted-R^2.

Figure 1 depicts the time trend of average MLB attendance per game, including the three shocks in demand representing the effects of player strikes that caused the cancellation of games. YEAR1972, YEAR1981, and YEAR1995 are fixed-effect indicator variables for the years 1972, 1981, and 1995 that control for the effects of strikes. The 1995 indicator is to control for the strike which began in August 1994, canceling the end of the 1994 season, the 1994 World Series championship, and delayed the start of the 1995 schedule. Since the 1994-95 strike was largely unexpected by fans, its impact on attendance was not felt until the following season. The strikes in 1972 and 1981 occurred mid-season, so the negative attendance effects were immediate for these seasons.

City population, as measured by the natural logarithm of population, $LNPOP_{it}$, is included to control for gross market size and levels of aggregate demand for entertainment within the community. Decennial data from the US Census Bureau and Census Canada for Metropolitan Statistical Area (MSA) or Metropolitan Area population was interpolated for all 53 years in the sample.

To account for the presence of multiple teams in the same metropolitan area, an indicator variable called $TEAMSINCITY_{it}$ is used to control for degree of substitutability between franchises rather than assume how strongly one team's games can substitute for the other team's games.[9]

Ticket prices are from the archives of the SABR Business of Baseball Committee.[10] Prices represent the cost of a ticket for club seats equal to the highest priced regular seats. From 1997-2001, club seats were included in this computation, but 2002 price data exclude these premium seats from the computation. This is a likely source of measurement error, as some ticket prices are substantially lower than those of the previous year due to this computational change.[11] Additional sources of error may arise from unavailable ticket price data for the years 1963 and 1986-1990 for all teams, and 1998 for the Diamondbacks and Devil Rays, and from the recent innovation of pricing seats in a given section differently for particular games within a season.[12] Ticket prices for missing years were interpolated. Canadian prices were converted to American dollars according to historic exchange rates. The data were also transformed into 2000 dollars using the CPI and logged so that the coefficient estimated would represent the own price elasticity of demand, matching the convention of the literature. Numerous previous studies have found the coefficient on $LNREALTIC_{it}$ to range between 0 and –1, indicating pricing in the inelastic range of the demand curve.

It would be desirable to control for the prices of other goods consumed at ballparks, or, as discussed above, estimate stadium revenues rather than attendance. The only two panel data sources of this information, however, are a series of team revenue statements published in Financial World magazine for the 1990-1996 seasons, and the USA Today Fan Cost Index, calculated from 1991-2003. The Financial World figures are probably more reliable, and indicate that the Fan Cost Index likely presents an upwardly-biased estimate of per fan expenditures. Extrapolating either series back forty years would lead to unacceptable uncertainty in the estimates. Limiting the data to 1991-2002 would lead to loss of an unacceptable number of degrees of freedom in stadium construction and possibly introduce serious measurement error involving transfer prices. We have therefore chosen to estimate attendance effects as precisely as possible, and demonstrate how that relationship compares with the results suggested by what revenue data are available.

E. Stadium and Franchise Features, Including Age and Age-Winning Percentage Interaction

Since this study uses annual attendance data, factors such as weather, day of the week, and month will be aggregated away, as will variables such as opposing team star power and opposing team quality. Instead, the relevant variables of interest to casual fans will include stadium amenities and landmark years in the history of the stadium and franchise.

Our proxy for the level of ballpark amenities is the natural logarithm of real stadium cost, $LNREALCOST_{it}$.[13] Nominal stadium costs were obtained from www.ballparks.com and transformed into 2000 dollars using the Consumer Price Index (CPI).[14] The natural logarithm is used to account for expected decreasing returns to scale in additional amenities. The coefficient should be positive, indicating that as the level of amenities at a stadium increases, it will become more attractive to fans.

While it is rare for a MLB team to sell out a large fraction of its games during a season, stadium capacity should influence pricing decisions and will represent a constraint on potential attendance growth for popular teams. To this effect, a variable to measure the natural logarithm of stadium capacity, $LNCAP_{it}$, is included. Unlike football, however, Major League Baseball teams rarely approach full capacity attendance over the course of a season, except for an expansion team or a franchise with a new stadium. As this effect applies to only a small fraction of the observations, the point estimate is not expected to be large, but should be positive. To the extent that Becker's (1991) effect survives in the data, a negative coefficient is theoretically possible.

The positive attendance effects of a new stadium can be expected to be at least partially offset by diminished attendance at the previous home if fans hold off on attending games until the new venue is open. As stadium moves are usually uncertain until just prior to the move, and as the length of delaying consumption is unlikely to be extended over a period of several years, indicator variables were only created for the penultimate year ($PENULTYEAR_{it}$) and final year ($FINALYEAR_{it}$) a stadium was in use.

The simple indicator variable $CLASSIC_{it}$ is also included to allow for lower typical levels of attendance at the older generation of ballparks due to their having fewer amenities relative to the multipurpose stadiums of the 1960s and 1970s and the modern generation of ballparks. The exception to this negative effect might occur if the previous stadium is a beloved local historical landmark which is in danger of being retired. To test for this exception, separate indicators for auld lang syne effects in classic (age greater than 50) ballparks are included as $CLASSICPY_{it}$ and $CLASSICFY_{it}$, where the "PY" and "FY" indicate cross-products with $PENULTYEAR_{it}$ and $FINALYEAR_{it}$. The $CLASSICFY_{it}$ coefficient is expected to be significantly higher than that for $FINALYEAR_{it}$, although it is not theoretically obvious whether the $FINALYEAR_{it}$ effect will be significantly negative or that the $CLASSICFY_{it}$ coefficient will be significantly positive.

Not all teams began playing in their new stadiums at the beginning of the baseball season. In these instances, an indicator variable, $STAD2_{it}$, is used to pick up the effects of the multiple venues on attendance.[15] As it is likely that casual fans will hold off on purchasing tickets until the team is in its new home, the sign on this variable is expected to be negative.

Stadium age is recorded as zero for the year the stadium opened for baseball, and the value increases by one for each subsequent year. The counter variable is reset to zero in cases where stadiums were completely renovated or rebuilt, such as Municipal Stadium (Kansas City) in 1955 when a roofed second deck was added or Jarry Park (Montreal) in 1969 when it was converted from a tennis stadium to a baseball park. Three individual age categorical variables –

$AGE0_{it}$, $AGE1_{it}$, and $AGE2_{it}$ – were generated from stadium age, as well as indicator variables for two-year age groups, $AGE34_{it}$, …, $AGE910_{it}$.[16] These categorical variables take a value of one if the stadium is in the given age range and zero otherwise. The stadium age categorical variables should all be positive, reflecting the magnitude of the honeymoon attendance effect, but should decrease to zero over time as the novelty of a new stadium fades.

To test for demand complementarity between new stadiums and quality-of-play, a set of interaction terms is created using the cross product of stadium age and team win percentage, $CAGE0WPCT_{it}$, …, $CAGE2WPCT_{it}$.[17] If there is complementarity between new stadiums and quality of play, the interaction terms should produce positive coefficients.

In order to control for the novelty effect of an expansion team or a team changing cities moving into a new stadium, as opposed to a stable franchise moving into a new park in the same city, a vector of indicator variables for a new team in the city was created using the same method as stadium age. These are labeled $NEWTEAM0_{it}$ – $NEWTEAM2_{it}$.[18] A new franchise in the city should generate additional excitement that a new stadium alone does not, as major league quality of play is a novelty that will appeal to "pure" baseball fans, while the new logos and merchandise for an expansion or relocated team will be a source of attraction for the more casual fans.

Of 1232 potential observations, 53 observations are lost to lack of construction cost information for some ballparks.[19] The remaining 1179 observations are used in the regressions to follow. Additionally, real team payroll in millions of 2000 dollars, $REALPAYROLL_{it}$, was calculated using the CPI from the 1977-2002 team payroll data available on Pappas' web page, for use in subsequent analysis of team finances and decision-making.

Summary statistics for the continuous variables appear in Table 1. The mean attendance is about 18,000 fans per game, and has increased from about 13,000 fans per game in the 1950s to about 30,000 fans per game in 2000, as indicated in Figure 1. This is in contrast to mean stadium capacity, which has remained largely unchanged in the 45,000 – 50,000 seat range. Real ticket prices have increased slowly over the time period of the panel from about $10.25 (in 2000 dollars, about $1.60 in current dollars) to about $17.00 in 2000. Similarly, construction costs of stadiums in use have increased fifteen-fold in nominal terms and by about 125% in real terms over the time period of the panel.

Table 2 gives counts for the indicator variables in the sample, with notes describing the observations for which the indicators are equal to one.

IV. IF YOU BUILD IT, WILL THEY COME? EMPIRICAL RESULTS

After estimation of several alternative models to establish the robustness of our final specification, the following empirical model was estimated to quantify the length and magnitude of the attendance honeymoon from a new MLB stadium. Due to heteroskedasticity and first order autocorrelation within panels, generalized least squares (GLS) was used to produce efficient and consistent parameter estimates.[20]

A. A General Demand Model for Baseball Games

The models use beta (ß) to denote the coefficients of on-field variables, gamma (?) to denote general market demand factors, and lambda (?) to denote stadium and franchise effects. The General Demand Model for the natural logarithm of per game attendance is:

$$LNATTENDPG_{it} = a + ß_1(CWPCT_{it}) + ß_2(CLAGWPCT_{it}) + ß_3(ALLSTARS_{it}) + ß_4(PARKFACTOR_{it}) + ?_5(YEAR_t) + ?_6(YEAR1972) + ?_7(YEAR1981) + ?_8(YEAR1995) + ?_9(LNPOP_{it}) + ?_{10}(TEAMSINCITY_{it}) + ?_{11}(LNREALTIC_{it}) + ?_{12}(LNREALCOST_{it}) + ?_{13}(LNCAP_{it}) + ?_{14}(PENULTYEAR_{it}) + ?_{15}(FINALYEAR_{it}) + ?_{16}(CLASSIC_{it}) + ?_{17}(CLASSICPY_{it}) + ?_{18}(CLASSICFY_{it}) + ?_{19}(STAD2_{it}) + ?_{20}(AGE0_{it}) + \ldots + ?_{22}(AGE2_{it}) + ?_{23}(AGE34_{it}) + \ldots + ?_{26}(AGE910_{it}) + ?_{27}(CAGE0WPCT_{it}) + \ldots + ?_{29}(CAGE2WPCT_{it}) + ?_{30}(NEWTEAM0_{it}) + \ldots + ?_{32}(NEWTEAM2_{it}) + \varepsilon_{it}$$

The results of the initial estimated equation appear in columns 3 and 4 of Table 3. The estimated regression explains about half of the variation in $LNATTENDPG_{it}$ about the mean, even without franchise-specific fixed effects, and the vast majority of the included variables have parameter estimates with the expected sign and which are statistically significant.

A.1. Control Variables

The general demand model returns plausible results for most of our control variables. Both of the winning percentage variables are positive, with current quality of play, $CWPCT_{it}$, slightly more than twice as influential as $CLAGWPCT_{it}$ on current year attendance. In other words, given two equally good teams the previous year, a team with one additional win in the current season (0.00617 increase in $CWPCT_{it}$) would expect an attendance boost of about 1.08% (about 302 fans per game, at the year 2002 mean attendance of 28,003) in that season compared to an otherwise equal team. Once the attendance boost from increases in lagged demand is added, the total effect of an additional win is 1.57% (about 440 fans per game) above its otherwise equal counterpart. These coefficients indicate that attendance is responsive to on-field performance, and the positive coefficient on the lagged winning percentage term indicates that some of this attendance boost is delayed, possibly due to season ticket holders who must purchase tickets in advance of the current season.

The positive coefficient on the $ALLSTARS_{it}$ variable provides further evidence that fans respond to on-field performance, as well as evidence that player star power also provides an attendance boost. The $PARKFACTOR_{it}$ variable is positive, but insignificant, suggesting that fan preference for higher-scoring games is not as strong as sometimes argued.

The positive coefficient on the $YEAR_t$ variable quantifies the positive trend in baseball attendance over the sample period seen in Figure 1. The coefficients on the year-specific variables indicate that player strikes do result in negative demand shocks, and indicate that the 1994 player strike had the largest effect on attendance of the strikes in this sample.

The coefficient on the $LNPOP_{it}$ variable indicates that over the data range, as a city's metropolitan population increases by 1%, attendance of the city's Major League Baseball games will increase by 0.187% per game. Teams in cities large enough to accommodate multiple teams, however, will see attendance per game fall by 9.8% for each additional team in the city.[21]

The parameter estimate is for $LNREALTIC_{it}$, measuring the own price elasticity of demand for baseball games, is unexpectedly positive. According to the point estimate, a 1% increase in real price results in a 0.11% increase in quantity demanded for baseball games. The non-negative estimate is worrisome, but could be explained in several ways, including endogeneity, the measurement errors enumerated in Section III, or multicollinearity. The data set contains a high degree of multicollinearity between real ticket prices, real stadium costs, and the time trend.

Echoing the difficulties with ticket price, the coefficient of $LNREALCOST_{it}$ indicates that a 1% increase in stadium cost results in a 0.04% decrease in attendance, which would appear to indicate that more expensive stadiums are not desirable. In addition to multicollinearity concerns, there are at least two other reasons, however, to be cautious regarding this finding.

First, this result may be due to proxy measurement error in stadium costs due to varying land prices, as the data available do not differentiate between construction and land costs, or to incorrectly controlling for price inflation. Also, as new stadium real construction costs are increasing dramatically over time, if stadiums are becoming economically obsolete at higher levels of attendance over time as well, the result could lead to a spuriously negative coefficient for the attendance effect of real new stadium cost.[22] As our key concern is only to control for variation in ticket prices and stadium construction costs rather than obtain an accurate parameter estimates for these variables, we have opted not to drop the variables despite the multicollinearity and other problems.

The coefficient on $LNCAP_{it}$ estimates that teams with 1% larger stadium capacities can expect 0.194% higher per game attendance, but this could either be due to binding capacity constraints or to self-selection by teams into stadium sizes.

The variable $FINALYEAR_{it}$ has a significant negative coefficient, suggesting that fans postpone consumption of baseball games when they know a new stadium will open the following season. In the final year of a stadium's existence, there is a 14.4% decrease (4,040 fans per game at the 2002 mean) in per game attendance. The theoretically similar $STAD2_{it}$ variable also has the expected negative parameter estimate, but this is statistically insignificant, likely due to lack of sufficient degrees of freedom.

This result is a stark contrast to the final year of games played in a classic stadium, as classic stadiums see a 26.3% increase in attendance in their final year relative to other closing venues, or 8.1% higher than baseline attendance, due to fan nostalgia. For a team with the average attendance per game in the sample, this would result in an average of an additional 2,263 fans per game over baseline for the course of the season. Neither the $PENULTYEAR_{it}$ nor the

$CLASSICPY_{it}$ variables were significantly different from zero, indicating that a nostalgia effect does not influence fan attendance decisions until the final year of games played in a stadium.[23]

A.2. The Honeymoon Effect of Stadiums and Franchises, and Tests of Complementarity

The coefficients on the $NEWTEAM\_{it}$ group of variables indicate that, as hypothesized, there is an increase in attendance due to novelty as a team newly arrives in a city. This attendance boost is only statistically significant at the 95% confidence level, and only for the team's first year in the new city, but results in a 15.4% increase in per game attendance during that first season over and above any stadium effects. The statistically insignificant coefficients on the new team variables in the subsequent years indicate that the honeymoon for relocating and expansion teams is very short-lived. Given 2002 average attendance per game as a baseline, this would result in an additional 4,304 fans per game over the course of the season for the new team.

Measuring the differential intercept effect of the stadium honeymoon, the categorical stadium age terms returned positive coefficients which decrease both in magnitude and significance as the ballpark ages, providing evidence of an attendance honeymoon that slowly disappears. In the initial year a stadium opens, there is a 44.1% increase in expected attendance. The following year, expected attendance per game is 26.9% greater than the baseline, and the following year it remains 20.2% greater than a typical year before the stadium opened, both of which are statistically significant at the 0.01 significance level. The seventh and eighth years after a stadium opens have increases that are only significant at the 0.05 significance level, and estimate an increase of 10.0% in attendance over the baseline. In the ninth and tenth years after a new stadium opens, the point estimate of the attendance effect is only 2.6%, and this effect is not significant at the 0.10 significance level. These coefficients provide clear evidence of the existence of an attendance honeymoon between MLB fans and teams playing in new stadiums, after controlling quality-of-play. Figure 2 illustrates this honeymoon effect in terms of changes in per game attendance for a hypothetical team (with baseline attendance at the mean, and a .500 win percentage) that builds a new stadium. We call this the "no reinvestment" scenario, as it assumes (an assumption to be relaxed in a moment) that the stadium revenues will not be used to improve team quality.

As Zimbalist (2003) noted, the short-lived attendance success of new stadiums in Detroit and Milwaukee in recent years, while parks in Cleveland and San Francisco continued to pull in sell-out crowds several years after their debut, leads to the plausible hypothesis that team success may extend their honeymoon period. This would only be desirable to a profit-maximizing team owner, however, if wins in a new stadium have higher marginal revenue than wins in the venue it replaced. Otherwise, it would be optimal for the owner to leave team quality of play unchanged, and retain the revenue stream (after paying for construction costs, of course) as rent.

Estimating the increases in attendance is, of course, only one portion of the additional revenue stream from a new ballpark. When the new park opens, there is also additional revenue earned through increased prices paid by the existing fan base. Using average ticket price and game attendance data as a rough estimate of gate revenues per game (and of stadium revenues per game to the extent that non-ticket revenue increases are proportional), the only significant differences between attendance and "revenue" regression results among the control variables are that CLASSICPY suggests a 21.9% drop in gate revenues the penultimate year of a classic stadium's use, and that the CLASSICFY coefficient is insignificant. The differences could be attributable to price reductions during the last two years of a classic stadium's use. The same honeymoon pattern found for attendance appears for estimated gate revenues, with the only difference being in the magnitudes, due to price hikes upon the debut of the new park. The initial year revenue increase is estimated at 65%, followed by estimates of 50% and 40% in years one and two following the debut, 34% in years 3 and 4, 28% in years 5 and 6, and 19% in years 7 and 8 before statistical significance is lost. Given the similarities in the attendance and revenue honeymoon patterns, and the greater confidence we have in the attendance data, we maintain our focus on the attendance honeymoon.[24]

The importance of complementarity of demand for on-field success and new ballparks can be seen in Figure 3. In the old ballpark, a profit-maximizing owner sets quality-of-play where marginal revenue (MR_0) equals marginal cost (MC) in the right-hand panel, at Q^*_0, with MR_0 and MC derived from total revenue (TR_0) and total cost (TC) in the left-hand panel. The increasing marginal costs are due to diminishing returns to additional hired playing talent. The marginal revenue curve could be slightly upward or downward sloping without loss of generality, so long as MR intersects MC uniquely, and from above. If the effects of the new ballpark are only to increase prices and to bring in casual fans who are uninterested in quality of play, the effect is a parallel shift in total revenue to TR_P, producing equal increases in attendance and revenue at all levels of quality-of-play. Marginal revenue in this instance would remain unchanged at MR_0. Since player costs are not affected by the construction of a ballpark by any one team, marginal costs also remain unchanged, resulting in the same equilibrium quality-of-play at Q^*_0.

Alternatively, suppose there is a positive interaction between quality-of-play and new ballparks, so that the effects on total revenue would be as indicated by curve TR_1. With the new ballpark bringing in more fans for each additional win, the marginal revenue of a win is increased to MR_1, which is depicted as a parallel shift here, but can take any one of many relationships, so long as MR has increased at all relevant levels of team quality-of-play. The upward shift in marginal revenue results in an increased equilibrium quality-of-play, at Q^*_1. It is this latter scenario, with positive interaction between win percentage and new ballparks over and above the effects estimated in the $WPCT_{it}$ and stadium AGE_{it} variables, that is implicitly hypothesized in the Zimbalist quote in Section I. In our empirical model, the interaction terms will pick up a differential slope effect indicating how winning augments or decreases the attendance effect of a stadium in the given age category. If the honeymoons of successful teams are extended by complementarities over and above the boost to attendance occurring through $WPCT_{it}$, positive coefficients on the $CAGE\_WPCT_{it}$ variables are expected.

Despite the existence of the honeymoon effect found in the differential intercepts, none of the stadium age and win percentage cross products are statistically significant. This indicates that a complementarity does not exist between the stadium effect and the team's on-field performance and that there is not a super-additive component to the attendance boost.[25] Fans are apparently only concerned with one of the two dimensions of a baseball game at a time, either on-field performance or stadium amenities, indicating that the spectrum of fan interests is largely bi-polar. In other words, casual fans do not derive more utility watching a winning team play in a new stadium than they would from watching a mediocre team in a new stadium, and "purist" fans do not enjoy watching their team win in a new ballpark more than watching their team win in an old ballpark. Thus, fans don't demand additional consumption of games where successful teams play in new stadiums beyond what the age and winning percentage variables predict.

B. Demand for Baseball Games: Pre-1975 and Post-1975 (Inclusive)

One possible complication with the above results lies in the fact that not all new stadiums are created equal. Baseball has seen at least three (some would argue four) distinct eras in stadium construction. While some classic stadiums built prior to 1950 still persist, many were replaced during the 1960s and 1970s by larger multipurpose stadiums that had the capacity to host fans for both baseball and football games. In the latter part of the 1970s, this trend morphed slightly, as large, domed stadiums that were construction marvels became the norm. Stadium construction was stagnant for most of the 1980s, but the 1990s saw the advent of the modern era of stadium construction. Teams began building baseball-only facilities that emphasized amenities and classic features, as opposed to capacity.

To test for the possibility of structural differences between the effects of multipurpose stadiums and "throwback" ballparks upon attendance, the data has been split into two subsets. In order to obtain enough degrees of freedom for the general demand regression to be run on both of the subsets, the four domed stadiums debuting in 1977 and later are included in the modern era.[26] We made this distinction because the domes provide amenities to fans interested in their unique architecture, advanced engineering, and controlled climate much like the way McCovey Cove at Pacific Bell Park provides amenities to fans that enjoy being near the water and watching home run balls land with a splash. The first section includes all observations prior to 1975 in order to capture the multipurpose stadium era, and the post-1975 (inclusive) section captures the modern era. A split in 1975 roughly divides the data set in half both in years and in terms of new stadiums, as 18 of the 38 stadiums coded as new in the data set opened after 1975. Columns 5 and 6 of Table 3 contain the pre-1975 regression, which omits observations for the modern ballparks, and columns 7 and 8 contain the post-1975 (inclusive) regression, which omits the first ten years of observations for the multi-purpose stadiums so as to isolate the honeymoon effects of stadiums in each era.

The two sets of coefficients are very similar for most of the control variables. For example, the coefficients on $CWPCT_{it}$ were almost identical across periods, while the coefficient on $CLAGWPCT_{it}$ in the modern era is about one standard error higher than in the multipurpose era, leading to somewhat increased total attendance effects from an increase in team quality-of-play. Similar differences in point estimates of about one standard error can be found for other parameters. $LNREALTIC_{it}$ becomes statistically significant in the modern era, but the estimate is untrustworthy, as explained in the previous subsection.

The coefficient on the $NEWTEAM0_{it}$ variable is only significantly different from zero in the modern era, possibly indicating that expansion teams are entering the league amidst greater fanfare, or with greater chances for on-field success. However, this result may be biased because, unlike the pre-1975 era, no MLB teams have relocated to different cities in the modern era. The response to relocated teams may be pulling down the multipurpose era expansion teams.[27]

The coefficients of interest, on the age variables, are greater in magnitude and more significant in the modern era, indicating that the attendance honeymoon effect is larger and lasts longer for the new throwback ballparks. The attendance boosts in the first year of play in the new stadium are estimated at 37-44% over the baseline year, but there is a marked difference in the duration of the attendance boost. The honeymoon stays significant, with attendances remaining at 18% or more above baseline until the end of the sixth year for new stadiums in the modern era, whereas attendance drops to levels insignificantly above baseline levels by the third year of a multipurpose stadium's existence.[28]

The exception to the rule of larger attendance effects is in the first year of the new ballpark, where the modern era attendance boost is about 7 percentage points lower than in the multipurpose stadiums, due to lower seating capacity constraints. It is likely that the smaller increase in attendance from a new throwback stadium is because there are fewer open seats to fill. For example, when the Houston Astrodome opened, attendance per game tripled over the team's final year in Colt Stadium, even though most games still did not sell out. When the teams in Cleveland and San Francisco moved into their new parks, per game attendance increased by "only" 40-60%, but every seat was filled.

One cross-product for age and win percentage, is significant at the 0.10 significance level, but the unexpected negative sign and non-credibly large magnitude, plus its occurrence in the third year of a new stadium's use while there were no effects in the first two years, lead to the conclusion that this result is merely an aberration in the sample.

V. DISCUSSION

Despite the lack of positive demand complementarity between on-field success and a new facility in any model specification, a new stadium results in increased attendance in and of itself, likely caused by casual fans attending baseball games after a stadium is built in order to see the new ballpark and enjoy its amenities. These fans provide the franchise ownership with an increased flow of revenues into coffers than they had previously enjoyed. If the costs of stadium construction are amortized over an extended period of time through long-term loans and bonds, owners receive positive net cash flows during the honeymoon period, until the point where the additional revenue stream has diminished to match the annual debt service.

As explained above, if non-stadium revenues behave in the same non-complementary manner that stadium (attendance-based) revenues do, there is no reason for a profit-maximizing owner to reinvest the honeymoon cash flow in team payroll, as the optimal level of team quality-of-play, where the marginal dollar spent on payroll results in one dollar of increased revenues due to on-field success, will remain unchanged.[29] There are sets of plausible assumptions, however, that might lead an owner to reinvest at least some of the cash flow into team payroll.

As one example, if team profits are only one argument in the utility function for a "sportsman" owner – that is, one who values team winning percentage in and of itself – and if that owner does not have unlimited borrowing capacity, then one might expect him to use positive cash flows as an opportunity to improve team quality-of-play. If this reinvestment of cash flow occurs, the resulting increases in win percentage are indirectly attributable to the new venue, and the resulting revenues from the increased team success would augment attendance and team revenues in the following period, increasing the duration of the initial series of sellouts for "sportsman" owners beyond that which would be witnessed for an owner who does not reinvest, even without demand complementarity.

Estimation of the net present value of a new facility to a franchise and to the city in which it resides is an obvious extension of the findings presented here, but will be presented separately due to space constraints. Other closely related questions -- on the optimal timing of venue construction, optimal stadium size and costs, and empirical testing of owner objectives -- are left for future research.

ENDNOTES:

[1] This referendum approved a $544 million dollar budget for new stadiums for both the Reds and Bengals, but Bengals' stadium cost well over this allotted amount.
[2] Becker (1991) addresses the same phenomenon as Salant, but his theory of restaurant pricing (that there are social influences on demand such that the desire to visit a popular restaurant is increased specifically because it is popular with other demanders) needs not assume the implicit insurance contract between entertainment event suppliers and demanders that prices will remain relatively stable should demand increase. In Becker's model, it is in the suppliers' *unilateral* interest to maintain prices below the point of unit elasticity on the short-term demand curve. The Becker model also more easily allows for the observed recent phenomenon of differential pricing of "premium" tickets which will assuredly sell out at even an elevated price, as there is no implicit smoothing of surpluses. Finally, the Becker model also provides a reason (in addition to somewhat lower operating costs) why new venues in the current era are typically designed to be smaller than the venues they replace, despite the significant boosts in attendance the new venues are expected to provide.
[3] The Astros (Colts, Astrodome, Enron/Minute Maid), Giants (Seals, Candlestick, Pac Bell), and Pirates (Forbes, Three Rivers, PNC) are the only teams to have changed stadiums more than once within the same metro area over the course of the sample period. Even in these cases, the newest stadium has been in use for only two or three years.
[4] City- or franchise-specific fixed effects are also not estimated. Use of fixed effects in preliminary estimates did result in increased overall goodness-of-fit, but their inclusion did not greatly affect the estimates on our parameters of interest and precluded our ability to control for heteroskedasticity and within-panel autocorrelation using the xtgls function of our Stata statistical software.
[5] In addition to the 16 franchises in 1950, there are now 14 expansion franchises. Time-series data for expansion franchises begins in their first year of play: 1961 – Angels and Senators/Rangers; 1962 – Mets and Astros; 1969 – Pilots/Brewers, Expos, Padres, and Royals; 1977 – Blue Jays and Mariners; 1993 – Marlins and Rockies; 1998 – Devil Rays and Diamondbacks.
[6] Severe multicollinearity prevented the inclusion of both the categorical variables for stadium age and their winning percentage interaction terms, so the values of the winning percentages were centered to prevent imprecise or possibly misleading estimates.
[7] This variable could as easily be classified an aesthetic variable rather than a quality of play variable, but it has been placed in this section under the assumption that the marginal All-Star is selected more in recognition of a stand-out statistical season rather than for flamboyance. This assumption, however, bears no effect upon the results which follow.
[8] The winning percentage and park factor variables were obtained from data available at www.retrosheet.org. As per the policy of the Retrosheet organization, the following statement is included with the citation information: "The information used here was obtained free of charge from and is copyrighted by Retrosheet. Interested parties may contact Retrosheet at 20 Sunset Rd., Newark, DE 19711."
[9] Markets with multiple teams include New York (1950-1957, 1962-present), Boston (1950-1952), St. Louis (1950-1953), Philadelphia (1950-1954), Chicago (1950-present), Los Angeles (1961-present) and San Francisco/Oakland (1968-present).
[10] Ticket price, Team Marketing Report's Fan Cost Indices, and team revenue and payroll data are from http://www.roadsidephotos.com/baseball/earlyticketprices.htm, a site maintained by SABR Business of Baseball committee chair Doug Pappas.
[11] Also, marginal ticket prices are likely much lower than club seat prices, and the magnitude of the bias is likely to vary as some function of stadium capacity. But this is the best data currently available. A great deal of literature also critiques the adequacy of ticket prices to adequately capture the expense of going to a baseball game. Two broader measures are described in the text below.
[12] In recent seasons, several teams have moved away from the uniform pricing of their tickets, either by creating packages which tie tickets for premium games to hard-to-move tickets against weaker teams, or by increasing ticket prices against top rivals and on summer weekends. The economic reasons for this shift in sales approach present an open and interesting topic, not least because it suggests a structural change which might invalidate Salant's (1992) rationale for underpricing of tickets.
[13] The sources for information on franchise venue changes, seating capacities, construction costs, and other stadium-specific information for this project are Leventhal (2000) and the website www.ballparks.com.
[14] This proxy presents several difficulties. Even after CPI deflation, real stadium costs rise exponentially across time, but a superior deflator has not been identified. The basket of goods used for various construction cost indices

was not relevant to large scale construction projects, and was not obviously superior to the CPI. GDP deflation results in very similar time trends in real cost. Use of the stadium cost data points themselves in a cost-trend regression would result in estimated amenity levels relative to the level in contemporary parks, and not to an outside benchmark. Alternatives such as stadium cost per seat did not improve the empirical results.

[15] The 1998 New York Yankees played two games in Shea Stadium while a fallen piece of concrete was repaired in Yankee Stadium. This instance was ignored because of the small effect of two games on the annual attendance over an 81 game home schedule.

[16] The decision to include age categorical variables for a ten year period after a stadium opens was based on the prior belief that the honeymoon effect would not be significant for roughly more than ten years. The step function is used in order to smooth out small spikes in the plateaus of the stadium effect that were collectively insignificant. As such, the number of categorical age variables is arbitrary, but proved to be significantly large enough to test the hypothesis posed in the paper.

[17] An alternative specification tested used two sets of interactions, $AGE0GOOD_{it}$ – $AGE2GOOD_{it}$ and $AGE0BAD_{it}$ – $AGE2BAD_{it}$, where the GOOD and BAD indicators represent teams which are more than one standard deviation above or below .500 ball (that is, winning half their games) in season *t*, respectively, but this specification returned the same qualitative results.

[18] In addition to the expansion franchises listed above, there are new team effects for the following franchise moves: 1953 – Braves; 1954 – Browns/Orioles; 1955 – Athletics; 1958 – Dodgers and Giants; 1966 – Braves; 1968 – Athletics; 1970 – Brewers; and 1972 – Senators/Rangers. The new team effect was anticipated to be relatively short, so only three lag indicators were created. This set of indicators includes the point of vanishing effects, and the degrees of freedom consumed by the irrelevant additional terms do not present a critical loss.

[19] Cost information is missing for Sportsman's Park (St. Louis), Griffith Stadium (Washington DC), Polo Grounds (New York), Mile High Stadium (Denver), Pilot Field (Seattle), and Jarry Park (Montreal).

[20] Checking for first-order autocorrelation using of the form $e_t = re_{t-1}$, ?= 0.722 and is significant at the 0.01 level.

[21] Note that researchers using the convention of dividing metropolitan population by two for multi-team cities overestimate the impact on demand of another franchise's presence.

[22] Auxiliary regressions were run to determine if this result was being driven by classic stadiums (extreme outliers in cost), but the results were not conclusive.

[23] As mentioned above, it is possible that the legal wrangling normally associated with replacing a stadium means that fans don't expect that the stadium is really going to shut down until the last moment.

[24] The revenue increase results are downplayed here relative to the attendance effects due to the many potential sources of measurement error and the plausibility of the assumptions required to interpret the estimates (e.g. regarding price elasticities of ticket compliments sold by the franchise at the stadium). More attention to these issues is given in Hakes and Clapp (2003), which focuses upon the public finance aspects of MLB stadium construction.

[25] The search for quality-of-play and stadium age interactions was repeated in a separate regression using what team revenue data was available as the dependent variable, and again using an proxy for gate revenue derived fro m real ticket prices and attendance as the dependent variable. The cross-product terms were insignificant in all instances.

[26] Prior to 1977, the Astrodome in Houston, built in 1965 and hailed as one of the marvels of the modern world, was the only domed stadium. In 1977, two domed stadiums, the Kingdome and Olympic Stadium, opened for the first time. The Metrodome opened in 1982 and the SkyDome opened in 1989. An alternative split placed between the domes and the throwback parks (pre- and post-1989) resulted in somewhat weaker distinctions between the subsets.

[27] Sufficient degrees of freedom are not available to test for these effects separately.

[28] Estimated revenues for the multipurpose stadium era, using the real ticket price multiplied by the attendance per game proxy, dropped less pronouncedly than attendance, but still showed a much smaller and shorter honeymoon than modern stadiums enjoy. Furthermore, the longer estimated revenue effect may be due to greater measurement error for ticket prices in large stadiums than small ones.

[29] The effect of a new stadium upon media contracts, which form an increasing proportion of a MLB team's revenues, is unknown. Here, the effect (after controlling for WPCT) is assumed to be neutral, but this potential source of measurement error in our complementarity estimates is a topic ripe for future research.

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Table 1: Summary Statistics for Continuous Variables					
Variable	***Description***	***Mean***	***Std. Dev.***	***Min.***	***Max.***
$LNATTENDPG_{it}$	The natural log of average attendance per game.	9.815	0.49	8.114	10.961
$ATTENDPG_{it}$	The average attendance per game.	20,506.82	9,617.81	3,339.61	57,570.37
$WPCT_{it}$	The winning percentage of the team in the given year.	0.499	0.074	0.248	0.716
$LAGWPCT_{it}$	The 1 year lag winning percentage of the team.	0.499	0.074	0.248	0.716
$ALLSTARS_{it}$	The number of Allstars on the given team in the given year.	2.481	1.621	0	10
$PARKFACTOR_{it}$	The stadium's park factor.	1.005	0.129	0.695	1.719
$LNREALCOST_{it}$	The natural log of the real stadium construction costs.	3.163	1.902	-1.43	7.474
$REALCOST_{it}$	The real stadium construction costs (in $millions)	95.95	192	0.239	1761
$LNPOP_{it}$	The natural log of city population.	8.085	0.617	6.978	9.161
POP_{it}	The city population (in millions).	3.966	2.518	1.073	9.519
$LNCAP_{it}$	The natural log of the capacity of the given stadium.	10.769	0.234	9.926	11.457
CAP_{it}	The capacity of the given stadium.	48,834.38	11,251.40	20,457	94,600
$YEAR_{t}$	The year of the annual data.	1,978.94	14.812	1,950.00	2,002.00
$LNREALTIC_{it}$	The natural log of the real cost of a ticket.	2.443	0.216	1.922	3.637
$REALTIC_{it}$	The real cost of a ticket in dollars	11.806	3.022	6.834	37.982
$REALPAYROLL_{it}$	The real team payroll in millions.	28.538	21.447	2.438	127.719

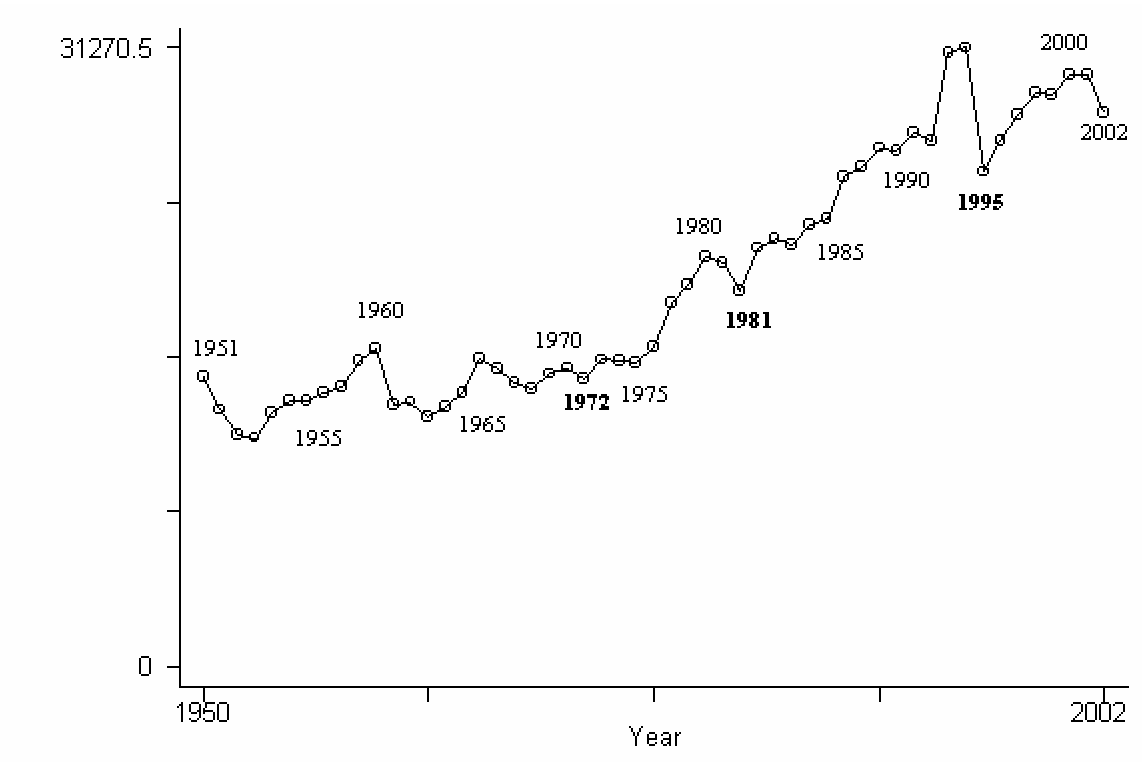
Note: Real money amounts are in 2000 dollars.

Table 2: Counts and Descriptions for Indicator and Interaction Variables			
Variable	***Description***	***Observations in Use***	***Count (List)***
$AGE(0\text{-}2)_{it}$	Team played in a stadium of the given age.	36 (AGE0), 36 (AGE1), 34(AGE2)	AGE0: 1953 Milwaukee County Stadium, 1954 Memorial Stadium, 1955 Municipal Stadium, 1960 Candlestick Park, 1962 Colt Stadium, 1962 Dodger Stadium (Dodgers & Angels), 1962 RFK Stadium, 1964 Shea Stadium, 1965 Astrodome, 1966 Anaheim Stadium, 1966 Atlanta-Fulton County Stadium, 1968 Oakland-Alameda County Coliseum, 1969 Qualcomm Stadium (Jack Murphy), 1970 Three Rivers Stadium, 1970 Cinergy Field (Riverfront Stadium), 1971 Veterans Stadium, 1973 Kauffman Stadium, 1977 Kingdome, 1977 Olympic Stadium, 1977 Exhibition Stadium, 1982 Metrodome, 1989 SkyDome, 1991 Comiskey Park (II), 1992 Camden Yards, 1994 Jacobs Field, 1994 The Ballpark in Arlington, 1995 Coors Field, 1997 Turner Field, 1998 Bank One Ballpark, 1999 Safeco Field, 2000 Comerica Park, 2000 Minute Maid Field, 2000 Pacific Bell Park, 2001 PNC Park, & 2001 Miller Park
$AGE(34\text{-}910)_{it}$	Team played in a stadium of the given two year age range.	58 (AGE34), 56 (AGE56), 58 (AGE78), 54(AGE910)	Stadiums as $AGE(0\text{-}2)_{it}$
$CAGE(0\text{-}2)WPCT_{it}$	The centered cross product of AGE_{it} and $WPCT_{it}$.	36 (CAGE0WPCT), 36 (CAGE1WPCT), 33 (CAGE2WPCT)	Stadiums as $AGE(0\text{-}2)_{it}$
$STAD2_{it}$	Team played in two stadiums during the given year.	4	1970 Pirates: Forbes Field & Three Rivers Stadium, 1970 Reds: Crosley Field & Riverfront Stadium (Cinergy Field), 1989 Blue Jays: Exhibition Stadium & SkyDome, & 1999 Mariners: Kingdome & Safeco Field
$NEWTEAM(0\text{-}2)_{it}$	Expansion team or team moved into new city given number of years previously.	17 (NEWTEAM0), 19 (NEWTEAM1), 22 (NEWTEAM2)	NEWTEAM0: 1953 Braves, 1954 Orioles, 1955 Athletics, 1958 Dodgers, 1961 Twins, 1962 Astros, 1966 Braves, 1968 Athletics, 1969 Padres, 1969 Royals, 1970 Brewers, 1972 Rangers, 1977 Blue Jays, 1977 Mariners, 1993 Marlins, 1998 Devil Rays, & 1998 Diamondbacks

Table 2: Counts and Descriptions for Indicator and Interaction Variables (Continued)			
Variable	***Description***	***Observations in Use***	***Count (List)***
$FINALYEAR_{it}$	The final year of play in a stadium.	22	1952 Braves Field, 1954 Shibe Park, 1957 Ebbets Field, 1961 Los Angeles Memorial Coliseum, 1964 Colt Stadium, 1965 Dodger Stadium, 1965 Milwaukee County Stadium, 1967 Municipal Stadium, 1970 Shibe Park, 1971 R.F.K. Stadium, 1972 Municipal Stadium, 1981 Metropolitan Stadium, 1990 Comiskey Park (I), 1991 Memorial Stadium, 1993 Cleveland Stadium, 1993 Arlington Stadium, 1996 Atlanta-Fulton County Stadium, 1999 Astrodome, 1999 Candlestick Park, 1999 Tiger Stadium, 2000 Milwaukee County Stadium, & 2000 Three Rivers Stadium
$PENULTYEAR_{it}$	The penultimate year of play in a stadium.	22	Same stadiums as $FINALYEAR_{it}$
$CLASSICFY_{it}$	The final year of play in a classic stadium.	8	1952 Braves Field, 1954 Shibe Park, 1957 Ebbets Field, 1961 Los Angeles Memorial Coliseum, 1970 Shibe Park, 1990 Comiskey Park (I), 1993 Cleveland Stadium, & 1999 Tiger Stadium
$CLASSICPY_{it}$	The penultimate year of play in a classic stadium.	8	Stadiums as $CLASSICFY_{it}$
$CLASSIC_{it}$	The stadium was built pre-1950.	373	12 (Braves Field, Cleveland Stadium, Comiskey Park (I), Crosley Field, Ebbets Field, Forbes Field, Fenway Park, LA Colliseum, Shibe Park, Tiger Stadium, Wrigley Field, & Yankee Stadium)
$TEAMSINCITY_{it}$	The number of teams in the city.	1139	16 obs=3 (1951-57 Dodgers, Giants, & Yankees); 206 obs=2 (1962-65 Angels & Dodgers), 1950-54 Athletics & Phillies, 1950-52 Braves & Red Sox, 1950-2002 Cubs & White Sox, 1964-2002 Mets & Yankees; 917 obs=1
$YEAR19(72/81/95)_{it}$	A player strike canceled games in the given year.	22 (YEAR1971), 25 (YEAR1981), & 27 (YEAR1995)	In each year, the Cardinals are the only missing team.

Table 3: Demand for Baseball Games, using GLS Estimation							
Dependent Variable:		$LNATTENDPG_{it}$					
		General Demand Model		Multipurpose Era Model (Pre 1975)		Modern Era Model (Post 1975, Inclusive)	
Variable	***Expected Sign***	***Coefficient***	***Std. Error***	***Coefficient***	***Std. Error***	***Coefficient***	***Std. Error***
INTERCEPT		-25.347***	2.623	-22.980***	3.102	-24.778***	2.591
$CWPCT_{it}$	+	1.744***	0.1	1.755***	0.107	1.746***	0.105
$CLAGWPCT_{it}$	+	0.776***	0.092	0.702***	0.101	0.811***	0.097
$ALLSTARS_{it}$	+	0.028***	0.004	0.032***	0.005	0.028***	0.005
$PARKFACTOR_{it}$	+	0.062	0.048	0.057	0.053	0.066**	0.052
$YEAR_{t}$	+	0.016***	0.001	0.015***	0.002	0.016***	0.001
$YEAR1972_{it}$	-	-0.075**	0.031	-0.071*	0.032	-0.091**	0.042
$YEAR1981_{it}$	-	-0.116***	0.029	-0.134***	0.031	-0.111***	0.031
$YEAR1995_{it}$	-	-0.133**	0.028	-0.162***	0.035	-0.135***	0.029
$LNPOP_{it}$	+	0.187***	0.035	0.196***	0.035	0.210***	0.035
$TEAMSINCITY_{it}$	-	-0.098**	0.041	-0.096**	0.041	-0.105	0.04
$LNREALTIC_{it}$	-	0.113*	0.06	0.082	0.072	0.106	0.062
$LNREALCOST_{it}$	+	-0.041***	0.013	-0.044***	0.016	-0.040**	0.013
$LNCAP_{it}$	+	0.200***	0.062	0.203***	0.07	0.180***	0.063
$PENULTYEAR_{it}$	-	-0.059	0.047	-0.069	0.049	-0.074	0.048
$FINALYEAR_{it}$	-	-0.156***	0.053	-0.171***	0.058	-0.181***	0.051
$CLASSIC_{it}$	-	-0.158**	0.058	-0.205***	0.067	-0.191***	0.057
$CLASSICPY_{it}$	+	-0.1	0.076	-0.078	0.078	-0.096	0.077
CLASSICFYit	+	0.233***	0.078	0.265***	0.086	0.254***	0.081
$STAD2_{it}$	-	-0.053	0.081	-0.145	0.114	-0.026	0.116
$AGE0_{it}$	+	0.365***	0.056	0.368***	0.073	0.317***	0.058
$AGE1_{it}$	+	0.238***	0.053	0.171**	0.071	0.216***	0.056
$AGE2_{it}$	+	0.184***	0.051	0.079	0.067	0.231***	0.055
$AGE34_{it}$	+	0.170***	0.047	0.04	0.06	0.215***	0.052
$AGE56_{it}$	+	0.139***	0.045	0.037	0.057	0.168***	0.051
$AGE78_{it}$	+	0.095**	0.041	0.025	0.051	0.082*	0.049
$AGE910_{it}$	+	0.026	0.034	-0.017	0.041	-0.007	0.042
$CAGE0WPCT_{it}$	+	-0.249	0.355	0.537	0.496	-0.11	0.413
$CAGE1WPCT_{it}$	+	-0.3	0.306	-0.328	0.437	-0.196	0.346
$CAGE2WPCT_{it}$	+	-0.334	0.312	-0.053	0.456	-0.642*	0.468
$NEWTEAM0_{it}$	+	0.143**	0.057	0.071	0.067	0.302***	0.066
$NEWTEAM1_{it}$	+	-0.014	0.053	-0.048	0.062	0.089	0.06
$NEWTEAM2_{it}$	+	-0.022	0.043	-0.015	0.051	0.036	0.049
Wald Statistic		1126.11		953.34		1086.28	
pseudo R^2		0.488		0.49		0.505	
N		1179		992		1065	
***-Significant at the .01 level.		**-Significant at the .05 level.			*-Significant at the .10 level.		

Figure 1: Average Game Attendance in Major League Baseball, 1951-2002



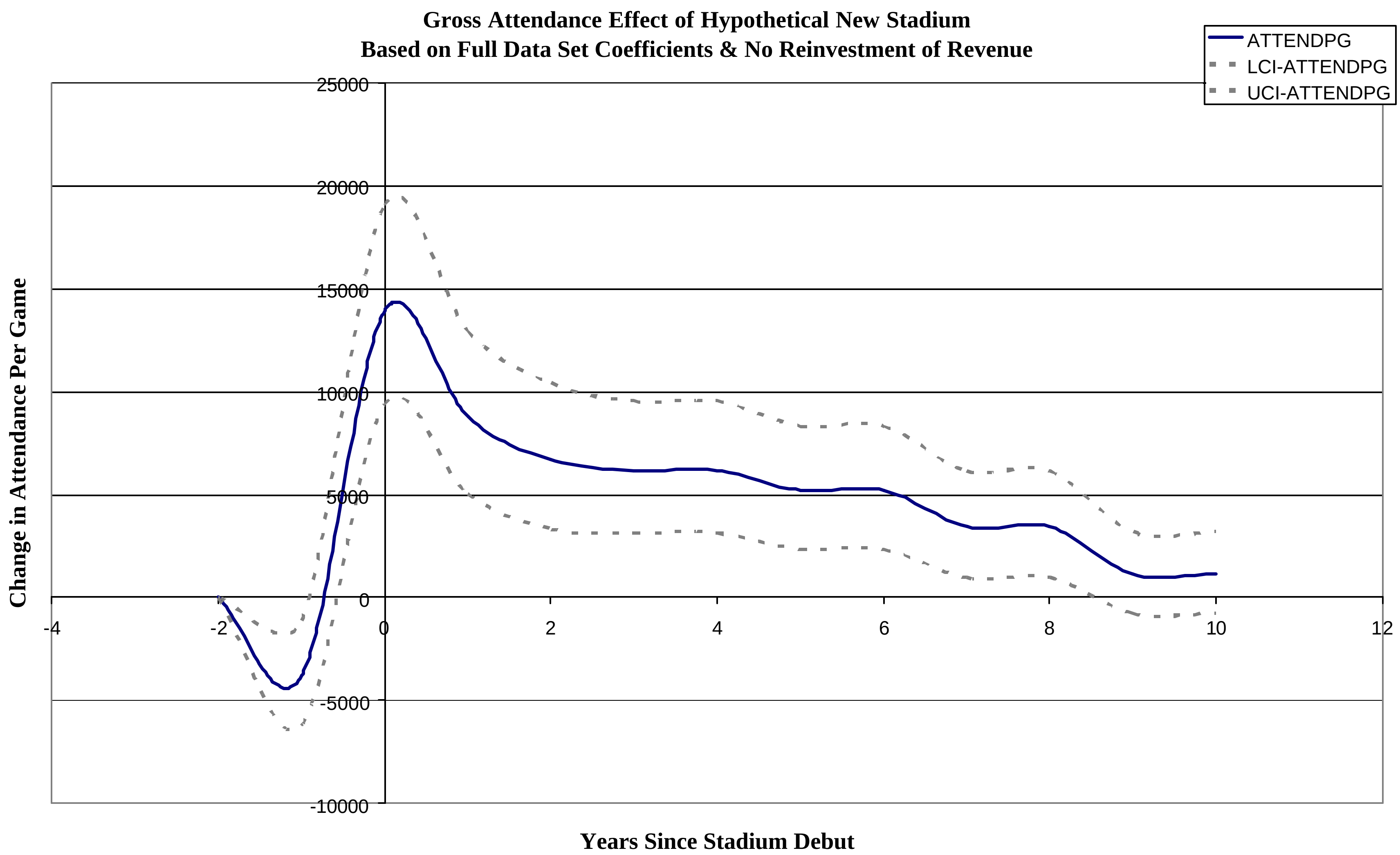


Figure 2: The Honeymoon Effect - Change in Fitted Attendance after the Construction of a Hypothetical New Stadium

Figure 3: Optimal Quality of Play With Honeymoon Effects, With and Without Interaction Between Win Percentage and New Venue