The Edifice Complex: The Economics of Public Subsidization of Major League Baseball Facilities

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ABSTRACT

Using a panel of Major League Baseball team attendance data for the period 1950-2003, we determine that after controlling for team quality and other factors, a new modern era ballpark adds 27-36% to total attendance over a ten-year period and on average generates present-value stadium revenues of $133 million for the franchise. We further find that due to non-complementarity between new stadiums and team success, team profits are maximized when an owner "pockets" increases in revenue rather than reinvesting in the on-field quality of the team. Since the construction costs for this group of ballparks, consist of $77 million in private money and $199 million in public funds, we find two important implications for public finance: First, the revenue estimates are less than the typical cost of most modern stadiums, indicating that the projects generate positive rents for team owners only due to public subsidization. Second, the ratio of recipient benefits to subsidy expenses indicates that spending on construction of replacement stadiums is less than 30 percent as effective as a direct lump-sum payment to the franchise owner.

I. INTRODUCTION

Expenditures on facilities in all professional sports escalated during the 1990s, with Major League Baseball (MLB) franchises actively participating in the construction wave. Fourteen new MLB facilities were built during the period from 1991-2003 at a total cost of $3.69 billion.[1] By comparison, during the period from 1974-1991 only five new stadiums were built.

The large investments in MLB venues during this most recent construction wave have not been undertaken by the owners of the baseball franchises alone, as the local city, county, and state governments have cooperated with planning and financing of the new ballparks, and in most cases hold legal title to the facilities and responsibility for managing their day to day operations. Public funding of the fourteen new MLB ballparks from 1991-2003 averaged 72.3 percent of stated costs.[2] The total real cost of the twelve facilities retired during this period amounted to less than half of the *publicly financed* portion of their replacements.[3]

There is a large body of literature researching the question of why local governments participate in the financing of sports venues. This literature can be divided into two main subsets. The first examines the ability of these projects to create economic stimulus for their regions, a hypothesis that is rarely supported in the existing case studies. The second features franchises exerting their market power to collect consumer surplus from local residents through government subsidization. In this second category of research, it is often either asserted or implied that when the subsidy is in the form of stadium construction, teams are expected to use

[1] These numbers do not include Petco Park ($427m, including land and infrastructure) in San Diego or Citizens Bank Park ($323m) in Philadelphia, both of which opened in 2004 and are not in our dataset. Costs throughout the paper are expressed in year 2000 dollars unless stated otherwise.
[2] These percentages exclude the implicit subsidies which frequently result from issuing federal income tax-exempt bonds to finance portions of the projects.
[3] We do not have cost information on Mile High Stadium in Denver, and Bank One Ballpark was built for an expansion team in Phoenix that did not have an existing MLB facility.

the increased revenue stream to improve the quality of play of the team, further increasing the value of the public good that fans receive (Cagan and deMause, 1998).

The economic logic behind this reinvestment promise relies upon the complementarity between new stadium amenities and team quality-of-play. If the goods are complementary, a team generates more marginal revenue per win in the new ballpark and is willing to spend more on payroll than in its old stadium. But Clapp and Hakes (2005) have found that attendance effects from new ballparks are independent of quality of play, suggesting that team profits might be higher if owners simply "pocket" the revenue streams from the new ballparks.

We expand upon these earlier findings by using publicly available revenue data to confirm that independence between quality-of-play and stadium amenities holds after controlling for ticket pricing choices by the franchises. From our panel data regression results, we estimate the discounted revenue stream from a hypothetical new stadium under reinvestment and no-reinvestment scenarios and use that to demonstrate that the net subsidy to franchise owners is substantially higher when they choose *not* to reinvest a portion of their new stadium revenues in team quality of play.

This finding has an important implication for communities contemplating construction subsidies. Given that the value of the public good will not be increased by a new ballpark due to non-complementarity between new stadiums and winning, that value can be obtained more efficiently without construction, which requires an average of $199 million in public expenditures to create $56 million in transferred rents. A city already having a functional facility would be much better off subsidizing the franchise with cash than by having over 70 cents of every dollar spent leak away as it assists with construction of a replacement ballpark.[4] The $143

[4] This assumes that there is an existing facility which is physically suitable for play, which is the case for all of the non-expansion teams in our sample (see Cagan and deMause (1998) for further discussion on what constitutes a

million average welfare loss quantifies the cost of conferring local funds to teams through tangible structures rather than through more efficient forms. These curious preferences are occasionally referred to flippantly as an "edifice complex" held by public officials

Section II of the paper briefly discusses the background literature on estimation of demand for MLB games and public involvement in aspects of stadium construction. Our theory in Section III presents the franchise and fan objective functions and generates testable hypotheses as to franchise behavior given the relationship between stadium amenities and team quality-of-play. Section IV discusses our panel dataset using MLB franchise-level observations from 1950-2003, and sets forth our empirical model. Section V presents our panel-data regression results and demonstrates the independence of quality-of-play from stadium amenities. Section VI uses the parameter estimates from the regression to construct revenue streams from a hypothetical new ballpark under partial reinvestment and no-reinvestment scenarios to quantify the net subsidies to franchises under each scenario and confirm that profit-maximizing franchises would not reinvest a new stadium's revenue stream in quality-of-play improvements. Section VII concludes the paper.

II. BACKGROUND LITERATURE

As Noll and Zimbalist (1997) and Zimbalist (2003) have described, teams use their monopoly power over the quantity of MLB quality baseball games available in a given city to extract public subsidies for their stadium construction costs. PNC Park in Pittsburgh, which opened in 2001, provides an example of this franchise rent-seeking at work. Construction and land acquisition for the stadium cost $262 million, but the project was bundled with the construction of a new stadium for the city's National Football League (NFL) team, the Steelers,

"suitable" site, using Detroit's Tiger Stadium as a case study) and that the subsidy be given in conjunction with contractual obligations that the franchise remain in the locality for a length of time similar to those in a stadium lease.

the demolition and debt retirement of Three Rivers Stadium, and other area capital improvements for a total cost of $803 million. Of this total, the Pirates and Steelers were responsible for only a total of $85 million, with the remaining funding coming from a variety of bond initiatives, taxes, government contributions, and other sources.[5]

An ever-increasing body of literature overwhelmingly declares such investments to be ineffective at creating jobs or boosting local economies, although new ballparks do increase attendance significantly through a novelty effect and create corresponding marginal revenue streams for franchise owners.[6] An alternative rationale for subsidization, as described in the introduction, suggests that public contributions to a new facility will allow the home team to use new stadium revenues to acquire a more potent roster of players through free-agency, and better compete on the field against more well-heeled rivals, increasing consumer surplus for taxpayers who follow the team. Alexander, Kern and Neill (2000), Johnson and Whitehead (2000), and Fenn and Crooker (2004) have attempted to quantify this surplus.

If stadium revenues are used to improve team quality of play, it is possible that the value of the public good provided by the team is higher after a new ballpark is built. But Clapp and Hakes (2005) suggest that the incentive to reinvest stadium revenues into the team does not exist. Their regression analysis demonstrates that the increase in team attendance (and, with some assumptions, stadium-related revenues) attributable to a new playing facility is statistically the same for both "good" and "bad" teams. Stated another way, the boost to stadium-related revenues is the same as a team improves regardless of the novelty of its playing facilities. Unless the franchise is operating under a binding borrowing constraint which would be loosened by the

[5] These details were obtained from the website www.ballparks.com.
[6] Noll and Zimbalist (1997) and Zimbalist (2003) discuss the job creation and economic impact of new venues. The attendance impact upon the franchise has been estimated by Coates and Humphreys (2005) and Clapp and Hakes (2005). Depken (2003) examines increases in team revenues at new facilities.

stadium-specific revenue increase from constructing a new stadium, the argument that a new ballpark will lift up the on-field performance of a franchise by its bootstraps is invalid.

III. THEORY

We model the demand for tickets to a MLB game as a function of ticket price, the attractiveness of the game on the field (team quality of play, exhibitions of talent by All-Star caliber players, etc.), the amenities of the venue, and the characteristics of the geographical market in which the franchise plays its home games. More formally, in each season (*t*)

$$q_t = f(p_t, w_t, w_{t-1}, a_t, m_t) \tag{1}$$

where q is the quantity of tickets sold per game,

p is the ticket price,

w is a vector including the win percentage of the team and other measures of quality of play,

a is a vector of stadium amenities, including its novelty, and

m is a vector of market characteristics.

The functional form is here left indeterminate, and will be discussed more as we present the empirical model. In particular, we leave open the possibility that the cross-product between quality-of-play and stadium amenities, $w \times a$, is non-zero.

The franchise objective may be similar to that of other firms, to maximize its discounted stream of profits. But given the nature of sports leagues, which compete on the field as well as off, we leave open the possibility of what has been termed the "sportsman owner." In this theory, the ownership has a multi-argument utility function in which both the net present value of future profits *and* quality-of-play (particularly in the form of championships) are valued. To maintain the generality of the model, we present the owner's utility as

$$U = g(p_t \cdot q_t(p_t, w_t, w_{t-1}, a_t, m_t),\ c_t,\ R_t(w_t, a_t),\ \delta,\ w_t(c_t)), \quad (2)$$

where U is the owner's utility, and

g( ) sums time-discounted values of the annual variables:

p is the price of tickets,

q is the demand for tickets, as in equation (1),

c is the competitive cost of player talent,

R is the sum of non-ticket team revenues,

δ is the (assumed to be constant) discount rate of the owner, and

w is the team's quality of play.

If the owner is a profit-maximizer, quality-of-play will only affect the owner's utility indirectly, and the final term in equation (2) will become irrelevant. In such a case, the owner's utility could be expressed by his discounted valuation function

$$V = h(p_t \cdot q_t(p_t, w_t, w_{t-1}, a_t, m_t),\ c_t,\ R_t(w_t, a_t),\ \delta). \quad (3)$$

If the owner is a sportsman, however, the final term in equation (2) will significantly influence his management decisions.

IV. METHODS AND DATA

Our approach is to adapt the dataset from Clapp and Hakes (2005) to estimate per game attendance and ticket revenues directly. After making assumptions about the proportionality of other team revenues to ticket revenues, we will use the parameters from the demand equation to construct discounted revenue streams for a hypothetical team under two scenarios which can be thought of as illustrating profit-maximizing and sportsman objectives.[7] Comparing case study

[7] We detail these assumptions in Section IV and discuss the consequences of their potential invalidity in Section IX.

outcomes to the two scenarios will in some cases allow us to make inferences about owner objectives.

The demand estimation results from a generalized least squares regression upon panel data where the observational unit is the franchise-season. The panel data records annual statistics for franchise i ($i \in 1, \ldots, n$) in year t ($t \in 1950, \ldots, 2003$), where n is the number of franchises in existence in year t. 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.[8]

The regression equations estimated are,

$$\ln(q)_{it} = \alpha + \beta_1 p_{it} + \beta_2 w_{it} + \beta_3 a_{it} + \beta_4 m_{it} + \gamma (w \times a)_{it} + \varepsilon_{it} \quad (4a)$$

$$\ln(pq)_{it} = \alpha + \beta_2 w_{it} + \beta_3 a_{it} + \beta_4 m_{it} + \gamma (w \times a)_{it} + \varepsilon_{it} \quad (4b)$$

The dependent variable in the first model 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-altered seasons in 1972, 1981, and 1994-95.

As MLB franchises face negligible marginal costs, and as seating capacity, ticket prices, and other stadium goods prices are endogenously chosen, it would be theoretically preferable to estimate stadium-related revenues than attendance. But as this data only exists for a very limited time series, we have opted to estimate attendance effects, for which measurements are more reliable, as well as estimated gate revenue from available ticket price data for the entire time series in order to observe the robustness of the parameter estimates for the control variables.

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[8] 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.

Real ticket prices ($REALTIC_{it}$) used are from the archives of the SABR Business of Baseball Committee, and have been converted into logarithmic form after adjusting for inflation using the Consumer Price Index.[9] 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 Team Marketing Report's Fan Cost Index, calculated from 1991-2003. We will use these more complete recent data series in our case study estimation of revenue effects from a hypothetical new ballpark, but in order to preserve degrees of freedom in our panel regression, we will proxy for stadium revenues with $LNRGATEPG_{it}$, which is the logarithm of real ticket price times per game attendance. While imperfect, estimation of logged real per game gate revenue will give us unbiased estimates of revenue growth to the extent that non-gate stadium revenues are proportional to gate revenues, and allows us to separate price and quantity effects on revenue growth.[10]

To control for the economic and general market factors affecting ticket demand, we include a linear time trend ($YEAR_t$), fixed-effect indicator variables (YEAR1972, YEAR1981, and YEAR1995) that control for the effects of labor strikes, the natural logarithm of Metropolitan Statistical Area population ($LNPOP_{it}$), and an indicator variable ($TEAMSINCITY_{it}$) to account for the presence of multiple teams in the same metropolitan area.

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[9] Prices represent the cost of a ticket for club seats equal to the highest priced regular seats. Ticket price, Team Marketing Report's Fan Cost Indices (reported in USA Today), and team revenue and payroll data are from http://www.roadsidephotos.com/baseball/earlyticketprices.htm, a site maintained until his death by the late SABR Business of Baseball committee chair Doug Pappas. A great deal of literature critiques the ability of ticket prices to adequately capture the expense of going to a baseball game, but this is the best time-series data available that precedes the mid-1980s.

[10] The Financial World data, which are probably more reliable than the TMR data, suggest that stadium revenues have recently been growing somewhat faster than gate revenues, implying that the revenue growth estimates that follow will be downward biased.

Team on-field quality of play is measured by centered win percentage in the given season $CWPCT_{it}$, and the previous season's centered win percentage, $CLAGWPCT_{it}$, as in Scully (1974).[11] 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.

The other selected measures of a team's marquee drawing power and game excitement are the number All-Stars on the team ($ALLSTARS_{it}$) and the effects of scoring ($PARKFACTOR_{it}$).[12] Other park-specific demand factors not involving stadium age are the natural logarithm of real stadium cost ($LNREALCOST_{it}$), which proxies for the level of ballpark amenities, and the natural logarithm of stadium capacity ($LNCAP_{it}$).[13]

The positive attendance effects of a new venue can be expected to be at least partially offset by diminished attendance at the existing facility if fans refrain from attending games until the new ballpark is open. To measure this effect, indicator variables were created for the penultimate year ($PENULTYEAR_{it}$) and final year ($FINALYEAR_{it}$) the previous stadium was in use. Another indicator variable ($STAD2_{it}$) is used to pick up the effects of the multiple venues in a given season on attendance.

The indicator variable $CLASSIC_{it}$ and its interactions with $PENULTYEAR_{it}$ and $FINALYEAR_{it}$ are also included to distinguish between classic (pre-1950) and multipurpose (1950-1974) stadiums. The differential intercept allows for lower typical levels of attendance at the older generation of ballparks due to their having lower amenity levels relative to the newer

[11] The purpose of the centered statistics, which measure the deviation of a team's winning percentage above or below the mean of .500, is to reduce multicollinearity when these variables are used to form cross-product variables.
[12] A "pitcher's park" will thus have a park factor < 1, while a "hitter's park" will have a park factor >1. The park factor and winning percentage 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."
[13] As capacity constraints affect only a small fraction of the observations, the point estimate is not expected to be large, but should be positive.

ballparks. The $CLASSICPY_{it}$ and $CLASSICFY_{it}$ terms measure nostalgia effects from loss of an historical landmark. Similarly, ballparks built in 1991 or later are identified with another indicator variable, $MODERN_{it}$.

Stadium age is recorded as zero for the year the stadium opened for baseball, with the value increasing by one for each subsequent year, and reset to zero in cases where stadiums were completely renovated or rebuilt. Three one-year, five two-year, and one three-year stadium age categorical variables ($AGE0_{it}$, $AGE1_{it}$, $AGE2_{it}$; $AGE34_{it}$, …, $AGE1112_{it}$; and $AGE1315_{it}$) were generated from stadium age to reflect the magnitude of the honeymoon attendance effect, which decreases to zero over time as the novelty of a new stadium fades.[14]

To measure demand complementarity between new stadiums and quality-of-play, a set of interaction terms records the cross-product of stadium age and team win percentage, $CAGE0WPCT_{it}$, …, $CAGE2WPCT_{it}$.[15] If there is complementarity between new stadiums and quality of play, the interaction terms would produce positive coefficients. Similarly, a cross-product, $MODERN*CWPCT_{it}$, is used to see if new ballparks change the attendance or revenue elasticity of winning.

As a new franchise in a city should generate additional excitement that a new stadium alone does not, we differentiate between the novelty effect of an expansion or relocating team and the impact of a stable franchise moving into a new park in the same city with a set of indicator variables ($NEWTEAM0_{it}$ – $NEWTEAM2_{it}$).

[14] 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.

[15] An alternative specification tested used two sets of interactions between the stadium age indicators and indicators that 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. Additional terms testing for interactions beyond the second year were all insignificant.

Summary statistics appear in Table 1. Of 1262 potential observations, 53 observations are lost to lack of construction cost information for some ballparks, and another 100 observations from the last two seasons before and the first three seasons after the opening of non-modern era ballparks are omitted to avoid biasing the coefficients of the control variables. The remaining 1109 observations are used in the regressions to follow.

The mean attendance is about 21,462 fans per game, increasing from about 13,000-15,000 fans per game in the 1950s to mid-1970s to about 30,000 fans per game in 2000. This is in contrast to mean stadium capacity, which has changed less dramatically. Mean stadium capacity increased from about 41,700 in 1950 to about 52,000 in 1993, and has declined to just over 46,000 in 2003. Real ticket prices have increased steadily over the time period of the panel from about $10.25 (in 2000 dollars, about $1.60 in 1950 dollars) to $17.51 in 2003. 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.

V. PANEL DATA EMPIRICAL RESULTS

The generalized least squares (GLS) results are reported in Table 2, which have been corrected for heteroskedasticity and first order autocorrelation within panels. As modern era stadiums, defined as opening in 1991 or later, are most relevant for public policy decisions, we present only these estimates.[16] The results of the initial estimated equation (4a) on logged attendance appear in columns 3 and 4 of Table 2. Alongside the attendance results, the equation (4b) model for logged real gate revenues is presented in columns 5 and 6. Comparison of the two sets of results allows for isolation of price and attendance effects upon per game revenue.

[16] One limitation of this cutoff, which coincides with the first HOK-designed ballpark, is that there is only 13 years of data for even the oldest of these ballparks (at US Cellular Field, in Chicago). The lack of observations for multi-year lagged values complicates accurate estimation of the tail end of the honeymoon effects.

The estimated regressions explain about two-thirds of the variation in attendance and gate revenues about the mean, and the vast majority of the included variables have parameter estimates with the expected sign and which are statistically significant.

By placing the attendance and gate revenue estimates side by side, one can see the similarities between the attendance effects and the proxied stadium gate revenue effects. The most salient differences between the two sets of results are in the magnitudes of the various AGE_{it} indicators for new venues, and in the increase in baseline revenue associated modern facilities.

Combining the baseline revenue increase for a modern stadium and the time trend stadium age indicators, the total change in revenue is of greater magnitude than the change in attendance. For example, in the debut year of a modern ballpark for a team leaving a multipurpose stadium, per game attendance is expected to be about 45% over baseline (as the differential intercept indicator is not statistically different from zero.) Real per game gate revenues, however, are expected to be 68.8% higher. The full revenue effect of a new stadium is through a combination of price and quantity effects. The total derivative for gate revenue is

$$\partial TR(q(p,X),p) = \partial TR/\partial q \cdot \partial q/\partial p \cdot \partial p + \partial TR/\partial q \cdot \partial q/\partial X \cdot \partial X + \partial TR/\partial p \cdot \partial p \qquad (5)$$

where X represents the vector of all non-price determinants of quantity.

The attendance model's estimates of stadium age effects ignore the final term, which is particularly important for stadiums near full capacity. The differences in magnitude between the various AGE_{it} indicator coefficients in the two models vary as stadium novelty wears off and team owners adjust ticket prices back accordingly, slowing the attendance decline through price signals.

Given the similarities in the results, we focus upon the gate revenue estimates, which are more relevant for policy despite the possibilities of additional measurement error.

Both of the winning percentage variables have positive coefficients. These coefficients confirm that gate revenues are 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 purchase tickets before the season begins. For modern era ballparks, however, the net magnitude is much smaller than at older stadiums. The two-year "long-run" effect of increases in quality of play, $CWPCT_{it}$, is 2.88 at multipurpose stadiums, but only 1.53 at modern era ballparks, due to the negative differential slope cross-product.[17] Revenues for teams in modern ballparks are less sensitive to winning than revenues for teams in multipurpose stadiums. For a team in a multipurpose stadium, one additional win in the current season (0.00617 increase in $CWPCT_{it}$) would expect a gate revenue boost of about 1.16% (about $5,691 per game, or $461,000 for the season, at the year 2002 mean attendance of 28,003 and real ticket price of $17.52) 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 in a multipurpose home stadium is 1.78% (about $707,000) above its otherwise equal counterpart. The value of that win in a modern era ballpark, however, is only about $375,000.

The positive coefficient on the number of All-Stars provides evidence that player star power also provides an attendance boost. The offensive park factor variable is positive, but not very significant, suggesting that fan preference for higher-scoring games is not as strong as sometimes argued.

[17] A cross-product between the modern stadium indicator and centered lagged win percentage was included in an alternate specification, but was statistically insignificant.

The positive coefficient on the $YEAR_t$ variable quantifies the growth in baseball revenues over the sample period. 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, as evidenced by fan bitterness at the gates in 1995. The similarities between the attendance and gate revenue parameters show that teams did little to maintain attendance by adjusting prices after the strikes.

The coefficient on logged population 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 0.20% per game. Teams in cities large enough to accommodate multiple teams, however, will see attendance per game fall by 9.2% for each additional team in the city, with revenue falling as similar amount.

The parameter estimate for real ticket price in the attendance model, which measures the own price elasticity of demand for baseball games, is unexpectedly positive. This can be explained in several ways, including endogeneity, the measurement errors mentioned previously, or multicollinearity between real ticket prices, real stadium costs, and the time trend. As our concern here is to control for heterogeneity in prices and not to estimate price elasticity, we ignore the counter-intuitive result, as it does not interfere with our interpretation of the coefficients of interest.[18]

The insignificant coefficients on real stadium cost and stadium capacity in the revenue equation clearly demonstrate the change of franchise emphasis from quantity of tickets sold in the multipurpose stadiums, to fewer tickets at higher prices in the modern facilities. The results

[18] Marburger (1997) has argued that ticket price coefficients may suffer from omitted variable bias due to the bundling of tickets with parking and concession items. Alexander (2001) has obtained more reliable estimates of ticket price elasticity by including prices of substitute entertainment goods in his demand estimation model.

indicate a negative impact of facility cost and a positive impact from releasing capacity constraints upon attendance, which is due to the higher costs of modern mid-capacity ballparks relative to their multipurpose predecessors. Once ticket prices have been factored in, however, the faint revenue effects of opulence and capacity are negligible.[19]

To some extent, that pattern can be seen in the various stadium age indicators themselves. The $AGE0_{it}$ revenue coefficient plus the baseline $MODERN_{it}$ effect is approximately one and half times as large as the respective attendance effect (ignoring the statistically insignificant coefficient on $MODERN_{it}$ in the attendance model), resulting in 23% more revenue per game due solely to price effects.[20] While the attendance effect disappears after the tenth year, the stadium age coefficients fall faster in the gate revenue model, reaching a permanently positive increased steady state level after six years.

The coefficients for the retiring stadium indicators show that different pricing techniques were used in multipurpose and classic ballparks in their twilight. While there were neither significant attendance or gate revenue effects at the multipurpose stadiums, the classic ballparks closed to attendance totals 44% higher than their benchmark level, although gate revenues were not significantly increased.[21]

The coefficients on the new team indicators show that, as hypothesized, there is an increase in attendance due to novelty as a team first arrives in a city. This attendance boost only

[19] Bear in mind that a large proportion of a new stadium's revenues are from non-ticket merchandise and services, which may be growing faster than gate receipts.

[20] Real ticket prices for the first season at new stadiums for existing franchises rose an average of 37% over the price from the previous season during the post-1975 era, from $11.75 to $16.15. Some of these effects will be captured in correlated variables, such as real stadium cost.

[21] The obvious question here is, "Why would teams in classic stadiums drop prices to increase attendance at the old park, while teams in multipurpose stadiums did not?" One possibility is that lower prices represented a public relations move by teams to soothe fan resentment over the abandonment of a beloved landmark, whereas multipurpose stadium teams were not so constrained. Another is that dwindling attendance (and fan interest) is easier to notice in smaller parks. Neither of these stories is completely satisfying, but further exploration of this matter is beyond the scope of this paper.

occurs for the team's first year in the new city, but results in a 38% increase in per game revenue 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 and ticket prices as a baseline, this would result in an additional $15 million in gate revenue over the course of the first season for the new team.

As Zimbalist (2003) noted, the short-lived attendance success of the recently-built stadiums in Detroit and Milwaukee, 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. Yet, despite the existence of the honeymoon effect found in the differential intercepts, the stadium age and win percentage cross-products have no statistically significant impact on attendance and gate revenue in the first years of the new ballpark, and have an unexpected negative coefficient on fan elasticity to quality-of-play. The lack of significantly positive parameter estimates 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. Moreover, the negative cross-product between modern ballparks and win percentage indicates that the new stadiums actually *decrease* a profit-maximizing team owner's demand for wins, as the marginal revenue from an additional win is diminished in the new venue.

VI. NET REVENUES RESULTING FROM A NEW BALLPARK

Why the Novelty Values of New Ballparks Vary

Because of the lack of positive demand complementarity between on-field success and a new facility in either model specification, the question as to why honeymoons are of varying durations still stands. The most likely source of variation arises from ownership choices over whether to reinvest the revenue flows from the new stadium into team payroll in order to increase team quality.

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 not be increased.[22] There are other sets of plausible assumptions, such as the sportsman owner discussed in Section III, that also might lead an owner to reinvest at least some of the cash flow into team payroll. If this reinvestment of cash flow occurs, the resulting increases in win percentage indirectly attributable to the new venue will increase the duration of the initial series of sellouts beyond that which would be witnessed for the profit-maximizing owner.

<u>The No-reinvestment Scenario</u>

Our first hypothetical scenario assumes that an existing team in a multipurpose stadium with average values for all continuous variables opens a new ballpark in the same city in 2004, after having drawn the 2002 MLB average attendance of 28,003 fans per game as the baseline attendance. It is assumed that the owner factors the attendance decrease due to the final year in the stadium effect into his construction costs, which are deferred.

Given the high likelihood of measurement error in the real gate revenues proxy, its inability to account for non-ticket stadium revenues, and the less critical need for a long time

[22] 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 win percentage) is assumed to be neutral, but this is a topic ripe for future research.

series, the attendance increases estimated by the coefficients on the stadium age indicators in the model for the modern era ballparks are converted into revenue estimates with the aid of an auxiliary regression. For the seven years in which team gate revenues and stadium revenues are known (1990-1996), we calculated the sum of these revenues per fan, and converted the sums into year 2000 dollars. Ordinary least squares regression upon real fan revenues per person as a function of real ticket prices and time trend produced the equation:

$$REALFANREVPP_{it} = -1173 + 1.029\ REALTIC_{it} + 0.591 YEAR_t;\ \ R^2 = 0.42. \qquad (6)$$

Substituting the mean real ticket price for 2002 into the equation, we obtain estimated real fan revenue per person of $29.10, or $2,357 per additional fan per game over an 81-game home schedule.

From equation (1) we know that estimating the revenues generated from new fans is only one portion of the additional revenue stream from a new ballpark. The final term of equation (5) represents revenue from price increases to existing customers. For the five ballpark openings (Chicago, Baltimore, Cleveland, Denver, and Arlington) for which Financial World data was available, the average fan revenue for the last season in the old stadium was $13.39, which increased to $22.38 in the new stadium. Scaling those revenues to the level where the new stadium fan revenue is the $29.10 figure estimated above, this results in a baseline of $17.41 in fan revenue per person per game. The additional $11.69 in revenues collected for each the 28,003 baseline attendees over 81 games results in $26.52 million of additional stadium revenue annually for our hypothetical franchise.

The total estimated attendance and revenue effects of this no-reinvestment scenario are shown in Panel A of Table 3. The attendance boost is nearly 15,800 fans per game as the stadium debuts, and slowly fades to about 5,080 fans in years 7 and 8 before reverting to baseline. The total attendance effect over the first twelve years after the stadium opens is 6.77 million fans, an average increase of over 27% per year. At $29.10 per additional fan, and discounting at a 10% annual rate, the net present value of the additional revenues is about $133 million, with a 95% confidence interval ranging from about $50 million to $230 million.

The 50% Re-investment Scenario

In the no-reinvestment hypothetical, the revenues generated by fans drawn to the new ballpark are simply pocketed by the team owner, who leaves the team at its baseline level of quality (assumed to be .500). That scenario is consistent with our results of non-complementarity and the assumption of a profit-maximizing owner. As noted by Depken (2003), franchises attempting to persuade local communities to provide public funds for new ballparks, however, often imply that the additional revenues from a new home would be at least partially used to improve team quality of play. Furthermore, recent research by Quinn et al. (2003) finds some evidence of improvement in MLB team quality of play for the 3-year and 7-year periods after a new park opens compared with the corresponding periods prior to the debut. While this result may be open to question for reasons we illustrate below, we now consider a scenario in which a portion of additional revenue is used to augment the team's player payroll and is converted into additional wins using a relationship determined from an auxiliary regression.

Following Quirk and Fort (1997), we assume that there is a sigmoidal relationship between payroll and team winning percentage, where the marginal effect of increased payroll upon win percentage is higher for mediocre teams than for very bad or very good teams. The rationale is that bad teams will have numerous holes to fill before they begin to improve, while good teams will have little room for improvement and face diminishing returns. To estimate this relationship for MLB's present economic conditions we use a grouped logit model to relate

$WPCT_{it}$ to $REALPAYROLL_{it}$, for the years 1995 to 2002, and controlling for wage inflation using $YEAR_t$ as a trend.[23] Although the regression explained only 32% of the variation in win percentage about its mean, the coefficient on real player payroll, 0.0084, was significant at the 0.01 level. That coefficient is used as a proxy for the relationship between win percentage and team payroll in order to estimate the indirect increases in attendance due to increased team quality-of-play for the reinvestment scenario. Zimbalist (2003, 71) shows that payrolls for MLB teams currently amount to slightly over half of team revenues, and we assume 50% of the additional stadium revenues are to be reinvested into the team for that scenario.[24]

The effects of those additional wins increase attendance per game that year and the following year as dictated by the coefficients on centered win percentage and lagged win percentage shown in columns 3 and 4 of Table 2. The net present value of the resulting revenue stream is calculated as in the no-reinvestment scenario, using a discount rate of 10% to represent the opportunity cost of the capital involved. Panel B of Table 3 shows the numerical results of the 50% reinvestment scenario, where a larger and longer-sustained attendance boost results from the improved team quality-of-play. Although the attendance boost is larger with reinvestment, the net present value of the revenue increase, net of payroll increases, is smaller. Because the additional payroll outlays exceed the revenue from the additional fans attracted through better team quality-of-play, the expected net revenues from the new stadium are only $85.6 million in this scenario.

[23] Zimbalist (2003, 44) shows a structurally different relationship between team payroll and performance between collective bargaining agreements such that payrolls influence win percentages at the 0.01 significance level after 1995, but with much less significance during prior agreements.

[24] If some portion of stadium costs are distributed within each season of the scenario, the revenues available for reinvestment will be diminished appropriately. We ignore the cost side for this hypothetical for the purpose of showing the greatest possible contrast to the no-reinvestment scenario.

Figure 1 displays the changes in win percentage an owner would see under the 50% reinvestment scenario compared to the baseline win percentage of .500 with no reinvestment. Win percentage peaks at .567 (91.9 wins in 162 games) in year one and slowly trails off until reaching .537 (87.0 wins) in the tenth year. These increases in win percentage represent an expected increase of more than one standard deviation, enough to make a mediocre team a playoff contender during the honeymoon period.

Figure 2 overlays the estimates from Panels A and B of Table 3 to demonstrate the increased revenues resulting from positive feedback between win percentage and revenues if previous cash flow increases are reinvested in team quality-of-play. The graph provides one possible explanation for the observed variation in the length and magnitude of the periods of high observed attendance at new stadiums (as opposed to the "honeymoon", which we use to refer solely to the effects not associated with team quality-of-play). Table 3 show that teams that reinvest half the newly-generated stadium revenues draw about 33% more additional fans to their games over the course of the honeymoon period, but obtain net revenue streams that are 36% lower in net present value terms due to the costs of the additional player talent. Despite the positive feedback provided through reinvestment, attendance and win percentage eventually regress to the mean.[25] The number of fans staying home as past wins recede into history outnumbers the new fans attracted by current success. An example of this is can be seen in the Atlanta Braves, who after many years of success found themselves winning games in front of increasing numbers of empty seats until late in the season and wondering how long the front office would continue to maintain high payrolls.

[25] As a sensitivity test, we found that attendance and win percentage would return to their original equilibria even with 100% reinvestment, but the estimated peaks on the time series occur at implausibly high levels, and the duration of above average attendance is prolonged several years.

The two scenarios outlined above serve to illustrate the potential stimulus available to a franchise with a borrowing-constrained owner intent on increasing team quality-of-play. While there may be other valid explanations for the very different attendance honeymoons following the opening of the stadiums in Cleveland and Detroit, the hypotheticals presented above illustrate the possibility that those outcomes arose not from a lack of fan loyalty in Detroit nor from "incompetence" in team management, but from different ownership preferences for profits versus on-field success.

VII. DISCUSSION AND CONCLUSIONS

Caveats

There are several sources of uncertainty in these calculations of which we wish to remind readers. One concern which could affect the verdict on the desirability of new stadiums is measurement error in stadium cost figures. It is difficult to determine from most media reports whether the stadium cost numbers reported by teams represent net present value or simply a total construction cost, or how the figures account for land prices and infrastructure improvements associated with the project. As stated previously, a stadium's construction costs are typically amortized over a multiyear period through loans and bond issues (often including tax-free municipal bonds, which include an implicit federal subsidy). While MLB teams assuredly understand the time discounted value of money, they have incentive to report nominal figures to the media to make the stadium sound more expensive and justify public subsidies for construction.

A different source of possible measurement error arises from uncertainty concerning team revenue sources. Although a better proxy for fan expenditures at MLB games than ticket prices, the Financial World data is limited in scope and aggregates revenue categories, making estimation of structural relationships across time problematic. Use of revenue estimates from what historical numbers are available can potentially underestimate revenue streams if revenues per fan increase during the honeymoon, as time trends for the last ten years suggest. Very importantly, luxury boxes are becoming an increasingly significant source of revenue for teams, as evidenced by their increasing prevalence in new stadiums, but these revenue figures, as well as gate and stadium revenues, are not currently revealed by teams to the public. Additionally, in the last decade, it has become commonplace to sell the rights to the name of a stadium to a corporate sponsor, such as Enron Field/Minute Maid Park in Houston, Safeco Field in Seattle, or PNC Park in Pittsburgh, which results in another income stream not included in our calculations.

Finally, media revenues present another source of possible measurement error. The calculations fail to take into account the revenue teams earn from media contracts, which are much higher than stadium-related revenues. To the extent that there is a significant positive impact upon local radio and TV audiences caused by new stadiums, possibly from fans who tune in to watch more games in new stadiums to get a feel for the new stadium, and that those effects are anticipated and capitalized within the local media contracts, the revenue stream will be underestimated. Even if there is no direct impact of a new stadium upon viewership, audiences would increase indirectly if the team reinvests stadium revenues into improvements in team quality-of-play, as more people will tune in to listen and watch a successful ball club than a mediocre one. Also, by ignoring media revenues, we have implicitly assumed that the relationship between media revenues and team quality-of-play is not affected by new stadiums – if a new stadium affects that relationship, there will be a motivation to invest in team quality that has not been characterized in our analysis.

Findings and Future Research

The analysis in this paper estimates the attendance and revenue increases attributable to a new MLB ballpark in the modern era. To illustrate the effects of varying preferences for combinations of profits and team success by different ownership groups, we presented two scenarios, one which avoids reinvestment in player personnel and team quality, and another in which 50% of new revenues are diverted into team payroll. The simulations demonstrate that revenues net of player costs are maximized when there is no reinvestment, with the $50 million to $230 million generated representing a return more than 50% higher than in the partial reinvestment scenario. The partial reinvestment scenario, however, through its effects on team quality, results in a larger increase in team attendance, with a total turnstile increase of 3.4 million to 16.2 million fans over the length of the honeymoon period. The attendance increases with reinvestment are about 33% higher than they would be if team quality is left unchanged.

Using the point estimate of $133 million for the marginal revenue stream of a new MLB ballpark, we see that only the presence of public subsidization makes the project viable. With the public subsidy, which averages $199 million, $56 million in rents are generated for franchise owners once their own contributions of $77 million are netted out.[26] If economic distortions occur in raising the additional money required to obtain a given subsidy amount, as is commonly the case, then the welfare loss will be still larger. Estimation of the dead-weight-loss caused by stadium taxes is beyond the scope of this paper, as our hypothetical benchmark of acash payment to the franchise from the local government would entail similar social costs. We note, however, that using the estimates of Ballard, Shoven and Whalley (1985) of approximately 10 to 50% as a rough guideline, the true social cost of raising stadium subsidies could be close to $300 million.

[26] Using the 95% upper confidence limit value of $230 million, the rents would still be less ($153 million) than the public subsidy. Even this optimistic scenario leads to an expected leakage of about 23 percent of the funds used relative to a cash transfer.

The ratio of rents conferred to the franchise to public expenditure suggests that the process is highly inefficient, with over 70 cents of every dollar (over 80 cents of every dollar of social welfare) spent on replacement of physically sound ballparks wasted, relative to a lump sum transfer. Yet the "edifice complex" persists as municipalities continue to direct their efforts to arranging politically expedient stadium subsidies, apparently preferring bricks and mortar to more efficient contractual agreements.

With future research on the decisions made by individual franchises when opening new stadiums and the legal and financial details of each ballpark project, we hope to reveal differences in franchise management strategies which will explain the apparent variations in realized attendance and revenue effects and determine what set of contract terms between franchises and government officials might better align the interests of teams, local taxpayers, and fans.

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TABLE 1
Summary Statistics
Panel A: Mean & Standard Deviation for Continuous Variables

Variable	*Description*	*Mean*	*Std. Dev.*
$LNATTENDPG_{it}$	The natural log of average attendance per game.	9.872	0.46
$ATTENDPG_{it}$	The average attendance per game.	21,462	9,464
$WPCT_{it}$	The winning percentage of the team in the given year.	0.504	0.071
$ALLSTARS_{it}$	The number of All-stars on the given team in the given year.	2.50	1.61
$PARKFACTOR_{it}$	The stadium's park factor.	1.004	0.129
$LNREALCOST_{it}$	The natural log of the real stadium construction costs.	3.794	1.756
$REALCOST_{it}$	The real stadium construction costs (in $millions)	137.78	260.64
$LNPOP_{it}$	The natural log of city population.	8.124	0.615
POP_{it}	The city MSA population (in thousands).	4078	2530
$LNCAP_{it}$	The natural log of the capacity of the given stadium.	10.79	0.22
CAP_{it}	The capacity of the given stadium.	49,597	10,706
$YEAR_{t}$	The year of the annual data.	1981.5	14.56
$LNREALTIC_{it}$	The natural log of the real cost of a ticket.	2.448	0.231
$REALTIC_{it}$	The real cost of a ticket in dollars	11.92	3.34
$REALPAYROLL_{it}$	The real team payroll in millions.	30.57	22.85
$LNRGATEPG_{it}$	The natural log of the real gate revenues per game.	12.32	0.59
$REALFANREVPP_{it}$	Real fan revenues, gate plus stadium, per person	17.07	4.00

Notes: 1,109 observations. Observations omitted where stadium cost data unavailable, or near openings ($-2 < age < 2$) of non-modern (pre-1990) ballpark.

TABLE 1 (cont.)
Summary Statistics
Panel B: Count Statistics for Indicator Variables

Variable	***Description***	***Count where indicator = 1***
AGE_{it}	Team played in a stadium of the given age.	14 (AGE0); 20 (AGE910) at 10 parks.
$STAD2_{it}$	Team played in two stadiums during the given year.	2
$NEWTEAM(0\text{-}2)_{it}$	Expansion team or team moved into new city given number of years previously.	8 (NEWTEAM0), 8 (NEWTEAM1), 7 (NEWTEAM2).
$FINALYEAR_{it,}$ $PENULTYEAR_{it}$	The final (penultimate) year of play in a stadium.	12
$CLASSICFY_{it,}$ $CLASSICPY_{it}$	The final (penultimate) year of play in a classic stadium.	3
$CLASSIC_{it}$	The stadium was built pre-1950.	364
$TEAMSINCITY_{it}$	The number of teams in the city.	14 with 3; 199 with 2

Note: Count for the number of teams in the city = 3 is low because of lack of construction cost data for the Polo Grounds.

TABLE 2
Demand for Baseball Games, using GLS Estimation

Dependent Variable:		***LNATTENDPG$_{it}$***		***LNRGATEPG$_{it}$***	
Variable	***Expected Sign***	***Coefficient***	***Std. Error***	***Coefficient***	***Std. Error***
INTERCEPT		-20.196***	2.623	-28.132***	2.962
CWPCT$_{it}$	+	1.816***	0.092	1.859***	0.108
MODERN*CWPCT$_{it}$	+	-1.222***	0.402	-1.352***	0.471
CLAGWPCT$_{it}$	+	0.819***	0.085	1.025***	0.099
ALLSTARS$_{it}$	+	0.029***	0.004	0.031***	0.005
PARKFACTOR$_{it}$	+	0.086*	0.045	0.078	0.053
YEAR$_{t}$	+	0.013***	0.001	0.020***	0.002
YEAR1972$_{it}$	-	-0.079**	0.031	-0.053	0.037
YEAR1981$_{it}$	-	-0.123***	0.027	-0.114***	0.032
YEAR1995$_{it}$	-	-0.138***	0.026	-0.167***	0.031
LNPOP$_{it}$	+	0.197***	0.034	0.228***	0.039
TEAMSINCITY$_{it}$	-	-0.092**	0.040	-0.087*	0.046
LNREALTIC$_{it}$	-	0.143**	0.057		
LNREALCOST$_{it}$	+	-0.006	0.012	0.016	0.014
LNCAP$_{it}$	+	0.226***	0.066	-0.024	0.075
AGE0$_{it}$	+	0.447***	0.096	0.295***	0.110
AGE1$_{it}$	+	0.341***	0.093	0.206*	0.108
AGE2$_{it}$	+	0.270***	0.088	0.075	0.102
AGE34$_{it}$	+	0.283***	0.070	0.183**	0.081
AGE56$_{it}$	+	0.244***	0.068	0.159**	0.078
AGE78$_{it}$	+	0.167***	0.064	0.059	0.074
AGE910$_{it}$	+	0.056	0.054	-0.025	0.063
PENULTYEAR$_{it}$	-	-0.012	0.059	0.041	0.069
FINALYEAR$_{it}$	-	0.019	0.061	0.099	0.072
CLASSIC$_{it}$	-	-0.174***	0.052	-0.044	0.060
CLASSICPY$_{it}$	+	-0.054	0.106	-0.159	0.125
CLASSICFYit	+	0.254**	0.107	0.173	0.125
MODERN$_{it}$	+	-0.082	0.085	0.393***	0.094
STAD2$_{it}$	-	-0.088	0.141	-0.199	0.166
NEWTEAM0$_{it}$	+	0.280***	0.073	0.381***	0.085
NEWTEAM1$_{it}$	+	0.026	0.067	0.104	0.079
NEWTEAM2$_{it}$	+	-0.032	0.061	-0.055	0.072
CAGE0WPCT$_{it}$	+	-0.444	0.652	-1.013	0.765
CAGE1WPCT$_{it}$	+	0.480	0.574	0.497	0.674
CAGE2WPCT$_{it}$	+	0.098	0.515	0.423	0.605
Wald Statistic		1217.50		1277.13	
pseudo R^2 (from OLS)		0.68		0.70	
N		1109		1109	

Note: *** - Significant at 0.01 level; ** - Significant at 0.05 level; * - Significant at 0.10 level

TABLE 3
Marginal Revenue Stream From A New Modern Era Ballpark
Panel A: Scenario Without Reinvestment

Year	t	Change in Attendance per Game	LCI-Change in Attendance per Game	UCI-Change in Attendance per Game	2002 Avg. Gate and Stadium Revenues per Person	Real Change in Present Value of Season Revenue (Millions)	LCI-Real Change in Present Value of Season Revenue (Millions)	UCI-Real Change in Present Value of Season Revenue (Millions)
2002	-2	0	0	0	$17.41	$0.00	$0.00	$0.00
2003	-1	544	-2,693	4,196	$17.41	$0.77	($3.80)	$5.92
2004	0	15,798	8,320	24,816	$29.10	$33.85	$17.83	$53.18
2005	1	11,382	4,803	19,280	$29.10	$22.17	$9.36	$37.56
2006	2	8,662	2,837	15,588	$29.10	$15.34	$5.02	$27.61
2007	3	9,144	4,400	14,583	$29.10	$14.72	$7.08	$23.48
2008	4	9,144	4,400	14,583	$29.10	$13.38	$6.44	$21.34
2009	5	7,754	3,315	12,824	$29.10	$10.32	$4.41	$17.06
2010	6	7,754	3,315	12,824	$29.10	$9.38	$4.01	$15.51
2011	7	5,080	1,194	9,483	$29.10	$5.59	$1.31	$10.43
2012	8	5,080	1,194	9,483	$29.10	$5.08	$1.19	$9.48
2013	9	1,602	-1,376	4,913	$29.10	$1.46	($1.25)	$4.46
2014	10	1,602	-1,376	4,913	$29.10	$1.32	($1.14)	$4.06
		Total Attendance Increase (Millions):				6.77	2.29	11.95
		Total Revenue Increase ($Millions):				$133.38	$50.47	$230.08

TABLE 3 (cont.)
Marginal Revenue Stream From A New Modern Era Ballpark
Panel B: Scenario With 50% Reinvestment of New Revenues

Year	t	Change in Attendance per Game	LCI-Change in Attendance per Game	UCI-Change in Attendance per Game	2002 Avg. Gate and Stadium Revenues per Person	Real Change in Present Value of Season Revenue (Millions)	LCI-Real Change in Present Value of Season Revenue (Millions)	UCI-Real Change in Present Value of Season Revenue (Millions)
2002	-2	0	0	0	$17.41	$0.00	$0.00	$0.00
2003	-1	544	-2,693	4,196	$17.41	$0.77	($3.80)	$5.92
2004	0	15,798	8,320	24,816	$29.10	$33.85	$17.83	$53.18
2005	1	13,972	6,056	24,238	$29.10	$27.22	$11.80	$47.22
2006	2	12,186	4,512	22,513	$29.10	$21.58	$7.99	$39.87
2007	3	12,460	5,971	21,140	$29.10	$20.06	$9.61	$34.03
2008	4	12,332	5,944	20,830	$29.10	$18.05	$8.70	$30.49
2009	5	10,837	4,884	18,638	$29.10	$14.42	$6.50	$24.80
2010	6	10,742	4,841	18,431	$29.10	$12.99	$5.86	$22.29
2011	7	7,732	2,562	14,399	$29.10	$8.50	$2.82	$15.83
2012	8	7,568	2,476	14,087	$29.10	$7.57	$2.48	$14.08
2013	9	3,629	-312	8,586	$29.10	$3.30	($0.28)	$7.80
2014	10	3,436	-408	8,213	$29.10	$2.84	($0.34)	$6.79
Total Attendance Increase (Millions):						9.01	3.41	16.21
Total Revenue Increase ($Millions):						$171.14	$69.15	$302.29
Total Net Revenue Increase ($Millions):						$ 85.57	$34.58	$151.15

FIGURE 1
Win Percentage Effects of a Hypothetical New Stadium Based on Modern Era Demand Effects and 50% Reinvestment of Added Revenue

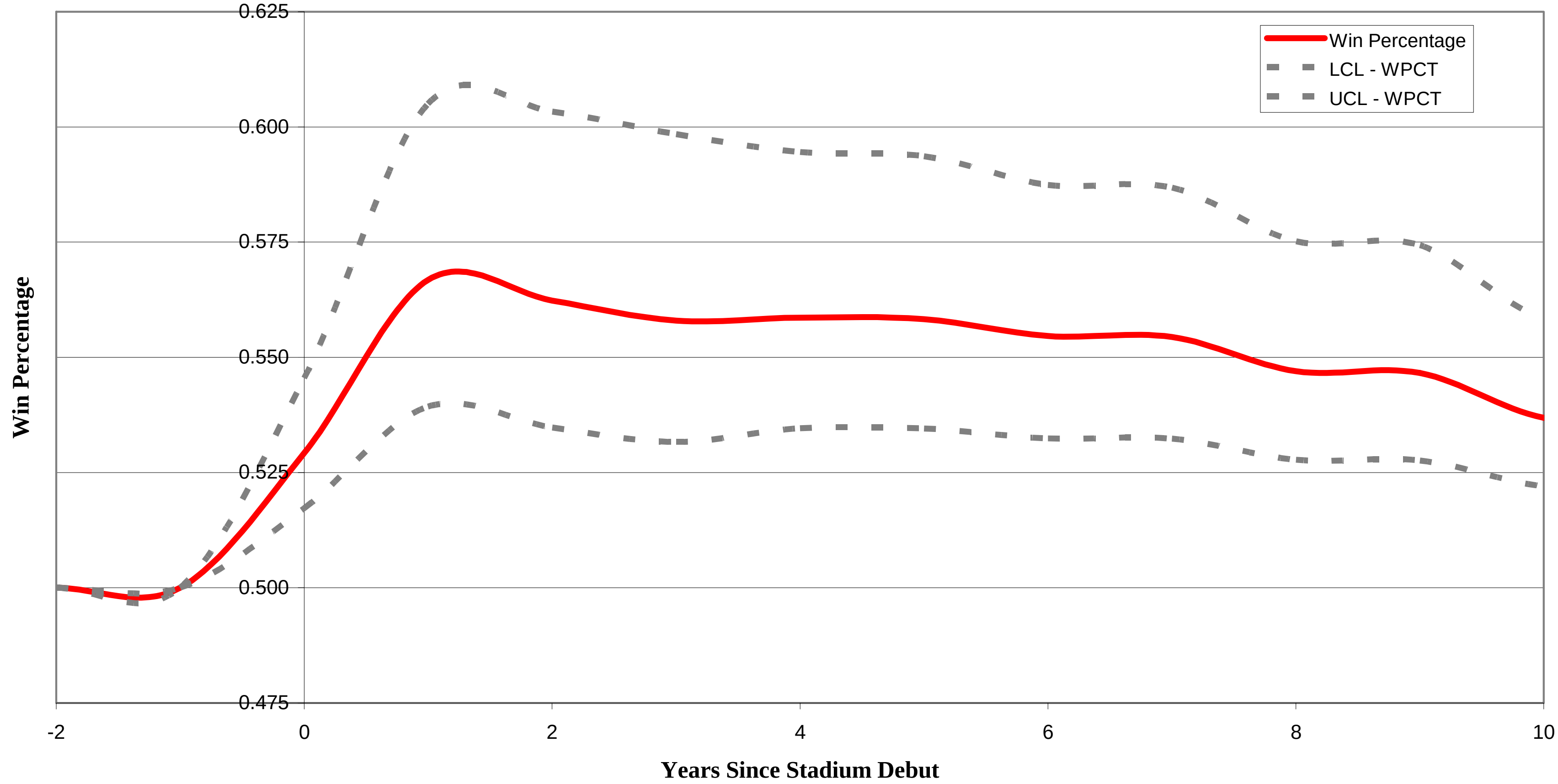

FIGURE 2
Gross Revenue Effect of a Hypothetical New Stadium – Comparison of Modern Era Effects
with No Reinvestment and 50% Reinvestment