The Impact of New Stadiums on Professional Baseball Team Finances

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Abstract

This paper investigates the impact of a new stadium on the finances of professional baseball teams and updates the empirical evidence through the 1990s. The data suggest that new stadiums continue to generate substantial short-term returns to team owners, partially explaining their insistence on public subsidies for new stadiums. Conclusions that the public returns to a new stadium are minimal likely reflect the ability of team owners to negotiate for the majority of the additional revenue generated by a new stadium. The additional profit to a team owner averaged in excess of seven million dollars during each of the first five years of a new stadium.

JEL Classifications: L13, D43, L83

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Introduction

During the 1990s, U.S. cities spent approximately $6 billion on more than 50 new venues in the four major sports: the National Football League (NFL), the National Hockey League (NHL), the National Basketball Association (NBA), and Major League Baseball (MLB). These venues averaged $327 million in construction cost and have an average capacity of 35,727 seats; the new venues cost approximately $6,750 per seat.[1] On average, host cities paid approximately two-thirds of total construction costs, or approximately $4,500 per seat. As noted by Rosentraub and Swindell (2002), these public dollars represented an increase in subsidies to sports teams over previous decades. Yet, these new stadiums were built during a time when approximately 40% of public referenda for new stadiums failed, and those that passed were often controversial and closely contested (Fort, 1997).

The closely contested public referenda for stadium construction reflect the heated debates and often strongly divided voting public on the issue of financing stadium construction. These debates have increased in intensity over the past twenty years, caused by an increased amount of public money dedicated to the construction of new arenas relative to previous eras and an increased demand for alternative government services. [2] Yet, the increased spending may not be completely unjustified. The

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[1]Additional stadium information can be found in Rosentraub and Swindell (2002) and at *www.ballparks.com*.

[2] In 1971, Texas Stadium, home of the Dallas Cowboys, was built for approximately $2200 per seat (2000 dollars). In 2002, Cowboys owner Jerry Jones proposed a $1 billion dollar stadium complex, at a cost of approximately $10,000 per seat. By 2004, the Cowboys were proposing a $650 million dollar 75,000 seat stadium in Arlington, Texas. Similarly, Turner Field in Atlanta, built in 1995 for $4,715 per seat (2000 dollars), replaced Atlanta Fulton County Stadium, built in 1965 for $1850 per seat (2000 dollars).

majority of the new stadiums built in baseball during the 1990s replaced venues that were more than thirty years old.[3] Perhaps the building spree of the 1960s was sufficiently depreciated in the 1990s to require replacement. However, unlike the public acceptance of spending public money to repave roads, which offer clear public good benefits, it has yet to be conclusively determined that stadiums provide sufficient public benefits to justify their costs. Debates to replace a stadium most often center on who will ultimately bear the cost of construction, the population of the host city or the team owner (Zimmerman, 1997), and implicitly who receives the benefits of a new stadium.

Most every proposal to publicly fund a new professional sport venue evokes economic studies and other justifications for or against the proposal. While economists have generally concluded that the public benefits of a new stadium do not outweigh the public costs (or that the public returns to new stadiums are significantly less than alternative uses of public money), studies funded by stadium proponents consistently predict dramatic economic benefits from a new stadium.

One reason for the differences between academic and consultant studies is that most academic studies take place *after* a stadium has been built, while those studies that predict tremendous economic benefits almost universally occur *before* a stadium is built. The source of the different conclusions should be apparent. Studies published in the peer-reviewed literature are *ex post* studies that use *actual* data, however imperfectly measured, whereas *ex ante* studies utilize imagined or estimated impacts, which however motivated are much more susceptible to mistake.

The majority of studies about the impacts of new stadiums focus on quasi-public benefits, i.e., those that accrue to the

[3] Not including stadiums in Phoenix and Tampa Bay, which were built for expansion teams.

host-city's population and businesses, including economic development, increased tourism, reduced unemployment, increased wages, increased property value and tax revenues, and quality of life measures such as civic pride. However, economists have generally concluded that a new stadium does not have a significant beneficial impact on most of these target variables, and often has a deleterious effect. While it has been recognized that a new stadium may subsidize the profits of the team owner (Noll and Zimbalist, 1997b; Rosentraub and Swindell, 2002), there seems to have been little direct examination of exactly how much new stadium impacts team finances and other aspects of franchise performance.

This study investigates to what extent new stadiums influence the finances of professional baseball teams. This is an important question because the debate about stadium financing focuses on the anticipated quasi-public benefits to the stadium while largely ignoring the private benefits a new stadium provides a team owner. Therefore, the paper provides a potentially valuable contribution to the overall debate about stadium financing.

To preview the findings in this paper, professional baseball teams that moved into a new stadium during the 1990s experienced greater gate and stadium revenues, no change in local media revenues, increased total revenues, paid slightly more in team payroll, and incurred slightly larger operating expenses. The most striking impact of a new stadium is on team profits and book value. These findings suggest that significant benefits accrue to team owners in the first few years after a publicly funded stadium opens, supporting Zimbalist (1996). The average baseball team experienced an aggregate increase of approximately $47 million in profits during the first five years of a new stadium. Moreover, as team owners negotiate ever more favorable revenue-sharing arrangements with host cities (Zimbalist, 1996; Levine, 2002) the public subsidies to team owners are often understated.

The Economic Impact of Sports Arenas: A Brief Literature Review

The literature investigating the economic impact of sports arenas takes two predominant forms. Economic impact studies, usually undertaken at the request of teams, city governments or leagues, almost always find positive net economic benefits of a new stadium. Economic impact studies of this sort are rarely published in peer-reviewed journals, and are universally *ex ante* in nature, that is, they are undertaken before the stadium or arena is constructed.

The second strain of literature appears in economic and public-policy journals and has two distinctions from the non-peer reviewed studies. First, the studies investigate the impact of stadiums *ex post* or after they have been built. Second, academic studies take more care to accurately account for the economic impact of a stadium. Traditionally, economic impact studies overstate the benefits of the stadium by attributing all tourism to the new stadium and by falsely assuming that all spending is so-called new spending, rather than substitute spending. Additionally, because academic studies are *ex post* they can more accurately account for a new stadium's construction and maintenance costs, which can only be estimated *ex ante.*

The basic arguments in favor of public funding include: local economic development; increased employment and earnings; increased property and sales tax revenues; increased tourism to the host city; increased probability of hosting special events such as the Super Bowl or the MLB All Star Game; an improved reputation as a "big-time" city; an increase in local civic pride and quality of life; the team owner can hire better and more expensive players and contend for a championship; and stadium costs can be "exported" through sales and excise taxes.

The basic arguments against public funding include: the benefits of the stadium are generally overestimated and the

costs of construction are underestimated; the team owner can raise capital in private financial markets, e.g., by selling stocks and/or bonds; stadiums are expensive ways to spur limited economic growth; the threat to relocate a team has little credibility; and public funding is a wealth transfer to team owner and a subsidy to relatively wealthy fans.

Many of the expected benefits of a new stadium sound plausible and consultant-generated economic impact studies often estimate these benefits at tens or hundreds of millions of dollars per year. As discussed by several authors, these values are potentially overstated for two predominant reasons. First, the direct spending attributed to the stadium must be carefully calculated. It must not include dollars that would have been spent elsewhere in the host city if the stadium had not been constructed. Moreover, the direct spending should not include transient spending that is not directly attributable to the stadium. Second, the indirect economic impacts of a stadium are calculated using the so-called multiplier effect, which literally multiplies the direct spending by a certain factor to determine the estimated total economic impact.[4] Professional economists estimate multiplier effects to be in the neighborhood of one or less, whereas many consultant studies use multipliers of three or more (Noll and Zimbalist, 1997c; Leeds and von Allmen, 2002). The upshot is that using an exaggerated multiplier will dramatically overestimate the total economic impact of a stadium

The general consensus in the professional literature is that the predicted public benefits of a new stadium may be too small to detect with traditional statistical techniques or they may not exist. For example, Baade and Dye (1990) find that hosting a professional sports team does not enhance, and may actually reduce, aggregate personal income at the MSA level. Baade

[4] Specifically, the total economic impact can be calculated as $\$D \times (1+m)$, where $\$D$ is the amount of direct spending attributed to the stadium and m is the multiplier.

(1996) investigates the impact of new stadiums on per-capita income levels and finds no statistically significant impact. Coates and Humphreys (2000) investigate economic growth of cities with a football, baseball or basketball team and conclude that growth rates are no greater with sports teams. Hudson (1999) investigates the employment effects of new stadiums and concludes there is not a statistically significant increase in employment by hosting a professional sports franchise.

These studies are only a sample of the large literature focusing on the impact of a new stadium. A particularly insightful set of papers is included in the collected volume edited by Roger Noll and Andrew Zimbalist (1997a). This volume includes papers covering a variety of topics relating to the actual or anticipated economic impacts of professional sports franchises and stadiums. The interested reader is directed to this valuable source for additional information on how stadiums impact many economic variables of interest to public officials and the voting public.

The Economic Impacts of a New Stadium: The Private vs. the Public

As specific inputs to the production of baseball games, new stadiums are expected to provide a positive return. These returns are distributed between private agents and the public-at-large according to who owns (or doesn't own) the property rights to the returns. Rappaport and Wilkerson (2001) estimate the total returns of a new stadium to a host city to be in the area of $3 million per year. Yet, the anticipated returns on a new stadium, *qua* specific asset, would be considerably more than three million dollars per year. Who internalizes the difference? Economic theory predicts that it accrues to economic agents who hold property rights to the remainder. The value of property rights has long been recognized in economics (Smith, 1776; Coase, 1937, 1960), and to be equally important in the business of sports (Noll and Zimbalist, 1997b; Levine, 2002).

The property rights to the revenues generated by a new stadium are determined in negotiations between the team owner and the host city. Because the competition for sports franchises has increased while the supply of franchises has not increased proportionally, team owners have generally been successful in negotiating ever-better lease and revenue sharing arrangements with host-cities (see Noll and Zimbalist, 1997b, for details on specific lease arrangements in the four major professional sports), including retention of the majority of revenues from parking, concessions, advertising, and luxury boxes (Levine, 2002). Moreover, franchise owners often acquire low rent payments, lower sales taxes on tickets, and less responsibility for maintenance and renovations. Additionally, team owners may secure naming rights, which can provide several million dollars in additional revenue by selling the name of the stadium, e.g., Minute Maid Park (previously named Enron Field) in Houston, Texas (see Leeds, Leeds and Pistolet, 2003). Host cities often capitulate to the demands of the team owner to avoid the possibility that the franchise might relocate, even if the threat doesn't seem economically credible (Rosentraub and Swindell, 2002).

A sports franchise team is most accurately characterized as a multi-product firm that provides access to the sport, the particular teams playing, the stadium and its amenities, and any complementary goods such as concessions and fan excitement that might have greater value when consumed within the stadium. A new stadium is expected to increase the demand for a team's "output," in the near term.

The increased demand generated by a new stadium is often revealed in increased attendance. If the increase in demand reflects increased value to consumers, the team owner may increase average ticket prices and increase gate revenue. In some instances increased demand generated by a new stadium may cause a binding capacity constraint, which would help put further upward pressure on price.[5]

[5] The Cleveland Indians enjoyed 455 consecutive home sell-outs

If a new stadium increases total revenues, what is the impact on team owner decisions? Fans who pay for a stadium may want the team owner to buy the services of better players. However, a new stadium can have two offsetting influences on a team owner's decisions. First, a new stadium may provide a subsidy to the team owner, motivating her to increase payroll by hiring higher quality players, thereby improving team quality and perhaps contending for a division or league championship. During stadium referenda, team owners often hint of the subsidy effect of a new stadium to increase the chances of securing public funding for the new stadium. However, evidence is mixed as to whether teams that receive a new stadium actually do better than teams that play in older stadiums (Quinn et al., 2003; Pollard, 2002).

On the other hand, the increased demand (and revenues) may reduce the incentive for the team owner to increase team quality, at least in the short-run. When a team plays in an older stadium the team owner may have no other way to significantly increase the demand for the team's product than to increase team quality, usually through increased payroll (see Depken, 2000; Frick et al, 2003). However, an increased payroll reduces profits, *ceteris paribus*, and higher quality may not guarantee an increase in revenues sufficient to enhance profits.[6] If a new stadium generates a sufficiently large increase in demand on its own, the team owner may have no need to increase quality in order to increase revenues, i.e., there may be a disincentive to increase team quality after the new stadium is built.

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after moving to Jacob's Field in 1994. The streak came to an end on April 4, 2001 (Cleveland Indians, 2003).

[6] The recent experience of the Montreal Expos (now the Washington Nationals) is a good example. Before their move, the Expos were an above average team even while their attendance was the worst in baseball.

While some authors have hinted at these impacts, to date there has been no direct study of the effect of a new stadium on team finances. The next section specifically investigates these impacts.

The Impact of New Stadiums on Baseball Team Finances: Testable Hypotheses

Before investigating how new stadiums impact baseball team operating and performance variables, it is useful to determine exactly what qualifies as a new stadium. Quirk and Fort (1997) suggest that the immediate attendance effects of a new stadium, also called the "novelty effect," are exhausted after five years. Kahane and Shmanske (1997) assume the novelty effect holds for three years and find that newer stadiums tend to increase attendance, *ceteris paribus*. Coffin (1996) finds that the novelty effect for baseball stadiums is statistically significant after four years. Quinn et al. (2003) define new stadiums alternatively as those less than three and seven years old. However, Coates and Humphreys (2003) point out that recent stadium construction has not been accompanied by as large of a novelty effect as in the past. However, the "novelty effect" can last for up to eight years in baseball, but that the effect in the other sports may be considerably less. In this study, a stadium is considered "new" for the first ten years.

Between 1990 and 2003, fifteen new professional baseball stadiums were constructed and opened. Table 1 reports several variables of interest about these new stadiums. All are single-purpose stadiums, ten replaced multi-purpose venues, and four have retractable roofs or are domes. Thirteen of the fifteen were constructed with majority public funding; new stadiums in Atlanta and San Francisco were the exceptions. Those with majority public funding cost an average of $298 million in 2000 dollars, with the public paying an average of 80% through local bonds financed in a variety of ways including sales taxes, hotel and rental-car taxes, and excise taxes on local restaurants and

bars (see Leeds and von Allmen, 2002, for a more detailed discussion).

Table 1: New Stadiums in Professional Baseball (1990-2003)

City	Capacity	Year	RealCosts (millions)[b]	Percent Public	Public Cost per Seat [b]	Cost per Seat in Replaced Stadium [b]
Tampa Bay [c,d]	46,000	1990	$225.30	100.00	$4699.96	NA
Chicago	44,321	1991	$212.50	100.00	$4786.73	$142.71
Baltimore	48,000	1992	$260.20	96.00	$4560.00	$1498.41
Arlington	49,292	1994	$227.74	71.00	$3280.38	$589.41
Cleveland	42,400	1994	$206.59	88.00	$7287.79	$927.43
Denver	50,100	1995	$242.93	75.00	$3636.72	NA
Atlanta	49,831	1997	$252.13	0.00	$0.00	$1910.65
Phoenix [c,d]	48,569	1998	$368.70	68.00	$5162.03	NA
Seattle	46,621	1999	$535.00	66.66	$7537.10	$307.21
Detroit	40,000	2000	$300.00	38.00	$2875.00	NA
Houston [d]	42,000	2000	$250.00	68.00	$4047.62	$4532.07
San Francisco	41,059	2000	$255.00	3.92	$243.45	$1993.85
Milwaukee	43,000	2001	$394.20	77.50	$7209.30	$895.58
Pittsburgh	38,365	2001	$252.51	100.00	$6829.14	$4138.97
Cincinnati	42,059	2003	$399.08	86.15	$6657.01	$3773.28
Average [e]	44,671	1997	$298.06	79.56	$5274.52	$1867.23

Notes: Data obtained from www.ballparks.com and author's calculations. [a] Current dollars at date stadium opened. [b] Dollars adjusted by BLS inflation factor to represent 2000 dollars. [c] New stadium not replacing an old stadium. [d] Domed or retractable roof stadium. [e] Includes only those stadiums with majority funding, i.e., excluding Atlanta and San Francisco. An expanded version of this table is available from the author upon request.

Of the stadiums built with majority public funding, the average capacity of 44,671 yields a total cost per seat of $6580 (in 2000 dollars) with the public paying an average of $5275 per seat. One potential source of public anxiety about public funding may be the (implicit) comparison to the cost per seat of the stadium being replaced. Table 1 reports the estimated cost per seat of the replaced stadium (data obtained from www.ballparks.com); figures appropriately adjusted to year 2000 dollars. The stadiums replaced with a publicly funded stadium cost an average of $1867 per seat; stadiums in Tampa Bay and Phoenix were new baseball stadiums that did not replace old stadiums, and construction costs were unavailable for Detroit and Denver.

The increased costs of stadium construction can have several

sources. General inflation in construction costs, increased land and labor costs, and regulatory-based costs, e.g., handicap access or regulated restroom facilities, contribute to greater costs of a new stadium. However, the most obvious increase in construction costs are in the amenities offered average and special spectators. The former often enjoy bigger seats, specialized concessions, sophisticated computerized graphics displays, and unique sight lines. The special spectator can enjoy private “luxury suites” with private restrooms and dining facilities, luxury seating, and big screen televisions.

The advent of the luxury suite is a relatively recent development. As documented by Rafool (1998), the luxury suite is a valuable asset within the stadium for a number of reasons. First, the majority of luxury suites are leased to corporations that spend considerably more per attendee than the average ticket price (Zimbalist, 1992). Second, in most leagues (including professional baseball), revenues from luxury suites are not included in any league-wide revenue sharing agreement. Moreover, team owners are often able to negotiate with the host-city to retain the property rights to these revenues. The upshot is that luxury suites are a large source of revenues for a team owner.

Furthermore, as the technology for convertible or retractable roofs has improved, team owners are anxious to have the ability to preclude inclement weather from ending or postponing a game. Therefore, more stadiums are built with retractable roofs, which can add up to $200 million in construction costs. While it is likely that consumers might receive some benefit from being protected from the elements, it is likely that team owners are able to extract additional revenues when the uncertainty of demand (at least from the influences of weather) is reduced.

Arguably, therefore, the major increase in construction costs has been caused by the additional direct costs of luxury suites and retractable roofs, and indirect costs incurred to

adapt stadium design to accommodate these innovations. The additional costs and restricted access of luxury suites may contribute to the reduced voter acceptance to dedicating public money to stadium construction.

Abstracting away from the impact of a new stadium to the host-city and focusing on a stadium's impact on a team's financial performance, several variables can be affected by a new stadium. Perhaps most obvious is attendance per game (alternatively, season attendance), which has been shown by others to increase after a new stadium opens. The most obvious impact of additional attendance would be on gate revenues, which ostensibly include season ticket sales, day-of-game ticket sales, and luxury suite revenue (although the latter is not included in league revenue sharing agreements). As the newer stadiums in MLB tend to be smaller (by an average of 6,700 seats), if there is a substantial increase in attendance caused by the new stadium the team owner might increase price and hence enhance gate revenue.

Attendance can enhance at least two other revenue streams for team owners. First, concession licensing and sales, including soda, beer, food, and memorabilia, are likely to be positively correlated with attendance. Second, teams with greater attendance can charge more for in-stadium advertising, e.g., billboards and other signage.

Team owners often claim that this increased revenue will be used to purchase a more competitive team. However, as described in the previous section, team owners are not required to spend increased revenues generated by a new stadium on better players. To test this claim, team payrolls are investigated before and after a team moves into a new stadium.

Also of interest is the impact of a new stadium on operating expenses, operating income, and franchise value. Operating expenses might increase after a new stadium opens if the team owner attempts to hide franchise profitability or

otherwise internalize the benefits of a new stadium, say through higher salaries for general management. The latter two variables are important because any windfall generated by a new stadium should be reflected in one or both of these values. Even if a team owner manipulates operating expenses, and hence operating income, the team's value will reflect increases in expected future profit after a new stadium.

The Impact of New Stadiums on Baseball Team Finances: Empirical Evidence

To test the impact of a new stadium on the variables described above is undertaken by estimating a common specification $DEP_{jit} = X_{it}\beta_j + \varepsilon_{jit}$, where b_j are parameters to be estimated for each possible dependent variable j = 1...8. The explanatory variables in X include the host city population, the host city per capita income, the host city unemployment rate, the team's once-lagged winning percentage, whether the team's stadium is a dome or retractable roof, whether the team's stadium is a single-purpose stadium, and dummy variables that take a value of one or zero for the first ten years of a new stadium. The error structure is considered a composite term with a white-noise portion and team and year fixed effects which control for unmeasured heterogeneity across teams and years.

The data employed come from several sources. Stadium data were collected from *www.ballparks.com*, team wins and attendance from Major League Baseball, and team financial variables from various issues of *Financial World* and *Forbes Magazine*. All nominal dollar values are converted to 2000 dollars using the GDP deflator available from the Bureau of Labor Statistics.

Table 2a reports the descriptive statistics for the entire sample of Major League Baseball teams from 1990-2003 and for the sub-sample of observations that correspond with teams playing in a stadium less than ten years old during the sample period. Some teams might play in a stadium less than

ten years old early in the sample but later in the sample the team's stadium would be considered not new. On the other hand, there are other teams that moved into a new stadium during the sample period, for example, the Atlanta Braves in 1997, whose stadium would be considered "new" for the remainder of the sample. The restricted sample is used for comparison purposes and provides the motivation for a more sophisticated econometric analysis, which focuses on the entire sample.

Table 2a: Descriptive Statistics of the Full Sample

All MLB Teams (1990-2003)

Variable	Mean	Std. Dev.	Min.	Max.
Gate revenue (millions)	36.63	26.98	7.69	154.14
Stadium revenue (millions)	13.13	9.25	0.16	43.20
Media revenue (millions)	26.56	12.49	5.65	85.05
Total revenue (millions)	86.13	36.56	27.03	225.29
Player payroll (millions)	48.38	25.11	9.92	177.01
Operating expenses ($m)	52.52	15.55	20.31	101.22
Operating income ($m)	3.04	11.56	-28.89	40.80
Franchise value ($m)	198.88	109.19	67.31	803.67
City population (10,000s)	513.27	475.54	137.45	1866.98
Per-capita income ($)	29065.15	6029.64	18550.00	47139.00
City unemployment rate	5.32	1.47	2.10	9.80
Season attendance	2232445	714155.70	813127	4483350
Win percentage	499.32	71.16	265	716
Lag win percentage [a]	494.02	86.59	0.00	716.00
Domed stadium (1=Yes)	0.15	0.36	0.00	1.00
Single purpose stadium (1=Yes)	0.63	0.48	0.00	1.00
New stadium (1=Yes)	0.04	0.19	0.00	1.00
Lag 1 of NEWSTAD	0.03	0.19	0.00	1.00
Lag 2 of NEWSTAD	0.03	0.19	0.00	1.00
Lag 3 of NEWSTAD	0.03	0.17	0.00	1.00
Lag 4 of NEWSTAD	0.02	0.14	0.00	1.00
Lag 5 of NEWSTAD	0.02	0.13	0.00	1.00
Lag 6 of NEWSTAD	0.02	0.14	0.00	1.00
Lag 7 of NEWSTAD	0.02	0.13	0.00	1.00
Lag 8 of NEWSTAD	0.02	0.14	0.00	1.00
Lag 9 of NEWSTAD	0.02	0.14	0.00	1.00

Notes: Data describe Major League Baseball from 1990-2003. All dollar values measured in 2000 dollars. Data are missing for gate revenue in 1997 and 1998, stadium revenue in 1998, 1999, and 2001 through 2003, media revenue for 1998, 1999, 2002, and 2003, and operating expenses for 1997, 1998, and 1999; observations with missing data are not included in descriptive statistics calculations. Two observations corresponded with negative operating expenses and were excluded from the analysis (although the qualitative did not change). [a] Lagged winning percentages of expansion teams are entered as zeroes, therefore lagged winning percentage does not equal 500.

From Table 2a, the average real gate revenue during the sample period was approximately $37 million, stadium revenue was approximately $13.13 million, and media revenue was approximately $27 million per year. Total reported revenue averaged approximately $86 million over the sample period (certain revenue flows are not included in the gate, stadium, and media categories). The average payroll was $48 million, average operating expenses were $52 million and average operating income was $3 million per year. However, operating income had a very large range, from a reported loss of approximately $29 million by the Los Angeles Dodgers in 2001 to a reported "profit" of more than $40 million by the New York Yankees in 1996 and the Colorado Rockies in 1997. The operating income data is somewhat suspect as 153 observations or approximately 42% of the sample observations correspond with negative reported operating incomes. It is highly unlikely that 42% of team-year observations actually correspond with negative profits, however these are the data that are publicly available and, as such, they are included in the analysis.

The host-city characteristics are consistent with other studies. Average host-city population was approximately 5 million people, real per-capita income was approximately $30,000, and average unemployment was approximately 5.2 percent. The once-lagged winning percentage is approximately 500; the difference occurs because expansion teams are recorded as having a lagged win percent of zero. Approximately 15% of the observations correspond with a team playing in a domed or retractable roof stadium, approximately 63% of the

observations correspond with a team playing in a single purpose stadium. Approximately 4% of all observations correspond with a team playing in a brand new stadium. The lagged values of the new stadium dummy variable capture the subsequent nine years of a stadium's existence.

Table 2b reports the descriptive statistics of a restricted sample of baseball teams that played in a stadium less than ten years old during the sample period. In general, the revenue figures are a bit higher than the overall sample, except for the media revenues. On the expenditure side, teams in new stadiums tend to spend a little more on players, have slightly higher operating expenses, and almost twice the average level of operating income. Moreover, the book values of franchises in newer stadiums are considerably higher than teams in older stadiums. These ocular comparisons hint that stadiums might significantly impact the financial position of baseball franchises, and invite more sophisticated analysis.

Table 2b: Descriptive Statistics of Restricted Sample

MLB Teams in first 10 years of a new stadium (1990-2003)

Variable	Mean	Std. Dev.	Min.	Max.
Gate revenue (millions)	51.74	29.41	13.00	133.24
Stadium revenue (millions)	18.64	10.00	3.10	40.50
Media revenue (millions)	24.00	9.28	5.00	53.70
Total revenue (millions)	105.98	33.88	38.60	169.00
Player payroll (millions)	59.06	24.86	14.20	166.00
Operating expenses ($m)	51.13	12.76	27.38	89.00
Operating income ($m)	6.84	12.09	-28.50	38.30
Franchise value ($m)	251.35	94.75	81.00	424.00
City population (10,000s)	379.75	242.49	148.41	911.97
Per-capita income ($)	31015.71	5599.52	19652	47139
City unemployment rate	4.94	1.42	2.50	8.20
Season attendance	27227768	687588.8	1338851	3891014
Win percentage	811.89	80.76	265	716
Lag win percentage [a]	499.85	114.28	0.00	716
Domed stadium (1=Yes)	0.30	.046	0.00	1.00
Single purpose stadium (1=Yes)	0.84	0.36	0.00	1.00
New stadium (1=Yes)	0.14	0.34	0.00	1.00
Lag 1 of NEWSTAD	0.14	0.34	0.00	1.00
Lag 2 of NEWSTAD	0.14	0.34	0.00	1.00
Lag 3 of NEWSTAD	0.12	0.32	0.00	1.00
Lag 4 of NEWSTAD	0.09	0.29	0.00	1.00
Lag 5 of NEWSTAD	0.07	0.25	0.00	1.00
Lag 6 of NEWSTAD	0.08	0.27	0.00	1.00
Lag 7 of NEWSTAD	0.07	0.25	0.00	1.00
Lag 8 of NEWSTAD	0.09	0.28	0.00	1.00
Lag 9 of NEWSTAD	0.08	0.27	0.00	1.00

Notes: Data describe Major League Baseball from 1990-2003. All dollar values measured in 2000 dollars. Data are missing for gate revenue in 1997 and 1998, stadium revenue in 1998, 1999, and 2001 through 2003, media revenue for 1998, 1999, 2002, and 2003, and operating expenses for 1997, 1998, and 1999; observations with missing data are not included in descriptive statistics calculations. Two observations corresponded with negative operating expenses and were excluded from the analysis (although the qualitative did not change). [a] Lagged winning percentages of expansion teams are entered as zeroes, therefore lagged winning percentage does not equal 500.

To estimate the impact of a new stadium on the financial characteristics of a baseball team, panel data estimation is undertaken. It is common to fixed or random effects models in

the studies of attendance to baseball teams. However, in the current context it is highly likely that a) there is heteroscedasticity across the different teams and b) there is autocorrelation within each team's time series. In a short and wide panel, the autoregressive tendencies of the error term might be difficult to capture, however as the current panel is fourteen years long, it is possible and practical to estimate a separate autoregressive process for each team; that is, it is possible to allow for a more general autoregressive process while not sacrificing a critical number of degrees of freedom. The estimation process undertaken here is to estimate a GLS panel estimator in which each team is treated as heteroscedastic and having it's own autoregressive process, assumed to be AR(1). Alternative estimations were also undertaken, including standard fixed and random effects models. While the qualitative results did not change dramatically, the GLS approach provides efficient estimates.

Table 3 and Table 4 report GLS panel estimation results for the various dependent variables described in the previous section, each of the general form $DEP_{jit} = X_{it}\beta_j + \varepsilon_{jit}$, where b_j are parameters to be estimated for each possible dependent variable j = 1…8. The dependent variables investigated focus primarily on the private benefits of a new stadium that are internalized by the team owner and are indicated at the top of each column in Table 3 and Table 4.

Column one of Table 3 reports the results concerning gate revenue. In general, the socio-economic characteristics of the host city influence gate revenue as expected: greater population and per-capita income are positively related to gate revenue and unemployment is negatively related to gate revenue. Playing in a single purpose stadium increases real gate revenue by approximately $4 million while playing in a domed stadium seems to have little impact on gate revenue. The new stadium dummy variables indicate that for the first ten years after a stadium opens the team earns more gate revenue than teams in older stadiums, although by the ninth and tenth years the additional revenue has significantly

dropped off. The aggregated ten-year increase in real gate revenue is estimated at approximately $126 million dollars. The annual marginal impact of a new stadium on real gate revenues is depicted in Figure 1.

Column two of Table 3 reports the results concerning stadium revenue, which ostensibly includes concession sales and in-stadium advertising revenues. Unlike gate revenues, the only host-city characteristic that has a statistically significant relationship with stadium revenue is city population. On the other hand, a single-purpose stadium corresponds with approximately $1.3 million in additional stadium revenues. However, on average a new stadium does increase stadium revenues for the first six years. The aggregate impact on stadium revenues is estimated to be approximately $49 million. This increase in revenue, coupled with the increase in gate revenue, is almost completely retained by the team owner because cities tend to cede these revenues to team owners when negotiating revenue sharing agreements concerning a new stadium. The marginal impact of a new stadium on real in-stadium revenues is depicted in Figure 1 as well.

Column three of Table 3 reports the results concerning media revenues. Not surprisingly, the socio-economic characteristics of the host city are positively correlated with a team's media revenue. While it might seem counterintuitive that higher unemployment corresponds with greater media revenues, higher unemployment is negatively correlated with attendance but not necessarily with the population's interest in the team's games. Even though there is less attendance there might be a greater television and radio audience, the value of which team owners are partly able to internalize. In general, a new stadium has little impact on local media revenues.

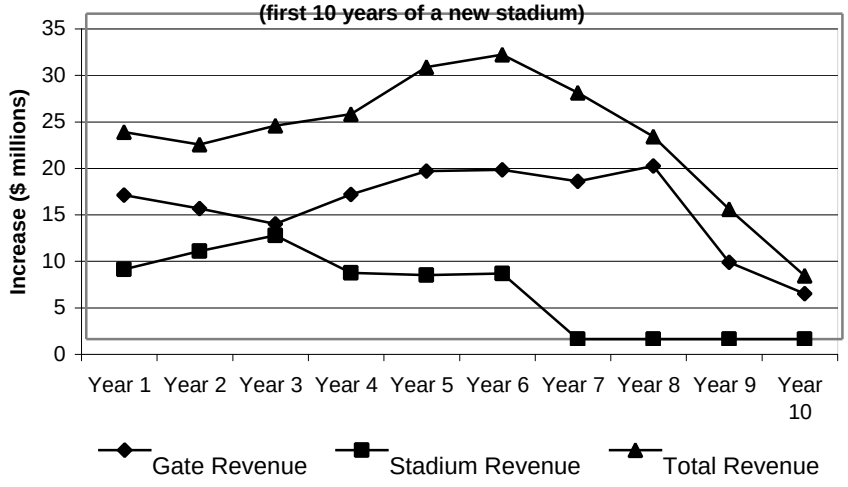
Table 3: GLS Panel Estimation Results
(Dependent variables measured in millions of 2000 dollars)

Explanatory Variable	(1) Gate Revenue	(2) Stadium Revenue	(3) Media Revenue	(4) Total Revenue
Population	0.011	0.005	0.014	0.025
	(9.04)**	(5.40)**	(8.30)**	(12.30)**
Per-capita income	0.001	-0.000	0.000	0.001
	(3.11)**	(0.42)	(3.22)**	(3.17)**
Unemployment	-1.855	0.190	0.747	-1.095
	(3.69)**	(0.68)	(2.42)*	(1.55)
Domed stadium	0.150	-1.559	-0.313	-2.748
	(0.10)	(1.79)	(0.43)	(1.02)
Single purpose stadium	4.061	1.343	1.777	8.273
	(3.28)**	(2.03)*	(2.23)*	(4.87)**
Lag win percentage	0.015	0.005	0.013	0.023
	(3.57)**	(1.62)	(4.81)**	(4.07)**
New stadium	15.494	7.514	-1.300	22.267
	(9.85)**	(7.32)**	(1.35)	(9.70)**
Lag 1 of NEWSTAD	14.037	9.455	0.393	20.920
	(7.58)**	(7.95)**	(0.33)	(7.58)**
Lag 2 of NEWSTAD	12.397	11.148	2.682	22.968
	(6.43)**	(8.27)**	(1.83)	(7.74)**
Lag 3 of NEWSTAD	15.559	7.131	1.008	24.197
	(6.85)**	(4.92)**	(0.60)	(7.41)**
Lag 4 of NEWSTAD	18.072	6.867	3.582	29.261
	(7.40)**	(3.80)**	(1.69)	(7.72)**
Lag 5 of NEWSTAD	18.222	7.053	4.397	30.602
	(8.03)**	(4.27)**	(2.24)*	(7.37)**
Lag 6 of NEWSTAD	16.966	2.477	3.231	26.513
	(6.65)**	(1.64)	(1.89)	(6.53)**
Lag 7 of NEWSTAD	18.620	1.317	9.117	21.785
	(7.54)**	(0.38)	(3.76)**	(5.41)**
Lag 8 of NEWSTAD	8.246	-0.831	1.679	13.960
	(3.88)**	(0.44)	(0.83)	(3.93)**
Lag 9 of NEWSTAD	4.876	0.164	0.268	6.801
	(2.75)**	(0.11)	(0.18)	(2.09)*
Constant	2.703	2.647	4.438	25.194
	(0.50)	(0.83)	(1.42)	(3.73)**
Team Effects	YES	YES	YES	YES
Year Effects	YES	YES	YES	YES
Observations	313	226	256	367
Number of Teams	28	28	28	28

Notes: All dollar values measured in 2000 dollars. Observations with missing data are not included which accounts for different sample sizes. Specification assumes heteroscedasticity across teams and team-specific AR(1) process over time. Absolute value of z statistics in parentheses. * Significant at 5%; ** Significant at 1%

Column four of Table 3 reports the results concerning total ream revenues. These revenues include gate, stadium, and media revenues, and additional revenues that might not be included in the other categories, such as stadium naming rights, etc. In general, the socio-economic characteristics of the host city have the same impact on total revenue as with other sources of revenues. A single-purpose stadium tends to increase total revenues by approximately $8 million, which might explain the increased interest on the part of team owners in single purpose stadiums. The first ten years of a new stadium increase total revenues dramatically, relative to teams that play in older stadiums. During the first ten years, the aggregated increase in total revenues is estimated to be approximately $219 million dollars. Therefore, a new stadium seems to provide substantial returns to team owners, especially when contrasted with the average amount of money team owners contribute to a new stadium – during the sample period, team owners contributed approximately $80 million in 200 dollars. Therefore, in terms of gross return on investment, the recent trend in how new stadiums are financed seems to provide outstanding returns for team owners.

Figure 1: Annual Marginal Impact of a New Stadium on Gate, Stadium and Total Revenue (first 10 years of a new stadium)



Do team owners reward the host-city with a higher quality team after a new stadium is built? The incentive to reduce team quality because of anticipated novelty or honeymoon effects has been investigated by other authors (see Quinn, Hakes, etc). Column 1 of Table 4 reports the estimation results concerning team payrolls. In general, teams in larger cities pay slightly more for players (but not in an important sense economically) and teams in single purpose stadiums tend to spend about $6 million more on players than teams in multipurpose stadiums. In general, a new stadium does not correlate with increased spending on players until the stadium's fourth year. At that point, teams in new stadiums spend from $7 to $18 million more on players relative to teams in older stadiums. However, there is a rather narrow window during which team owners spend more on players; by the tenth year of a new stadium teams spend no more on players than their counterparts in older stadiums.

Column two of Table 4 reports the estimation results concerning operating expenses. In this case, team owners might have an incentive to artificially increase operating expenses as a means of "hiding" profitability. There are many ways in which operating expenses might increase, including stadium and field maintenance, travel expenses, front office salaries, farm-club subsidies, and so forth. The evidence suggests that operating expenses increase dramatically for the first six years of a new stadium. The estimated aggregate increase in operating expenses during the first six years of a new stadium is approximately $48 million. The annual increase in operating expenses is depicted in Figure 2.

Table 4: GLS Panel Estimation Results
(Dependent variables measured in millions of 2000 dollars)

Explanatory Variable	(1) Player Payroll	(2) Operating Expenses	(3) Operating Income	(4) Franchise Value
Population	0.011	0.012	0.005	0.067
	(4.07)**	(9.54)**	(2.46)*	(5.95)**
Per-capita income	0.000	0.000	0.000	0.004
	(1.45)	(1.21)	(2.45)*	(6.20)**
Unemployment	-0.970	-1.263	0.468	-9.186
	(1.47)	(2.40)*	(0.79)	(4.09)**
Domed stadium	0.328	-5.943	-0.947	-11.020
	(0.19)	(3.03)**	(0.57)	(1.08)
Single purpose stadium	6.519	5.297	-0.054	28.844
	(4.22)**	(4.45)**	(0.04)	(5.63)**
Lag win percentage	0.037	0.027	-0.005	0.038
	(6.76)**	(5.05)**	(1.00)	(2.57)*
New stadium	-2.915	4.997	17.157	16.946
	(1.35)	(2.46)*	(8.23)**	(2.68)**
Lag 1 of NEWSTAD	0.692	8.230	12.489	23.597
	(0.28)	(3.71)**	(5.34)**	(3.00)**
Lag 2 of NEWSTAD	4.621	10.643	11.159	36.364
	(1.83)	(4.73)**	(4.62)**	(4.31)**
Lag 3 of NEWSTAD	8.859	4.607	7.628	57.034
	(3.28)**	(1.81)	(2.87)**	(6.18)**
Lag 4 of NEWSTAD	13.327	14.624	7.483	61.583
	(4.23)**	(4.89)**	(2.40)*	(5.80)**
Lag 5 of NEWSTAD	18.709	9.647	4.920	62.704
	(5.16)**	(2.95)**	(1.31)	(5.34)**
Lag 6 of NEWSTAD	16.056	0.097	6.330	70.235
	(4.72)**	(0.03)	(1.96)	(6.28)**
Lag 7 of NEWSTAD	9.135	3.381	4.557	47.790
	(2.58)**	(1.11)	(1.28)	(4.24)**
Lag 8 of NEWSTAD	7.841	3.636	2.748	33.721
	(2.37)*	(1.38)	(0.87)	(3.22)**
Lag 9 of NEWSTAD	3.192	2.654	1.444	18.574
	(0.99)	(1.04)	(0.48)	(1.96)
Constant	-8.143	34.860	-5.711	44.297
	(1.25)	(6.45)**	(0.96)	(2.32)*
Team Effects	YES	YES	YES	YES
Year Effects	YES	YES	YES	YES
Observations	367	285	367	367
Number of Teams	28	28	28	28

Notes: All dollar values measured in 2000 dollars. Observations with missing data are not included which accounts for different sample sizes. Specification assumes heteroscedasticity across teams and team-specific AR(1) process over time. Absolute value of z statistics in parentheses. * Significant at 5%; ** Significant at 1%

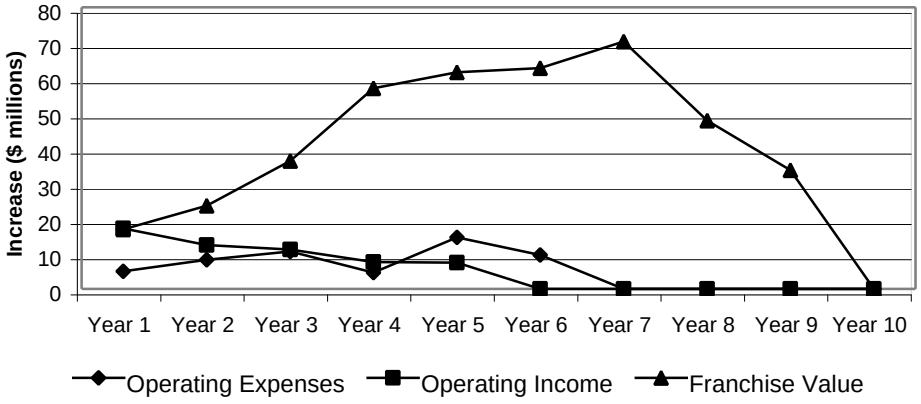
Column 3 of Table 4 reports the estimation results concerning franchise operating income, ostensibly franchise profits. As mentioned above, approximately 41% of all sample observations correspond with a reported operating income that is less than zero, and therefore the operating income is likely to be biased downward as team owners try to hide their true profitability. Nevertheless, it is not surprising that teams in larger cities with greater per-capita income tend to be more profitable. City unemployment does not statistically or economically influence baseball franchise profitability, nor does playing in a domed or single purpose stadium. However, it is clear that during the first six years of a new stadium teams stand to profit substantially. On average, the year a team moves into a new stadium their operating income increases by approximately $17 million dollars. The increase in profits is consistently positive, although declining, over the remaining five years. The aggregate profit from a new stadium is estimated in the neighborhood of $60 million dollars. The annual marginal impact of a new stadium on operating income is depicted in Figure 2.

From Table 1, the average franchise contribution to stadium construction costs was approximately $60 million. Therefore, on average, team owners recouped their entire investment in the new stadium within six years, whereas the public might continue servicing public debt incurred for stadium construction for another 24 years.

Evidence of rents generated by the new stadium beyond the ten-year horizon investigated here is provided in the final column of Table 4, in which the empirical results concerning the estimated franchise book value are reported. It is clear that franchises located in larger cities with more affluent populations are much more valuable. A high host-city unemployment rate reduces a franchise's value, while a single-purpose stadium increases franchise value. Finally, the new stadium dummy variables are all positive and statistically significant except for the tenth year, in which case the

estimated parameter is positive but not distinguishable from zero. The estimated annual marginal impacts of a new stadium on franchise book value are depicted in Figure 2.

Figure 2: Annual Marginal Impact of a New Stadium on Operating Expenses, Operating Income and Franchise Value (first 10 years of a new stadium)



In other words, during the first ten years of a new stadium a franchise's book value increases dramatically, especially in the fourth, fifth, and sixth years of a stadium, which correspond to the greatest increases in gate revenue. This increase in franchise value represents that portion of total benefit of a new stadium that is internalized by the team owner through increased ticket sales, concession sales, and other revenue sources. Most economic impact studies include anticipated revenue increases as part of the total benefit of a new stadium but fail to explicitly specify how much of the total benefit of a new stadium is available for the public at large and how much is anticipated to be internalized by the team owner.

To summarize, the results in Table 3 and Table 4 indicate that during the 1990s and into the early 2000s, new baseball stadiums correlated with increased gate, stadium, and total revenue, while local media revenues were unaffected by a new stadium. A small portion of the additional revenue generated

by a new stadium was spent on increased team payrolls, perhaps to the extent of hiring one additional All-star player, however operating expenses increased more dramatically than team payrolls, suggesting that team owners may artificially increase operating expenses in order to downplay their profitability. The additional revenue not spent on additional players' salaries and other operating expenses increased operating profits and increased team book value. It is estimated that the average team contribution to a new stadium is recouped in six to seven years. Given these results, it is not surprising that the default is for a team owner to ask for a new, publicly funded stadium.

Discussion and Conclusions

What lessons can be learned from the results presented in Table 3 and Table 4? The main finding in this paper is that the property rights to the majority of the revenues generated by a new stadium prove very valuable. As team owners continue to successfully negotiate for these property rights, the majority of the benefits of a new stadium continue to shift to the team owner and away from the rest of the host-city's population and businesses. In other words the benefits of a new stadium may become more private and less quasi-public than in the past. This assertion deserves further investigation because, if true, it might explain why sports economists have searched in vain to detect sizeable public benefits from a new stadium.

While the hard-to-measure non-monetary benefits of a new stadium to the local population may be greater than the benefits that accrue to the team owner, to date no combined estimates of consumer surplus, increased spending, and increased employment approach the figures implied by the results in Table 3 and Table 4 (see Irani, 1997).

The skewed distribution of monetary benefits towards team owners may help explain why referenda on public funding for stadiums are often fiercely contested. Those who enjoy the

stadium the most and expect to receive more consumer surplus from a new stadium are motivated to vote yes for public funding (see Fort, 1997; Depken, 2000). On the other hand, those who expect to realize few if any benefits from the stadium may feel any windfall to the team owner is unjustified and a misallocation of public resources, leading to closely contested referenda.

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