STADIUM GAMES: PUBLICLY FINANCED STADIUMS AND THEIR IMPACT ON GATE REVENUE FORECASTS

A Thesis

Presented to

The Faculty of the Department

of Economics

University of Houston

In Partial Fulfillment

Of the Requirements for the Degree of

Master of Arts

By

Hardy S. Almes

August, 2012

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STADIUM GAMES: PULBLICLY FINANCED STADIUMS AND THEIR IMPACT ON GATE REVENUE

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Abstract

Over the course of the last two decades there has been a great period of stadium construction amongst the four major American sports leagues. The bulk of the funding for said construction has come from public sources. Amongst politicians, taxpayers and economists there has been significant debate as to whether the public financing of these stadiums is a prudent public policy decision. Arguments in favor of public financing for sports stadiums have hinged on the assumption that the construction of new stadiums will have a positive impact upon revenues. Our study looks to investigate the validity of this assumption. We seek to determine the best methods of forecasting gate revenues both in the wake of a newly built stadium as well as in a period many years after their construction. From these results we hope to glean some useful information regarding the impact of newly constructed stadiums on demand for professional sports. Our results suggest that new stadiums provide a significant and positive shock to gate revenues. However, these shocks are not permanent and tend to wane over time.

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I) Introduction

Within the last quarter century there has been a dramatic increase in the construction and renovation of stadiums and arenas amongst the four major American sports leagues. As of 2005 an overwhelming majority of professional sports teams competed in arenas built after 1990. Such periods of construction are nothing new in pro sports with similar cycles generally occurring every thirty years or so. While such periods are far from a novel occurrence, the way in which these stadiums have been financed has changed substantially over the years. Up until 1953 nearly all such stadiums were built using private funds with the only exceptions being stadiums built with the intention of luring the Olympic Games (Siegfried and Zimbalist, 2000). By contrast the majority of the funds for stadiums in each decade since the 1960’s have come from public sources of revenue (Siegfried and Zimbalist, 2000). Public ownership of stadiums has also increased substantially (Coates and Humphreys, 2000). Anecdotally this system of financing seems to have worked out fantastically for team owners as there has been a marked increase in franchise values since the 1970’s (Coates and Humphreys, 2000). However, it is less clear whether the public has similarly benefited.

II) Literature Review

One of the reasons for the increase in the incidence of publicly financed stadiums is simply that major league sports franchises have a substantial amount of leverage in their negotiations with cities. The source of this leverage originated with westward expansion in the United States. Between 1903 and 1953 not a single Major League Baseball team changed cities (Siegfried and Zimbalist, 2000). As the population began shifting westward more cities became viable candidates for a major league sports franchise thereby increasing demand for such franchises.

Furthermore teams are able to exert both monopoly and monopsony power over cities. Major league sports leagues exist as monopolies. In fact they are given certain anti-trust protections by the federal government. These leagues expand at a rate which prevents other leagues from establishing themselves. At the same time they expand slowly enough so as to exert some influence over cities by threatening to move their teams (Siegfried and Zimbalist, 2000). This allows franchises to assert monopsony power over cities. In order for a team to change cities, the move must be approved by a supra-majority of owners. Acting collectively they can threaten cities with the prospect of moving a team. They can also threaten cities with the prospect of never relocating a team to that city ever again.

There also exist a number of practical reasons in favor of public funding for sports stadiums. The primary argument in favor is that the assumed increases in attendance and revenue from the new stadium will have additional positive effects upon the local economy (Zygmont and Leadley, 2005). The idea is that a professional sports franchise serves as a positive externality to the local economy. Consider the following. A new stadium will lead to new jobs within the city. People working these jobs have more money, and will therefore spend more. This influx of demand in turn leads to more jobs being created. There is also an assumption that people will spend money outside of the ballpark as well as inside it. From this it follows that a new stadium will have a positive impact upon local restaurants, hotels, businesses etc. Arguments like these which present sports stadiums as a means of core redevelopment have shown to be particularly appealing to politicians as many downtown areas have been negatively impacted by suburbanization in the latter half of the twentieth century (Siegfried and Zimbalist, 2000).

There are also arguments for the public financing of sports stadiums apart from economic development. One such argument is that having a state of the art stadium along with the professional sports team that comes with it helps to “put a city on the map” (Siegfried and Zimbalist, 2000). A natural consequence of increasing a cities profile is to increase tourism as well as to draw in businesses. Furthermore there are psychic benefits to having a major league sports team. The notion is that having a professional sports team helps to make a city world class. Similarly having a successful team helps to increase civic pride. Such psychic benefits are nearly impossible to quantify and consequently their role is difficult to determine.

Rather than providing teams with a cash subsidy, city governments normally build stadiums themselves. They do this for a number of reasons, some of which are political. For instance, the construction of new arenas are generally supported by labor groups (Siegfried and Zimbalist, 2000). Also, subsidies could be spun as cities redistributing funds from everyday people to wealthy owners and players which is never a popular proposition (Siegfried and Zimbalist, 2000). Furthermore due to the complexities of lease contracts, building a stadium is more likely than subsidies to keep a team from moving to another city (Siegfried and Zimbalist, 2000). Finally, an unintended consequence of the 1986 Tax Reform Act has contributed to this outcome (Siegfried and Zimbalist, 2000).

Generally speaking the financing for new arenas comes from tax revenues. All kinds of taxes have been used. The most common sources of financing have been through sales taxes, sin taxes and lotteries (Siegfried and Zimbalist, 2000). These taxes are mainly regressive.

As far as the actual impact of new stadiums upon attendance and gate revenue, the literature suggests that there is an initial increase which tapers off as time goes by. Zygmont and Leadley refer to this phenomenon as the "Honeymoon effect" (2005). The "honeymoon effect" applies to both attendance and gate revenues. The former is generally shorter lived lasting between 8 and 10 years while the latter persists for a slightly longer period, as ticket prices generally are elevated over this time period as well.

Research has shown there to be other significant determining factors in gate revenue apart from stadiums. Team performance is perhaps the largest of these. Zygmont and Leadley found that not only was winning percentage positive and significant, but the number of games a team is behind in the divisional race was negative and significant (2000). In other words, performance as judged in absolute and relative terms was a significant indicator of gate revenue. The unemployment rate has been found to have a negative and significant impact on gate revenue, as have multipurpose stadiums (stadiums which house more than one team or sport). Additionally dummies for new franchises have been shown to be significant and positive (Zygmont and Leadley, 2000).

III) Motivation

This particular study looks at how publicly subsidized stadiums impact gate revenue over time. Specifically we intend on using a number of models to forecast gate revenue over two periods, one occurring soon after the stadium is built and one occurring a number of years later. The hope is that comparing how various forecasting methods fair against each other over time will yield some conclusions about the shocks to gate revenue associated with the building of a new stadium as well as the persistence of these shocks.

Rather than looking at each of the major American sports (football, basketball, baseball and hockey), we chose to specifically look at data from Major League Baseball. We had many reasons for doing this. First, there is a preponderance of data available as Major League Baseball has existed in one form or another since the 19th century. Secondly MLB stadiums are quite large and as a result they rarely sell out. MLB data does not suffer from issues pertaining to an excess of demand which can occur in other sports such as basketball and hockey in which the arenas seat fewer people. Also the bulk of the literature on the subject revolves around MLB, which made it easier to procure this data.

We decided to limit our analysis to three teams; the Cleveland Indians, Texas Rangers and Baltimore Orioles. We wanted to limit our analysis to teams which have several data points both before and after the building of a new arena. If a "honeymoon effect" does indeed exist, using teams who built a new stadium in the 2000's would likely hide such an effect as there may not be enough time for the positive shock to wane.

Secondly we wished to look at stadiums built after 1990. In earlier years, the prevailing trend in sports arenas was something called the "cookie cutter" stadium. These stadiums generally housed multiple teams, usually baseball and football. If we were to use these stadiums in our analysis we would likely have to include data from each sport. Furthermore since modern stadiums are built specifically for one sport, they are likely to be better suited for that particular sport, and therefore the impact of a new stadium on demand will be more telling.

During the 1990's there were a number of MLB stadiums built. However, many of these were built by expansion teams. We neglected these franchises from the data. As previously mentioned the literature suggests that there is a secondary "honeymoon effect" associated with a city obtaining a new franchise. This secondary effect would likely cloud our analysis. Also such franchises do not provide us with enough data points to provide viable models and forecasts. There were only five MLB stadiums built after 1990 which fit our criteria. Of these five, we discounted two; the Atlanta Braves and the Chicago White Sox. We discounted the Atlanta Braves as their stadium was privately funded. We discounted the White Sox as their stadium, US Cellular Field, underwent significant renovations in the early 2000's. The literature suggests that substantial renovations to stadiums can have an impact on demand similar to the building of a new stadium (Zygmont and Leadley, 2005). This impact is likely to hinder our analysis. This left us with the sample of three franchises already listed.

IV) Data

All of the data on attendance, and stadiums is a matter of public record and was found on baseball-reference.com. The ticket price data was normalized using CPI figures found via the Federal Reserve of St. Louis. There were a few gaps in the data. For whatever reason no ticket price data was found for the 1963 season. There was also no data available for the 1989 and 1990 seasons as MLB did not release that information. There were two major sources of ticket price data which we had to choose from. There was a series which took the simple average of the price of tickets sold by each team. This series was compiled by Doug Pappas, a prominent baseball writer and researcher, and covered the years from 1950 to 2004. There was also a weighted average series. This series was compiled by Roger Noll, an economics professor emeritus at Stanford, and covered the following seasons: 1952, 1971, 1975-1988 and 1991-2009. Ceteris paribus, the simple average series would seem to hold some disadvantages. Using this data could create a spurious correlation between attendance and average price (Zygmont and Leadley, 2005). The average ticket price does not impact attendance, rather it is the structure of ticket prices that does so. Ultimately we decided to use the simple average series because it covered a greater time frame, however we did use the Noll series for the period from 2005 until 2007 (we rejected the 2008, and 2009 seasons so as to not include the impacts of the recession from our analysis). We covered any missing gaps in our data by assuming a linear progression of ticket prices during those periods. Finally we calculated gate revenues by multiplying attendance by the average price series.

V) Methodology

The primary forecasting methods that we will utilize are AR, ARMA and ARIMA models. These are all univariate time series models which attempt to forecast a series by using past values of that series.

The AR, MA and ARMA models are best served for a stationary series. While our data is not stationary (we ran Augmented Dickey-Fuller tests in order to confirm this), we assume regime-wise stationarity (in the periods before and after a new stadium is built) when forecasting using these models.

AR or autoregressive models are expressed by a function of the past p values.

$$y_t = c + \alpha_1 y_{t-1} + \alpha_2 y_{t-2} + ..+\alpha_p y_{t-p} + u_t$$

C represents a constant, y_t the past values, and u_t the error term.

MA or moving average models can be shown as a function of the past q errors of a series.

$$y_t = c + u_t + \theta_1 u_{t-1} + \theta_2 u_{t-2} + ... + \theta_q u_{t-q}$$

ARMA models serve as a combination of the two, and the predicted values of the series are determined by both its past values as well as its past errors.

$$y_t = c + \alpha_1 y_{t-1} + \alpha_2 y_{t-2} + ..+ \alpha_p y_{t-p} + \theta_1 u_{t-1} + \theta_2 u_{t-2} + ... + \theta_q u_{t-q} + u_t$$

ARIMA models are used for non-stationary series'. For such series' we difference the data (i) times until it becomes stationary. Generally speaking we only difference the data once.

$$\Delta y_t = c + \alpha_1 \Delta y_{t-1} + ..+\alpha_p \Delta y_{t-p} + \theta_1 u_{t-1} + ... + \theta_q u_{t-q} + u_t$$

In order to determine the appropriate model we use the Box-Jenkins procedure. First we determine whether or not the data should be differenced. Then we find the optimal model using Schwartz criteria (minimizing SIC). Next we fit a standard regression to the data. Finally we check the residuals to determine whether or not the estimated residuals are a white noise process. We do this by checking the Ljung-Box Q-Statistics. The null hypothesis for these statistics is that the residuals are a white noise process and the alternative hypothesis is that they are not.

We used the Bai-Peron method for testing for the presence of structural breaks within our data. Determining whether structural breaks occur in a series is very important. In the presence of structural breaks, Dickey-Fuller test statistics are biased. Specifically they lead to the non-rejection of a unit root (Enders, 2004). As a consequence any forecasts that are made may infer trends in the data that do not actually exist. Bai-Peron determined a method of testing for structural change as well as determining the appropriate number of breaks.

They describe three sorts of tests. One was a test of zero breaks against the alternative of a fixed number of breaks using a supF test. Then there is a test with the null hypothesis of zero structural breaks against an unknown (albeit upper bounded) number of breaks. This determination is made by means of double maximum tests. Finally, they describe a sequential test. It starts with a test of zero breaks versus one break. Provided the null hypothesis of zero breaks is rejected, then there is a test of one break against two breaks. Such tests continue until one fails to reject the null hypothesis. The total number of rejections at this point would represent the total number of breaks (Prodan, 2008).

When using the Bai-Perron method we follow the sequential procedure unless we fail to reject the null hypothesis of zero breaks versus one break. At such a point we utilize the double maximum tests mentioned above to determine if an additional break is present. If we reject the null hypothesis of zero breaks we continue to determine structural breaks using the sequential procedure (Prodan, 2008).

Bai-Perron's method protects against some of the weaknesses of the sequential procedure. When there are two off-setting breaks, it can be difficult to reject the null hypothesis of zero breaks. However, in the same case rejecting the null of zero breaks against a greater number of breaks is not nearly as difficult (Prodan, 2008).

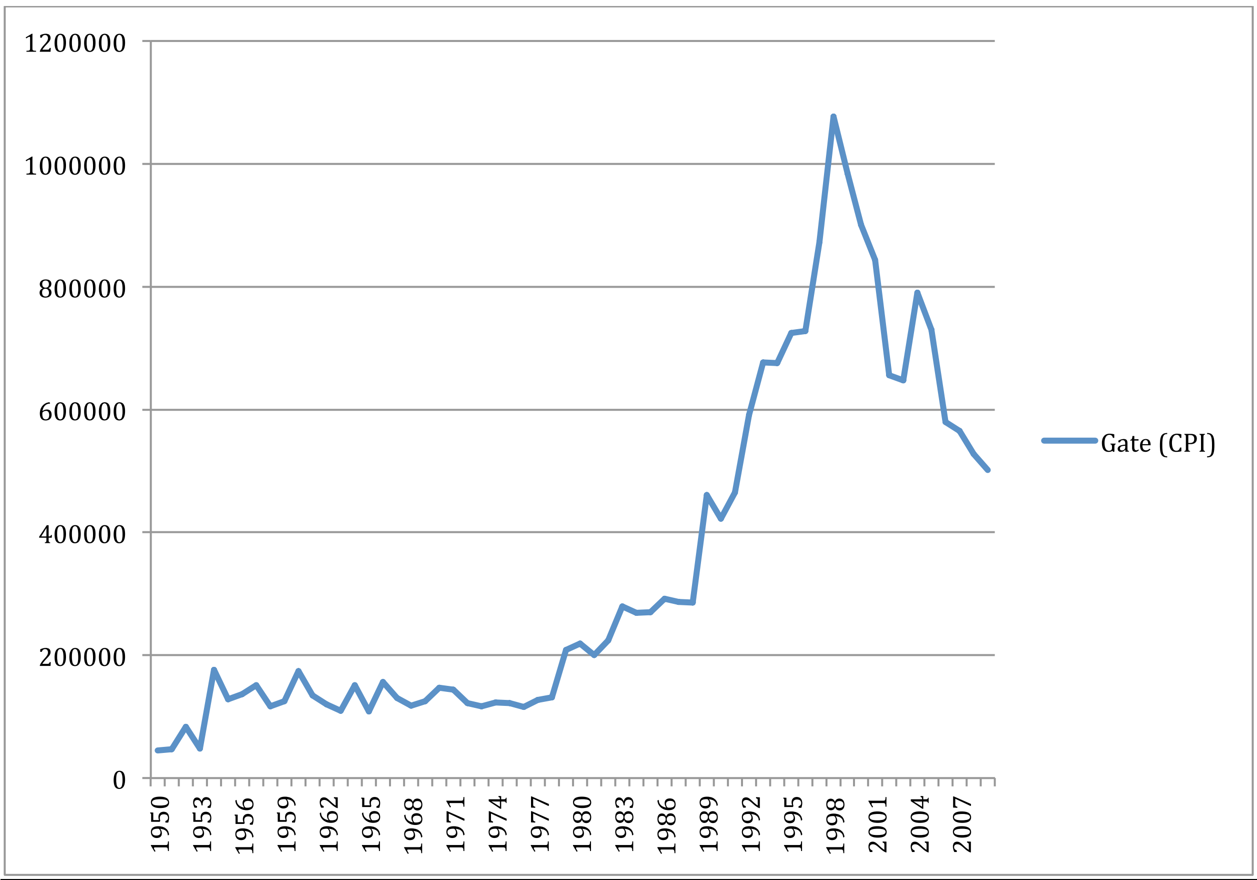
In the presence of structural breaks we can provide forecasts in the following way. We determine the best AR model and then simply include dummies for the appropriate breaks. Additionally we included a forecast which accounts for trend along with the structural break dummies.

VI) Empirical Results

First we graphed the series', and tested for structural breaks in the data. The full Bai-Perron results are tabulated in Appendix III on page 30.

Graph I

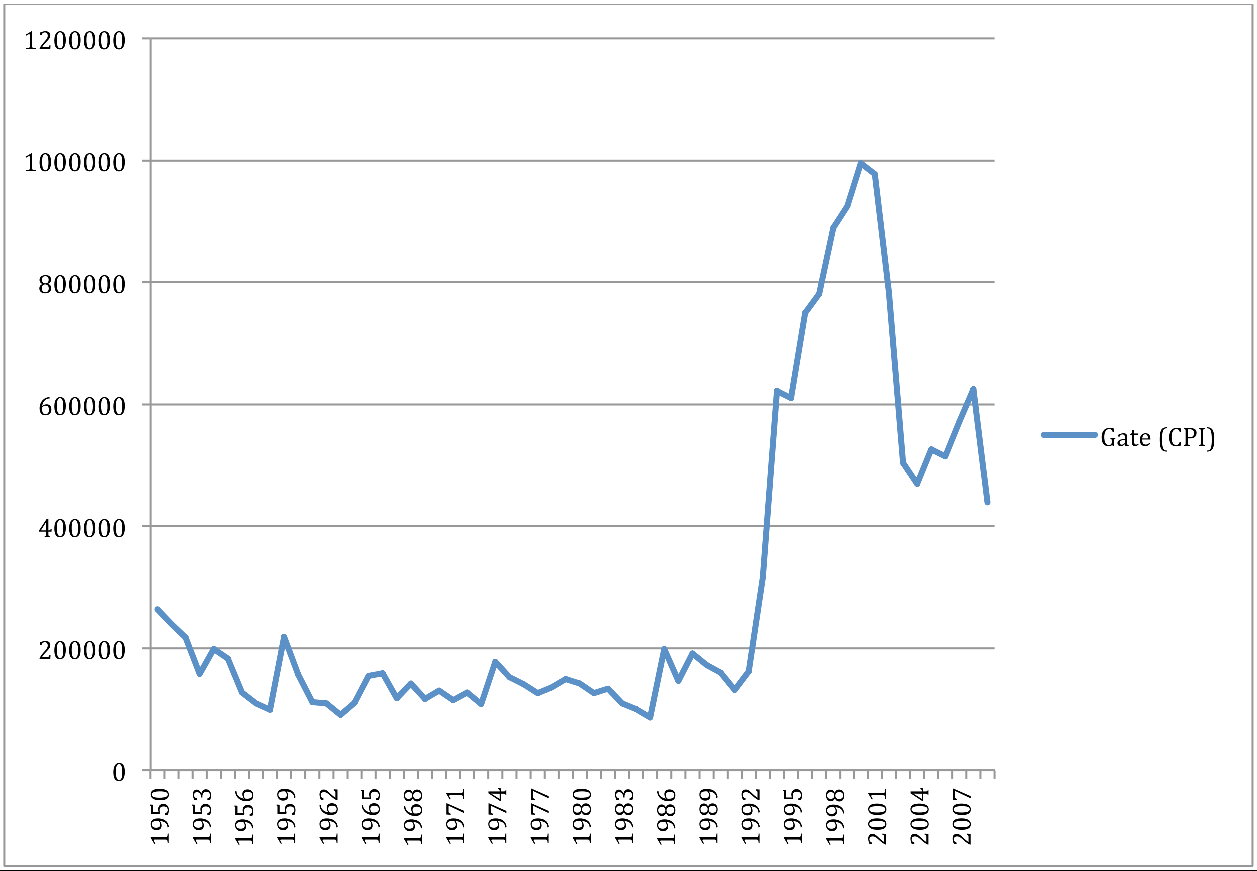
Orioles Gate Revenue



Using the sequential procedure we found two significant breaks at the one percent level. The first break found by the sequential procedure occurred at data point 42 which coincides with the opening of Camden Yards in 1992.

Graph II

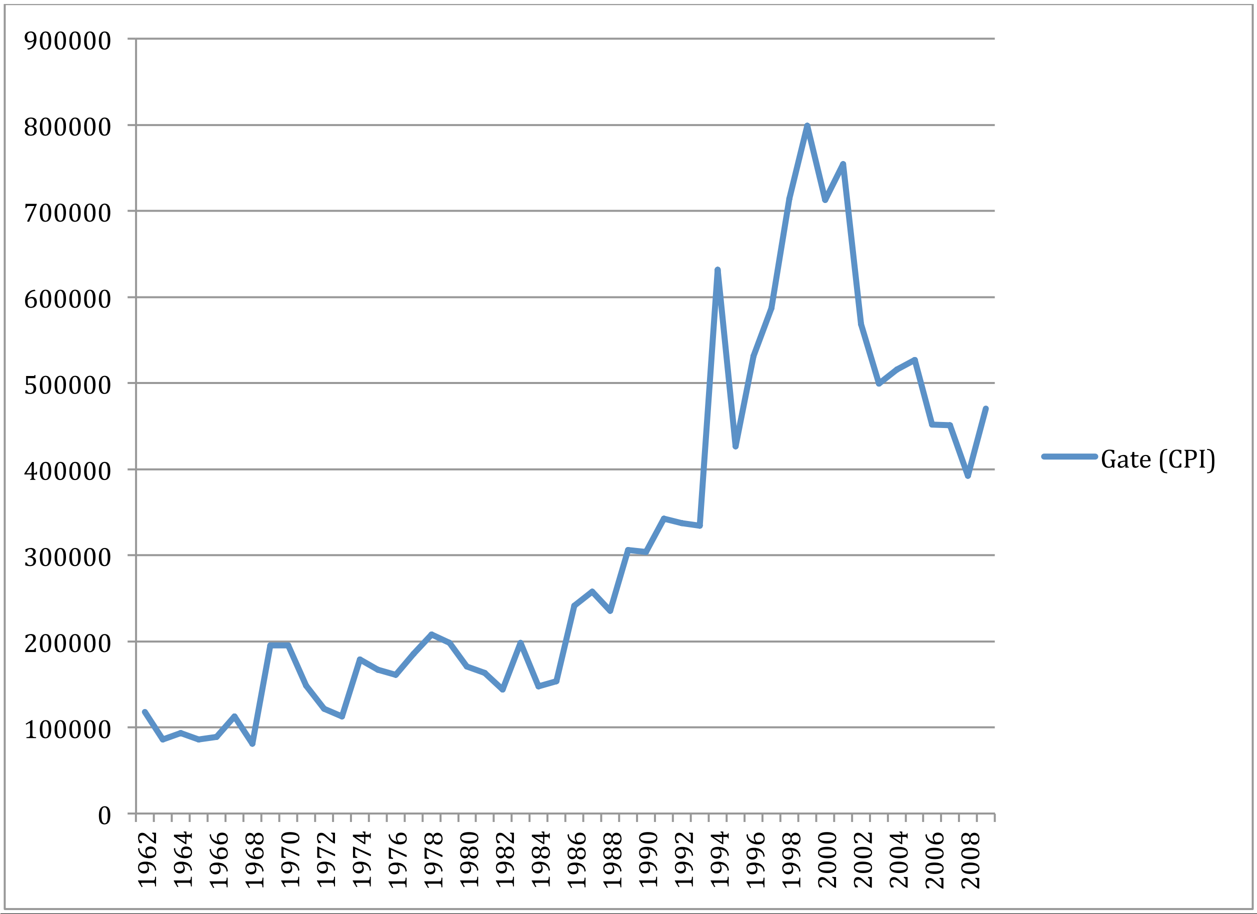
Indians Gate Revenue



Using the sequential procedure we found a single significant break at the one percent level. In fact there was only one significant break at even the ten percent level. The first break occurred at data point 44 which coincides with the opening of Jacobs Field in 1994.

Graph III

Rangers Gate Revenue



Using the sequential procedure we found three significant breaks at the one percent significance level. The first break found by the sequential procedure occurred at data point 44 which coincides with the opening of The Ballpark in Arlington in 1994.

For each of the teams in our sample the sequential procedure found a significant break at the one percent level which coincided with the opening of a new stadium. Furthermore in each case these breaks were the first breaks found by the procedure.

These results suggest that new stadiums at the very least provide significant shocks to the gate revenue series and may indeed cause a structural break in the sequence.

Practically speaking this provides justification for using an AR model with structural break dummies as one of our models for forecasting gate revenue.

For simplicities sake we will look at the results for the Cleveland Indians step by step. Results of the other teams will be described and tabulated later on in Table C. We will begin with forecasts of gate revenues in seasons soon after the building of the new stadium. In the cases of Cleveland and Texas we forecasted beginning in 1997 despite the fact that their stadiums opened in 1994. We did this because we wanted to limit the impact of the negative shock to demand caused by 1994 players strike, and the subsequent cancelation of the World Series.

Our optimal AR model for the Indians as determined by the Box-Jenkins procedure was an AR(1). The residuals were deemed to be a white noise process. In addition to the traditional AR (p) model, we also estimated an AR model with a structural break dummy corresponding to the opening of Jacobs Field as well as a similar model which also accounted for any trend in the data.

We then estimated ARMA and ARIMA models and performed forecasts. The appropriate ARMA specification was an ARMA (3,2) and its residuals were a white noise process. Similarly our estimated ARIMA model produced white noise. The specification for this model was an ARIMA (4,1,2).

Finally we tabulated the results in Table A.

Table A

Cleveland Period 1 Forecast Specifications, Residuals and Fit

Cleveland Indians (97-01)

	Lags	Residuals	RMSE
ARMA (p,q)	2,3	WN	109,700.65
ARIMA (p,1,q)	4,1,2	WN	446,827.04
AR (p)	1	WN	156,872.96
AR (p) w/ Breaks	1	WN	47,991.44
AR (p) w/ Breaks, Trend	1	WN	45,749.386

The AR models with structural breaks are the best here as evidenced by their substantially lower root mean squared errors (RMSE). This lends credence to the claim that building a new stadium causes structural changes in the data. We had similar findings for the other two teams. In both cases the lowest root mean squared errors out of the models we forecasted came from the AR models with structural break dummies.

We then performed forecasts using these models on the same teams over a later time period (2003-2007). The output for Cleveland is recorded in Table B.

Table B

Cleveland Period 2 Forecast Specifications, Residuals and Fit

Cleveland Indians (03-07)

	Lags	Residuals	RMSE
ARMA (p,q)	1,3	WN	135953.74
ARIMA (p,1,q)	2,1,1	WN	208058.6
AR (p)	1	WN	303199.51
AR (p) w/ Breaks	1	WN	241951.3
AR (p) w/ Breaks, Trend	1	WN	242462.79

We found that in period two the models with structural breaks are not as effective as the other models both absolutely and relatively. In the case of Cleveland the ARMA (1,3) model is superior. The results vary amongst the other teams with no one model being dominant.

Not only do the AR models with structural break dummies forecast better in a relative sense during period one, but they also are superior in an absolute sense. This is evidenced of their smaller RMSE as compared to their period two counterparts. It should be noted that the AR models with structural breaks overestimate the true values of gate revenue in each forecast. In other words these models overstate the persistence of the positive shock brought on by the building of a new stadium.

Finally I tabulated all of the results for each team in Table C.

Table C

Complete Forecast Specifications, Residuals and Fit

Cleveland Indians		1997-2001			2003-2007	
	Lags	Residuals	RMSE	Lags	Residuals	RMSE
ARMA (p,q)	2,3	WN	446827.04	1,3	WN	135953.74
ARIMA (p,1,q)	4,1,2	WN	109700.65	4,1,2	WN	233646.22
AR (p)	1	WN	156872.96	1	WN	303199.51
AR (p) w/ Breaks	1		47991.44	1		241951.3
AR (p) w/ Breaks, Trend	1		45749.386	1		242462.79

Texas Rangers		1997-2001			2003-2007	
ARMA (p,q)	2,3	WN	105091.04	2,2	WN	208127.24
ARIMA (p,1,q)	2,1,1	WN	172469.23	2,1,1	WN	148239.09
AR (p)	3	WN	91476.658	2	WN	182641.3
AR (p) w/ Breaks	3		86453.593	2		153229.5
AR (p) w/ Breaks, Trend	3		88124.995	2		204367.4

		1993-1997			2003-2007	
Baltimore Orioles						
ARMA (p,q)	1,1	Not WN	70529.616	1,3	WN	126805.64
ARIMA (p,1,q)	1,1,3	WN	53825.111	3,1,4	WN	116014.63

AR (p)	3	Not WN	74427.81	1	WN	90194.025
AR (p) w/ Breaks	3		46378.651	1		108512.14
AR (p) w/ Breaks, Trend	3		43573.512	1		125680.72

The Ljung-Box Q-Statistics and their associated levels of significance used to determine whether the models produced a white noise process are found in Appendix I on page 25. The complete individual forecasts for these models are tabulated in Appendix II on page 27.

Our results suggest that publicly financed stadiums provide a positive shock to gate revenues. However these shocks do not persist indefinitely and tend to wane as the years progress. In other words it would seem as if there is a “honeymoon effect” of sorts as described in the literature.

VII) Limitations

One of the limitations of our analysis is that the data was incomplete. Specifically there were a number of years in which we were missing price data. I filled in the blanks by making an assumption that prices would increase linearly. Depending on the validity of this assumption our work may suffer from measurement error.

Also our analysis may be limited by problems of endogeneity. As previously alluded to there are a number of significant determinants of demand for Major League Baseball games beyond just the age or condition of the stadium. Our sample was not perfect in holding all factors equal, and thus our results likely were impacted by omitted variable bias. Further clouding the matter is the issue of team success and simultaneity. It is likely that team success and new stadiums are positively correlated. For example if a team builds a new stadium its revenue increases leading it to spend more money on procuring talented players which leads to more wins which in turn leads to more revenue. This seems to have occurred in our sample, most notably in the case of the Cleveland Indians who achieved one of their longest periods of success in the mid to late 1990's after Jacobs Field was built.

Another limitation of our study is that we were only able to find data concerning gate revenue. However, there are other ways in which franchises generate revenue at the ballpark. The most prominent of these is the sales of concessions. It is likely that, because of the sale of concessions, individual clubs will generate some sort of price discrimination schemes so as to maximize the revenue they receive from patrons at the ballpark. While we would imagine that there is a substantial correlation between gate revenue and total revenue, the correlation is certainly not perfect and consequently is likely to impact our study to some degree.

Finally, not everyone who buys a ticket actually attends the game. These people would not be able to spend on concessions and the like. Therefore in order to truthfully understand a stadiums impact on revenue, we would have to determine the incidence of this phenomenon.

VII) Areas of Future Work

This analysis only addresses revenue made at the ballpark. Any residual impact of these dollars on the outside community is unaccounted for due to the scope of the project. There is some reason to believe that positive shocks to revenue may have a negligible impact on local economic development. The theoretical backing for this has to do with the substitution effect and leakages. In the case of the substitution effect the argument goes as follows. Consumers have a reasonably fixed leisure budget. Therefore any increases in spending on major league baseball games may only represent a redistribution in peoples spending habits from bowling, or movies to baseball games (Siegfried and Zimbalist,2000). In this sense multipliers may only be relevant to the extent that having a new stadium actually adds to economic activity. This is an issue which needs to be explored.

Another problem has to do with leakages. The increases in revenue are only impactful to the local economy if they are spent locally. However it is reasonable to believe that much of this revenue "leaks" out into other areas (Siegfried and Zimbalist, 2000). This has to do with the two groups which receive the bulk of the revenue, namely the players and the owners. "Approximately 55 to 60 percent of NHL, NBA, NFL and MLB team revenues go to player compensation" (Siegfried and Zimbalist, 2000). The rest goes to the owners, who either pocket it or use it to "defray any additional costs"(Siegfried and Zimbalist, 2000). Due to the nature of these two groups it is quite likely that a substantial amount of the revenue does indeed leak out. These people are generally quite wealthy, and as such a substantial amount of their income goes towards taxes. Therefore a disproportionate amount of the revenue from a new stadium goes to

Washington D.C. rather than staying within the city proper. Any analysis of the issue should take into account how leakages and the substitution affect impacts the dollars being generated by the building of a new stadium.

Finally any further look into the potential benefits of publicly financed sports stadiums should attempt to take into account the counterfactual of what else those public dollars could be used for as well the counterfactual of how the city would fair in the aftermath of the loss of its team.

VIV) Concluding Remarks

In the recent decades there has been an increase in the construction of stadiums for professional sports stadiums amongst the four major American sports leagues. The bulk of these funds have come from various taxes. Proponents of such spending plans suggest that new stadiums will bring on a great increase in demand for professional sports and provide a boost to gate revenue as a result. They argue that this revenue will have a greater impact than their nominal value by means of various multipliers. Our study addresses the first point. We seek in this work to find the best forecasting methods for gate revenue in two periods, with the first period occurring soon after the construction of a new stadium and the second period a number of years later during the final five years of the dataset. Our results indicate that there is indeed a positive shock to attendance in the wake of a new stadium. However, these shocks are not permanent and tend to wane as time progresses. In order to better understand the general policy question, further work must be done to identify both the magnitude and persistence of these positive shocks to demand. Also, additional work as to the ability of these increased revenues to extend further than their nominal value should be undertaken.

Appendix I: Residual Diagnostics

Ljung-Box Q-Statistics/Significance Level

Cleveland Indians

1997-2001

Lags	ARMA	ARIMA	AR
8	5.637 / 0.059694	7.240 / 0.064640	6.705 / 0.349026
16	9.939 /0.445837	17.791 /0.165624	11.078 / 0.679868
24	20.988 /0.280028	33.591 /0.071314	26.418 / 0.234185

Cleveland Indians

2003-2007

Lags	ARMA	ARIMA	AR
8	1.677 / 0.432264	10.337 / 0.015909	6.257 /0.395077
16	13.121 /0.216983	16.503 /0.223053	16.336 /0.293260
24	18.003 /0.455447	27.810 /0.223066	21.536 / 0.487852

Texas Rangers

1997-2001

Lags	ARMA	ARIMA	AR
8	5.592 / 0.231729	7.511 / 0.111245	7.328 / 0.119531
16	21.221 /0.096110	14.381 / 0.277072	14.545 / 0.267257
24	134.775/0.000000	55.521 / 0.000034	48.565 / 0.000354

Texas Rangers

2003-2007

Lags	ARMA	ARIMA	AR
8	6.339 / 0.096253	12.242 / 0.056780	6.208 / 0.286512
16	14.586 / 0.202254	25.056 / 0.068852	13.813 / 0.387118
24	23.862 / 0.201519	67.483 / 0.000015	25.225 / 0.237570

Baltimore Orioles

1993-1997

Lags	ARMA	ARIMA	AR
8	15.953 /0.025547	8.717 / 0.120893	11.483 / 0.021644
16	28.578 /0.038622	16.479 / 0.350921	21.539 / 0.043022
24	70.039 /0.000011	61.849 / 0.000058	38.079 / 0.008661

Baltimore Orioles

2003-2007

Lags	ARMA	ARIMA	AR
8	10.147 /0.071177	4.830 / 0.089378	10.253 / 0.114398
16	23.326 /0.077460	14.542 / 0.267450	23.053 / 0.059411
24	37.098/ 0.056506	39.751 / 0.011557	29.634 / 0.127627

Appendix II: Yearly Forecast Results

Cleveland Indians Forecasts Period 1

Year	Gate Revenue	AR	AR w/ Breaks	AR w/ Breaks, Trend	ARMA	ARIMA
1997	781798	831598	826992	826715	577302	724805
1998	889660	923573	873276	873724	624273	841657
1999	925061	1026882	900997	902673	445307	816187
2000	995827	1142924	917601	920748	505152	839304
2001	977611	1273264	927545	932274	333330	842461

Cleveland Indians Forecasts Period 2

Year	Gate Revenue	AR	AR w/ Breaks	AR w/ Breaks, Trend	ARMA	ARIMA
2003	503861	795256	769090	769291	717165	765668
2004	469795	807353	759892	760275	648191	770472
2005	526307	819497	753897	754453	626837	753489
2006	514744	831689	749991	750716	585367	713960
2007	571205	843929	747446	748338	570934	721884

Texas Rangers Forecasts Period 1

Year	Gate Revenue	AR	AR w/ Breaks	AR w/ Breaks, Trend	ARMA	ARIMA
1997	587381	671368	598209	596402	650182	528742
1998	713906	620018	593792	594987	645089	534919
1999	799346	721627	650315	647486	773095	553846
2000	712808	817744	696850	689085	818809	564921
2001	754346	848789	735322	722997	940400	577959

Texas Rangers Forecasts Period 2

Year	Gate Revenue	AR	AR w/ Breaks	AR w/ Breaks, Trend	ARMA	ARIMA
2003	499139	666110	548883	594086	679538	635336
2004	515808	639885	583364	637799	664554	615132
2005	527186	667640	675979	731489	691962	629291
2006	451700	671732	698368	754799	702003	634117
2007	450741	686057	687074	745992	719280	645055

Baltimore Orioles Forecasts Period 1

Year	Gate Revenue	AR	AR w/ Breaks	AR w/ Breaks, Trend	ARMA	ARIMA
1993	676322	608720	615924	627026	616907	619101
1994	675282	678994	676281	688241	684928	666319

1995	724602	771625	746456	750690	761638	716331
1996	727501	849754	808752	805502	848148	745999
1997	872761	949940	877926	861337	945710	769221

Baltimore Orioles Forecasts Period 2

Year	Gate Revenue	AR	AR w/ Breaks	AR w/ Breaks, Trend	ARMA	ARIMA
2003	647995	659752	677391	688576	605983	629486
2004	789992	664001	695569	715045	578326	731081
2005	730062	668163	710602	736446	550350	681777
2006	580200	672238	723035	754012	547125	682797
2007	565051	676229	733318	768676	544062	790054

Appendix III: Bai-Perron Output

Indians

Break Point/Break #	Significant at 10%	Significant at 5%	Significant at 2.5%	New Stadium
42/1	Yes	Yes	Yes	Yes

Rangers

Break Point/Break #	Significant at 10%	Significant at 5%	Significant at 2.5%	New Stadium
32/1	Yes	Yes	Yes	Yes
24/2	Yes	Yes	Yes	No
7//3	Yes	Yes	Yes	No

Orioles

Break Point/Break #	Significant at 10%	Significant at 5%	Significant at 2.5%	New Stadium
42/1	Yes	Yes	Yes	Yes
33/2	Yes	Yes	Yes	No

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