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Major League Duopolists: When Baseball Clubs Play in Two-Team Cities

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Abstract: This paper focuses on examining the attendance of MLB teams that play home games in the same metropolitan area – duopoly teams. Comparisons were made between the determinants of attendance for duopoly teams and monopoly teams. While duopoly and monopoly teams share most of the same determinants, the estimated weights on some determinants differ. There is evidence that one duopolist's attendance is negatively related to the other's performance. Evidence is therefore provided that fans of one team respond to quality changes in the other team in a city.

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1. Introduction

In June of 2004, Erik Ahlberg described the Chicago baseball scene in the Wall Street Journal:

> The Chicago White Sox have the best record in baseball, and their best chance in years of ending an 88-year drought of World Series championships. But here in one of America's great sports towns, hardly anyone seems to care.
>
> The team has tried almost everything to lure fans, including half-price tickets on Mondays, $1 hot dogs, and roving bands of cheerleaders who give free tickets to anyone who happens to be wearing a White Sox hat or jersey. Still, the Sox are averaging only 23,000 fans a game -- a tad more than half the capacity of their South Side home, U.S. Cellular Field. When the Sox recently faced another first-place team, the Los Angeles Angels, only about 20,000 showed up, despite delightful weather and a 2-for-1 ticket special.

Chicago is not unique in American professional sports, but it is one of only a handful of cities that sport more than one franchise in one of the four major leagues. In 2006, four metropolitan areas (New York, Chicago, San Francisco-Oakland, and Los Angeles) had more than one Major League Baseball (MLB) franchise, two metropolitan areas (New York and San-Francisco) had more than one National Football League franchise, two metropolitan areas had more than one NBA franchise (New York and Los Angeles), and New York has three NHL franchises.

During its history, other cities have called more than one MLB team the home team, namely Philadelphia, Boston, and St. Louis. But each of these cities is now a one-team city. One reason why so few teams in a league call the same city home is that even with open entry, fans would be willing and able to financially support only one team. Another reason is institutional. The exclusivity arrangements granted by league officials to individual franchise owners raise barriers, and thus costs, to any other potential owner seeking to locate a team within a certain distance of an established team's stadium. Quirk and Fort (1995) note, for example, the circle centered at an NFL team's stadium and with a radius of 75 miles is the exclusive territory of that team. Pappas (2002) described some of the barriers facing franchise owners (current and potential) who wished to move into another team's territory (circa 1999):

> "(E)ither league can move into a territory belonging to a club in the other league, so long as (a) ¾ of the affected league's teams consent; (b) the two parks are at least five air miles apart unless the two clubs mutually agree otherwise; (c) the newcomer pays the existing club $100,000 plus half of any previous indemnification to invade the territory; and (d) the move leaves no more than two clubs in the territory. This provision dates to late 1960, when it was adopted to establish the terms for the expansion Los Angeles Angels to play in the territory claimed by the Dodgers in 1958

Pappas also notes MLB's American League (AL) constitution requires that a ¾ majority of current franchise owners must vote in favor of expansion and relocation. In addition,

he notes "relocation within 100 air miles of another club must also be approved by that club." [1]

Oligopoly and game theory teach us that when two firms with market power compete in the same product market, the decisions made by one firm fundamentally affect the outcomes felt and the decisions made by the competing firm. There are many interesting examples of price wars and other sorts of competitive (and non-competitive) outcomes stemming from oligopolistic markets. But how do major league duopolists behave in such situations?

One answer: such duopolists, along with the rest of the league's officials and franchise owners, cooperate to minimize the number of home games played in the same city on the same day. League schedules are arranged so that when one team in a city is playing at home, the other team that calls the city home is either not playing or playing on the road. For example, other than interleague games, there are no dates during the 2006 MLB season on which both duopoly teams in a city compete in their home city on the same day with one exception: the Chicago Cubs and Chicago White Sox played home games on September 7th. These games, however, did not overlap (the Cubs played at 1:20 PM and the White Sox played at 7:05 PM).

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[1] Peter Angelos, the owner of the Baltimore Orioles of MLB, felt that the 2005 move of the Montreal Expos to Washington DC was an infringement on his exclusive territory. Angelos claimed that the Orioles' territory included parts of Pennsylvania, Maryland, Virginia, West Virginia, Delaware, Washington D.C. and North Carolina (Angelos, 2006). But MLB officials argued that television territories are the property of MLB. Angelos and MLB officials reached an agreement in early 2005 that allowed the relocation of the Expos to Washington D.C. (and renamed the Nationals) in exchange for majority ownership of a new cable television sports network, the Mid-Atlantic Sports Network (MASN), that will present both Orioles and National games (Fisher, 2005).

Although their home games rarely overlap, duopolists still compete for the attention of the same general group of fans. While many will have strong loyalties towards one of the teams, others will be general fans of baseball and may simply want to see the best team play. Consequently, this existence of the duopolistic markets poses some interesting questions for researchers. Does attendance of one team respond to the quality of the other team? How does one team's attendance vary with the pricing of the other team's tickets? I explore these questions below.

The rest of the paper is organized as follows: section 2 describes the theoretical framework, the empirical model, and the data. Section 3 presents the empirical results. Section 4 concludes.

2. The Theoretical Framework, the Empirical Model, and the Data

The Theory

Franchise owners are assumed to make choices to maximize profits and are assumed to have some degree of market power in their local market. I only focus on the demand for a team's tickets during a given season (assumed to be the short run).

Duopoly teams face off-field competition from the other local team. Consider two teams that call the same city home: team i and team j. To the extent that fans of team i find team j's games to be a substitute good, team i's attendance will be a function of team j's ticket pricing and performance. Let the general demand function of team i's games during some particular season be given by

$$Q_i = f\left(P_i, Pop_i, PCI_i, Qual_i, E\left(Qual_i\right), Misc_i, \phi Qual_j, \lambda E\left(Qual_j\right), \delta P_j\right) \qquad (1)$$

where Q_i is the annual attendance and P_i is the price of tickets to team i's games. Pop_i is the population of the city in which team i plays. PCI_i is the per-capita income in the city in which team i plays. $Qual_i$ and $E\left(Qual_i\right)$ are the realized and expected quality of team i respectively. In terms of the role that expected and realized quality play in determining attendance, expectations will play the largest role in determining season ticket sales and early-season individual game sales while realizations will play an increasingly important role in determining individual games sales as the season progresses. $Misc_i$ represents a vector of various miscellaneous factors, such as the age of the stadium and tenure in a city, that affect attendance.

$Qual_j$ and $E\left(Qual_j\right)$ represent the realized and expected quality of team j, the other local team in the city. ϕ and λ are constant scalars which represent the importance attached by fans[2] to team j's games and are assumed to be non-negative. If $\phi = 0$ then the fans of team i do not account for the realized quality of team j. If $\lambda = 0$ then the fans of team i do not account for the expected quality of team j. P_j is the price of admittance to team j's games and δ is a scalar representing the importance to which the price of the other team's games plays in team i's demand function.

[2] The term "fan" is used quite loosely, but not arbitrarily, here. The term fan usually connotes fanaticism for a particular team. One could plausibly argue that die-hard fans would not view the games of another local team as a substitute. On the other hand, there will be others in both team's drawing area that will be fans of the sport in general and will attend games for which they get the highest surplus. As used in this paper, fans refer to general fans of the sport played.

In the short run, the team's variable costs include janitorial, utility, and maintenance expenses. Fort (2006) argues that team payroll is largely set by contracts finalized before a season begins and can essentially be treated as a fixed cost in a short-run analysis like that being developed here.

Franchise owners are assumed to "choose" the level of attendance so that the marginal revenue generated by selling a ticket to the last fan equals the additional cost of serving him. For brevity, capacity is assumed to be irrelevant. The profit-maximizing team chooses the optimal level of attendance, Q_i^*, where $MR_i\left(Q_i^*\right) = MC_i\left(Q_i^*\right)$ and the price of tickets is set at the reservation price for the last ticket offered for sale.

Note that I make no explicit assumption about the value of the marginal cost of selling a ticket. The marginal cost of having one more fan attend a game may be very close to zero, suggesting that profit-maximizing franchise owners would set ticket prices very close to where demand is unit-elastic.

However, numerous studies have shown that ticket prices are set in the inelastic portion of the demand curve for tickets (Fort, forthcoming). Sandy, Sloane, and Rosentraub (2004) explain this paradox by noting that sports teams are not single-product producers but are, instead, producers of multiple products (the game on the field, concessions, and souvenirs). If so, researchers can model sports teams as firms facing negative marginal costs and rational profit-maximizing franchise owners will set ticket prices in the inelastic portion of their demand curves.

The Empirical Model and the Data

In general, this theoretical framework suggests the following general regression model:

$$Q_i = \alpha + X_i \beta + X_j \theta + \varepsilon_i \quad . \tag{2}$$

Q_i is as defined above and X_i is a matrix of demand factors specific to team i. X_j is a matrix of variables specific to the other team in team i's city. ε_i is a random error term and α , β , and θ are parameter vectors.

The data cover the period from 1970 to 2003 except for 1989 and 1990 when no ticket price data was available. All U.S. Major League Baseball teams are included in the analysis. Toronto and Montreal are excluded from the analysis because of the lack of metropolitan-specific data for Toronto and Montreal. All team-specific productivity data was obtained from the Lahman database (www.baseball1.com). I assume that team attendance is dependent upon the team's current and previous performance, SMSA characteristics, team ticket prices, and other team qualities as well as year-specific characteristics. Team performance is measured by team winning percentage. Since attendance in one year is partly determined by the previous season's performance, it was necessary to make an assumption about the previous year's winning percentage for expansion teams playing in their first year. I assume, all else equal, that fan expectations about the performance of an expansion team in its first year are the same as fans of a team that won 40% of its games in the previous year. In other words, for each expansion team in its first year, I set the previous year's winning percentage equal to 0.400. Making this assumption does not change the basic results of the analysis.

Team ticket price data was calculated using weighted average ticket price data obtained from the late Doug Pappas's website (www.roadsidephots.com) and from past personal correspondence with Roger Noll. In years where the Pappas and Noll data each had values for each team (1975-1985) I took the average of the values reported in each dataset rather than choose between them. Ticket price data was only available from the Pappas dataset for the years 1970-1974 and 1990-2003. The Noll data only had values for 1986-1988. As noted above, neither source had ticket price data for 1989 and 1990. Therefore, records for those years were dropped. Lastly, Pappas did not report a ticket price for the Tampa Bay Devil Rays for that franchise's expansion year (1998). To be able to include this record in the analysis, I obtained a ticket price value from the Team Marketing Report Database (www.teammarketing.com).

SMSA population and per-capita income were obtained from the Bureau of Economic Analysis' Regional Economic Information System (REIS).

Other variables included in the analysis are the age of each team's stadium, the age of the team, the number of years each team has been in its current city, and a dummy equal to one if a team had been in the playoffs the previous season: the "lagged playoff dummy." Between 1969 and 1994, teams made the playoffs by winning their division in a two-division format. In 1995, MLB went to a three-division format and teams could make the playoffs by winning their division or by winning the wild card – the team with the best record that did not win its division. Consequently, the lagged playoff dummy was set equal to one if a team won its division prior to 1995, to one if a team won its division or the wild card in 1995 and thereafter, and to zero otherwise.

The 1994 players' strike resulted in the cancelling of the playoffs that year, so no team literally won a division. However, I treated teams that led their division at the time the strike began as having won its division. In other words, since fans of a team base their decision to attend games in part on last year's team's performance, this assumption is akin to a representative fan believing something on the order of "We would have won the division if it hadn't been for that pesky strike!"

I also include dummies equal to one for each of the strike years (1981, 1994, and 1995), each of which shortened the length of the MLB season.

Lastly, all dollar values are expressed in constant 2003 dollars using the seasonally-adjusted consumer price index for all urban consumers obtained from the Bureau of Labor Statistics data website (stats.bls.gov).

3. Empirical Results

Table 1 presents the means of variables by team type used in the analysis. Compared to the average monopoly team (the only local team in its particular city), the average duopoly team (one of two teams that competes in the same city) is older, has larger attendance levels, wins more often, plays in a market with more people and a higher per-capita income, and plays in an older stadium. Two sets of regressions were run on the data. First, models were fitted separately on the set of monopoly teams and the set of duopoly teams. Performing these regressions allows for a comparison of the determinants of team attendance between monopoly and duopoly teams. To make comparisons between the group of monopoly and duopoly teams, I exclude "other team"

information from regression on equation (2) (the term $X_j\theta$ is deleted from the estimation of equation (2)).

In the second set of regressions, I fit models solely using the duopoly team data. In these models, I explore how the performance and ticket pricing of the other team in a city (referred to as "the other team") impacts attendance of the team in question. I thus include the expression $X_j\theta$ in the estimation of equation (2).

When performing both sets of regressions, I tested for the presence of random effects using the Breusch-Pagan (1980) Lagrangian Multiplier and the Hausman (1978) tests. All models showed strong evidence of the presence of random effects and I estimated each model by controlling for the presence of random effects.

In addition to the Hausman and Breusch-Pagan tests, I tested for the presence of first-order autocorrelation (an AR1 process) in each model using the Wooldridge (2002) test. Each model significantly showed the presence of an AR1 process. It is also plausible that team ticket prices and attendance are variables that are simultaneously determined. Therefore, I ran an AR1 random effects two-stage least squares model in each estimation. I run first-stage regressions on team ticket prices using year-specific dummies for the years not included in the attendance regression (1970-1980, 1982-1988, 1990-1993, and 1996-2002) as additional instruments, with 2003 being the reference year. The results of these first-stage regressions are available upon request.

Monopolist vs. Duopolist

Table 2 presents the results from performing separate regressions on the monopoly sample and the duopoly sample. The estimated coefficients on the logarithm of real predicted ticket prices are negative and significant in both regressions. In addition, the estimated coefficients are significantly greater than -1 (t = 11.57 in the monopoly model and = 8.10 in the duopoly model, both of which are significant at less than the 1% level). Therefore, both models present evidence of inelastic pricing at the gate, a finding consistent with those of many others who have researched attendance at sporting events (see Fort (forthcoming)).

The estimated coefficients on the logarithm of real per-capita income is positive and significant in each model suggesting that baseball games are normal goods for both types of teams. Note that the estimate for the monopoly regression is larger than its counterpart for the duopoly regression. This suggests that growth in real per-capita income has a greater impact on monopoly teams. This result is an indication that, in two-team cities, general fans of baseball have more choices and when additional income is spent, it is spread among two teams rather than one.

The estimated coefficient on the logarithm of SMSA population is insignificant in the monopoly model and positive and significant in the duopoly regressions. According to these results, a change in SMSA population positively affects attendance at duopolists' games only. Yet, attendance appears to be relatively population inelastic for duopolists. For instance, a 1% increase in the population in an SMSA translates to a 0.6% increase in attendance.

The coefficients on current and lagged team winning percentage are both positive and highly significant in each model. In short, fans want to watch a winning team. The estimated coefficient for current winning percentage is larger than that for the lagged counterpart. This suggests “what have you done for me lately?” is the more important determinant of whether to attend games relative to “what did you do for me last year?” for both sets of teams. In addition, the estimated coefficients on current and lagged winning percent are larger in the duopoly regression suggesting that duopolist fans are more responsive to the team’s on-field performance.

The results suggest that whether a team made the playoffs the previous season positively and significantly impacts attendance of monopoly teams but the significance is weak. For duopoly teams, the estimated coefficient on the lagged playoff dummy is positive but insignificant suggesting that duopolist attendance variation is already explained by changes in current and past winning percent.

The coefficient on the age of the stadium and its quadratic term are negative and positive respectively and both are significant in the monopolist regression. But in the duopolist regression, neither estimate is significant. Only two of the duopoly teams moved into new stadiums during the sample period (the Chicago White Sox in 1991 and the San Francisco Giants in 2000). The other 6 duopolists played in stadiums opened on or before 1966. The monopolist regressions suggest that attendance increases when a team receives a new stadium but then begins to fall off over time, but this drop also tends to level off as the stadium ages. Therefore, since the average duopolist plays in an older

stadium (relative to the monopolist counterpart) any statistical attendance effect of stadium age has possibly diminished.

The results suggest that as a monopoly team ages, attendance drops off over time, but the decline gradually dissipates. This is a similar effect as that found with the age of monopoly team stadiums. For duopoly teams, the estimated coefficient on the linear age of the team is negative yet insignificant, but the coefficient on the quadratic term is positive and significant. The results suggest, therefore, that as duopoly teams age, attendance increases at a quadratic rate. Both sets of results suggest that there may be some historical value in older teams.

The results suggest that as a monopoly team spends more time in a city, its attendance rises but at a decreasing rate. This could be an indication of the building of fan loyalty for these teams. No such effect is present for the duopoly model. While the Dodgers (1958 from New York), the Giants (1958 from New York), the A's (1968 from Kansas City) and the expansion Mets (1962) and Angels (1961). The other three teams date back over 100 years as of 2003. The insignificance of the number of years a duopolist has spent in the current city is potentially due to the newness of the average duopoly having worn off by the time the sample period began.

In each model, the coefficient on the 1981, 1994, and 1995 strike dummies are negative and significant showing that for those years, the shortened season, not surprisingly, resulted in lower attendance levels for both monopolists and duopolists.

Overall, the estimates in Table 2 suggest the determinants of monopolist and duopolist attendance differ both in terms of the factors particular to one group's attendance levels, but also in terms of the weights given to particular factors.

Figure 1 presents a diagram of estimated attendance levels for the average monopolist and for the average duopolist using the coefficients from model 4 from Table 2. The average monopolist is the hypothetical local monopoly team that has the average monopolist statistics given in Table 1 for team winning percentage, age of the stadium, age of the team, and years in the current city. For brevity, I also assume that the team did not make the playoffs and that the attendance measure was from 2003. The real ticket price was calculated using the same parameter estimates from the first stage estimation used in the regressions presented in table 2. The average duopolist is similarly defined.

At a winning percent of 0.400, the monopolist draws 2.1 million fans while the duopolist draws 2.5 million fans. At a 0.500 winning percent, the average monopolist draws 2.2 million fans while the average duopolist draws just under 2.8 million fans. This 100-point increase in lagged winning percent led to roughly 100,000 more fans attending the average monopolist's games, an average of approximately 1,200 fans for each of the assumed 81 home games. For the duopolist, however, the increase in attendance was just over 300,000, an average of just over 3,700 per home game. When the average team's lagged winning percentage increases to 0.600, the team, if it is a monopolist, draws an additional 2,100 fans per game while the average duopolist draws an additional 4,000 fans per game. Note the average duopolist outdraws the average monopolist for all

lagged winning percentages and the rate of increase of attendance is larger for the average duopolist.

I now turn the reader's attention to an examination of duopoly team attendance levels.

Duopolist vs. Duopolist

Table 3 presents regression results on various models estimated solely with the duopoly team sample. These models allow the reader to examine the relationship between one city's duopolist's attendance and the city's other duopolist's ticket prices and past season's performance. Note that these models include neither the quadratic stadium age term nor the linear and quadratic terms on the number of years in the city. These variables were deleted from these models because they were insignificant in every model. Other than the deletion of these variables and the inclusion of the city's other duopolist's ticket prices and past performance, the models are the same as those presented in Table 2.

The regression results suggest the estimation procedure fits each model well. In models 1 and 2, the estimated coefficients of the logarithm of real ticket prices are positive but each is insignificant. In model 3, its coefficient is negative but insignificant. The predicted ticket prices do not explain changes in attendance over and above that explained by the other variables.

The coefficient on the logarithm of real per-capita income is positive and significant, suggesting that baseball games are normal goods in duopoly cities. Models 1 and 3 each give weak evidence that attendance may be income unit-elastic. In model 2 the

hypothesis that attendance is unit-elastic with respect to income cannot be rejected[3]. Models 5 and 6 suggest that attendance is income elastic at least at the 5.6% level of significance. Each model also shows that there is a positive relationship between SMSA population and duopolist attendance but that attendance is inelastic with respect to changes in population. For instance, according to model 1, a 1% change in population leads to a 0.48% change in team attendance all else equal.

Not surprisingly, the results suggest attendance is positively and significantly affected by current and past team performance. Also, as in the monopolist vs. duopolist comparison, current winning percent has the greater impact on attendance for duopoly teams and the estimates for both variables are fairly robust across models.

The estimated coefficients on the age of the stadium are negative in every regression but not significant in any model. The quadratic term on team age is positive but insignificant in each model. These results suggest that changes in attendance are not explained by changes in the age of the stadium for duopoly teams.

All three strike year dummies are negative and significant in each model. This suggests, not surprisingly that duopolist attendance was lower in the strike years relative to non-strike years.

Now I turn the reader's attention to the impact of a team's other local competitor's pricing and performance on the attendance of the team in question. The "other team" is

[3] The t-values on the hypothesis test that the estimated coefficients on the log of per-capita income were different from 1 for models 1-3 are respectively as follows: 1.66 (p-value = 0.098), 1.61 (p-value = 0.109), and 1.74 (p-value = 0.083).

the team that shares the same home city as the team in question. For instance, the New York Yankees is the “other team” to the New York Mets and vice-versa.

There is some evidence that lagged performance and prices of the other team negatively impact attendance of the team in question. In models 1 and 2, the logarithm of the other team’s ticket price is negatively related to the attendance of the team in question. In other words, according to models 1 and 2, when (for example) the Cubs raise ticket prices fewer fans go to White Sox games. Does this mean that Cubs and White Sox games are complementary goods? This is not likely the case.

This anomaly can be explained by the logic that higher prices are positively correlated with expected team performance and other amenities found at a team’s ballpark. For instance, if the Cubs improved the amenities at Wrigley Field, this would be expected to draw some potential attendees away from White Sox games, but would also result in higher ticket prices to Cubs games. In other words, Cubs ticket prices and White Sox attendance are correlated but changes in Cubs ticket prices do not per-se cause changes in White Sox attendance. Indeed, as evidenced by model 1 (compared to model 3), adding the other team’s ticket price to the regression causes the coefficient of the other team’s lagged winning percentage to become insignificant.

The results also suggest that one duopolist’s attendance is relatively insensitive[4] to changes in the other team’s ticket prices. This is expected since most fans don’t base their attendance decisions upon competing team prices. But some apparently do.

[4] The t-statistics for testing whether the coefficients on the logarithm of the other team’s ticket price is greater from -1 (i.e. inelastic cross-price elasticity) are 5.37 for model 1 and 5.15 for model 2.

Lastly, model 4 presents regression results where a first-stage regression was run on the logarithm of the other team's ticket price. Predicted values were calculated and included in a second stage regression to control for potential simultaneity bias between one local duopolist's attendance and the other's ticket price. When the competitor's predicted ticket price is added to the regression, its coefficient is positive, suggesting that the games of local duopolists are indeed substitutes for one another, but the estimate is insignificant. The other team's lagged winning percent is negatively related to the attendance of the average duopolist providing further evidence that fans of one team respond to the quality of the other team.

Figure 3 presents a diagram showing attendance estimates for the average duopolist evaluated at varying win percents of the competing team in the city. In addition to the assumptions that define the average duopolist, I assume this team won 50% of its games in the past season. The estimates were calculated using model 3 from Table 3. The attendance estimate of the average duopolist falls as the other team's lagged winning percent increases. For instance, the average duopolist draws approximately 1.84 million fans when the other team has a lagged winning percentage of 0.500. This attendance estimate drops to 1.78 million when the competing team has a lagged winning percentage of 0.600. However, since the evidence on the effect of competitor team's winning percentage is mixed, care must be taken when interpreting the diagram.

4. Conclusion

This paper examines the attendance of MLB teams that play home games in the same metropolitan area (San Francisco Giants/Oakland A's, Los Angeles Dodgers/Anaheim

Angels, Chicago Cubs/Chicago White Sox, and New York Mets/New York Yankees). One reason why so few cities call more than one team the “home” team is because some markets can only profitably support one team. Another reason is because of exclusive territories granted to franchise owners by MLB officials. Granting these territories raises the costs that a current (or potential) franchise owner would incur should he want to move his team to another team’s exclusive market.

Comparisons were made between the determinants of attendance for the so-called duopoly teams and the rest of the U.S. MLB teams that do not share their home markets with other MLB teams (so-called monopoly teams). I found that the while duopoly and monopoly teams share most of the same determinants, the estimated weights on some determinants differ. In examining the set of duopoly teams, there is evidence that one team’s attendance is dependent upon the other team’s performance.

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Table 1

Means of Variables

	All Teams		Monopoly Teams		Duopoly Teams	
Variable	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
Home Attendance	1,835,244	767584.7	1,802,747	760803.8	1,903,663	778736.6
Real Per-Capita Income (BY = 2003)	$29,506	5541.735	$28,402	4977.009	$31,829	5947.188
SMSA Population	5,158,896	4429549	2,901,260	1163896	9,912,279	4977883
Winning Percentage	0.501	0.0705472	0.497	0.0716924	0.509	0.0674309
Age of Stadium	27.5	23.41299	23.9	21.7676	35.0	24.96436
Age of Team	68.2	39.37214	63.7	41.0863	77.7	33.63489
Years in Current City	51.1	39.40202	51.0	40.67212	51.2	36.66077
Real Ticket Price (BY = 2003)	$12.92	4.094625	$12.89	4.084657	$12.99	4.122862
Sample Size	795		539		256	

Table 2

Regression Results: Local Monopoly Teams vs. Local Duopoly Teams

	Monopoly Teams	Duopoly Teams
Log of Real Predicted Ticket Price	-0.4115721***	-0.2936702*
	0.1219387	0.1596771
Log of Real Per-Capita Income	1.428038***	0.9802367***
	0.1475865	0.2435428
Log of SMSA Population	0.0606684	0.6067568***
	0.093797	0.1343458
Team Winning Percent	1.872046***	2.14254***
	0.1214603	0.1771258
Previous Season's Winning Percent	0.799557***	1.191964***
	0.141648	0.2131422
Made Playoffs Last Season	0.0376675*	0.043755
	0.0204445	0.0305148
Age of Stadium	-0.0148847***	-0.0015022
	0.0026406	0.0061649
Age of Stadium Quadratic	0.0001264***	0.0000103
	0.0000355	0.0000819
Age of Team	-0.0114733***	-0.0067167
	0.004428	0.0062018
Age of Team Quadratic	0.0000752**	0.0001008**
	0.0000343	0.0000425
Years in City	0.0112976**	-0.0018487
	0.0046172	0.0065309
Years in City Quadratic	-0.0000701**	-0.0000057
	0.0000356	0.0000505
d1981	-0.5529822***	-0.4462372***
	0.0339275	0.0486666
d1994	-0.2566532***	-0.2963222***
	0.0363055	0.0552647
d1995	-0.2645292***	-0.2314099***
	0.0363575	0.0551549
Intercept	-1.204926	-6.454069**
	1.62124	3.226431
R-sq: within	0.7104	0.7128
between	0.6139	0.6134
overall	0.6608	0.6632
Sample Size	539	256
Hausman Test	28.61***	21.08**
Breusch	454.58***	354.94***
Wooldridge test for autocorrelation	39.026***	52.687***
Wald chi2(16) =	814.97***	396.32***

**** Significant at the 1% level or better*

*** Significant at the 5% level up to but not including the 1% level*

** Significant at the 10% level up to but not including the 5% level*

#Instrumented Variable for both Models: Log of Real Ticket Price

Duopoly Instruments: Log of Real Per-capita income; log of population; previous season WPCT; age of stadium and its quadratic term, age of team and its quadratic term; years in city and its quadratic term; d1981; d1994; d1995

Additional Duopoly Instruments: Dummies for Each Year 1970-2002 except 1981, 1994, 1995, and 2001

Monopoly Instruments: Log of Real Per-capita income; previous season WPCT; age of stadium and its quadratic term; d1981; d1994; d1995

Additional Monopoly Instruments: Dummies for Each Year 1975-2002 except 1981, 1994, 1

Table 3

Local Duopoly Teams

Model	**1**	**2**	**3**	**4**
Log of Real Predicted Ticket Price	0.0254882	0.0718726	-0.2310648	-0.3539765*
	0.2170681	0.215201	0.1556991	0.2050121
Log of Real Per-Capita Income	1.362915***	1.351672***	1.383433***	1.495374***
	0.2184732	0.2187147	0.2208648	0.2447267
Log of SMSA Population	0.4782099***	0.4731949***	0.4965529***	0.5189809***
	0.1222669	0.1215503	0.127755	0.1295042
Team Winning Percent	2.129112***	2.123568***	2.123344***	2.137754***
	0.1740717	0.1744715	0.1741515	0.17553
Previous Season's Winning Percent	1.216004***	1.223843***	1.293775***	1.349598***
	0.1914787	0.1918742	0.1857571	0.1951537
Age of Stadium	-0.0038819	-0.0033154	-0.0056725	-0.0072527
	0.005024	0.0050195	0.0049708	0.0051727
Age of Stadium Quadratic	0.0000558	0.0000493	0.0000768	0.000098
	0.0000637	0.0000636	0.0000634	0.0000662
d1981	-0.4537341***	-0.453333***	-0.4539674***	-0.4620531***
	0.0483111	0.048439	0.0482217	0.0500626
d1994	-0.2901802***	-0.2933088***	-0.2900909***	-0.2888161***
	0.0548823	0.0549827	0.0548393	0.0551893
d1995	-0.2195256***	-0.2196516***	-0.2194669***	-0.2261887***
	0.0545915	0.0547351	0.0545442	0.0557925
Log of Competitor's Ticket Price	-0.2431912*	-0.295945**	-	-
	0.1410564	0.1366202		
Log of Competitor's Predicted Ticket Price	-	-	-	0.2910507
				0.3826438
Previous Season's Winning Percent of Competitor	-0.2495167	-	-0.3244884*	-0.4214988**
	0.1736355		0.1677121	0.2089301
Intercept	-8.341433***	-8.265154***	-8.787791***	-10.72386***
	2.815397	2.814034	2.870868	3.534708
R-sq: within	0.7226	0.7205	0.7088	0.7179
between	0.3663	0.3721	0.3335	0.3293
overall	0.5764	0.5785	0.549	0.5493
Sample Size	256	256	256	256
Hausman Test for Random Effects:	123.73***	52.39***	24.92***	28.19***
Breusch Pagan LM test for RE	674.97***	866.59***	857.98***	863.91***
Wooldridge test for autocorrelation	43.796***	49.413***	44.965***	44.15***
Wald chi2(13)	393.65***	389.71***	386.58***	391.53

**** Significant at the 1% level or better*

*** Significant at the 5% level up to but not including the 1% level*

** Significant at the 10% level up to but not including the 5% level*

#Instrumented Variable: Log of Real Ticket Price

Instruments for own ticket price: Log of Real Per-capita income; log of population; previous season WPCT; age of stadium and its quadratic term, age of team and its quadratic term; years in city and its quadratic term; d1981; d1994; d1995

Additional Instruments: Dummies for Each Year 1970-2002 except 1981, 1994, 1995, and 2001

Instruments for competitor's ticket price: competitor's previous season's winning percent; d1982; d1986-d1988; d1991-d1993; d1996-d2001

Figure 1

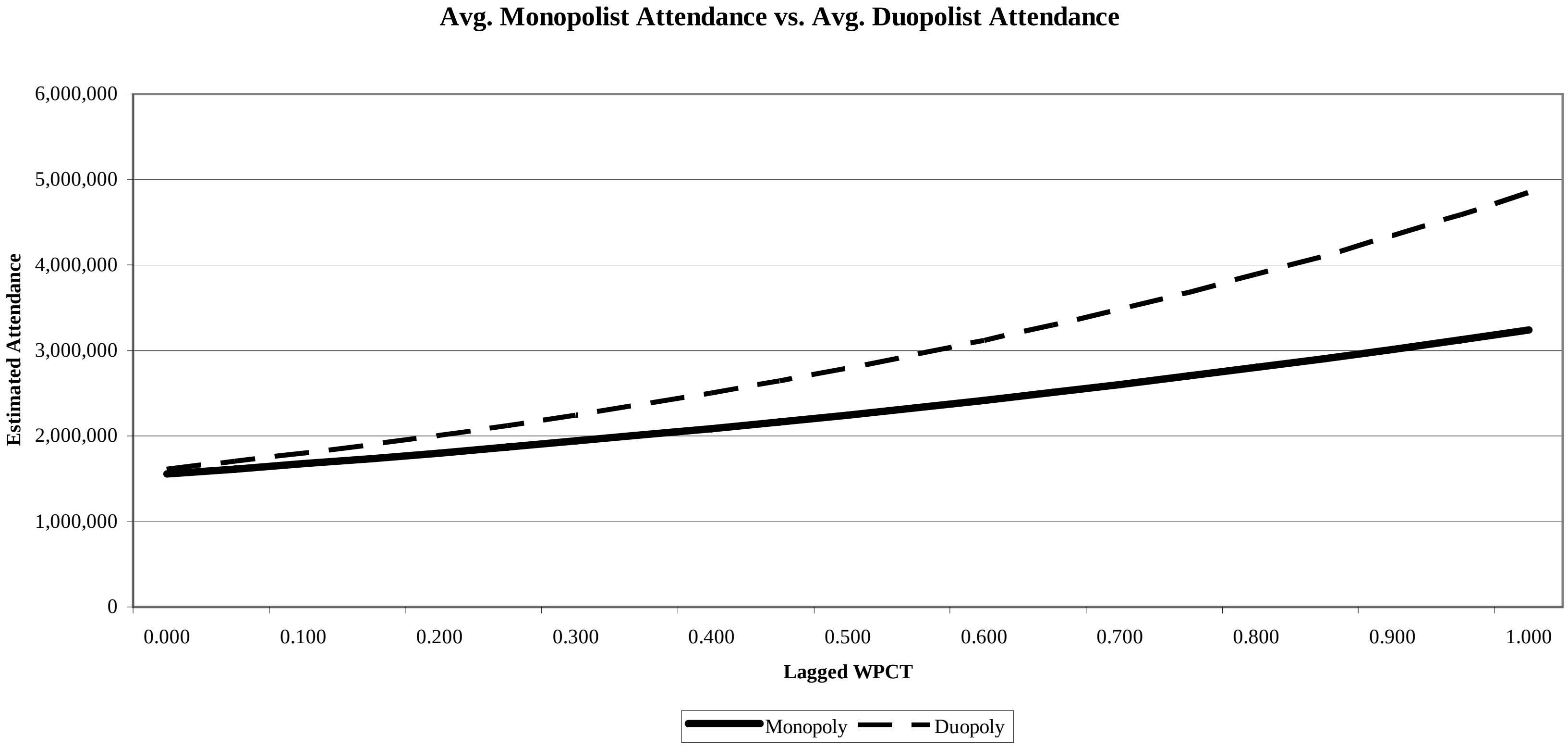
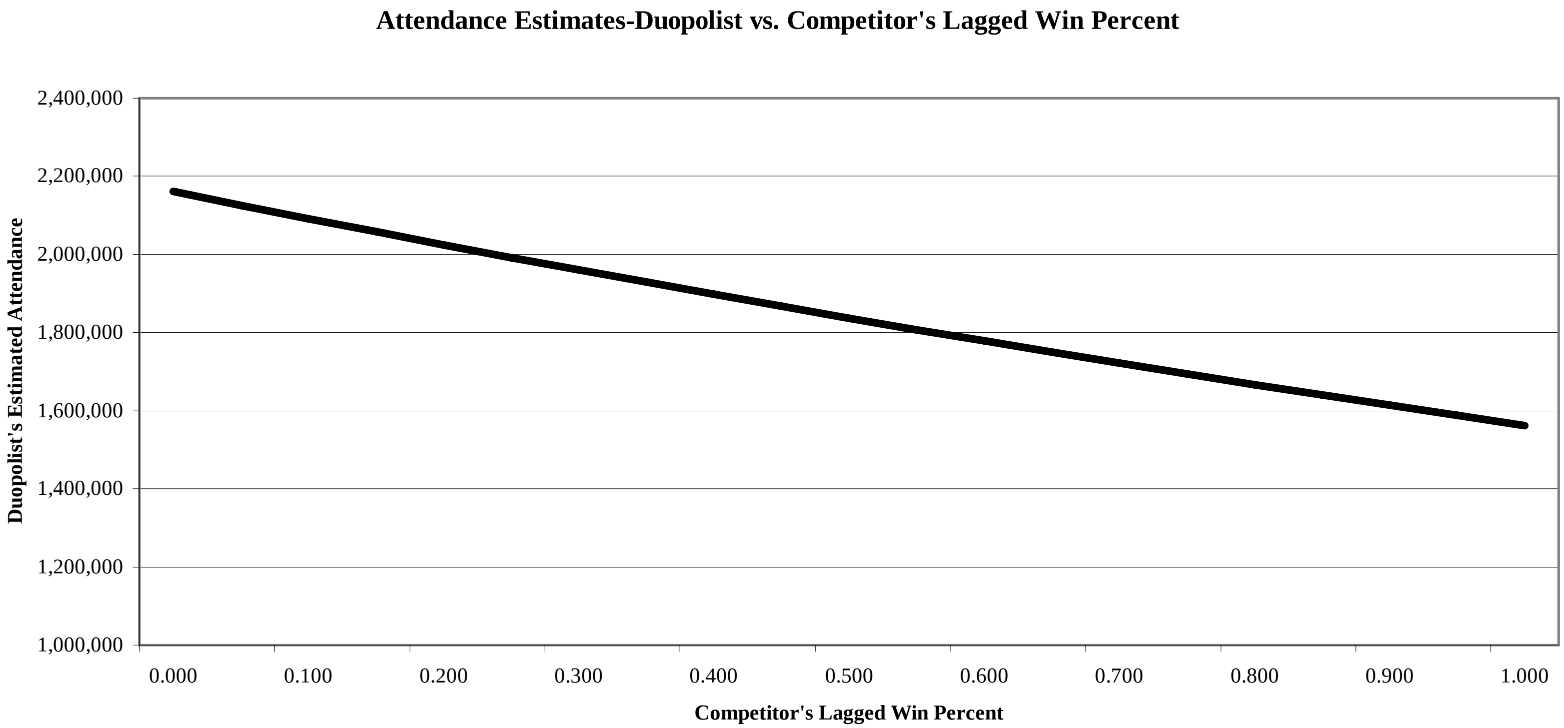

Avg. Monopolist Attendance vs. Avg. Duopolist Attendance
Estimated Attendance
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
0.000
0.100
0.200
0.300
0.400
0.500
0.600
0.700
0.800
0.900
1.000
Lagged WPCT
Monopoly
Duopoly

Figure 2


Attendance Estimates-Duopolist vs. Competitor's Lagged Win Percent
2,400,000
2,200,000
2,000,000
1,800,000
1,600,000
1,400,000
1,200,000
1,000,000
Duopolist's Estimated Attendance
0.000
0.100
0.200
0.300
0.400
0.500
0.600
0.700
0.800
0.900
1.000
Competitor's Lagged Win Percent