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I. Introduction.

Over the past 4 years, 7 major league sports franchises have moved and several more relocations have been proposed.[1] This mobility of sports franchises has created a political uproar in the cities that have lost their sports teams and has led to calls in Congress to regulate the location of teams (Vader, 1995; Malkin, 1997; Norton, 1995). Cities desiring to acquire or retain sports franchises have invested millions of dollars in building stadiums, constructing parking facilities and other infrastructure, and even guaranteeing ticket sales to make their city more attractive to potential teams.

These investments and subsidies represent a transfer of resources to city taxpayers for the dubious benefit of supporting a segment of the entertainment industry and maintaining a city's "major league" reputation (Federal Reserve Bank of Cleveland, 1991). In fact, analysts have concluded that the net economic benefits for a city to have a sports franchises are much more limited than voters and political leaders have assumed (Baade and Dye, 1988; Baade and Dye, 1990).

A different set of studies have looked at the motivation of sports franchises to relocate and the role that local governments play in attracting and retaining teams (Shropshire, 1995; Euchner, 1993). What is clear from these studies is that stadium ownership plays an important role in the decision to relocate.

In an earlier paper, we examined the factors leading Major League Baseball franchises to relocate using data from 1950 to 1995 (Mildner and Strathman, 1996). In this paper, we extend our analysis to look at the National Basketball Association from 1960 to 1995. Our intent is to extend this line of research to cover the other major league sports, but we present here the data for these two sports along with some location data for professional hockey and football. The paper proceeds as follows: a model of the team relocation decision process, a description of our data set, our analysis of that data, and a concluding section.

II. Model.

In our model, there are three agents in the decision to relocate: the franchise owner, the stadium owner, and the local government. We assume that the franchise owner is primarily concerned about the net revenues of his sports team. That is, their goal is profit maximization. The key determinants of net revenues are players salaries, stadium rent, television income, ticket revenue, capital gains from franchise value, and subsidies from the local government. The stadium owner is also primarily concerned about net revenue for this facility which includes stadium rent, concession revenue, and capital gains from stadium value. Local governments are concerned about two things: the presence of the team and the cost of subsidies to the taxpayer.

In our model, there are three possible institutional arrangements: either the stadium is owned by government, the sports franchise owner, or by a third party. Our hypothesis is that stadium ownership by local government leads to subsidies being given to local franchises and leads to a greater likelihood of team relocation. Because local government officials exaggerate the economic benefits of the presence of a sports franchise and discount the costs of subsidies paid by taxpayers, they are likely to be held hostage by the sports franchises that threaten to move. When the local government is also the stadium or arena owner, they have greater opportunities to make those subsidies in a way that is hidden from taxpayers: below market rent payments, subsidized loans, low-cost transportation facilities, or tax abatements or below market value tax assessment, among others. Thus, one reason that sports franchises operating in

municipally owned facilities are more mobile is the "stadium subsidy mechanism" that municipal ownership allows.

When the stadium owner is also the sports franchise owner, the local government has a greater difficulty in making payments to keep franchise in the local area. More importantly, the franchise owner now has a large incentive not to relocate; because he owns the same sports facility that his team uses, the relocation decision will mean that the stadium will lose value. Since in many cases, the value of the stadium equals or exceeds the value of the franchise, the owner will only leave a city when the value of the stadium is already very low or the increase in net revenue from moving to a larger market is very high.[2] Hence the second reason that municipal ownership of stadiums leads to more franchise mobility is the "stadium value motive".

We would expect that sports franchises that own their own stadiums to have a lower likelihood of moving. For the intermediate case where stadiums are owned by a third party, we would expect to see a level of mobility that ranks between franchise ownership of their own stadiums and municipal stadium ownership. In this intermediate case, the franchise owner does not have the stadium value motive to stay, but the threat to leave will likely result in reduced stadium rent or a revenue-sharing arrangement with the stadium owner. And since the local government does not have the stadium subsidy mechanism, the threat to leave does not easily generate offers from local government to subsidize the move.

In practice, third party ownership has become rather rare. Our previous paper (Mildner and Strathman, 1996) indicated that third party ownership had the same effect as team ownership for baseball franchises. Hence, for the model, we estimate the effect of public ownership alone. No data is currently available that allows us to measure the tax subsidy issue directly. Instead we will follow the team relocation decision alone.

III. Data

A. Franchise Data

For this research, we have developed two data sets: one for Major League Baseball (MLB), 1950-1995, and one for the National Basketball Association (NBA), 1960-1995.[3] The baseball data set has 1,026 observations of team-years, while the basketball data set has 681 observations. Data was collected on team performance, attendance, metropolitan population, franchise ownership, stadium/arena characteristics, and stadium/arena ownership.

The data for the two sports are summarized in Table 1 by decade, along with the first six years of the 1990's. As can be seen in the growth of franchise years, both sports underwent a significant expansion between the 1960's and the 1970's, although by comparison baseball is a relatively established sport. The growth in franchise years per decade for baseball was 24% for 1950-69 and for 1960-79, and slowed down to 6% for 1970-89. The comparable numbers for the NBA are 86% for 1960-79 and 23% for 1970-89. The growth in the 1970's also reflects the merger of the NBA with the American Basketball Association in 1976.

The relative stability of baseball is also demonstrated in long metropolitan tenure, as well as ownership and stadium use. Since NBA was founded in 1947, the opportunity to establish metropolitan tenure is not the same as baseball. Nevertheless, the difference (or at least the percentage difference) in each of these "tenure" measures has been reduced, indicating reduced rates of ownership tenure in basketball, and the end of basketball's rapid expansion years.

Stadium age and stadium capacity data indicate two important trends in both sports. First, the late 1960's and 1970's were an era for new stadium construction (and hence declining age) and rising stadium capacity, with basketball arenas tending to be much smaller and newer than baseball facilities. Between the 1960's and the 1990's, baseball stadiums grew by 0.47% per year in capacity, while basketball arenas grew by 1.0% per year, more than twice as fast.

One reason for the slow growth in baseball stadium capacity is that unlike the other sports, baseball has always had always had a significantly higher capacity than average attendance, so that capacity growth has a lesser impact on team attendance. Of course, the popularity of each sport and the physical limitation on human eyesight also play a role.

Table 1
Franchise and Stadium Trends
Baseball and Basketball Compared

		1950's	1960's	1970's	1980's	1990's
Franchise Years	MLB	160	198	246	260	162
	NBA		91	192	236	162
Average Metro Population of Franchise (millions)	MLB	5.4	5.3	5.4	5.6	6.0
	NBA		5.8	4.6	5.2	5.4
Average Owner Tenure (years)	MLB	16.6	13.0	15.2	11.6	14.0
	NBA		7.3	7.3	8.5	11.2
Average Metro Tenure (years)	MLB	47.6	36.3	37.0	44.8	50.9
	NBA		8.6	10.5	17.4	22.4
Average Stadium Tenure (years)	MLB	37.7	27.5	20.2	27.0	28.7
	NBA		7.7	7.6	13.0	15.3
Average Stadium Age	MLB	30.0	24.7	19.7	26.2	28.3
	NBA		18.6	14.2	17.1	18.1
Average Stadium Capacity	MLB	42.0	45.5	48.9	51.9	51.6
	NBA		13.8	15.9	17.1	17.9
Stadium Owned--Third Party	MLB	0.025	0.06	0.065	0.04	0.04
	NBA		0.22	0.16	0.09	0.06
Stadium Owned--Franchise	MLB	0.788	0.50	0.22	0.20	0.25
	NBA		0.18	0.18	0.17	0.30
Stadium Owned--Publicly Owned	MLB	0.188	0.44	0.71	0.76	0.70
	NBA		0.60	0.66	0.74	0.64
Adjusted Average Annual Attendance (millions)	MLB	1.09	1.14	1.34	1.76	2.07
	NBA		0.285	0.405	0.499	0.663
Attendance as Percent of Stadium Capacity	MLB	32.0	30.9	33.8	41.9	49.5
	NBA		50.4	62.1	71.1	90.3
County Move Probability	MLB	0.031	0.020	0.008	0.000	0.000
	NBA		0.055	0.031	0.013	0.000
Metro Move Probability	MLB	0.031	0.015	0.008	0.000	0.000
	NBA		0.055	0.026	0.008	0.000

Average baseball stadium age declined from 30 to 20 years in the 1970's as a host of new stadiums and new franchises were established, rising again to 28 years in the 1990's. Basketball arenas have had a similar trend and have risen by 4 years in average age since the 1970's. The rising average age of stadiums in the 1990's may explain why team owners are presently clamoring for local governments to build new stadiums. Baseball stadiums today are approaching the average age experienced in the 1950's, an era of owner discontent and franchise movement and a time when teams abandoned old stadiums such as Braves Field, the Polo Grounds, Ebbets Field, Sportsman's Park, and Shibe Park.

And in addition to the unattractiveness of an older facility to fan attendance, owners have an additional incentive to demand new facilities. The rising demand for "luxury boxes" that offer close viewing, catering, and other amenities at a premium price cannot be satisfied by older stadiums with more "democratic" seating arrangements. In addition, league rules that demand revenue sharing with the visiting team for regular attendance but allow the owner to keep all luxury box revenue further encourage this trend. Also excluded from revenue sharing are the "seat rights" that fans are commonly required to purchase when new facilities are built.

The trends in stadium ownership are very different for each sport. The development of new baseball stadiums in the 1960's and 1970's ended a long tradition of team ownership of facilities. Public ownership of stadiums rose from 19% in the 1950's to 70% in the 1990's. For basketball, franchise ownership of arenas has always been the exception. During the early years of the sport, many teams played in publicly-owned arenas, arenas owned by National Hockey League teams, and college facilities. In the last few years, however, teams such as Chicago, Philadelphia, Phoenix, Portland, Sacramento, and Utah have built their own new arenas. The owner of the Washington Wizards franchise (formerly the Bullets) is even moving from one team-owned arena to a downtown facility that he will also own. There has even been a modest revival in baseball teams building their own facilities, including the Texas Rangers and the Cleveland Indians franchises.

Attendance per team has risen significantly for both sports, especially basketball. Baseball attendance has risen 2.2% per year between 1960-95, while basketball attendance has risen by 3.2% per year. Thus, where as the average baseball team in the 1960's had 4 times the annual attendance of the average basketball team, by the 1990's the multiple has fallen to 3. Given that baseball teams have approximately twice as many home dates and three times the stadium capacity, this means that average per game attendance at baseball is only 50% greater, despite having stadiums with almost three times the capacity.

The rise in the popularity of basketball is also noted by looking at attendance in relation to stadium capacity. According to our data, basketball attendance in the 1990's was running at 90.3% of arena capacity, while for baseball, the figure was 49.5%. Both capacity figures are significantly higher than during previous decades, although the trends are different.

For baseball, the takeoff in capacity utilization has occurred entirely in the last 20 years. Until the 1970's only one-third of baseball seats were occupied on average, whereas today the number is one half. For basketball, the rise in attendance/capacity ratio has been strong in each of the decades surveyed, from 50% to 62% to 71% to 90%. Whether due to the development of prominent stars or good promotion, basketball has developed a large fan base.

One possible explanation for the rise in baseball attendance might be the construction of smaller single-use facilities, in some cases by private owners. These new stadiums, including the Ballpark at Arlington, Camden Yards in Baltimore, Coors Field in Denver, and Jacobs Field in Cleveland, have been acclaimed by architects and baseball enthusiasts and a boon to team attendance. In three of these four cases, the new stadium replaced a larger multiple-use stadium whose configuration was judged poor for baseball viewing.

B. Franchise Moves

Finally, the variable indicating the number of moves per franchise year is measured in two ways. County move probability views any movement in franchise location from one county to another as a move, including, for example, a team moving from a downtown arena to a suburban arena. The second measure, metro move probability, only records a move from one metropolitan statistical area to another. In practice, there is very little difference, and we focus on the metro move variable for our analysis.

For both sports, franchise relocation is a rarity, with no recorded moves in baseball for over twenty years. In Table 1, we calculate the number of moves per franchise year and find it declining for both sports over time. For baseball, there were a flurry of moves in the 1950's following decades of stability. The Braves, Browns, and Athletics each left their hometown (which they shared with another team) to a smaller metropolitan area where they were the only team in town. And in 1958, the Dodgers and the Giants both left the New York metropolitan area, re-establishing their rivalry in California. The advent of airplane travel in the 1950's made long distance traveling by teams more feasible and opened up the set of possible team locations.

Moves in baseball became somewhat rarer in the 60's and 70's, perhaps in part because expansion soaked up the demand for franchises in growing parts of the country. Washington, DC lost both the original Senators and the expansion Senators to Minneapolis and Dallas, respectively. The Braves and Athletics continued the movement to new locations, and the ill-fated Pilots left Seattle for Milwaukee, in part because Seattle had a poor stadium, in part because they finished 33 games out of first place.

Table 2
Inter-Metropolitan Franchise Moves

Sport	Year	Franchise	MSA of Origin	MSA of Destination
Baseball	1953	Braves	Boston	Milwaukee
	1954	Browns/Orioles	St. Louis	Baltimore
	1955	Athletics	Philadelphia	Kansas City
	1958	Dodgers	New York	Los Angeles
		Giants	New York	San Francisco
	1961	Senators/Twins	Washington, DC	Minneapolis
	1966	Braves	Milwaukee	Atlanta
	1968	Athletics	Kansas City	Oakland
	1970	Pilots	Seattle	Milwaukee
	1972	Senators/Rangers	Washington, DC	Dallas
Basketball	1960	Lakers	Minneapolis	Los Angeles
	1962	Warriors	Philadelphia	San Francisco
	1963	Zephyrs/Bullets	Chicago	Baltimore
		Nationals/76ers	Syracuse	Philadelphia
	1968	Hawks	St. Louis	Atlanta
	1971	Rockets	San Diego	Houston
	1972	Royals/Kings	Cincinnati	Kansas City
	1973	Bullets	Baltimore	Washington
	1978	Braves/Clippers	Buffalo	San Diego
	1979	Jazz	New Orleans	Salt Lake City
	1984	Clippers	San Diego	Los Angeles
	1985	Kings	Kansas City	Sacramento

For basketball, many of the early moves in the league reflected the maturation of a business enterprise that was founded in small cities like Fort Wayne, Rochester, Syracuse, Minneapolis, and Waterloo, Iowa. The Lakers' move west in 1960 was soon followed by the Warriors. The Warriors move opened up the Philadelphia market for Syracuse. Another of the original NBA franchises that has made several moves is the Royals/Kings franchise which was originally based in Rochester, moved to Cincinnati in 1957, transferred to Kansas City, played some of its home games in Omaha, and has finally settled in Sacramento.

As the league expanded in the 1960's and 1970's, many new franchises suffered from poor attendance and losing records, and moved after few years. The failed Packers/Zephyrs franchise in Chicago left for a new arena in Baltimore, and moved to a new arena in suburban Washington eight years later. The Rockets left San Diego for Houston after four seasons, and the Jazz left New Orleans for Salt Lake City after 5 seasons. The Braves/Clippers franchise has made two moves and as the secondary franchise in Los Angeles may move again.

But for both sports, the likelihood of moving was ever declining. In the 1950's, the probability that a baseball team would move in a given year was 3%, which was cut in half by the 1960's and in half again by the 1970's. No baseball team has moved since the Senators left for Texas in 1972. For basketball, moves were quite common in the 1960's, 5.5%, fell to 2.6% in the 1970's, and no team has moved since 1985. In the next section, we will conduct a statistical analysis to explain the trends in franchise mobility.

C. Metropolitan Markets

Another key determinant of franchise moves is the absence of franchises in large metropolitan areas. For both baseball and basketball (and unlike football which only has a national television contract), the incentive to move to a larger metropolitan area is considered crucial for individual team owners. And as Quirk and Fort (1992) have pointed out, sports leagues have a collective interest in insuring that the largest metropolitan areas have franchises, so as to preclude competitive leagues and capture the monopoly rents that come from being the sole professional league.

In Table 3, we present a picture of how franchises in the four sports leagues are distributed by metropolitan areas, ranked in order of population. The second column provides an indicator of how "saturated" each metropolitan area is by calculating a metropolitan population per franchise indicator.

In general, sports teams locate in large metropolitan areas. The five metropolitan areas above 6 million in population each have five or more franchises whereas franchises between 2 and 6 million people have between two and four franchises. Below 2 million, no franchise has more than 2 franchises.

Among the various sports, widely different location strategies are chosen. For baseball, where local attendance and television markets are paramount, all the large metropolitan areas have teams. A baseball team has 81 home dates, plays in a large facility, and has home games every other day during the six month season. By comparison, hockey and basketball have half as many games, have stadiums one-third the capacity, and play much less frequently.

All 26 US-based baseball franchises are located in metro areas ranked in the top 25. The only top 25 metro areas without a baseball team are Phoenix, Tampa, and Portland, and the leagues will be establishing new franchises in Phoenix and Tampa. In a previous paper (Mildner and Strathman, 1996), we demonstrated that the movement of baseball franchises to the midwest and western cities in the 1950's resulted from the development of airplane travel and the rise of those metropolitan areas in population.

Table 3

Sports Franchises by Metro Areas, 1997

Ranked by Population, 1994

	Metro Areas	Pop. (m)	Pop/Team	MLB	NBA	NHL	NFL	Total
1.	New York	19.80	2.20	2	2	3	2	9
2.	Los Angeles	15.30	2.55	2	2	2		6
3.	Chicago	8.53	1.71	2	1	1	1	5
4.	Washington	7.05	1.41	1	1	1	2	5
5.	San Francisco	6.51	1.09	2	1	1	2	6
6.	Philadelphia	5.96	1.49	1	1	1	1	4
7.	Boston	5.50	1.38	1	1	1	1	4
8.	Detroit	5.26	1.32	1	1	1	1	4
9.	Dallas	4.36	1.09	1	1	1	1	4
10.	Houston	4.10	2.05	1	1			2
11.	Miami	3.41	0.85	1	1	1	1	4
12.	Atlanta	3.33	1.11	1	1	*	1	3
13.	Seattle	3.23	1.08	1	1		1	3
14.	Cleveland	2.90	1.45	1	1			2
15.	Minneapolis	2.69	0.90	1	1	*	1	3
16.	San Diego	2.63	1.32	1			1	2
17.	St. Louis	2.54	0.85	1		1	1	3
18.	Phoenix	2.47	0.82	*	1	1	1	3
19.	Pittsburgh	2.40	0.80	1		1	1	3
20.	Denver	2.19	0.55	1	1	1	1	4

Table 3 (cont.)
Sports Franchises by Metro Areas. 1997
Ranked by 1994 Population

	Metro Areas	Pop. (m)	Pop/Team	MLB	NBA	NHL	NFL	Total
21.	Tampa	2.16	1.08	*		1	1	2
22.	Portland	1.98	1.98		1			1
23.	Cincinnati	1.89	0.95	1			1	2
24.	Kansas City	1.65	0.83	1			1	2
25.	Milwaukee	1.64	0.82	1	1			2
26.	Sacramento	1.59	1.59		1			1
27.	Norfolk	1.53	na					0
28.	Indianapolis	1.46	0.73		1		1	2
29.	San Antonio	1.44	1.44		1			1
	Columbus	1.42	na			*		0
	Orlando	1.36	1.36		1			1
	New Orleans	1.31	1.31				1	1
	Charlotte	1.26	0.43		1		1	2
	Buffalo	1.19	0.60			1	1	2
	Salt Lake	1.18	1.18		1			1
	Greensboro	1.11	1.11			1#		1
	Nashville	1.07	na			*	#	0
	Memphis	1.06	1.06				1#	1
	Raleigh	0.97	na			#		0
	Jacksonville	0.97	0.97				1	1
	Green Bay	0.20	0.20				1	1
	Total US cities			26	27	20	30	103
	Canadian Cities			2	2	6	0	10

***** MLB and the NHL have announced plans for expansions between now and the year 2000. MLB will have new teams in Tampa and Phoenix for the 1998 season. The NHL will have new franchises in Nashville (1998-99), Atlanta (1999-2000), Minneapolis (2000-2001) and Columbus, Ohio (2000-2001)

The Houston NFL franchise and the Hartford NHL franchise will play the 1997 seasons in Memphis and Greensboro, respectively, and will be named the Tennessee Oilers and the Carolina Hurricanes. The Oilers are having a stadium constructed and will move to Nashville for the 1999 season. The Hurricanes will move to Raleigh for the 1999-2000 season when a new arena has been constructed.

For basketball and hockey, the loss for being located in smaller metropolitan areas is less severe due to the smaller number of dates and seating capacity. And because the seasons for the two sports almost perfectly overlap, teams are reluctant to locate in the same city hosting a team in the other sport, presumably for fear of saturating the market for fall and winter indoor sports. This reluctance is somewhat remarkable given that hockey teams and basketball teams can experience economies of scope by sharing sporting facilities and have developed scheduling arrangements that avoid same night event conflicts.

Thus, while 10 of the 11 largest metropolitan areas in the US have both hockey and basketball franchises, for metropolitan areas ranked 12 through 29, only Phoenix (#18) and Denver (#20) have franchises in both sports. Those anomalies may be explained both fast population growth in those metro areas and anticipation that they will become larger markets in the long run.

The table also offers some insight on where possible future sports expansions might take place for hockey and basketball. Houston (#10), Atlanta (#12), and Seattle (#13) stand out as large metropolitan areas that might be ready for hockey, their second fall-winter indoor sport. Atlanta was recently awarded a new NHL franchise, and is building a new basketball/hockey arena. An offer from Houston was rejected in the recent NHL decision on new franchises largely because of the age of the current arena, whereas Seattle completed its 17,000 seat Key Arena in 1995.

The only medium size metropolitan areas with hockey but not basketball are St. Louis (#17), Pittsburgh (#19), and Tampa (#21). St. Louis and Pittsburgh are slow-growing metropolitan areas that seem likely to fall in size rankings over time. More attractive candidates might be San Diego (#16), Cincinnati (#23), Kansas City (#24), or Norfolk (#27) which stand out as large metropolitan areas without either hockey or basketball. San Diego and Norfolk both have the advantage of being fast-growing metropolitan areas, however San Diego has the dubious distinction of attracting and losing two basketball franchises (Rockets and Clippers).

Perhaps the most likely candidate, now that Toronto and Vancouver have received NBA franchises, would be Montreal. With a metropolitan population of 3.32 million, Montreal would rank as high as Atlanta in our US metro population table, has a newly built indoor arena, and would have a natural rivalry with the Toronto franchise.

For football, the need to locate in large metropolitan areas is a league concern and not a significant team owner concern. This is because fans are willing to drive longer distance for weekend football games (hence, the market is regional, not metropolitan) and because of the importance of the national television contract in team revenue. Thus, teams are able to survive in small metropolitan areas such as Green Bay and Jacksonville, and teams can make franchise shifts to smaller markets, such as the Rams move from Los Angeles to St. Louis, or the Oilers move from Houston to Memphis (and ultimately to Nashville). In those cases, the desire to reduce stadium rents and increase luxury box and concession revenue were more important factors.

The NFL's concern for franchise location is much greater than individual owners. Failure by a league to have a presence in major television markets can lead to new league formation and a loss of monopoly rent. This has happened twice before to the NFL, most recently when the American Football League established franchises in the then under-served markets of Boston, New York, Houston, Denver, and Buffalo, and later expanded to Miami.

Thus, the Table 3 exposes a potential market for a rival football league as the large metropolitan areas of Los Angeles, Houston, and Cleveland currently have no franchise, and two major markets, New York and Chicago, may be considered under-served. We suspect, however,

that this gap is really a temporary disequilibrium and the league will undergo expansion to these cities in upcoming years. Nevertheless, the failure of the league to control franchise mobility (as baseball and hockey have done) represents an importance weakness in league structure.

IV. Statistical Analysis.

Franchise relocation is analyzed using a logit model of the following structure:

$$P(M_i=1) = Z_iB_n + B_1S_i + e_i$$

The probability of decision to move in year i, Mi, depends upon a variety of franchise factors Zi (metropolitan population growth, annual attendance growth, team's winning percentage, and league-wide team expansion, among others), municipal stadium/arena ownership, Si, where Si=1 if the city owns the stadium and Si=0 otherwise. Our expectation is that the coefficient on Si would be positive indicating an increased likelihood of moving relative to city ownership. Other variables test alternative hypotheses to predict the incentive to move, such as falling attendance, losing seasons, declining metropolitan economies, or stagnant metropolitan population sizes.

Table 4 reports separate results for baseball and basketball teams moving between metropolitan areas. The only two statistically significant variables in the baseball equation were the negative time trend and the positive effect of public stadium ownership on teams leaving, thereby lending support to our hypothesis that public ownership of stadiums contributes to greater team mobility.

Table 4
Determinants of an Inter-Metropolitan Franchise Movement
Logit Regression

Variable	Coefficient (t-ratio)	
	Baseball	Basketball
Constant	0.375 (0.17)	-0.036 (-0.02)
Time	-0.158 (-4.114)	0.033 (0.481)
Average Winning Percentage (3-year moving average)	-9.15 (-1.749)	3.85 (0.977)
Number of New Franchises in Year	-0.218 (-0.467)	
Metro Population	-0.376 E-07 (-0.410)	-0.842 E-06 (-2.142)
Owner Tenure	-0.20 E-01 (-0.436)	0.051 (0.551)
Publicly-Owned Stadium	3.37 (2.636)	0.257 (0.299)
Stadium Capacity	-0.197 E-01 (-0.640)	-0.337 E-04 (0.280)
Adjusted Annual Attendance	0.923 E-06 (1.32)	-0.167 E-04 (-2.81)
Log Likelihood	-60.8	-68.2
Log Likelihood (B)	-41.7	-55.1
Likelihood Ratio Statistic (8 d.f.)	38.3	26.3
McFadden's R^2	0.32	0.19
N	1,026	681

Of the other variables reaching low levels of statistical significance, team winning percentage (3 year moving average) was weakly negative and team attendance was weakly positive. The winning percentage result is intuitive (that winning teams stay put) but the attendance figure is not. One possibility is that the teams leaving the highly attended New York region may skew this result. Of course, that begs the question of why an owner would leave a high attendance city.

The basketball equation showed no effect of public ownership. One possible explanation is that indoor arenas have a value for hosting musical events and other sports, whereas baseball stadiums are highly specialized facilities. Hence, the "salvage value" of abandoned arenas means that a basketball team that owns a stadium might have less of a mobility constraint than a baseball team. Short of attempting additional specifications and constructing other variables, we conclude that stadium ownership does not seem to be a significant factor in determining movements by basketball franchises.

Unlike baseball, metropolitan population and average annual attendance were important factors in basketball team moves. Thus, teams in small or declining metropolitan areas and low attendance are the franchises that would most likely to candidates for moving.

A related question that we investigated is what conditions determine public ownership of stadiums and arenas. Table 5 reports the results of logit regressions on the probability of public ownership of stadiums for baseball and for basketball. This model performs much better than the relocation equation, with similar results for both sports.

First, we find a general trend toward public ownership over time, although this is only significant for baseball. Second, we find that teams with low annual attendance are in public stadiums. This may reflect the idea that expansion teams are more likely in public stadiums and their poor performance may be associated with low attendance. Third, teams which have only been located in a metropolitan area for a short period of time are more likely to be in publicly-owned stadiums. This may reflect the pattern that only cities that build public stadiums attract new franchises. Finally, recent acquisition of the franchise by a new owner is associated with playing in a publicly-owned stadium. Each of these results points to the importance of municipal ownership in attracting new teams.

Lastly, we examine the determinants of annual attendance, seeing that as a proxy for team net revenue. In Table 6, we present a regression equation that predicts the log of "adjusted" annual attendance. For baseball, we adjusted for the effect of strike years and for both sports, we adjusted for the increase in the number of games per season.

Results for the two sports are very similar. Stadium age is negatively correlated with fan attendance, however the pattern of causation isn't entirely clear. Fans may prefer new ballparks and arenas, but it's also true that high fan attendance may generate the revenues required to support new stadium construction. Fan attendance rises with a winning record (again, there is a weak case for reverse causation). Larger cities have higher attendance, and attendance is rising over time in both sports.

Table 5
Determinants of a Public Stadium Ownership
Logit Regression

Variable	Coefficient (t-ratio)	
	Baseball	Basketball
Constant	0.807 (1.68)	1.75 (3.86)
Time	0.243 (6.68)	0.069 (1.61)
Time Squared	-0.223 E-02 (-3.19)	-0.006 (-0.59)
Adjusted Annual Attendance	-0.588 E-07 (-3.92)	-0.233 E-05 (-3.28)
Metropolitan Tenure	-0.051 (-13.56)	0.012 (1.04)
Owner Tenure	-0.057 (-6.98)	-0.063 (-4.32)
Metro Population	3.37 (2.636)	0.131 E-06 (6.30)
Log Likelihood	-649.2	-429.9
Log Likelihood (B)	-338.7	-364.8
Likelihood Ratio Statistic (8 d.f.)	620.9	130.2
McFadden's R^2	0.48	0.15
N	1,026	681

Metropolitan tenure, which we interpret as a tradition effect, has a significant impact in baseball and not in basketball. This may reflect the newness of basketball's popularity and the high frequency of team moves in earlier years. Note that absolute value for the coefficient on metropolitan tenure for baseball is much smaller than the coefficient on stadium age. This indicates that a team moving to a new metropolitan area will likely gain more attendance from the playing in a new stadium than they lose from the loss of the tradition effect. This may explain why so many long-established franchises like the Giants and Dodgers were willing to leave long established homes for the sake of a new, attractive ballpark.

A second key difference in the two attendance equations is the significance of the capacity variable for basketball and not for baseball. As discussed earlier, basketball arenas have consistently been playing to higher capacity utilization levels than baseball, with the current level at 90%. Under those conditions, the team with the higher attendance is the one with more seats. The need to upgrade facilities to meet rising demand may also explain why basketball arenas are so much newer than baseball stadiums. Baseball, on the other hand, requires the additional seating capacity to meet the higher demand on weekends or when a particularly good match-up occurs.

Table 6
Determinants of Attendance
(Dependent Variable: Log of Annual Adjusted Attendance)

Variable	Coefficient (t-ratio)	
	Baseball	Basketball
Constant	12.28 (47.89)	7.04 (16.44)
Log Stadium Capacity	0.050 (1.06)	0.53 (11.81)
Stadium Age	-0.091 (-7.18)	-0.050 (-5.35)
Log Winning Percentage	0.678 (13.19)	0.381 (13.54)
Log Metro Population	0.120 (7.90)	0.043 (3.37)
Time	0.020 (22.49)	0.027 (21.82)
Metropolitan Tenure	0.115 E-03 (2.85)	0.002 (1.59)
SEE	0.34	0.23
R2	0.49	0.71
N	1,026	681

V. Conclusions

The results of this research will help inform local officials about the feasibility of using subsidized stadium development as a means of attracting and maintaining sports franchises. For baseball franchises, team ownership of a stadium makes the franchise less likely to move. Cities with publicly-owned facilities may want to explore privatization.

The best prospects for cities seeking to attract a new baseball franchise are teams currently playing in public facilities. Even teams that own their own facilities might be attracted if a city has a new facility and the land occupied by the current stadium has a high alternative use. A second consideration would be to identify teams that had poor winning records since they are somewhat more likely to move. That may be sound attractive, but it assumes the objective is to win a team, not just a winning team.

For basketball-seeking cities, the advice is less clear. We do not yet have a useful model of franchise relocation. We know that teams are playing next to capacity. We also know from our equation, that teams draw better in large metropolitan areas with new stadiums. Part of the reason for the poor performance of the relocation equation may be the number of expansion franchises in recent years. This suggests a different model for future research, predicting where a league will expand its membership.

Finally, we want to exercise a word of caution to city officials who see economic development and political gains from attracting new franchises. As others have noted, sports is just one of many entertainment outlets. Consultants' estimates of the multiplier effect of sports expenditures are frequently exaggerated. While making investments in new facilities make

influence some team location decisions on the margin, we suspect these effects are small and the benefits are fleeting.

Notes

1. The moving franchises (and their destination city) are the Cleveland Browns (NFL, Baltimore), the Los Angeles Raiders (NFL, Oakland), Los Angeles Rams (NFL, St. Louis), the Winnipeg Jets (NHL, Phoenix), the Quebec Nordiques (NHL, Colorado), the Minnesota North Stars (NHL, Dallas), and the Hartford Whalers (NHL, Greensboro-Charlotte). In addition, the Houston Oilers (NFL) are scheduled to Memphis and later to Nashville.

2. Estimates of franchise values are reported in Quirk and Fort (1992). The highest values for each of the major leagues are for basketball, the Boston Celtics, $120 million (1986), for baseball, the New York Mets, $100 million (1986), and for football, the New York Giants, $150 million. As for hockey, the NHL recently announced 4 new expansion teams, with the entry price set at $80 million.

By comparison, seven new sports stadiums and arenas have been built in Baltimore, Cincinnati, Cleveland, Nashville, San Francisco, St. Louis, and Seattle for between $250 million and $525 million. (Malkin, 1997)

3. The reason for the differences in time periods is that professional basketball was an unstable business enterprise until the early 1960's. The NBA merged with other leagues in the late 1940's and early 1950's and clearly had a less prominent attention in the public eve than college basketball. In addition, data for the NBA prior to 1960, particularly on attendance is very difficult. Thus, while the baseball data is comprehensive, there are 12 missing team-year observations for basketball, largely due to missing data on team attendance Finally, pro basketball in the 1950's was frequently played in neutral cities or in doubleheaders where attendance and stadium data becomes less meaningful.

The missing observations are the St. Louis Hawks, 1960-67; the Syracuse Nationals, 1960-61, and the Chicago Packers/Zephyrs, 1961-62. The year refers to the beginning year of the season.

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