THE EFFECTS OF LOCATION AND TEAM ATTRIBUTES ON VIABILITY IN MAJOR LEAGUE BASEBALL

by

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ABSTRACT

In the early 1980s, interest groups in several U.S. cities, and Molson Breweries Ltd. in Vancouver, actively pursued a Major League Baseball franchise. Despite their efforts, the number of baseball teams remains unchanged. During the same period, several existing franchises consistently incurred financial losses, underwent changes in ownership, and threatened to relocate to other markets.

An explanation of why Major League Baseball did not expand, nor relocate those teams in financial difficulty, should focus on the determinants of team viability. While other team attributes are important, the long-run economic viability of a club in a particular location should ultimately depend on those locational attributes which are significant determinants of team revenues and profits. This thesis applies a model of professional sports teams to explore the locational and other determinants of attendance revenue in Major League Baseball. The results are used to evaluate recent decisions regarding franchise location. Their antitrust implications on Major League Baseball regulations for controlling franchise location are also discussed.

The two-equation model, which explicitly treats both attendance and price as endogenous variables, forms a system of seemingly unrelated regressions and, using game data from the 1983 season, is estimated using a procedure devised by Zellner. The locational attributes: population, income and climate, are important determinants of both attendance and market power. Although locational quality

remains the crucial factor in attendance revenue generation, gate receipts as a percentage of total revenue is decreasing because of the rapid growth in broadcast revenues.

Various measures of team success are also important determinants of attendance revenue, particularly in the short-run. Using composite measures of locational and team quality derived from the model, a regression of the former on the latter provides little support for the Quirk-El Hodiri hypothesis that better quality teams tend to emerge in the stronger markets over the long-run.

Simulation of attendance revenue combined with estimates of other revenue sources and estimates of cost indicate that profitability varies widely among the existing clubs. The results indicate half of the teams had net operating losses in 1983 and that several appear to be unviable or marginal operations at best. This was also true for the majority of the non-franchises, however, there were a few cities which appeared quite viable. Hence, the model is effective in explaining the league's cautious approach to expansion.

Why teams in the markets of questionable long-run viability did not relocate to more lucrative locations can only be explained by factors which lie outside the scope of the model. Public subsidies, in the form of the tax breaks and below-cost stadium rents, are worth a substantial amount to team owners in Major League Baseball; and, in the weaker markets, is the primary reason why clubs are financially viable. While these indirect subsidies increase the number of viable locations, it also results in increased competition among cities for existing franchises, and has led to increased public pressure on Major

League Baseball to expand or face increased regulation or lose its special status in terms of being immune from antitrust scrutiny.

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DEDICATION

To my father, Joe, who taught me to never start a job I couldn't finish; to my mother, Eveline, whose only request was that I do my best; and, to Andrée, who was there when it mattered.

CHAPTER 1: INTRODUCTION

In 1978, the Vancouver Canadians baseball club returned to the Pacific Coast League under the ownership of Harry Ornest who arrived talking of a domed stadium and a major league franchise. In March 1984, six years later, B.C. Place hosted its first major league exhibition games and an intensified campaign for a Major League Baseball franchise began.[1]

Four months earlier, at its winter meetings in Nashville, Major League Baseball's executive council had established a seven-man long-range planning committee to investigate the feasibility of expansion and was to report back to the council at the upcoming summer meetings to be held in conjunction with the 1984 All-Star game.[2] During this period, the Canadians' new owner, Molson Breweries Ltd., actively campaigned for a franchise. Led by Molson Breweries B.C. president Jack Beach and Canadian's vice-president Senator Ray Perrault, the pitch for a major league franchise in Vancouver was made to eight of

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[1] The three major league baseball exhibition games, played on March 30, 31 and April 1, drew an attendance of 106,145 (Source: B.C. Place Annual Report, 1984: 1). Earlier that month, Molson Breweries purchased the Canadians from Jimmy Pattison. At the time of the announcement the new owner said it did not buy the Class AAA club with the intentions of operating a minor league team: included in the estimated purchase price of $3 million were the major league territorial rights. As noted in D. Feser, "Molson doesn't want majority role," Vancouver Sun 6 Nov. 1985: C1.

[2] The committee was to explore the possibility of adding six major league teams to create two sixteen-team leagues. As noted in P. Hickey and D. Feser, "Baseball eyes expansion, Vancouver," Vancouver Sun 9 Dec. 1983: C1.

the twenty-six major league owners. The long-range planning committee, however, did not file its report until after Peter Ueberroth was hired as the new Commissioner in October. Although the committee recommended that baseball expand by as many as six teams by 1990, more pressing matters such as the drug issue, the negotiation of a new players association contract, and the poor financial state of some of the existing franchises, stalled any plans for increasing the number of teams. At his state of the game message made at the winter meetings that year, Ueberroth bemoaned that seven of the twenty-six major league teams were for sale.[3] During the next nine months, the list of interested cities continued to grow and their interest turned towards purchasing existing franchises[4].

In October 1985, the Commissioner's office issued a five-page memorandum to the twelve cities seeking Major League Baseball. Included were guidelines for discussion containing criteria for

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[3] P. Hickey, "Ball hopes must wait," Vancouver Sun 9 Dec. 1985: C1. The seven franchises were San Francisco, Oakland, Cleveland, Texas, Minnesota, Seattle and Pittsburgh. At that time, the turnover in owners was unparalleled in baseball history. During the previous five years, eleven of the twenty-six teams had changed owners, and sixteen teams, including San Francisco and Cleveland, had been bought and sold in the previous nine years.

[4] For a number of years, Denver, Vancouver, and Washington, each with major league playing facilities in place, were regarded as the top expansion cities. In early 1985, however, interested groups in New Jersey, Tampa-St. Petersburg, Miami, New Orleans, Buffalo, Phoenix and Indianapolis stepped up their campaigns for a franchise. Later that year, bids were also made from groups representing Nashville, Tennessee and Columbus, Ohio.

ownership, stadium, government cooperation and market strength.[5] Representatives from each of the prospective cities were invited to make their presentations to the long-range planning committee the following month. Overall, the tough new criteria weakened Vancouver's

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[5] The ideal candidate would fulfil many of the following:

- "Individual rather than corporate" ownership. Baseball is seeking owners with a net worth of $100 million and a willingness to make that sum available to the operation of a major league team.

- Prospective owners are expected to make a commitment to "baseball's interests rather than to the enhancement of other business activities".

- Diversified ownership with strong local roots is preferred and minority owners will be expected to assume a majority position if necessary.

- Privately-owned stadiums are preferable to municipally-owned facilities and it is recommended that the facilities have natural grass and adequate lighting.

- If the stadium facilities are leased, the deal should be a long-term arrangement with flexibility.

- Government cooperation is best expressed in terms of tax concessions.

- A prospective franchise must show evidence of the ability to sell 10,000 full-season tickets for each of its first five years of operation.

As noted in P. Hickey, "Tough Criteria make it whole new ballgame," Vancouver Sun 8 Oct. 1985: A1,A2.

bid for a franchise.[6] However, shortly after at the annual winter meetings in San Diego, it became evident that the game's priority would be the problems of cities whose teams were in financial difficulty. Expansion, therefore, would again be postponed.[7] Although league plans for expansion have been modified since 1985, no definitive action has occurred to date.[8] Furthermore, despite

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[6] Vancouver's chances for securing a franchise were based on two main selling points; namely, B.C. Place stadium and solid ownership in Molson Brewery. Under the guidelines both conflicted with the new criteria. Although not fulfilling the stadium criteria was a minor issue (Ueberroth's ideal stadium rarely exists in most cities) the ownership criteria proved to be a major concern, as Molsons had trouble raising specific commitments from local businessman and were unable to find a majority owner fitting the league guidelines. In addition, the limited market in the Lower Mainland was a major stumbling block in the Vancouver bid and there was some question as to whether the community support criteria (10,000 season tickets for each of the first five years of operation) could be met.

[7] Ueberroth said expansion would not be a priority until baseball settled the problems besetting the Pittsburgh, San Francisco and Cleveland franchises. In San Francisco, team owner Bob Lurie said his club would not play another game in drafty Candlestick Park and that he was negotiating a plan to move the team temporarily to Denver while San Francisco worked on an alternative playing site. In Pittsburgh, new ownership still awaited league approval while in Cleveland, where the team was near bankruptcy, new owners were being sought. Earlier that year, after a year-long drama involving city, county and state officials, the Seattle Mariners had reached a new lease agreement with the Kingdome. As noted in P. Hickey, "Baseball definitely a rich man's game," Vancouver Sun, 7 Dec. 1985: D1, and P. Hickey, "Ball hopes must wait," Vancouver Sun, 9 Dec. 1985: C1.

[8] At the 1987 winter meetings in Dallas commissioner Ueberroth envisioned the following scenarios:

- A bottom line of 32 teams "by the year 2000, give or take a year or two," with four four-team divisions in each league, a 154 game schedule and two rounds of league playoffs before the World Series.

- A first step move by the American League to expand from 14 to 16 clubs (four four-team divisions with a 154 game schedule).

recurring financial problems with some franchises, no relocations have occurred.

It appears the delay in league expansion and the ultimate survival of teams beset by constant financial problems during the 1980s were based on: stadium lease arrangements, government concessions, ownership changes, the national TV contract, the players association contract, and league operating rules,[9] rather than the

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- A next-step move by the National League to add two new teams plus the simultaneous shift of one of the two newest American League teams to the National League.

This would create a pair of 15 team leagues, with three five-team divisions in each. The leagues would play 154 game schedules, with the three champions and a wild card taking part in league playoffs prior to the World Series. As noted by National League president A. Bartlett Giamatti, however, "[n]othing concrete can be accomplished until the next labor and television agreements have been concluded." As noted in D. Nightingale, "Looking Down Expansion Road: 15-Team Leagues," The Sporting News 21 Dec. 1987: 44.

The latest expansion plan calls for two franchises to be added to the National League for the 1993 season. In early 1991, the National League's expansion committee members began an inspection of the six cities vying for the two franchises: Miami, St. Petersburg, Orlando, Denver, Buffalo and Washington. As noted in "Sports in Brief: Two Florida franchises not ruled out," Globe and Mail [Toronto] 26 Feb. 1991: A14.

[9] The Supreme Court granted Major League Baseball an antitrust exemption that permits it to conduct its affairs outside the federal antitrust statutes in *Federal Baseball Club v. National League*, 259 U.S. 200 (1922). This omission has permitted Major League Baseball to control the supply of its product free from any competitive pressure to respond to market demand. Teams within the leagues obtain valuable monopoly rights to supply games in local geographical markets: the American League gives 100 mile territorial rights while the National League only gives territorial rights for 10 miles. Relocation of a franchise in each league requires approval from three-quarters of the member clubs. League expansion requires approval from three-quarters of the member clubs and majority approval within the other league.

real market strength of cities to support a franchise. This is confirmed by the criteria for cities seeking franchises issued by the league owner's in 1985. While these considerations are important to franchise survival, they either have the same effect on all cities (e.g. the national TV contract) or they can be fixed by the individual city (e.g. stadium lease arrangements, local government concessions). If, however, the market is not there or has limited potential for future growth, over the long run the franchise becomes a liability to the league, other member clubs, local governments and ultimately the local constituents.

To evaluate the reasons for league expansion and franchise relocation, one should focus primarily on locational attributes: some cities offer better revenue opportunities than others, "each location, having different attributes, and thus different revenue-generating ability, presumably has different profit potential."[10] To determine the impact of locational attributes on profit potential, one must consider the ways in which location can affect profitability and assess the magnitude of these effects relative to those of other possible determinants.[11]

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[10] J.C.H. Jones and D.G. Ferguson, "Location and Survival in the National Hockey League," Journal of Industrial Economics 36.4 (June 1988): 443.

[11] As indicated in a preliminary draft of Jones and Ferguson (1988), "... it seems reasonable, a priori, that outcome uncertainty, various league wide rules, team performance, and locational attributes all affect a franchise's viability."

In this thesis, the objectives are as follows. First, to develop a short run model of team demand in Major League Baseball which enables one to consider the importance of location and other attributes for revenue generation in existing or potential locations. Second, using composite measures of locational quality and team quality derived from the model, assess the long run effects of the former on the latter. Third, using estimates obtained from the model, together with revenues from other sources and costs, determine profitability. Fourth, to examine the effects of potential league expansion, in the short run, using endogenous team quality. Fifth, to discuss the implications of the objectives on Major League Baseball regulations for franchise location as they pertain to current antitrust laws.

CHAPTER II: THE MODEL

Two of the major restrictive practices of baseball, the division of geographical markets and territorial rights and the sale of national broadcasting rights, have enabled the teams within a league to behave as monopolists in the provision of professional baseball games in their local markets. The value of the monopoly rights to each team depends on the locational attributes of the local market, the quality of the games in which the team participates and ticket prices. However, once assigned to a particular geographical market, teams cannot change territories without league permission; hence, the choice of location is largely beyond the control of the team. Within the control of the team are the quality of the games it supplies and ticket prices. Presumably, teams set both to maximize season profits. In this study, a two-equation model of demand is employed to explicitly treat both attendance and price as endogenous variables.[1] The latter assumption accounts for the fact that individual teams set prices at the beginning of the season to maximize profits for that year. The format of the model allows one to focus explicitly on profitability which is also endogenous. The short and long run models and their empirical contents are outlined below.

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[1] The model employed is a variation of the model of professional sports franchises introduced by Jones and Ferguson (1988) in their study of location and survival in the National Hockey League.

1. Location, Price and Attendance in the Short Run

The demand for attendance at a particular game is assumed to be a linear function of the price charged by the home team. Both the position and slope of the demand curve depend on the locational attributes of the home franchise and the attributes of the game which reflect the quality of the teams involved, when the game is played and other special conditions pertaining to the game.

Formally, it is assumed that

$$A_g = C(g,h(g),v(g))(a_{h(g)} - b_{h(g)}p_{h(g)}) \tag{1}$$

where g is an index of all games played by all teams in the league, h(g) and v(g) are, respectively, the home and visiting teams in game g, A_g is the attendance of game g, and $p_{h(g)}$ the price set by the home team. The term C(g,h(g),v(g)) is a shift parameter explained by other variables which depend on the attributes of both the home h(g) and visiting v(g) teams playing game g, and attributes associated with the timing of the game. The terms $a_{h(g)}$ and $b_{h(g)}$ depend solely on the locational attributes of the home franchise h(g) in game g. As noted by Jones and Ferguson (1988, p. 445), "[a]lthough the particular form in (1) was chosen for its tractability, it does have an intrinsic appeal and allows one to consider how the specific features of teams and their locations affect demand." For all games g played by team t in its home location, the second term in parentheses in (1) simplifies to $a_t - b_t p_t$ which can be interpreted as the underlying demand in a particular location as it depends on factors such as population size, income and climate of the home city. The term C(g,t,v(g)) represents the variation in demand from game to game in response to when the game is played, the characteristics of the teams involved in the game, and other special conditions pertaining to the game.

As noted above, prices charged by the teams are explicitly treated as endogenous. In this respect, it is assumed that teams seek to maximize season profits and that, for a given season, the marginal costs of attendance are negligible, so that all costs associated with extra attendance are fixed. Simply stated, the profit-maximizing price is the revenue-maximizing price.

Although a team sets revenue-maximizing price for all games played in its home location, a team does not retain the total revenue accruing from these games. A league gate-sharing arrangement stipulates that the home and visiting teams in a game receive a share of the revenues accruing from that game; however, a larger share is usually retained by the home team. Therefore, total season revenues for a team depend not only on the revenue-potential of its location but also on the revenue-potential of the locations of the other franchises in the league. Summing over all games g played by team t yields a total season attendance revenue of

$$R_t = r \sum_{g \epsilon D_t} R_g + (1 - r) \sum_{g \epsilon V_t} R_g \qquad (2)$$

where R_g = the attendance revenue of game g (i.e. $R_g = A_g P_{h(g)}$)

r = the home team's share of the gate ($0 \leq r \leq 1$)

D_t = the set of home games for team t

V_t = the set of visiting games for team t

The first term in (2) is the share of attendance revenues accruing to team t for games played in its home location. The second term consists of the share of attendance revenues accruing to team t from games it plays away from home. Substituting for R_g in each term in (2) yields

$$(3) \qquad R_t = r \sum_{g \epsilon D_t} C(g,t,v(g))(a_t - b_t p_t)p_t + (1 - r) \sum_{g \epsilon V_t} C(g,h(g),t)(a_{h(g)} - b_{h(g)} p_{h(g)})p_{h(g)}$$

where $h(g) \neq t$ for all $g \epsilon V_t$.

From (1) and (3) it follows that the revenue-maximizing price for team t is

$$(4) \qquad p_t^* = a_t/2b_t$$

which is the price at which the elasticity of demand

$$(5) \qquad E_t = p_t/(a_t/b_t - p_t)$$

is unity. Substituting the revenue-maximizing price for team t into (1) yields the attendance equation

$$(6) \qquad A_t^* = C(g,t,v(g))(a_t/2) \qquad \text{for all } g \epsilon D_t$$

which, together with the price equation (4), summarizes behavior in the model as it depends on team and locational attributes.

From (3), (4) and (6) we also obtain the revenue function for team t in its existing location

$$R_t^* = r[\sum_{g \epsilon D_t} C(g,t,v(g))](1/4)(a_t^2/b_t) + \quad (7)$$

$$(1 - r) \sum_{g \epsilon V_t} C(g,h(g),t)(1/4)(a_{h(g)}^2/b_{h(g)})$$

As noted previously, the two terms in (7) reflect attendance revenue accruing to team t from its home and away games respectively. By construction, the first term in (7) is the product of three components; the first component is the home team's share of the gate, the second component consists of the sum of the characteristics of the teams playing and other game conditions, over all games played by team t; and the third component depends solely on the locational attributes of the home city. The second term in (7) is similar in that it has a component which is the share of the gate that team t receives from its away games. The remainder of the second term in (7) differs, however, because it consists of the sum of products in which one of the factors, namely $a_{h(g)}^2/b_{h(g)}$, varies game-by-game. Therefore, unlike the first term in (7), the locational attribute component in the second term is not constant across all games. Nonetheless, the second term in (7), and the first and second components of the first term in (7), would be invariant under a change in the team's location.

The revenue of team t (indexed by its current location) in an alternate site τ can be written as

$$(8) \qquad R_{t\tau}^* = r \left[\sum_{g \epsilon D_t} C(g,t,v(g)) \right] (1/4)(a_\tau^2/b_\tau) + (1 - r) \sum_{g \epsilon V_t} C(g,h(g),t)(1/4)(a_{h(g)}^2/b_{h(g)})$$

where, by construction $R_t^* = R_{tt}^*$ (i.e. R_t^* is the simulated attendance revenue of team t in its current location). As expected the second term in (8), the revenue accruing to team t for games it plays away from home, is invariant under a change in the location of team t.

The third component of the first term in (8)

$$H_\tau = (1/4)(a_\tau^2/b_\tau)$$

depends only on locational variables and will be referred to as the "locational quality" of a franchise in site τ. Locational quality (H_τ) represents the combined revenue effect of a location on market power in (4) and on attendance in (6). The relative size of H_τ provides the basis to rank the revenue-generating ability of all actual and potential locations for a franchise.

The remaining component of the first term in (8) consists of the sum of C(g,t,v(g)) entries

$$Q_t = \sum_{g \epsilon D_t} C(g,t,v(g))$$

over all home games played by team t. As defined above, each entry C(g,t,v(g)) depends on the characteristics of both the home and visiting teams and other conditions pertaining to the game. Since each team plays its league opponents the same number of games per season, and these games are split equally between home and away, the variation in $C(g,t,v(g))$ over the season as a whole will depend primarily on the characteristics of the home team t. As a result, this residual term (Q_t) will be referred to as "team quality". It, however, refers not only to the team's playing success (i.e. winning percentage is the standard usage), but to any other attributes of the team which enable it to generate revenue. Therefore, in terms of the gate receipts generated by games played in the home location of team t, H_τ and Q_t allow one to consider the implications of placing a team of varying quality in alternative locations of varying quality.[2]

By substituting H_τ and Q_t into (8), one can simulate the effect of relocation on the gate revenues accruing to team t.

$$(9) \qquad R_{t\tau}^{*} = rH_\tau Q_t + (1 - r)\ [\sum_{g \epsilon V_t} C(g,h(g),t)H_{h(g)}]$$

Presumably, the characteristics of the teams playing and other conditions pertaining to the game would be invariant under a change in a team's location. In terms of (9), this implies that the only factor which would change is H_τ. Since the locational quality of team t occurs only in the first term of (9), the revenue accruing to team t from its away games would remain unchanged as expected.

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[2] Algebraically

$$\sum_{g \epsilon D_t} R_g = [\sum_{g \epsilon D_t} C(g,t,v(g))][(1/4)(a_\tau{}^2/b_\tau) = Q_t H_\tau$$

It is more complicated to simulate the gate receipts accruing to an expansion team. The difficulty is that the effects of the characteristics of the expansion team on gate receipts for games it plays away from home, as shown algebraically by the second term in (9), cannot be determined. Unlike the first term in (9), the characteristics of the teams playing in, and other conditions pertaining to, each away game g cannot be summed independent of locational quality. Therefore, while it can be assumed that expansion team t has some level of team quality (Q_t), however determined, and the team's gate receipts from its home games can be simulated using the first term in (9), it is impossible to determine the team's gate receipts from its away games from the second term in (9).

In order to simulate gate receipts accruing to an expansion team, one needs to make an assumption regarding the receipts received by the team for games it plays away from home. For an average quality team, its share of the gate from all its games played away from home would approximate an average share of the visitor's percentage of revenues from all games played by all teams in the league.[3]

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[3] Algebraically, the revenue accruing to an average quality team from games it plays away from home can be expressed as

$$(1 - r) \sum_{g \epsilon V_t} R_g = (1 - r) \ [\sum_{t=1}^{N} (\sum_{g \epsilon V_t} R_g]/N$$

The revenue accruing to an average quality team in location τ can be expressed as

$$(10) \qquad R_{ave\ \tau} = rH_{\tau}Q_{ave} + (1 - r)\ [\sum_{t=1}^{N} (\sum_{g \epsilon V_t} R_g]/N$$

where N is the number of existing teams in the league. The two terms in (10) are similar to those in (9) since they represent a team's share of gate receipts from its home and away games. In addition, (10) allows one to simulate, from relocation, the effects on an average quality team's home and away gate receipts, since each term in (10) is the product of a locational quality expression and a team quality expression. Since receipts from games played by the team at home are also included in the second term in (10), revenues from away games will also depend on location τ. However, the overall impact of location τ on the second term in (10) will be negligible since games in which revenue would be altered, namely those played in location τ, represent a small fraction of the league's total season schedule. In the case where an average quality team is added to a league and placed in a city of average locational quality, there would be no effect.

League expansion will also affect the gate receipts accruing to league members. With no changes to either the total number of games played by each team or the interlocking league schedule, an equal number of an existing team's home and away games previously played against other existing league teams would be replaced by games involving the expansion team. For the first term in (8), only Q_t would be affected but, since it was primarily dependent on the characteristics of the home team t, the effects would be negligible. As a result, the change in gate receipts accruing to the existing team t from games played at home would be minimal. For the second term in (8), both the characteristics of the expansion team and its location affect gate receipts, however, this effect is unclear. In cases where the expansion club is of above (below) average team quality and is located in a city of above (below) average locational quality, the gate receipts accruing to existing teams from games played away from home increase (decrease). Because, however, the expansion team will account for only a small proportion (1/(N - 1)) of each existing team's away games the effects on total away game revenues, whether positive or negative, will be minimal. The effect on each existing team's total gate revenues would be even less because of the small visitor's share of the gate. If the expansion club is of average team quality, then the net change on each existing team's total season gate receipts, as given by (8), depends primarily on the locational attributes of the new franchise. As a result, only gate receipts from away games for the existing teams are affected. For similar reasons, the effects on each existing team's total gate revenues would be small.

To complete the description of the model, it is assumed that a_t, b_t and C(g,t,v(g)) are log-linear functions of locational and game attributes. Therefore

$$\text{(11)} \qquad \text{Log } a_t = \alpha_0 + \alpha_1 \log X_1 + \ldots + \alpha_n \log X_n$$

$$\text{(12)} \qquad \text{Log } b_t = \beta_0 + \beta_1 \log X_1 + \ldots + \beta_n \log X_n$$

$$\text{(13)} \qquad \text{Log } C(g,t,v(g)) = \gamma_0 + \gamma_1 \log Y_1 + \ldots + \gamma_m \log Y_m$$

follows where $X_1,..,X_n$ are locational attributes and $Y_1,..,Y_m$ are game attributes.

Using equations (11), (12) and (13), equations (4) and (6) can be written as below.

$$\text{(14)} \qquad \text{Log } A_t = (\alpha_0 + \gamma_0 + \log\tfrac{1}{2}) + \alpha_1 \log X_1 + \ldots + \alpha_n \log X_n$$
$$+ \gamma_1 \log Y_1 + \ldots + \gamma_m \log Y_m$$

$$\text{(15)} \qquad \text{Log } P_t = (\alpha_0 - \beta_0 + \log\tfrac{1}{2}) +$$
$$(\alpha_1 - \beta_1)\log X_1 + \ldots + (\alpha_n - \beta_n)\log X_n$$

As a result of the functional forms adopted, namely equations (1) and (2), there are no binding cross-equation restrictions on the coefficients of the reduced-form equations (14) and (15). Since, however, these equations are derived from the demand equation (1), their disturbance terms might not be independent.[4] Given this possibility, parameter estimates yielded from the application of ordinary least squares to each equation will not be efficient.[5] Hence, the reduced-form equations are treated as a system of seemingly unrelated regressions. Consequently, they are estimated using Zellner's procedure (1962) which takes into account that the cross-equation error correlations might be non-zero.[6] While the structural form representation of the model (equations (1) and (3)) could have

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[4] This would be the case if, for example, there are omitted variables. In general, equations (14) and (15) form a specific type of recursive model in which a series of endogenous variables (A_{gt} and P_t) are considered as a group because they bear a close conceptual relationship to each other (i.e. each is derived from the same demand equation).

[5] Ordinary Least-Squares (OLS) estimation yields inefficient parameter estimates because all the information available in the description of the system of equations, in this case, that the error terms across equations for corresponding observations may be correlated, is not used in the estimation procedure.

[6] Zellner estimation is a two-stage systems method of estimation in which a system of seemingly unrelated equations is viewed as a single large equation to be estimated. Estimation of the single large equation is accomplished efficiently through the use of Generalized Least-Squares.

been estimated, using the reduced-form representation avoids the simultaneous equation bias that could arise.[7]

The following observations can be made from the reduced-form equations. First, it is possible to identify all of the structural coefficients in (11), (12) and (13) with the exception of the intercepts. The restrictions imposed by the estimates in (14) and (15) leave one degree of freedom in choosing α_0, β_0, γ_0 which, given the log linear form of (11), (12) and (13), acts to scale H_t and Q_t simultaneously.[8] However, because revenue is obtained from the summation of several terms, each of which is a direct product of the antilogs of the dependent variables in (14) and (15), the scaling does not affect the revenue estimates.[9] In addition, it does not affect the ranking of H_t, Q_t, or the correlation between them.

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[7] The use of OLS to estimate the structural form demand functions will lead to non-zero covariance in the error terms and/or non-zero variance of the error term in equation (1). In general, cross-equation restrictions necessarily exist between any monopoly price equation and the (structural form) demand function from which it is derived. Therefore, application of OLS generates estimators that are not only less efficient, but given non-zero covariance, are also asymptotically biased.

[8] The presence of α_0 in the intercept terms of both (14) and (15) implies that choosing a value for one of α_0, β_0, γ_0 also determines values for the remaining two. Since the scaling factors for H_t and Q_t ($e^{2\alpha-\beta}$ and e^{γ}, respectively) are completely described by the three coefficients it follows that the both scaling factors are determined simultaneously as well.

[9] Algebraically, the scaling factor for revenue is equal to the following expression

$$e^{[\log\frac{1}{2} + \alpha_0 - \beta_0] + [\log\frac{1}{2} + \alpha_0 + \gamma_0]}$$

where the terms in brackets are the intercept terms from equations (14) and (15) respectively. Therefore, if k_1 and k_2 are the estimated

Second, the coefficients in (14) can be interpreted directly in terms of their effect on demand, a positive (negative) value indicating that increases in that variable increases (decreases) demand. Specifically, the coefficients $\alpha_1,\ldots,\alpha_n$ represent the effects of the locational attributes $X_1,\ldots,X_n$ on demand. The remaining variables $Y_1,\ldots,Y_m$ represent the characteristics of the particular games and of the teams playing in them.

Third, from equation (5) it follows that the estimates $(\alpha_i - \beta_i)$ in (15) represent the inverse effect of the locational variables on the elasticity of demand. Hence, a positive (negative) value indicates that, as that variable is increased, the elasticity of demand decreases (increases).[10]

2. Location and Team Quality in the Long Run

Quirk and El Hodiri (1974) presented a model to investigate whether the collection of rules governing the business aspects of

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intercepts for (14) and (15) respectively, the scaling factor for revenue is a constant, namely $e^{(k_1 + k_2)}$.

[10] The term a_t/b_t is the quotient of the antilogs of the dependent variables in equations (11) and (12)

$$a_t/b_t = e^{(\alpha_0 - \beta_0)} X_1^{\alpha_1 - \beta_1} \ldots X_n^{\alpha_n - \beta_n}.$$

Therefore, if $\alpha_i - \beta_i > 0$ (< 0) an increase in X_i will increase (decrease) a_t/b_t. Taking the first derivative of equation (5) with respect to a_t/b_t yields

$$dE_t/d(a_t/b_t) = - p_t/[(a_t/b_t) - p_t]^2 < 0$$

indicating an increase in a_t/b_t causes the elasticity of demand to decrease.

professional team sports leagues has any tendency towards the equalization of playing strengths among clubs. It was assumed that teams acted to maximize profits by varying their stock of playing skills through the sale and purchase of player contracts. The authors concluded that as long as franchises are located in cities of markedly different revenue potential, current rules permitting the sale of player contracts among teams leads to unequal playing strengths. The greater the revenue generating ability of a team's location, the greater will be its long run stock of playing skills. Expanding their argument to include not only playing skills but any other player attributes, contributing to team profitability, leads to the conclusion that the long run quality of a team, as defined above, will depend on its location's quality.[11]

As suggested by Demmert (1973), however, a positive visitor's gate share implies that each team will consider the effects of variations in its stock of playing skills on the demand for tickets in markets other than its own. This could partially mitigate the effects of intermarket differences in revenue generating ability by incorporating these cross effects into the decision function of the individual club. The extent to which these cross effects are considered by clubs depends on the actual value of the visitor's share of the gate: the larger the visitor's gate share, the greater the

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[11] A simple derivation of the relationship between the quality of a team (Q_t) and its location (H_t) for the case in which there are multiple attributes underlying team quality is presented in Appendix I.

weight placed on the cross effects relative to the own-market effects of a change in the stock of playing skills.

For a single season, the attributes which underlie a team's quality are predetermined and the above short run model can be used to assess the immediate alternatives facing a team. However, it should be taken into account that the location's quality, and to a lesser extent (depending on the visitor's gate share) the locational quality of other franchises in the league, determine team quality in the long run.

Ideally, the determination of long run team quality requires data for many seasons where the number and location of teams were stable. The magnitude of this task was beyond the scope of the analysis. Instead, the relationship between team quality and location, as it existed in the 1983 season, will be examined. Using a single season requires the assumption be made that the departures from long run team quality are random so that the estimation of

$$(16) \qquad Q_t = \delta_0 + \delta_1 H_t$$

yields an estimate of expected long run team quality. This equation can provide some basis on which to assess the effect of location on team quality and ultimately the long run effect of location on franchise profitability.

CHAPTER III: REVIEW OF RELATED LITERATURE

In this chapter, a survey of the related literature is undertaken. There are two objectives: first, to provide an overview of the empirical research; and second, to identify the crucial variables influencing attendance at Major League Baseball games. The latter will provide an initial list of locational and game quality variables to consider in the estimation of the model introduced in the previous chapter.

Empirical studies of the demand for in-person attendance at baseball games can be classified into three groups according to the role of the demand estimates.[1] First, there are studies wherein attention has been restricted to testing the significance of one specific determinant of demand, such as team success in the Greenstein and Marcum (1981) study. Second, there are studies in which the estimation of attendance revenue is an input to determining the marginal revenue product players, such as the Scully (1974) and Medoff (1976) studies. The third group of studies, which form the bulk of empirical work, are those in which the estimation of demand is the central concern. The latter group will now be discussed.

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[1] This was done by Cairns, Jennett and Sloane (1986) in their survey of theory and evidence of the economics of professional team sports.

1. Studies in which the Estimation of Demand is the Central Concern

(i) Noll (1974)

Noll investigated the factors influencing the demand for baseball games, as measured by season attendance, using data for the 1970 and 1971 seasons. In his demand equation, explicit consideration is made for differences in population from city to city. Factors influencing attendance are assumed to interact with the population of the city where the game is played: that is, variations in demand-related factors are expected to produce greater variation in attendance in larger cities. Therefore, each explanatory variable, except for population, is the product of population and a demand-related factor.

Regressions were also run on linear and log-linear specifications without multiplying the independent variables by population but few regression coefficients were statistically significant and of the correct sign. Overall, the statistical quality of the results was highest from regressions based on the normalized data. The form adopted was preferred to estimating attendance per unit of population because the latter would have created serious errors in variables.

Since the model is an aggregation of individual demand functions for the population of the metropolitan area in which a team is located, and because the number of demand curves differs from city to city, the ordinary least squares estimates were checked for heteroskedasticity. All regressions were estimated after multiplying each observation of each variable by the inverse of the square root of the appropriate SMSA population.[2] The procedure, however, did not improve the statistical significance of the regression coefficients and increased the correlation coefficients to near unity.

Ordinary least squares estimation yielded the following. The coefficient on average ticket price, as measured by the prices of individual seat locations weighted by the fraction of seats available at that price, was negative and not significant at the 5% level. Although the results suggested that baseball is inelastic at current prices, Noll did not dismiss the possibility that prices are below the revenue-maximizing level. He gives two reasons: first, the estimated elasticity is biased downward because differences in the quality of seats between stadiums are not taken into account; and secondly, ticket price represents only a fraction of the total cost of attending a game. Noll suggested that if the price of admission represents only one-half of the cost of attending a game then the estimated coefficient approximates that which would yield an overall demand elasticity of unity.

The coefficient on per-capita income was significant and negative. Noll presented two explanations for the sign of the variable: rising incomes are associated both with a declining sensitivity to price differentials among entertainment options (i.e. baseball tickets are relatively cheap) and with relatively fewer

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[2] The technique, weighted least squares, is the normal procedure used for correcting for heteroskedasticity where the error variance varies directly with an independent variable.

persons in physically exerting occupations (assuming such persons find the sedate pace of baseball less attractive).

Entertainment competition was measured by two variables. The number of competing sports teams in the home team's SMSA was used as a measure of intersports competition; and population was used as an index of non-sports competition, assuming larger cities have more entertainment options. As expected, the coefficient on the number of competing sports teams was negative and significant. Also, as anticipated, the coefficient on population was positive and significant, and its magnitude indicates that it is the crucial factor in determining attendance.

The relationship between a city's racial composition and attendance at games was measured by the percentage of the population comprised by blacks. Although the coefficient was negative and significant, the measured effect was much larger than anticipated. The magnitude of the coefficient prompted Noll to dismiss two commonly used explanations for racial composition variables; namely, that blacks are less interested in baseball games and that "white racism" exists to the extent that for every black who attends a game, more than one white stays away. Instead, Noll attributed a large proportion of the measured effect to the correlation of black population with undesirable stadium location (i.e. cities with large black populations were generally larger, older cities whose stadia were located in unattractive areas).

A related variable, stadium age, was significant and positive suggesting that new or recently renovated ball parks were responsible for increased attendance.

Playing success was proxied by several measures, but because all were highly correlated only two were used.[3] Recent success in winning a pennant and number of games behind the division leader had the highest t-statistics and contributed most to the equation's coefficient of determination. Winning a pennant greatly affected attendance, particularly for the following season as the win would positively affect season ticket sales. The games-behind-leader variable was negative but not statistically significant.

A variable representing the number of star players was found to have a significant positive impact on attendance at the ball park. The author subjectively classified players as "stars" in an attempt to measure the drawing power certain players have that is beyond their contribution to the playing success of their teams.

Overall, the equation explained 69% of the variation in season attendance at Major League Baseball games.

(ii) Demmert (1973)

An empirical model of in-person attendance at Major League Baseball games was formulated by Demmert to test formally some of the implications of a comparative statics model of optimal team quality. In the model, each club is assumed to act as a Cournot-independent

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[3] Adding more measures did not add to the explanatory power of the equation and destroyed the estimates of the standard deviations of the regression coefficients because of multicollinearity.

maximizer, isolated from other league members by its geographical monopoly from direct price competition; however, each club determines its optimal stock of athletic talent based upon the quality of the other teams in the league. The demand for the product, as defined by the product of the expected number of tickets an average consumer will purchase and the population of the market, is assumed to be functionally dependent on ticket price and the quality parameters of the game. The latter consists of the uncertainty of outcome, entertainment value and the potential association with a winning team in the club's home market. The main comparative statics results are that clubs in more populous markets, and in markets where there are few recreational substitutes, will tend to be athletically superior to those clubs located in less attractive markets.

To test the implications of the model, the author postulates an underlying structure which enables the use of ordinary least squares methods to estimate the demand for tickets. The empirical model developed forms a block recursive system which is sufficient to allow for the estimation of the third block, namely the demand equation, using ordinary least squares techniques.[4]

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[4] The structure of the model is expressed by the following system of equations:

$$P = P(V, T, A_{-1}, M, Z, U_p)$$

$$V = V(P, T, A_{-1}, M, Z, U_v)$$

$$T = T(P, V, A_{-1}, M, Z, U_t)$$

$$X = X(T, U_x)$$

$$A = A(P, V, X, M, U_a)$$

Two forms of the demand function were estimated: first, a simple linear form with season home attendance as the dependent variable and second, a linear form with season home attendance per-capita as the dependent variable.[5] The latter form was used principally to allow for a more satisfactory point estimate of the price effect on demand by eliminating the problem of multicollinearity between that variable and population.

The sample consisted of 282 observations of 16 major league clubs during the period from 1951 to 1969. The price variable consisted of the weighted average of prices charged by each club annually. Although the author acknowledged that it is unlikely that seats are sold in the same proportion of seats available, he assumed that they do not introduce any systematic bias into the price series.

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where

- A = total home attendance for the season in the club's market
- P = price of admission to the club's home games
- V = the number of the club's games televised during the season
- T = the stock of talent employed by the club during the season
- X = the relative quality of the club over the season
- M = a vector of characteristics of the club's market
- Z = a vector of parameters affecting the club's pricing, employment and broadcasting decisions, but not directly entering the structural demand function (e.g. the marginal cost of supplying seats)
- U_k = the random disturbance term affecting the k^{th} endogenous relation of the model

The first three equations form the first sub-block, the relative team quality relation forms the second, and the demand equation, the third.

[5] Logarithmic transformations were also used but yielded results which were unsatisfactory.

The price series and the household disposable income series were also corrected for both intermarket and intertemporal price differences.

Indices were designed to measure the availability of direct substitutes, in the form of other professional baseball teams in the same market, and indirect substitutes, in the form of other professional sports teams operating in that market. Demmert considered both the existence and quality of these substitutes in calculating the indices: namely, the sum of respective winning percentages, in addition to the number of substitute teams.

To measure relative team quality, games-behind-leader was used as determined at five monthly intervals during the course of the season. Past and current performance were assumed to influence consumer evaluations of relative quality. As a result, attendance was assumed to depend on some expected, or "permanent", team quality as evaluated by potential ticket buyers.[6]

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[6] The adjustment process for the revision of the consumer's expectations of team quality is

$$dx_t^* = \delta(x_t - x_{t-1})$$

where $0 \leq \delta \leq 1$, $dx_t^* = x_t^* - x^*_{t-1}$

and δ = the adjustment elasticity. If attendance A_t in period t is a linear function of this measure of permanent quality and h_t is a linear combination of all other factors affecting A_t, then δ is identified and could be estimated from observations on the A_t's and the corresponding x_t's. Since, however, only a single observation per season on home attendance was available, the author opted to express A_t as a linear function of the weighted average of five period moving averages of team quality. For attendance in year t

$$A_t = H_t + kX_t$$

where $$H_t = \sum_m h_t^m$$

Club quality, measured as the average number of games separating a first place team from the second place team, was also used to evaluate the returns to winning by a close or large margin. By definition, this variable was zero for clubs which did not hold the division lead for at least at one of the monthly observation points in the season.

The effects of a pennant race on ticket demand, as measured by various "race indices", were also included as explanatory variables. Demmert used the number of teams in the pennant race rather than measures of variances in winning percentages or games-behind-leader,

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and $$X_t = \delta X_t^5 + \delta(1 - \delta)X_t^4 + \ldots + \delta(1 - \delta)^4 X_t^1 + \delta(1 - \delta)^5 X_{t-1}^5 + \ldots$$

where X_t^m is the five period moving average.

Since δ is not uniquely identified in the model it could not be estimated. Instead, the series given by the weighted average of five period moving averages of team quality were constructed using six different values of δ, ranging from $\delta = 1.0$ to $\delta = 0.5$. A number of different specifications of the demand function were estimated using each of the δ values and, in all cases, $\delta = 0.7$ yielded the minimum residual variance for the estimate and the highest t-statistic for the test of the null hypothesis. Consequently, the author assumed this value of δ in constructing the series for relative team quality for use in the demand estimates.

since the latter indices could exhibit bias due to variances in performances of teams not in the pennant race.[7]

Other independent variables included in the model were the number of home and away games televised by the club, the number of years the club was located in its market, and a set of binary variables corresponding to the existence of a new stadium, a league champion and a world champion. A time trend, to test for a long run secular decline in the popularity of baseball, was included as well.

Each of the two functional forms was estimated using all 282 observations and was estimated for each league separately, for a total of six demand estimates. Results were as follows. Estimation of the price effect in the per-capita form of the demand equation was significant and negative. The point estimate of price elasticity was 0.93 at the sample mean, indicating profit-maximizing behavior on the part of clubs. Income had no significant impact on attendance. This was true for both functional forms of the demand equation.

As predicted by the comparative static results of the model, the effects of intermarket differences in population and the availability of substitutes resulted in significant differences in attendance.

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[7] The i^{th} club was defined as a pennant contender in month m if $GBL_i \leq k_m$ where $k_m = 7.5$ for m = June, July, August and $k_m = 5.0$ for m = May, September. The pennant race index was taken to be the average of these five measures. Three alternative specifications of the race index were also used in the demand estimates. The first was a binary variable taking on the value one when a pennant race exists at all during the season. The second was the number of months in a given season during which a pennant race exists. The third was the number of different teams which occupied the league leadership position over the course of the season.

The coefficient on population, which was found only in the absolute attendance functional form, was significant at the 1% level, implying that an additional one million people in the club's market increases the demand for tickets by more than 40,000 per season. The existence of another Major League Baseball team in the same market, winning half its games, reduced demand by more than 230,000 for a metropolitan area with a population of 2.5 million. The index for indirect competition was significant and negative in the per-capita estimates. The existence of an average quality major league professional sports team would reduce the demand for baseball tickets by about 300,000 in a market area with a population of 2.5 million.

In all six demand specifications, the relative team quality variable had the expected sign and an estimated coefficient statistically significant at the 1% level. Within each of the two functional forms, the estimated coefficient was relatively uniform across data sets. Estimates from the absolute attendance form suggest season attendance will differ by 253,000 between a club 5 games behind the leader and one 15 games behind the leader. The "average lead" variable was also significant in both forms of the demand function. The estimated coefficient was positive, implying that the returns to winning by a large margin are greater than by a close margin (i.e. the demand for tickets to the games of a first place club seems to increase as its lead over the second place club is extended).

The existence of a pennant race did not have any significant effect on the individual club's demand. Regardless of the race index and the data set used, the estimated coefficient was not significantly different from zero and, in some cases, had the opposite sign to that expected. Based on the previous two results, winning was considered more important than competitive equality in attracting fans to the ball park.

Results pertaining to the other independent variables were as follows. Televising a club's games, whether played at home or away, had a negative impact on in-person season attendance. Each additional game televised reduced attendance by about 4,000. The nominal titles of "League" and "World" Champion were significant using the absolute attendance form, but only for certain data sets. As a result, Demmert suggested that being a "champion" serves as a form of advertising for the club and hence provides an incentive for winning. The time trend variable included in the per-capita attendance form yielded a negative coefficient. It, however, was not significant because the decline in the popularity of baseball could be explained in terms of economic variables. The number of years a club was located in its market had a considerable negative impact on attendance. This result could partially explain the increased franchise shifting by club owners.

Overall, the variation in the explanatory variables accounted for 62% and 57% of the variation in season attendance and per-capita season attendance, respectively.

Demmert also provided some evidence on the long run effects of locational variables on team quality. He focused on inter-market differences in population and the availability of substitute forms of entertainment. The model predicted the former to have a positive influence, and the latter a negative influence, on the optimal quality of the club. Team quality, as measured by the winning percentage of the club in a given year, was regressed on population, the indices for direct and indirect substitutes and a lagged value of the dependent variable. Estimated coefficients, except for the indirect substitutes index, had the expected sign and were statistically significant at the 5% level.

The author concludes that the results, subject to several statistical difficulties,[8] provide some evidence on the influence of market variables on team quality.

(iii) Siegfried and Eisenberg (1980)

Ordinary least squares multiple linear regression analysis was used by Siegfried and Eisenberg to estimate the demand for minor league baseball attendance. The model was estimated with 86 baseball season observations from 27 different minor league teams during the period from 1973 to 1977.

The estimated demand equation was log-linear except for five variables: a binary variable for the level of competition and four

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[8] Foremost is the least squares bias which arises from an incomplete specification of the model's structure. Since analogous relations may exist for other professional sports teams in the market, which would result in correlation between the substitute proxies and the disturbance term, the application of ordinary least squares would overestimate their coefficients. Secondly, there is the common problem of an upward bias on the lagged dependent variable. Third, a relatively low coefficient of determination (0.44) indicates many of the factors influencing winning percentage are omitted in the specification, which may exert a bias, direction unknown, on the estimated coefficients.

variables representing the advertising and promotional efforts of the teams.[9] The logarithmic specification was preferred to three alternatives because it allowed for interaction between the variables, its ease of interpretation, and because it accounted for a greater fraction of the variation in attendance.[10]

Their study differed from those previously discussed in two notable respects. First, the price variable is the actual average price paid to attend games; and secondly, information on the specific efforts of teams to shift the demand for baseball attendance through advertising and promotions is included.[11] Since price discrimination is an important part of the price structure of baseball clubs, the authors considered it crucial to use actual prices rather than the price of available seats. The authors questioned the findings from studies where price is proxied by the average price of available seats

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[9] These variables were entered linearly since they do not have strictly positive values.

[10] The alternate functional forms included a linear specification explaining total season attendance, a linear specification explaining per-capita season attendance, and a specification explaining total season attendance which multiplied each explanatory factor by population. The first functional form does not allow for the interaction effects among explanatory variables. The usual reasons for adopting a per-capita functional form, to avoid multicollinearity problems, was of little consequence in their estimation. The third functional form was characterized by severe problems of multicollinearity.

[11] The price variable was calculated by dividing total season gate receipts by total season paid attendance.

since they found little correlation between the proxy and average actual price paid.[12] Assuming that the marginal costs of additional attendance are near zero, and the existence of non-profit maximizing goals, the authors predicted that demand might be price inelastic. The value of the estimated coefficient, -0.25, was significant and statistically different from both zero and one. The authors, however, cautiously accepted that demand is inelastic for two reasons. First, because the average price used might not be representative, it could distort the measure of price elasticity, direction of bias unknown. Second, assuming that the cost of parking, programs and concessions are part of the price of attending a game, the elasticity would be greater than that estimated and perhaps near one.

To measure the effect on attendance of promoting minor league baseball games, the authors categorized promotions two ways. One, reduced price promotions included games where everyone, or a selected group, was admitted at less than normal price. Two, merchandise promotions were games where everyone, or a selected group, receive token merchandise. The effectiveness of each type of promotion was measured by evaluating the sensitivity of annual attendance to an additional promotion date. The coefficients on both types of promotions were positive and statistically significant, suggesting promotions are attendance generators.[13] Radio and newspaper

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[12] Regressing average price of tickets distributed on average price of tickets available yielded a coefficient of determination of only 0.164.

[13] For the average team with a season attendance of 68,607 an additional reduced price promotion could be expected to yield an

advertising, as measured by expenditures on each, were not significantly related to total season attendance. The authors suggested that, at least in the minor leagues, teams receive sufficient "free" advertising via sports reporting, and that additional paid advertising has a marginal impact.

The results on the standard demographic variables were as follows. No evidence was found to support the findings from other studies that baseball is an "inferior" good. Population and the percentage of the population comprised by blacks were both statistically significant. The coefficient on population was positive, yielding an elasticity of demand of 0.189. The negative effect of an increased black population on season attendance was much smaller; a 1% increase in the fraction of the population that is black precipitated a 0.1% decline in season attendance.

None of the playing success measures were significant, except home runs per game suggesting fans were more responsive to scoring than winning.

Overall, 80% of the variation in attendance at minor league baseball games was accounted for by the model.

(iv) Hill, Madura and Zuber (1982)

Hill et al investigated the factors which determine fan attendance at a particular baseball game in a given season. In terms of demand studies on baseball, their analysis was unique and of

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additional 975 fans per season. An additional merchandise promotion is predicted to generate an additional 1,568 fans per season.

particular relevance to this paper because their study focused on the short run. Data consisted of all the 2,103 games played during the 1977 Major League Baseball season.

The dependent variable, attendance at a particular game, is explained by: locational factors, expected quality factors, time factors, and special conditions pertaining to the game. Expected quality factors were further divided into variables representing the past and current season performance of the teams involved, and variables representing specific players who play in a game (i.e. pitchers' personal characteristics and their past and current pitching statistics).

Results reported were from the application of multiple regression analysis to a linear functional form. Although other models were run with as many as 150 independent variables (in which an coefficient of determination of 0.74 was attained), the one selected was chosen because of its simplicity. The authors indicated that none of the major results were lost in the larger models.

The population, and the number of professional baseball teams in, the home team's SMSA, and a binary variable representing whether the stadium was recently renovated or constructed were all statistically significant at the 1% level. Although the results indicated higher attendance for the more densely populated areas, the coefficient is small - an additional one million persons in the home team's SMSA translated into an additional 650 fans per game. The effect of additional professional baseball teams in the home team's SMSA adversely affected attendance; in areas with at least one substitute professional baseball team, attendance fell by 3,600 per game. Finally, in stadiums not recently constructed or renovated, attendance was approximately 6,000 lower per game.

The effects of past and current performance of the teams involved in the game suggest that the higher the expected quality of the game, the larger the attendance. However, the magnitude of the coefficients on the home team's past and current performance variables suggests that winning is at least as important as the uncertainty of game outcome. Past performance, measured by the recent success of winning a pennant, was significant at the 1% level for both the home and visiting teams.[14] Current performance, measured by games-behind-leader, was also significant at the 1% level for both teams.[15] The greater importance fans attach to winning is revealed by the coefficient on a binary variable indicating whether the home team is the division leader: leading one's division added 3,100 fans per game to the home team's attendance.

Only three of ten variables used to describe pitchers' personal characteristics and pitching statistics were statistically significant. A negative coefficient on a binary variable indicating whether the home team's starting pitcher is of minority status

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[14] A home team winning a pennant in the last 4 years added over 5,000 fans per game while a visiting team which has won a pennant during the last 4 years attracted an additional 1,200 fans per game.

[15] Each additional game the home team is behind the division leader results in 350 fewer fans per game. Each additional game the visiting team is behind the division leader results in 200 fewer fans per game.

suggested that racial discrimination by fans does exist.[16] Past pitching performance was significant for the visiting pitcher, only as measured by career won-loss record. In contrast, fans appeared to be more attracted to a game where the home team's starting pitcher is having a good season as measured by his current won-loss record. Overall, results revealed that fans are generally unresponsive to the characteristics of the starting pitchers.

Time factors were measured using three binary variables, indicating whether the game was played in the afternoon, on the weekend, or during the last nine weeks of the season. Although the sign on the afternoon binary variable was negative, indicating that fans prefer night games, it was not statistically significant. The coefficients on the other two time factors were positive and statistically significant. Games played on the weekend attracted an additional 4,500 fans per game; while games played during the last nine weeks of the season drew 7,000 additional fans per game. The authors suggested that lower attendance at games played at the beginning of the season could be explained by: inclement weather, no well-developed pennant races, and schools in session.

Special conditions pertaining to the game were also measured using binary variables. While televising the game in the home team's city negatively affected attendance at the ball park, the coefficient

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[16] Attendance is estimated to be roughly 2,000 lower for games where the home team's starting pitcher is black or Latin American. The presence of a minority starting pitcher on the visiting team lowered attendance by approximately 1,000 fans per game, but the result is not statistically significant.

was not statistically significant. The coefficient on the binary variable indicating whether the game was part of a doubleheader was positive and significant at the 1% level. Games that were promoted or were accompanied by a special event garnered much higher attendance, the magnitude of the coefficient suggesting by almost 11,000 fans per game.

Overall, variations in the explanatory variables explained only one-half of the variation in game-to-game attendance.

(v) Cairns, Jennett and Sloane (1986)

Cairns et al reviewed the theory and evidence regarding the economics of professional team sports. While they do not question the importance of population as a determinant of attendance, the authors are concerned with the way in which it enters the demand function. They argued that unless the demand formulation allows for interaction among the independent variables (particularly between population and other variables), the equation is potentially misspecified.

Although price elasticity results suggest demand is price inelastic, the authors were more inclined to support the likelihood that the true relationship has yet to be identified because of data problems. Inadequacies with available data and the possible bias they exert on the estimates as put forth by Demmert and Noll were reiterated. Results regarding the income variable are inconclusive. The authors agreed with Noll that because there are numerous ways in which income might explain attendance, the use of results to measure the effect of generally rising income on demand could be misleading.

The authors were particularly critical of the inadequate attention paid to determining the appropriate empirical specifications of the underlying theoretical notion of "uncertainty of outcome". The issue is further complicated by the four distinct usages of the term as identified in the literature. In their opinion, uncertainty of match or game outcome has been inadequately tested. They argued that existing measures (usually the difference in league rankings) ignore the benefits of home advantage, are insensitive, and neglect consumer expectations. The authors suggested introducing an adaptative expectations model, or some other mechanism, to account for recent changes in the home team's position in the league. Uncertainty of season outcome has been associated with individuals valuing the eventual winner of the championship or, alternatively, the prospects of their team winning the championship. The fourth use of the term has been used to characterize the absence of long run domination by one club. This latter use of the term has not been adequately tested in the literature and will not be considered here because of the nature of the data.

The authors argued that higher expected quality attracts consumers not only because of its relationship to probability of success, but also because consumers prefer watching better teams. The authors, therefore, suggested that variables representing the visiting team's relative quality also be included in the demand function (where the game is the unit of observation), as it could positively affect attendance, although lowering the probability of a home win. They also suggested trying more dynamic variables, which might exhibit some movement, particularly as the season advances, ultimately allowing for greater sensitivity.

(vi) Scully (1989)

To identify the determinants of fan attendance the author estimated the demand for baseball tickets in the 1984 season. The dependent variable was season attendance and the independent variables included were the 1984 ticket price, the clubs' winning percentage in the 1983 and 1984 seasons, and the 1984 population of the franchise city's Primary Metropolitan Statistical Area (PMSA). Scully found that other factors which were significant in Noll's study were less important and, given the paucity of data (26 observations) and the practical demands of statistical testing, the author decided not to include these other factors.[17]

Ticket price was calculated as total ticket receipts divided by total paid attendance from records supplied by the Office of the Commissioner of Baseball. Current team quality was proxied by 1984 win percentage. The previous season's win percentage was included for two reasons; first, attendance at the beginning the season might be affected more by the club's previous finish than its current standing;

[17] Coefficients on per-capita income and the number of other professional sports franchises had the expected signs but were not statistically significant. Coefficients on the percentage of the population comprised by blacks and previous championship status variables were statistically insignificant and had the wrong sign. Although the author believes star players affect attendance, he opted not to include a measure since finding one which is independent of performance is difficult.

and second, season ticket sales are greatly affected by the previous season's standing.

The demand model was estimated in three functional forms: linear in all variables, all variables transformed into logarithms, and independent variables scaled by population size as in the Noll study. All the independent variables were of the correct sign in each of the functional forms. In general, there was no evidence that owners set ticket price any different from that which maximizes club revenues. Both measures of team quality revealed that the effects of winning on attendance are quite large. The coefficient on 1983 win percentage was smaller but was considered to be consistent with the high fraction of season ticket sales out of total attendance. Overall, the explanatory variables were associated with more than one-half of the variation in attendance in all three functional forms. The linear form of the model explained 68% of the variation in attendance which is comparable to Noll's results with a much larger number of independent variables.

Of particular interest are the results from the log-linear specification of the model. First, although the coefficients on ticket price and population had the correct sign, neither was statistically significant at the 5% level. Second, the coefficient on population (0.22) and the coefficient of determination (0.51), compare with the results that follow in this study.

2. Studies in which the Estimation of Demand is Primarily an Input rather than an Output

The following two studies are included in the survey because revenue functions are estimated and, as least as far as gate revenue is concerned, the explanatory variables are relevant.

(i) Scully (1974)

The purpose of the study was to measure the economic loss to players due to the restrictions of the player reserve clause. The model employed to determine marginal revenue product and salary determination assumes one of the features of the baseball labour market is that gross baseball revenues are related to individual performance primarily through their effect on team standing. As a result, player marginal revenue products are estimated in a two-equation model. The first equation is a team production function which relates team output or standing, measured by win percentage, to a number of team inputs or productivity measures.[18] The second equation is the team-revenue function which relates team revenues to team output (as measured by win percentage) and the principal market characteristics of the area in which the team plays. It was assumed

[18] Inputs consisted of team lifetime slugging average to measure hitting performance, team strikeout-to-walk ratio to measure pitching performance, and dummy variables to designate teams which play in the National League (where the absolute quality of play is generally regarded as being higher) and, teams in contention for the pennant at the end of the season. The production function was estimated with team data for 1968 and 1969. All explanatory variables were significant and together explained 88% of the variation in win percentage.

that fans attend games principally to see the home team win, not to witness the hitting and pitching.[19]

Our interest lies with the estimation of the team-revenue function. The dependent variable in the team-revenue function is defined as home attendance multiplied by average ticket price, plus broadcasting revenue. Locational explanatory variables included population, percentage of team players who are black, a binary variable indicating the existence of an older stadium in a poor neighborhood, a binary variable for games played in the National League, and a variable to adjust for interteam differences in the intensity of fan interest.[20] The function was estimated as a linear

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[19] The author indicates that empirical evidence shows that the zero-order correlation coefficient between team revenue and team percent wins is much higher than the correlation coefficients between team revenue and team hitting and pitching measures.

[20] The latter variable was derived essentially from estimating the relationship between team attendance, team winning percentage, team winning percentage lagged one year, and several dummy variables representing the effects of new stadiums, franchise shifts, and the entry of new teams into the same geographical area. Data covered the period 1957 to 1971. The coefficient on winning percentage was almost always highly significant, ranging from 603 to 5,819, although winning percentage lagged one year was rarely significant.

equation using team data from the 1968 and 1969 seasons.[21] All estimated coefficients were significant at the 5% level and had the expected signs; positive for population, the National League dummy and intensity of fan interest, and negative for the percentage of players on the team who are black and the dummy for older stadiums.

Overall, 75% of the variation in team revenues was explained by the variation in the independent variables.

(ii) Medoff (1976)

Medoff's study refined Scully's analytical model of marginal revenue product by changing some of the explanatory variables in the production function and team-revenue equations, by using more recent data (1972-74), and by taking into account the presence of a simultaneous relationship between the equations previously ignored.[22]

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[21] The team revenue function was also estimated logarithmically, but yielded a coefficient between the dependent variable and win percentage of 1.02, which was not significantly different from unity. This suggested that there is no nonlinearity present in the relationships. The author also offers an intuitive justification for the existence of linear revenue functions in baseball based on the age and stability of the industry. During baseball's early period increasing returns might have been present but currently there is enough uncertainty of outcome that high win percentages do not appear to be associated with declining attendance.

[22] In the production function number of runs scored and earned-run-average were employed to measure hitting and pitching performance respectively. The former was regarded as a more complete measure of offensive productivity and the latter a better measure of the effectiveness of a pitcher in retiring a batter. A dummy variable to designate teams in the National League was included as in the Scully production function. All explanatory variables were highly significant and of the expected sign. Together they explained 81% of the variation in win percentage, similar to the results obtained in the Scully study.

Like the Scully team-revenue function, that estimated by Medoff also included population, percentage of non-white players on the team, dummies for the National League and older stadiums, and win percentage. The intensity-of-fan-interest variable created by Scully was omitted and the number of other professional sports teams that played in the local market was added as an explanatory variable. Team revenue, the dependent variable, consisted of all revenues from attendance, television and radio.

To estimate the team-revenue function Medoff argued against using ordinary least squares methods because of possible correlation between win percentage and the disturbance term. His argument focused on the plausibility that omitted variables from the production function, such as managerial quality and fan enthusiasm, could also influence team revenue, resulting in serial correlation. The author suggested that Scully's use of ordinary least squares will yield an estimated coefficient on win percentage which is biased upward. To avoid this difficulty, the team-revenue function was estimated using two-stage least squares.[23] All explanatory variables yielded coefficients of the expected sign and, except for the percentage of non-whites on the team variable, were significant at the 10% level. Overall, the explanatory variables accounted for 58% of the variation in team revenues.

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[23] The slope on the win percentage variable is $3,500 below the result from estimation using ordinary least squares. All other variables have coefficients consistent with those generated by the application of ordinary least squares.

3. Studies in which Attention is Restricted to One Specific Determinant of Demand

(i) Greenstein and Marcum (1981)

Greenstein and Marcum examined the relationship of team performance factors to attendance of games played in the National League from 1946 to 1975. A dataset of 282 observations employing team season summary statistics as the unit of analysis was used. They concluded that team performance variables accounted for 25% of the variation in season attendance and that the effects of specific performance measures (represented by linear composites of pitching, offensive and defensive indicators) on attendance were mediated through winning percentage.

Performance variables were grouped into three categories: offense (doubles, triples, home runs, team batting average, team slugging average, and stolen bases), defense (errors, team fielding average, and double plays) and pitching (complete games, bases on balls, strikeouts, shutouts, saves and team earned-run-average). Other variables included team won-loss percentages, total paid home attendance and the proportion of seats filled by paying ticket holders.

Initially, all fifteen performance measures were to predict the proportion of seats occupied by paying ticket holders. Estimation was complicated by serious multicollinearity problems: the zero-order correlation matrix showed that all performance measures were highly intercorrelated and that all coefficients, except on won-loss percentage, were not statistically different from zero. To resolve the problems, linear composite measures were constructed for each of the three performance categories.[24] Two types of models were used to show the effects of the composite measures and won-loss percentage on the proportion of seats occupied by paying ticket holders. The first model allowed for the direct effects of all four variables on the dependent variable. Estimation, however, yielded coefficients on the composite performance measures which were not statistically significant, suggesting winning is the crucial factor in explaining attendance. The second model assumed that the performance factors indirectly affect attendance through their effect on won-loss percentage. This latter model corresponds to the two-equation models presented by Scully and Medoff. Regression results indicated that the elimination of the direct effects of the composite performance measures did not substantially lower the explanatory power of the model.

(ii) Whitney (1988)

Whitney sets up an analytical framework, the focus of which was championship prospects as a possible motivation for fan interest in team sports. Conceptually, a distinction between victories and championships as alternative measures of team success was made. The model was applied to professional baseball for the period from 1970 to 1984, excluding the strike year of 1981. In the regression equations, an explicit attempt is made to allow for the separate effects of game-winning and flag-winning prospects on demand. It is assumed that

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[24] Construction consisted of using unweighted sums of standardized scores for each performance measure.

during the course of a season, fans form adaptive expectations concerning their team's probabilities of winning games and season championships. Proxy variables for game-winning and flag-winning expectations were developed using similar procedures.[25]

The regression equations were grouped into two systems of ticket demand equations, one for each league. Each system contained 12 demand equations, each equation corresponding to a team in existence since the start of divisional play in 1969.[26] Team home attendance throughout a full season constituted the dependent variable in all ticket demand equations. In addition to the two proxies described above, two variables relating directly to team performance were included. The first was a binary variable equal to one for a team which won its division flag the previous season and the second, a baseball competition variable for markets containing more than one baseball team. Other market variables included the real price of tickets, real per-capita income and population. Individual team intercepts allowed for cross-market variations in climate, stadium quality and underlying fan attachment to the local team.

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[25] Using monthly data for all 24 teams from the fifteen years in the sample, an estimate of the empirical relationships between current and past performances were made. The estimated relationships were used to forecast each individual team's performance at monthly intervals which were combined to obtain proxies for the team's average expected performance over the course of a full season.

[26] Seattle and Toronto, which were granted expansion franchises in the American League in 1977, are omitted.

Dummy variables for franchise relocation and new stadiums were also used to allow for team-specific shifts in demand.

Zellner estimation was applied to two alternative specifications of the model. The first specification followed that previously employed by Noll (1974), namely linear with all independent variables, except population and the various team specific intercepts, multiplied by market population. The second was a log-linear specification, with logs employed for team attendance, price, income, and population. Estimation of the log-linear specification offered a better balance of explanatory power across market sizes.

Generally, the regression results provided significant support for the expected performance variables, indicating that a mix of game-winning and flag-winning prospects motivates fan interest. Dummy variables introduced to differentiate pennant winners from division champions consistently failed to exhibit a statistically significant association with attendance. The estimated coefficient on the baseball competition variable was, as expected, negative and significant. Similarly, the coefficients on the franchise relocation and new stadium dummies were positive and statistically significant. As for the other market variables, considerable variation characterized the sizes and significance levels of the estimates. While coefficients on price and population were negative and positive respectively, the sign on income varied systematically across leagues.[27]

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[27] In both specifications of the model, the coefficient on income was negative for the National League and positive for the American League.

4. Summary

It is evident that a variety of variables and approaches have been used to estimate the demand for attendance at baseball games. In terms of approach, differences primarily arise from the data used (e.g. season summary statistics versus game-by-game data) and the role of the demand estimates (e.g. as an input to the determination of player salaries or where the demand estimates are the central concern). In terms of estimation, multiple regression methods were employed with the overwhelming problem being correlation between explanatory variables and, in the two-equation marginal revenue product models, the omission of relevant explanatory variables.

In terms of variables, there appeared to be reasonable consensus that price is significant and that demand might be relatively inelastic, that substitute forms of entertainment and the percent of the population that is black negatively affect attendance, and that population size, team success (measured in a variety of ways), new stadia, special events and certain residual preference factors (e.g. games played at night and/or on the weekend) contribute significantly to attendance. Evidence regarding the importance of other variables, particularly income and uncertainty of outcome, is mixed or non-existent. Even among the significant variables, the literature provided no clear indication for ranking them in terms of importance, although population and team success appeared to be the crucial factors in several of the studies.

CHAPTER IV: EMPIRICAL RESULTS

1. The Final Model

The empirical form of equations (12) and (13), which fully describe the model presented in Chapter II, are given below.[1] The locational and game attributes included, among the many factors identified in the previous chapter which might influence demand, are those which explain the greatest proportion in the variation in game-by-game attendance for the 2,109 Major League Baseball games played in 1983.

$$(16) \qquad LA_t = (\log\tfrac{1}{2} + \alpha_0 + \gamma_0) + \alpha_1 LPOP + \alpha_2 LINC + \alpha_3 LTEMP + \gamma_1 LHLRK + \gamma_2 ADIFW + \gamma_3 HOOPR + \gamma_4 HRG + \gamma_5 WKND + \gamma_6 DH + \gamma_7 LSTAR$$

$$(17) \qquad LP_t = (\log\tfrac{1}{2} + \alpha_0 - \beta_0) + (\alpha_1 - \beta_1) LPOP + (\alpha_2 - \beta_2) LINC + (\alpha_3 - \beta_3) LTEMP$$

The variable definitions are as follows:[2] for the locational attributes, POP is the population of a city's Primary Metropolitan

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[1] The L prefix denotes a natural logarithm.

[2] Detailed variable descriptions and data sources are given in Appendices II and III.

Statistical Area (PMSA)[3]; INC is per-capita personal income of the PMSA; and, TEMP is the average daily mean temperature in the city for the six months from April to September. Attempts to add other location variables did not increase the explanatory power of the model and, in many instances, because of multicollinearity, destroyed the estimates of the standard deviations of the regression coefficients.[4] The three locational attributes retained had the highest t statistics and contributed the most to the model's coefficient of determination.

For game attributes, HLRK represents the league rank of the home team prior to the game; ADIFW is the absolute value of the difference in current winning percentage between the home and visiting teams prior to the game; HOOPR is a dummy variable identifying games played by the home team after being mathematically eliminated from the divisional pennant race; HRG is the combined current home runs per game of the home and visiting teams; WKND is a dummy variable for games played on the weekend; DH is a dummy variable for games played

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[3] According to Noll (1988), "the vast majority of fans in attendance at a game are people who live within twenty miles of the sports facility. In a smaller metropolitan area, this translates to a market for tickets that is the metropolitan area in which the team is located, plus, perhaps, a few adjacent communities. In the largest metropolitan areas, the actual market may be a little smaller than the metropolitan area." In this study the market used is the PMSA rather than the Consolidated Metropolitan Statistical Area (CMSA) primarily because the former had greater explanatory power in the model. Coincidentally, the PMSA comes closer to estimating the relevant attendance markets in the larger cities as described by Noll.

[4] In some cases, estimated coefficients were not statistically significant and/or not the correct sign. For a description of the locational variables considered, and the simple correlation matrix of all locational factors, price, and attendance see Appendix II.

as part of a doubleheader; and STAR is a dummy variable denoting the number of "superstars" participating in a given game. Several other game attributes were used to measure the effects of: team success, closeness of competition, team performance (offense and pitching), player characteristics, time factors and special conditions pertaining to the game.[5] The aforementioned game attributes, however, were not included for at least one of the following reasons. Firstly, the measured effect was statistically insignificant. Secondly, where several measures of a particular game attribute were used, they tended to be highly collinear and; including more than one or two variables did not contribute to the explanatory power of the model, and increased the standard errors of the coefficients. Thirdly, as was revealed in the Greenstein and Marcum (1981) study, the effects of many of the team performance factors on attendance were mediated by team success (i.e. the correlation between team performance variables and team success variables was greater than the correlation between one or both and attendance).

As noted previously, the signs of the coefficients in the attendance equation can be interpreted directly in terms of their effect on demand. For the locational attributes, the existing literature suggests unequivocally that $\alpha_1 > 0$. Current evidence on the sign of INC is inconclusive; it is not clear whether the sign is

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[5] For a description of all game attribute variables considered and the simple correlation matrices of game attribute variables and attendance see Appendix III.

positive or negative, nor whether it is significant.[6] The expected sign of α_3 depends on whether higher attendances are associated with cities with warmer climates. The literature suggests that two reasons could explain the sign on TEMP: first, fans might remain at home if the weather is bad; or secondly, fans in cities with generally good weather attend ball games less frequently because of the increased opportunity for more active outdoor recreational pursuits. Regardless of the sign, this variable, like any other measure of climate, is strongly correlated with the region of the country, so the measured effect will likely reflect factors other than weather conditions.

The anticipated signs for the γ coefficients are based on the assumption that people prefer to attend games of a winning home team ($\gamma_1 < 0$), teams that are closely matched ($\gamma_2 < 0$), games where the home team is involved in a pennant race ($\gamma_3 < 0$), games that have lots of home runs i.e. "game excitement" ($\gamma_4 > 0$), games played on weekends ($\gamma_5 > 0$), games that are part of a doubleheader ($\gamma_6 > 0$), and games that involve superstars ($\gamma_7 > 0$).

The signs of the coefficients on the variables in the price equation reflect the effects of increases in each variable on market power. Since an increase in population should cause a decline in the

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[6] In addition, as Noll (1974) has stressed, "the ways in which income might explain attendances are numerous, so that the results cannot properly be used to measure the effect of generally rising income on the demand for sports. Inter-city differences in per-capita income reflect, among other things, differences in industrial structure, region, and educational attainment and age composition of the population." It is for representing the latter effects that per-capita income is included in this study.

price elasticity of demand, the sign of the coefficient on POP is expected to be positive. As in the attendance equation, the expected signs on INC and TEMP are unclear.

2. Locational Attributes and Attendance

The results of estimating (16) are shown in (18) below. The figures in parenthesis are asymptotic t statistics.[7]

(18)
$$LA_t = \underset{(9.680)}{13.059} + \underset{(12.037)}{0.2236LPOP} - \underset{(6.288)}{0.8016LINC} + \underset{(1.239)}{0.1733TEMP}$$
$$- \underset{(17.177)}{0.2585LHLRK} - \underset{(10.357)}{0.8098ADIFW} - \underset{(9.751)}{0.3770HOOPR}$$
$$+ \underset{(8.188)}{0.2869HRG} + \underset{(16.405)}{0.3257WKND} + \underset{(7.372)}{0.2522DH} + \underset{(16.198)}{0.3756LSTAR}$$
$$R^2 = 0.4780 \qquad n = 2{,}096$$

As a group, the locational attributes are strong. The estimated coefficient on POP is positive and overwhelmingly statistically significant. The interpretation of the negative coefficient on INC is that, ceteris paribus, cities with relatively lower per-capita incomes do better at the gate. Similarly, the coefficient on TEMP implies that, ceteris paribus, higher attendance is associated with those cities located in a region characterized by, among other things, a warmer climate.

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[7] Although the t statistics in (18) are asymptotic values, the sample is sufficiently large (n = 2,096) to avoid the inference problems usually associated with small sample estimators in systems of equations.

One of the most important determinants of attendance is relative team quality as evidenced by the significance of the coefficient on the home team's rank (HLRK) in the league. The coefficient on ADIFW is also strong indicating that while fans like to see the home team win, they prefer games in which the teams are closely matched. The sign and significance of the coefficient on HOOPR indicates that, in addition to the home team's game-winning prospects, fans are motivated by the pennant-clinching prospects of the team. The sign on HRG confirms that, regardless of team success, fans are more responsive to games of greater physical activity (i.e. hits, home runs, scoring). Scheduling is also an important determinant of demand, as fans prefer games played on the weekend and/or as part of a doubleheader. Finally, it is apparent that stars add substantially to the drawing power of baseball.

3. Locational Attributes and Market Power

The results for the price equation (17) are shown below (19). The asymptotic t statistics in parenthesis.

$$LP_t = \underset{(8.913)}{-2.637} + \underset{(12.606)}{0.0505}LPOP + \underset{(1.457)}{0.0392}LINC + \underset{(26.303)}{0.7846}LTEMP \qquad (19)$$

$$R^2 = 0.3102 \qquad n = 26$$

The signs of the coefficients in (19) are all positive, suggesting that, in choosing a location to exercise market power, a large city in a region characterized by a relatively warm climate with a relatively high per-capita income is optimal.

4. Locational Quality and Team Quality

The estimates of the structural parameters obtained from equations (18) and (19) allow one to estimate locational quality (H_τ) for existing franchises and a sample of non-franchise cities, and team quality (Q_t) for existing franchises.[8] These results are reported in columns (2) and (5) of Table 1.[9] As expected, the locational rankings of existing teams strongly reflect the relative importance of population (column (3)). The influences, however, of TEMP and INC are also evident in the rankings of existing teams. The rankings of Atlanta, St. Louis, and Texas reflect their favorable climates, while the rankings of Pittsburgh, Cincinnati, and Montreal reflect their relatively low per-capita incomes. The importance of the latter two locational attributes becomes particularly evident when non-franchise cities are included (column (4)).

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[8] The sample of non-franchise cities consists of the 12 cities which were seeking franchises and made presentations to baseball's long-range planning committee, chaired by commissioner Peter Ueberroth, in November 1985. The cities were Vancouver, Washington, Denver, Tampa-St. Petersburg, Miami, Nashville, Phoenix, New Orleans, Indianapolis, Buffalo, East Rutherford, and Columbus, Ohio.

[9] As mentioned earlier, the one degree of freedom in choosing α_0, β_0, γ_0 from equations (12) and (13) acts to scale both H_t and Q_t simultaneously. In the results that follow, a particular scaling was chosen that yielded estimates for locational and team quality which are of the same order of magnitude.

Table 1

Locational Quality and Short Run Team Quality

Team/Location	Locational Quality H_T (1)	Rank: Existing Cities (2)	Rank: All Cities (3)	Short Run Team Quality: Q_t (4)	Short Run Team Quality: Rank (5)
Atlanta	1992	9	12	7334	4
Chicago (NL)	2194	5,6	5,6	3717	24
Cincinnati	1714	16	21	4291	20
Houston	2193	7	7	3949	21
Los Angeles	2430	3	3	7565	2
Montreal	1935	10	13	5530	11
New York (NL)	2475	1,2	1,2	3564	25
Philadelphia	2254	4	4	5795	9
Pittsburgh	1812	14	18	4574	17
San Diego	1803	15	19	4957	14
San Francisco	1140	26	38	4537	18
St. Louis	1928	11	14	5059	13
Baltimore	1871	13	17	9676	1
Boston	1687	17	22	6477	5
California	1505	22	30	7487	3
Chicago (AL)	2194	5,6	5,6	4843	16
Cleveland	1602	20	28	3807	22
Detroit	2065	8	11	5546	10
Kansas City	1673	18	24	5408	12
Milwaukee	1431	23	33	6364	7
Minnesota	1601	21	29	3793	23
New York (AL)	2475	1,2	1,2	6388	6
Oakland	1379	24	35	4933	15
Seattle	1375	25	36	3500	26
Texas	1906	12	16	4439	19
Toronto	1647	19	25	6007	8
Buffalo	1436		31		
Columbus	1643		26		
Denver	1398		34		
East Rutherford	1313		37		
Indianapolis	1607		27		
Miami	2087		10		
Nashville	1674		23		
New Orleans	1920		15		
Phoenix	2149		8		
Tampa-St. Peters.	2142		9		
Vancouver	1432		32		
Washington	1771		20		

Clearly, the rankings of Phoenix, Tampa-St. Petersburg and Miami reflect the favorable values for the TEMP and INC variables in these cities.[10]

In the short run, it is possible for team quality to offset locational quality. A good team might offset the effects of a poor location on attendance, while a poor team could fail to exploit the potential of a good location. The net effect on attendance will depend on the degree to which H_t and Q_t are related. As shown in Table 1 there appears to be limited correspondence between locational and team quality.[11] In particular, team quality rankings in Baltimore, Boston, Toronto, California and Milwaukee exceed their locational rankings; while, the converse is true for Houston, Texas, both clubs in Chicago, and the Mets in New York. The estimation of (14), which yields the following results (t statistics in parenthesis)

$$Q_t = \underset{(2.8846)}{4635.9} + \underset{(0.4633)}{0.3938}H_t$$

$$R^2 = -0.0324 \qquad F = 0.215$$

suggests that team quality is directly related to locational quality,

[10] Any interpretation of the locational quality of these three cities must be made with caution since only they had values for TEMP which did not lie within the range of values for existing teams from which the structural parameters of the model were estimated.

[11] The rank correlation coefficient is only 0.12 which is not sufficient to reject the null hypothesis of independence between H_t and Q_t.

but that the coefficient on locational quality is not statistically significant. While the results do not provide support for the Quirk-El Hodiri hypothesis that team quality is dependent on locational quality, the hypothesis should not dismissed since it is possible that team quality measured in the 1983 season could be an aberration from long run team quality.[12] Nevertheless, the above results preclude any further analysis of the long run effects of location on franchise profitability.

5. Location and Attendance Revenue

The estimates of locational quality (H_r) and team quality (Q_t) in Table 1 are used to simulate short run attendance revenue that would be generated by either locating an existing team to an alternate site (using equation (9)) or, via league expansion, by placing a team of average quality in an alternate site (using equation (10)).

Table 2 presents three of the many possible short run simulations that could be conceived. The first simulation presents the results for current teams in their existing locations (column (2)). The other two simulations are the result of expanding, not

[12] In his analysis of evidence of changes in the relative quality of play in baseball, Scully (1989) notes that "there is considerable instability in baseball data from year to year." He also examines the relationship between city size and win percentage for each league from 1961 to 1987. The results yield rank correlation coefficients that are positive but not statistically significant. In addition, he finds that relative team strengths have shown a tendency to narrow over time and that this is directly related to the trend in the narrowing of market size (i.e. diffusion of the population).

concurrently, each of the two existing major leagues by two teams.[13] The simulated short run revenues, under the expansion scenarios presented, assume that each expansion city has a club of average team quality. The results for expanding the National League and American League are given in columns (3) and (4) respectively. In all three simulations, the home team's share of the gate is that which is currently used: approximately 90% in the National League and 80% in the American League.

For the purpose of the simulations, the expansion franchises are assumed to have average team quality because it allows for a reasonably accurate estimation of the gate receipts from games played away from home accruing to these new franchises. Historically, expansion franchises in Major League Baseball have begun with poorer quality teams. It would, therefore, have been preferable to choose a lower quality team, not unlike those which existed in Seattle, Minnesota or Cleveland in 1983, to simulate revenues for expansion franchises.[14]

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[13] Although several expansion plans were discussed in the 1980s one of the two scenarios presented appear most likely. A clause in the basic agreement negotiated by the league and players in the summer of 1985 allowed for the addition of two National League teams by 1989. Scully (1989) suggests that if expansion comes at all it will occur in stages. For the first stage, the most obvious and compelling suggestion is to expand the American League to 16 clubs, distributed in four four-team divisions.

[14] Since 1961, expansion teams have averaged a 0.403 winning percentage during their first five years of play. In addition, since existing franchises can be expected to undergo variations in quality over time, the worst case can serve to indicate whether they might encounter short run financial difficulties.

Table 2

Estimates of Short Run Attendance Revenue

	Short Run Attendance Revenue ($000)		
	Existing Quality	Average Quality	
		AL Expansion	NL Expansion
Team/Location	(1)	(2)	(3)
Atlanta	14244		
Chicago (NL)	8255		
Cincinnati	7721		
Houston	8645		
Los Angeles	17583		
Montreal	10692		
New York (NL)	8810		
Philadelphia	12852		
Pittsburgh	8402		
San Diego	9142		
San Francisco	5737		
St. Louis	9843		
Baltimore	16875		
Boston	11268		
California	11698		
Chicago (AL)	10216		
Cleveland	6412		
Detroit	10918		
Kansas City	9373		
Milwaukee	9397		
Minnesota	6606		
New York (AL)	14834		
Oakland	7466		
Seattle	5489		
Texas	8327		
Toronto	9673		
Buffalo		8192	8006
Columbus		9089	9014
Denver		8031	7824
East Rutherford		7663	7410
Indianapolis		8935	8842
Miami		11011	11178
Nashville		9222	9165
New Orleans		10287	10362
Phoenix		11279	11479
Tampa-St. Petersburg		11249	11445
Vancouver		8175	7987
Washington		9643	9638

The Kansas City club, which ranks 12th in terms of team quality among the existing teams, most closely resembles a team of average quality. Consequently, teams of Kansas City quality will be assumed for simulating revenues of expansion franchises using equation (10).

The following observations can be made from the attendance revenues of Table 2. First, short run attendance revenues of existing teams generally reflect their locational rankings. Exceptions include the Cubs in Chicago and Mets in New York where revenues are significantly lower than the revenues accruing to the American League clubs in those cities. The revenues of these two clubs reflect their below-average team quality which ranks 24th and 25th respectively. Conversely, gate receipts accruing to clubs in California, Boston, and Baltimore can, in large part, be attributed to their above-average team quality. Indeed, these three clubs ranked first, second and third respectively in terms of total gate receipts from games in which they were the visiting club, indicating their drawing power regardless of where the game is played.[15] In total, simulated attendance revenue for Major League Baseball in 1983 was $260.5 million, or $10.02 million per club. Although the results are comparable, they slightly

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[15] Total season attendance revenues for games played at home, games played away from home, and that ultimately received, by each existing Major League Baseball team is given in Appendix IV.

underestimate the actual gate receipts of $269.2 million for all Major League Baseball, or $10.35 million per club.[16]

Second, the short run attendance revenues for the expansion franchises obviously reflect their locational rankings. In terms of expansion of American League expansion (column (2)), franchises in Phoenix, Tampa-St. Petersburg, Miami, New Orleans and Washington would generate higher attendance revenues than the Kansas City club in its existing location. Except for Washington, clubs supported in these cities would generate even higher gate revenues in the National League where they would benefit from the larger home share of the gate. The remaining eight non-franchise cities would garner larger gate revenues by supporting a team in the American League, however, their revenues would be lower than those accruing to the Kansas City club. Except for Washington, the locational quality of these eight cities is well below the existing averages of both leagues but is, to a greater extent, below the average of the National League clubs. Therefore, these

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[16] Data on actual attendance revenues was provided to the author by Roger G. Noll. The simulated attendance revenue underestimated actual attendance revenue for 14 of the 26 teams. The difference between simulated and actual attendance revenues was less than $1 million for 14 of the 26 teams. Results were least accurate for St. Louis and Milwaukee, where the simulated gate was roughly $4 million less than actual figures, and in Baltimore, where the simulated gate was roughly $6 million higher than the actual figure. The latter result could be attributed to an overestimation of the Orioles "team quality". Simulated and actual figures are a per team basis are given in Appendix IV.

cities would benefit from the larger visitor's share of the gate in the American League.[17]

As previously discussed, the effects of league expansion on the gate revenues of existing teams are minimal. An additional comment, however, can be made based on the locational quality of the proposed expansion cities. Since the locational quality of Phoenix, Tampa-St. Petersburg, Miami and New Orleans is higher than the average locational quality of franchises in both leagues, expansion into these cities would increase the gate revenues accruing to existing teams. Conversely, the locational quality of the remaining non-franchise cities (except Washington) is below the existing average of both leagues, hence, placing teams in these cities would decrease the gate revenues of existing teams. Finally, the locational quality of Washington is above-average in the American League but is below-average in the National League. Therefore, American League expansion into Washington would increase gate revenues, but National League expansion into Washington would decrease gate revenues.

6. Revenue, Costs and Survival

While attendance revenues give some indication as to whether new or relocated franchises could survive, an overall assessment of viability requires that total costs and total revenues be considered. The data available to the author do not provide a complete breakdown of all revenue and cost categories on a team-by-team basis.

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[17] Average locational quality is 1744 in the American League and 1990 in the National League.

However, team-by-team data, where available, combined with league totals and ad hoc detailed information on specific clubs, do allow one to arrive at reasonably complete and accurate estimates. The basis for the estimates is described in detail in Appendix V. Estimates of total short run season revenue, defined as the sum of regular season attendance revenue, post-season attendance revenue, broadcast revenue, and revenue from concessions, parking and other miscellaneous sources are shown in Table 3. Short run profitability, defined as short run season revenue less operating costs, is also shown in Table 3.

The following comments can be inferred from Table 3. Profitability among the twenty-six existing teams varies widely, with one-half of the clubs showing a profit in 1983, ranging from $12.6 million in Los Angeles to $390,000 in Boston, while the remaining half suffer a net loss, ranging from $720,000 in St. Louis to nearly $7 million in San Francisco and Cleveland. Six of the profitable clubs rank among the top eight existing teams in terms of locational quality. The other two franchises in the top eight, the Chicago Cubs and Houston Astros, had clubs of inferior team quality, ranking 24th and 21st respectively and, in Houston, had above-average operating (i.e. player salary) costs. Five of the seven other profitable clubs rank among the top eight in terms of team quality.

Table 3

Short Run Revenue and Profits ($ Millions)

	Existing Teams		AL Expansion		NL Expansion	
Team/Location	Revenue	Profit	Revenue	Profit	Revenue	Profit
Atlanta	23.12	0.76				
Chicago (NL)	18.38	(1.54)				
Cincinnati	14.38	(4.61)				
Houston	16.62	(6.27)				
Los Angeles	33.16	12.63				
Montreal	24.76	2.23				
New York (NL)	25.96	4.88				
Philadelphia	27.37	2.08				
Pittsburgh	15.19	(6.15)				
San Diego	16.79	(2.91)				
San Francisco	12.42	(6.86)				
St. Louis	18.91	(0.72)				
Baltimore	27.22	6.17				
Boston	20.18	0.39				
California	24.43	0.76				
Chicago (AL)	22.03	1.43				
Cleveland	12.25	(6.84)				
Detroit	20.73	0.96				
Kansas City	16.75	(4.45)				
Milwaukee	19.02	(3.48)				
Minnesota	11.77	(2.85)				
New York (AL)	30.74	4.78				
Oakland	13.68	(6.17)				
Seattle	10.51	(4.76)				
Texas	18.72	1.54				
Toronto	20.08	1.89				
Buffalo			15.13	(6.06)	14.88	(6.31)
Columbus			16.34	(4.85)	16.24	(4.95)
Denver			14.91	(6.28)	14.63	(6.56)
East Rutherford			14.42	(6.77)	14.08	(7.12)
Indianapolis			16.13	(5.06)	16.01	(5.18)
Miami			18.94	(2.25)	19.16	(2.03)
Nashville			16.52	(4.67)	16.44	(4.75)
New Orleans			17.96	(3.23)	18.06	(3.13)
Phoenix			19.30	(1.89)	19.57	(1.62)
Tampa-St. Peter.			19.26	(1.93)	19.52	(1.67)
Vancouver			15.11	(6.08)	14.85	(6.34)
Washington			17.09	(4.10)	17.08	(4.11)

Parentheses indicate a net loss.

Teams that did not rank among the top eight in terms of either locational or team quality showed a net loss. Exceptions were Montreal and Texas. Their profitability was mainly due to higher than average revenues from local broadcasting. Losses were generally higher in cities which rank low in both locational and team quality (i.e. Seattle, Cleveland, and San Francisco).

A lack of data on team-by-team total revenues and costs from baseball operations for the 1983 season precludes an evaluation of the simulated profitability of clubs as constructed above. However, an assessment of the simulated results, based on comparisons with Major League Baseball total and average figures, reveals that the simulated results, on average, underestimate total operating revenues, overestimate total operating costs, and thus slightly exaggerate net operating losses.[18] Consequently, the simulated results are conservative estimates of team profitability.

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[18] Data from financial reports submitted by the team owners and from a financial report prepared for the player's association [from R.G. Noll, Player Salaries Since the 1981 Agreement (Stanford University, 1985) 3] indicate total revenues for Major League Baseball in 1983 were $521.7 million and $520.6 million respectively, or roughly $20.4 million per team. Figures for an average Major League Baseball team, as noted in Scully (1989: 118), show total revenue from baseball operations of $20.1 million. From Table 3, total operating revenues for Major League Baseball are $515.2 million or $19.8 million per team.

For the average baseball team total operating costs, net of team replacement, were $20.39 million (Scully, 1989: 118). The average total operating costs of the 26 existing clubs used in the calculation of team profitability in Table 3 was $20.47 million.

Overall, an average Major League Baseball team showed a net operating loss of $228,000 (Scully, 1989: 118). Total simulated losses for Major League Baseball from Table 3 equal $17.1 million or roughly $660,000 per club.

Overall, it appears that cities with above-average locational quality are profitable and, at the worst, experience small losses with clubs of inferior team quality. For cities with average locational quality, profitability depends on team quality. Clubs which are of superior team quality - Atlanta, Baltimore, and Boston tend to show a profit; while clubs of average or below-average team quality - Cincinnati, San Diego, St. Louis, and Kansas City tend to show a net loss. Generally, clubs in cities of inferior locational quality show a net loss regardless of team quality. The exceptions are clubs in Toronto and California, which rank among the top eight in team quality. Their profitability is attributable to above-average revenues accrued from local broadcasting. In summary, short run economic viability, measured only in terms of net operating revenues, requires that a club be located in a city of above-average or at least average quality and, in the case of the latter, field a team of superior quality.

Although not shown in Table 3, short run revenues and profits of existing clubs are lower in the two expansion scenarios because shares of the existing national broadcast contract are lower with the addition of two more teams. As noted in Appendix V, the share to each existing team would decline by $160,000 to $2.071 million. While for all teams there would be a decline in total revenues and profits, the loss of revenue would not affect the sign of net operating income. In Seattle, for example, where total revenues were only $10.1 million, the loss of revenue from the national contract would represent a decline in total revenue of only 1.6 percent.

None of the non-franchise cities, with a team of Kansas City quality and operating costs, show a profit under the two league expansion scenarios presented. The net loss, however, in five of the non-franchise locations would be lower than that experienced in Kansas City. In Phoenix, Tampa-St. Petersburg and Miami each of which ranks in the top ten among all cities in terms of locational quality, the size of the net loss would be approximately one-half that of the Kansas City club. If, as discussed, cities with average locational quality require an above-average quality team to make a profit, or breakeven, then the three southern cities could be expected to earn a profit, given that they have above-average quality teams. Profits could be higher in the two Florida cities where potential revenue from local broadcasting rights is higher. Although, New Orleans and Washington with teams equal in quality to Kansas City fare better, they require an above-average team to remain viable. The remaining non-franchise cities are probably not viable even fielding a high-quality club. In terms of locational quality, they compare with Minnesota and Seattle which, despite running low-cost operations, continue to lose money. Alternatively, the marginal costs of fielding a team of higher quality exceed the marginal revenue such a team would produce in these cities.

Based on the above analysis of short run book profits, it appears that expansion of the major leagues in 1983 would not have been feasible given that some existing franchises were located in markets of questionable viability. The prospects, however, of improving and stabilizing club profits was probable by relocating the weaker franchises (i.e. Seattle, Cleveland, and San Francisco) to potentially more lucrative markets (i.e. Phoenix, Tampa-St. Petersburg, Miami). To understand why such relocations have not occurred, one must consider the total economic returns to owning a Major League Baseball club. The financial viability of baseball can be primarily attributed to the current tax treatment of sports franchises and the changing structure of ownership it has fostered, in addition to plain book profits. While making little sense economically[19], current U.S. tax laws allow teams to make deductions for the amortization of intangible assets which increase operating costs considerably. A conservative estimate of the depreciation on these intangible assets, defined earlier as team replacement costs, was $2.334 million per club in 1983.[20] From an economic perspective this depreciation is a fictitious expense, however, it used by team owners for reducing their tax liability because it is allowed as a deduction from their income.[21] For many Major League Baseball clubs the tax

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[19] Noll (1985) and Scully (1989) see no meaningful justification for the amortization of player contracts, broadcast contracts, concession contracts, other rights contracts, stadium leases or the franchise. They contend that, except for player contracts, none of these contracts wither away like a normal asset. When these contracts expire they are renewed because clubs still have valuable rights to sell. As for the depreciation of player contracts, clubs already deduct training expenses associated with player development as they are accrued.

[20] G. Scully, The Business of Baseball (Chicago: University of Chicago, 1989) 118.

[21] The tax value of the asset to the owner is the excess depreciation times his marginal tax rate. According to Noll (1985: 10), "... wealthy individuals and corporations typically face marginal tax rates of fifty percent (actually, more than this if

value of excess depreciation substantially exceeds their profitability. Therefore, to take full advantage of the tax shelter "... ownership requires substantial income from other sources, if ownership is as an individual, or profit, if ownership is corporate."[22] In part, this has fostered a change in the ownership structure of Major League Baseball, from the traditional "family farm" style of baseball operation where a team was owned and operated by one or a few people as their only or principal business activity, to affiliated corporations with other profitable activities (e.g. broadcasters and advertisers), or individuals with substantial income from other sources.

In addition to using the excess depreciation for tax avoidance, the tax treatment of sport franchises provides an accrued capital gain to the owner upon selling the franchise. Over the lifetime of ownership, the amortization of intangible assets is deducted at ordinary income tax rates. At the time of sale, an increase in the value of the team's assets is subject to capital gains tax. If, however, there is any recapture of the amortization because of the gain (contracts which expire tend to renegotiated or replaced with newer, higher valued contracts), the owner receives what amounts to an

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state taxes are considered), so that $1 in excess depreciation reduces tax liabilities by $0.50."

[22] G. Scully, The Business of Baseball (Chicago: University of Chicago, 1989) 133.

interest-free loan of the tax liabilities which reduces the capital gains tax.

Hence, one reason why teams consistently lose money yet survive in poor locations is because of changes in ownership where the new owner has decided not to relocate the team. The decision not to relocate probably had more to do with the owner's other business interests than the true viability of baseball in the market. In such cases, the owner's motives for purchasing a team are more closely associated with the tax shelter it provides and capital gains made on its future sale than to the potential profits accruing from baseball. Therefore, the duration of a team in its present market is inextricably tied to how long the tax shelter to ownership lasts and the probability that the team's next owner will decide to keep the team in its present location.

In summary, while net operating revenues provide an indication of the viability of a team as it exists as a single economic entity, operating revenues represent only one of several economic returns to ownership. In the emerging type of baseball operation, the financial statements for ball clubs reveal less about their economic viability as the club might form only one of the owner's many businesses or sources of income. For example, profits from the joint economic activities of the owner could emerge in the ball club or in the parent company. While this change in ownership structure makes the assessment of true economic viability more difficult, it enhances the overall financial stability of Major League Baseball by making more teams viable and by bringing greater financial resources to the game.

Nonetheless, clubs in weaker markets which are consistently big money losers become prime candidates for a change in ownership that, among other things, could mean relocation.

CHAPTER V: CONCLUSIONS AND POLICY IMPLICATIONS

1. Conclusions

The model works well in explaining the financial health of Major League Baseball in the mid-1980s in terms of the effects of locational and team quality on profitability. Although it explains why Major League Baseball has consistently postponed expansion plans, decisions not to relocate teams in markets of questionable long run economic viability to more lucrative markets are better attributed to ad hoc factors, namely public subsidies, which are outside the scope of the model.

Detailed results of this paper's analysis are as follows: First, locational attributes and team success are the major determinants of attendance at Major League Baseball games. Second, market size (population) and regional factors (climate) are important in terms of market power. Third, locational quality remains a principal factor in franchise revenue determination. To the extent, however, that the factors which determine broadcast revenues differ from those which determine in-person attendance (i.e. locational quality), the former are becoming increasingly important as growth in both national and local broadcast revenues outpaces growth in gate receipts. Fourth, team quality can offset poor locational quality in the short run but there is no evidence to support the argument that the better quality teams emerge in the better quality locations over the long run. Fifth, simulations of attendance revenue, combined with estimates of other revenue sources and costs, indicate that there are economically viable locations which do not currently have teams.

Finally, despite the excitement[1] surrounding Vancouver's bid for a franchise during the early 1980s, it appears that Major League Baseball would not have been feasible in terms of strict, long run economic viability. Peter Bavasi, then president of the Cleveland Indians and a former director of the Toronto Blue Jays in their formative years, had the following to say about Vancouver's chances of landing a franchise:

> Vancouver has some things going for it but there are also some drawbacks. I think in the long run the market is going to be the determining factor when, and if, we get around to expanding. The other factors, things like stadium, government help, tax abatements, that sort of thing, you can fix those up. But if you don't have the market there to begin with you're in trouble.[2]

2. Policy Implications

The implications of the foregoing analysis on the current public policy issues surrounding the topic of franchise location in Major League Baseball are examined in this section. In the 1980s, the most prominent public policy issue regarding franchise location in

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[1] The results of a poll conducted by Marktrend Marketing Research Inc., which indicated 56% of respondents wanted a Major League Baseball franchise in Vancouver, was included in the article "You Say Yes: Exclusive Sun Poll finds Vancouver would Support Majors" in the April 4, 1985 edition of the Vancouver Sun.

[2] Quoted in P. Hickey, "Baseball meetings whimper to finish," Vancouver Sun, 13 Dec. 1985: C3.

professional team sports became whether the government ought to prevent, or at least control, the movement of franchises. This was a result of public outcry in cities which lost franchises.[3] It was the contention of constituents that owners did not adequately consider the interests of the fans and communities which had made a substantial investment in the franchise.

Public investment in professional team sports is in the form of tax breaks and below-cost stadium rents. Each will be examined in terms of their implications on franchise location. As noted in Chapter IV, current U.S. tax laws allow owners to capitalize and depreciate most of the intangible assets which comprise a team. Since only people with other business interests or sources of income can take full advantage of the tax benefits of the excess depreciation, the structure of ownership has changed from a traditional "family farm" operation to one where running the team is but one of the many businesses within the whole corporate structure. It can be argued that the new type of ownership is less likely to build a durable market for the team, than would the traditional type of owner whose sole livelihood was the baseball operation. Instead, the main concern of

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[3] In the NFL, the Raiders moved from Oakland to Los Angeles, the Colts from Baltimore to Indianapolis, and the Cardinals from St. Louis to Phoenix. In the NBA, the Clippers moved from San Diego to Los Angeles, and in the NHL the Rockies moved from Denver to New Jersey to become the Devils. In Major League Baseball the number and location of teams has remained unchanged since the addition of the Seattle and Toronto franchises in 1977. As in the other professional team sports leagues, however, there were numerous instances where the existing owner threatened to relocate or to sell the franchise to a new owner who would do the same.

the emerging owner is a saleable asset once terms for depreciating player contracts and other intangible assets expire. The effect of this tax treatment has been to create an incentive for the fairly rapid turnover in ownership of franchises. This increases the probability of relocation since there is a greater likelihood that the future acquisitor of the franchise be from another geographical area.

Currently, few professional sports teams own the facilities in which they play their home games. In most cases, teams lease facilities that are financed, built and maintained using public funds.[4] Due to the scarcity of franchises, the reasons for which are discussed in detail below, stadium authorities are at a disadvantage when it comes to negotiating a lease arrangement. Owners are able to use the threat of relocation to play off local city governments, which are competing for the team, against each other by extracting rents that are substantially below cost.[5] The extent to which rent paid and operating cost differ is the subsidized rent available to the team. In addition, most municipalities' investment in their local team assumes the costs for the provision of: training facilities, tax concessions,

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[4] Of the 94 facilities used by professional football, baseball, hockey and basketball teams since 1953, 67 are or were publicly owned. More than 50 state and local governments spent over $6 billion taxpayer dollars to build or refurbish stadiums in the twenty years to 1984. From "Sports Stadiums: Is the U.S. Overdoing It?", U.S. News and World Report 21 May 1984: 51-52.

[5] Many baseball teams have rental agreements that excuse them from any rent or provide for only a token payment if attendance falls below one million fans. From R.G. Noll, "The Economics of Sports Leagues," (Stanford University, 1987) 57.

interest-free loans, debt service, operational expenditures, police protection, traffic control, sanitation, and guaranteed ticket sales. Ultimately, to attract teams, local governments compete by providing increasingly reduced stadium rental agreements and other local public subsidies which have contributed to the instability in franchise locations, and have increasingly put local taxpayers at risk who are financially accountable for the contracts negotiated by their local officials.

The fact that persistent money-losing teams have remained in Seattle, Cleveland and Pittsburgh suggests that both forms of public subsidy previously discussed can effect the number of financially viable teams. As noted in Chapter IV, the tax shelter available to teams from the excess depreciation associated with intangible assets was worth an average $2.334 million per club. No figures are available on the benefit to teams of reduced stadium rents. In the early 1970s, however, Noll (1974) indicated that both forms of public subsidy were worth more than $1 million annually to some professional sports teams. For baseball, he indicates that this was approximately the net gain to a team from having attracted an additional 500,000 fans during a season which, at the time, represented nearly one-half of the average attendance of Major League Baseball teams. Overall, the indirect subsidies were equal to about two-thirds the average team's total broadcasting revenues. Given the experience of clubs in the weaker markets in the 1980s, and the short run profitability of these clubs as estimated in Chapter IV, it can be concluded that the benefits of public subsidy to teams remain substantial. Indeed, as Noll suggests "it is reasonable to conclude that many teams are financially viable only because of the subsidies they receive."

If cities with locational quality equal to that in the weakest markets among existing teams (i.e. Seattle, Cleveland, San Francisco) represent the lower bound for financial viability then, based on the locational rankings in Chapter IV, several non-franchise cities exist which could support a team. Such teamless cities can obtain a franchise through the creation of a new league, expansion, or acquisition of a franchise located in another city. Historically, the first two alternatives have proven to be ineffective: first, the operation of a franchise in a new league in competition with the established league is financially risky; and second, expansion of Major League Baseball is equally unreliable since, as described in Chapter I, it might require years of lobbying. The result has been that teamless cities must compete against one another and current franchise cities for existing teams. As discussed, this has enabled team owners to threaten their host cities with relocation should demands for increased public subsidies not be met.

The disparate bargaining power between teams and cities can be attributed to the special status Major League Baseball enjoys relative to other sports and non-sports industries. The current structure of professional baseball and its operating rules and procedures have developed within an environment exempt from the antitrust laws since 1922.[6] This omission has allowed Major League Baseball the right to control league membership and the geographical location of member franchises, to pool television and gate receipts, and to establish rules and sanctions which are deemed necessary for ensuring equality of member playing strengths: all anticompetitive practices that would not serve public policy goals if allowed in non-sports industries. In terms of league membership, Major League Baseball has been able to control the supply of its product which has, therefore, been generally free from any competitive pressure to respond to market demand. By reducing economic competition and combining resources the teams comprising Major League Baseball have essentially behaved as a cartel, choosing to supply fewer teams than would be provided under competitive circumstances. In summary, Major League Baseball's exemption from the antitrust laws have diminished market forces that would prompt the owners to increase the supply of franchises to meet demand.

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[6] In *Federal Baseball Club v. National League*, it was the court's opinion that baseball exhibitions were beyond the reach of antitrust law since they were "purely state affairs" not within federal jurisdiction over interstate commerce. This decision has been upheld in several subsequent court cases despite criticism that the nature of the game has changed and that the volume of interstate business in Major League Baseball places it within the provisions of the Sherman Antitrust Act. Essentially, the courts have contended that the orderly way of reversing the decision should be by legislation not by court decision. In turn, they have interpreted a lack of action on the matter by Congress as an implied desire not to disapprove Major League Baseball's antitrust exemption legislatively.

Clearly, many of the problems associated with the relocation of existing franchises can be attributed to inadequate penetration of the market for franchises by Major League Baseball: it is because of the scarcity of franchises that cities compete and owners are able to elicit concessions at an increasingly greater cost to local constituents. Therefore, many of the problems encountered by cities with respect to franchise relocation could be lessened by league expansion. Indeed, the problems associated with franchise relocation appear to be a symptom of the real public policy issue which is whether existing team owners in Major League Baseball should be permitted to maintain a scarcity of franchises. Upon scrutiny, Major League Baseball is currently organized to protect the interests of the owners who benefit from that scarcity in the following ways: first, it enhances the value of existing teams by reducing competition for fans; second, it allows for the division of revenues from national broadcasting among fewer teams; third, it increases the market price of existing and expansion teams; fourth, it preserves a few potentially lucrative franchise cities so that a team failing financially has an attractive alternative site; and fifth, as discussed in detail above, it provides the threat of relocation which increases a team's bargaining power when negotiating stadium agreements and local broadcasting rights.

Before addressing the issue of league expansion, some of the legislative options which have been proposed to address the problems with franchise relocation are examined in the context of the results chapter IV. In the celebrated antitrust case, *Los Angeles Memorial*

Coliseum Commission v. NFL[7], the courts determined that league rules for controlling franchise location were too subjective, prone to arbitrary application, and afforded greater protection than reasonably necessary to effectuate league members' interests. It was suggested that reasonable rules, based on specific objective criteria[8], should be promulgated to guide leagues in relocation decisions. Uncertainty, however, regarding the legal effectiveness of such procedures and the necessity for explicit recognition of the role taxpayers play in the operation of professional sports precipitated Congressional intervention. Several bills directed at protecting local communities and subjecting franchise relocation requests to an objective decision-making process were not adopted, usually because the interests of all concerned parties were not taken into account.

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[7] On March 1, 1981 the managing general partner of the Oakland Raiders, Al Davis, announced to the NFL that the team would be moving to Los Angeles. Pursuant to the requirements of the NFL's relocation rule, the NFL owners voted, but overwhelmingly rejected the proposed relocation. In response, the Coliseum Commission and the Raiders filed suit alleging that the relocation rule requiring approval from three-quarters of the league owners prior to a move violated Section 1 of the Sherman Antitrust Act.

[8] The criteria contained in subsequent legislative proposals included the adequacy of the stadium in which the team plays its home games, the extent to which fan support for the team has been demonstrated during the teams tenure in the community, the extent to which the team has received public financial support and, whether the team has incurred net operating losses (exclusive of depreciation and amortization) sufficient to threaten the continued financial viability of the team. As noted in M.A. Wesker, "Franchise Flight and the Forgotten Fan: An Analysis of the Application of Antitrust Laws to the Relocation of Professional Football Franchises," Baltimore Law Review 15 (1986): 586, 588.

Although, not included in any of the bills presented to Congress, a suggested legislative option worthy of note proposes a market-sensitive regulatory solution to the policy issues arising from the relocation of franchise. The proposal, which calls for the implementation of federal non-negotiable standards for stadium leases[9], attempts to create a balance at the bargaining table between franchise owners and municipal officials. Currently, market forces are restricted as the supply of teams is kept artificially below the level of demand, and the costs of relocation are much lower than they might be otherwise. The proposal is designed so that owners consider the true costs, internal and external, of relocation. The proposal would make future franchise moves more expensive and would reduce the public subsidy teams receive in their lease agreements. Depending upon the importance of the subsidy to a team, which would be greater in markets with lower revenue potential (e.g. Seattle, Cleveland, Minnesota), the additional costs borne by the owner could be sufficient to reduce the number of financially viable teams in Major League Baseball.

It is likely that the courts will eventually rule that a collective process for governing franchise relocation is legal providing that the criteria for gaining approval are clearly specified

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[9] As suggested by Beisner (1988), the standards that would be incorporated into a stadium lease would consist of: a requirement that an owner give advanced notice of any proposed agreement to relocate; the payment of leasehold improvements by the team owner; a required financial commitment by the owner towards the financing of either building or renovating the stadium; and, a lease provision that requires the length of lease to increase with the level of public financing.

and do not require overwhelming majorities for approval, nor include obvious anticompetitive elements.[10] The result will facilitate the movement of teams and in Major League Baseball, where substantial differences in revenue potential exist among teams and where operations in the weaker markets appear marginal at best, will create a tendency for more teams to move to the larger cities. Rules regarding relocation could slow expansion as owners in the lucrative markets will share legitimate concerns that additional teams in marginal markets will eventually move to their market.

Two of the legislative bills put before the 99th Congress included a provision which addressed the issue of expansion in Major League Baseball. The *Professional Sports Community Protection Act* mandated that Major League Baseball have an expansion policy while the *Professional Sports Team Community Protection Act* went a step further by mandating expansion in Major League Baseball. Each was an attempt by Congress to address the plight of the growing number of "have-not" cities. The need for congressional intervention was based on the finding that the special treatment afforded Major League Baseball under the antitrust laws might continue to perpetuate the scarcity of franchises if not coupled with measures to prevent leagues from failing to respond to the public's need for franchises. According to

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[10] R.G. Noll, "The Economics of Sports Leagues," (Stanford University, 1987) 66. This could potentially apply to Major League Baseball as well since, according to Staudohar (1985), "[a]lthough baseball has an exemption from antitrust law, it is possible that this exemption will not extend to relocation of franchises should a challenge arise."

Senator Slade Gorton, "[i]t is within Congress' authority to find that the prolonged refusal of leagues to expand the availability of their product when there are cities which can support a team, is a misuse of monopoly power."[11] That is, the failure of Major League Baseball to expand is alleged to be a direct violation of Section 2 of the Sherman Act.[12]

The argument proceeds as follows. Section 2 proscribes improper market domination by a single actor. A critical premise of the provision is that abusive exercises of monopoly power must be regulated through legal institutions because normal market forces will be insufficient to ensure that consumer welfare is advanced. The complaint against Major League Baseball is not so much that it enjoys a monopoly position, which in large part can be attributed to an exemption from antitrust law for Section 1 purposes, but rather that Major League Baseball's dominant position limits its incentive to satisfy all the demand that might exist for additional franchises. Specifically, the basis of section 2 regulation is that market power has been misused; in particular, it has been used improperly to acquire a monopoly position or to extend it. In the context of

[11] S. Gorton, "Professional Sports Franchise Relocation: Introductory Views from the Hill," Seton Hall Legislative Journal 9.1 (1985) 5.

[12] Section 2 of the Sherman Act, 15 U.S.C. 2 (1982), provides, in relevant part, that "[e]very person who shall monopolize, or attempt to monopolize, or combine or conspire with any other person or persons, to monopolize any part of the trade or commerce among the several States, or with foreign nations, shall be deemed guilty of a felony."

professional baseball, it is the failure of current market forces to ensure that an optimal number of franchises will be established. Given the existence of a a market imperfection, Congress has two responsible alternatives: one, a return to a free market, by repealing previous grants of antitrust immunity; or two, to regulate the market imperfections they created.

Generally, the existing teams consider a number of conflicting incentives regarding the decision to expand. Expansion is financially unattractive because it decreases the benefits that an existing team enjoys from a scarcity of franchises. To be worthwhile, existing teams must set a price high enough for the indemnification they would receive from the new teams to recoup the costs of lost revenues and opportunities. If actual value of the new teams is too small to be worth indemnification then expansion will not occur. This was likely the case in the mid-1980s, since the majority of the non-franchise cities seeking a franchise had locational quality equal to that of the league's weaker markets which could be considered to be marginal at best. If Major League Baseball were to have expanded into these cities, it might have increased franchise instability to a degree which could have damaged baseball.

In practice, the arguments against expansion given by Major League Baseball in the 1980s were the lack of good markets[13], and that

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[13] In April 1985, Major League Baseball Commissioner Ueberroth commented that, at that time, no city met his personal requirements for consideration as an expansion team. From "Ueberroth Draws Fire," New York Times 10 Apr. 1985: B14.

new franchises, if needed, should be established in a controlled manner. The previous analysis refutes the first assertion since, in terms of locational quality, at the least, above-average markets existed in Phoenix, Tampa-St. Petersburg, and Miami. Although neither of the former two cities had major league playing facilities available in 1985, plans for financing and construction were undertaken.[14] Clearly, the tough criteria issued by the Commissioner's Office in 1985 for cities seeking a franchise reflect the cautious manner in which Major League Baseball approached expansion. The fact, however, that several of the leagues' existing markets would have failed to satisfy the expansion criteria[15] and yet were able to retain their franchises (via changes in ownership and lower stadium rents) suggests that little was done to improve the financial status of Major League Baseball. An improved financial status would have entailed the

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[14] In Phoenix a $90 million baseball and football stadium was being planned, while in Florida the rivalry for a Major League Baseball franchise had both Tampa Bay and St. Petersburg planning domed baseball stadiums of $80 million and $90 million respectively.

[15] In October 1985, Commissioner Peter Ueberroth indicated that Seattle did not meet the minimum standards announced by his office for cities seeking a Major League Baseball franchise. In particular, he noted "the criteria involve a better agreement than the one King County didn't pass" referring to the King County Council's resistance in fully ratifying a mediation panel's recommendation for a new Kingdome lease for the Mariners. From "Seattle has Failed Ueberroth's Test," Vancouver Sun 10 Oct. 1985: D6. Paul Godfrey, the ex-Metro Toronto chairman who was a prime force in the city's acquisition of the Blue Jays, said if the new criteria had been enforced when Toronto pursued a franchise, "we never would have got a team." Specific reference was made to the emphasis placed on individual ownership which was puzzling because Toronto, which is owned by Labatt's, is one of the more successful franchises. From K. Baldrey, "Vancouver still swinging," Vancouver Sun 9 Oct. 1985: A6.

relocation of teams in failing markets to more lucrative markets, such as those in the south.

Under its exemption from antitrust law, Major League Baseball adopted a business rules structure that makes it extremely difficult for small-city franchises to survive. Generally, the monopoly gains from the sport tend accrue to big-city owners while small-city franchises must exploit their mobility to obtain concessions from the city in order to survive. To increase the financial viability and stability of professional baseball, measures to address the source of the problem are required: namely, the wide differential in the revenue-potential of existing markets. Rather than attempting to prevent or control the location of teams, the following government measures would address the problem of franchise relocation while allowing leagues to regulate themselves. A first measure could be a requirement for a minimum degree of revenue sharing among the teams. Although gate revenues are currently shared, the visitor's share could be increased while a similar split could be applied to local broadcast revenues which are the largest source of the variation in total revenue among clubs and are currently not shared. A second measure is to limit the extent to which a franchise's intangible assets can be amortized while allowing a team a reasonable profit. This measure would reduce the rapid turnover in ownership of franchises and return sports ownership to those whose primary motivation is the operation of the club. Although the measure would also reduce the indirect tax subsidy received to all clubs, it could be offset by some form of direct subsidy to only those clubs where the subsidy was crucial to their financial viability. A third measure could be to legislate non-negotiable stadium lease arrangements similar to those suggested by Beisner which would ensure that the true cost of relocation is borne by all parties. Further revenue-sharing would be required to cover the increased costs of stadium rental.

While the above measures would enhance the viability of Major League Baseball's existing clubs, team owners would be less inclined to approve a league expansion, particularly if the cities seeking a franchise have markets of below-average locational quality. If, however, these cities are able to support a franchise, then Major League Baseball will have to address the issue properly otherwise Congress will legislate league expansion or, although highly unlikely, repeal baseball's antitrust exemption[16] which would result in a significant institutional change in the sport.

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[16] As a result of the growing discontent in Congress about baseball's failure to expand the Senate set up a task force to examine the issue in November, 1987. By early 1989, many of the members of the Task Force on Expansion of Major League Baseball, were considering introducing legislation repealing the sport's unique antitrust exemption. In July, however, new Commissioner A. Bartlett Giamatti announced plans for adding two teams to the National League for the 1993 season. From B. Welling et al, "Professor Hardball," Business Week 3 Apr. 1989: 88.

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APPENDIX I

The Relationship Between Locational Quality and Team Quality

This appendix expands on the model presented in Chapter II which provides a derivation of the relationship between team quality Q_t and locational quality H_t where there are multiple attributes underlying team quality.[1]

In equation (9), the revenue from games played by team t in location τ is represented as the product of locational quality H_τ and team quality Q_t. Team quality is expressed as a function of a vector of team attributes, with the vector w denoting the imputed prices of these attributes.

(i) $$Q_t = Q[X_t]$$

The attribute prices will depend on the total amounts demanded by all teams, with

(ii) $$w = w[X]$$

and $$X = \sum_{\delta=1}^{N} X_\delta$$ where N is the number of teams in the league.

It is assumed that each team chooses its bundle of attributes to maximize profit

(iii) $$\pi_t = \pi_t(H_t, X_t, X) = H_t Q[X_t] - w[X]X_t.$$

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[1] The derivation given is largely taken from that included in a preliminary draft of the article by Jones and Ferguson (1988) on location and survival in the National Hockey League.

Letting D denote the gradient operator, the first order conditions are

(iv) $$D_{X_t}\pi_t = H_t D_{X_t} Q_t - w[X] - X_t D_{X_t} w[X] = 0$$

and the second order necessary conditions imply that

(v) $$Z(D_{X_t}{}^2\pi_t)Z \leq 0$$

for any Z. From (iv) it follows that

(vi) $$(\partial^2\pi_t/\partial X_t{}^2)dX_t + \partial/\partial H_t(\partial\pi_t/\partial X_t)dH_t = 0$$

and since $\partial/\partial H_t(\partial\pi_t/\partial X_t) = \partial Q_t/\partial X_t$, substitution in equation (vi) yields

(vii) $$dX_t/dH_t = -(\partial^2\pi_t/\partial X_t{}^2)^{-1}(\partial Q_t/\partial X_t).$$

Using the chain rule,

(viii) $$dQ_t/dH_t = (dQ_t/dX_t)(dX_t/dH_t)$$

which, combined with (vii), yields

(ix) $$dQt/dHt = -(dQt/dXt)(\partial^2\pi_t/\partial X_t{}^2)^{-1}(\partial Q_t/\partial X_t) \geq 0$$

which is non-negative from (v). If (v) is negative then (ix) holds with strict inequality, thus establishing the direct relationship between locational quality and endogenous team quality.

APPENDIX II

Variable Definitions and Data Sources for Attendance, Price and Locational Factors

P_t average ticket price paid 1983, constructed by taking average ticket price paid 1984 and making selected adjustments on a team-by-team basis using total 1983 gate revenues, total home and away paid season attendance 1983, and the visiting team's share of the gate. Sources: average ticket price paid 1984, G. Scully, The Business of Baseball (Chicago: University of Chicago, 1989) 106; total gate revenue 1983, data provided by R.G. Noll; total home and away paid season attendance 1983, J. Hoppel, ed., The Sporting News Official Baseball Guide (St. Louis: The Sporting News, 1984) 263.

A_{gt} attendance, actual game attendance. Source: The Sporting News all weekly issues from April 1983 - October 1983 inclusive.

POP population for U.S. Primary Metropolitan Statistical Area, 1983. Source: U.S. Bureau of the Census, Statistical Abstract of the United States, 1985 105th ed. (Washington, D.C., 1984) 19-21; population for Canadian cities (Census Metropolitan Areas), 1983, Source: Canada, Minister of Supply and Services Canada, Postcensal Annual Estimates of Population of Census Divisions and Census Metropolitan Areas, June 1, 1985 3 3rd issue, 91-211 (Ottawa: Statistics Canada, 1986) 34.

INC income for U.S. cities, per-capita personal income for Primary Metropolitan Statistical Area, 1983. Source: U.S. Dept. of Commerce, Survey of Current Business 66.4 (1986) 39; income for Canadian cities, per capita money income before tax for Census Metropolitan Areas, 1983, Source: Canada, Minister of Supply and Services Canada, Income Estimates for Sub-Provincial Areas, 13-216, (Ottawa: Statistics Canada, 1986) 53.

YOU percent youth population, for U.S. cities, percentage of the 1980 PMSA population aged 18 years and under. Source: Statistical Abstract of The United States, 1985 19-21; for Canadian cities, percentage of the 1981 CMA population aged 18 years and under, Source: Canada, Minister of Supply and Services Canada, 1981 Census of Canada, Census Tracts, Selected Characteristics, Vol. 3 - Profile Series A, Cats. 95-918 & 95-936 (Ottawa: Statistics Canada, 1982) Table 1.

WKAGE percent working age population, for U.S. cities, percentage of the 1980 PMSA population aged 18-64 years. Source: Statistical Abstract of The United States, 1985 19-21; for Canadian cities, percentage of the 1981 CMA population aged 18-64 years, Source: 1981 Census of Canada, Census Tracts, Selected Characteristics Table 1.

SEN percent senior population, for U.S. cities, percentage of the 1980 PMSA population aged 65 years and older. Source: Statistical Abstract of The United States, 1985 19-21; for Canadian cities, percentage of the 1981 CMA population aged 65 years and older, Source: 1981 Census of Canada, Census Tracts, Selected Characteristics Table 1.

BLK percent black population, for U.S. cities, percentage of the 1980 PMSA population that is black. Source: Statistical Abstract of The United States, 1985 19-21; for Canadian cities, percentage of the 1971 CMA population that is Negro, Source: Canada, Minister of Supply and Services Canada, 1971 Census of Canada, Population, Ethnic Groups Vol. 1 Part 3 Bulletin 1.3-2, 92-723 (Ottawa: Information Canada, 1972) Table 6.

PRI percent employment in primary industries, for U.S. cities, percentage of total employed in the SMSA working in the Primary Industries, 1980. Source: U.S. Bureau of the Census, 1980 Census of Population, Vol. 1, Characteristics of the Population, Chapter C: General Social and Economic Characteristics (Washington, D.C., 1982) Table 122; for Canadian cities, percentage of total employed in the CMA working in the Primary Industries, 1981, Source: Canada, Minister of Supply and Services Canada, 1981 Census of Canada, Census Tracts, Selected Social and Economic Characteristics, Vol. 3 - Profile Series B Cats. 95-959 & 95-977 (Ottawa: Statistics Canada, 1983) Table 1.

MAN percent employment in Manufacturing. Ibid.

CONST percent employment in Construction. Ibid.

TRANS percent employment in the Transportation, Communication and Utility industries. Ibid.

TRADE percent employment in the Wholesale and Retail Trade sector. Ibid.

FIRE percent employment in the Finance, Insurance and Real Estate industries. Ibid.

SERV percent employment in the Community, Business and Personal Services sector. Ibid.

PA	percent employment in the Public Administration sector. Ibid.

GOODS	percent employment in the goods-producing sector (Primary Industries, Manufacturing and Construction). Ibid.

TEAMS	baseball competition, number of professional baseball teams within the home teams CMSA (CMA-Canada). Source: J. Hoppel, ed., The Sporting News Official Baseball Guide, 1984 (St. Louis: The Sporting News, 1984); and, U.S. Bureau of the Census, County and City Data Book, 1983 10th ed. (Washington, D.C., 1983) Appendix A.

MLTEAMS	sports competition, Number of professional teams in the major team sports - baseball (MLB), hockey (NHL), basketball (NBA), and football (NFL, USFL, CFL) - located in the home team's CMSA (CMA-Canada). Source: The Sporting News, various issues for 1983; J.L. Reichler, ed., The Baseball Encyclopedia (New York: Macmillan, 1988); and, County and City Data Book, 1983, Appendix A.

MLSUBW	sports competition, indirect substitutes index composed of number of teams as in MLTEAMS plus the sum of their respective winning percentages in the previous season. Ibid.

BBSUB	major league baseball competition, number of major league baseball franchises located in the home team's CMSA (CMA-Canada). Ibid.

BBSUBW	major league baseball competition, direct substitutes index composed of number of teams as in BBSUB plus the sum of their respective winning percentages in the previous season. Ibid.

CAN	dummy variable of one if home franchise is located in Canada, zero otherwise.

SREG	dummy variable of one if home franchise is located in the south region, as defined by the U.S. Bureau of the Census, zero otherwise. Source: City and County Data Book, 1983 Figure 1.

EREG	dummy variable of one if home franchise is located in the east region, as defined by the U.S. Bureau of the Census (plus Montreal and Toronto), zero otherwise. Ibid.

WREG	dummy variable of one if home franchise is located in the west region, as defined by the U.S. Bureau of the Census, zero otherwise. Ibid.

NEREG dummy variable of one if home franchise is located in the northeast region, as defined by the U.S. Bureau of the Census (plus Montreal and Toronto), zero otherwise. Ibid.

TEMP normal daily mean temperature of city (average of monthly data for April to September). Source: U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration, Climatology of the United States 81, Sep. 1982 and Monthly and Seasonal Weather Outlook, 1989.

TRAIN precipitation, sum of normal monthly precipitation in city (in inches) for the months April to September inclusive. Source: Climatology of the United States 81, Sep. 1982 and Monthly and Seasonal Weather Outlook, 1989.

CYIC consecutive years in city, number of consecutive years the home franchise has been in its current location. Source: C. Carter, ed., The Sporting News Official Baseball Dope Book, 1983 (St. Louis: The Sporting News, 1983).

STADAGE stadium age, equal to 11 minus the age of the stadium, except it is zero for stadiums over ten years old. Ibid.

DOME covered stadium, dummy variable of one if the home team's playing facility has a retractable or non-retractable roof, zero otherwise. Ibid.

GRASS natural playing surface, dummy variable of one if the home team's playing surface is natural grass, zero if it is synthetic turf. Ibid.

Correlation Matrix of Attendance, Price, and Locational Factors

L prefix denotes natural logarithm of the variable.

(1)	LATTEN	1									
(2)	LAPP	.01	1								
(3)	LPOP	.21	.29	1							
(4)	LINC	-.17	-.01	.07	1						
(5)	LYOU	.15	-.05	.04	-.54	1					
(6)	LSEN	-.01	.13	.14	-.02	-.61	1				
(7)	LWKAGE	-.15	-.17	-.20	.68	-.61	-.25	1			
(8)	LBLK	.01	.39	.34	.15	.06	.05	-.15	1		
(9)	LPRI	-.12	-.04	-.44	.04	.15	-.62	.41	-.13	1	
(10)	LMAN	.08	.02	.07	-.46	.48	.05	-.61	-.10	-.19	1
(11)	LCONST	-.09	-.12	-.44	-.03	.23	-.75	.44	-.14	.86	.32
(12)	LTRANS	-.07	-.14	.10	.17	-.09	.08	-.02	.25	-.18	.49
(13)	LTRADE	-.19	.00	-.47	.14	.13	-.40	.26	.11	.58	.00
(14)	LFIRE	-.02	-.03	.34	.68	-.47	.10	.47	.01	-.26	.64
(15)	LSERV	.03	.11	.27	.31	-.67	.59	.24	-.11	-.41	.56
(16)	LPA	.15	-.25	-.04	-.13	-.21	.24	.06	.10	-.28	.51
(17)	LGOODS	.02	.03	-.12	-.47	.61	-.35	-.40	-.13	.30	.86
(18)	TEAMS	-.02	-.12	.11	.81	-.65	.22	.57	.08	-.16	.48
(19)	LMLTEAMS	.11	.11	.64	.63	-.43	.25	.28	.16	-.38	.16
(20)	LMLSUBW	.11	.12	.60	.61	-.43	.29	.23	.11	-.41	.11
(21)	BBSUB	.09	.00	.51	.61	-.43	.18	.35	.15	-.28	.21
(22)	BBSUBW	.10	-.01	.51	.61	-.41	.16	.35	.14	-.27	.20
(23)	CAN	-.12	-.26	-.04	-.03	.20	-.17	-.06	-.45	.01	.08
(24)	SREG	.00	.06	-.11	-.05	.34	-.65	.19	.34	.41	.32
(25)	EREG	.06	.16	.36	-.39	.04	.51	-.56	.17	-.70	.45
(26)	WREG	-.02	-.28	-.19	.49	-.50	-.08	.76	-.33	.35	.34
(27)	NEREG	.08	.35	.41	-.16	-.31	.59	-.25	-.07	-.47	.09
(28)	LTEMP	.08	.51	.11	-.11	.38	-.46	-.07	.49	.41	.20
(29)	LTRAIN	-.08	.22	.14	-.36	.42	.08	-.66	.34	-.37	.31
(30)	LCYIC	-.02	.43	.32	-.08	-.04	.40	-.37	.34	-.32	.32
(31)	LSTADAGE	-.12	.09	.19	.10	-.23	.22	.06	.12	-.31	.07
(32)	DOME	-.35	.01	-.14	.16	.14	-.43	.24	-.25	.45	.08
(33)	GRASS	-.05	.04	-.02	.00	-.32	.24	.15	-.03	-.27	.10
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
(11) LCONST	1									
(12) LTRANS	-.01	1								
(13) LTRADE	.45	-.10	1							
(14) LFIRE	-.18	.45	-.18	1						
(15) LSERV	-.42	.14	-.54	.55	1					
(16) LPA	-.04	.21	-.34	.15	.44	1				
(17) LGOODS	.17	-.54	.22	-.76	-.78	-.61	1			
(18) TEAMS	-.18	.28	-.08	.66	.47	.05	-.58	1		
(19) LMLTEAMS	-.48	.13	-.20	.66	.42	-.15	-.37	.72	1	
(20) LMLSUBW	-.53	.12	-.17	.66	.43	-.18	-.36	.71	.99	1
(21) BBSUB	-.33	.21	-.12	.67	.29	-.13	-.38	.79	.84	.81
(22) BBSUBW	-.32	.19	-.11	.66	.28	-.14	-.36	.79	.84	.81
(23) CAN	.03	-.05	-.12	.11	.01	.00	.06	.17	-.18	-.14
(24) SREG	.67	.19	.22	-.10	-.37	.16	.02	.25	-.40	-.47
(25) EREG	-.59	-.15	-.64	-.20	.14	.13	.15	.18	.04	.06
(26) WREG	.23	-.16	.22	.32	.25	-.05	-.24	.54	.29	.29
(27) NEREG	-.43	.14	-.56	.17	.60	.14	-.32	.00	.27	.29
(28) LTEMP	.48	.08	.38	-.07	-.33	-.07	.07	.31	-.21	-.25
(29) LTRAIN	-.20	.31	-.17	-.27	-.28	-.01	.20	.48	-.28	-.28
(30) LCYIC	-.41	-.21	.02	-.29	.05	-.08	.14	.00	.20	.20
(31) LSTADAGE	-.10	.19	-.10	.10	.17	.12	-.19	.14	.11	.10
(32) DOME	.41	.03	.26	-.06	-.19	-.35	.17	.21	-.23	-.25
(33) GRASS	-.07	.26	-.02	.14	.09	.06	-.22	.09	.01	.00
	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)

	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)
(21) BBSUB	1									
(22) BBSUBW	1	1								
(23) CAN	-.19	-.19	1							
(24) SREG	-.28	-.28	-.12	1						
(25) EREG	-.05	-.06	-.02	-.25	1					
(26) WREG	.42	.44	-.16	-.23	.59	1				
(27) NEREG	.03	.02	-.16	-.23	.51	-.30	1			
(28) LTEMP	-.16	-.16	-.28	.70	.28	-.31	-.07	1		
(29) LTRAIN	-.40	-.41	.10	.24	.53	-.92	.28	.21	1	
(30) LCYIC	.09	.08	-.11	-.25	.42	-.40	.27	.08	.33	1
(31) LSTADAGE	.17	.17	-.27	-.05	.14	.03	.19	.03	.12	.32
(32) DOME	-.24	-.24	.35	.18	.39	.09	-.20	.02	.11	-.14
(33) GRASS	.19	.19	-.36	.12	.06	.06	.25	.08	.05	-.03
	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)

	(31)	(32)	(33)
(31) LSTADAGE	1		
(32) DOME	-.03	1	
(33) GRASS	.67	-.21	1
	(31)	(32)	(33)

APPENDIX III

Variable Definitions for Team Quality Factors

Team Performance Measures

HLRK(VLRK)	the home (visiting) team's league rank prior to the game
HDRK(VDRK)	the home (visiting) team's divisional rank prior to the game
HGBL(VGBL)	the number of games that the home (visiting) team is behind the division leader at game time
HWP(VWP)	the home (visiting) team's current season winning percentage prior to the game
HWP10(VWP10)	the home (visiting) team's winning percentage over its previous 10 games
HDL(VDL)	dummy variable of value one if the home (visiting) team is the division leader at game time, zero otherwise.
HSTRK(VSTRK)	the number of consecutive games either won or lost by the home (visiting team prior to the game
HDS82(VDS82)	the home (visiting) team's divisional standing the previous year, 1982.
HWP82(VWP82)	the home (visiting) team's overall winning percentage in the previous season, 1982.
HRDW(VRDW)	the home (visiting) team's recent success of winning a division title as measured using a dummy variable which has a value of two if the team won their division within the last four years, a value of one if the team won their division within the last five to nine years, and zero otherwise.
HDC82(VDC82)	dummy variable of one if the home (visiting) team won its division in 1982, zero otherwise.
HLC82(VLC82)	dummy variable of one if the home (visiting) team won its league championship in 1982, zero otherwise.
HWSC82(VWSC82)	dummy variable of one if the home (visiting) team was the World Series champion in 1982, zero otherwise.

Offensive Performance Measures

HBA(VBA)	the current team batting average of the home (visiting) club prior to the game
HRSG(VRSG)	the current number of runs scored per game by the home (visiting) team prior to the game
RSG	the sum of the current number of runs scored by the home and visiting teams prior to the game
HHRG(VHRG)	the current number of home runs per game by the home (visiting) team prior to the game
HRG	the sum of the current number of home runs per game of the home and visiting teams prior to the game
HSBG(VSBG)	the current number of stolen bases per game by the home (visiting) team prior to the game
SBG	the sum of the current number of stolen bases per game of the home and visiting teams prior to the game
HSL(VSL)	the current team slugging average of the home (visiting) club prior to the game
HBA10(VBA10)	the team batting average of the home (visiting) club in its previous 10 games
HRSG10(VRSG10)	the number of runs scored per game by the home (visiting) team in its previous 10 games
RSG10	the sum of the number of runs scored per game of the home and visiting teams in their previous 10 games respectively
HHRG10(VHRG10)	the number of home runs per game of the home (visiting) team in its previous 10 games
HRG10	the sum of the number of home runs per game of the home and visiting teams in their previous 10 games respectively
HSBG10(VSBG10)	the number of stolen bases per game of the home (visiting) team in its previous 10 games
SBG10	the sum of the number of stolen bases per game of the home and visiting teams in their previous 10 games respectively

HSL10(VSL10)	the team slugging average of the home (visiting) club in its previous 10 games

Characteristics and Performance Measures of Starting Pitchers

Personal Characteristics

HMINOR(VMINOR)	dummy variable of one if the scheduled starting pitcher of the home (visiting) team is Black or Latin American, zero otherwise
HBLK(VBLK)	dummy variable of one if the scheduled starting pitcher of the home (visiting) team is Black, zero otherwise

Performance Measures

HIP(VIP)	the total number of innings pitched in the current season by the home (visiting) team's scheduled starting pitcher prior to the game
HSO(VSO)	the total number of strikeouts in the current season by the home (visiting) team's scheduled starting pitcher prior to the game
HWML(VWML)	the total number of wins less losses in the current season by the home (visiting) team's scheduled starting pitcher prior to the game
HDEC(VDEC)	the total number of decisions (games where the pitcher is designated as the winning or losing pitcher) in the current season by the home (visiting) team's scheduled starting pitcher prior to the game
HWPCT(VWPCT)	the current winning percentage (total wins as a percentage of total decisions) of the home (visiting) team's scheduled starting pitcher prior to the game
HSOW(VSOW)	the current strikeout-to-walk ratio of the home (visiting) team's scheduled starting pitcher prior to the game
HERA(VERA)	the current earned-run-average (ERA) of the home (visiting) team's scheduled starting pitcher prior to the game

HSOG(VSOG)	the number of strikeouts per nine innings in the current season by the home (visiting) team's scheduled starting pitcher prior to the game
HBBG(VBBG)	the number of walks issued per nine innings in the current season by the home (visiting) team's scheduled starting pitcher prior to the game
HCIP(VCIP)	total career innings pitched in the Major Leagues by the home (visiting) team's scheduled starting pitcher prior to the 1983 season
HCSO(VCSO)	total career strikeouts in the Major Leagues by the home (visiting) team's scheduled starting pitcher prior to the 1983 season
HCW(VCW)	total career wins in the Major Leagues by the home (visiting) team's scheduled starting pitcher prior to the 1983 season
HCWML(VCWML)	total career wins minus losses record in the Major Leagues of the home (visiting) team's scheduled starting pitcher prior to the 1983 season
HCSOW(VCSOW)	the career strikeout-to-walk ratio in the Major Leagues of the home (visiting) team's scheduled starting pitcher prior to the 1983 season
HCERA(VCERA)	the career earned-run-average in the Major Leagues of the home (visiting) team's scheduled starting pitcher prior to the 1983 season
HCWPCT(VCWPCT)	the career winning percentage in the Major Leagues of the home (visiting) team's scheduled starting pitcher prior to the 1983 season
HW82(VW82)	the total number of wins by the home (visiting) team's scheduled starting pitcher in the 1982 season
HL82(VL82)	the total number of losses by the home (visiting) team's scheduled starting pitcher in the 1982 season
HWML82(VWML82)	the number of wins less losses by the home (visiting) team's scheduled starting pitcher in the 1982 season
HWPCT82(VWPCT82)	the winning percentage of the home (visiting) team's scheduled starting pitcher in the 1982 season

Managerial Quality Measures

HGM(VGM)	total career games managed in the Major Leagues by the home (visiting) team's manager prior to the 1983 season
DIFGM	the difference in the number of career games managed in the Major Leagues of the home and visiting team's managers (i.e. HGM minus VGM)
HMCWP(VMCWP)	the career winning percentage in the Major Leagues of the home (visiting) team's manager prior to the 1983 season
DIFMCWP	the difference in career winning percentage in the Major Leagues of the home and visiting team's managers (i.e. HMCWP minus VMCWP)

Uncertainty of Outcome Measures

ADIFLR	the absolute value of the difference in current league rankings between the home and visiting teams prior to the game
ADIFW	the absolute value of the difference in winning percentages of the home and visiting teams prior to the game
ADIFW10	the absolute value of the difference in winning percentages over the previous 10 games played of the home and visiting teams prior to the game
HOOPR(VOOPR)	dummy variable of one if the home (visiting) team is mathematically eliminated from the divisional pennant race, zero otherwise
PERIOD	dummy variable of one if the game was played during ninth week of the season or after, zero otherwise

Residual Preference Factors

WKND	dummy variable of one if the game was played on the weekend (i.e. Friday, Saturday or Sunday), zero otherwise
DH	dummy variable of one if the game was scheduled as part of a doubleheader, zero otherwise

AFT	dummy variable of one if the game was played during the afternoon, zero otherwise
OWNDIV	dummy variable of one if the home and visiting team's play in the same division, zero otherwise
AL	dummy variable of one if the game was played in the American League, zero if played in the National League
STAR	superstars, total number of superstars in a game plus one, a qualitative assessment by the author. Distribution of superstars: California, 3 superstars; Baltimore, Boston, 2 superstars each; Atlanta, Cincinnati, Kansas City, Los Angeles, Milwaukee, Montreal, Oakland, Philadelphia, St. Louis, San Diego, 1 superstar each; remaining teams, no superstars.

<u>Correlation Matrices of Team Quality Variables</u>

Team Performance Measures

(1)	LATTEN	1									
(2)	LHLRK	-.45	1								
(3)	LHDRK	-.44	.86	1							
(4)	HGBL	-.45	.61	.64	1						
(5)	HWP	.39	-.75	-.68	-.46	1					
(6)	HDL	.26	-.67	-.79	-.42	.48	1				
(7)	HSTRK	.10	-.22	-.22	-.15	.26	.16	1			
(8)	LHWP10	.20	-.42	-.37	-.29	.46	.30	.51	1		
(9)	LHDS82	-.44	.42	.44	.35	-.38	-.27	-.05	-.06	1	
(10)	LHWP82	.45	-.44	-.42	-.41	-.81	.36	.26	.08	.15	1
(11)	HRDW	.41	-.41	-.39	-.32	-.64	.50	.34	.22	.05	.10
(12)	HDC82	.26	-.21	-.19	-.17	-.80	.44	.44	.24	.12	.00
(13)	HLC82	.18	-.05	-.05	-.12	-.54	.33	.30	.68	.10	.03
(14)	HWSC82	.12	-.03	-.12	-.10	-.38	.20	.21	.47	.69	.08
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

(11)	HRDW	1			
(12)	HDC82	-.04	1		
(13)	HLC82	.02	-.01	1	
(14)	HWSC82	.10	-.02	-.07	1
		(11)	(12)	(13)	(14)

(1)	LATTEN	1									
(2)	LVLRK	-.08	1								
(3)	LVDRK	-.07	.86	1							
(4)	VGBL	-.08	.60	.66	1						
(5)	VWP	.06	-.73	-.66	-.44	1					
(6)	VDL	.06	-.70	-.81	-.45	.48	1				
(7)	VSTRK	-.03	-.27	-.25	-.19	.28	.23	1			
(8)	VWP10	-.01	-.46	-.41	-.37	.49	.33	.54	1		
(9)	LVDS82	-.11	.41	.44	.35	-.30	-.28	-.05	-.11	1	
(10)	LVWP82	.11	-.43	-.43	-.40	-.81	.32	.27	.11	.22	1
(11)	VRDW	.13	-.39	-.37	-.30	-.64	.50	.31	.19	.07	.14
(12)	VDC82	.06	-.21	-.21	-.19	-.80	.44	.44	.17	.13	-.01
(13)	VLC82	.05	-.03	-.04	-.14	-.54	.33	.30	.68	.05	.02
(14)	VWSC82	.04	-.03	-.10	-.14	-.37	.20	.21	.47	.69	.04
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

(11)	VRDW	1			
(12)	VDC82	-.01	1		
(13)	VLC82	.02	.02	1	
(14)	VWSC82	.04	-.01	.00	1
		(11)	(12)	(13)	(14)

Offensive Performance Measures

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1)	LATTEN	1									
(2)	LHBA	.26	1								
(3)	HRSG	.28	.68	1							
(4)	HHRG	.25	.22	.48	1						
(5)	HSBG	-.03	-.09	-.18	-.25	1					
(6)	LHSL	.35	.79	.75	.69	-.19	1				
(7)	LRSG	.22	.48	.71	.31	-.18	.54	1			
(8)	HRG	.24	.17	.34	.67	-.20	.48	.44	1		
(9)	SBG	-.06	-.11	-.18	-.25	.72	-.22	-.24	-.27	1	
(10)	LHBA10	.18	.55	.42	.18	-.09	.48	.33	.17	.13	1
(11)	HRSG10	.18	.41	.54	.29	-.13	.46	.39	.24	.15	.74
(12)	HHRG10	.18	.15	.32	.56	-.21	.41	.22	.43	.19	.28
(13)	HSBG10	.04	-.11	-.19	-.27	.69	-.22	-.18	-.22	.46	.05
(14)	LHSL10	.22	.46	.48	.41	-.16	.59	.36	.33	.18	.81
(15)	LRSG10	.13	.31	.39	.20	-.17	.34	.52	.32	.25	.54
(16)	HRG10	.16	.13	.27	.42	-.21	.33	.33	.59	.27	.21
(17)	SBG10	-.01	-.14	-.20	-.24	.50	-.23	-.31	-.35	.70	-.02

		(11)	(12)	(13)	(14)	(15)	(16)	(17)
(11)	HRSG10	1						
(12)	HHRG10	.52	1					
(13)	HSBG10	.08	-.11	1				
(14)	LHSL10	.80	.71	-.02	1			
(15)	LRSG10	.71	.33	.00	.57	1		
(16)	HRG10	.38	.73	-.12	.52	.48	1	
(17)	SBG10	-.01	-.13	.70	-.09	-.06	-.21	1

(1)	LATTEN	1									
(2)	LVBA	.07	1								
(3)	VRSG	.03	.73	1							
(4)	VHRG	.08	.28	.40	1						
(5)	VSBG	-.05	-.05	-.13	-.15	1					
(6)	LVSL	.09	.83	.74	.71	-.14	1				
(7)	LRSG	.22	.59	.76	.30	-.16	.60	1			
(8)	HRG	.24	.21	.33	.69	-.18	.50	.44	1		
(9)	SBG	-.06	-.11	-.16	-.13	.71	-.17	-.24	-.27	1	
(10)	LVBA10	.04	.53	.43	.20	-.12	.48	.32	.17	.19	1
(11)	VRSG10	.01	.36	.52	.33	-.20	.44	.37	.24	.22	.74
(12)	VHRG10	.05	.11	.32	.57	-.20	.40	.25	.43	.20	.30
(13)	VSBG10	-.05	-.17	-.29	-.30	.74	-.30	-.26	-.26	.52	-.04
(14)	LVSL10	.05	.41	.46	.42	-.19	.55	.34	.32	.23	.83
(15)	LRSG10	.13	.26	.38	.26	-.19	.33	.52	.32	.25	.55
(16)	HRG10	.16	.09	.23	.42	-.18	.30	.33	.59	.27	.19
(17)	SBG10	-.01	-.20	-.28	-.26	.51	-.30	-.31	-.35	.70	-.10
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

(11)	VRSG10	1						
(12)	VHRG10	.50	1					
(13)	VSBG10	-.05	-.17	1				
(14)	LVSL10	.79	.70	-.12	1			
(15)	LRSG10	.72	.35	-.08	.57	1		
(16)	HRG10	.32	.70	-.17	.47	.48	1	
(17)	SBG10	-.10	-.17	.69	-.16	-.06	-.21	1
		(11)	(12)	(13)	(14)	(15)	(16)	(17)

Characteristics and Current Performance Measures of Starting Pitchers

(1)	LATTEN	1									
(2)	HMINOR	.06	1								
(3)	HBLK	-.07	.29	1							
(4)	HIP	.14	.04	.00	1						
(5)	HSO	.13	.10	.06	.91	1					
(6)	HWML	.19	.05	.03	.22	.23	1				
(7)	HDEC	.12	.04	-.02	.97	.88	.17	1			
(8)	HWPCT	.17	.08	.03	.08	.09	.67	.05	1		
(9)	HSOW	.08	.10	.13	.03	.17	.20	.03	.20	1	
(10)	HERA	-.13	-.05	-.04	-.18	-.21	-.31	-.13	-.50	-.25	1
(11)	HSOG	.03	.19	.14	.04	.35	.07	.04	.06	.48	.12
(12)	HBBG	-.15	.00	-.03	-.19	-.12	-.21	-.18	-.26	-.57	.37
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

(11)	HSOG	1	
(12)	HBBG	.11	1
		(11)	(12)

(1)	LATTEN	1									
(2)	VMINOR	.00	1								
(3)	VBLK	-.02	.31	1							
(4)	VIP	.07	.06	.01	1						
(5)	VSO	.06	.11	.07	.91	1					
(6)	VWML	.02	.04	.06	.22	.24	1				
(7)	VDEC	.07	.07	.00	.97	.87	.18	1			
(8)	VWPCT	.01	.06	.04	.11	.11	.68	.09	1		
(9)	VSOW	-.01	.07	.10	.01	.16	.17	.01	.20	1	
(10)	VERA	-.02	-.03	-.03	-.14	-.16	-.29	-.10	-.42	-.23	1
(11)	VSOG	-.03	.14	.14	.07	.39	.07	.05	.03	.47	.06
(12)	VBBG	-.05	-.03	-.02	-.19	-.13	-.20	-.18	-.26	-.57	.43
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

(11)	VSOG	1	
(12)	VBBG	.08	1
		(11)	(12)

Characteristics and Past Performance Measures of Starting Pitchers

(1)	LATTEN	1									
(2)	HMINOR	.06	1								
(3)	HBLK	-.07	.29	1							
(4)	HCIP	.11	-.13	.05	1						
(5)	HW82	.17	.03	-.03	.44	1					
(6)	HL82	.03	.00	.01	.27	.59	1				
(7)	HWML82	.17	.04	-.04	.25	.61	-.28	1			
(8)	HWPCT82	.08	-.05	-.02	.14	.42	-.25	.73	1		
(9)	HCSO	.10	-.12	.08	.96	.40	.24	.24	.15	1	
(10)	HCW	.12	-.14	.07	.99	.45	.26	.27	-.34	.96	1
(11)	HCERA	-.15	-.03	-.06	-.34	-.33	-.09	-.31	.22	-.35	-.35
(12)	HCWML	.11	-.09	.07	.74	.39	.10	.36	.17	.75	.80
(13)	HCSOW	.10	-.04	.12	.45	.31	.22	.16	.70	.52	.46
(14)	HCWPCT	.09	-.14	-.04	.22	.32	-.03	.41	.70	.20	.23
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

(11)	HCERA	1			
(12)	HCWML	-.35	1		
(13)	HCSOW	-.43	.48	1	
(14)	HCWPCT	-.42	.40	.32	1
		(11)	(12)	(13)	(14)

(1)	LATTEN	1									
(2)	VMINOR	.00	1								
(3)	VBLK	-.02	.31	1							
(4)	VCIP	-.01	-.06	-.01	1						
(5)	VW82	.03	.08	-.05	.45	1					
(6)	VL82	-.03	.04	-.01	.28	.59	1				
(7)	VWML82	.06	.06	-.05	.26	.62	-.27	1			
(8)	VWPCT82	.01	-.02	-.04	.13	.42	-.25	.72	1		
(9)	VCSO	.00	-.11	.03	.96	.41	.23	.26	.13	1	
(10)	VCW	.01	-.13	.02	.99	.46	.26	.29	.15	.96	1
(11)	VCERA	.00	-.05	-.03	-.30	-.28	-.02	-.30	-.41	-.31	-.31
(12)	VCWML	.03	-.08	.02	.73	.41	.09	.40	.24	.74	.78
(13)	VCSOW	.01	-.02	.06	.39	.26	.14	.18	.23	.47	.41
(14)	VCWPCT	.01	-.10	-.07	.19	.28	-.07	.39	.73	.17	.20
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

(11)	VCERA	1			
(12)	VCWML	-.31	1		
(13)	VCSOW	-.45	.45	1	
(14)	VCWPCT	-.48	.38	.36	1
		(11)	(12)	(13)	(14)

Managerial Quality Measures

(1)	LATTEN	1						
(2)	HGM	.22	1					
(3)	VGM	.08	-.08	1				
(4)	DIFGM	.09	.74	-.74	1			
(5)	LHMCWP	.30	.34	-.05	.26	1		
(6)	LVMCWP	.07	-.04	.34	-.26	-.09	1	
(7)	DIFMCWP	.15	.24	-.25	.33	.74	-.73	1
		(1)	(2)	(3)	(4)	(5)	(6)	(7)

Uncertainty of Outcome Measures and Residual Preference Factors

(1)	LATTEN	1									
(2)	ADIFLR	-.08	1								
(3)	ADIFW	-.14	.48	1							
(4)	ADIFW10	.05	.20	.19	1						
(5)	PERIOD	.19	.03	-.34	.12	1					
(6)	HOOPR	-.23	.05	-.05	.04	.19	1				
(7)	VOOPR	-.11	.02	-.06	.03	.17	.56	1			
(8)	OWNDIV	.02	.07	.06	.04	.27	.21	.20	1		
(9)	AFT	.08	-.01	.04	.01	-.07	.02	-.01	.03	1	
(10)	WKND	.25	-.02	-.02	.02	-.02	.02	.02	-.02	.32	1
(11)	DH	.13	-.04	-.06	.00	.12	-.02	.00	.07	.20	.00
(12)	LSTAR	.37	-.06	-.07	-.02	.00	-.02	-.03	.01	-.05	.00
(13)	PRECIP	.01	.01	.01	.06	-.06	-.03	.00	.02	.03	.06
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

(11)	DH	1		
(12)	LSTAR	.02	1	
(13)	PRECIP	.13	.00	1
		(11)	(12)	(13)

APPENDIX IV

Table 4

Season Attendance Revenues, $ Millions

Team	Simulated Attendance Revenues			Actual Gate Receipts[1]
	Games Played		Accruing to Team	
	Home	Away		
Atlanta	14.62	10.91	14.24	12.1
Chicago (NL)	8.16	9.12	8.26	8.6
Cincinnati	7.36	10.99	7.72	8.8
Houston	8.66	8.50	8.65	9.9
Los Angeles	18.39	10.34	17.58	19.9
Montreal	10.70	10.60	10.69	11.6
New York (NL)	8.82	8.71	8.81	8.2
Philadelphia	13.07	10.92	12.85	15.3
Pittsburgh	8.29	9.40	8.40	7.5
San Diego	8.94	10.95	9.14	9.3
San Francisco	5.17	10.81	5.74	8.1
St. Louis	9.76	10.60	9.84	13.9
Baltimore	18.11	11.92	16.88	10.7
Boston	10.93	12.63	11.27	10.8
California	11.28	13.39	11.70	13.9
Chicago (AL)	10.63	8.56	10.22	10.6
Cleveland	6.10	7.66	6.41	5.5
Detroit	11.46	8.77	10.92	10.8
Kansas City	9.05	10.67	9.37	10.5
Milwaukee	9.11	10.54	9.40	13.6
Minnesota	6.07	8.74	6.61	5.6
New York (AL)	15.81	10.92	14.83	15.1
Oakland	6.81	10.10	7.47	6.6
Seattle	4.81	8.19	5.49	4.9
Texas	8.47	7.77	8.33	7.9
Toronto	9.90	8.77	9.67	9.5

[1] Data provided to the author by Roger G. Noll.

APPENDIX V

Calculations of Short Run Revenue and Operating Costs

1. Short Run Revenue

Club revenues in baseball accrue from gate receipts (regular and post-season), broadcast fees, and concessions, parking and other miscellaneous revenue. Regular season gate receipts for existing teams and expansion teams of Kansas City (average) quality are given in columns (2) and (3) of Table 2. Post-season gate receipts accrue only to the four division pennant winners which were Los Angeles, Philadelphia, Baltimore and the Chicago White Sox. Net receipts from games played in the League Championship Series and the World Series are based on total attendance figures from all games played, club shares of game receipts, and average ticket price paid for World Series games.[1] The latter figure, roughly $25 per ticket, was derived from total paid attendance and total net receipts from games played in the World Series, and was used as average price paid for games in the League Championships Series since no gate receipt figures were available. Participants in the World Series each received 8.5% of net game receipts; this figure was also used to determine club shares for League Championship Series gate receipts. Club shares were worth

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[1] Each league championship series went five games with total attendance in the American League Series and National League Series reaching 195,748 and 223,918 respectively. Total attendance for the five World Series games was 304,139. Net receipts from the World Series totaled $7,652,103 of which 51% went towards the player's pool, 15% to the Commissioner's Office, and 8.5% shares to each of the American and National Leagues and the two participating clubs. Data from "For the Record," The Sporting News 31 Oct. 1983: 53.

$415,965 in the American League Championship Series, $475,826 in the National League Championship Series and $650,429 in the World Series.

Revenues from the sale of broadcast rights occur at two levels. First, each team receives an equal share of the national contract negotiated by the Commissioner's Office on behalf of the league clubs with the national television and radio networks. In 1983, national rights totalled $58 million or $2.231 million per club.[2] Local rights, which are negotiated by each club individually and mostly cover away games, vary widely among the clubs. Actual local broadcast fees for 1983 are shown in column (1) of Table 5.[3] The value of local rights is generally determined by the size of the broadcast market. Adjustments were made to the figures in Table 5 (as given in column (2)) to

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[2] In 1983, the national broadcast and cable networks were all in the last year of multi-year pacts with Major League Baseball. The new contract that took effect in 1984 paid the Major League Central Fund $1.2 billion over six years. As a result, the sale of national rights jumped to $163 million annually or $6.269 million per club, representing an increase of 181 percent. This suggests the actual market value of national broadcasting rights in 1983 was likely higher than what baseball was paid.

[3] "Baseball 1983: Special Report," Broadcasting 28 Feb. 1983: 56.

reflect the actual market value of local rights to existing teams accurately.[4]

Under the two expansion scenarios presented, the existing national contract would be divided equally among the twenty-six existing teams and the two expansion franchises; hence, national rights would decline from $2.231 million to $2.071 million per team. Local broadcast fees are assumed to be worth $2.5 million to each expansion club; these fees are approximately the average for existing clubs not located in the larger broadcast markets like New York, Los Angeles, Chicago, and Philadelphia.[5]

In 1983, revenues from concession sales, parking and other miscellaneous sources of income totalled $89,076,000. Assuming these revenues are directly related to the level of home attendance, each existing club's share was based on its share of overall home attendance. For expansion cities, these revenues were assumed to be

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[4] Approximatley one-half of the teams in baseball are either owned, all or in part, by broadcasters or use an affiliated corporation to market their broadcasting rights. Therefore, fees paid to the team are not the result of arms-length dealings in a market, but are strategic decisions within the same corporation which have little to do with the actual value of those rights. The adjustments made are based on similar adjustments made by Noll in his report to the Major League Baseball Players Association on the financial viability of baseball in 1985.

[5] A strong argument can be made that local broadcast fees in Miami and Tampa-St. Petersburg, which would access the vast southern U.S. market, and in East Rutherford, located in the New York CMSA, would likely exceed $2.5 million. Therefore, the $2.5 million figure should be considered the minimum fee that franchises in these three locations would receive for local broadcast rights.

equal to 35% of gate revenues, reflecting the average among existing teams.

Table 5

Local Broadcast Rights, 1983

Team	Local Broadcast Fees ($ Millions)	
	Unadjusted (1)	Adjusted (2)
Atlanta	2.00	2.50
Baltimore	3.05	3.05
Boston	3.20	3.20
California	4.00	5.50
Chicago (AL)	3.40	5.00
Chicago (NL)	3.00	5.00
Cincinnati	2.10	2.10
Cleveland	3.40	2.00
Detroit	2.00	4.00
Houston	3.10	3.10
Kansas City	1.30	1.30
Los Angeles	3.10	6.00
Milwaukee	2.70	2.70
Minnesota	1.25	1.25
Montreal	7.30	7.30
New York (AL)	11.50	11.50
New York (NL)	10.50	10.50
Oakland	1.45	1.45
Philadelphia	7.00	7.00
Pittsburgh	2.16	2.16
San Diego	2.40	2.40
San Francisco	2.00	2.00
Seattle	1.20	1.20
St. Louis	1.70	2.30
Texas	5.50	5.50
Toronto	4.40	4.40

2. Operating Costs

The major costs associated with operating a major league baseball club can be categorized as: team costs, game costs, player development and training costs, sales and promotion costs, general and administrative expenses, and team replacement costs.[6] In 1983, player salaries accounted for 75% to 80% of team costs and 36% of total operating costs in the major leagues. In addition to being the single largest expense item, player salaries are also the principal source of the difference in cost among the clubs. Table 6 shows the average

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[6] Detailed descriptions of cost categories:

Team Costs - player salaries, salaries of the manager, coaches, trainers, and travel secretary, transportation and other road trip costs, hotels and meals, and a variety of miscellany.
Game Costs - stadium rental fees, salaries of stadium personnel, field maintenance and facility repair, utility costs, and security services.
Player Development and Training Costs - salaries of minor league personnel, scouts and player development directors, farm club expenses, minor league player salaries and expenses, spring training, and meal money.
Sales and Promotion Costs - salaries and commissions, publicity and advertising expenses
General and Administrative Expenses - costs of the front office including the owner's salary, bonuses, and travel and entertainment expenses.
Team Replacement Costs - amortization and depreciation of player contracts, the franchise and other intangible assets.

As described in G. Scully, The Business of Baseball (Chicago: University of Chicago, 1989) 123.

player salary by team for 1983 and, based on a roster size of 31 players per team, total player salary costs by team.[7]

Table 6

Average and Total Baseball Team Salaries, 1983

Team	Average $	Total $ millions
Atlanta	347,620	10.78
Baltimore	305,305	9.46
Boston	264,883	8.21
California	389,833	12.08
Chicago (AL)	291,114	9.02
Chicago (NL)	268,947	8.34
Cincinnati	239,068	7.41
Cleveland	242,134	7.51
Detroit	263,899	8.18
Houston	364,825	11.31
Kansas City	309,962	9.61
Los Angeles	288,555	8.95
Milwaukee	352,061	10.91
Minnesota	97,980	3.04
Montreal	353,357	10.95
New York (AL)	463,687	14.37
New York (NL)	306,253	9.49
Oakland	266,815	8.27
Philadelphia	442,165	13.71
Pittsburgh	314,769	9.76
San Diego	261,820	8.12
San Francisco	248,204	7.69
Seattle	118,875	3.69
St. Louis	259,393	8.04
Texas	180,848	5.61
Toronto	213,087	6.61

[7] Average player salary by team data from P. Staudohar, The Sports Industry and Collective Bargaining (New York: Cornell University. 1986) 31. Player roster size is set at twenty-five for much of the season except in September when it is expanded to forty. A roster size of thirty-one is used to calculate total team player salary costs because it yielded a figure for overall player salary costs approximately equal to that stated by both the Major League Baseball Players Association and the owners in R.G. Noll, Player Salaries Since the 1981 Agreement (Stanford University, 1985) 3.

In the attendance revenue simulations given in columns (2) and (3) of Table 2, non-franchise cities were assumed to have teams of Kansas City (average) quality, which translates into player salary costs of roughly $9.6 million.[8]

Of the remaining operating costs, only team costs net of player salaries, player development and training costs, and team replacement costs can be expected to affect "team quality". From an economic standpoint, however, team replacement costs are an indirect cost of operating a club. They are not out-of-pocket expenses and will, therefore, be ignored for the purpose of determining franchise viability.[9] The wide variation in team quality among the existing clubs should also reflect differences in player development and training costs, and non-player personnel salaries among the clubs. However, the only data available to the author was the average costs for these categories for the twenty-six existing clubs. As a result, the average costs for these categories is used for both existing teams

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[8] Average team player salary costs for all of Major League Baseball in 1983 was $8.89 million as given in P. Staudohar, The Sports Industry and Collective Bargaining (New York: Cornell University. 1986) 31.

[9] Noll (1985) states "...the accounting practices for depreciation are determined, for the most part, by tax law and bear little relation to economic reality ... with claimed deductions overstating the actual diminution in the assets of the team. ...The fact that depreciation and amortization overstate the extent to which a team's capital assets are actually 'used up' constitutes the extent of tax shelter in owning a team. ...The thrust of the preceding argument is that a large part of the amortization of intangible assets ought to be disregarded when estimating the long run financial viability of a team..."

and non-franchise cities. Game costs, sales and promotion costs, and general and administrative expenses are treated as fixed costs and are assumed to show no great variation between teams.[10] Therefore, the average costs for these categories, among the existing twenty-six clubs, are used in the calculation of total operating costs for existing teams and non-franchise cities. The average total costs of operating a baseball club in 1983, net of player salaries, is given in Table 7 below.[11]

Table 7

Total Operating Costs Per Team (Net of Player Salaries), 1983

Item	Cost ($000s)
Other Team Costs	2,409
Player Development	2,180
Spring Training	414
Stadium Operations	2,668
Sales	1,724
General and Administrative	1,996
Miscellaneous	192
Total	11,583

[10] As Scully (1989) notes "[w]hile some variability in these fixed costs is observed among clubs, particularly in the general and administrative expenses category, and tend to be higher for winning clubs, it is believed that this factor is explained by club attempts to disguise profits as costs."

[11] Data from G. Scully, The Business of Baseball (Chicago: University of Chicago, 1989) 118.

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