

# Inelastic Sports Pricing

Rodney Fort\*

*Department of Economics, Washington State University, Pullman, WA 99164-4741, USA*

**A recurrent finding in estimates of the gate demand for sports events is pricing in the inelastic portion of demand. With few exceptions, this finding has either been ignored or (rather poorly) explained away. In this paper, the recurrent outcome is detailed and the explanations given by past authors are discussed. Then, profit maximization theory is explored for its inelastic pricing implications. It ends up that the local TV revenue relationships between MLB teams satisfy the situation that theory predicts would generate inelastic gate pricing. This suggests two things. First, inelastic pricing is consistent with profit maximizing team behavior. Second, fuller specification of revenue functions will enhance future work in the area. Copyright © 2004 John Wiley & Sons, Ltd.**

## INTRODUCTION

Empirical work on sports attendance demand has almost uniformly found that teams do not set ticket prices in the elastic portion of gate demand. Some past authors have simply ignored this finding. Others have attempted to explain it away. Apparently, some of these authors were aware of an early literature that argued that sports teams do not maximize profits at all.<sup>1</sup>

Two (apparently forgotten, since I find no reference to them in any of the demand studies) early contributions by El Hodiri and Quirk (1974b, henceforth, EH-Q) and Heilmann and Wendling (1976, henceforth, H-W) make it clear that inelastic pricing should be expected in certain situations. The latter, extending the approach in the former, shows that there can be a trade-off between gate revenue and other elements in sports team revenue functions that would lead a profit maximizing team to price in the inelastic portion of gate demand.<sup>2</sup> (That non-ticket stadium revenues have become an increasingly important part of total revenues over time is documented in Table 1.) Thus, it has been known for nearly twenty-five years that profit maximizing sports team owners may price in the inelastic region of demand.

But the EH-Q and H-W results are for an admissions-only world. A more general specification of the team revenue function is in Fort and Quirk (1995, henceforth, F-Q) where teams choose talent to maximize profits from the production of winning sold both at the gate and on TV. Some minor rearrangement of the main F-Q first-order condition shows how inelastic pricing of winning on the field can result from a particular relationship between local television revenues in a league.

This paper proceeds as follows. First, past works on attendance demand are reviewed and it is argued that their explanations for non-elastic pricing are not very insightful. Second, the theory of inelastic pricing is presented. In the more general revenue specification based on winning, a condition on individual team local TV revenues compared to the rest of the league's average local TV revenues is derived that can lead to inelastic pricing. Third, empirical analysis reveals that particular relationship holds in MLB. Conclusions round out the paper.

## THE RECURRENT EVIDENCE ON INELASTIC PRICING

A fairly extensive empirical literature reveals that sports teams price attendance in the unitary to inelastic demand range. Not all researchers

\*Correspondence to: Department of Economics, Washington State University, Pullman, WA 99164-4741, USA. E-mail: fort@mail.wsu.edu

**Table 1. Stadium Revenues as a Percent of Total Operating Revenues in MLB**

Team	Percent 1990	Percent 1996	% Change
Atl	9.0%	12.5%	-11.9%
Bal	10.6%	25.2%	90.9%
Bos	10.1%	14.0%	84.2%
Cal	11.1%	19.0%	50.4%
ChiC	8.3%	18.0%	164.2%
ChiW	13.1%	32.1%	127.6%
Cin	10.3%	17.3%	50.5%
Cle	7.5%	24.6%	221.3%
Det	2.9%	11.2%	320.1%
Hou	7.0%	26.5%	229.7%
KC	30.1%	28.5%	-21.3%
LA	15.5%	21.0%	59.9%
Mil	4.4%	13.8%	426.7%
Min	7.8%	13.7%	55.1%
Mon	7.1%	15.5%	65.7%
NYM	19.0%	16.9%	29.5%
NYN	6.7%	14.0%	94.9%
Oak	17.1%	18.3%	16.0%
Phil	14.1%	15.8%	13.8%
Pit	10.5%	9.8%	84.5%
SD	13.6%	17.6%	69.0%
SF	11.0%	27.8%	68.5%
Sea	9.4%	21.2%	38.3%
StL	9.7%	19.3%	120.6%
Tex	13.1%	20.6%	121.6%
Tor	10.6%	9.9%	-58.3%
Aves.	11.1%	18.8%	96.6%

Source: Adapted from *Financial World*, various years. Stadium shares for Colorado and Florida in 1996 were 25.0% and 13.1%, respectively.

recognize their finding and all that do attempt to explain it away. The approach in this section is to detail these past findings and evaluate the explanations that are offered.

Demmert (1973), on data covering the period 1951–1969, reports a point elasticity estimate of  $-0.93$  for both leagues in MLB, overall, evaluated at the averages of price and attendance.<sup>3</sup> He notes that this is essentially pricing at the unitary elastic point on the demand curve, and argues that this would be expected if the marginal cost of letting additional fans through the gate is close to zero (profit maximization and revenue maximization are equivalent since marginal costs are zero).

But this is a very limited observation. Once teams have chosen quality, and incurred the fixed costs that comprise the bulk of short run total costs, it is true that maximizing total revenue is the object of the game. But this is only true because stadium size and the team roster have been chosen prior to play. In the long run, attendance surely is not what sports teams produce for sale at the gate. Pro sports team balance sheets clearly organize

costs and revenues around the production of winning, rather than letting one more person through the gate. And, in the long run, the marginal costs of winning can be very high indeed (a marvelous exercise aimed at teaching undergraduate students the marginal cost function of teams can be found in Bruggink, 1993, and a full discussion is in Fort, 2003). So, in the short run, Demmert doubtless is correct, but the marginal cost of output in the long run cannot be zero since the team is not producing clicks of the turnstiles.

Noll (1974) reported price estimates in the inelastic region of attendance demand for MLB, with a point elasticity estimate of  $-0.14$ . Noll offered three explanations. First, pricing at the unitary point was within plus or minus a standard deviation. Second, larger parks have a greater proportion of seats with poor views than smaller parks and average ticket prices cannot capture this variation. Third, elasticity estimates are understated since ticket price is only a portion of the over-all costs of attendance.

Noll's first explanation really just echoes Demmert's and falls victim to the same criticism. The second explanation doubtless is true, but remains a question of degree. Noll's average price was determined as follows:

$$w_i = \sum_{s=1}^S p_s \gamma_s, \quad (1)$$

where  $p_s$  is the price of seat type  $s$ ,  $\gamma_s$  is the proportion of seat type  $s$ , and  $w_i$  becomes the weighted average ticket price for team  $i$ . And the only reason that the weighted sum in (1) would not capture the idea that larger parks have a larger proportion of bad seats is if price by seat type did not adjust for this fact across teams. But they do. Presumably, then, this type of measurement captures quality variation in percentage terms. The last point perhaps is Noll's strongest, given his analysis. But, later researchers do hold other (travel and/or general opportunity) costs constant and still obtain similar elasticity estimates.<sup>4</sup>

Siegfried and Eisenberg (1980) found a point price elasticity estimate of  $-0.25$  for minor league professional baseball but did not discuss the implications. In a model that explicitly held travel costs constant, Bird (1982) found an elasticity estimate of  $-0.22$  for total league football (soccer) attendance but also found that attendance does not vary within divisions based on price. Bird just

calls this outcome 'reasonable' and offers no explanation. But it is important to emphasize that his model held travel costs constant. This casts doubt on Noll's earlier conjecture that omitting travel costs was partly responsible for his finding of inelastic pricing. Jennett (1984) found attendance completely unresponsive to price for Scottish football (soccer) and, without further discussion, blamed it on the fact that an average across the variety of available seat prices clouded the issue.

In their review of work to their date of writing, Cairns *et al.* (1985) summarized the results of attendance demand estimation as follows (p. 15):

The price elasticity results can be given two interpretations. First, that there is substantial evidence in favor of demand being highly price inelastic. Second, that the data problems of one form or another have led to the true relationship not being identified. A review of these problems tends to support the second interpretation.

They also repeated Noll's earlier idea that admission is only part of the cost of attendance, so that these elasticity estimates were under-stated. But one of the works they did review, Bird (1982), did hold travel cost constant and yielded the same result. On their final decision that 'data problems of one form or another' were responsible, the data are what they are. The upshot of such an observation, essentially, is that attendance demand estimation be forsaken all together.

Medoff (1986) found that the coefficient on price was zero in his analysis of the 1980 MLB season. His explanation (p. 152) returned to Noll's earlier argument about how average prices cannot capture the variation in seat quality. But, like Noll's measurement, Medoff's price measure was a weighted average by seat type, as in (1), which, presumably, accounts for this type of quality variation. Scully (1989) provided evidence that teams price in the inelastic range, with estimated point elasticity of  $-0.61$ . And he, too, adopted the Demmert/Noll line that pricing at the unitary elastic point was reasonable.

But Scully's findings do suggest that seat quality can have other impacts on attendance demand estimates. Directly, Scully (1989, p. 103) shows that there are vast differences between clubs in the number and proportion of season and single game ticket sales (season range 8.6% to 61%). Similarly,

there is wide variation in the number and proportion of business and individual ticket sales between clubs (business range 22.8% to 61.9%). Scully's finding means, for example, that loyal fans and others with a greater willingness to pay for reserved seats over a season have relatively more inelastic demand (Boston Red Sox fans in Scully's analysis) while 'fickle' fans have relatively less inelastic demand (L.A. Dodger fans in Scully's analysis). Indirectly, Scully's finding suggests that the degree of attendance demand inelasticity likely differs across type of seat, especially if most of the season ticket sales are in the higher priced seats. Overall, it would appear that both within- and between-club variation in fan sensitivity to ticket price and win record probably have yet to be captured in attendance demand analysis.

Burdekin and Idson (1991) found attendance completely unresponsive to price in the NBA. They labeled this finding (p. 184) 'consistent with similar findings...in most previous attendance studies,' and discussed it no further. Fort and Quirk (1996) also produced attendance regressions for MLB (1975–1988), and their results play a large role in the empirical work in this paper. While they were interested in the results for other reasons, the reported average prices and attendance over their sample period, along with their coefficient estimate on price, yield point elasticity estimates (at the averages of attendance and price) of  $-0.43$  and  $-0.50$  for the AL and NL, respectively. And Fort and Rosenman (1999a, 1999b) estimate a game-by-game attendance model, separately for the 1989 and 1990 seasons. Again, they were not interested in the implications of their findings for inelastic pricing but the reports in their paper allow one to calculate price elasticity estimates averaging  $-0.36$  and  $-0.14$  for the AL and NL, respectively, over the two years considered. It also is important to note that these findings occur even though their analysis held the opportunity costs of attendance constant.

All-in-all, that sports teams price in the unitary to inelastic portion of attendance demand has been a remarkably consistent finding for nearly thirty years. Some of the arguments against this finding are weak (bad data, statistical reasonableness based on a limited definition of marginal costs) and some have subsequently been found not to change the result (inclusion of travel and/or other opportunity costs of attendance). But the finding remains and the implications are clear. The

remainder of this paper explores profit maximization models for their implications about inelastic pricing.

### PROFIT MAXIMIZING SPORTS TEAMS AND INELASTIC PRICING

After Rottenberg (1956) first brought theory to bear on team sports, subsequent developments all follow Demmert (1973) and El Hodiri and Quirk (1971, 1974a). Given the theoretical literature's subsequent fascination with competitive balance, it is no wonder that the two papers that continued to explore pricing choices by sports teams have been all but forgotten.

It is worth resurrecting the original EH-Q and H-W theory just for the sake of reacquainting researchers with it and for the insight it provides in the gate-world context. The model used here will be more general than their models, and their results will be noted where appropriate.

Let attendance demand be the usual one for a sports team,  $x = x(p)$ , where  $x$  is ticket sales and  $p$  is price of a ticket and the team has market power,  $x'(p) < 0$ . Team quality is held constant in this short-term demand function. Let  $z(p)$  be other revenues on a per attendance basis. These could be concession revenues, parking fees or other on-site purchases made by fans. While H-W explicitly treat  $z(p)$  as revenues going to the team owner because they own the facility, there is no reason to exclude all revenues that are allowed under a lease arrangement between the team owner and a public host. Let  $r(p)$  be the rental rate charged by the owner of the stadium.<sup>5</sup> Under this specification, net non-ticket revenues are  $s(p) = z(p) - r(p)$ , the operating subsidy to owners over and above their ticket revenues.

The firm's problem is to maximize profits subject to its capacity constraint,  $x(p) = X$ . The Lagrangean is:

$$L = [p + z(p) - r(p)]x(p) + \lambda[X - x(p)]. \quad (2)$$

First-order conditions, with primes denoting derivatives and subscripts indicating partial derivatives, are:

$$L_p = [1 + z'(p) - r'(p)]x(p) + [p + z(p) - r(p)]x'(p) - \lambda x'(p) = 0, \quad (3)$$

$$L_\lambda = X - x(p) = 0, \quad (4)$$

with  $\lambda = 0$  if  $x(p) < X$  and  $\lambda > 0$  if  $x(p) \geq X$ . Nearly all of the insights come from the case of no sell-outs, that is  $x(p) < X$ . Rearranging (2) with  $\lambda = 0$  yields:

$$-\frac{x'(p)p}{x(p)} = \frac{p[1 + z'(p) - r'(p)]}{[p + z(p) - r(p)]}. \quad (5)$$

But the left-hand side of (5) is just the price elasticity of demand, henceforth  $\varepsilon_p$ . Given (5), it is easy to see the essential EH-Q result. Letting  $z(p) = r(p) = 0$  for all  $p$ , from (5), we find  $\varepsilon_p = 1$ . This EH-Q result yields the following proposition.

#### Proposition 1 (EH-Q):

In an admissions-only world, with no rental rate, marginal costs equal to zero, and attendance below capacity, a profit maximizing team prices at the unit elastic point on the demand for tickets.

H-W extend this basic idea first to the case of a constant non-ticket revenue per admission,  $z(p) = z > 0$ , without any rental rate,  $r(p) = 0$  for all  $p$ . Again, from (5), for this case it is clear that

$$\varepsilon_p = \frac{p}{p + z(p)} < 1 \text{ for } z(p) = z > 0.$$

H-W then move on to the case of a constant rental rate  $r(p) = r > 0$  for all  $p$ , but with  $z(p) = 0$  for all  $p$ . Our old friend (5) yields

$$\varepsilon_p = \frac{p}{p - r(p)} > 1 \text{ for } r(p) > 0.$$

H-W find these two results sufficient to justify the following conclusions, stated in the form of a proposition.

#### Proposition 2 (H-W):

In an admissions-only world, if the team owner has rights to other revenues per attendance, with attendance below capacity, a profit maximizing team prices in the inelastic region of the demand for tickets. A positive constant rental rate per attendance pushes price higher than one would observe without a rental rate (ultimately, back to the elastic region of demand).

H-W also argue that a conditional rental rate that kicks in at some threshold level of attendance does not alter the team owner's choice. Finally, what of choices at the capacity constraint? Comparing their results to the basic EH-Q outcome, H-W note that all prices converge to the same price whenever a team is at capacity.

This earlier theory only covers the case of teams selling admission at the gate. While this technically is not true of any sport since radio broadcasts became prevalent, local broadcast revenues were a very small proportion of total revenues in MLB during much of the time period of the earlier empirical work in the last section. Stadiums were predominantly privately owned as well, entitling owners to attendance-related revenue. And in the case of European sports analyses, gate also dominates the revenue picture. The recurrent unitary to inelastic demand findings in those studies actually is no surprise given the EH-Q and H-W theoretical results.

More recently, this previous theory would seem most appropriate for the NFL, minor league sports, and so-called ‘non-revenue’ sports in college. Local broadcast revenues are quite limited in these endeavors. This is not to downplay the potential importance of the theory in these leagues. To the contrary, since so many more cities have minor league and college teams than have major league teams, the possible magnitude of importance from the social perspective may be immense. And the insights to be had from the interplay of various lease-granted revenues may be piercing for the NFL.<sup>6</sup>

To analyze the more modern findings of demand inelasticity, let’s move on to a broader definition of revenue. Fort and Quirk (1995, p. 1273, expression (12)) arrive at the following first-order condition in their general theoretical treatment where talent (winning) is the choice variable and winning is sold at the gate and on local and national TV, with gate revenue sharing:

$$MRG^i = \frac{c - \alpha MRT^i - (1 - \alpha) AVE(MRT)^{j \neq i}}{2\alpha - 1} \tag{6}$$

On the left-hand side of (6),  $MRG^i$  is marginal revenue at the gate for team  $i$ . On the right-hand side,  $c$  is the marginal cost of a unit of talent,  $\alpha$  equals the home team share of the gate,  $MRT^i$  is marginal local television revenue for team  $i$  and  $AVE(MRT)^{j \neq i}$  is the average of marginal local television revenue for all teams in the league except team  $i$ . Thus, according to (6), the owner of team  $i$  sets marginal gate revenue equal to a weighted sum of the marginal cost of talent, own marginal local TV revenue, and average marginal local TV revenues in the rest of the league. Clearly, the

theory yields a trade-off between attendance revenue and local TV revenues; the derivative of  $MRG^i$  with respect to either  $MRT^i$  or  $AVE(MRT)^{j \neq i}$  is less than zero.

In order to investigate the conditions for inelastic pricing on the part of teams in a general revenue setting, we seek conditions where  $MRG^i < 0$ , that is, the level of winning is chosen (and price would follow) in the inelastic portion of fan demand for winning. Setting the right-hand side of (6) less than 0 and rearranging yields:

$$MRT^i > \frac{c - (1 - \alpha) AVE(MRT)^{j \neq i}}{\alpha} \tag{7}$$

And Proposition 3 follows immediately:

**Proposition 3:**

If local marginal television revenue for team  $i$  is ‘large enough’ relative to the average marginal television in the rest of the league, then profit-maximizing team  $i$  prices in the inelastic region of attendance demand for winning.

**EMPIRICAL EVIDENCE**

No empirical tests for Propositions 1 and 2, inelastic pricing in the gate-only world, are offered in this paper. With data on ticket prices, other revenues, and rental rates, these propositions should be empirically approachable. At the major league level, ticket price data are readily available. Also, major league rental rates and some non-ticket revenues are available in lease contracts. But other non-ticket revenue tied to gate, such as concessions and parking, is not generally known, even though concession prices are annually surveyed. And I know of no source of similar data for minor league and non-revenue college sports short of surveying individual teams and athletic departments.

Moving on to the more general revenue context, Proposition 3 yields inelastic pricing for a particular relationship between a team’s marginal local TV revenue, the marginal cost of talent, and the average marginal local TV revenue for the rest of the teams in the league. Fort and Quirk (1996) give estimates of marginal gate revenue, marginal local TV revenue, and the marginal cost of talent for a few seasons for MLB, over the period 1975–1988. Along with the revenue sharing coefficients in

**Table 2. Calculation of Expression (7): MLB 1975–1988,  $c = \$38,716$  (s.e.  $\$22,418$ ),  $\alpha = 0.95$  (AL) and  $0.80$  (NL)**

	MRG <sup>i</sup>	MRT <sup>i</sup>	AVE <sup>j≠i</sup>	Inelastic	High $c$ inelastic
<i>AL</i>					
Bal	\$100,637	\$47,890	\$54,872	X	X
Bos	\$164,515	\$54,580	\$54,358	X	X
Cal	\$149,458	\$48,530	\$54,823	X	X
Chi	\$83,602	\$60,950	\$53,868	X	
Cle	\$71,794	\$49,140	\$54,776	X	
Det	\$150,035	\$57,170	\$54,158	X	X
KC	\$184,733	\$47,140	\$54,930	X	X
Mil	\$141,133	\$48,110	\$54,855	X	X
Min	\$110,735	\$50,180	\$54,696	X	X
NY	\$211,612	\$72,000	\$53,018	X	X
Oak	\$50,081	\$56,850	\$54,183	X	
Sea	\$70,239	\$54,000	\$54,402	X	
Tex	\$109,539	\$50,040	\$54,707	X	X
Tor	\$268,307	\$64,650	\$54,434	X	X
<i>NL</i>					
Atl	\$153,338	\$54,920	\$55,010	X	X
Chi	\$242,979	\$55,380	\$54,968	X	X
Cin	\$205,350	\$52,720	\$55,210	X	X
Hou	\$177,042	\$54,890	\$55,013	X	X
LA	\$307,912	\$55,240	\$54,981	X	X
Mon	\$241,508	\$54,720	\$55,028	X	X
NY	\$257,924	\$54,860	\$55,015	X	X
Phi	\$238,412	\$56,260	\$54,888	X	X
Pit	\$126,854	\$52,610	\$55,220	X	X
SD	\$149,694	\$56,430	\$54,873	X	X
SF	\$157,475	\$56,410	\$54,875	X	X
StL	\$235,020	\$55,590	\$54,949	X	X

Source: Calculated from results in Fort and Quirk (1996).

baseball, all of the data required to actually analyze Proposition 3 are at hand.

The Fort and Quirk (1996) estimates and the calculations for expression (7), for both the AL and NL in MLB, are shown in Table 2. Using the point estimate for the marginal cost of talent, the condition in (7) is satisfied for every team in MLB. Thus, it is no surprise in a more modern sample that teams price in the inelastic region of gate demand. Note that this finding is fairly robust given the estimate of the marginal cost of talent. Using the marginal cost of talent plus two standard errors only rejects the condition in (7) for 4 of the 26 teams (Chicago White Sox, Cleveland Indians, Oakland Athletics, and Seattle Mariners). All-in-all, inelastic pricing consistent with profit maximization appears easily supported in the general revenue function case.

## CONCLUSIONS

Inelastic ticket pricing for team sports has been a recurrent empirical finding for nearly thirty years. Explanations based on profit maximization range from statistical reasonableness given zero marginal costs to weak data. Still others argue that these results cast doubts on profit maximization as a useful analytical device.

In this paper, theoretical conditions are derived where inelastic pricing can happen as a result of profit maximization. There is a particular relationship between individual team local TV revenues, the marginal cost of talent and the average of the rest of the teams' local TV revenues that can lead to inelastic pricing at the gate. And one set of data shows that this particular relationship holds for MLB.

In the future, it would prove insightful to follow up on Propositions 1 and 2. Leagues without TV contracts would be prime candidates for analysis under this theory. Indeed, it would be interesting to analyze inelastic pricing in other non-sports markets. Essentially, anywhere that other revenues are tied to attendance and there is no local TV, one can expect inelastic pricing. Candidates are all entertainment events and expositions that charge entrance prices but also sell concessions.

Further, the Fort and Quirk (1995) model used to derive Proposition 3 is quite general. The revenue function does not explicitly include the H-W idea of other revenue related to gate and is gross of rental payments. In addition, it seems quite likely that there is an inverse relationship between pricing and the level of state and local government subsidy enjoyed by pro sports teams (Fort, 2004). Explicit theoretical treatment of these factors may lend further insight in team pricing behavior.

There may well be other explanations for the observed results from attendance demand estimation. El Hodiri and Quirk (1971, 1974b) offer a dynamic framework for sports team analysis. Perhaps a full stadium, today, enhances gate revenues over time. Or perhaps the answer lies in an application of the literature concerning why events are under-priced in the first place. In some sports, such as the NFL, sell-outs do appear to dominate the landscape. In this case, (6) simplifies to  $MRG^i = c/(2a-1)$  which is clearly greater than zero. NFL teams should be pricing in the elastic portion of their demand functions. So, in order to

find out why NFL teams tend to price for sell-outs, it would be useful to return to the gate-only world and its explicit specification of the interplay between attendance and non-ticket revenues tied to attendance. Since this interplay occurs either because of direct ownership or lease arrangements in publicly owned facilities, the NFL appears a good case for analysis since both types of ownership do exist.

### NOTES

1. Sports markets are an area of study where challenges to profit maximization have arisen. The earliest works are Davenport (1969), Sloane (1971), Brower (1977). Reviews by Cairnes *et al.* (1985) and Fort and Quirk (1995) put these works in context. In the European context, see Kesenne (1996, 2000) and in the general context of owner objectives, see Fort and Quirk (2002). Noll (1974, p. 125) notes the implications of abandoning profit maximization:

If demand were inelastic, the belief that team owners do not maximize profits would gain important support. An owner wanting both to build a winning team and to provide a public service would not only overspend on player development but would also engage in cost-plus pricing; that is, ticket prices would be set just to cover the operating costs of the team and its player development system. If this 'sportsman' attitude were characteristic of owners, prices would be lower for a team with greater attendance, regardless of quality, and over the long run the profitability of all viable teams, regardless of attendance, would be about the same (except, of course, for teams with very low attendance figures that have difficulty covering costs).

2. The idea that there are trade-offs between revenue sources in professional sports certainly is not new. For example, Demmert (1973) included the number of home games broadcast on TV in his original attendance model, finding an inverse relationship between broadcast games and home attendance. Zimbalist (1992, p. 53) makes an important observation about sports team pricing that actually sets the stage for the work done in this paper:

Gate revenues are maximized at that price where the price elasticity of demand for tickets is equal to one; that is, when the percent change in price (in one direction) is equal to the percent change in attendance (in other direction). Business strategy is actually a bit more complicated because what the team will really try to maximize is gate revenues *plus net income from concessions and parking* [emphasis added].

3. There is a problem somewhere with Demmert's report. His reported estimate for the price variable

for both leagues, overall, of  $-0.00196$  (p. 65), along with an average price over the sample of \$2.50 (quoted on p. 66) and an average attendance/capita of 0.43 (quoted in footnote 15, on p. 68) generate a point elasticity estimate (at these averages) of  $-0.011$ . More than likely, there is a typographical error somewhere along the line.

4. Noll (1974) also finds a negative relationship between price and admission for the NBA. He discusses the qualitative outcome but states that he is unwilling to discuss the quantitative (elasticity) result because of lack of confidence in the NBA pricing data. Since he is very critical of his own data, those reports are not included in this paper.
5. Rent could be a simple fixed amount. It could be a constant rate on attendance. But here it is specified as a function of the price charged by the team owner, allowing that it could be used as a strategic element in the relationship between teams and their hosts. The implications for the behavior of sports team, including pricing decisions, are in Fort (2004).
6. Again, Fort (2004) pursues the political implications on the gate-only world from a rational actor/public choice perspective.

### REFERENCES

- Bird P. 1982. The demand for league football. *Applied Economics* **14**: 637–649.
- Brower J. 1977. Professional sports team ownership: fun, profit and ideology of the power elite. *International Review of Sport Sociology* **12**(December): 79–98.
- Bruggink T. 1993. National pastime to dismal science: using baseball to illustrate economic principles. *Eastern Economic Journal* **19**(Summer): 275–294.
- Burdekin R, Idson T. 1991. Customer Preferences, Attendance and the Racial Structure of Professional Basketball Teams. *Applied Economics* **23**(January): 179–186.
- Cairns J, Jennett N, Sloane P. 1985. The economics of professional team sports: a survey of theory and evidence. *Journal of Economic Studies* **13**: 3–80.
- Davenport D. 1969. Collusive competition in major league baseball: its theory and institutional development. *American Economist* (Fall): 6–30.
- Demmert H. *The Economics of Professional Team Sports*. Lexington Books: Lexington, MA. 1973.
- El Hodiri M, Quirk J. 1971. An Economic Model of a Professional Sports League. *Journal of Political Economy* **79**(Nov/Dec.): 1302–1319.
- El Hodiri M, Quirk J. 1974a. The Economic Theory of a Professional Sports League. In *Government and the Sports Business*, Noll RG (ed.). Washington, D.C.: Brookings Institution.
- El Hodiri M, Quirk J. 1974b. Stadium Capacities and Attendance In Professional Sports. Social Science Working Paper 54. California Institute of Technology. October.

- Fort R. 2003. *Sports Economics*. Prentice Hall: Upper Saddle River, New Jersey.
- Fort R. 2004. Subsidies as incentive mechanisms in sports. *Managerial and Decision Economics* **25**: 95–102.
- Fort R, Quirk J. 1995. Cross-subsidization, Incentives, and Outcomes in Professional Team Sports. *Journal of Economic Literature* **XXXIII**(September): 1265–1299.
- Fort R, Quirk J. 1996. Over-Styled Exploitation: Monopsony versus Revenue Sharing in Sports Leagues. In *Baseball Economics: Current Research*, Fizek J, Gustafson E, Hadley L (eds). Praeger Publishers: Westport, CT.
- Fort R, Quirk J. 2002. Owner Objectives and Competitive Balance. Working Paper, Department of Economics, Washington State University, Pullman, WA.
- Fort R, Rosenman R. 1999a. Winning and Managing for Streaks, with Robert Rosenman, *Proceedings of the Joint Statistical Meetings of 1998, Section on Sports Statistics*, American Statistical Association: Alexandria, VA.
- Fort R, Rosenman R. 1999b. Streak management. In *Sports Economics: Current Research*, Fizek J, Gustafson E, Hadley L (eds). Praeger Publishers: Westport, CT.
- Heilmann RL, Wendling WR. 1976. A Note on Optimum Pricing Strategies for Sports Events. In *Management Science in Sports*, Machol RE, Ladany SP, Morrison DG (eds). North-Holland: Amsterdam.
- Jennett N. 1984. Attendances, uncertainty of outcome and policy in Scottish league football. *Scottish Journal of Political Economy* **31**(June): 176–198.
- Kesenne S. 1996. League management in professional team sports with win maximizing clubs. *European Journal for Sport Management* **2**(2): 14–22.
- Kesenne S. 2000. Revenue sharing and competitive balance in professional team sports. *Journal of Sports Economics* **1**(February): 56–65.
- Medoff M. 1986. Baseball Attendance and Fan Discrimination. *Journal of Behavioral Economics* **15**: 149–155.
- Noll R. 1974. Attendance and Price Setting. In *Government and the Sports Business*, Noll R. (ed.). Brookings Institution: Washington, D.C.
- Rottenberg S. 1956. The baseball players' market. *Journal of Political Economy* **64**(June): 242–258.
- Scully G. 1989. *The Business of Major League Baseball*. University of Chicago Press: Chicago, IL.
- Siegfried J, Eisenberg J. 1980. The demand for minor league baseball. *Atlantic Economic Journal* **8**(July): 59–69.
- Sloane P. 1971. The economics of professional football: the football club as a utility maximiser. *Scottish Journal of Political Economy* **18**(June): 121–145.
- Zimbalist A. 1992. *Baseball and Billions: A Probing Look Inside the Big Business of Our National Pastime*. Basic Books: New York.