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Subsidies As Incentive Mechanisms In Sports

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Applying even the most fundamental public choice principles suggests that subsidies to sports team owners will be inversely related to ticket prices. The primary aim of this paper is to demonstrate the impact of such an inverse relationship on the pricing behavior of owners. Theory shows that if either the rent or concessions/parking response by policy makers is elastic (percentage change in subsidy is greater than the percentage change in prices by teams), then the other one cannot be. A (very) cursory look at readily available NFL data lends support to the theory, at least for single-use stadiums. The outcomes here may inform any future analysis that extends the idea into the full-blown analysis of the politics of subsidies and for those interested in the rationing by waiting that often occurs at sports events. Copyright © 2004 John Wiley & Sons, Ltd.

INTRODUCTION

If politicians choose sports owner subsidies to encourage owners to set ticket prices below the profit maximizing level, then subsidies and ticket prices will be inversely related. The subsidy can come in terms of the amount of attendance-related revenue that the owner is allowed to keep, such as concession and parking revenue, or from a reduction in the rental rate on publicly provided stadiums and arenas. Both of these elements are handled in the stadium lease agreement.

Public finance lessons show that the potential size of subsidies, calculated from consumers' surpluses, increases as price falls (for example, Tresch, 1981, Chapter 10). And basic public choice logic, following Peltzman (1976), shows that an inverse relationship between prices and subsidies can be expected. Since owners typically price in the inelastic region of attendance demand, as long as subsidy payments more than offset the revenue reduction associated with lower ticket prices, owners will lower ticket prices. And politicians in control of subsidies will find it politically profitable to pay the subsidy since their other constituents, fans, like lower prices.

The theoretical analysis in this paper finds that, in a gate-only world with inelastic gate pricing (the typical pricing situation in sports), politicians are constrained in their ability to manage subsidies to team owners. For example, if the subsidy response in terms of concession and parking revenues by politicians to a change in ticket prices is elastic, then only an inelastic rental rate response can be chosen. Otherwise, inelastic gate pricing will be sacrificed. But more elastic gate pricing means that gate price increases and attendance falls to the detriment of fans.

Various pro sports stadium leases contain language of the 'hold the line on gate prices or else' variety consistent with an inverse relationship between subsidies and ticket prices. In essence, leases that spell out both the rental rate and the ability of the team owner to keep concession and parking revenues also spell out when pricing is far enough out of line to threaten those benefits. A (very) cursory look at the relationship between prices and subsidies in the NFL yields some

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additional support for the idea of inversely related prices and subsidies, overall, as measured by stadium operating revenues. The support is more limited looking specifically at measures of rent and concessions/parking revenue subsidies. But, at least for single-use stadiums *Circa* 1989, evidence is found in support of the elasticity relationship suggested by the theory.

This paper proceeds as follows. First, the rudimentary public choice argument for inversely related subsidies and ticket prices is offered. Second, the theoretical impacts of politically controlled subsidies on price choices by owners are examined. Third, the NFL data on subsidies and ticket prices in the NFL are presented. Conclusions round out the paper. The response of team owners to politically controlled subsidies has clear impacts on sports consumers. And this should be true in any policy arena where attendance-related revenues and rental rates are under political control. Further, the existence of inelastic gate pricing appears tied to the pursuit of subsidies. This has implications for those interested in just why it is that teams appear to price tickets so low in the first place.

A PUBLIC CHOICE SETTING

Most attendance-related revenue and the rental rate on publicly provided facilities are under political control, as detailed in the empirical section below. Let the short run attendance demand be the usual one, $x = x(p)$, where x is ticket sales, p is price of a ticket and the producer has market power, $x = x'(p)$. (In the long run, of course, the owner chooses output quality and the facility configuration in order to maximize profits, but in the short run, given quality and facility, the owner collects expected profits through attendance, TV rights sales, venue services, and memorabilia sales.)

The first element of the analysis under political control are tied to attendance, denoted $s(p)$. These could be concession revenues, parking fees or other on-site purchases made by consumers. The definition of $s(p)$ is intended to cover all revenues that are allowed under a lease arrangement between the owner and their public host.

The second element under political control is the rental rate. Let $r(p)$ be the rental rate charged by the public owner of the facility calculated on a per attendance basis. What is essential to the development in this section is that rental is a function of the price charged by the monopolist. As such, it can be used as a strategic element in the relationship between the producer and elected officials in charge of facilities.

Even a basic public choice model suggests that subsidies and prices are inversely related, that is, $s'(p) < 0$ and $r'(p) > 0$.[1] First, public finance lessons imply the potential size of subsidies that can be paid by fans that actually use the facility increases as the price falls (for example, Tresch, 1981, Chapter 10). This is shown in Figure 1, a graph of a money-losing team owner with market power but costs such that losses occur at the profit maximizing level of ticket sales. Losses equal the area of rectangle $decp_m$. If the area of $\triangle adb$ exceeds the area of $\triangle bec$, then a subsidy exists that would keep this owner in business since consumers' surpluses exceed owner losses. Further, as the price that the team owner might charge falls toward the level where price equals marginal cost (p_c at attendance level A_c), consumers' surpluses net of the subsidy also increase. At least the potential size of a subsidy collected from patrons and given to owners is inversely related to ticket price. By the way, this is true whether or not the owner might suffer losses at the lower price or not. If the owner would suffer losses at the lower price, then the subsidy is required for production. If the owner would not suffer losses, then the subsidy just makes the owner better off than they would be otherwise.

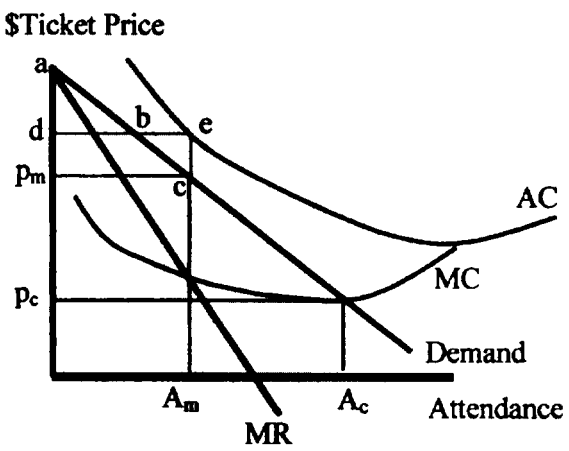

Figure 1. Subsidies and prices.

But turning potential subsidies into actual subsidies is a political outcome. Models of that process go all the way back to Stigler (1971) and Peltzman (1976). Peltzman demonstrated the trade-off, politically speaking, between consumer welfare and particular firm welfare, tied it to the optimization problem of politicians, and generated expected equilibrium results. This is depicted in Figure 2. Suppose a producer with market power and profits as depicted in Figure 2. Profits are maximized at (P_m, π_m). However, politicians face trade-offs that team owners do not. Since both fans and owners matter to politicians in terms of electoral support, the politician can only be unambiguously better off in terms of political support if lower prices and higher profits occur simultaneously. This gives rise to iso-political profit curves as shown in the figure. Political support is higher along I^1 than at I^0. In the sports example in this paper, the highest level of support (the best chance for reelection) comes from a combination of owner profits and ticket prices on I^* at the combination (p^*, π^*).

When owners accept politically determined subsidies, lower ticket prices and lower profits from team operations will occur than the team owner would choose in the absence of subsidies. Subsidies can be used to make lower prices palatable to team owners and one would expect that the net subsidy should rise as ticket prices fall. Returning to the notation developed earlier in this section, this can happen with $s'(p) < 0$ and $r'(p) > 0$. If both lower prices and profits to owners can be maintained, then the politician will enjoy greater support than otherwise.

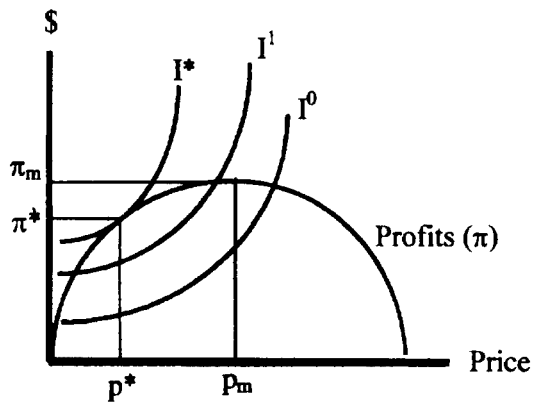

Figure 2. Profits versus prices and political support.

SUBSIDY IMPACTS ON TEAM PRICING

After Rottenberg (1956) first brought theory to bear on team sports, subsequent developments all follow El Hodiri and Quirk (1971, 1974). Practically forgotten is the contribution to pricing by Heilmann and Wendling (1976). While the subsequent theoretical literature's fascination has been primarily with competitive balance, the original literature covered pricing choices by sports teams as well. The model used here will be a bit more general than earlier EH–Q and H–W models.

For the sake of incorporating the public choice ideas in the last section, a gate-only world is assumed. Complications arise for sports like MLB with local TV (Fort and Quirk, 1995; Vrooman, 1995), especially with blackout rules (Heilmann and Wendling, 1976). While missing these real-world complications, it is hoped that the insights gained into the relationships between subsidies and ticket prices are worth the loss in generality.

Team revenue sources are portrayed on a value per unit attendance level. Price (p) represents the gate revenue per attendance. Some attendance related revenues are under the control of the team owner by virtue of their league membership, such as league merchandise. The revenue per attendance on these items is denoted z, and is assumed not to vary with ticket prices.

From the last section, short run gate attendance is $x = x(p)$, where $x'(p) < 0$, politically determined attendance related revenue is $s(p)$, where $s'(p) < 0$, and the politically determined rental rate is $r(p)$, where $r'(p) > 0$. It is assumed that $s(p) - r(p) \geq 0$. On a per-attendance basis net subsidies are assumed not to turn into taxes.

The analysis proceeds with one last assumption. Owner choices will not be embedded in any formal model of the subsidy determination process; owners simply take the subsidy as given. The owner's optimization problem under a subsidy regime is to maximize profits subject to its capacity constraint, $x(p) = X$. The Lagrangean is

$$L = [p + z + s(p) - r(p)]x(p) + \lambda[X - x(p)]. \qquad (1)$$

In (1), the first term in brackets represents all sources of revenue for the owner-ticket price, owner-controlled attendance related revenue, and the two subsidy elements of concession and parking operating revenue and the rental rate. First-order conditions, with primes denoting

derivatives, are:

$$L_p = [1 + s'(p) - r'(p)]x(p) + [p + z + s(p) - r(p)]x'(p) - \lambda x'(p) = 0, \quad (2)$$

$$L_\lambda = X - x(p) = 0, \quad (3)$$

where $\lambda = 0$ 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:

$$-\frac{x'(p)p}{x(p)} = \frac{p[1 + s'(p) - r'(p)]}{[p + z + s(p) - r(p)]}. \quad (4)$$

Note that $r'(p) < 1 + s'(p)$ since both $x'(p) < 0$ and $s(p)$–$r(p) \geq 0$. But the left-hand side of (4) is just the price elasticity of attendance demand, henceforth ε_p.[2]

Actually, it is pretty simple to see the impact of a politically determined subsidy from (4). It ends up that almost all analysis of gate demand for attendance finds $\varepsilon_p < 1$, that is, inelastic gate pricing (Fort, 2004). Imposing the condition that $\varepsilon_p < 1$ and rearranging (4) yields:

$$-\frac{s'(p)p}{s(p)} > \frac{r(p) - [z + s(p) + r'(p)p]}{s(p)}. \quad (5)$$

And the left-hand side of (5) is the elasticity of the concessions/parking revenue response by political overseers with respect to the price chosen by the monopolist, henceforth, ε_s. In the usual way economists refer to elasticity, an elastic response will have $\varepsilon_s > 1$ and an inelastic concessions/parking revenue response will have $\varepsilon_s < 1$. Note that $\varepsilon_s > 0$ since $s'(p) < 0$.

The concessions/parking response in (5) will be elastic if the right-hand side of (5) is greater than one, which happens if

$$\frac{r'(p)p}{r(p)} \leq \frac{r(p) - s(p) - [z + s(p)]}{r(p)}. \quad (6)$$

That is, the magnitude of ε_s depends upon the magnitude of the elasticity of the rental choice by political overseers, denoted ε_r. But, since the right-hand side of (6) is strictly less than one, Proposition 1 follows immediately:

Proposition 1:
In a gate-only world, if the team owner confronts a politically determined subsidy, with attendance below capacity, and $\varepsilon_p < 1$, then $\varepsilon_s > 1$ implies $\varepsilon_r < 1$.

The gist of Proposition 1 in this carefully specified world is, in order to have politically determined subsidies and inelastic (low) gate pricing at the same time, *elastic* concession/parking responses by politicians to ticket price changes by owners must go along with *inelastic* rental responses.

By exactly the same steps, the concession/parking revenue response is inelastic if the right-hand side of (5) is less than one, which happens if

$$\frac{r'(p)p}{r(p)} > \frac{r(p) - s(p) - [z + s(p)]}{r(p)}. \quad (7)$$

Now, since the right-hand side of (7) is still strictly less than one, we get the less assertive outcome as follows:

Proposition 2:
In a gate-only world, if the team owner confronts a politically determined subsidy, with attendance below capacity, and $\varepsilon_p < 1$, then $\varepsilon_s < 1$ if $\varepsilon_r > 1$.

The intuition is that in order to have inelastic (low) ticket pricing, inelastic concession/parking responses always will go with elastic rental responses. But an inelastic concession/parking response also follows from *some* inelastic punitive rental responses.

The general implication of Propositions 1 and 2 is, as long as the political overseers want attendance priced in the inelastic region of demand, presumably because fans want lower prices as opposed to higher ones, then a particular pattern of responses to owner ticket price choices is required. In response to a 1% ticket price increase by owners, politicians can decrease concession/parking revenue by more than 1% but any simultaneous increase in rent must be less than 1% (Proposition 1). Similarly, in response to a 1% ticket price increase, if politicians raise rent by more than 1% then concessions/parking revenues cannot be decreased by more than 1% (Proposition 2). But there is a combination of rent and concession/parking increases both less than 1% that will maintain inelastic ticket pricing by team owners. If any of these restrictions were violated, something else would have to give. The most likely candidate is inelastic gate pricing and ticket prices would rise. Similar restrictions on the level of punitive choices also hold if owners have priced in the elastic portion of attendance demand. For the sake of brevity (and following the dominant empirical result of inelastic gate pricing), that outcome is not developed here.

EMPIRICAL EVIDENCE: LEASE CLAUSES AND THE NFL

The theory in the last section lends itself to a close look at lease outcomes in sports where the main choice by owners concerns ticket pricing. This means that lease agreements between host cities and their NFL teams are a more likely candidate than, say, MLB leases since the latter also generates significant local media revenue. Other types of subsidies happen during construction, both directly and indirectly in terms of infrastructure and tax subsidies. Here, we were after operating subsidies—rent and the allowed share of concessions and parking charges that owners are allowed to keep. That happens in leases.

The primary aim of this paper is theoretical. But some data are readily available to take a cursory look at the relationship between ticket prices and subsidies. These data do not support a full analysis of the elasticity of subsidy choices, but they do produce indicative results. But one can at least check to see if the variation in rent and concession/parking revenue choices conforms to the earlier public choice logic. That is, are operations subsidies inversely related to ticket prices? Are rent and ticket prices positively related? And are concession/parking shares to owners inversely related to price?

It is worth noting that there is direct language in some leases concerning pricing behavior by team owners. Putting it directly in the language of the lease is *prima facie* evidence of their political content. Failure to comply with such a clause would be grounds to revisit the lease, presumably to the benefit of politicians in charge of that outcome and to the detriment of the team owner.

Recently, class action plaintiffs alleged that the Denver Broncos violated a clause in their lease that can be read as a contingency under which the Broncos' subsidy would be revisited. Paragraph 25 of that lease reads as follows (Team Marketing Reports, Inc., 1998):

> Broncos covenant that charges, excluding admission taxes, if any, and other taxes for admission and services at Home Games of Broncos at the Stadium or Expanded Stadium during this Agreement or any extension thereof shall not exceed similar charges in comparable facilities made by other owners of a franchise in the League without the written permission of the Mayor first had and obtained.

Plaintiffs lost, but the threat was clear. If the Broncos violated the pricing stipulation in Paragraph 25, raising prices higher than their comparable group of teams, then the lease is violated and all of the rental and revenue allowance stipulations therein were subject to renewed negotiations.

And there are quite a few other examples of clear pricing language in pro sports facility leases (in addition to the Team Marketing Reports, Inc., source, see Forsythe, 2000). In the NFL, see the Colts, Section 8.2(a); Chiefs, Section 7.04; 49ers, Section 18; Seahawks, Section 5.2. In MLB, see the Royals, Section 7.04; Phillies, P. 426; Mariners, Clause 15.2. These lease clauses give the appearance of inversely related subsidies and team prices, with the subsidies chosen in order to reduce ticket price. With the force of a lease contract, these subsidies can be revoked and revised in ways that keep prices lower than the team owner would otherwise choose.

The NFL is the pro sports league closest to the gate-only development in the last section. The following variables were devised to compare to 1993 TICKET prices for the NFL (the closest year to the 1989 subsidies available in the analysis). SUBSIDY is the Quirk and Fort (1992) estimation of the overall annual operating subsidy *Circa* 1989. One would expect TICKET and SUBSIDY to be inversely related. RENT is the total dollar payment collected from the team *Circa* 1989 (Quirk and Fort, 1992), divided by gate revenue in 1989 (from the well-known *Financial World*, 1990, report). RENT is nearly always specified as a percentage of gate revenue in leases and the variable used here is modeled along that specification. A positive relationship is expected between TICKET and RENT. Finally, CP (for concessions and parking) is the stadium revenue reported by each team in 1989 (*Financial World*, 1990), divided by the sum of that same team stadium revenue and stadium revenues contributed by the team to overall stadium operating revenues, *Circa* 1989 (from Quirk and Fort, 1992). This last variable represents the share out of the entire stadium revenue stream that the lease allows the team owner to keep. TICKET and CP should be negatively related. The data are in Table 1.

The simple correlation of these variables with TICKET comprises the first part of the analysis since the data are sparse and would not support a more sophisticated analysis. Correlations are calculated for all teams combined and separately

Table 1. NFL Data

City	Multi = 1	TICKET	SUBSIDY	RENT	CP
SF	1	35.8	2612.2	0.023	0.935
Wash	0	35.7	—	—	0.217
Phil	1	35.0	—	0.025	0.803
Dal	0	32.9	5391.02	0.067	0.876
Min	1	29.7	468.2	0.030	0.684
Hou	1	29.5	3967.1	0.013	0.951
Chic	0	29.4	—	0.262	0.649
Ana	1	29.1	318.4	0.073	0.737
SD	1	29.1	1318.4	0.037	0.781
NYG	1	28.7	4837.8	—	0.211
Buff	0	28.7	4985.0	—	—
Atl	1	28.1	1903.3	—	0.611
Den	0	27.8	6131.0	—	0.000
NO	0	27.1	42174.0	0.270	0.341
KC	0	27.0	11452.0	0.038	0.469
Seat	1	26.6	3087.4	0.066	0.674
Ind	0	26.5	11477.0	0.161	0.252
GB	0	26.1	189.0	0.013	0.949
NYJ	1	25.0	3482.2	—	0.137
Det	0	25.0	11225.0	—	0.313
Cin	1	24.8	2250.2	—	0.677
TB	0	24.1	—	0.052	—

Sources: Ticket prices are for 1993. Remaining data are calculated from Quirk and Fort (1992), *Circa* 1989. Subsidies are in $000.

Table 2. NFL TICKET and SUBSIDY Correlations, Circa 1989

	SUBSIDY	#OBS.
Combined	−0.189	18
Multi-use	−0.124	10
Single-use	−0.181	8

for teams playing in either multiple-use or single-use stadiums. The results for TICKET and SUBSIDY are in Table 2. The correlations have the correct sign whether teams are combined or separated on the basis of multi-use or single-use stadiums. While the correlations are not very large, some confidence can be placed in them since it appears that outliers are not driving the results. Throwing each observation out, *seriatim*, and recalculating the correlations always yields the expected negative correlation.

The RENT and CP correlation analysis involves two complications. First, for this time period, cookie-cutter stadiums housing both NFL and MLB teams were common. Unlike the SUBSIDY variable that concerns operating losses that logically should be calculated across both tenants, RENT and CP decisions are complicated by tandem negotiations between hosts and their NFL and MLB tenants. At the very least, single-use and multi-use stadiums should be separated for analysis. Second, Dallas proves to be an outlier that substantially alters correlation calculations. It simply has the highest ticket price in the sample, among the lowest SUBSIDY and RENT values, and nearly the largest CP value. In the remainder of the correlation analysis, Dallas is omitted. As shown in Table 3, RENT and CP correlations have the correct sign for teams subsidized in single-use stadiums, omitting Dallas. The correlation between TICKET and RENT is the more substantial of the two (of course, statistical significance is another matter).

The results in Tables 4 and 5 represent attempts to unfold the aggregate correlation analysis in three ways. First, the values at the top and bottom ends of the distribution of the subsidy variables, ranked by TICKET, are compared. If the positive relationship holds for RENT, then the mean of the observations with the highest values of TICKET should be larger than the mean for the lowest value observations. The opposite will be true if the inverse relationship holds for CP. (No analysis is done for SUBSIDY since it has the predicted inverse correlation with TICKET in all three cases). Second, one can look at the averages of a

Table 3. NFL TICKET correlations with RENT and CP, *Circa* 1989 Single-Use Stadiums Omitting Dallas

Variable	Correlation	#OBS.
Rent	0.650	6
CP	−0.222	8

Table 4. NFL TICKET and RENT Comparisons, Circa 1989 Single-Use Stadiums Omitting Dallas

City	Ticket	Rent	Cum. Ave.
Chic	29.4	0.262	—
NO	27.1	0.270	0.266
KC	27.0	0.038	0.190
Ind	26.5	0.161	0.183
GB	26.1	0.013	0.149
TB	24.1	0.052	0.133
Top 2 mean		0.266	
Bottom 2 mean		0.141	
Median	26.8		
Closest 2 above median		0.154	
Closest 2 below median		0.087	

Table 5. NFL TICKET and CP Comparisons, Circa 1989

City	TICKET	CP	Cum. ave.
Wash	35.7	0.217	
Chic	29.4	0.649	0.433
Den	27.8	0.000	0.289
NO	27.1	0.341	0.302
KC	27.0	0.469	0.335
Ind	26.5	0.252	0.321
GB	26.1	0.949	0.411
Det	25.0	0.313	0.399
Top 2 mean		0.433	
Bottom 2 mean		0.631	
Median	27.0		
Closest 2 above median		0.170	
Closest 2 below median		0.600	

few observations around the median TICKET price of $27.90 for the same type of relationship. Third, if a negative relationship holds, ranking the observations in descending order of TICKET, the cumulative average of the RENT variable should fall. That is, the average taken over the three teams with the highest TICKET price should be larger than the average taken over the first four teams of highest TICKET price, and so on. Under this approach, the cumulative average of the CP variable should increase rather than decrease.

The results of these three looks at the RENT data ranked by TICKET are in Table 4, again just for single-use stadiums, omitting Dallas. All three measures support the theory; the cumulative average falls throughout, the top mean is nearly twice the bottom mean, and the average RENT declines around the median of TICKET. (None of these results holds for a sample combining single-use and multi-use stadiums.)

The results of these three looks at the CP data, for single-use stadiums omitting Dallas, ranked by TICKET are in Table 5. One of the measures is inconsistent with a negative relationship between TICKET and CP; the cumulative average does not increase throughout. But the bottom mean is larger than the top mean and the mean CP increases around the median of TICKET. (Once again, support of the negative relationship between TICKET and CP disappears for a sample combining single-use and multi-use stadiums.)

All in all, the NFL evidence for single-use stadiums (omitting the interesting case of Dallas) supports an inverse relationship between subsidies and ticket prices. Untangling the relationship for multi-use stadiums remains for future work.

At the risk of stretching these limited data to the breaking point, the elasticities of interest for Propositions 1 and 2 were calculated. Simple regression of RENT on TICKET and then of CP on TICKET yielded marginal effects that, when multiplied by average values of the variables, give the elasticity of ticket price with respect to RENT (ε_r from the theory section) equal to 8.63 and the elasticity of ticket price with respect to CP (ε_s from the theory section) equal to 1.34.[3] This outcome is in keeping with the general idea from Propositions 1 and 2 that the RENT and CP responses by politicians to changes in ticket prices cannot both be elastic.

CONCLUSIONS

Rudimentary public choice logic suggests that subsidies to sports team owners will be inversely related to ticket prices. Using a model that takes politically controlled subsidies as given, the inelastic pricing by team owners that is the mainstay of attendance demand estimation is only consistent with either elastic rent or elastic concession/parking subsidy responses by politicians, but not both. If policy makers raise rent by more than 1% in response to a 1% increase in ticket prices, then they cannot do the same with a reduction in concessions/parking revenue without running the risk of forcing owners into raising prices. Such an outcome would confront politicians with the political support lost due to fan dislike of higher ticket prices.

A cursory examination of NFL data lends support to the idea that overall operating subsidies are inversely related to ticket prices in the NFL. In addition, for owners occupying single-use stadiums, the NFL data show a positive relationship between stadium rent and ticket prices as well as a negative relationship between concession/parking subsidies and ticket prices. Finally, calculations show that the elasticity of rent with respect to ticket price is elastic while the elasticity of concession/parking subsidies with respect to ticket price is not. This cursory examination of limited data suggests that more sophisticated analysis of comprehensive data would prove enlightening. And an extension of the analysis of subsidies to multi-use stadiums is clearly in order. Finally, theoretical extensions beyond a gate-only world would facilitate comparisons between leagues.

The work here concentrates on the relationship between sports subsidies and gate pricing in primarily gate-dominated pro sports decisions. But it should be expected that the theory is applicable whenever there are substantial public facility subsidies and political control over attendance-related revenue and rental rates where gate dominates. No doubt this characterizes everything from opera and opera houses to rodeos and fairgrounds.

Finally, one might suspect some implications for discussions about excess demand. Waiting lines can be long for some NFL fans, suggesting that prices are below the equilibrium of just a gate market. Maybe its because the pursuit of lower rental rates and higher concessions/parking subsidies pushes prices into the inelastic portion of demand. Prices may be in the inelastic region because owners find it on net valuable to give up higher prices in the pursuit of subsidies tied to low gate prices.

NOTES

1. An informal public choice model of the sports stadium subsidy process appears in Fort (1997b). The first collection of articles on stadium issues is Noll and Zimbalist (1997). In that volume, on public choice issues and stadiums, see Fort (1997a) and Agostini *et al*. (1997).
2. Given (4), the essential EH–Q result of unit elastic pricing follows by setting $z = s(p) = r(p) = 0$ for all p (neither EH–Q nor H–W included z in their analysis). H–W extend the EH–Q idea to the case of a constant non-ticket revenue per admission, $s(p) = s > 0$, without any rental rate, $r(p) = 0$ for all p (and, again, with $z = 0$). Again, from (4), it is clear that $\varepsilon_p = p/p + s(p) < 1$ for $s(p) = s > 0$. H–W then move on to a constant rental rate $r(p) = r > 0$ for all p, but with $s(p) = 0$ for all p (and $z = 0$). Again, (4) yields $\varepsilon_p = p/p - r(p)$ for $r(p) > 0$. H–W find these two results sufficient to justify their conclusions that rights to other revenues per attendance can drive pricing into the inelastic region but that a rent per attendance can reverse that outcome, ultimately back to the elastic portion of demand.
3. The regression results were as follows:

   RENT = –1.02 + 0.043*TICKET ($R^2 = 0.42$; $P = 0.16$),
   CP = 0.94–0.019*TICKET ($R^2 = 0.05$; $P = 0.60$).

   Elasticities were calculated in each case at the averages of RENT, CP, and TICKET even though the estimated coefficient impact of TICKET on CP is practically zero.

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