



Inelastic Ticket Pricing Puzzle and Home-City Corporate Social Responsibility as a Business Strategy in the Sports Industry: A Firm Optimization Approach*

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Abstract: Inelastic pricing of sports tickets, an outcome routinely demonstrated in empirical studies, cannot be explained by the conventional hypothesis of pricing under monopoly. In this paper, we incorporate the notion of home-city corporate social responsibility (CSR) as a business strategy into a sports team's objective in that the team cares not only about team profit, but also about the benefit of its fans/consumers. Such consideration may engender fan loyalty, as well as improve prospects for public stadium financing. We show that inelastic sports ticket pricing arises for teams that place a sufficiently large emphasis on home-city fan/consumer surplus. Our analysis helps identify the condition under which inelastic sports ticket pricing is consistent with a home-city CSR strategy.

Keywords: Inelastic sports ticket pricing, Corporate social responsibility, Firm pricing strategy, Municipal public finance, Public choice

JEL Classification: D21, L12, L21, L83

1 Introduction

1. Introduction

The notion of corporate social responsibility (CSR) has increasingly attracted the attention of firms as a business strategy, which poses a challenge to the traditional economic analysis of monopoly. Traditionally, profit maximization is considered as the firms' overriding objective in making production and pricing decisions. Nevertheless, a firm may engage in CSR activities that combine social, economic, and environmental concerns into its objective and business operations in a positive manner (see, e.g., Porter and Kramer 2006, Baron 2007, and Chang et al., 2014, p. 626). Vogel (2005) states that CSR has a long history in the United States and has been legitimated by U.S. court rulings dating from 1954 that have recognized a corporation's right to engage in philanthropy and other forms of CSR.

Carroll and Shabana (2010) summarize the key motivations for CSR identified in the literature. These include "long-term self interest" and favorable policies from the public sector. Both of these motivations are relevant in the case of professional sports teams. Given the typical scale of public stadium subsidies (i.e., long-run capital investment subsidies and tax exemptions for stadium bonds), for example, CSR may engender long-run favor toward large subsidies benefitting teams. Such subsidies are a substantial consideration for

sports teams, with direct stadium subsidies stretching to as much as \$750 million for a single project and tax exemptions on \$17 billion worth of stadium debt since 1986 (Kalin and Kazda 2018). Murray and Frijters (2016) find evidence that firm donations influence urban rezoning decisions, and Fei, Hines, and Horwitz (2016) present evidence that voluntary PILOT payments to local governments have a similar effect. Godfrey (2009) states that sport “exists as a significant social institution” with a long history of CSR activities. Despite this, he notes that the motivations and effects of sports industry CSR are not well-understood from research perspectives.

In this paper, we present a formal model of sports firm home-city CSR and the effect of such commitments upon home team (monopoly) ticket pricing.¹ Specifically, we consider whether (under what condition) a CSR commitment by a sports franchise can explain the inelastic sports ticket pricing puzzle. This puzzle asks why home teams in various professional sports leagues are consistently found to price along the *inelastic* portion of demand, thus defying the central qualitative prediction of monopoly price theory. Krautmann and Berri (2007) provide a survey of 11 empirical findings of estimated price elasticities of demand for sporting events (see, e.g., the contributions in Demmert (1973), Noll (1974), Siegfried and Eisenberg (1980), Bird (1982), Scully (1989), Coffin (1996), Fort and Quirk (1996), Depken (2001), García and Rodríguez (2002), Hadley and Poitras (2002), and Winfree, McCluskey, Mittelhammer and Fort (2004)). The estimates, collectively representing 5 different sports leagues, range in value from highly inelastic (-.06) to marginally inelastic (-.93).

A number of studies have provided plausible theories to explain these results. Fort (2004) shows that local TV revenue relationships between teams can explain inelastic pricing in Major League Baseball. Krautmann and Berri (2007) find that sports teams may price tickets in the inelastic portion of demand to sell more concessions. Kesenne (1996, 2000) shows that inelastic pricing may result from teams maximizing wins (subject to a profit constraint) rather than profits directly. Andersen and Nielsen (2013) demonstrate that inelastic pricing may result from the behavior of team risk aversion under uncertainty. Chang, Potter, and Sanders (2016) demonstrate that concern for a win-loss record and its dynamic effect upon demand for future home games can push teams to price tickets along the inelastic portion of demand.

Herein, we model and analyze the effect upon home ticket pricing of a “consumer-oriented CSR” initiative, which is defined as a home team's commitment—in selling its tickets and setting prices—to account for both team profit and home-city consumer (fan) benefit. We show that inelastic sports ticket pricing arises when the weight that a CSR team assigns to home-city fan/consumer surplus is sufficiently large. Our analysis identifies the condition under which inelastic sports ticket pricing is consistent with CSR.

The remainder of the paper is organized as follows. In Section 2, we discuss a standard model of ticket pricing decision by a home team that pursues profit maximization under monopoly. In Section 3, we present a formal model of ticket pricing decision by a home team that launches a fan-oriented CSR initiative. We characterize the CSR equilibrium and determine conditions under which the home team sells game tickets at a point where demand is price inelastic. Section 4 concludes.

2. A Model of the Standard Monopolistic Home Team

Consider a home team that pursues profit maximization as its goal in selling tickets (setting ticket prices). Let the respective demand and profit functions for this team be:

$$p = p(Q) \text{ and } \pi = p(Q)Q - C(Q), \quad (1)$$

where p represents ticket price, Q stands for quantity of tickets sold, π represents profit level, $p(Q)$ symbolizes the relationship between p and Q along the demand function, and $C(Q)$ represents the total cost of provisioning game tickets as a function of quantity. Denoting $MC(Q)$ as the marginal cost function, where $MC(Q) \equiv dC(Q)/dQ$, we have the first-order condition (FOC) for the team:

¹ We focus our analysis on sports ticket pricing without making attempt to analyze the economic effects of CSR in general. For contributions on the economics of corporate social responsibility and its strategic uses in business operations, see, e.g., Bagnoli and Watts (2003), McWilliams et al. (2006), Baron (2007), and Siegel and Vitaliano (2007).

$$\frac{d\pi}{dQ} = \frac{dp(Q)}{dQ} Q + p(Q) - MC(Q) = 0,$$

which implies that

$$p(Q)\left(\frac{1}{\varepsilon^m} + 1\right) = MC(Q), \quad (2)$$

where $\varepsilon^m = \frac{dQ}{dp} \frac{p}{Q}$ represents price elasticity of demand. As such, we have from (2) that $(\frac{1}{\varepsilon^m} + 1) > 0$, or $\varepsilon^m < -1$. In other words, monopoly pricing in the presence of positive marginal cost implies that a standard monopoly prices tickets along the *elastic* portion of demand.

In this example, let us consider the following market demand: $p = \alpha - \beta Q$, where $\alpha > 0$ and $\beta > 0$. We assume that total cost of operation takes a quadratic form: $TC = cQ^2$, where c is a constant parameter ($c > 0$). A monopolist's objective function is then given as $\pi = (\alpha - \beta Q)Q - cQ^2$, where $c(> 0)$ is a constant parameter within the model. We derive the firm's FOC:

$$\frac{\partial \pi}{\partial Q} = \alpha - 2\beta Q - 2cQ = 0,$$

which solves for the profit-maximizing ticket sales, Q^m , as $Q^m = \frac{\alpha}{2(c + \beta)} > 0$. Calculating the optimal price, p^m , the team's monopoly profit, π^m , and the price elasticity of demand, ε^m , we have the following results:

$$p^m = \frac{\alpha(2c + \beta)}{2(c + \beta)} > 0, \quad (3a)$$

$$\pi^m = p^m Q^m - c(Q^m)^2 = \frac{\alpha^2}{4(c + \beta)} > 0, \quad (3b)$$

$$\varepsilon^m = \frac{\partial Q^m}{\partial p^m} \frac{p^m}{Q^m} = -1 - \frac{2c}{\beta} < -1. \quad (3c)$$

In this example, we find that price is chosen along the elastic portion of the demand function (as is predicted generally for a monopolistic setting).

3. A CSR Model of Home Team's Decisions on Selling Tickets and Pricing

We consider a home team that adopts a CSR strategy in that its objective function includes not only its profit but also the benefit of fans (i.e., consumer surplus). Both of these considerations come into play when such a team sets ticket allocations. Moreover, as mentioned earlier in the introduction section, CSR initiatives or activities may engender long-term favor toward large public subsidies on stadiums that benefit sports teams. In view of this, we introduce f as the amount of *lump-sum funding* per game that a CSR team receives from its local government. Taking into account these elements, the objective function of the CSR team can be specified as follows:

$$V = (\pi + f) + \phi CS = [p(Q)Q - C(Q) + f] + \phi \left[\int_0^Q p(q) dq - p(Q)Q \right], \quad (4)$$

where parameter ϕ is the weight that a CSR firm gives to the consumer surplus (CS) component in its objective, and $0 < \phi < 1$.² We use ϕ to reflect the firm's level of CSR commitment. This model formulation implies that a team necessarily puts more weight on its profits than consumer surplus.

Re-writing the CSR objective function in (4) yields

$$V = [(1 - \phi)p(Q)Q - C(Q) + f] + \phi \int_0^Q p(q) dq \quad (5)$$

The FOC for the home team is:

$$\frac{dV}{dQ} = (1 - \phi) \left[\frac{dp(Q)}{dQ} Q + p(Q) \right] - MC(Q) + \phi p(Q) = 0.$$

Manipulating the FOC yields

$$(1 - \phi) \left[\frac{dp(Q)}{dQ} Q + p(Q) \right] = MC(Q) - \phi p(Q), \quad (6)$$

which determines the equilibrium volume of tickets, Q^{CSR} . The optimal price that the CSR firm charges is then given as $p^{CSR} = p(Q^{CSR})$.

Denoting $\varepsilon^{CSR} (\equiv \frac{dQ}{dp} \frac{p}{Q})$ as the price elasticity of demand at the CSR equilibrium, $\{Q^{CSR}, p^{CSR}\}$, we re-write the FOC in (6) as follows:

$$(1 - \phi) p(Q^{CSR}) \left(\frac{1}{\varepsilon^{CSR}} + 1 \right) = MC(Q^{CSR}) - \phi p(Q^{CSR}), \quad (7)$$

Solving the FOC in (7) for ε^{CSR} yields

$$\varepsilon^{CSR} = \left\{ \frac{1}{(1 - \phi) p(Q^{CSR})} [MC(Q^{CSR}) - \phi p(Q^{CSR})] - 1 \right\}^{-1}. \quad (8)$$

Given that $0 < \phi < 1$, it is easy to verify from (8) that

$$-1 < \varepsilon^{CSR} < 0 \text{ if } [MC(Q^{CSR}) - \phi p(Q^{CSR})] < 0,$$

which implies that

²Note that consumer surplus is defined as $CS = \int_0^Q p(q) dq - p(Q)Q$, which is the area under the (inverse) demand curve, $p = p(Q)$, up to the quantity consumed minus total spending. This approach of describing consumer-oriented CSR activities can be found in Kopel and Brand (2012), Chang et al (2014), Lambertini and Tampieri (2015), and Lambertini, Palestini, and Tampieri (2016). Note further a limitation of this approach. It implies that lump-sum funding is equal to zero if a team acts as monopolist in the short run. That is, such a monopolist cannot benefit from stadium subsidies. As an anonymous referee notes, if f is treated as a function of present consumer surplus, such benefits can be considered more richly.

$$-1 < \varepsilon^{CSR} < 0 \text{ if } \phi > \frac{MC(Q^{CSR})}{p(Q^{CSR})} > 0. \quad (9)$$

The result in (9) permits us to establish the following proposition:

PROPOSITION 1. *Demand for tickets is price **inelastic** when the degree of CSR, ϕ , exceeds the ratio of marginal cost over ticket price at the CSR equilibrium.*

In this example, we make use of the same market demand: $p = \alpha - \beta Q$, where $\alpha > 0$ and $\beta > 0$. Consumer surplus is calculated as

$$CS = \int_0^Q (\alpha - \beta q) dq - pQ = \frac{\beta}{2} Q^2.$$

The objective function of a CSR team is:

$$V = (\pi + f) + \phi CS = [(pQ - cQ^2) + f] + \phi \left(\frac{\beta}{2} Q^2 \right),$$

where $c(>0)$ is, as defined earlier, a constant parameter. That is,

$$V = (\pi + f) + \phi CS = [(\alpha - \beta Q)Q - cQ^2 + f] + \phi \left(\frac{\beta}{2} Q^2 \right). \quad (10)$$

The FOC for the CSR team is:

$$\frac{\partial V}{\partial Q} = \alpha - 2\beta Q - 2cQ + \beta\phi Q = 0,$$

which implies that the optimal quantity allocation is:

$$Q^{CSR} = \frac{\alpha}{2c + \beta(2 - \phi)} > 0.$$

Calculating the optimal ticket price, the home team's profit plus the per-game subsidy, and demand elasticity, we have the following results:

$$p^{CSR} = \alpha - \beta Q^{CSR} = \frac{\alpha[2c + \beta(1 - \phi)]}{2c + \beta(2 - \phi)} > 0; \quad (11a)$$

$$\Pi^{CSR} = p^{CSR} Q^{CSR} - c(Q^{CSR})^2 + f = \frac{[c + \beta(1 - \phi)]\alpha^2}{[2c + \beta(2 - \phi)]^2} + f > 0, \quad (11b)$$

$$\varepsilon^{CSR} = \frac{\partial Q^{CSR}}{\partial p^{CSR}} \frac{p^{CSR}}{Q^{CSR}} = -1 - \frac{2c}{\beta} + \phi. \quad (11c)$$

It is easy to verify from (11c) that $\varepsilon^{CSR} < 0$ since $0 < \phi < 1$. Moreover, we have the following condition for demand inelasticity:

$$-1 < \varepsilon^{CSR} < 0 \text{ if } 1 > \phi > \frac{2c}{\beta} > 0. \quad (12)$$

Thus, inelastic ticket pricing arises ($-1 < \varepsilon^{CSR} < 0$) when a sports team behaves as a socially responsible firm such that (i) its payoff includes not only team profit but also the benefit of fans/consumers and (ii) the CSR weighting is sufficiently large. For a numerical illustration, consider the case where the degree of CSR is: $\phi = 2c/\beta + 0.40$. It follows straightforwardly from (11c) and (12) that $\varepsilon^{CSR} = -1 - (2c/\beta) + [(2c/\beta) + 0.4] = -0.6$, which is price *inelastic*.

One question that we need to address concerns why or under what condition CSR is relevant to owners and shareholders as it may affect a team's overall profit per match. To answer this question, we compare profits between a non-CSR team that charges a monopoly and a CSR team that receives a public subsidy. Following from π^m in (3b) and Π^{CSR} in (11b), we have:

$$\Pi^{CSR} > \pi^m \text{ if } f > \frac{\alpha^2 \beta^2 \phi^2}{4(c + \beta)[2c + \beta(2 - \phi)]^2} > 0.$$

This inequality indicates the constrained condition that a sports team faces in making CSR relevant to the interest of shareholders, viewed from the perspective of the team's financial situations. It is instructive to note that the sports industry is becoming a significant social organization embracing CSR activities (Godfrey 2009). This would make public subsidies to sports teams more likely to occur which, in turn, makes CSR more appealing to shareholders.

Returning to issues on the optimal decision of a home team, we use Figure 1 to present a graphical illustration when the team's CSR level (ϕ) is sufficiently large to elicit inelastic pricing. Let the market demand curve for game tickets be: $p = p(Q)$. The corresponding marginal revenue curve is MR^m . In the absence of CSR, the profit-maximizing team sells tickets up to the level at which $MR^m = MC^m$, where $MC^m = C'(Q)$ is the team's marginal cost of operation. The optimal volume of tickets sold is Q^m , and the profit-maximizing price is p^m . The monopoly equilibrium occurs at E^m , which is in the elastic portion of the market demand curve.³

³ Note that price elasticity of demand for tickets at point E^1 is equal to -1.

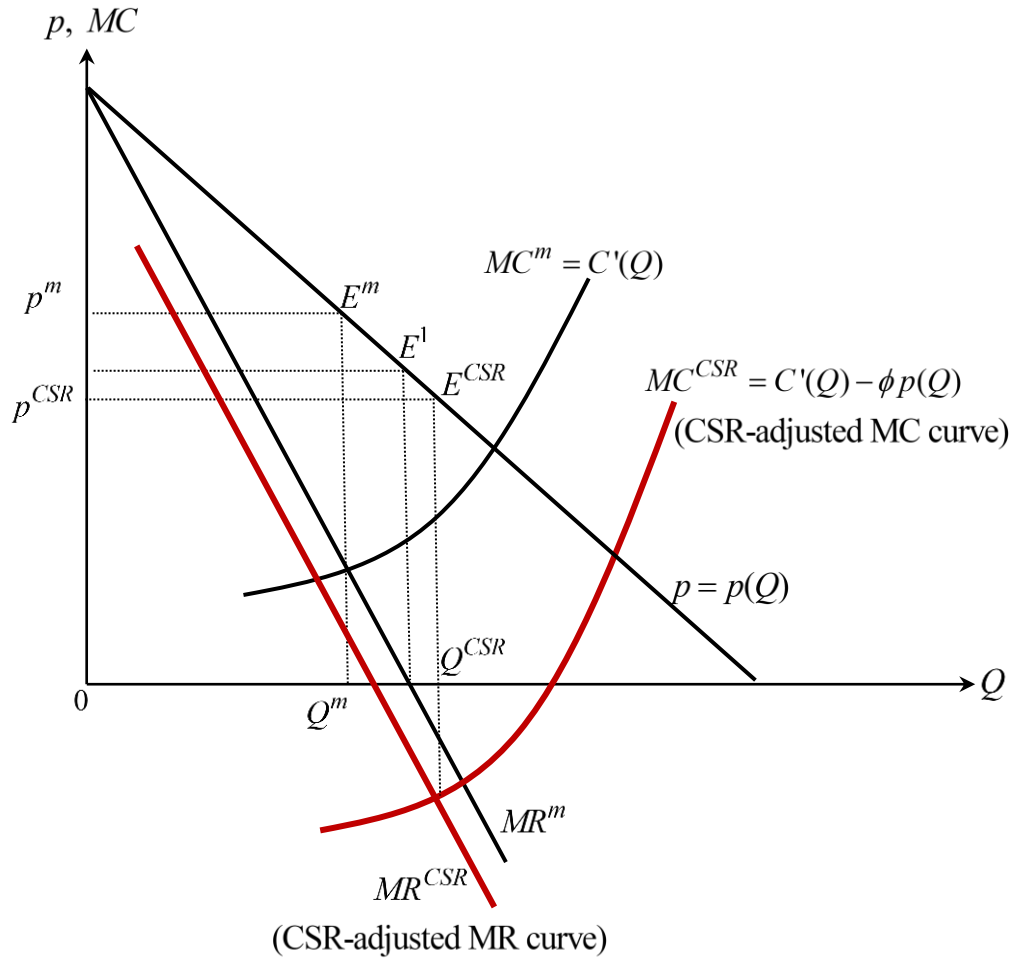


Figure 1. Inelastic ticket pricing when the level of CSR is sufficiently large

For the case in which the team practices CSR, its marginal revenue curve shifts downward to MR^{CSR} , as shown by the LHS of (6) since as

$$MR^{CSR} = (1 - \phi) \left[\frac{dp(Q)}{dQ} Q + p(Q) \right].$$

The CSR team's marginal cost curve shifts downward to MC^{CSR} , as shown by the RHS of (6) since

$$MC^{CSR} = MC(Q) - \phi p(Q).$$

As illustrated in Figure 1, the CSR team sells tickets up to the level at which $MR^{CSR} = MC^{CSR}$.⁴ That is, the CSR-adjusted marginal revenue equals the CSR-adjusted marginal cost. The volume of tickets sold is Q^{CSR} , the optimal price is p^{CSR} , and the CSR equilibrium is E^{CSR} . As shown in Figure 1, this CSR equilibrium

⁴ Through the analysis, we assume that the total cost of operation takes a quadratic form such that the firm's marginal cost of operation increases with Q . The qualitative results of the analysis are not affected by the quadratic assumption. One can assume that the firm's total cost of operation takes a linear form ($TC = cQ$). In this case, the firm's marginal cost curve is linear and constant at c . The two marginal cost curves as shown in Figure 1 become horizontal, and the equilibrium outcomes with or without CSR continue to hold. We thank an anonymous referee for comments on the cost assumptions.

occurs at a point where market demand for game tickets is price *inelastic*.

4. Concluding Remarks

In contrast to the traditional economic analysis of firms that are assumed to pursue profit maximization, a growing number of studies have analyzed the various aspects of corporate social responsibility as an alternative business strategy. However, it appears that no previous study has examined the crucial role that home-city consumer-oriented CSR plays in affecting the pricing decisions of sports industry owners, where team owners and players often rely on tremendous support from their fans, and there are frequently observed interactions directly between players and their fans.

To our knowledge, this paper is the first to show that the notion of consumer-oriented CSR offers a potentially useful and compelling framework for understanding the relationship between team owners and their fans in terms of demands for (price of) sports match tickets. From the perspective of sports teams, the CSR notion—which considers the well-being of sports fans—represents a philosophy of conducting business in a socially-desirable manner. As a whole, sports fans benefit, as more people can afford to watch games at lower prices. We show that inelastic sports ticket pricing arises when the weight that a CSR team attributes to the consumer surplus of its fans is sufficiently large. Our analysis helps identify the condition under which inelastic sports ticket pricing is consistent with CSR.

Some caveats and potentially interesting extensions of the model should be mentioned. Given that this paper is theoretical, the model results serve as interesting hypotheses for pursuant empirical testing. For example, an anonymous reviewer points out that teams in need of positive PR due to requests for a municipally-subsidized new stadium may be more apt to price along the inelastic portion of the demand curve. Several simple assumptions have been made in deriving the model's reduced-form solutions. The analysis of this paper is static and hence ignores the dynamic aspects of interactions over time. One possible extension is to incorporate consumer-oriented CSR into the two-period (dynamic) model of Chang, Potter, and Sanders (2016) and examine CSR's role in affecting ticket pricing along the inelastic portion of market demand. Another interesting issue concerns whether the monopoly model or the monopolistically competitive model is a more accurate estimate of what a pro sports team is.⁵ More research should be done to systematically analyze sports team motivation for engaging in socially responsible endeavors. We believe this constitutes a new direction for future research in sports economics toward a stronger understanding of sports firm behavior and the inelastic sports ticket pricing puzzle.

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⁵ We owe this valid point raised by an anonymous referee.

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