

## **TICKET UNDERPRICING AND PUBLIC SUPPORT FOR MEGA-EVENTS**

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***Abstract** – The organizer of a mega-event often owns a monopoly for several products like tickets and sponsorship contracts. While ticket prices below the maximum sellout price reduce gate revenues, they increase the degree to which the event is accepted by the population of the host region. Since public support usually serves as an important input factor for sponsors, it increases revenues in the market for sponsorship contracts. Hence, ticket underpricing may well maximize overall profits of the organizer. Moreover, if public support exerts some positive externality on the regional development, such underpricing may be beneficial for the host region, too.*

**Key-words:** MULTI-PRODUCT MONOPOLY, TWO-SIDED MARKETS, DEMAND RATIONING

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## 1. INTRODUCTION

Underpricing of tickets for mega-events is a widespread phenomenon within the sports and entertainment industry. The 2006 edition of the FIFA World Cup, the soccer world championship, in Germany is an illustrative example. During the first selling-period in February and March 2005, ticket prices ranged from 35 Euro for a group match in the fourth seating category to 600 Euro for the final in the first category. Though some reader may think that was not cheap, demand exceeded supply already three days after ticket orders were possible. At the end of the selling-period excess demand amounted to more than factor 10. In order to ration demand, the FIFA used a random allocation of tickets.<sup>1</sup> Given the huge excess demand it is, *prima facie*, surprising that ticket prices were not set higher *ex ante* or determined by an auction-like mechanism. Why were the tickets so cheap?

The economic literature provides a series of explanations for this underpricing phenomenon, e.g. fairness (Kahnemann et al., 1992), loyalty (Salant, 1986), demand uncertainty (Swafford, 1999), or positive externalities between customers (Becker, 1991). Adopting a simple version of the model developed in Eichhorn and Sahn (2010), this paper offers an alternative solution to the underpricing puzzle. Our explanation is based on examining the pricing decision of a multi-product monopolist who internalizes the externality induced by the price in one market on demand in a second market.

The organizer of a mega-event often owns a monopoly for several goods like tickets, merchandizing products, and sponsorship contracts (Jeanrenaud, 2006). On the one hand, ticket prices below the maximum price, for which the capacity of the venue is reached, call it *maximum sell out price*, reduce gate revenues. On the other hand, as Voeth and Schumacher (2003) show for the case of the FIFA World Cup 2006 in Germany, moderate ticket prices increase the degree to which the event is accepted by the population of the host region. However, public support for the event usually exerts some positive externality on the demand in related markets, e.g. the one for sponsorship contracts. This externality can be explained as follows. People's empathy for the event has a decisive impact on its image. The image of the event, in turn, is transferred to the sponsors' products (Gwinner, 1997). Put differently, public support enhances the value of the event as a platform for advertisement and hence increases the demand and revenues in the market for sponsorship contracts. If the externality is strong enough, these additional profits may well offset the decline in gate revenues. Therefore, ticket underpricing may well be optimal in order to maximize overall profits of the organizer.

The remainder of this paper is organized as follows: The formal model is set up in Section 2 and used to derive the underpricing result in Section 3. Section 4 illustrates the mechanics of the model by means of a simple example.

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<sup>1</sup>The sale of tickets for the UEFA Euro 2008, the soccer European championship, was organized in a very similar way to the FIFA procedure (UEFA, 2007) provoking comparable excess demand (UEFA, 2008).

Finally, possible interpretations and extensions of the model are discussed in Section 5.

## 2. A MODEL OF MEGA-EVENTS AS MULTI-PRODUCT MONOPOLIES

We consider a simple version of the partial equilibrium model of a two product monopoly developed in Eichhorn and Sahm (2010). The organizer of an event exclusively sells one commodity, called tickets  $t$ , to individuals in the  $t$ -market and another commodity, called sponsorship contracts  $x$ , to firms in the  $x$ -market.

### 2.1. Individuals' ticket demand and public support

We assume that individual  $i \in I := [0, 1]$  buys either zero or one ticket, depending on her willingness to pay  $v^i$ , which is independent and identically distributed (i.i.d.) on  $[\underline{v}, \bar{v}]$  with density  $f$ . The willingness to pay may differ among individuals due to differences in income or preferences for the event. Hence, total demand for tickets  $t(p_t)$  decreases as the ticket price  $p_t$  increases.

**Assumption 1-** *Tickets are an ordinary good, i.e.  $\frac{dt(p_t)}{dp_t} < 0$ .*

The ticket price does not only influence the individuals' consumption decisions but also their opinion about the event per se. As the empirical literature on mega-events emphasizes, the degree to which the pricing scheme is accepted among the population of the hosting region has a positive impact on public support for the event. In particular, Voeth and Schumacher (2003) show within a study on the FIFA World Cup 2006 in Germany that this degree of acceptance increases as ticket prices decrease. This may be due to the fact that the cheaper the tickets are the more people are willing to participate which raises empathy for the event. Hence, we make the following

**Assumption 2-** *Public support – measured by the fraction  $\tilde{e} \in [0, 1]$  of individuals  $i \in I$  with empathy for the event – decreases as the ticket price  $p_t$  increases, i.e.  $\frac{d\tilde{e}(p_t)}{dp_t} < 0$ .*

### 2.2. Firms' demand for sponsorship contracts

We assume that the firms' demand for sponsorship contracts  $x$  with the organizer in the  $x$ -market does not only depend on the price  $p_x$  for such contracts but also on the degree of public support  $\tilde{e}$  for the event.

**Assumption 3-**  *$\frac{\partial x(p_x, \tilde{e})}{\partial p_x} < 0$  and  $\frac{\partial x(p_x, \tilde{e})}{\partial \tilde{e}} > 0$  for all  $p_x \geq 0$  and  $\tilde{e} \in [0, 1]$ .*

The role of image creation and image transfer in event sponsorship has been discussed extensively in the literature on marketing (see e.g. Gwinner, 1997) and sponsorship (see e.g. Jeanrenaud, 2006). Public support for the event and the related positive image enhance the effect of advertisement for contract-

ing firms and therefore boost the demand for their products increasing their profits.<sup>2</sup>

The entertainment industry is well aware of the fact that the degree of acceptance for an event is an important (production) factor. Considerations of public support play a role for various decisions throughout the organization of an event, from the choice of the venues<sup>3</sup> over the choice of PR measures (e.g. logos and mascots) to the pricing strategies<sup>4</sup>.

### 2.3. Profit maximization by the organizer

The monopolistic organizer of the event simultaneously maximizes his profit  $\pi$  from sales in the t-market and the x-market by setting the respective prices  $p_t$  and  $p_x$  observing the respective demands  $t(p_t)$  and  $x(p_x, \tilde{e}(p_t))$ . However, supplying tickets the monopolist faces a capacity constraint  $t \leq \bar{t} \leq 1$ . We define the *maximum sellout price*  $\hat{p}_t := \max\{p_t | t(p_t) \geq \bar{t}\}$  as the maximum ticket price that leads to demand at capacity  $\bar{t}$ . By Assumption 1,  $\hat{p}_t$  is the unique price fulfilling  $t(\hat{p}_t) = \bar{t}$ . Whenever ticket demand  $t(p_t)$  exceeds the capacity  $\bar{t}$ , i.e. whenever  $p_t < \hat{p}_t$ , the event manager uses some procedure to ration demand.<sup>5</sup>

For analytical convenience, assume that the monopolist's production costs can be described by an additively separable function  $C(t, x) = C_t(t) + C_x(x)$ . Hence, the profit function takes the following form:

$$\pi(p_t, p_x) = \begin{cases} p_t \bar{t} + p_x x(p_x, \tilde{e}) - C_t(\bar{t}) - C_x(x(p_x, \tilde{e})), & p_t \leq \hat{p}_t \\ p_t t(p_t) + p_x x(p_x, \tilde{e}) - C_t(t(p_t)) - C_x(x(p_x, \tilde{e})), & p_t > \hat{p}_t \end{cases}$$

## 3. TICKET UNDERPRICING

In this section we characterize the implications of our setup for the organizers' pricing decision. We show that if public support for the event is an important determinant for demand in the x-market, it may well be optimal to choose a ticket price below the maximum sellout price.

<sup>2</sup>Taking this relation into account, Assumption 3 could be derived explicitly as a result of the firms' standard profit maximization problem.

<sup>3</sup>For example, choosing the host towns for the FIFA World Cup 2006 in Germany has been a big deal of discussion. Voeth and Liehr (2003) find that public support for the event is significantly higher within the population of those cities serving as a venue for some of the matches.

<sup>4</sup>Statements like that of Franz Beckenbauer, member of the organization committee for the 2006 FIFA World Cup, that the "fans are the defining factor at a World Cup", seem to bid for public acceptance and try to prevent the media from launching a campaign against grabby organizers (FIFA, 2005).

<sup>5</sup>Like for the FIFA World Cup 2006 or the UEFA Euro 2008, the organizer often uses random rationing. Such a procedure is fair in the sense that any individual demanding a ticket is chosen with the same probability. Fair rationing might be important with respect to public support (see e.g. Voeth et al., 2005).

To see this, consider a situation in which the organizer optimally chooses the price  $\hat{p}_x$  in the x-market given that he charges the maximum sellout price  $\hat{p}_t$  and sells tickets at capacity  $\bar{t}$ . In such a case, the partial derivatives of the profit function are given by<sup>6</sup>

$$\left(\frac{\partial \hat{\pi}}{\partial p_t}\right)^- = \bar{t} + \left(\hat{p}_x - \frac{d\hat{C}_x}{dx}\right) \frac{\partial \hat{x}}{\partial \bar{e}} \frac{d\bar{e}}{dp_t}, \quad (1)$$

$$\frac{\partial \hat{\pi}}{\partial p_x} = \hat{x} + \left(\hat{p}_x - \frac{d\hat{C}_x}{dx}\right) \frac{\partial \hat{x}}{\partial p_x}, \quad (2)$$

where  $\hat{\pi} := \pi(\hat{p}_t, \hat{p}_x)$ ,  $\hat{x} := x(\hat{p}_x, \hat{e})$ ,  $\hat{e} := \bar{e}(\hat{p}_t)$ , and  $\hat{C}_x := C_x(\hat{x})$ .

Using equation (2) and Assumption 3, optimality of  $\hat{p}_x$  implies that  $\hat{p}_x - \frac{d\hat{C}_x}{dx} = -\frac{\hat{x}}{\partial \hat{x} / \partial p_x} > 0$ . Hence, by Assumptions 2 and 3, the second term in the sum on the right hand side of equation (1) is negative. If this negative effect is strong enough,  $\left(\frac{\partial \hat{\pi}}{\partial p_t}\right)^- < 0$ , i.e. the marginal profit is negative, indicating additional profits if the price  $p_t$  is reduced below its maximum sellout level  $\hat{p}_t$ . Those considerations prove

**Proposition 1-** *Under Assumptions 1 – 3, the optimal price  $p_t^*$  in the t-market lies below the maximum sellout price  $\hat{p}_t$  if and only if public support  $\bar{e}$  for the event is sufficiently important for the demand in the x-market; more formally:*

$$p_t^* < \hat{p}_t \Leftrightarrow \bar{t} < -\left(\hat{p}_x - \frac{d\hat{C}_x}{dx}\right) \frac{\partial \hat{x}}{\partial \bar{e}} \frac{d\bar{e}}{dp_t}$$

Proposition 1 asserts that it is optimal to set  $p_t$  below the maximum sellout price whenever the marginal decrease in profit in the t-market from the lower price is smaller than the marginal increase in profit in the x-market from higher public support for the event. The following Corollary clarifies how prices are actually chosen in this case.

**Corollary 1-** *If  $p_t^* < \hat{p}_t$ , the optimal monopolistic price levels  $p_t^*$ ,  $p_x^*$  are given by the following conditions (3) and (4):*

$$\left\{ p_t^* = 0 \text{ or } \frac{\partial \pi^*}{\partial p_t} = \bar{t} + \left(p_x^* - \frac{dC_x^*}{dx}\right) \frac{dx^* d\bar{e}^*}{d\bar{e} dp_t} = 0 \right\} \quad (3)$$

$$\text{and } \left\{ \frac{\partial \pi^*}{\partial p_x} = x^* + \left(p_x^* - \frac{dC_x^*}{dx}\right) \frac{\partial x^*}{\partial p_x} = 0 \right\} \quad (4)$$

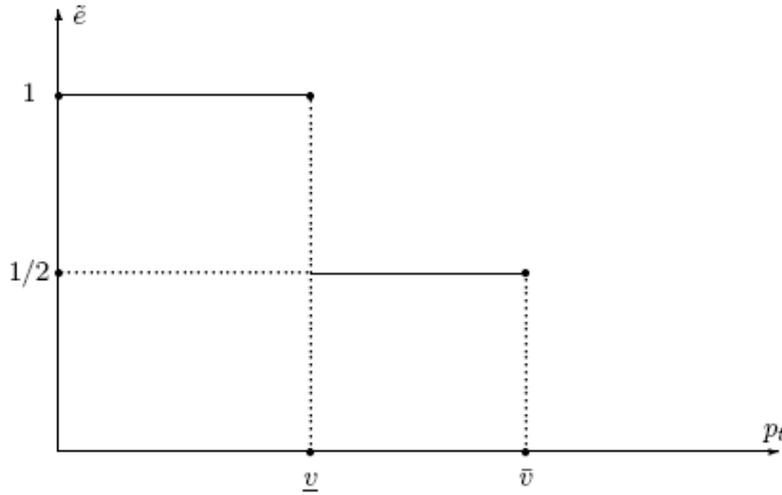
where  $\pi^* := \pi(p_t^*, p_x^*)$ ,  $x^* := x(p_x^*, \bar{e}^*)$ ,  $\bar{e}^* := \bar{e}(p_t^*)$ , and  $C_x^* := C_x(x^*)$ .

<sup>6</sup>Note that at  $p_t = \hat{p}_t$  the profit function is not partially differentiable w.r.t.  $p_t$ . However, since we are interested only in possible gains from price reductions, it is sufficient to consider  $\left(\frac{\partial \hat{\pi}}{\partial p_t}\right)^- := \lim_{h \rightarrow 0} \frac{\pi(\hat{p}_t - h, \hat{p}_x) - \pi(\hat{p}_t, \hat{p}_x)}{h}$ .

#### 4. A SIMPLE EXAMPLE

To illustrate the main idea of our model, consider the following example. There are only two individuals within the economy: Lady Zealous has a high willingness to pay for a ticket  $\bar{v}$ , while Mr. Grouch has a low one  $\underline{v}$ . Suppose for simplicity that either individual accepts the pricing scheme and shows empathy for the event if and only if the ticket price does not exceed the respective willingness to pay. Hence, public support measured by the fraction of the population accepting the event is 0 for  $p_t > \bar{v}$ ,  $1/2$  for  $\bar{v} \geq p_t > \underline{v}$ , and 1 for  $p_t \leq \underline{v}$  as illustrated by Figure 1.

*Figure 1. Ticket prices and public support*



The organizer of the event has zero production costs but is constrained by a stadium capacity of one single seat ( $\bar{t} = 1$ ). Hence, the maximum sell-out price on the t-market is given by Lady Zealous' willingness to pay:  $\hat{p}_t = \bar{v}$ . If the event manager charges this price, public support equals  $\tilde{e}(\bar{v}) = 1/2$ . If, however, he alternatively charges a ticket price amounting to Mr. Grouch's willingness to pay,  $p_t^* = \underline{v}$ , and rations demand, public support equals  $\tilde{e}(\underline{v}) = 1$ . Though, in the latter case, the monopolist loses revenue in the market for tickets, this loss might well be offset by higher revenues in a second market x, if public support is an important determinant of demand in that x-market. Consequently, he chooses the price  $p_t^* = \underline{v}$  below the maximum sellout price  $\hat{p}_t = \bar{v}$  if and only if

$$\bar{v} + \bar{p}_x * x(\bar{p}_x, 1/2) < \underline{v} + \underline{p}_x * x(\underline{p}_x, 1), \quad (5)$$

where  $\bar{p}_x$  is the optimal price given  $p_t = \bar{v}$  and  $\underline{p}_x$  is the optimal price given  $p_t = \underline{v}$ .

## 5. CONCLUSION AND DISCUSSION

We have shown that the price structure a multi-product monopolist chooses internalizes profit-relevant externalities across markets. In our framework, the organizer of an event is able to gain public support by reducing the ticket price for spectators. This exerts a positive production externality on sponsors, which leads to higher sales in the market for sponsorship contracts. The fact that the additional profits in this market may overcompensate for the loss in gate revenues explains frequently observed underpricing of admission tickets in the entertainment industry without giving up the assumption of profit maximizing behavior. In the following we discuss some specific interpretations and extensions of the model.

### 5.1. Relation to the literature on two-sided markets

The classical literature on two-sided markets – an overview is provided by Rochet and Tirole (2006) – investigates optimal pricing if demand externalities are present. The seller acts as an intermediary who brings two groups together by doing business with both of them. To maximize the own profit the seller charges a lower price on one side of the market if a negative externality from the other side exists, and a higher price if the externality is positive.

The similarity between our model and the existing literature arises from the fact that the customer base in market 1 determines sales in market 2. So far, however, the respective literature exclusively considers effects of quantitative nature where the respective externalities originate only from those customers who actually buy the good. Therefore price structures that do not imply a change in the transaction volume in the market from which a one-sided link to another market originates, are equivalent. In particular, facing a binding capacity constraint, prices below the maximum sellout price seem to be unreasonable.

By contrast, in our model the externality originates not only from those consumers who actually buy the good for a given price but from all individuals who are willing to buy – or, more general, show empathy for – the good at this price. If the respective externality is positive, this provides an incentive for price reductions despite a binding capacity constraint.

### 5.2. Resale deterrence

Besides underpricing of tickets, which is frequently observed within the entertainment industry, there is a new phenomenon, which is, *prima facie*, puzzling as well: The organizers of mega-events take measures to deter customers from ticket resale. In case of the FIFA World Cup 2006, for example, the tickets were personalized in order to prevent resale in the black market. Resale of tickets was allowed only at the purchase price via an official platform installed and controlled by the FIFA.

In line with the argument made for the underpricing phenomenon, resale deterrence may similarly increase public support. This is due to the fact that foreclosing the secondary market allows for dispelling two fears people might

have about mega-events: First, the fear that tickets end up only with the rich if resale is allowed; second, the fear of a secondary market as a source of crime.<sup>7</sup> In fact, Voeth and Liehr (2003) find that one of the most important concerns among the population in the host region of a mega-event is the expected increase in criminal activities.<sup>8</sup>

### 5.3. Considerations of welfare and regional development

Concerning the welfare implications of our model, note that the underpricing strategy will never lead to a Pareto improvement since some inefficiency will arise in the t-market if the monopolist sells to individuals with valuations lower than the maximum sellout price. From a (utilitarian) welfare perspective, the relevant question is whether this inefficiency in the t-market is offset by the efficiency gain in the x-market, which is due to the positive externality of higher public support in the case of underpricing. Unfortunately, even in our simple partial equilibrium framework, this question cannot be answered unambiguously.<sup>9</sup> To see why, consider the case where the monopolist optimally sets a ticket price below the maximum sellout price. He does so if  $\pi^* > \hat{\pi}$ , i.e. if the revenue loss from underpricing in the t-market is overcompensated by the additional profit in the x-market. However, he does neither take into account the resulting decrease in consumer surplus in the t-market nor the increase of firms' profits in the x-market. If the former is big while the latter is small, total benefit might shrink despite the monopolist's increasing gain.

There is one more aspect of welfare that deserves discussion. Besides the profit-relevant externality on demand for sponsorship contracts, public support for the event may, at the same time, exert some positive externality on the economic development of the host region as well as on social cohesion and recognition among its population (Gouguet and Barget, 2006).<sup>10</sup> Though a profit-oriented organizer does not take into account these effects when he chooses the pricing scheme, internalizing the profit-relevant externality, he unintentionally helps to correct for the externality on regional development. In this spirit, ticket underpricing makes a positive contribution to welfare of the host region and lowers the need for governmental intervention with respect to the organization of mega-events.

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<sup>7</sup>On 06/03/2006 Kalamazoo, a British security print enterprise, reports in the rubric Latest News on its web-page that it 'currently prints personalized season tickets for a number of premier ship football clubs, which when checked against official forms of ID such as passports and driving licences successfully controls touting' (Kalamazoo, 2006).

<sup>8</sup>Note, however, that Voeth et al. (2005) at the same time identify the inconveniences associated with the restrictions for the resale of tickets as a source of customer dissatisfaction which may decrease public support for the event.

<sup>9</sup>This ambiguity resembles the results of several studies that examine the welfare effects of pricing decisions in two-sided markets, see e.g. Anderson and Coate (2005) and the references within.

<sup>10</sup>Though several cost-benefit-analyses find mixed evidence for the overall impact of mega-events on the economic development of the host region (Baade, 2006; Matheson, 2006), public support for the event undoubtedly translates into the value of an enhanced image of the host region. Factors like the nurturing of regional identity and civic pride may in turn have a positive effect on productivity (Barros, 2006).

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#### **SOUS-TARIFICATION ET SUBVENTIONS PUBLIQUES DANS L'ORGANISATION DES GRANDS ÉVÉNEMENTS SPORTIFS**

***Résumé** - L'organisateur de grands événements, sportifs ou culturels, détient souvent un pouvoir de monopole dans la tarification et/ou la mise en place de contrats de sponsoring. La sous-tarification, bien qu'elle réduise les retours sur investissement, permet une plus grande adhésion de la population locale, de rassembler un plus grand public, et donc d'attirer davantage les sponsors privés. La sous-tarification, en améliorant l'image et l'audience de l'événement organisé, conduit donc à une plus grande attractivité envers les sponsors privés. Elle peut ainsi conduire à de meilleurs résultats financiers du fait notamment des retombées dues au marché du sponsoring.*