# An economic guide to ticket pricing in the entertainment industry

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## Introduction

Ticket markets raise a large variety of pricing questions that are of substantial interest for theoretical economists. They also offer a unique laboratory experiment for empiricists because they exhibit rich sources of price variations. Prices vary because seats are different, because seats are located in different places, because performances take place on different dates, because venues offer different complementary goods, or because the promoter bundles several tickets together in a season ticket package, to name just a few examples.

Some of these pricing issues have received scant attention as applications of broader economic theories. In the last ten to twenty years, however, ticket pricing as such has started to receive more attention. This recent interest has produced a set of papers that cover both theoretical and empirical issues. What will surprise the reader who fancies these issues is that many of them have been studied in isolation. Surprisingly enough, these works rarely reference each other. In fact, there are many disjoint works on ticket pricing but no real literature per se on the topic.

One goal of the paper, then, is to establish that there is a topic that one could call ticket pricing with a corresponding literature. This paper systematically goes through the pricing practices observed in ticket markets and reviews the papers that shed some light on them. Another goal is to evaluate how much we understand about ticket pricing. Based on this review,

I will try to assess whether ticket market outcomes are broadly consistent with existing pricing theories.

As a clarifying note, the paper uses the terminology entertainment industr*ies* in a general sense to include art, music, but also sometimes sports events. In fact, the ticket pricing issues that arise in these industries are similar. Little will be said, however, in this review about ticket pricing in the transportation industries.[1]

Because of the nature of the literature on ticket pricing, this paper can present no general unifying model as is sometimes done in the prototypical academic survey exercise. Trying to construct a unifying algebraic framework would introduce complexity without adding much insight because the models reviewed here are quite different in nature. Rather, this guide to ticket pricing is divided into complementary topics. For each topic, I typically start by pointing out the associated economic theory and then briefly describe some applications specific to ticket pricing. For space concerns, I often do not go much into depth of the logic underpinning of each paper but I rather try to convey the intuition and the implications for ticket pricing. The exposition might at some point appear sketchy and the reader is advised to go back to the original source for further references.

The paper is organized as follows. Before starting with the review of the literature, Section 1 presents a brief description of the entertainment industries. The purpose of this description is to familiarize the reader with the issues specific to ticket markets. The rest of the paper reviews the most important themes of the literature that are displayed in Table 1. It may be useful to keep in mind that this table also captures the general organization of the paper.

Section 2 reviews the theoretical literature on ticket pricing putting each contribution in perspective within the economic literature on second degree price discrimination, bundling, transaction costs, peak load pricing and intertemporal pricing. This section is divided in three broad themes. The first one looks at the pricing of different seats for the same performance. Seats may be different because they are located in different places or because they are physically distinct. The papers reviewed are largely based on the second-degree price discrimination literature although some arguments are drawn from transaction costs economics. The second theme has to do with the pricing of tickets under demand uncertainty. Some of the problems addressed here are similar to those found in peak load pricing. The third theme reviews the pricing of tickets when the producer offers several performances. This covers two distinct cases. The same performance may be offered several times in which case the firm faces an intertemporal pricing problem. Alternatively, different performances may be offered at different

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[1] There are several reasons for this choice. The first one is conciseness. Second, one may argue that although the ticket pricing problems raised in the transportation and the entertainment industries share some common features, these two industries differ in the degree of regulation they face, in their vertical organization and in the nature of the service offered.

**Table 1** : *Ticket Studies by Topics*

| Topic | Study | Industry |
|---|---|---|
| Scaling the house | Rosen and Rosenfield (1997) | All |
| | Huntington (1993) | Theater (Great Britain) |
| Seat Enforcement | Cheung (1977, 1980) | All |
| Choice of Seat Quality | Dupuit (1844) | Transportation |
| | Walras (1875) | Transportation |
| | Rosen and Rosenfield (1997) | All |
| Advance Sales and | Courty (1999) | All |
| Demand Uncertainty | Courty and Li (2000) | Transportation |
| | Weatherford and Bodily (1992) | Transportation |
| | Leslie (1998) | Broadway Shows (U.S.) |
| Pricing Multiple Events | McCain (1987) | All |
| | DeSerpa (1994) | Sports |
| | Rosen and Rosenfield (1997) | All |
| Pricing Complementary | Lott and Roberts (1991) | Movies |
| Goods | Landsburgh (1993) | Movies |
| | Marburger (1997) | All |
| | Steiner (1997) | Museum |
| | Rosen and Rosenfield (1997) | All |
| Resale Laws | Diamond (1982) | All |
| | Happel and Jennings (1989, 1995) | All |
| | Thiel (1993) | All |
| | Courty (1999) | All |
| | Williams (1994) | Football, NFL (U.S.) |
| Social Dimension | Becker (1991) | Restaurants |
| | Locay and Alvarez (1993) | Movies |

dates in which case the firm may choose to bundle performances by offering season tickets.

Section 3 is really a collection of independent issues that do not belong to the first three themes but that play an important role in ticket markets. Section 4 summarizes the main findings of this review and identifies open problems that are still not satisfactorily understood. The empirical literature is too scarce to deserve a section of its own.[2] Rather, the few empirical studies of pricing practices will be reviewed where they belong in Sections 3 and 4.

Before starting, one disclaimer is in order. The reader should keep in mind that in some situations ticket revenues might not represent the

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[2] There is a large literature on the demand for tickets both for cultural and for sports events. This literature focuses on the estimation of the price elasticity for ticket and rarely address the issue of price variation in ticket markets. Throsby (1994) reviews the literature on the demand for the arts but see also Levy-Garboua and Montmarquette (1996) for an important recent contribution.

largest component of total revenue from a performance. For sport events, for example, broadcasting rights may largely dominate ticket sales. More generally, the merchandizing of cultural events is becoming more and more important with many branded goods being designed after an event's image. Although these considerations may influence ticket pricing, they have not been studied in the literature and hence will not receive much attention in this review.

# 1    Pricing issues in the entertainment industries

This Section describes the features of the entertainment industries that are important to understand ticket-pricing practices. It also establishes some stylized facts about these practices. The goal therefore is to provide the necessary background information to understand the theoretical and empirical issues that have received some attention in the literature.

Because the entertainment industries are by nature very media-oriented, they receive a fair amount of attention in the press. Indeed, this section is largely based on information drawn from newspaper articles and industry magazines.[3] Another source of information that will be used in the context of the Broadway theatre industry is Leslie (1998). Although most of the evidence is restricted to pricing practices in the United States during the last twenty years, this should not cost much loss of generality because ticket pricing practices are quite stable across industries, across countries and also over time.

## 1.1    Vertical organization

The entertainment industries are vertically divided between performers, agents, promoters, venues, and ticket agencies. Typically, a promoter contracts an act from an agent who represents the performers. Then, the promoter searches for venues in which to perform the event. The venue imposes some constraints about the number and the type of seat categories that are available for each performance. Once a venue is selected, tickets are sold either at the venue booth or through ticket agencies.

For some events, the market for venues is quite competitive. In the United States, for example, "there is a highly competitive market (for music concert venues) where sometimes as many as nine buildings vie for the same act" (Powel, 1990). Similarly, the market for stadiums in the sports business can also be quite competitive. For example, American cities must bid for

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[3] About 400 articles were reviewed by searching the LEXIS-NEXIS database. This search was conducted in the summer 1995. Most of the articles were published in the eighties or the early nineties. For the sake of conciseness, however, only the most relevant articles are referenced.

hosting the Super Bowl. More generally, cities also compete for teams in many sports that are organized within a league. A result of this competition is that better teams sometimes relocate to larger stadiums.

## 1.2   Pricing policies

Front seats usually cost more than those located further away. Industry professionals call 'scaling the house' the process of pricing the front rows (referred to as the 'golden circle') at high prices and reducing prices all the way to the nosebleed section. The practice of scaling the house, however, varies quite a lot from performance to performance both within and across industries and across time. For example, scaled seating arrangements were commonly employed at reserved seat rock shows during the sixties but disappeared for the more youthful pop scene when promoters introduced general admission tickets in the mid-seventies. Since the late eighties, however, house-scaled seating arrangements are becoming again the blueprint for pop concerts (Giblin and Chadwell, 1994).[4]

Firms price discriminate in other dimensions than just scaling the house. They typically offer discounts under various conditions. For example, early buyers are sometimes offered advance-purchase discounts, coupons are mailed to selected segments of the markets, price discounts are given to students and senior citizens, and some tickets are sold at discounted price on the day of performance. In a study of a particular Broadway show, Leslie (1998) found that, on average, 8.7 different tickets categories (out of 17 possible categories) were offered for each show. He also found that the expected absolute difference between any two ticket prices selected at random was 40% of the mean price. To put this figure into perspective, the same measure of price dispersion in the airline industry is 36% (Borenstein and Rose (1994)). This evidence on price dispersion suggests that price discrimination may play an important role in some ticket markets. One must keep in mind, however, that a fair amount of price dispersion may not be due to price discrimination. Increasing prices on Saturday evening or charging more for front row seats is perfectly consistent with a competitive assumption.

Promoters are responsible for setting the price for their own events and generally tailor prices to the demand of the particular events. For example, a performer on a tour may set different prices in different city stops to match the specific city demands. Another illustration of this principle is that performances are priced according to day-of-performance. Prices tend to increase over the week and are highest for Saturday night performance. Although prices vary over the week they rarely vary from week to week. The observation that prices are often 'sticky' over the run of the performance is

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[4] Actually, this is just one illustration of a general trend in rock concerts to charge as much as the market can bear suggesting that a profit maximizing assumption may not be as bad as is often argued outside the economic literature.

more or less the rule for movies, plays or musical operas. Early consumers pay the same price as those who have to wait to get a ticket.

Another outcome related to price stickiness is the observation that performances that are consistently sold-out for long periods do not raise prices. Similarly, poorly performing shows do not lower prices. This observation that price dispersion seems to understate quality dispersion will be referred to as price compression. In general, it seems that better quality performances generate more revenue not because consumers pay more but because these performances have longer runs so that they sell more tickets overall. Again, this is true in many industries such as movies, theater plays and musical shows. Movies, for example, sell more tickets because they have longer runs and are displayed on more screens or in larger venues.

## 1.3   Primary market

Not all tickets are sold to the general public but some, usually those for the best seats, are withheld. Depending on the nature of the event, these tickets may go to season tickets holders, performers, the venue operator, news media, the manager and the agent, the record company, the fan club, the promoter and/or the tour sponsor. Those tickets that are not withheld are sold at the ticket booth, to brokers who underwrite the performance, or through ticket agencies. The current trend, however, is that brokers are squeezed out of the primary distribution network by ticket agencies. Ticketmaster, for example, which is the biggest ticket agency in the United States sold 53 million tickets for a revenue of $1.3 billion in 1992 (Andrews (1993)).

These agencies offer computerized box office systems that allow promoters to reach larger audiences more efficiently because they use centralized inventory control systems. In addition, they provide some convenience to consumers by taking telephone reservations and credit card payments. Ticket agencies do not have much control over pricing decisions. They are merely agents who take a fee per ticket sold. The point is that the pricing of tickets is a revenue making activity that producers want to keep control over.[5]

Many theaters also offer unsold tickets shortly before the performance at discounted prices. Broadway theaters, for example, have since 1973 sold remaining tickets on the day of performance at substantial discounts in a special location, forcing buyers to wait in line and possibly to make an additional trip before the show. Overall, discount booth tickets represent

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[5] A common observation in ticket markets is that promoters rarely give control over key pricing and marketing decisions to third parties although the physical distribution of tickets may be outsourced. In fact, the actual production of the event and the pricing activities are typically vertically integrated. This is not only true in sports, entertainment, and arts but also in most transportation industries where travelling agencies have very little discretion over pricing. This, however, does not have to be that way. One could imagine, for example, that two distinct and independent firms could manage the production activity and the retailing/pricing activities, as it is the case for many goods and services.

10 to 15% of all Broadway ticket sales (Weber (1994)). In other industries, day-of-performance discount tickets are restricted to certain segments of the market, typically students and senior citizens.

Unsold tickets are called deadwood. The fraction of deadwood varies accross industries. Even in those industries that use discount booths, however, the fraction of unsold tickets may be substantial. For example, Leslie (1998) found (for a particular Broadway show) that the average attendance was 75% and that only 12 out of 199 performances sold out. In the sports industry, Welki and Zlatoper (1994) found that only 68% of the football games played in the NFL 1991 season sold out. Therefore, the capacity constraint imposed by the size of the venue does not always bind. When this is the case, price differences are difficult to explain by differences in cost since the opportunity cost of a ticket is zero.

## 1.4   Sellout and rationing

An observation that always receives a fair amount of attention in the popular press is that promoters sometimes underprice tickets. The interest here is not in those instances where underpricing occurs because of sudden and unpredictable changes in demand. Rather the interest is on those situations where tickets are systematically and deliberately underpriced. An argument commonly found in the popular press is that underpricing guaranties a sellout, and hence generates a certain amount of prestige that acts as a kind of explicit validation of the worthiness of attendance.

Producers also underprice because consumers make purchasing decisions based on box-office figures. For example, it is a recognized fact that Broadway shows overstate the success of their shows as a marketing tool. There are additional more specific rationales for selling out. Some sport leagues (such as the National Football League) impose a 'black-out' rule that prevents local television from broadcasting a game that is not sold out (Putsis and Sen (1999)). As a consequence, NFL teams have some extra incentives to sell-out in order to cash on TV revenues.

Another argument for underpricing is that it enables those intermediaries who keep control over the set of withheld tickets to grant favors to certain selected applicants. Finally, there is related argument based on tax evasion. According to this argument, the promoter declares that all tickets have been sold at face value and pays taxes on that value. But in reality, some withheld tickets are sold at market value.

## 1.5   Secondary market

Some of the tickets bought in the primary market are sold again in secondary markets typically by brokers and scalpers. The popular press distinguishes these two types of middleman. Brokers are bona fide businesspeople, often

listed in telephone registries, who buy large blocks of seats and then pass them along at higher prices to eager consumers. Scalpers do the same thing but are unlikely to be licensed and often do not run official businesses. They usually trade in furtive settings – through classified ads or at the gate of the event itself. From a purely economic perspective, however, brokers and scalpers provide very similar services. For this reason, I will not distinguish them and will use the word broker throughout the paper.

Brokers have developed fairly sophisticated secondary markets for tickets. Much like a loose-knit exchange, they buy, swap and sell tickets to turn out a profit. Brokers get their tickets from several sources. They may own their own season tickets, they may also have longstanding relationships with some recipients of the tickets that are withheld, they hire teams of people with credit cards to buy tickets over the phone, or they may send people to stand in line and buy directly at the ticket booth (a practice called digging). At the same time, brokers constantly run advertisements in newspapers to buy tickets at prices varying between the face value and the resale price. Brokers may resell between 5 to 10 percent of the tickets to a popular show (Mohl (1992)). Usually they traffic in the best seats in the premises for the most popular events. For these reasons, they are mostly interested in weekend as well as holiday season performances. According to Honan (1991), "the nationwide practice of marking up and reselling tickets for plays, rock concerts, operas, dance and sporting events run to $600 million annually" in the United States.

From an economic perspective, brokers offer several services. They arbitrage by buying tickets at face value and reselling them at market price. They can do so, because promoters often ignore market forces. As was mentioned above, some promoters deliberately underprice and ration demand, using lottery systems or some less efficient waiting mechanisms. Another kind of arbitrage occurs when promoters do not fully scale the house so that brokers can typically buy tickets for the best seats in a section at a price representing the average section's seat and resell them at their true value. Brokers can also arbitrage when the theater charges the same price during week-ends and week-days although the two corresponding demands differ.

Related to arbitrage, brokers also provide some liquidity in the secondary market by buying tickets from consumers who decide that they do not want anymore to (or cannot anymore) attend the performance. They later sell these tickets to those most eager consumers who could not plan ahead but find out that they want to attend a performance only in the last minute. These activities involve some sense of speculation, and brokers in some instances lose on their inventory of tickets.

## 1.6   Resale regulations

Ticket resale is a very controversial issue and receives a lot of attention in the popular press. Promoters are typically against resale because they argue that it affects the goodwill value for future promotions of the performer. Promoters have tried to limit brokers' interventions by : (1) Rationing the quantity a single buyer can get; (2) Requiring that buyers pay with a credit card and checking credit card numbers to control large purchases; (3) And in extreme cases, selling non-removable bracelets and admitting only bracelet-wearers at the consumption date.

In addition, promoters lobby state legislators to pass laws regulating resale prices and/or prohibiting resale. As a consequence, about half of the resale markets for concerts, theaters, and sporting events are regulated (Diamond (1982)).

The legal and ethical uncertainties surrounding ticket resale have long confused lawmakers, event promoters and consumers alike. Resale laws restrict the price mark-up above face value and the physical places where tickets can be exchanged. They sometimes also require that resellers purchase business licenses. In the United States, resale laws vary from state to state and from year to year. As mentioned above, these laws have been supported and opposed by well-organized lobbies of promoters and brokers (Hobbs (1994)). Consider for example the state of California, where there are two organizations that lobby lawmakers : *Californians Against Ticket Scalping* is an association supported by ticket promoters lobbying lawmakers to prohibit resale while the *Californian Association of Ticket Agencies* is supported by brokers and ticket agencies and has the opposite agenda (Philips (1990)).

We will conclude our discussion of resale regulation with an anecdote of centralized secondary markets shedding some light on the likely consequences of encouraging resale. In an original experiment, the city of Phoenix decided to allow resale for a NBA All-Star Game but only in a designated area next to the stadium (Happel and Jennings (1995)). Some 400 scalpers traded during the five hours period before the game. Thanks to this centralized trading, buyers could easily gather information from all sellers. This experiment created the spot market model cherished by economists. The general feeling was that this greatly benefited buyers. Ticket prices were exchanged at prices much lower than a few days before when buyers did not have access to a centralized trading place.

## 2   Primary pricing issues

As starting point to explain ticket prices, one may assume that ticket markets are similar to the standard textbook model where demand and supply are in equilibrium at a single market-clearing price. That demand and supply framework sheds some light on some ticket market outcomes. For example,

it may explain why it is cheaper to listen to Kathleen Battle in Omaha than in London. The standard textbook model, however, will not explain many pricing outcomes that are specific to ticket markets and that are the focus of this paper.

Ticket markets differ from the standard spot market model in at least three ways. (a) In ticket markets, firms typically do not sell homogeneous goods. Rather, they sell seats of different qualities offering different experiences. To understand these practices, we will have to borrow some insights from the second-degree price discrimination literature. (b) Because tickets must be sold before the event date, the pricing problems raised in ticket markets share a lot with the pricing problem of perishable products. The starting point to understand this feature will be peak-load pricing theory. (c) Finally, firms often offer the same performance several times (such as in an 'ensuite' musical opera) or offer different performances over a season (such as in sport season tickets). We will see that the inter-temporal pricing problem has something reminiscent of the Coase time inconsistency problem while the season ticket pricing problem is an application of bundling theory. These topics are explored in the next three subsections. For each topic, I start by briefly reviewing the relevant economic theories and then move to specific applications of these theories to ticket markets.

## 2.1 Seat pricing

In ticket markets, firms do not sell a homogenous good since no two seats offer the same experience. One does not see or hear the same way from two different seats in the premises. These differences in visibility and hearing will depend mostly on the distance to the performance. In extreme situations, consumers are so far away that they can barely see the performance but rather experience it on nearby television screens. Firms will take these differences in product quality into account and will accordingly sell different seats at different prices.

### 2.1.1 Scaling the house

As a starting point, one could consider each seat as a distinct good and price it accordingly. Under a competitive assumption, the problem of pricing seats falls as an application of hedonic theory (Rosen (1974)). Seats are described by a vector of objectively measured characteristics and competitive prices characterize an equilibrium where producers and consumers choose their location in the characteristics space. Hedonic theory explains how prices depend on performance quality and on seat quality. An application to ticket pricing would be a set of geographically concentrated movie theaters that offer the same films but different seating environments.

Under the assumption that firms have monopoly power, the problem of pricing seats is equivalent to the screening branch of the theory of second-

degree price discrimination where both prices and attributes can vary continuously. In these models, consumers are privately informed about their willingness to pay for quality. The monopolist offers a menu of quality and prices and consumers self-select by choosing their preferred option (Tirole (1988)). See Mussa and Rosen (1978) for an early treatment of the screening problem and Rochet and Chone (1998) for recent developments.

In practice, however, promoters rarely consider each seat as a distinct good but rather sort seats in categories and price each category not each seat. This more practical view of scaling raises three sets of questions: (1) What determines the optimal number of categories? (2) How should the firm sort seats in categories? (3) How should each seating category be priced? Rosen and Rosenfield (1997) refine the screening theory of price discrimination to address the last two questions. Restricting their attention to a model where there are only two seating categories, they compute the optimal price and the optimal size of each category.

On the empirical side, Huntington (1993) studies whether scaling increases total revenues in a sample of thirty-three theaters that received subsidies from the Arts Council of Great Britain. He assumes that theaters scale the house if less than 70 percent of the tickets are sold at any single price. He finds that about half of the theaters were not scaling-the-house. In addition, those that offer tickets at a single price tend to raise lower revenues than those which charge tickets at different prices. In a regression controlling for seat capacity and the number of performances offered over the season, he finds that those theaters that do not scale the house could increase revenue by about 24 percent by doing so.

Surprisingly, however, we have little understanding of what determines the optimal number of seating categories so that we cannot explain two important observations: (a) Many venues are scaled in only a few categories. Most Broadway shows, for example, have only two seat categories. (b) The number of scaling categories vary quite a lot across venues. Some theaters are scaled in a few sections, others are scaled in only two or three sections, while still others are not scaled at all.[6]

Obviously, firms may not choose to fully scale the house because separate scaling and pricing of seats is a costly process. The seats themselves must be numbered; tickets must be printed; consumers will take more time to make their decision; ushers will be needed to avoid confusion in seating. This process may be especially costly if different performances require different house scalings. Costs considerations may explain some of the variation in scaling arrangements across venues. More specifically, one process that may be very costly to monitor is the enforcement of seat rights. This problem is the focus of next topic.

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[6] Note that some movie theaters are scaled and priced differentially although most are priced uniformly. Similarly, planes are scaled between first and business classes that are always in the front and economy class that is further in the back. Preference for location, however, is limited in planes. Otherwise, there would be further scaling between aisle, middle and window seats.

### 2.1.2  Seating enforcement

A potential important problem with scaling is to enforce that consumers do sit in their assigned seats. Obviously, consumers would like to move to more attractive seats at the beginning of the performance or during the intermission. In fact, theaters may not be able to sell premium seats if consumers expect that these will not sell out. The intuition is that those consumers who would be willing to purchase premium seats may rather buy cheaper ones in the hope to relocate. This observation raises the question : How can the firms fully cash on higher seat categories ?

Cheung (1977, 1980) uses a transaction cost argument to show that a producer may optimally under-price tickets for better seats.[7] The argument starts from the observation that under demand uncertainty, all seats may not always sell out at the optimal prices. Consumers will therefore expect that high quality seats are sometimes unsold. They will be willing to pay less for these seats if they can relocate from low to high quality seats. He then argues that the least costly method of enforcing seat rights is to make sure that better seats are surely, or almost surely, sold-out so that the mere presence of seated customers wards off prospective violators. This goal is achieved by reducing the price of better seats, by reducing their section size, or by a combination of both. By underpricing, the firm enforces that consumers sit in their assigned seats and, by keeping the seats full, the firm saves on costs of enforcing higher prices for better seats. His argument is consistent with the observations that better seats are more likely to be under-priced, sell faster, and are more likely to be sold out, and that in situations where the house is sold out they command higher premium in resale markets.

### 2.1.3  Comfort and lavishness

In many venues, more expensive seats do not only offer a better view but are also more comfortable and are located in more lavishly decorated sections. More expensive seats are often wider, offer more leg space, and are made of softer materials which make seating for long periods less unpleasant. This is illustrated by the differences between boxes, main floor, balcony and standing room tickets at the opera, between skyboxes and bleachers at sport games. Therefore, many premises further distort the seat quality beyond the quality differences which are imposed by the physical constraints of grouping consumers in batches for performances. This observation raises the question : How should seat quality differ between seat classes ?

This problem was addressed a long time ago in the context of the rail-road industry by Dupuit (1844) and later by Walras (1875). Under a competitive assumption, the quality of each category is chosen independently so that the problem of choosing uniform seat quality within each category is

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[7] Cheung does not explain why all seats are sometimes underpriced but why better seats are more likely to be underpriced. We will turn to the former issue later.

similar for the problem of choosing a public good (Spence (1975)). As in the public good problem, the seller must choose one quality for all consumers within a category although they have different preferences over quality.

Under a monopoly assumption, the problem is similar to the second-degree price discrimination problem of scaling the house but now the monopolist has an additional instrument consisting in the physical quality of the seat in addition to the seat location. Again, one must also take into consideration the possibility that consumers will try to substitute across categories. The general idea is that increasing the difference in quality between classes limits substitution and allows charging higher prices to some categories of consumers. As in the standard screening problem, the firm can either increase the quality of the top seats or decrease the quality of the worst seats to limit substitution between classes. Rosen and Rosenfield (1997) show that even in the two-class of seats problem no general results can be derived on the size of distortion for the two classes.

## 2.2 Capacity constraint and demand uncertainty

The previous subsection described some applications of second-degree price discrimination that have been well-studied in the economic literature. We now turn to a feature of ticket markets that has not received much attention. The demand for tickets is typically uncertain. For clarity, it is convenient to distinguish individual from aggregate demand uncertainty. Aggregate demand uncertainty occurs, for example, when demand depends on the weather. Individual demand uncertainty occurs because many consumers are not able to plan ahead of time. For example, some business consumers only buy their tickets in the last minute when they are sure that they will be able to attend.

Demand uncertainty alone does not distinguish ticket markets from markets for other goods and services. What makes this feature dramatic is that tickets are perishable goods and loose all value after the performance starts. In theory, promoters could satisfy periods of high demand by holding large inventories of seats as this is typically done in many other industries. Because tickets are highly perishable goods, however, the costs of holding large inventories can be quite high. Producers respond to these constraints by choosing venue capacities that may turn out to be too small in some states of the world. As a consequence, capacity constraints may bind. This is illustrated by the observation that performances are sometimes sold out. Peak load pricing studies how prices are determined when the capacity constraint binds.

### 2.2.1 Capacity constraint and peak load pricing

Peak load pricing deals with situations where demand varies but supply cannot be adjusted in real time to respond to changes in demand. The simplest case was studied early on by Boiteux (1949). When demand varies in a predictable way, peak load pricing predicts that prices should be increased in periods of high demands and decreased in period of low demands.

The demand for Broadway shows, for example, typically depends on the day and the time of the show. Revenues and total attendance are usually greater for evening shows than for matinees. In addition, they tend to increase over the week and reach their peak on Saturday evening. This is consistent with the prediction that under deterministic peak load pricing the firm should be able to raise more revenue when demand is stronger.

### 2.2.2 Aggregate demand uncertainty

Demand may also vary in unpredictable ways. For example, demand for an outdoor sport events typically depends on the weather. Stochastic peak-load pricing deals with situations of aggregate demand uncertainty (Crew, Frenando and Kleindorfer (1995)). If a spot market could be managed shortly before the performance, these theories predict that prices in the spot market should be such that total capacity equals demand. Prices are high/low when the ex-post demand is high/low. In turn, prices before the performance date are equal to the expected resale value in the spot market (Courty (1996)). This prediction is difficult to test because of the scarcity of spot markets. Although centralized spot markets are rare, brokers typically organize decentralized secondary markets. The fact that brokers sometimes lose money on their inventory of tickets is consistent with the stochastic peak-load pricing hypothesis.

The practice by Broadway shows to discount ticket on the day-of-performance illustrates some of the flavor of peak-load pricing. The problem with this illustration is that Broadway shows do decrease prices in low states of demand as predicted but they do not increase prices even when it becomes clear that the venue will sell-out. In fact, centralized day-of-performance spot markets where prices can arbitrarily vary are rare in practice. (For a rare exception, see the Phoenix experiment described in the previous Section.) This raises the question of why event promoters do not organize secondary markets. By doing so, they would probably capture some of the profits made by brokers. Alternatively, the promoter could sell more complex contracts with cancellation penalties or optional refunds. Indeed, it seems that the promoter leaves some money on the table by not offering more flexibility to consumers.

The simplest explanation may be that flexibility comes at a cost. Secondary spot markets are costly to operate. Brokers may have a comparative advantage in trading in these markets. Another more subtle explanation would be that a secondary market may have some negative signaling effects

that may damage the promoter's future ability to sell tickets.[8] Consistent with this explanation, some have argued that producers are rarely willing to risk the fortunes of a particular show on any new marketing idea. This may explain why the theater business has lagged in marketing ideas relative to the airline, hotel and car rental industries, for example, which face the same type of revenue management problems.[9] Another explanation for the observation that ticket promoters are hostile to secondary markets will be provided in the next Section.

At this point, it is worth mentioning the empirical work by Leslie (1998). He conducts a structural econometric analysis of price discrimination for a particular Broadway show. He estimates a demand system based on a random-utility discrete-choice model of consumer behavior that captures day-of-performance discounts among other dimensions of price discrimination. His model allows him to conduct various experiments about the revenue that would be raised by alternative pricing policies. Surprisingly, he finds that day-of-performance tickets are too discounted. Profits would increase if the discount would be reduced from 50 to 30 percent of face value.

### 2.2.3  Individual demand uncertainty

Another line of research has specifically focused on the role of individual uncertainty in ticket markets (Courty (1999)). In these models, peak load pricing does not play any role since individuals have independent demands so that all uncertainty cancels out in aggregate. Courty showed that when consumers have uncertain valuations : (a) The firm may optimally ration the market and underprice. (b) Total revenue depends on whether consumers are allowed to resell implying that producer will try to control resale markets.

A simple example will illustrate the main intuition for these results. Assume a unit continuum of consumers who do not know their valuation early on but learn it shortly before the performance. For simplicity, assume that half of the consumers are locals who value the good 4 for sure and the other half are tourists who value the good 5 half of the time and 3 the other half. Consumers' valuations are independent so that there is no aggregate valuation uncertainty. The firm can sell tickets before or after consumers have learned their valuations.

The firm maximizes revenue by charging 4 early on, before consumers have learned their valuations, and by prohibiting resale. At that price, all consumers purchase a ticket and the firm's revenue is 4 per consumer. This simple example illustrates the two points stated above. First, the revenue maximizing pricing scheme is feasible only if consumers cannot resell. If

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[8] This explanation, however, is not so valid in the sport industry where the role of imperfect information about quality does not play an important role. In fact, the quality of the game is fairly predictable from the quality of the players and the amount at stake. In addition, the negative signaling externality that low resale prices could transmit is less important in sport markets since the same game is never played twice.

[9] See Weatherford and Bodily (1992) for a review of revenue management, Dana (1998) for a theory of advance purchase discounts and Courty and Li (2000) for a theory of refund contracts.

consumers can resell, they will anticipate that the price in the resale market will be 3 only since half the tourists will turn out to value the good only 3 and they will be willing to sell at any price slightly above that value. Under resale, consumers will wait for the late market unless the price in the early market is 3.

Second, the above scheme works only if the firm can commit not to sell tickets in the late market. Otherwise, consumers will again anticipate that the market-clearing price in the late market will be 3. Most paradoxically, their expectations are self-fulfilling : given that consumers wait, the firm maximizes profit by selling at 3 in the late market. Under imperfect commitment, the firm has to give consumers additional incentive to buy early. To do so, it may be optimal to underprice and to ration tickets in the early market.[10] Courty shows that the amount of rationing will depend on the firm's commitment power.

## 2.3 Pricing multiple events

As mentioned above, ticket producers often do not offer only one event. This typically happens when the marginal cost of producing and additional performance is small and total demand for the event is large compared to the size of the premises. An example of this are 'ensuite musical operas' such as *Cats* which may be performed dozens or even hundred of times. Ticket producers may also offer a program of events that are performed by the same or different performers. This is the case of sport teams that often sell season tickets. More generally, these two situations could occur simultaneously as for opera houses that put together several productions every season and offer each of them several times. For the sake of clarity, these two cases are reviewed independently.

### 2.3.1 Multiple presentations of the same event

Capacity constraints on the venue size often require performances to be repeated sequentially over time. When the event dates are very close, as for opera productions or pop music concerts that are offered only on a few occasions in a short period of time, consumers will typically sort according to their preferences for the different dates.[11] Our interest here is not in the situations where there are only a few performances but in those where total demand is much larger than the venue size so that the intertemporal queue is long. This typically occurs for musical shows and some blockbuster movies. Then, attending early performances is strictly preferred to attending later ones. This raises the questions : Which consumers attend the early shows ? And, how do prices vary over the run of the show ?

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[10] DeGraba (1995) presents a related argument to explain buying frenzies.

[11] As mentioned above, peak load prices may play a role in sorting consumers if there are large differences in the demands for Saturday night and Sunday afternoon, for example.

This pricing problem has some of the flavor of the Coase (1972) time inconsistency conjecture since the firm will have an incentive to lower prices when demand starts to choke off after the show has been on for a while. According to Coase's conjecture, consumers anticipate prices to drop in "the twinkling of an eye" all the way down to marginal cost. As a result, consumers are not willing to pay more than the marginal cost and the firm loses all monopoly power. This is called the time inconsistency problem because the firm's interests before and after it has sold to the first batch of consumers differ: early-on, it would like to commit to sell only a limited quantity while later-on it has an incentive to produce more.

The intertemporal ticket pricing problem is slightly different form the Coase durable good problem, since in each period the firm cannot sell more than its capacity. This imposes a limit on the speed at which prices can unravel. Rosen and Rosenfield (1997) shed some light on this problem. Their main result is that prices are constant when all consumers have the same valuation for the event. In this situation, consumers will be rationed by queues and earlier viewers will get more utility (from an ex-post point of view) than later ones. Their result of constant prices, however, does not hold when consumers are willing to pay different amounts for the performance in which case prices decrease as in the Coase conjecture. Although Rosen and Rosenfield provide a framework to analyze the problem of pricing the same event over time, they do not explain why prices do not decrease over the run. I will return to this puzzle in the conclusion.

## 2.3.2   Multiple presentations of different events

Firms often offer a portfolio of events. For example, opera houses produce several operas every year and sport teams play many games every season. In such cases, the firm may sell season tickets that are bundles for several performances. Pure bundling occurs when only season tickets are sold while mixed bundling occurs when both season tickets and tickets for each independent performance are sold (Adams and Yellen (1976)).[12] One of the main results in this literature is that mixed bundling is likely to be optimal in fairly general settings (McAffee, McMillan and Whinston (1989)).

To conclude, it may be worth mentioning two papers that have tried to explain the feature that season-tickets are often underpriced. McCain (1987) considers a sports team that plays several games each season. Consumers get more utility when they cultivate their taste by committing early on to be a fan of the team. However, consumers will choose early-on to be fans only if they expect to be better-off by doing so. In his model, aggregate demand is uncertain so that consumers are scared to be sometimes priced

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[12] Another possibility would be for the firm to charge a fixed fee for the season and a marginal cost for each event as in the two part pricing schemes offered by theme parks (Oi (1971)). However, such practices are rarely used probably because they raise tricky rationing problems when the price for an individual performance has been set too low. An exception occurs in the sports industry where season ticket owners often have priority to buy tickets for additional games and rationing is sometimes used.

out of a game. The producer must price tickets in such a way that fans do not lose out. This imposes an upper limit on the price of performances, and hence non-price rationing when demand is exceptionally high.

In the same context of the sports industry, DeSerpa (1994) tries to explain the relationship between the market for season tickets, the chronic excess demand and the robust ticket resale market. He argues that season ticket holders act as brokers who price each individual game and charge a fee for this service. As a consequence, the resale price is on average higher than the season ticket price. Note that these arguments for underpricing, however, are specific to season tickets. They do not explain why tickets for individual events are also often underpriced.

# 3   Additional pricing issues

This Section addresses issues that have received some attention in the literature but which do not belong to any of the three themes developed above. Three issues are reviewed : pricing of complementary goods, regulation of resale rights, and the social dimension of ticket pricing.

## 3.1   Pricing complementary goods

Complementary goods may take many forms. The most visible is when goods are sold on the premises such as popcorn in movie theaters and tee shirts at pop music concerts. Complementary goods may take more subtle forms. For some concerts, performers are concerned about sales of their records. For sport events, broadcasting rights may represent a large fraction of total revenue. As mentioned in the introduction, the literature seems to have very little to say about how these subtler and possibly more powerful forms of complementary goods may influence ticket pricing. The literature has mostly investigated the problem of jointly pricing tickets and complementary goods sold on the premises.

A common observation is that complementary goods such as popcorn and soft drinks cost more in movie theaters than at usual outlets. There has been an ongoing debate about whether these practices illustrate monopoly power. The monopoly argument is that there is a positive relationship between willingness to pay for the movie and willingness to pay for the food and refreshment (Landsburgh (1993)). The competitive side of the debate argues that the price differences may be explained by differences in costs (Lott and Roberts (1991)).

Marburger (1997) and Rosen and Rosenfield (1997) formalize the price discrimination argument further. Their models are applications of multipart tariffs where consumers pay a fixed fee to enter the premise and a marginal

price for each unit of complementary good (Oi (1971)). Marburger shows that total profits are maximized when tickets are priced in the inelastic section of demand and suggests that this result is consistent with the inelastic point estimate found in performance goods studies. Rosen and Rosenfield show that when the average ticket buyer buys more complementary goods than the marginal ticket buyer (the one who gets no surplus by attending the performance), the firm increases the price of complementary goods above marginal cost and reduces the cost of tickets. By doing so, the firm does not lose many sales of complementary goods but attracts some marginal ticket buyers. We will return to the pricing of complementary goods in the section on the social dimension of ticket pricing.

On the empirical side of this literature, Steiner (1997) studies the effect of adding a free day each week on the revenue of a large American museum. The argument for such a policy follows the line of Rosen and Rosenfield for subsidizing ticket prices. Adding a free day may be profitable if the gains in shops and restaurant revenues offset the loss in revenue from forgone admission receipts. Steiner, however, finds that an additional free day would not be profitable.

## 3.2   Resale laws

Resale may occur for several reasons. First, promoters encourage arbitrage when they do not price tickets according to market forces. This occurs, for example, when the house is not fully scaled. Another reason for which resale may occur is because tickets are typically sold ahead of time so that early buyers may not be those consumers who value the ticket the most at the consumption date. Under both these circumstances a ticket can be worth less to its owner than to some other consumer; if so, reselling will benefit both parties. From an efficiency point of view, a reallocation of tickets always improves social efficiency and should therefore be allowed. The free-market argument says that the broker is merely an agent who takes a fee for his service and makes everybody better off (Happel and Jennings (1995)). This rationale for allowing resale at the time of the transaction, or ex-post, is clear. However, allowing resale also changes the behavior of the producer, brokers and consumers ex-ante, before the transaction date. Resale should be prohibited if it creates some perverse incentives from an ex-ante point of view. Several arguments have been proposed along these lines.

Thiel (1993) considers a firm that chooses to deliberately underprice (for some unmodeled reasons) and rations tickets by a lottery system. In his model, brokers allow those patrons who value the performance the most but who got unlucky in the lottery to buy tickets from less eager but more lucky patrons. He shows that resale laws raising transaction costs may increase welfare only when they completely eliminate the resale market. Otherwise, resale laws merely increase the inefficiency of channeling tickets to highest bidders.

Diamond (1982) arrives at the opposite conclusion using an argument based on the legal concept of unfair practice. He assumes that promoters underprice for two reasons : first because they rarely know whether an event will be successful and second to guarantee the success of future events by creating some goodwill. Brokers, however, intervene after it is clear that the event will be successful. Under this interpretation, brokers do not take any risk. Diamond's rationale for prohibiting resale is that such practices deprive consumers of a valuable, previously existing service : the availability of tickets through the box office. Worse for the promoter, the unavailability of tickets at advertised prices often damages the goodwill of the performance and tends to induce accusations of fraud and complicity against the promoter.

In addition to increasing efficiency by channeling tickets to the most eager consumers, Courty (1999) points out another effect of allowing resale. To easiest way to illustrate this effect is to come back to the example presented in Section 2.2.3. That example shows that a producer may choose to prohibit resale even when she does not underprice. The key intuition is that allowing resale changes the price consumers are willing to pay early. Indeed, this early price depends on consumers' expectations about their future opportunities to buy in the resale market. More surprisingly, Courty also shows that a regulator may choose to prohibit resale. In brief, the regulator must make a trade-off between two effects. By allowing resale, he allows market forces to channel tickets to those consumers who value them the most. But allowing resale also changes the producer's choice of capacity, by changing venue for example, because it changes the demand curve. Courty shows that the producer will typically choose smaller capacities more when the regulator allows resale. A regulator prohibits resale when the capacity effect dominates the channeling effect.

To conclude, a study on the impact of resale from the sports industry is worth mentioning. Williams (1994) studies the relation between anti-ticket scalping laws and revenues in a sample of National Football League stadiums. As mentioned above, resale laws vary substantially across local markets and through time in the United States. Williams uses ticket data for 28 NFL stadiums in 1992 and finds that 10 had few or no resale restrictions. Quite surprisingly, he also finds that even after controlling for differences in local markets, resale restrictions *increase* average ticket prices. He concludes that if owners of NFL teams followed a pure revenue maximization objective they should oppose laws that interfere with the scalping of tickets at prices higher than face value.

## 3.3   Socal dimension

Ticket pricing has also a social dimension. This social dimension may take many forms. For example, consumers often go to an event after talking to their friends, some consumers go exclusively to popular events that have

a success history, and still others only attend performance in groups, to name just a few examples. These social dimensions have not received much attention in the literature. As rare exceptions, two papers with application to ticket pricing are worth mentioning. Before presenting these papers, let me say that modeling the social dimension of ticket pricing seems to be a promising line of research that could potentially shed some light on several market outcomes.

Locay and Alvarez (1993) use the observation that people usually go to the movie theater in group as a departing point to study the pricing of complementary good. Consider a social group where some members like to eat popcorn and others don't. Popcorn eaters care about both the prices of ticket and popcorns while non-popcorn eaters care only about the ticket price. Locay and Alvarez show that movie theaters can exploit this heterogeneity in preferences to price discriminate even under competition. Theaters charge an entry fee that is below marginal cost to attract social groups and a marginal price for complementary goods above marginal cost because they have market power over individuals who are constrained by their group's choice.

Becker (1991) explains why many successful plays and sporting events do not raise prices even with persistent excess demand. The main intuition of his model is that the demand of a typical consumer is positively related to the demands by other consumers. The motivation for this approach is that going to a performance is a social activity. Becker shows that when consumers' demands are positively related, the market inverse demand may be upward sloping over a range of quantities. Although his model explains why a firm may not raise prices in the short run when capacity is fixed, it does not shed much light on the long run outcome that firms typically do not raise capacity to meet excess demand.

# 4    Conclusions

This economic guide to ticket pricing has reviewed many potential factors explaining why ticket prices vary. Ticket prices may differ because seats are different, because seats are located in different places, because performances take place at different dates, because venues offer different complementary goods, or because the promoter bundles several tickets together in a season ticket package, to name just a few examples. The paper has reviewed many theories explaining how producers fine tune prices to take into account these differences.

We were especially interested in evaluating whether theory was successful in explaining the price variations observed in ticket markets. Overall, the answer is positive. Actually, if anything, prices do not vary as much as the researcher would predict under either a competitive or a monopoly as-

sumption. Several observations support this claim. Consider for example the common observation that there is very little intertemporal price variation when performances are repeated over time. Competitive theory predicts that consumers who attend later performances should pay lower prices because they have to wait. Intertemporal price discrimination theory predicts that they should pay lower prices for the same reason but also because they are less eager consumers. In practice, however, prices do not vary over the run of a performance.

Another illustration that there is too little price dispersion is that performances of different qualities are often equally priced. Even when prices do vary, the general perception is that there is some price compression in that price differences usually understate quality differences. In most cultural industries, better quality products raise more revenues not because they charge higher prices but because they sell more tickets. The quantity margin seems to play a more important role than the price margin in explaining an event's success. We have a very poor understanding of why the price system plays such a little role in rewarding quality[13].

Still, another illustration of the claim that we do not observe as much price dispersion as the theory predicts is that many theaters scale their houses in only a few sections or simply do not scale at all. The conclusion that producers typically under-scale is supported by the observation that brokers make a substantial part of their business by trading the best seats in each section. The reason for which brokers specialize on the best seats is because these are typically undervalued. This under-scaling outcome is a puzzle that has not received much attention either. In particular, the literature has only considered the polar cases where the premises are divided in two sections or in a continuum of sections.

One alley of research for the theoretical literature would be to try to explain the facts that prices do not seem to vary as much as theory predicts. There is no theory explaining the observations that prices are sticky over time, compressed across events and across seating categories for a given event. Very likely, different explanations play a role in these observations.

Our lack of knowledge is empirical too. For example, little is known about how house-scaling arrangements vary across performances and industries. More generally, the empirical literature seems to be lagging behind the theory. It is difficult to know whether the theoretical predictions stand up to empirical scrutiny, because there is so little literature on how pricing policies are designed. With a few exceptions, the structural micro econometric approach that has revolutionized the empirical industrial organization literature has not reached the cultural economics sphere yet. Most empirical studies have focused on estimating ticket demand to test whether promoters

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[13] These price stickiness and price compression outcomes may be explained by asymmetric information on performance quality. Surprisingly, information and signaling issues have received little attention both in the theoretical and the empirical literature. These information issues may also explain why there have been much fewer marketing innovations in sport and entertainment ticket markets than in airline ticket and hotel reservation markets, which share several common features.

set prices to maximize profits assuming that all tickets are sold at a single monopoly price. We probably need more empirical studies that focus not only on demand and prices but that take into accounts the institutional constraints and the type of contractual arrangements that have been studied theoretically.

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