The Pricing of Art and the Art of Pricing:

Pricing Styles in the Concert Industry

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Abstract: We document the existence of pricing styles in the concert industry. Artists differ in the extent to which they rely on second- and third-degree price discrimination and in how likely they are to sell out concerts. Most strikingly, artists who use multiple seating categories are more likely to vary prices across markets and less likely to sell out concerts. These patterns are difficult to explain under a standard profit maximization paradigm. The hypothesis that artists differ in their willingness to exploit market power provides a plausible framework for explaining these patterns in artist pricing style.

JEL: D42, D45, L21, L82, Z11.

Keywords: Price discrimination, rationing, behavioral pricing, pricing style,

exploitation of market power, fair pricing.

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Tickets to see musicians such as Bruce Springsteen, who insists that entry to his shows be cheap enough for working stiffs to afford, are particularly susceptible to what fans call "price gouging".
The Economist, Jan 20th, 2011

`Bruce Springsteen, Pearl Jam, and Dave Matthews have never charged as much as they could for their tickets'.
Ray Waddell, 2009

When Babs tried to charge up to Euro 900 for a Rome gig, Italian fans rebelled and urged the city's government to refuse the singer use of a stadium. After the public outcry, Streisand cancelled the concert.
The Sunday Times, August 2nd, 2008

1 Introduction

Why devote an entire chapter of the Handbook to studying how artists set prices for live concerts? One reason is the overwhelming popular interest in the topic. Ticket pricing receives a lot of attention in the press, and fans seem obsessed with the price and availability of tickets. Journalists howl when concert prices are perceived to be outrageously high, and squawk when fans have to line up for hours for a much sought after ticket, unless they can afford to pay several times the face value on online resale markets. Newspapers also report on how difficult it is to get some or all types of seats when all tickets are sold at the same price. Artists, promoters, fans, and commentators have different views on ticket pricing. So who should one listen to?

Ticket pricing is also interesting because the live event industry exhibits many unusual characteristics. The suppliers, typically individual artists or bands, are not the textbook profit-maximizing entrepreneurs. Many artists are also songwriters and composers who see higher meaning in their music. Their songs often have strong emotional and political

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messages and they see music as a way of raising spirits and aspirations. Artists are also celebrities who often rely on their public image to sell their art. Some also enjoy public adulation for the sake of it. Another unique feature of the concert business is that some artists express personal views about who should attend their concerts and how much they should be expected to pay. Bruce Springsteen, for example, explains low ticket prices to his concerts as an attempt to make them affordable to the working classes. One may question whether such statements are sincere. The debate goes on.

Concert-goers are not textbook consumers either. Many fans are loyal to specific bands, developing emotional attachments to particular types of music and individual artists. The media reports on the lives of artists, thereby feeding fans with information that shape their perception of the artist. Some fans feel that concert attendees should not be selected on the basis of how much they are willing to pay but rather on the basis of their sincere understanding of, and commitment to, the art. Many artists are sympathetic to this view.[3]

These are just a few features of the live music industry that contribute to its uniqueness. While some have to do with the supply side of the market, others have to do with the demand side. The nature of the product and how it is distributed to consumers also raise interesting issues. Pricing is a salient issue because live bands have a tremendous amount of market power and sell highly differentiated products. Not all seats in a venue provide

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[3]   Pearl Jam, for example, has always intentionally maintained relatively low prices (Ault, 2003).

the same experience. Moreover, live music is also often delivered to consumers through tours that stop in cities with sometimes widely different local demands. This raises complex pricing issues. Should an artist charge different prices for the same concert in two different markets? Should an artist charge different prices for two seats located in different areas of a venue? What determines the artists' willingness to use price discrimination?

While interesting questions are a good starting point for conducting worthy empirical research, they alone are not sufficient. One also needs reliable data to conduct statistical analysis, and in this sense, concert pricing offers a unique laboratory for the researcher. Artists have to make a large number of choices when pricing tickets. Each time an artist launches a tour, which most artist do regularly, decisions must be made concerning the overall level of price, how much prices should be differentiated across local markets, and how much prices should be differentiated within a venue. Artists set ticket prices in advance and rarely change them (although prices may vary widely in the resale market). Two trade publications cover the concert industry, *Pollstar* and *Billboard*, and maintain datasets that match artists, promoters, venues, and concert prices. Most importantly for the researcher, the concert industry lends itself to the use of statistical analysis because the econometrician can use repeated observations to control for many unobserved factors. Artists tour repeatedly, year after year, and give a large number of identical concerts within each tour. They may repeatedly sing in the same city and venue as part of different tours. In addition, a fairly small number of promoters repeatedly promote concerts given by top artists.

A research topic is of particular interest if it offers outcomes that challenge conventional views. The live music is rich in such puzzles. First and foremost, one has to ask why rationing and resale markets are so common for live concerts. *The Economist* claims that 'Live music is one of the few businesses in which second-hand goods often sell for more than new ones' (The Economist, 2011).[4] This may be an overstatement, but it points outs the connections between the price level, the extent of price differentiation in the primary market, and the subsequent resale activities in secondary markets. Economists and others have produced many theories of under-pricing, rationing, and price rigidities. However, rigorous empirical evidence on rationing is almost non-existent. Overall, it is fair to say that there is no systematic understanding of the causes for rationing.

Another puzzling phenomenon typical of concert pricing is that price discrimination is not very common. Why are seats in the same venue often sold at the same price? Even when there are multiple seating categories, it seems that the number of categories is fairly small. The same is true if we consider the pricing of the same concert in two different cities. Why do so many acts set the same price for concerts that are part of the same tour?

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[4] This chapter focuses on the prices in the primary market because they are controlled to a large extent by artists. Tickets are also resold in secondary markets through brokers and on the Internet, but we do not discuss these issues here. See Courty (2003) or Leslie and Sorensen (2011) for a discussion of prices in the secondary market.

Connelly and Krueger (2006) highlight these puzzles in concluding their review of the 'Economics of popular music' in the previous issue of the Handbook of the Economics of Art and Culture. Several areas they deem worthy of future research have to do with ticket pricing. They ask: 'What determines the amount of price differentiation within concerts? Is there less regional variation in prices for the same concert than one would expect in an efficient market? If so, why? Why do tickets appear to be underpriced for many concerts?' This chapter takes on these questions. We study price discrimination and rationing in the concert industry.

We document new stylized facts from a large dataset that covers about 20,000 concerts offered by the top 100 acts in the period 1992-2005. We initially focus on the issue of the use of price discrimination (between seats within a venue and between venues that belong to the same tour). We document the existence of large differences across artists in the use of second- and third-degree price discrimination, even after controlling for a large number of sources of unobserved heterogeneity. Some artists vary prices to respond to demand conditions while others do not, suggesting that artists may have different pricing styles. Next, we develop a simple framework that is consistent with these stylized facts, and hypothesize that artists differ in their willingness to exploit market power. This assumption provides a plausible framework to explain the observed patterns in artist pricing styles. First, it rationalizes the observed heterogeneity across artists. Second, it implies that artists who are more likely to vary prices within a venue will also vary prices across venues more and ration tickets more. This prediction, which is unique to the

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hypothesis that artist pricing styles stem from differences in willingness to exploit market power, finds remarkable support in the data.

Our evidence is drawn from one industry: concerts for live popular music. There are many reasons for this choice. As mentioned earlier, data on ticket prices are uniquely suitable for conducting statistical analysis. In addition, the industry is significant in value, global, and subject to market forces with little government interference; three features that distinguish it from many other performing arts. The industry has also received serious attention by academics and has already been the object of a chapter in the earlier issue of this Handbook (Connolly and Krueger, 2006). This paper builds on that work by developing in-depth two key issues that are the object of much debate: price discrimination and rationing. A thorough investigation of these issues gets to the fundamental economic idea that sellers may vary in their willingness to exploit market power. This possibility arises in many markets with imperfect competition.

The rest of this paper proceeds as follows. Section 2 presents background information about the live event industry, reviews the literature, and lists a number of open questions. Sections 3 to 5 present the data and establish stylized facts about the use of second and third-degree price discrimination. Sections 6 and 7 show that it is difficult to associate the differences in pricing practices to unobserved demand and product heterogeneity. Instead, heterogeneity in artist willingness to exploit market power can, in fact, rationalize a number of observed patterns in the data. Section 8 presents further evidence consistent with the hypothesis that artists differ in their pricing styles. Section 9 concludes and lists a number of questions for future research. The last section also discusses the broader

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relevance of our work to other performing arts and explains how the concept of pricing style could be applied elsewhere.

2 The live event industry: facts, literature review, and open questions

The economics of live events raises a number of interesting issues that cannot all be addressed in a single chapter of the Handbook. Here we focus on second- and third-degree price discrimination and rationing. To prevent confusion, discussion of the broader context and of connections with other pricing issues is useful, although of course these issues are not directly addressed in this chapter.

This study focuses on the primary markets for concert tickets. Concerts are often sold out before the event date. Consumers who cannot purchase a ticket in the primary market can purchase tickets in resale markets. The most common ways to do so are through auction websites such as eBay, specialized resale websites, or professional brokers. Although secondary markets are outside the scope of this study, we do investigate the issue of sold-out concerts, which is essential to understanding the economic rationale for secondary markets.

Typically, the price of tickets is fixed when a tour is announced, prices do not change over time, and tickets are distributed through the box office or national distributors. Although there have been some innovations in recent years (revenue management, distribution through artist websites, for example), this is still the dominant model for the industry. While we do not study these innovations in the core of this study, we shall revisit the issue in the conclusion when discussing areas for future research.

Another consideration to be made is that some artists offer many concerts each year and rarely take breaks, whereas others hardly ever give live concerts. We leave aside the decisions of when to go on tour and which cities to visit, taking these issues as given, and focusing our investigation on the setting of prices for different seats in a venue and for different venues in a tour. Finally, the revenue from ticket sales is often supplemented by concessions revenues which can come from the sale of food and drinks as well as CDs and a wide variety of souvenirs. Although these are important sources of revenue, they are not the focus of this work and we do not consider them in most of this paper.

The artists in our sample make most of their income from touring. Connelly and Krueger (2006) discuss some of the connections between touring and other income sources, and in particular recording.

2-1 Industry background

We present the key characteristics of the concert industry that are relevant for this chapter. A more detailed review is available in Connelly and Krueger (2006) and Waddell et al. (2007). The modern touring industry was born in the late 1960s when a few bands such as the Rolling Stones and Led Zeppelin regularly started touring a variety of arenas and stadiums, using their own experienced crew to take care of the sound, staging and lighting. In the 1980s, advances in technology allowed bands to offer even more ambitious stage shows that were louder and brighter, and available to ever-larger audiences. By 2007, the

North American concert industry had grown to $4 billion in revenue and 100 million in attendance.[5]

   Although some acts give single concerts, the dominant model in the industry are tours. In brief, a concert tour is typically organized by an artist represented by his or her manager, a (booking) agent, and a promoter. The artist and the agent agree on an act and a tour plan. The agent then looks for promoters to organize the event in each city. The artist comes to an agreement with each promoter on a pricing policy and on a revenue sharing rule. Promoters are in charge of organizing the events. This involves booking venues, advertising, and collecting revenues. There are some variations on the theme. Most artists use the same set of promoters to be in charge of the tour, but some also use local promoters in certain cities to tap into the local expertise so crucial for success. A few artists even do everything in-house and directly contact the venues. Although there are different types of tours (e.g., promotional tours of new releases, seasonal tours, festival tours), all of the concerts in a single tour usually include a common set of songs and similar staging, and are marketed together.

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[5]   Part of the information on the touring industry presented in this section was collected by interviewing concert promoters and two professors who teach courses on concert promotion. Some of the information was also drawn from recent books and industry manuals on concert promotion, in particular Waddell et al. (2007).

2-2 What is specific about the pricing of live events? A review of the literature

Ticket prices of concerts are typically set jointly by the artist and the promoter(s) when the tour is announced and remain unchanged afterwards. Each event is unique and there is no set formula for pricing a concert. There is no second chance if one gets the wrong number of seating categories or prices. Events are sometimes added or cancelled, but prices or category allocations typically remain the same.

The problem of pricing tickets for live events shares much in common with selling tickets for air travel, booking hotel rooms, or handling restaurant reservations. At the heart of the problem is the issue that the seller has a fixed capacity, faces much demand uncertainty, and has a limited amount of time to sell tickets. Many industries use techniques known as revenue management, dynamic pricing, or responsive pricing (Courty and Pagliero, 2008) to handle these problems. But the live event industry does not think about pricing a seat for a concert in the same way that a revenue manager thinks about pricing a seat for a flight or a hotel room. The concert industry is unique by its lack of sophistication. Although we have seen more experimentation with revenue management in recent years, it is still rare and one has to ask why the concert industry does things differently.

Price discrimination

According to price discrimination theory, prices are expected to vary in response to differences in demand in different markets (third-degree price discrimination) or for different seats in the same venue (second-degree price discrimination (Stole, 2007)). Live events are peculiar in that the distribution of seat quality is given by the structure of the

venue, and the artist decides only the number and location of the different seating categories. Rosen and Rosenfield (1997) present a theory of second-degree price discrimination that deals with this specific problem.

Courty and Pagliero (forthcoming) estimate (using the same dataset as that used herein) that the return from price discrimination relative to uniform pricing is about 5 percent of revenue. The magnitude is consistent with the results presented in Leslie's (2004) simulations done in the context of a Broadway show. To put this number into context, assume that the artists' profits are 40 percent of revenue (LaFranco, 2003). Price discrimination increases the artist's take by 12.5 percent. Courty and Pagliero also show that the return to price discrimination increases in markets where demand is more heterogeneous, as predicted by the theory.

A preponderance of evidence indicates, however, that acts do not fully exploit the revenue potential of seat differentiation within a venue. The number of seating categories used in the concert industry appears to be relatively low. The majority of concerts in our sample use two seating categories and the maximum number of seating categories is four. Comparison with figures from other industries helps put this into perspective. In the context of a Broadway show, Leslie (2004) reports a similar observation. His firm never uses more than three seating categories for a given show. In contrast, the number of seating categories can be quite large for classical music events (Huntington, 1993).

Why do acts not increase the number of seating categories? One may argue that seat differentiation is not important in the concert industry. However, Leslie and Sorensen (2011) present a variety of evidence consistent with the fact that seats are not equal within

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a seating category. For example, the best seats within a category are much more likely to be resold in secondary markets.

Courty (2011) shows that a monopolist prefers to sell all the seats in a venue at the same price if low valuation buyers are more likely to obtain the better seats. Leslie and Sorensen (2011) make a similar point. They show that the secondary market influences the queuing game in the primary market and the sales of each seating category in the primary market. Clearly, there are interactions between the primary and secondary markets. But this is probably not the explanation for why artists use few seating categories. Courty and Pagliero (forthcoming) estimate the return from adding seating categories. They find that although the return to price discrimination decreases with the number of seating categories, the return from adding a third and fourth category is significant (about half the return of introducing a second category). This suggests that some artists leave money on the table.

Einav and Orbach (2007) address a similar puzzle in the context of the movie industry. They begin with the observation that prices do not vary for different movies within a theater despite differences in theatrical potential and realized success. They consider a different dimension of product quality than we do (film quality instead of seat quality), but the puzzle is similar: firms sell differentiated products at the same price. Einav and Orbach rule out conventional explanations based on fairness, uncertainty and agency and conclude that history and industry conservatism must be at play. A similar explanation may also hold weight in the concert industry. For example, industry norms and resistance to innovation may explain why so many concerts use just two seating categories.

Nevertheless, this type of argument cannot explain the large differences across artists in pricing choices central to the present analysis.

There is a small empirical literature in industrial organization on price discrimination (Verboven, 2010). Several studies investigate the relationship between second-degree price discrimination and market structure (e.g., Borenstein and Rose, 1994, and more recently, Busse and Rysman, 2005). The issue is relevant in markets with multiple firms selling products that are close substitutes. Market power in the concert industry differs because products are differentiated in two key dimensions. Artists have loyal fans who may not substitute even within a given musical genre. Even more importantly, few concerts are offered in any given local market on the same date. For these reasons, artists have a tremendous amount of market power.

Another line of research has tried to explain why service operators (e.g., telephone, electricity) offer only a few types of contracts (Wilson 1996, Miravete 2007). This literature shows that the gains of finely sorting consumers by providing many contracts that approximate the profit maximizing non-linear schedule are marginal. The issue is slightly different in the case of concert pricing because the distribution of seats is given and the only issue is whether to sell different seats at the same or at different prices. The return to price discrimination depends not only on the heterogeneity in consumer preferences but also in the exogenously given heterogeneity in seating experience. Offering multiple ticket prices may raise profits even if all consumers are identical. As mentioned above, artists do not fully exploit the opportunities offered by second-degree price discrimination.

To our knowledge, no studies have been done on the use of third-degree price discrimination in the context of the concert tour industry. Moreover, we do know of no study that has jointly looked at the use of second- and third-degree price discrimination. The literature on industrial organization has studied the two pricing questions independently (Stole 2007). This is not because the issue has no empirical relevance. In fact, most firms that sell vertically differentiated products do so in multiple markets. Such firms apply second- and third-degree price discrimination simultaneously, charging different menus of prices in different markets. Under a classical approach, there is no theoretical reason why the two decisions should be linked. Indeed, the second- and third-degree price discrimination literatures have no overlap.

A behavioral approach, however, can establish links between the two decisions. Kahneman et al. (1986) argue that community standard of fairness prevents sellers from increasing prices in response to positive demand shocks. Such a constraint on the sellers' ability to fine-tune pricing may apply to both second- and third-degree price discrimination. Alternatively, sellers may be subject to biases or personal styles, as we argue shortly, and such biases may apply to all pricing choices. A novel aspect of our work is to show that second- and third-degree price discrimination are linked empirically and to suggest that they are linked through the identity of the sellers.

Rationing

Happel and Jennings (2010) list several explanations for the prevalence of rationing for live concerts. Broadly speaking, these explanations belong to one of two categories depending on whether the argument is based on classical economics or whether it also

includes some psychological elements. Consider explanations based solely on classical economics. The main reason for rationing is that concert demand is subject to much uncertainty. Prices have to be set in advance before knowing many variables that influence demand. Uncertainty cannot explain, however, why some artists *systematically* sell out the *first day* that tickets are offered for sale. It is reasonable that when artists first offer tickets for sale, they do not know what the demand for the concert will be on the event date. But how could they have such poor information about contemporaneous market demand and fail to learn from past mistakes? Classical economics has offered other explanations that are consistent with this fact. One is based on the observation that most performing artists care about their reputation. Empty seats may reveal negative information about the tour that could damage the artist's eminence and ability to sell tickets in the future. If concert goers systematically substitute away from those artists who do not sell out, it may be rational for all artists to underprice because none of them wants to fall victim to a negative information spillover.

But there are other features that are specific to the concert industry. Producing a successful concert involves managing a coordination game between fans with important consumption externalities and informational asymmetries. Concert attendance is a joint consumption good and also an input of production. Becker (1992) has argued that due to consumer externalities, the demand for concerts may be upward sloping at least for some range or prices. DeSerpa and Faith (1996) refine the argument to explain excess demand for concerts. Another type of explanation is based on the relationship between ticket sales and other markets. Underpricing secures a full house that increases ancillary sales on the

premises. There are also complementarities between concert sales and the sales of recorded music that may justify keeping prices low (Krueger, 2006). These explanations explain why artists may want to subsidize tickets to increase consumption. However, while this explains selling below monopoly price, it does not offer a rationale against market clearing. It does not explain large excess demand for tickets that results in rationing and high prices on the secondary market.

A second class of explanations is based on the psychology of concert fans. One argument is based on the idea that ticket pricing is subject to norms of fairness. Kahneman et al. (1986) have argued that considerations of fairness play a large role in ticket markets to justify price compression. Fans have implicit contracts with artists that give entitlement to affordable prices. Artists who violate these norms may be subject to antagonism and withholding of demand. This view is consistent with the fact that high ticket prices receive much attention in the media. If the media is more likely to pick on unfair prices, charging excessive amounts can backfire and trigger a consumer boycott (see Courty and Pagliero (2010) for a discussion of these issues).

Happel and Jennings (2010) have argued that underpricing generates goodwill and that consumers reciprocate in other markets (recordings, ancillary products, endorsement) as they would in a gift exchange. They also propose another behavioral argument. Frenzies associated with rationing may produce a mystique of scarcity that steers the fear of rationing and exclusion. Consumers want to be among the happy few who get tickets. Artists may gain in the long run from creating such psychological drives.

There is very little evidence in support of these explanations. In fact, there is not even systematic evidence that rationing prevails in the concert industry. The underpricing debate is fueled by anecdotal evidence that lacks systematic examination. There is little doubt that some artists, like Bruce Springsteen, for example, systematically sell out their concerts. In addition, there is evidence that some concerts are underpriced. Consumers have to line up (or wait on the phone), tickets sell out very quickly, and some tickets are subsequently offered online at much higher prices. These pieces of evidence suggest that some artists leave surplus to consumers (or resellers). The fact that brokers and scalpers make large profits in resale markets is consistent with the underpricing hypothesis.

But there are also counter arguments to the hypothesis that tickets are systematically underpriced. It could be that brokers enter the market because artists use very coarse seating categories. Since consumers strictly prefer the best seats in a given category, these seats have to be underpriced in order to sell the worst seats. This alternative hypothesis is consistent with the fact that brokers trade in the best seats in each section (Leslie and Sorensen, 2011). In addition, rationing does not necessarily mean that artists leave money on the table. Courty (2003) has argued that artists may not be able to capture the profits from resale that are captured by brokers. More to the point, rationing is common but not at all pervasive. On the one hand, 40 percent of pop concert tickets were routinely unsold in 2011 (The Economist, 2011). On the other hand, our data reveals that 42 percent of concerts by the top 100 pop artists were sold out between 1992 and 2005. The debate on underpricing is still open. This is partly due to the challenging task of proving that artists

charge prices that are substantially lower than the profit maximizing prices (Connelly and Krueger, 2006).

Artist objective function

Sellers in the performing arts may not have standard objective functions. They may not care only about maximizing profits as in the standard classical framework. For example, artists may care about fans because they are altruistic. Pro-social attitudes could play a role in explaining pricing decisions. Artists may be willing to forego some profit to make sure that the event remains affordable to certain subgroups of fans.

As argued earlier, the assumption that artists have pro-social preferences is difficult to distinguish from the alternative hypothesis that artists are strategic. A strategic explanation typically assumes that fans' preferences have some behavioral component (e.g., consumers care about fairness, or are loss averse) and pricing is used to manipulate fan's willingness to pay. Most of the industrial organization literature on pricing has focused on behavioral consumers, and maintained the assumption that firms rationally maximize profits (Ellison, 2006, see also Spiegler (2011) for a review). A strategic explanation, however, has difficulty explaining large differences in pricing choices across sellers.

An alternative approach is to assume that there is some heterogeneity in how sellers set prices. There are two main ways to proceed. Sellers may have behavioral preferences that influence pricing decisions (e.g., pro-social preferences as described above). Classical theory has traditionally not paid much attention to such a possibility. The argument against doing so is that market competition will eventually eradicate these differences because it will drive inefficient practices out. But this argument does not apply to the concert industry

because sellers earn substantial rents and can afford to forgo some profit opportunities. In the concert industry, differences in seller preferences may explain some differences in pricing styles.

Another possibility is that decision makers are subject to behavioral biases. There is some recent evidence that support this assumption. Bertrand and Schoar (2003) and Malmendier et al. (forthcoming) use datasets on top officers of large corporations and demonstrate the existence of manager styles. They show the existence of individual fixed effects that are correlated across a wide variety of financial decisions. They attribute these differences to individual specific life and career paths such as early life experience and MBA education. The interesting point is that seller heterogeneity survives in a context where one would assume that market selection is vigorous. If top managers influence management practices, it is not unreasonable that rock celebrities may also influence pricing decisions.

These two arguments suggest that the existence of pricing styles is not entirely implausible. This possibility is particularly relevant in a study of the performing arts. Artists have a tremendous control over prices. They also have widely different views about their relations and responsibility toward fans or society. Some artists say that they care about fairness and affordability, but not all artists do. In addition, there is much heterogeneity in how much artists invest in their public image and care about their celebrity status. Artists may also acquire different pricing styles the same way that managers do.

2-3 Summary and questions to be addressed

The pricing of tickets offers an ideal case study to investigate standard questions in industrial organization (monopoly pricing, price discrimination) but with several twists due to the emotional nature of the product (musical performance), the special relationship between buyer and supplier (fan-idol), and the role played by the media in influencing the demand for top artists (celebrity status). The following questions are open:

1.   How often do artists price discriminate?

    1.1. Do demand and product characteristics explain the use of price discrimination as standard theory predicts?

    1.2. Is the use of second- and third-degree price discrimination connected?

2.   How often are concerts sold out?

    2.1. Do demand and product characteristics explain the use of rationing?

    2.2. Do artists leave money on the table by under pricing?

3.   Do artists differ in pricing styles?

    3.1. What behavioral considerations influence artist pricing?

    3.2. Do artists have different objective functions?

The rest of this chapter presents a detailed analysis of price discrimination and rationing from a novel dataset. We identify several puzzling features of the data and propose a unified framework based on the concept of artist pricing styles to explain these puzzles.

3 Data and summary statistics

This study focuses on the primary market for concert tickets, with data from two sources. The core of the data was collected by *Billboard*. It covers the same set of

concerts and contains variables similar to those used by Connolly and Krueger (2006), who used data from *Pollstar* instead. In addition, we supplemented this data with information on artists and tours from a wide range of sources.

3-1 Data

Our data identifies the main parties involved in organizing a concert (artists, venue, and promoter), with the exception of the agent, whose role is limited to putting artists and promoters in contact. For each concert defined by the date, venue, and artist(s), the *Billboard* dataset reports the promoter in charge, the different prices offered, the capacity available, the attendance, and the revenue realized. One main shortcoming is that we do not have information on tours. We collected that information from band and fan websites. In addition, we collected information on the characteristics of the bands from music websites, artist websites, and the *Rolling Stone Encyclopedia of Rock and Roll*.

Our resulting panel data is thus three dimensional. The first dimension describes the product, i.e., a concert, and can be aggregated by music genre, artist, or tour. The second dimension describes the local demand and can be aggregated at the level of city or state. In addition, knowledge of the venue in which the concert takes place provides information about both product and demand characteristics. The third dimension is time.

There are several differences from the Connolly and Krueger (2006) dataset. In terms of depth, our data is richer in several dimensions. First, we observe all of the prices for each concert, rather than just the highest and lowest prices. Second, we know whether a concert is part of a tour and, if so, what tour it belongs to. This additional information allows us to provide a much more complete picture of the pricing strategies across seating

categories and also across venues by comparing only concerts that belong to the same tour (same product offered in different local markets). In terms of breadth, our dataset covers fewer artists and fewer years. Still, we cover a large fraction of the industry measured in value terms for the years in our sample.

3-2 Scope and representativeness

Our sample includes all concerts collected by *Billboard* given by the top 100 grossing acts over the period 1992-2005. *Billboard* collects data on most concerts offered by our sample of acts in North America. We checked this by sampling a few tours, for which we collected the exact tour schedule from the artist website and matched it with the concerts reported in our database. In terms of breadth, our sample represents the majority of the industry in value terms. If we increased the sample to include the top 500 grossing artists over the same period, for example, the top 100 acts would represent 70 percent of total revenue. Obviously, the sample covers a small fraction of all performing artists. For our purpose, however, the pricing policies in our sample are representative, *in value terms*, of the average ticket sold in North America. That being said, our selection rule draws only from the superstars. The industry distinguishes between new performers and established artists. Established artists have more bargaining power over promoters. They also probably have more market power to set prices.

A few acts include multiple artists who systematically tour together (e.g., Billy Joel and Elton John, Bob Dylan and Paul Simon). We treat each of these artists as one act when they tour alone and as another when they tour together. Hence, we have a total of 122 different acts. In the rest of the paper we use the terminology act, or artist, keeping in mind

that these terms may refer to an individual, a band, or a set of these systematically touring together.

Table 1 presents some descriptive statistics. Our sample has 122 artists, 779 tours, and 20,362 concerts. There are 1,561 concerts given on average each year.[6] Most of the concerts in our sample (19,540 concerts out of 20,362) were given as part of a tour. The average number of artists performing in a given year is 57 and this number does not vary much across years (the minimum is 42 and the maximum 67). The average artist gives 7 tours and 167 concerts in our sample period with respective medians of 5 and 151. The majority (75 percent) of artists give at least two tours. The average tour has 24 concerts with a median of 18 and a standard deviation of 21. There is variability in the number of concerts per tour but half the tours have between 8 and 34 concerts.

Concerts are given in 579 different cities throughout the US. For half these cities, all the concerts that take place in a particular city are hosted in the same venue. For the other cities, there is much variation in the number of venues used. The overall average number of venues per city is 2.8 and the maximum is 25.

The tours in our sample are large multi-million dollar operations. Each concert is associated with a promoter. There are 464 promoters in our sample. Table 1 presents the distribution of the number of concerts organized by each promoter. The median promoter organizes 2 concerts and there is much variation across promoters. Clear Channel

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[6]   The number of concerts per year increases from 1,020 in 1992 to 1,989 in 2003, and slightly decreases afterwards.

Entertainment dominates the market (it organizes a bit more than one fourth of the concerts in our sample) but it has many competitors. About 46 promoters organize 67 concerts or more.

4 Price discrimination: measurement issues

An act that goes on tour offers the same concert in different cities. In each city, the act offers a variety of seating categories. The act can offer all the seats in all cities at the same price. Selling all seats in a venue at the same price is called general admission, single price ticketing, or uniform pricing. Instead, the act could charge different prices for different seats in a given venue and/or different prices in different cities. The former corresponds to second-degree price discrimination: consumers face a menu of seating quality options with different prices. As long as ticket availability is not an issue, they can select their favored option. The latter corresponds to third-degree price discrimination, at least as long as arbitrage is not a viable option. This will be the case if fans do not travel to cities where ticket prices are lower, which is reasonable if travel costs are much larger than price differences.

In this section, we present different measures of second- and third-degree price discrimination. We distinguish two types of measures that are inspired by past studies of price discrimination in the industrial organization literature (Verboven, 2008). One may measure whether an artist uses price discrimination instead of uniform pricing. In addition, conditional on using price discrimination, one may also measure the extent to which prices vary (Borenstein and Rose, 1994). This can be done both for second- and third-degree price discrimination.

There is a large body of empirical literature investigating whether price differences reflect differences in cost or differences in demand. In these studies, price differences among differentiated products might be due to variations in marginal cost, not just to price discrimination (Shepard 1991, Clerides 2004). In our application, however, matters are much simpler because most costs are fixed at the venue level so cost considerations should not influence pricing decisions. One can then interpret the absence of uniform pricing as price discrimination. This is obvious in the case of second-degree price discrimination. The seating capacity and the distribution of seat quality are given. The only issue is whether to sell different seats at the same or at different prices.

4-1 Second-degree price discrimination

Second-degree price discrimination is used when multiple seating categories are offered. A dummy variable identifies such concerts.

$$d_i=0 \text{ if } p^H_i=p^L_i \text{ and 1 otherwise}$$

where p^H_i (p^L_i) is the highest (lowest) price for a seat in concert i. Table 2 presents summary statistics on price discrimination. In our sample, second-degree price discrimination is used in 75 percent of the concerts. The dummy variable d_i measures the existence of price discrimination but does not take into account the number of seating categories or the price difference between seating categories. These measures of the intensity of price discrimination are also reported in Table 2. The number of seating categories per concert ranges from 1 to 4 with an average of 2. Overall, 56 percent of the concerts offer two price categories, 25 percent one, 15 percent three, and the remaining 4 percent four categories.

We next report some statistics on the intensive margin of second-degree price discrimination. We measure the maximum differences in price for seats in the same concert. The average price range ($p^H_i - p^L_i$) is about \$25. After normalizing by the low price, ($p^H_i - p^L_i$)/p^L_i, we get an average of .99. Top seats cost on average twice more than the worst ones. This figure, however, hides much heterogeneity. As reported above, $p^H_i - p^L_i$ is equal to zero for 25 percent of the concerts. The price range $p^H_i - p^L_i$ grows to \$34 for concerts in which $p^H_i \neq p^L_i$. In addition, the quality premium is extremely high for a few concerts.

Panel A in Table 3 shows that the three measures of price discrimination (price discrimination dummy, number of prices, relative price range) are highly correlated. In the rest of this paper, we will often conduct the empirical work using the price discrimination dummy because it is simpler to manipulate (than the number of prices, for example) and easier to interpret (than the price range, for example, which has an arbitrary component to the extent that concerts may use different venue splits). However, the results still hold using alternative measures of price discrimination.

4-2 Third-degree price discrimination

In the context of musical concerts, third-degree price discrimination occurs if the same product is sold in different markets at prices that do not reflect variations in variable costs. We measure third-degree price discrimination at the tour level, since concerts in a tour are virtually identical (same stage, musicians, and set of songs). Rental and labor costs can vary from one city to the other. The largest fraction of these costs, however, is highly inflexible at the venue level since the only choice variable that is costly to adjust is the number of shows offered in a given venue. Most tours offer a single show in most cities

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visited. For the sake of conciseness, we do not discuss in details the case when multiple concerts are given in the same city.

Conditional on visiting a city, the supply of seats in that city does not depend on labor and rental costs. Because cost considerations do not influence prices, the price of tickets in a given city should depend only on demand factors (local public) and on venue characteristics. If price discrimination takes place, we would expect prices to vary from city to city as long as there are important variations in public demand across cities. The only reason why prices might not vary is in the implausible scenario that differences in audiences are exactly compensated for by differences in venue characteristics.[7]

To measure third-degree price discrimination, we first define a concert pricing policy as the number of seating categories and the price for each seating category. For each tour, we record the pricing policy used in each city. We say that uniform pricing is used for a set of cities if the pricing policy does not vary across the cities in that set. The reader should keep in mind that the terminology 'uniform pricing' means different things for second and

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[7] When the same concert is offered more than once in the same city (which typically happens in large cities where demand is larger) rental and labor costs could influence the level of prices through the choice of total capacity. Differences in prices across cities reflect both demand and cost conditions. But this is not a problem here because we focus on the occurrence of price uniformity across cities. It would be very unlikely that prices do not vary across cities because differences in public, local cost and venue characteristics cancel out.

third-degree price discrimination. The correct interpretation, however, will be clear from the context.

There is no single way of measuring uniform pricing at the tour level. We propose two measures. Our first measure computes the fraction of concerts within a tour that use the modal pricing policy, which is the pricing policy most frequently used within a tour. On average, 22 percent of the concerts use the modal pricing policy (Table 2). This measures the average across all tours, of the proportion of concerts that use the same pricing policy as the tour modal policy. This high figure could be driven by tours with few concerts. For these tours, a high proportion of concerts may use the modal policy even though the actual number of concerts with identical policies is low. This is not the case. For example, the proportion of concerts that use the tour modal pricing policies does not decrease when we restrict the sample to tours with at least 10 concerts.

The median number of concerts per tour is 18. If each concert within a tour were priced differently (a different number of seating categories or different price for at least one seating category) the fraction of concerts using the tour mode would be 5.5 percent. The much higher figure of 22 percent suggests that uniform pricing plays a large role in the concert industry.

Our second measure computes the Gini-Simpson diversity index for the set of pricing policies in a tour. This is the probability that two concerts drawn randomly from a tour use the same pricing policy (i.e., they use the same number of prices and the same set of prices)

$$G_t = \Sigma_i \, n_{i,t}(n_{i,t}-1) \, / \, N_t(N_t-1)$$

where t denotes tours, i concerts, $n_{i,t}$ the number of pricing policies in tour t that are the same as the pricing policy of concert i, and N_t the number of concerts in tour t. Let N denote the total number of concerts in our sample. On average across all tours, the probability that two concerts in a tour use the same pricing policy,

$$G=\Sigma_t(N_t/N)G_t,$$

is 7.4 percent (Table 4). If only concerts in a tour sharing the same pricing policy used the modal policy, we would expect the Gini diversity index to be around 4.8 percent (0.22 squared). The fact that it is much higher implies that there is a significant proportion of concerts in a tour that use the same pricing policy that is different from the tour modal pricing policy.

One concern with our measures of price discrimination is that some pricing policies may just happen to be the same by chance. A second concern is that identical pricing policies may be associated with venues or with promoters rather than tours. Table 4 reports the Gini-Simpson diversity index for different partitions of our sample. Note that the Gini-Simpson diversity index is at least three times higher for tour partitions than for any other partition (venue, artist, year, city or promoter). This indicates that uniform pricing happens mostly at the tour level, confirming the validity of our measure of third-degree price discrimination.

There are many different measures of the extent of third-degree price discrimination. We compute the interquartile range of prices within a tour for the lowest, mean, and highest price. To illustrate these concepts, assume for the sake of the argument that tours use a single seating category. The interquartile price range in tour t is $(p^{75}_t - p^{25}_t)$ where p^{75}_t

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is the price that corresponds to the 75th percentile of prices in tour t and similarly for p^{25}_t.

This measure provides information on how much prices vary across cities within a tour.

The interquartile range provides a more robust measure of variability of prices than

standard deviation, for example, because there are outliers. On average across all tours, the

interquartile range of the lowest price is $7.5, of the mean price $8.3, and of the highest

price $9.4. Table 2 shows that the interquartile range of the mean price is about 23 percent

of the average price within a tour.[8]

Panel B in Table 3 shows that our measures of third-degree price discrimination are

highly correlated. Most interestingly, the tours that use less modal pricing also vary prices

less across cities. There is no clear reason for why this should be the case.

4-3 Summary

We have defined two sets of measures for second- and third-degree price discrimination.

The first set measures the existence of price discrimination. The second set measures the

intensive margin of price discrimination (differences in price). We find that price

discrimination is often but not always used. Uniform pricing is also common although not

as common as price discrimination. The next section shows that there is much variation in

the use of price discrimination across artists. Some artists practice price discrimination

more than others.

5 Heterogeneity across artists in the use of price discrimination

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[8] $E[(p^{75}_t - p^{25}_t)/p_t] = 0.23$ where p_t is the mean price in tour t and the expectation is taken

over all tours in our sample.

Artists do not price concerts in the same way. Figure 1A and 1B illustrate the point with two artists. The two figures describe ticket prices for Bruce Springsteen's "Solo Acoustic Tour" and Michael Bolton's "Fall Tour 1996". Both tours took place in 1996 and both artists are American rock singer-songwriters born around 1950. Figure 1A and 1B report the prices for different seats in a given venue (points on a vertical line), and for the different cities visited in a tour (different dates on the horizontal axis).

The use of price discrimination varies greatly across these two tours. Two patterns are worth noting. First, there is essentially only one seating category in the Bruce Springsteen tour (on average 1.05), while there are typically multiple seating categories in the Michael Bolton tour (on average 2.37), with significant variability in price within a venue (the highest price in a concert can be up to 200 percent higher than the lowest price). Bruce Springsteen rarely uses second-degree price discrimination while Michael Bolton often does so. Second, most prices are equal to one of two values ($30 or $33) across locations for Bruce Springsteen's tour (Figure 1A), while they vary greatly for Michael Bolton's tour (Figure 1B). Using our two measures of third-degree priced discrimination, the fraction of concerts that use the modal pricing policy is 44 percent and 0.6 percent respectively (Table 5). The variations in choice of pricing policies for these two tours are remarkable. Michael Bolton's "Fall Tour 1996" uses both second and third-degree price discrimination more than Bruce Springsteen's "Solo Acoustic Tour".

Why do Bruce Springsteen and Michael Bolton choose such different pricing policies? Before we attempt to address this question we provide more systematic evidence that the use of price discrimination varies greatly across artists. In fact, Figure 1A and 1B report

only one tour for two artists. To start, we should investigate if the patterns presented in Figure 1A and 1B are not specific to the two tours we selected. Table 5 also considers the other concerts given by these two artists. We do find that Bruce Springsteen uses fewer seating categories than Michael Bolton (1.53 against 2.44 on average across the 198 and 194 concerts these two artists respectively gave in our sample period) and varies price less within a tour (on average 57 percent of Bruce Springsteen's concerts are identical to the tour modal pricing policy against 7 percent for Michael Bolton). Bruce Springsteen and Michael Bolton seem to price concerts very differently. Is this specific to these two artists?

The rest of this section documents the existence of differences in the use of price discrimination across artists. In the next section, we will use a simple model to investigate candidate explanations for these differences.

5-1 Second-degree price discrimination

Panel B in Table 2 reproduces Panel A, but at the artist level. To illustrate the difference between these two tables, consider our measure of second-degree price discrimination. The unit of observation in Panel B is an artist. Denote $E(d^2_i|a)$ the mean value of d^2_i across all concerts offered by artist a. This is a measure of an artist's propensity to use second-degree price discrimination. Panel B presents summary statistics of the variable $E(d^2_i|a)$. On average, artists use second-degree price discrimination 77 percent of the time. This figure is similar to the same figure for the entire sample of concerts (Panel A). The new information in Panel B is found in the next columns which report statistics on the variability across artists. These statistics differ greatly from Panel A, which reported statistics for the entire sample.

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There is a large standard deviation (26 percent) in the artists' average use of price discrimination. The range of the same variable across artists is also very large. On the one hand, Billy Joel uses price discrimination in 4 percent of concerts, Garth Brooks in 8 percent and KORN in 22 percent. On the other, Madonna, the Eagles and the Pink Floyd almost always price discriminate. Figure 2A plots the distribution of $E(d^2_i|a)$ for our sample of 122 artists. The height of the histogram (Figure 2A) corresponding to x on the horizontal axis, for example, measures the fraction of artists who use uniform pricing about x percent of the time. Figure 2A confirms that there is much variation across artist in the use of price discrimination. Ten percent of the artists use price discrimination in at most 38 percent of their concerts. At the other extreme, one quarter of the artists almost always use second-degree price discrimination (in 97 percent of their concerts or more).

The same holds if we look at the average difference between the highest and lowest priced seats. Ten percent of the artists set an average price premium of 15 percent or less. At the other extreme ten percent of the artists set an average price premium of 214 percent or more.

5-2 Third-degree price discrimination

Panel B in Table 2 also reports statistics on our measures of third-degree price discrimination averaged at the artist level. Again, the means do not change much. For example, artists use the modal pricing policy on average for 22 percent for their concerts (no change in the mean relative to Panel A). What is relevant for us are the statistics on the distribution across artists. The standard deviation across artists in the use of modal pricing is 15 percent. There are on average 80 tours per artist. If modal pricing were random across

artists, the use of modal pricing would average out at the artist level around the sample value of 22 percent and we would expect to observe little variation across artists in the use of modal pricing. This is not the case. The standard deviation of modal pricing is still substantial in Panel B.

This is confirmed by Figure 3A which reproduces Figure 2A for modal pricing. About 25 percent of the artists use modal pricing on average in less than 11 percent of concerts, while 10 percent use modal pricing in 47 percent of concerts or more. Table 2, Panel B presents some statistics on the distribution of Gini-Simpson coefficients across artists. There is a great deal of heterogeneity across artists in the chance that any two concerts in a tour are equally priced. The standard deviation across artists in the Gini-Simpson coefficients is .10 (recall that the average Gini-Simpson coefficient across all tours was .074). For ten percent of the artists, the probability that two concerts in a tour use the same prices is 20 percent or higher. At the other extreme, ten percent of artists never set the same price for any two concerts in a tour.

The same conclusion holds when we look at the intensive measures of third-degree price discrimination. Ten percent of the artists have an interquartile range of the average price that is 11 percent of their average tour price; while at the other extreme, ten percent of the artists have an interquartile range that is 41 percent of the average tour price. The amount of price variation across cities within a tour varies greatly across artists.

5-3 Summary

There is much heterogeneity in the extent to which artists use second and third-degree price discrimination. This is true for our measure of uniform pricing (absence of price

discrimination) and also for the intensive measures of price discrimination (differences in prices).[9] This confirms that the difference between Bruce Springsteen and Michael Bolton is not specific to these two artists. In the next section, we investigate possible explanations for the observed differences in pricing across artists.

6 Identifying artist pricing styles

Differences in pricing across artists may be due, for example, to the fact that artists play different music, in different venues, in different years, and in front of different audiences. Such heterogeneity could play through different channels. One channel considered in the industrial organization literature is that competition may vary across markets. As argued earlier, we do not believe this to be a major issue in the concert industry, but we can empirically investigate this possibility by controlling for city and year fixed effects. However, we believe that there are other channels that are more relevant in our application.

The return to price discrimination may vary from one concert to the other. To see how this could generate differences in our measures of price discrimination across artists, it helps to step back and ask the question of when price discrimination is expected to be used according to the existing theoretical literature. In a frictionless world, a profit maximizing artist always price discriminates, at least as long as consumers have preferences for seat quality (second-degree), or as long as the public differ across cities (third-degree). There is

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[9]   The different measures of price discrimination are highly correlated, not only concert by concert, but also at the artist level. The correlation patterns presented in Table 3 generalizes when computed at the artist level (results not presented here).

no obvious reason for why this should not be the case. Artists should split each venue into different sections, vary prices across seating categories, and also adjust prices across local markets in response to changes in consumer preferences.

If there is a fixed cost associated with the implementation of price discrimination, however, some artists may find it more profitable to use uniform pricing. In practice, artists have to do some research to adjust ticket prices to local market conditions. In the case of second-degree price discrimination there are also costs associated with ticketing and enforcing that each attendee sits in the proper seat. Hence, the return from implementing price discrimination may not always dominate the costs. Variations in the return from price discrimination or in the implementation cost may explain why price discrimination is not always used.

We can now return to our interpretation of the finding that pricing practices vary across artists. To avoid confusion, in the rest of the paper we use the term *pricing practice* to say that that our measures of price discrimination vary across artists. We use the terminology *pricing style* to say that individual artists deliberately price concerts differently, as a result of, for example, differences in objective functions or individual skill endowments.[10]

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[10] There are other interpretations of artist pricing styles. Artists' fans may differ in how much they expect fair pricing. Consumers who care about fairness may sort with artists who are willing to offer fair pricing. Dynamic issues may also be at play. Fair pricing today by a given artist fuels expectations for fair pricing in the future. The issue of sorting and dynamics are beyond the scope of this chapter.

Evidence of differences in pricing practices does not necessarily imply the existence of artist pricing styles as just defined. It is also consistent with the existence of unobserved demand and product heterogeneity correlated with artist unobserved characteristics. To clarify the distinction, consider a simple thought experiment. Say one observes differences in pricing decisions across sellers and wants to find out whether these differences are due to individual pricing styles. The ideal experiment for testing this hypothesis would be to ask each decision maker to set prices for the same set of goods. Doing so, one would hold constant demand and product characteristics; hence the variability in pricing practices could be attributed to individual styles. Unfortunately, in our dataset each concert is a unique pricing problem that is decided only once. We can, however, try to hold constant concert characteristics as much as possible, in an attempt to investigate the role of individual pricing styles.

This section presents a simple theoretical framework to show that under fairly general assumptions on the structure of demand, we can interpret heterogeneity in pricing practices (after controlling for demand and product characteristics) as evidence of artist pricing styles. To be clear, field data cannot provide definite evidence of artist pricing styles as in our thought experiment. This is because one cannot fully rule out the existence of unobserved demand or product heterogeneity that is correlated with artist-specific characteristics. Still, in Section 7 we go a long way towards decomposing the variations in pricing choices that can be attributed to demand heterogeneity and individual pricing styles.

In Section 8, we follow a second approach to investigate the existence of pricing styles. We correlate the individual pricing practices for different pricing decisions. We argue that any non-zero correlation is consistent only with individual pricing styles. The case is convincing if the decisions that are found to be correlated have no reason to be connected according to classical theory. This delivers a powerful test in our application because there is no reason for which the decision to second- and third-degree price discriminate should be correlated across artists.

6-1 Theoretical framework: When should artists use price discrimination?

Assume an artist sells tickets to two different audiences. The tickets could be for the same concert in two different venues, or for two different seats for the same concert. Accordingly, the public could live in two different towns or buy two different types of seating categories. In this latter interpretation, we make the simplifying assumption that consumers use only one seating category. Allowing for the possibility of substitution across seating categories adds realism, but does not change our main conclusions. The inverse demand by consumers $c=1,2$ for artist a is $P(q|c,a)=\alpha_{c,a}-\beta q$. The marginal cost is χ (typically small or zero in the concert industry). We have assumed that the public demands can only influence the intercept. This is to establish a benchmark; later we will revisit this assumption.

Under price discrimination, the artist chooses prices in order to maximize $q(\alpha_{c,a}-\beta q-\chi)$ in each market. Profits from audience c are $(1/4\beta)(\alpha_{c,a}-\chi)^2$. Under uniform pricing, overall profits are $(1/8\beta)(\alpha_{1,a}+\alpha_{2,a}-2\chi)^2$. The increase in profits, or the return from price discrimination, is

$$R=(1/8\beta)(\alpha_{1,a}-\alpha_{2,a})^2-F$$

where F is a fixed cost of implementing price discrimination. Consider the benchmark case where the demand intercept for a concert performed by artist a in front of audience c is additively separable.

Assumption 1: $\alpha_{a,c}=\alpha_a + \alpha_c$

The net profits from price discriminating simplify to $R=(1/8\beta)(\alpha_1-\alpha_2)^2-F$.

Proposition 1: *If Assumption 1 holds, the return to price discrimination (a) increases with public heterogeneity ($\alpha_1-\alpha_2$), (b) is independent of the artist-specific demand intercept (α_a).*

Proposition 1 is important for two reasons. First, artists are expected to use price discrimination when there is enough difference across audiences. For example, they should use second-degree discrimination when seating categories are perceived to be sufficiently different. This could stem from physical differences in seating categories within a venue, or heterogeneity in willingness to pay for seats of different quality. Similarly, they should use third-degree price discrimination if the local audiences where the tour stops are sufficiently different or if the venues are sufficiently different. Second, the decision to price discriminate does not depend on the characteristics of the artist that equally affect all consumers. Proposition 1 establishes an important benchmark. It says that we should control for demand shifters that influence quality differences or difference in willingness to pay for quality. After controlling for these product and demand shifters, the decision to price discriminate should not depend on the artist's identity as long as **Assumption 1** holds.

6-2 Summary

Proposition 1 helps interpret the results presented in the previous section. For example, the differences across artists in the use of second-degree price discrimination could be rationalized if artists perform in front of different audiences who have different willingness to pay for seating quality. The differences in the use of third-degree price discrimination could be rationalized if artists tour different subsets of cities. Coming back to Figure 1A and 1B, it could be that Michael Bolton visits very different cities and performs in venues with very heterogeneous seating experiences while Bruce Springsteen tours similar cities and books venues where all seats are similar.

The next section initially assumes that *Assumption 1* holds, and investigates whether the variations in the use of price discrimination can be explained by demand and product characteristics. In the rest of the section, we relax *Assumption 1* and consider a number of other explanations for the variations in artist pricing practices.

7 Candidate explanations

7-1 Second-degree price discrimination

We propose to explain the decision to price discriminate with controls for demand, product heterogeneity, and artist fixed effects. Assuming *Assumption 1* holds, we follow the empirical methodology proposed by Bertrand and Schoar (2003) to identify the existence of managing styles. In a nutshell, we estimate the artist fixed effects θ_{artist} from model

$$\Pr(d_i=1)= \theta_{artist}+ \theta_{city} + \theta_{year} + \theta_{venue} + \gamma_1 \text{Popularity}_{a,y} + \varepsilon_i \tag{1}$$

where θ_{city} denotes city fixed effects that control for differences in local audiences and for differences in venue characteristics for all the cities where there is a single venue (more than half the cities in our sample); θ_{venue} denotes venue fixed effects that control for venue characteristics more precisely than city fixed effects do; θ_{year} denote year fixed effects that control for changes over time in public taste, any other time shifter that may affect public preferences for seating quality, or the cost of implementing price discrimination; $Popularity_{a,y}$ controls for heterogeneity in artists popularity as we will explain shortly.

Like Bertrand and Schoar (2003), we look at three sets of statistics: (a) changes in adjusted R^2 associated with the artist fixed effects, (b) F-test that the artist fixed effects are equal to zero, (c) summary statistics on the distribution of the artist fixed effects.

We can answer several questions. (a) Do the controls increase the explained variation in the use of price discrimination? According to Proposition 1, the answer should be yes if the controls capture relevant variations in demand and product characteristics. (b) Does the addition of control variables decrease the explanatory power of artist fixed effects? This should be the case if the artist heterogeneity documented in Section 5 is caused by heterogeneity in demand or product characteristics. We can answer these two questions by looking at changes in adjusted R^2 and testing the significance of artist fixed effects. (c) After including the control variables, what fraction of the variation in price discrimination is attributed to the artist fixed effects (i.e., artist pricing styles)? The distribution of the artist fixed effects

gives some information on the economic magnitude of heterogeneity across artists. City and year fixed effects control for unobserved demand and product characteristics. These variables also control for differences in the level of competition.

Table 6 reports the results. Column 1 says that artist fixed effects explain 27 percent of the variations in the use of second-degree price discrimination. Column 2 and 3 indicate whether this figure decreases once we control for year and city fixed effects. Column 2 shows that these controls explain about 18 percent of the variations in the use of price discrimination. The adjusted R^2, however, goes from 18 to 40 percent as we add artists fixed effects (move from column 2 to column 3). This shows that the variations explained by city and year fixed effect are to a large measure orthogonal to the variations explained by artist fixed effect.

Note that the artist fixed effects are economically highly significant in the sense that they explain a large fraction of the variations in price discrimination. This result will remain in all our specifications. In contrast, the manager fixed effects in Bertrand and Schoar (2003) explain only 4 percent of the variations in corporate behavior.

Table 7 reports statistics on the distribution of the artist fixed effect for all the columns from Table 6 where they are included. The first line corresponds to the benchmark case with only artist fixed effects as the control. The standard deviation of estimated artist fixed effect is 0.25, which is very close to the 0.26 figure in Table 2 Panel B as can be expected. The remaining lines present statistics on the distribution of the artist fixed effects with various sets of controls that correspond to specifications in Table 6, 9, 10 and 12. The

standard deviation in the second line of Table 7 (corresponding to Table 6 Column 3) only slightly decreases relative to the first line. The percentile estimates change very little.

We repeat the same exercise in Table 6, columns 4 and 5 with venue fixed effects instead of city fixed effects. The conclusion remains the same. The adjusted R^2 now increases from 28 to 46 percent. Interestingly, year and venue fixed effects explain about 10 percent more of the variations than year and city fixed effects. This suggests that venue fixed effects capture some variations in product characteristics.

We conclude that local market characteristics and venue characteristics explain a large fraction of the variations in the decision to second-degree price discriminate, a finding consistent with Proposition 1. Still, even after controlling for these potential sources of unobserved heterogeneity, the proportion of variation in the use of price discrimination explained by artist fixed effects does not decrease much. In fact, Figure 2B reproduces Figure 2A, but by using the residual of the specification controlling for venue and year fixed effects. If local market and venue characteristics explain much of the variations across artists in the decision to price discriminate, heterogeneity across artists, captured by the range of the distributions, would decrease after controlling for venue and year fixed effects. This is not the case. Heterogeneity in pricing styles still seems to play an important role.

7-2 Third-degree price discrimination

In the case of third-degree price discrimination, Proposition 1 says that we should control for the fact that different tours stop in different subsets of markets with possibly different venue characteristics and local audiences. Holding the set of cities within a tour constant

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should go a long way toward controlling for the mix of audience and venue characteristics. But there are 579 cities in our sample and no two tours visit the same set of cities. One option would be to focus on the set of most visited cities. But doing so would still leave many differences in the set of cities visited across tours.

We cannot use our measure of third-degree price discrimination computed at the tour level and also hold the set of cities visited constant. Therefore, we instead leverage the fact that there are many individual cities that are visited by a large fraction of tours. The nuance is that each city is visited by a slightly different subset of tours. Instead of measuring price discrimination at the tour level, we consider pairs of cities. For each pair, we can identify those artists who use the same pricing policy in the two cities and those who do not. We then aggregate this information across all pairs of cities and compute differences in pricing style across artists after holding city pairs constant.

The exact procedure is as follows. We first select the top 10 cities most visited and form the 45 possible city-pair combinations. For each pair, we construct an observation for each tour that visits that pair of cities. We construct a variable that is equal to one if the two pricing policies for that tour are identical, and equal to zero otherwise. This produces a dummy variable describing uniform pricing that assumes the value of zero or one each time one of the 779 tours in our sample stop in one of the 45 possible city pairs. The dummy variable for uniform pricing is equal to one in 16 percent of these observations. We explain the variation in this dummy variable with artist fixed effects (Table 8, Panel A, Column 1), city-pair fixed effects (Column 2), and both sets of fixed effects (Column 3). The adjusted R^2 with artist fixed effect alone is 0.18 (Column 1), and with the city fixed

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effect alone is 0.14 (Column 2). The first result is consistent with our earlier finding that there is much heterogeneity across artists in the use of third-degree price discrimination. In fact, the standard deviation of the artist fixed effects is 0.19.[11] The second result is consistent with Proposition 1 stating that the use of third-degree price discrimination should depend on differences in local market characteristics. City-pair dummies control for differences in audience and venue characteristics. Price discrimination should be more likely to take place in pairs of heterogeneous cities. Most interestingly, the 18 percent figure is identical to the increase in adjusted R^2 when we add the artist fixed effect to the city fixed effects (32-14).

Panel B in Table 8 presents summary statistics on the artist fixed effects computed in Table 8, Panel A, Column 1 and 3. We find no decrease in the standard deviation of the artist fixed effects after controlling for differences in local market characteristics. The standard deviation of the artist fixed effect is 0.19 in columns 1 and 3. There is significant heterogeneity across artists. The probability that two concerts have the same pricing policy in the same pair of cities varies by 0.77 across all the artists in our sample.

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[11]   In principle, the statistics reported here should be similar to the Gini-Simpson statistics reported in Table 2 and 4. In reality, these figures are higher than those in Table 2 and 4 (16 percent instead of 7.4 percent for the probability that two concerts have the same prices and 19 percent instead of 10 percent for the standard deviation across artists). This is because the measures here apply to a much smaller set of highly visited cities which are probably more similar than two random cities.

One possibility we have not discussed so far is that some artists may use a cost-based rule to set the price of tickets in venues. They may charge a price equal to the rental and labor cost plus some fixed mark-up. Uniform pricing could result if subsets of venues have the same rental and labor costs. Table 8 rules out this possibility because we hold constant city pairs. Uniform pricing cannot be due only to the fact that some venues have the same costs.

We have made important progress. We started from Proposition 1. It says that after controlling for demand and product characteristics, artists should make the same price discrimination decisions. Instead, we find large differences across artists even after controlling for demand and product characteristics and this holds both for second- and third-degree price discrimination. What is the explanation for this? It could be that we have missed some dimensions of demand and product heterogeneity. The demand specification or other features of the model behind Proposition 1 may be too simplistic. One could extend the model in several directions. Although a full treatment of the issue is beyond the scope of this work, we can rule out three candidate rationales that are particularly relevant to our application.

7-3 Other sources of heterogeneity in artist demands

The model assumes that artists influence the demand for tickets only through an additive component to the intercept. It could be that artists influence the demand in more complex ways. For example, the artist could influence the slope of the demand β or the overall demand in a multiplicative way, as in, $P(q|c,a)=k_a(\alpha_{c,a}-\beta q)$. In that latter case, the return to price discrimination becomes $R=(k_a/8\beta)(\alpha_1-\alpha_2)^2-F$. It now depends on k_a. Both α_a and k_a

are measures of artist popularity. The main difference is that they have a different impact on the return to price discrimination. Proposition 1 no longer holds when popularity is multiplicative. More popular artists, in the sense of an increase in k_a, are more likely to price discriminate. One could argue that some unobserved component of k_a explains the variations in pricing styles across artists. This possibility cannot be ruled out a priori.

The existence of non-additive demand heterogeneity across artists is not implausible. An increase in popularity then increases both the level of willingness to pay and also the difference in willingness to pay across audiences. In the case of second-degree price discrimination, an economic argument in support of this case goes as follows. The increase in willingness to pay to upgrade seating category is related to the level of willingness to pay if, for example, artist quality and seating quality are complement in the utility function. Consumers are willing to pay more to upgrade seating category when they are willing to pay more for the concert. One can make a similar case for third-degree price discrimination.

The possibility of heterogeneous demands deserves serious consideration. Table 6 controls for venue fixed effects. This should take care of the above problem if artists sort across venue by demand type (more popular artists play in larger venues, for example). Still, there may remain some heterogeneity in artist popularity that is unaccounted for.

We can make some progress toward showing that this is unlikely. We can measure many characteristics of the artists. We can use as controls, however, only those that vary over time. We check whether the variations in pricing style across artists remains after we control for these time-varying characteristics. For the artist characteristics that do not vary

over time, we follow a split-sample approach that we explain shortly. For the sake of conciseness, we conduct these robustness results only for second-degree price discrimination.

As our first control, we use a measure of artist popularity that is based on the success of musical recordings. We measure the number of albums and singles in the top charts up to a given year. If popularity is the main driving force of artist heterogeneity, then adding this variable should reduce the fraction of adjusted R^2 explained by adding the artist fixed effect. The last two columns of Table 6 control for artist popularity. The impact of popularity on the use of 2nd degree price discrimination is positive and significant. Having one additional top single or album increases the likelihood of using second-degree discrimination by 1 percent. This is consistent with the earlier interpretation of k_a as a multiplicative impact of popularity. But the fraction of adjusted R^2 that is explained by artist fixed effects only decreases marginally. The distribution of artist fixed effects, described in Table 7, shows that the economic magnitude of differences in pricing styles does not change.

We also try a split-sample approach. We rank all the artists in our sample according to the average revenue per seat (average price of tickets sold) and then compute the mean across all artists. We split the sample into two categories, high and low average price artists, according to whether an artist's average price is above the average across artists. This controls for artist popularity under the reasonable assumption that average ticket price is a proxy for popularity. This approach directly addresses the concern that price discrimination could be correlated with the level of ticket price. Under that scenario, the

explanatory power of artist fixed effects should decrease within the sub-samples of high and low average price artists. Table 9 reproduces selected specifications of Table 6 for our split sample. We cannot compare the changes in adjusted R^2 across the samples of high and low price artists. So we first discuss the evidence on the F-test for the artist fixed effects.

In all cases, we reject the null that all artist fixed effects are equal to zero. Adding artist fixed effects increases the adjusted R^2 although the magnitudes are smaller. For high price artists, the adjusted R^2 increases by 18 percent (difference between column 3 and 1 in Table 9) when we control only for the cumulated number of hits. It increases by 14 percent when we control for year and venue fixed effects as well. The figures are a bit lower for low price artists but even in the lowest case, artists fixed effects still increase the adjusted R^2 by 10 percent. Again, the distribution of artist fixed effects (Table 7) does not change.

Heterogeneity in demand could also be due to differences in musical genres. There are several channels that could be at play. First and most importantly, demand may vary across musical genres. The return to price discrimination may be higher for rock artists because, for example, they sing to more diverse audiences. Alternatively, one may argue that the community standards of fairness vary by musical genre. The rock audience may respond more strongly to unfair and exploitative pricing.

The main musical genre in our sample is rock music, which represents a bit more than half of the artists. The remaining artists cover a wide range of music including country, jazz, and rap. We spit the sample by rock versus non-rock music. The main interest is to investigate what happens to the artist fixed effects when we focus on the rock subsample. If musical genre explains pricing decisions, we would expect that artist heterogeneity

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should matter less for the subsample of rock artists. Table 10 reproduces selected specifications of Table 6 for Rock and non-Rock artists. The last four lines in Table 7 report statistics on the distribution of artist fixed effects. For the rock subsample, the increase in R^2 associated with the inclusion of artist fixed effects remains high around 17-24 percent. Similarly the standard deviation in artist fixed effect remains around 22 percent. Differences in musical styles do not explain the heterogeneity in the use of second-degree price discrimination across artists.

7-4 Cost of implementing price discrimination

Artists may have different access to information regarding the benefit from implementing price discrimination. Coming back to the model, the fixed cost of implementing price discrimination, F, could include information costs that are artist dependent. There is a related version of this argument. The model assumes that artists know the demand and can compute the profit maximizing prices. In practice, the return from price discrimination depends on the knowledge that an artist has about the demands for the differentiated product. Variations across artists in the use of price discrimination may be explained by differences in knowledge or expertise.

Many artists set prices jointly with promoters. If promoters have important information on how to set prices, we should expect that promoter fixed effects should absorb some of the heterogeneity across artists in access to information. In Table 12, we add a set of fixed effects for promoters. The adjusted R^2 in Column 1 in Table 12 is .28 which is about .1 higher than the adjusted R^2 with city and year fixed effects alone. This large increase in the adjusted R^2 is consistent with several interpretations. It may be due to access to

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information as argued above. Another explanation is that promoters may specialize in different types of music. Promoter dummies may control to some extent for unobserved musical style.

The important point for this work, however, is that even after controlling for promoter fixed effects, we still find that the adjusted R^2 increases by 16 percent. We also find that the distribution of artist fixed effects (Table 7) does not change even after we control for promoter fixed effects. Again we find that access to information does explain some of the variations in the use of second-degree price discrimination, but these variations are largely orthogonal to the variations explained by artists fixed effects.

7-5 Learning

It may be difficult to find out whether it is profitable to adopt price discrimination in a city that was never visited before. Even if they make mistakes early on, artists should learn over time. For example, they can imitate the artists who earn more by implementing price discrimination when it is profitable to do so. One could argue that artists are more able to learn when they repeatedly visit the same city or venue. We control for the number of times an artist has performed in a given city or venue before.

Table 11 presents summary statistics on artist past experience for each concert in our sample. Consider the case of city. For a given concert, past experience is defined as the number of times an artist has previously given a concert in that city. The value of past experience is equal to 0 for the early observations in our sample and increases up to 4 for the final years in our sample. The average past experience is 1.26. Columns 3-6 in Table

12 present the results.[12] The main result of this table is that the increase in adjusted R^2 explained by artist fixed effects does not change even when we control for past experience; this holds when we measure experience at the city or venue level. In both cases, the increase in adjusted R^2 associated with artist fixed effects is around .19. The distribution of artist fixed effects (Table 7) does not change.

7-6 Summary: A price discrimination puzzle?

We have considered a number of explanations based on standard economic theory. We found some evidence in support of these explanations. This demonstrates that it is important to control for local demand, product characteristics, artist popularity, and access to information. Taken together, all our controls explain a bit less than half of the variations in the decision to second-degree price discriminate. Although some of the variation in the use of price discrimination can be explained by differences in demand and product characteristics or access to information, doing so does not decrease the amount of variation that is explained by artist fixed effects. We are left with a puzzle. What explains the variations in pricing across artist?

One could still argue that the variation in pricing practices are due to unobserved demand heterogeneity. The return from price discrimination for a concert by Bruce

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[12]   Interestingly, experience is significant only when artist fixed effects are included and has the opposite sign as predicted under the learning hypothesis. It could be that artists are more likely to return to cities with a more loyal fan base. Those fans expect artists to use fair pricing (no price discrimination).

Springsteen may not be the same as for one by Michael Bolton. Returning to Proposition 1, it could be that there are unobserved demand differences (that are not related to the controls we have tried) or other variables that influence the return to price discrimination. As argued before, is not possible to fully exclude this possibility. But we think it is unlikely, because we would have expected that much of this heterogeneity should have been related to factors that vary across cities, venues, promoters, years, and our measures of popularity and musical styles. The finding that these controls did not reduce much the role of artist heterogeneity indicates that seeking new controls is unlikely to resolve the issue. Keeping in mind that unobserved demand heterogeneity may contribute to some of the heterogeneity in pricing practices, we consider in the next section an alternative hypothesis, based on the assumption that there exist artist pricing styles, to explain the variations in pricing practices across artists.

8 Exploitation of market power

Pop artists are the ultimate monopolists. They have tremendous market power and discretion over the pricing of concert tickets. But exploiting market power requires varying prices in response to demand conditions. Should artists take advantage of large differences in demand? Not necessarily. To start with, some artists make public statements that they want to set fair prices. They may have genuine preferences to be fair. In his discussion of the concert industry, Krueger (2005) argues that artists care about other things than profits. He writes: 'Some artists care about their customers' well-being as well as their own income.'

Most economists are suspicious of such statements. The concern is legitimate. One could explain almost anything by arbitrarily specifying decision makers' objective functions. But Krueger's view has more nuanced interpretations. Artists may act *as if* they cared about their fans and doing so may still be consistent with a long-term profit maximization hypothesis. The argument goes as follows. Exploiting market power increases profits but doing so is not without downside. Some pop music artists are notorious for participating in social and political debates. Not all artists are social activists, however. Many artists do not engage in the public debate at all.

Let us focus for now on the socially active artists. They take liberal positions supporting pro-social causes such as defending human rights, fighting against poverty, and condemning inequalities. The outspoken pro-social artists face a dilemma when they go on tours. Using price discrimination may be perceived as opportunistic profit-seeking behavior that sends a dissonant message to many fans, one that is associated with the evil notion of exploitation of market power. The pro-social artists may prefer to forgo the profit from price discrimination in order not to take the risk of being shamed as hypocrites in the media and on the Internet. Artists may not genuinely care about their fans. But they do care about maintaining their celebrity status, because it is marketable, and this may imply acting like they care about their fans.

In this section, we hypothesize that artists differ in their willingness to exploit market power. As we will argue in the discussion section, there are several reasons - sincere or strategic - for why this may be the case. We do not attempt to distinguish between them. Our goal is more modest. We investigate whether this simple hypothesis can shed new

light on artist pricing styles. We argue shortly that this hypothesis is consistent with the evidence we have presented so far. Most importantly, we also show that this hypothesis has novel and unique implications regarding the pricing of tickets.

8-1 Hypothesis: willingness to exploit market power

Assume artists differ in their willingness to exploit market power. At one extreme, the pro-social artists do not want to leverage their market power. They use uniform pricing for all tickets in a tour. They charge the same price for all seats in a venue and for all venues in a tour. At the other extreme, the profit-maximizing artist charges the market clearing prices for all seating categories and to all audiences.[13] These are two archetypes. Artists may take intermediate positions between the pro-social and profit maximizing archetypes. The evidence from the previous sections that there is much heterogeneity across artist in the use of second and third-degree price discrimination offers some support to our hypothesis. We derive two new implications.

Consider first the level of price. The pro-social artists may keep prices low to make their concert affordable to all fans. This implies that some artists will systematically sell out. The pro-social artists will also refrain from responding to positive demand shocks by

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[13] We use the label 'profit maximizing' for those artists who maximize concert profits. This can be confusing since we have just argued that the pro-social artists could also be maximizing profits, but using an objective function that takes into account other considerations than just concert revenue. The meaning of 'profit maximizing' should be clear from the context.

immediately increasing prices to the new equilibrium level. Instead, they may slowly increase prices and never fully incorporate the demand shock. Krueger (2005) and others have documented dramatic increases in demand in our sample period. An implication is that pro-social artists should be more likely to sell out in our sample period. Because artists do not adjust prices by the same margins to match demand, we expect that rationing probabilities to vary across artists.

- H1: The probability to sell out varies across artists even after controlling for demand and product characteristics.

H1 investigates a new feature of pricing. It does not consider differences in price across products, as we have done so far, but instead tries to back up information on the artist's choice of the level of price from evidence on rationing. Those artists who refrain from exploiting market power will price tickets below market price. If this is the case, we would expect that those artists should be more likely to sell out their concerts. While all the evidence presented so far was on price discrimination, H1 has to do with the level of price. The main shortcoming of H1 is that it is subject to the same reservations as those made in regard to our analysis of price discrimination. Artist pricing styles is consistent with variations in rationing probabilities. But unobserved demand heterogeneity is an alternative candidate explanation.

The second implication presents a totally new way to look at the evidence that tackles the issue of exploitation of market power directly. If artists differ in their willingness to exploit market power, we should be able to predict how an artist will price tickets if we know where she stands between the two archetypes. We do not have this information but

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we can compare the different decisions each artist makes. Those artists who are willing to exploit market power should do so along all dimensions of pricing.

- H2: The decision to second- and third-degree price discriminate are positively correlated across artists and these two decisions are negatively correlated with sell-out probabilities.

It is more difficult to argue that H2 could be explained by unobserved heterogeneity across artists. The unobserved demand or cost factors that are picked up by artist fixed effects would have to be correlated across second- and third-degree price discrimination. This puts a much more demanding requirement on the set of candidate unobserved factors. The same holds for why these two decisions should be correlated with the decision to ration.[14] But our simple framework based on exploitation of market power makes a unique prediction about the relation between three decisions.

This new hypothesis is important for two reasons. Finding a non-zero correlation would add to the case that artist pricing styles matter. Bertrand and Shoar have argued that if the

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[14] Different arguments can be made to explain why third-degree price discrimination and rationing should be related. When prices are not adjusted within a tour, one may argue that some concerts should be underpriced and others overpriced. The underpriced concerts should sell out more often. This prediction is the same as under the hypothesis of heterogeneity in willingness to exploit market power. This alternative explanation, however, cannot explain why some artists sell out most concerts.

individual fixed effects are caused by individual heterogeneity (instead of unobserved heterogeneity) one would hope that they are all caused by a common root factor. They argue that the correlation evidence is due to some overarching patterns in decision making. This conclusion rests on the implicit assumption that there is no theoretical argument for why any unobserved heterogeneity picked up by the fixed effects for different decisions should be correlated across decision makers. This is reasonable in our application. There is no economic theory that links second- and third-degree price discrimination (Stole, 2010). There is also no reason why the unobserved demand factors for second- and third-degree price discrimination should be correlated across artists.

But the assumption that pricing styles are due to different willingness to exploit market power allows us to go one step further. We can sign the different correlations. This provides a unique test of our new hypothesis that the differences in pricing practices are due to differences in willingness to exploit market power.

8-2 Artists' rationing

It is reasonable to assume that there is excess demand for the concerts that are sold out. Sold out is a coarse measure of rationing, however, because we do not know how much excess demand there is. Panel A in Table 2 reveals that 43 percent of the concerts in our sample are sold out. The last line in Panel B shows that there is much variation in rationing probabilities across artists. For example, the Allman Brothers never sell out in our sample. Janet Jackson, Styx, Bob Dylan and Paul Simon sell out in less than 15 percent of the concerts. However, one quarter of the artists ration tickets in at least 57 percent of their concerts. For example, Madonna always sells out in our sample, while Billy Joel, Elton

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John and Garth Brooks sell out in more than in 85 percent of the concerts. The interquartile difference across artists in rationing probability is 34 percent. This is a very large number considering that the sold out probabilities are fairly well estimated. In fact, the minimum number of observations per artists in our sample is 15 and the median across artists is 150. Figure 4A plots the distribution of sell out probabilities across artists. The range of sell out probabilities across artists is striking. Even if we restrict the sample to artists with at least 100 concerts in the sample, the results are not affected (Figure 4C).

The fact that some concerts are sold out is not surprising. After all, demand is uncertain and prices have to be set in advance. A random component of the demand is realized only after tickets are offered for sale. By increasing the price of tickets, the artist increases the revenue per seat sold but also increases the risk of having unsold tickets. If demand is uncertain, the probability of rationing should be strictly positive. The profit maximizing level of rationing depends on the elasticity of demand, the amount of uncertainty, and the venue capacity.

Several stylized facts from the concert industry are difficult to rationalize within this simple profit maximization framework. As mentioned above, a large subset of artists sells out most of their concerts and they do so tour after tour. This cannot be profit maximizing. There is a high suspicion that these artists systematically underprice tickets (as illustrated by the large literature pointing towards systematic underpricing reviewed earlier). For example, according to our initial quotes, there seems to be a widespread belief in the industry that Bruce Springsteen, Pearl Jam, and Dave Matthews have never charged as much as they could. In our sample, they sell out 70, 66, and 56 percent of their concerts

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respectively. If all artists perform in similar demand conditions, theory predicts that artists'

rationing probabilities should be fairly close to one another. Returning to Figure 4A, we

see that this is not the case. Although there is a peak centered around 40 percent, there are

large tails on both sides.

One concern with Figure 4A is that artists may not face similar demand conditions. We

check that artist fixed effects are robust after controlling for demand and product

heterogeneity by following a similar approach as we did for second-degree price

discrimination. Under a profit maximization hypothesis, rationing probabilities should

depend on venue and demand characteristics that influence the uncertainty of demand and

the shape of the demand curve. Assume, for example, that the population of concert fans

varies from city to city and that this influences the local demand elasticity and/or

uncertainty. This could be due to differences in income, racial composition, age

composition, or other variables. We would expect that the rationing probabilities should

differ from city to city.

As with second-degree price discrimination, demand and product characteristics may

explain variations in the chance that a concert sells out. We use a similar empirical model

as before to extract the artist fixed effects. The dummy variable r_i equals one if concert i is

sold out. We estimate the model

$$Pr(r_i=1)=\ \theta_{artist}+\ \theta_{city} + \theta_{year} + \theta_{venue} + \gamma_1 Popularity_{a,y} + \varepsilon_i \qquad (2)$$

where the control variables were defined in Section 7. Table 13 reports the results with

various sets of controls. Artist fixed effects alone explain 18 percent of the variability in

concert sell out. Most interestingly, the amount of variations explained by artist fixed

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effects does not decrease by a large amount after controlling for year, venue or city fixed effects, and artist popularity. Artist fixed effects increase the adjusted R^2 by 15 percent when we control for year, city fixed effects, and artist popularity. This figure remains the same if instead we control for venue and year fixed effects. The F-test corresponding to the hypothesis that the artist fixed effects are jointly equal to zero is rejected in all three specifications (Column 1, 3 and 5).

Figure 4B reproduces Figure 4A but using the artist fixed effect estimated in Table 13. The distribution is again strikingly spread out. Panel B in Table 13 presents statistics on the distribution of artist fixed effects. The standard deviation does not change across the three specifications. The range of the distribution of artist fixed effects and the interquartile range are large. The finding that some artists almost never ration and others always do so holds even after controlling for a number of demand and product factors. Is this due to artist pricing styles?

In Section 2-2 we reviewed the main explanations for rationing that have been proposed in the literature. Most of these explanations (consumer demand for fairness, coordination game between consumers, publicity value of selling out, complementary products, and gift exchange) can explain the overall level of rationing in the concert industry but cannot on their own explain large variations across artists in rationing. To explain these variations, these explanations would have to assume that some artists are subject to these forces while others are not. It is not clear, for example, why Bruce Springsteen's fans care about fairness while Michael Bolton's fans don't. In addition, specification (2) controls for a large number of variables associated with demand. Again, we doubt that the variations

across artists in sell out probabilities could be due only to unobserved demand or product heterogeneity across artists. Some of it is most likely caused by different pricing styles.

8-3 Artist pricing styles and exploitation of market power

Under the assumption that artists differ in the propensity to exploit market power, we should find that the decisions to second- and third-degree price discriminate should be positively correlated and these two decisions should be negatively correlated with artist sell out probability. We start with evidence from the raw data based on artist averages. Figures 5A, 5B, and 5C present the raw plots of the three variables of interest, second and third-degree price discrimination and sold out, taken two by two. Each point on the figures represents an artist. The three figures show a relation consistent with our three hypotheses and the correlation coefficients are highly significant. Artists who more frequently differentiate prices within a given venue are less likely to use the same pricing policy across concerts within a tour. The artists who are less like to price discriminate are more likely to sell out concerts. These correlations are difficult to explain under the theory of price discrimination. However, they are consistent with our behavioral assumption that artists differ in their willingness to exploit market power.

We follow the approach of Bertrand and Schoar (2003) to address two shortcomings with these raw correlations. First, each point of the graphs is computed by taking averages for an artist. This implies that our constructed measures contain measurement errors. Second, artists perform in different cities, venues, and years. Hence, it is possible that characteristics of the cities, venues, and years in which concerts take place determine the

choice to price discriminate and to sell out. We want to check that the correlations across

decisions remain after controlling for these characteristics.

Like Bertrand and Schoar (2003), we form a new artist dataset. For each artist, we

collect the estimated fixed effects and standard errors from regressions (1) and (2) for

second-degree price discrimination and rationing respectively, and from the regressions

described in Table 8 for third-degree price discrimination. We then estimate the following

equation

$$F.E.(y) = \alpha + \beta \, F.E.(z) + \varepsilon$$

where F.E(y) and F.E.(z) are any two of our three fixed effects. The right hand side

variable in this regression is itself an estimated coefficient which is noisy by definition.

This will tend to bias coefficient β toward zero. But we know the precision with which the

fixed effects were estimated. Following Bertrand and Schoar, we use a GLS technique to

account for the measurement error in the right hand side variables. We weigh each

observation by the inverse of the standard error of the independent variable.

Table 14 reports the results of these regressions. The average R^2 of these regressions is

0.1. with a maximum of 0.38 and a minimum of 0.014.[15] Panel A in Table 14 computes the

regression coefficients using the fixed effects from a specification that includes only the

artist fixed effects. This takes care only of the weighting problem. All regression

coefficients are significant and have the predicted sign. Second and third-degree price

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[15]   The R^2 are higher in Panel A 0.06, 0.17, 0.38, lower in Panel B 0.02, 0.06,

0.08 and even lower in Panel C 0.014, 0.054, 0.062.

discrimination are positively associated and both are negatively associated with modal pricing.

Panel B and C in Table 14 take care of the weighting problem and also address the issue of unobserved product and demand characteristics (the second problem with simple correlations). In both Panel B and C, we use the artist fixed effects for third-degree price discrimination from Table 8 Column 3 that holds constant city-pairs. Panel B takes the artist and rationing fixed effects from a specification that controls for city, year fixed effects, and artist popularity. Panel C is similar but controls for venue instead of city fixed effects. The sign of the regression coefficients remain the same but the significance decreases slightly. Additionally, the correlation between rationing and second-degree price discrimination is only marginally significant. This is likely to be caused by the fact that artist fixed effects are less precisely estimated when more control variables are included in (1) and (2). However, if we use the number of seating categories instead of the price discrimination dummy as a measure of second-degree price discrimination, the results are again significant at the 10 percent level.

Overall, accounting for measurement error as well as demand and product characteristics does not change the main finding from the results. The evidence is consistent with the hypothesis that there are differences across artists in willingness to exploit market power.

8-4 Summary

We hypothesize that artists vary in their willingness to exploit market power. This hypothesis is consistent with the finding that the heterogeneity across artists in the use of

second- and third-degree price discrimination remains even after we control for demand and product characteristics. It also implies that artists should differ in their propensity to ration tickets. Most importantly, this hypothesis implies that the propensity to second- and third-degree price discriminate should be positively related and that both should be negatively related to the propensity to ration tickets. Simple correlation coefficients and regression results are broadly consistent with these new hypotheses.

9 Discussion

The industrial organization literature typically focuses on demand and cost primitives to explain firm decisions. Consistent with this approach, we find that a large portion of the variations in the use of price discrimination and rationing is explained by demand and product characteristics. The industrial organization literature has largely ignored supply side behavioral considerations (Ellison 2006 and Spiegler 2011). Surprisingly, we find that seller identity explains a large portion of variations in price discrimination and rationing. In the case of second-degree price discrimination, individual pricing styles explain about 20 percent of the total variations, or 40 percent of the explained variations. In the case of third-degree price discrimination and rationing, artists fixed effects explain about 14-15 percent of the total variation, or about half of the explained variations. These findings are consistent with the new literature in corporate finance studying managerial styles (Bertrand and Schoar, 2003 and Malmendier et al. forthcoming). However, the variations in artist pricing styles are much larger than the observed variations in manager style. Bertrand and Schoar, for example, found that manager style explains only 4 percent of the variations in firm's financial decisions.

A candidate explanation for differences in management practice across firms is moral hazard. This explanation, however, does not hold in our application because artists are the main residual claimant over concert revenue. Contracts between artists and promoters vary greatly, but top artists usually obtain the largest fraction of residual revenue, after covering all expenses. Accounts vary, but the artist's take of profits lies somewhere between 60 to 80 percent, with a few artists taking as much as 100 percent.

Artists may face a moral hazard problem when dealing with promoters. This will be the case if promoters bear most of the cost of implementing price discrimination. This argument, however, cannot explain the variations across artists because all artists should face the same moral hazard problem when dealing with a promoter. The extent of moral hazard may be promoter specific, but controlling for promoter fixed effects does not change the role played by artists fixed effects.

Variations in management practices are notoriously difficult to explain (Bloom and Van Reenen, 2003). Exposure to market competition is a usual suspect, but we can rule this out as a candidate explanation for our findings.[16] Differences across artists remain ever after controlling for city and year fixed effects as well as musical styles.

The hypothesis that artists vary in their willingness to exploit market power goes a long way toward explaining many patterns in artist pricing styles. But what ultimately

[16]   Interestingly, the second key explanatory variable identified in Bloom and VanReenen to explain variations in firms' management practices is behavioral: the use of primogeniture (oldest male child) for management succession.

explains these differences? Could it be sincere pro-social preferences to transfer surplus to consumers? For example, it has been argued that owners of sports teams are willing to lose money in order to increase their chances of winning important competitions. Artists may be willing to give up surplus on fairness principle, to fuel public adulation, or for other reasons associated to the artists' preference.

This is not the only explanation. Artists may also have strategic motives to price in pro-social ways. The literature on corporate social responsibility, for example, explains firm pro-social investment in public good using strategic arguments (Kitzmuller, forthcoming). But how would a strategic argument explain differences in artist pricing styles? It may be due to the fact that artists vary in their revenue models. Some artists earn most of their revenues from music sales (concert and recordings). These artists have a long-term horizon. They are household names who will continue playing in an unforeseen future. Others are reunion bands or do not tour regularly for other reasons. This is one source of heterogeneity but there are others as well. Some artists earn a significant fraction of revenue from merchandizing, licensing, and endorsement (Rolling Stone, 2006). These ancillary sources of revenues, particularly endorsement, depend to a large extent on the artist's public image. All these factors suggest that artists may care differently about their reputation, public image, and celebrity status.

Those artists who need to maintain a good reputation to generate future revenue streams may refrain from using price discrimination. After all, concert pricing receives much publicity in the press and elsewhere; this contributes to the public's perception of the artist. Artists may prefer to leave profits on the table to appear generous and not fully

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exploiting their market power. This is because these forgone profits could be much smaller than what they could lose from the bad press they would suffer by pricing aggressively. Artists recoup the losses incurred by pricing in a social way through increased prospects of steady future revenues.

Our findings have important welfare implications. Artists leave surplus on the table but may benefit from the publicity associated with selling out concerts. One may also argue that artist pricing styles is an efficient way to generate publicity. However, such publicity also generates inefficiencies. The initial allocation of tickets is unlikely to be efficient for those artists who ration and do not use price discrimination. Whether secondary markets can correct such distortions is debatable because there are costs associated with resale (Leslie and Sorensen, 2011).

10 Overview and future research

We document differences across artists in the use of second- and third-degree price discrimination, and in the use of rationing. Much of this heterogeneity across artists remains, even after controlling for a number of variables that capture product and demand characteristics. We attribute this heterogeneity to individual pricing styles. We propose a simple framework to explain these differences based on the assumption that artists vary in their willingness to exploit market power. This assumption is consistent with the existence of artist fixed effects and delivers the unique prediction that those artists who are less likely to vary prices across seats within a venue are also less likely to vary prices for the same concert in different cities and are more likely to ration tickets. The evidence surprisingly supports these predictions.

Our results highlight the important role of individual styles in explaining economic outcomes in the context of cultural economics. The possible existence of individual pricing styles is surprisingly absent from the industrial organization literature. Even the recent influence of behavioral economics has not yet explored the possibility that non-standard considerations may influence decision makers on the supply side. The only research we are aware of that has demonstrated the existence of individual style has done so in the context of corporate finance (Bertrand and Schoar, 2003 Malmendier et al. forthcoming). Our work is the first to apply this idea to industrial organization with an application to the pricing of cultural goods.

We also contribute to the long-lasting questions in cultural economics of why brokers and scalpers actively resell tickets in secondary markets. Artists' objective functions may differ and some artists may prefer not to vary prices in response to market forces. This helps understand why some concerts are sold out, why quality and demand differences are not fully taken into account in ticket prices, and why tickets are often resold in secondary markets. However, a number of questions are left open:

- What ultimately differentiates artists? Sincere preferences, strategic motives, or some other characteristic?
- What is the welfare impact of heterogeneity in pricing styles?
- Is there a relationship between an artist's 'exploitation of market power' and celebrity status? Are famous artists less likely to exploit market power?
- Has the role of pricing style changed over time under the influence of media attention or the role of celebrity status?

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- Are artist pricing styles fixed over time? Is there a life cycle in pricing style?

- Does consumer demand for fairness influence the overall level of price?

- Do less popular artists (non top-100 artists) also have individual pricing styles?

- Generalize the analysis for other pricing decisions (e.g., choosing to increase prices in response to the large increase in demand in the 90's).

We mention the broader relevance of our results.

- Our study is specific to live concerts for popular music. Do the results generalize to other performing arts? Do other decision makers vary in their willingness to exploit market power?

- What are the broader implications of the concept of individual pricing style?

- Some artists have started to experiment with more innovative pricing policies leveraging the distribution opportunities offered by the Internet (Halcoussis and Mathews, 2007). Does our framework of individual pricing styles imply that not all artists will equally adopt these new opportunities?

- Is the notion of individual pricing style relevant outside performing art in markets where celebrity matters? Is the notion of exploitation of market power general?

Bibliography

Ault, Susanne. "Pearl Jam satisfies pent-up demand with tour." Billboard, p.19. June 7, 2003.

Becker, Gary (1991). "A Note on Restaurant Pricing and Other Examples of Social Influences on Price." Journal of Political Economy 99 (5) : 1109-1116.

Bertrand, Marianne and Antoinette Schoar. Managing with Style: The Effect of Managers on Firm Policies. Quarterly Journal of Economics, Nov 2003, vol 143. 1169-1208.

Nick, Bloom and John Van Reenen. "Measuring and Explaining Management Practices Across Firms and Countries." Quarterly Journal of Economics, November 2007, 122, 4, p. 1357-1408.

Borenstein, Severin and Nancy Rose. (1994). "Competition and Price Dispersion in the U.S. Airline Industry," Journal of Political Economy, 102(4), pages 653-83.

Busse, Meghan and Marc Rysman. (2005). "Competition and Price Discrimination in Yellow Pages Advertising," RAND Journal of Economics, 36(2), pages 378-390.

Clerides, Sofronis. (2004). "Price Discrimination with Differentiated Products: Definition and Identification." Economic Inquiry 42(3), 402-412.

Connolly, Marie and Alan B. Kruger (2006), "Rockonomics: The Economics of Popular Music." Handbook of the Economics of Art and Culture. Volume 1, p. 667-719.

Courty, Pascal. "Unpriced Quality." Economics Letters. 111 (1), April 2011, p. 13-15.

Courty, Pascal (2003), "Some Economics of Ticket Resale," Journal of Economic Perspectives, 17–2, 85–97.

Courty, Pascal (2000). An Economic Guide to Ticket Pricing in the Entertainment Industry. Louvain Economic Review. (66) 2 2000 p. 167-192.

Courty, Pascal and Mario Pagliero. The Impact of Price discrimination on Revenue: Evidence from the concert industry. Review of Economics and Statistics. Forthcoming, 2012.

DeSerpa, A.C. and R.L. Faith (1996). "Bru-u-u-uce: The Simple Economics of Mob Goods." Public Choice, 89, 77-91.

DeSerpa, Allan (1994). "To Err Is Rational : A Theory of Excess Demand for Tickets." Managerial and Decision Economics 15(5), (September-October) : 511-18.

Ellison, Glenn. "Bounded Rationality in Industrial Organization." in Blundell, Newey and Persson (eds.), Advances in Economics and Econometrics: Theory and Applications, Ninth World Congress, Cambridge University Press, 2006.

 Einav, Liran and Orbach, Barak. (2007). "Uniform Prices for Differentiated Goods: The Case of the Movie-Theater Industry." International Review of Law and Economics, 27(2), 129-153.

Halcoussis, Dennis and Timothy Mathews. "eBay auctions for Third Eye Blind concert tickets." Journal of Cultural Economics. (2007) 31:65–78

Happel, Stephen And Marianne Jennings. (2010). "The Eight Principles of the Microeconomics and Regulatory Future of Ticket Scalping, Ticket Brokers, and Secondary Ticket Markets," Journal of Law and Commerce 28(2): 115- 209.

Huntington, Paul (1993). "Ticket Pricing Policy and Box Office Revenue." Journal of Cultural Economics 17(1) : 71-87.

Kahneman, D., Knetsch, J., Thaler, R., 1986. Fairness as a constraint on profit seeking: Entitlements in the market. American Economic Review 76, 728–741.

Kitzmueller, Markus and Jay Shimshack. (2011) "Economic Perspectives on Corporate Social Responsibility." Journal of Economic Literature (forthcoming)

Krueger, Alan B. (2005), "The Economics of Real Superstars: The Market for Concerts in the Material World", Journal of Labor Economics, 23(1): 1-30.

LaFranco, Robert. "Rock's 50 richest." Rolling Stone 2nd annual money report. Rolling Stone. April 3rd, 2003. P 57-62.

Leslie, Phillip. (2004). "Price Discrimination in Broadway Theatre." RAND Journal of Economics, Vol. 35, 520-541.

Leslie, Phillip and Alan Sorensen. (2009). "The Welfare Effects of Ticket Resale." Mimeo, GSB, Stanford University.

Maguire, Siobhan. "Inflated ticket prices strike a sour note at big name gigs." The Sunday Times July 27, 2008, p.12.

Malmendier, Ulrike, Geoffrey Tate, and Jon Yan. "Overconfidence and Early-life Experiences: The Impact of Managerial Traits on Corporate Financial Policies." Journal of Finance, forthcoming.

Miravete, Eugenio. (2007). "The limited gains from complex tariffs." CEPR DP 4237.

Rosen, Sherwin and Andrew Rosenfield. 1997. "Ticket Pricing." Journal of Law and Economics. 40:2, pp. 351-76.

Shepard, Andrea. 1991. Price discrimination and retail configuration. Journal of Political Economy 99, 30–53.

Spiegler, Ran. Bounded rationality in industrial organization. Oxford University Press. (2011)

Stole, Lars. "Price Discrimination and Competition." In M. Armstrong and R. Porter: Handbook of Industrial Organization, Volume 3. Amsterdam: Elsevier, 2007. 2221-99

The Economist. Pricing the piper: An economics lesson for the concert business Jan 20th 2011.

Verboven, Frank. "Price discrimination (empirical studies)." 2008. Stephen N. Durlauf and Lawrence E. Blume, ed., The New Palgrave: A Dictionary in Economics, MacMillan, second edition.

Waddell, Ray, Rich Barnet, and Jake Berry. 'This business of concert promotion and touring.' Billboard Books, 2007.

Waddell, Ray. Ticketonomics Billboard March 7, 2009.

Wilson, Robert. Nonlinear Pricing. Oxford University Press US, 1997.

Tables

Table 1. Summary statistics: Concerts, artists, tours, cities, venues and promoters.

	N	mean	s.d.	min	p10	p25	p50	p75	p90	Max
Concerts per artist	122	166.9	126.5	15	25	58	151.5	247	336	685
Tours per artist	122	7.1	7.2	1	1	2	5	9	16	38
Concerts per tour	779	24.1	21.9	1	4	8	18	34	54	230
Venues per city*	579	2.9	3.7	1	1	1	1	3	7	25
Artists per year	14	57.4	7.2	42	48	52	59	62	67	67
Revenue per concert (thousand $)	20,362	542	821	0.7	91	165	314	619	1,102	38,700
Revenue per tour (million $)	779	12.6	20.5	0.01	0.48	1.57	4.76	14.8	35.1	175
Concerts per promoter	464	44	227	1	1	1	2	12	67	4,265

Note: N denotes the number of groups. Venues per city is the number of venues used at least once in each city.

Table 2. Summary statistics: Price discrimination and rationing

Panel A: Concert level data

	N	mean	s.d.	min	p10	p25	p50	p75	p90	max
Second-degree price discrimination:										
2nd degree price discrimination dummy	20,362	0.75	0.43	0	0	0	1	1	1	1
Number of prices	20,362	1.99	0.77	1	1	1	2	2	3	4
Price range (p^H-p^L)	20,362	25.74	61.15	0	0	0	12	29.75	50	1,225
Relative price range $(p^H-p^L)/p^L$	20,362	0.99	4.08	0	0	0	0.43	1.04	2.00	211
Price range (p^H-p^L) if $p^H \neq p^L$	15,224	34.43	68.58	0.01	5	10	20	35	64	1,225
Third-degree price discrimination:										
Interquartile range of avg price within tour/ avg price in tour	18,798	0.23	0.152	0	0.07	0.13	0.19	0.29	0.41	1.08
Modal pricing policy in tour dummy	18,798	0.22	0.412	0	0	0	0	0	1	1
Gini-Simpson coefficient (tour level)	18,786	0.08	0.136	0	0.001	0.008	0.024	0.086	0.227	1
Rationing:										
Sold out dummy	20,362	0.43	0.50	0	0	0	0	1	1	1

Note:

Panel B: Artist level data

Variable	Obs	Mean	s.d.	Min	p10	p25	p50	p75	p90	Max
Second-degree price discrimination:										
2nd-degree price discrimination dummy	122	0.77	0.26	0.02	0.38	0.62	0.89	0.97	1	1
Number of prices	122	2.07	0.50	1.02	1.38	1.73	2.12	2.36	2.63	3.42
Price range $(p^H\text{-}p^L)$	122	33.06	44.94	0.22	3.87	9.95	19.87	31.71	82.03	271.1
Relative price range $(p^H\text{-}p^L)/p^L$	122	1.15	1.45	0.01	0.15	0.37	0.82	1.40	2.14	13.32
Price range $(p^H\text{-}p^L)$ if $p^H{\neq}p^L$	122	39.44	51.36	2.74	10.16	15.03	22.43	37.32	82.88	288.0
Third-degree price discrimination:										
Interquartile range of avg price within tour/ avg price in tour	108	0.23	0.12	0.05	0.11	0.15	0.21	0.29	0.41	0.67
Frequency of modal pricing policy in tour	108	0.22	0.15	0	0.07	0.11	0.17	0.29	0.47	0.68
Gini-Simpson coefficient (tour level)	122	0.07	0.10	0	0	0.007	0.032	0.085	0.204	0.518
Rationing:										
Sold out dummy	122	0.41	0.25	0	0.10	0.23	0.37	0.57	0.78	1

Table 3. Correlation between different measures of price discrimination (concert level data)

Panel A: Second-degree price discrimination

	2nd-degree price discrimination dummy	Number of prices	Relative price range $(p^{H}-p^{L})/p^{L}$
2nd-degree price discrimination dummy	1		
Number of prices	0.74 (0.00)	1	
Relative price range $(p^{H}-p^{L})/p^{L}$	0.24 (0.00)	0.26 (0.00)	1

Note: the table reports correlation coefficients and p-values in parentheses.

Panel B: Third-degree price discrimination

	Interquartile range of avg price within tour/ avg price in tour	Frequency of modal pricing policy in tour	Gini-Simpson coefficient (tour level)
Interquartile range of avg price within tour/ avg price in tour	1		
Frequency of modal pricing policy in tour	-0.21 (0.00)	1	
Gini-Simpson coefficient (tour level)	-0.41 (0.00)	0.40 (0.00)	1

Note: the table reports correlation coefficients and p-values in parentheses.

Table 4. The heterogeneity of pricing policies

Partitioning the sample by	Gini diversity index
Tour	0.074
Artist	0.026
Promoter	0.021
Venue	0.015
City	0.008
Year	0.005
All data (no partitioning)	0.002

Note: the table reports the mean probability that two concerts
  selected randomly within a tour, artist, promoter, city, year,
  or in the whole sample have the same pricing policy

Table 5. Comparison of Bruce Springsteen and Michael Bolton

	N of concerts	Average frequency of modal pricing policy within a tour	Average number of prices within a concert
Bruce Springsteen, Solo Acoustic Tour 1996	39	0.44	1.05
Michael Bolton, Fall Tour 1996	16	0.006	2.37
Bruce Springsteen, 1992-2005	198	0.57	1.53
Michael Bolton, 1992-2005	194	0.07	2.44

Table 6. Artist effects on second-degree price discrimination

	2dpd	2dpd	2dpd	2dpd	2dpd	2dpd	2dpd
Artist's popularity						0.00870***	0.0390***
						(0.00257)	(0.0138)
Artist f.e.?	Yes		Yes		Yes		Yes
Year f.e.?		Yes	Yes	Yes	Yes	Yes	Yes
City f.e.?		Yes	Yes				
Venue f.e.?				Yes	Yes	Yes	Yes
Adjusted R^2	0.268	0.185	0.398	0.284	0.461	0.294	0.452
Obs.	20,362	20,362	20,362	20,362	20,362	17,787	17,787
Number of artist f.e.	121	121	121	121	121	87	87
F-test on artist fixed effects (p-value)	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: The dependent variable is the 2nd degree price discrimination dummy. Artist's popularity is the cumulative number of singles and albums in top charts in previous years (time varying for each artist). Robust standard errors in parentheses, clustered at the artist level. *** p<0.01, ** p<0.05, * p<0.1

Table 7. Second-degree price discrimination: Distribution of estimated artist fixed effects.

Artist F.E. from:	N	sd	min	p25	p75	max
Table 6 column 1	121	.251	-.665	-.0611	.282	.32
Table 6 column 3	121	.228	-.481	.0893	.37	.496
Table 6 column 5	121	.216	-.574	.061	.298	.408
Table 6 column 7	87	.231	-.811	.0877	.3	.57
Table 9 column 3	53	.240	-.947	.123	.364	.595
Table 9 column 4	33	.258	-.0617	.498	.784	1.05
Table 9 column 7	53	.199	-.922	.0534	.246	.412
Table 9 column 8	33	.213	-.0778	.295	.573	.782
Table 10 column 3	66	.266	-1.342	.0245	.293	.55
Table 10 column 4	20	.284	-.337	.294	.568	.66
Table 10 column 7	66	.228	-1.454	-.446	-.184	.102
Table 10 column 8	20	.214	-.307	.215	.433	.501
Table 11 column 2	87	.251	-.835	.13	.383	.643
Table 11 column 4	87	.252	-.914	.13	.362	.675
Table 11 column 6	87	.253	-.917	.136	.366	.684

Note: In computing the statistics, each artist fixed effect is weighted by the inverse of its standard error to account for estimation error.

Table 8. Artist effects on third-degree price discrimination for city-pairs

Panel A: Linear probability model: the impact of artist f.e. on the prob. that two concerts in top 10 cities by the same artist, within the same tour, have identical pricing policy (the model identifies 53 artist f.e.).

	Dummy for equal pr policy	Dummy for equal pr policy	Dummy for equal pr policy
City pair f.e.?		Yes	Yes
Artist f.e.?	Yes		Yes
Adjusted R2	0.18	0.14	0.32
Obs	3,237	3,237	3,237
Number of artist f.e.	53		53
F-test on artist fixed effects (p-value)	0.00		0.00

Panel B: Distribution of estimated artist fixed effects on third-degree price discrimination

Variable	Obs	Std. Dev.	Min	p25	p75	Max
Artist f.e.	53	0.19	-0.45	-0.361	-0.115	0.258
Artist f.e. (controlling for city-pair f.e.)	53	0.19	-0.42	-0.305	-0.093	0.357

Note: In computing the statistics, each artist fixed effect is weighted by the inverse of its standard error to account for estimation error.

Table 9. Artists' effects on second-degree price discrimination (split the sample between artists with high and low average ticket price)

Panel A.

	High average price	Low average price	High average price	Low average price	High average price	Low average price	High average price	Low average price
Artist's popularity	0.0008	0.0240***	0.0462***	0.0667**	0.0002	0.0146*	0.0309**	0.0441
	(0.0026)	(0.0088)	(0.0168)	(0.0284)	(0.0018)	(0.0078)	(0.0118)	(0.0262)
Artist f.e.?			Yes	Yes			yes	Yes
Year f.e.?	Yes	Yes	Yes	Yes	Yes	Yes	yes	Yes
City f.e.?								
Venue f.e.?					Yes	yes	yes	Yes
Adjusted R2	0.081	0.066	0.266	0.238	0.302	0.335	0.437	0.439
Observations	9,582	8,205	9,582	8,205	9,582	8,205	9,582	8,205
Number of artist f.e.			53	33			53	33
F-test on artist fixed effects (p-value)			0.00	0.00			0.00	0.00

Note: We rank all the artists in our sample according to the average revenue per seat (average price of tickets sold) and then compute the mean across all artist. We spit the sample in two categories, high and low revenue artists, according to whether an artist's average price is above the average across artists. The dependent variable is the 2nd degree price discrimination dummy. Popularity is the cumulative number of singles and albums in top charts in each year (time varying for each artist). Robust standard errors in parentheses, clustered at the artist level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 10. Artist effects on second-degree price discrimination (split the sample between artists playing rock music and other types of music).

VARIABLES	(1) Rock	(2) Other	(3) Rock	(4) Other	(5) Rock	(6) Other	(7) Rock	(8) Other
hits_progr	0.0116***	0.00757	0.0584***	0.0373	0.0102***	0.00321	0.0468***	0.0239
	(0.00360)	(0.00743)	(0.0165)	(0.0258)	(0.00321)	(0.00506)	(0.0153)	(0.0180)
Artist f.e.?			yes	Yes			Yes	yes
Year f.e.?	yes	Yes	yes	Yes	yes	yes	yes	Yes
City f.e.?								
Venue f.e.?					yes	yes	yes	yes
Observations	13,149	4,638	13,149	4,638	13,149	4,638	13,149	4,638
Number of artist f.e.			66	20			66	20
Adjusted R-squared	0.064	0.153	0.301	0.311	0.282	0.439	0.451	0.520
F-test on artist fixed effects (p-value)			0.00	0.00			0.00	0.00

Note: The dependent variable is the 2nd degree price discrimination dummy. Popularity is the cumulative number of singles and albums in top charts in each year (time varying for each artist). Robust standard errors in parentheses, clustered at the artist level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 11. Summary statistics on artists' experience in a given venue or city

variable	N	mean	sd	p10	p50	p75	p90	p95
Experience in venue	20,362	0.82	3.87	0	0	1	2	3
Experience in city	20,362	1.26	4.04	0	0	1	3	4

Note: there are 12,759 artist-venue combinations and 9,988 artist-city combinations. Experience is the cumulative number of previous concerts in the same city or venue .

Table 12. Artist effects on second-degree price discrimination (promoter f.e. and experience in the same city or venue)

	2dpd	2dpd	2dpd	2dpd	2dpd	2dpd
Artist's popularity	0.00964***	0.0475***	0.0111***	0.0483***	0.0111***	0.0486***
	(0.00308)	(0.0134)	(0.0027)	(0.0148)	(0.00274)	(0.0148)
Experience in same venue			0.0010	-0.0032***		
			(0.0007)	(0.0009)		
Experience in same city					-0.0004	-0.0043***
					(0.0014)	(0.0021)
Artist f.e.?		Yes		yes		Yes
Year f.e.?	Yes	Yes	Yes	Yes	Yes	Yes
City f.e.?	Yes	Yes	Yes	Yes	Yes	Yes
Promoter f.e.?	YES	Yes				
Adjusted R2	0.284	0.444	0.201	0.389	0.201	0.390
Observations	17,787	17,787	17,787	17,787	17,787	17,787
Number of artist f.e.		87		87		87
F-test on artist fixed effects (p-value)		0.00		0.00		0.00

Table 13. Artist effects on sell out probability.

	Sold out dummy	Sold out dummy	Sold out dummy	Sold out dummy	Sold out dummy
Artist's popularity		0.0065	-0.0054	0.0057	-0.0002
		(0.0044)	(0.0133)	(0.0047)	(0.0136)
Artist f.e.?	Yes		Yes		Yes
Year f.e.?		Yes	Yes	Yes	Yes
City f.e.?		Yes	Yes		
Venue f.e.?				Yes	Yes
Adjusted R2	0.179	0.127	0.272	0.166	0.314
Observations	20,362	17,787	17,787	17,787	17,787
Number of artist f.e.	119		87		87
F-test on artist fixed effects (p-value)	0.00		0.00		0.00

Note: Popularity is the cumulative number of singles and albums in top charts in previous years (time varying for each artist).

Panel B. Distribution of estimated artist fixed effects on sell out probability

variable	N	Sd	min	p25	p75	max
f.e. Table 12,col 1	121	0.245	-0.38	-0.134	0.195	0.62
f.e. Table 12,col 3	121	0.224	-0.551	-0.259	0.09	0.481
f.e. Table 12,col 5	121	0.235	-0.464	-0.195	0.152	0.563

Note: For each variable, the first row refers to artist estimated mean values (artist f.e.in a regression with no other controls); the second row refers to artist f.e. estimated controlling for city and year f.e.; the third row refers to artist f.e. obtained controlling for venue and year f.e. In computing the statistics, each artist fixed effect is weighted by the inverse of its standard error to account for estimation error.

Table 14. Correlation between artist effects on propensity to use second-degree price discrimination, third-degree price discrimination and to sell out

Panel A. Relationship between estimated artist mean pricing characteristics.

VARIABLES	Artist effects on second-degree price discrimination	Artist effects on sell out probability
Artist effects on sell out probability	-0.254*** (0.0910)	
Artist effects on third-degree price discrimination	-0.679*** (0.144)	0.981*** (0.121)

Panel B: Relationship between estimated artist fixed effects (controlling for artist, city, year f.e., for second-degree price discrimination and sold out; city pair for third-degree price discrimination)

VARIABLES	Artist effects on second-degree price discrimination	Artist effects on sell out probability
Artist effects on sell out probability	-0.132 (0.0923)	
Artist effects on third degree-price discrimination	-0.278* (0.153)	0.279** (0.130)

Panel C: Relationship between estimated artist fixed effects (controlling for artist, venue, year f.e., for second-degree price discrimination and sold out; city pair for third-degree price discrimination)

VARIABLES	Artist effects on second-degree price discrimination	Artist effects on sell out probability
Artist effects on sell out probability	-0.109 (0.0838)	
Artist effects on third-degree price discrimination	-0.287** (0.142)	0.313** (0.138)

Note: coefficients from a weighted regression where the dependent variable is the column variable and the independent variable is the row variable. Observations are weighted by the inverse of the standard error on the independent variable. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Figures

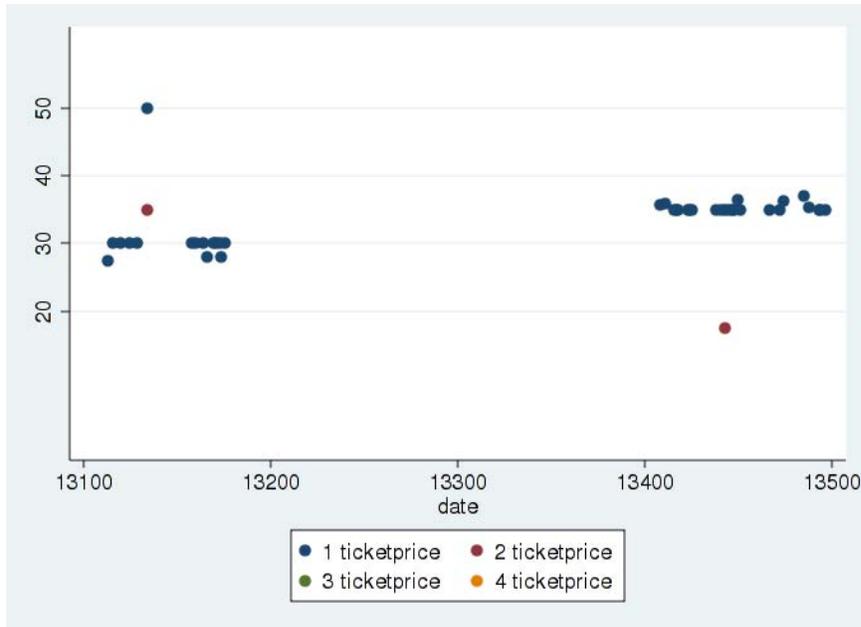Figure 1A. Bruce Springsteen, Solo Acoustic Tour (from November 1995 to December 1996)

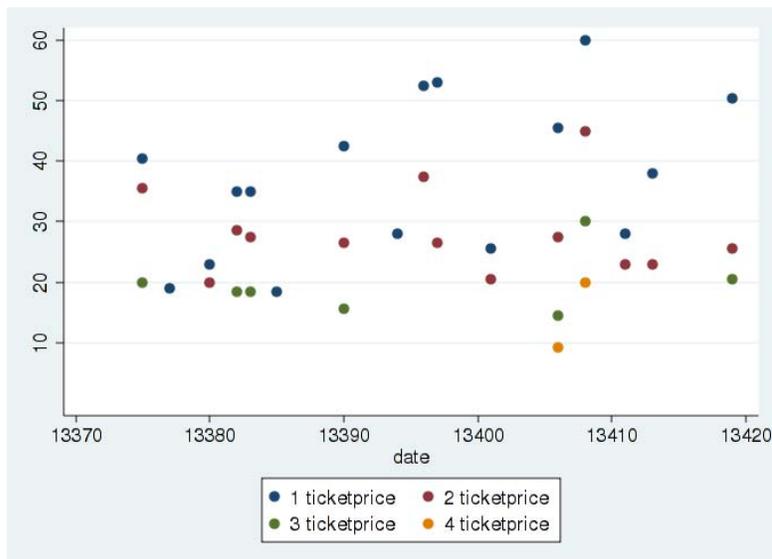Figure 1B: Figure 2. Michael Bolton, Fall Tour 1996

Figure 2A. The distribution of artist-specific average use of second-degree price discrimination.

Figure 2B. Second-degree price discrimination: Distribution of estimated artist f.e. in regression with artist f.e., venue f.e., year f.e.
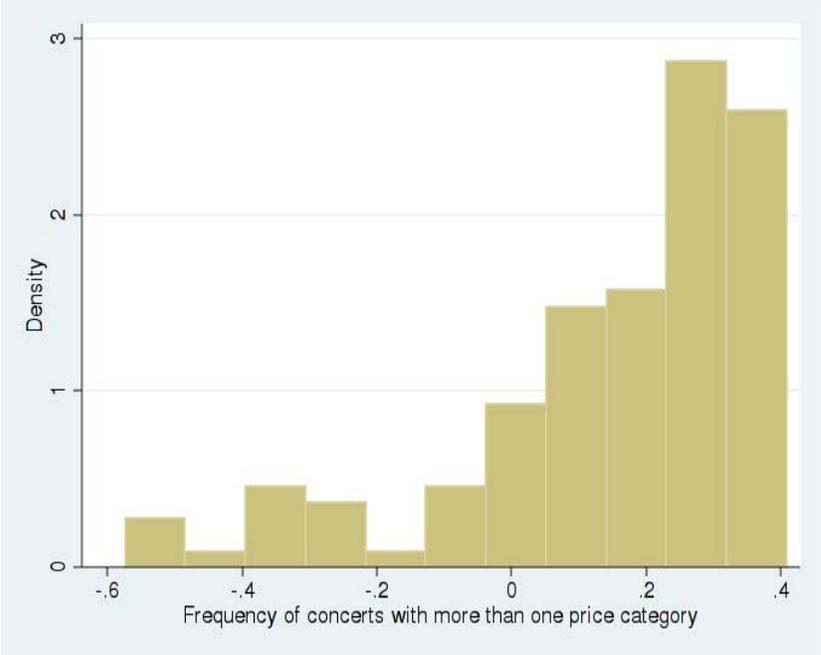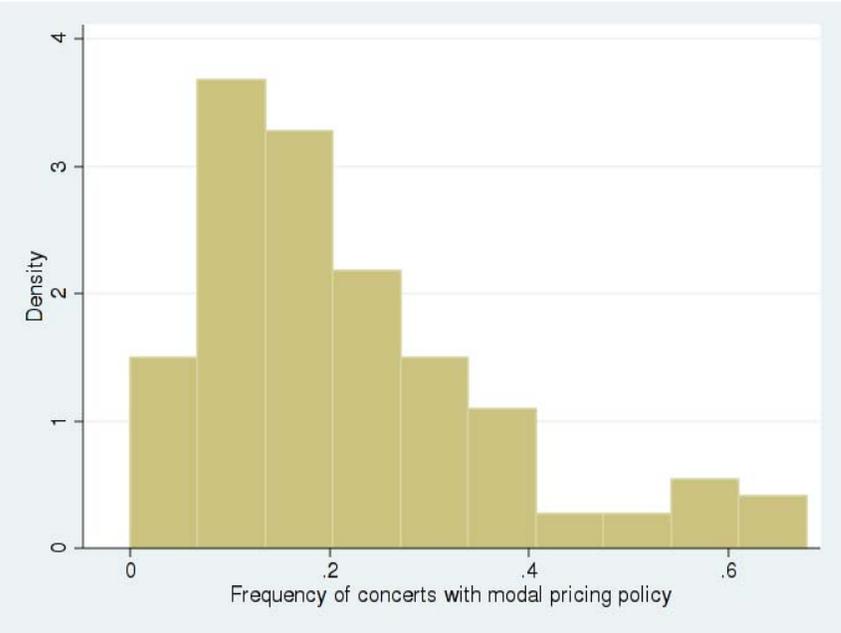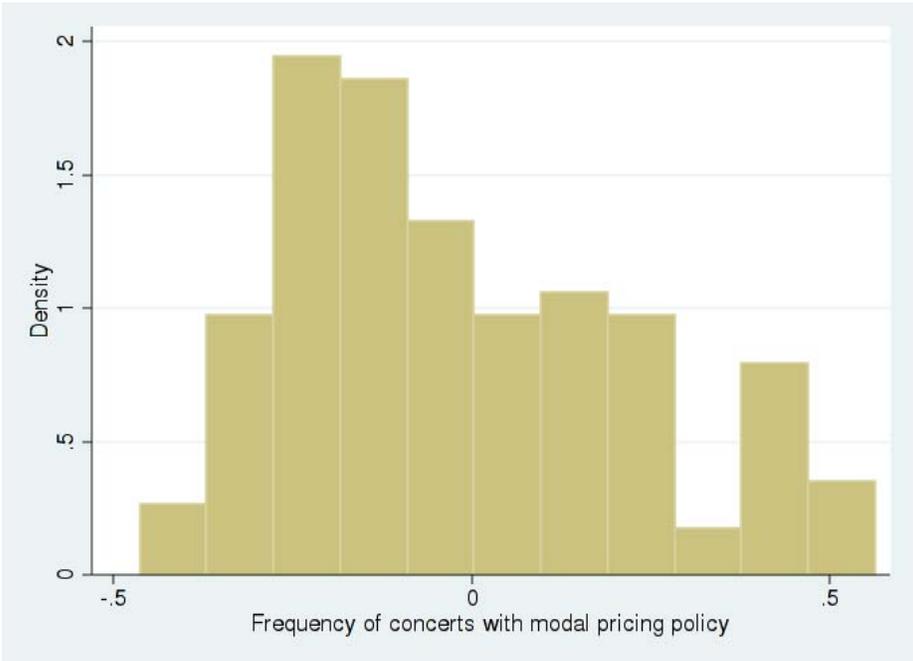
Figure 3A. Third-degree price discrimination: The distribution of artist-specific average frequency of concerts with modal pricing policy.

Figure 3B. Third-degree price discrimination: Distribution of estimated artist f.e. in regression with artist f.e., venue f.e., year f.e.

Figure 4A. Rationing: The distribution of artist-specific propensity to sell out.
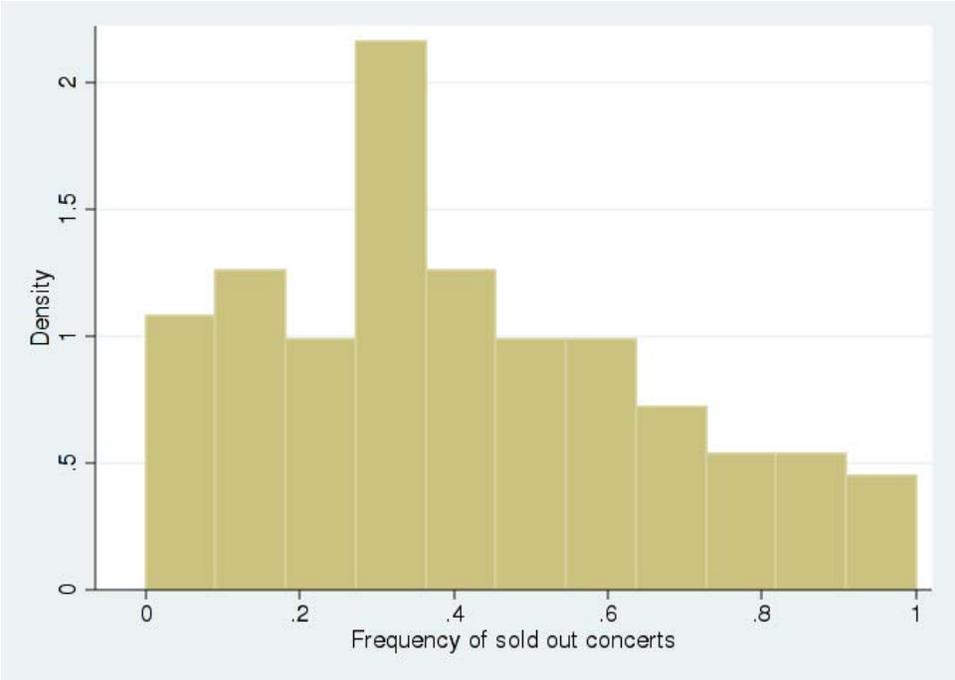
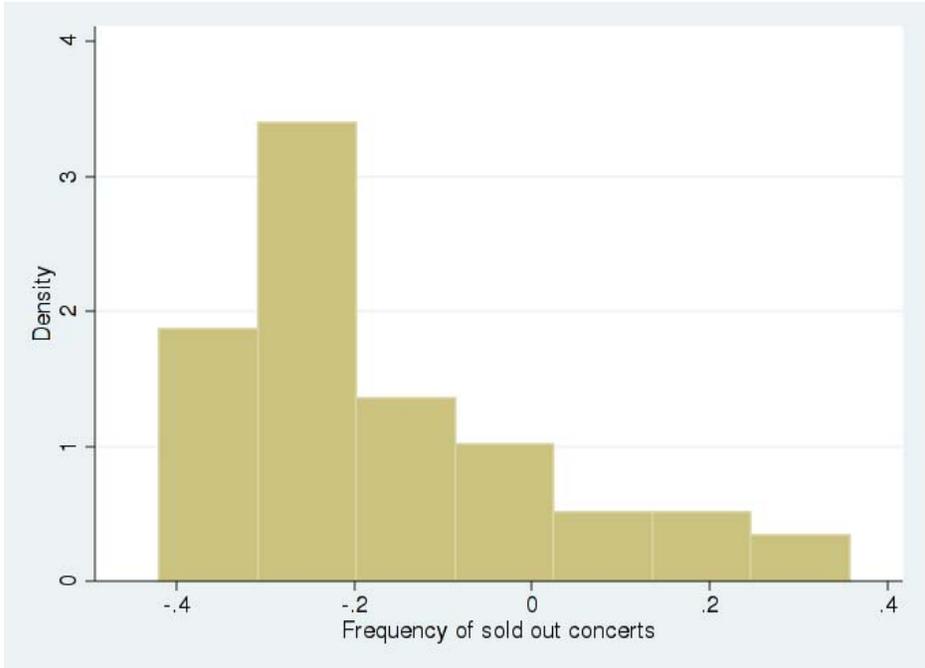Figure 4B. Rationing: Distribution of estimated artist f.e. in regression with artist f.e., venue

f.e., year f.e.

Figure 4C. Rationing: The distribution of artist-specific propensity to sell out (artists with more than 100 concerts).
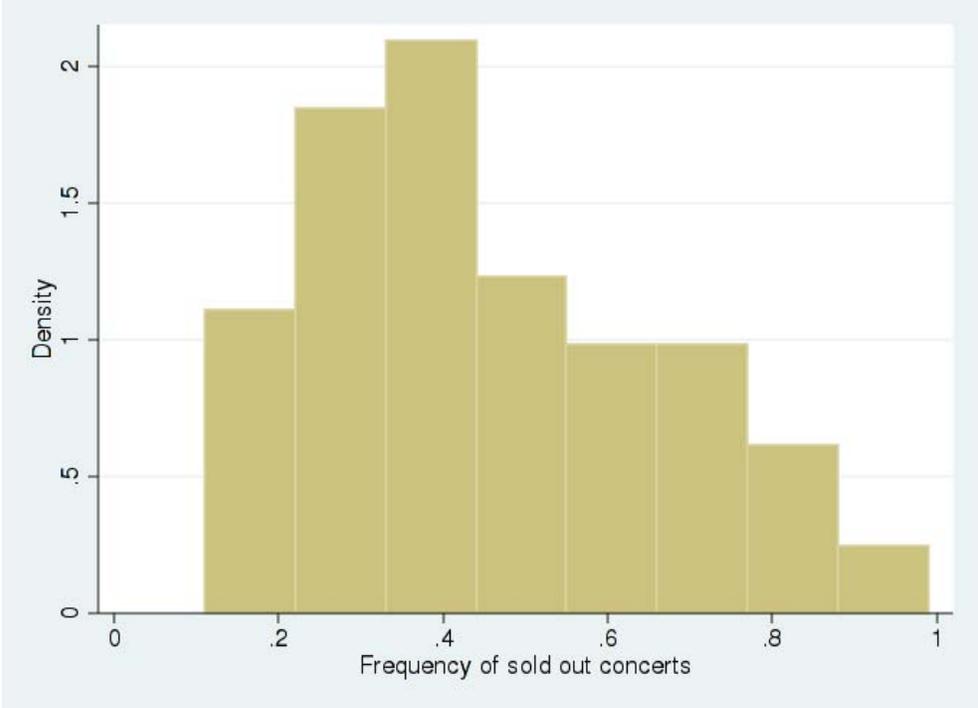
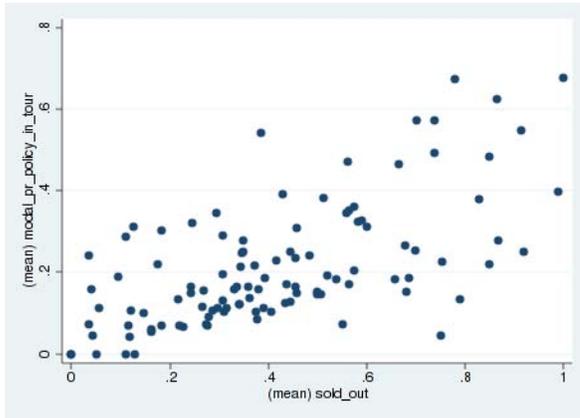Figure 5A. Correlation between artist propensity to sell out and modal pricing

Figure 5B. Correlation across artist between second degree price discrimination and sell out
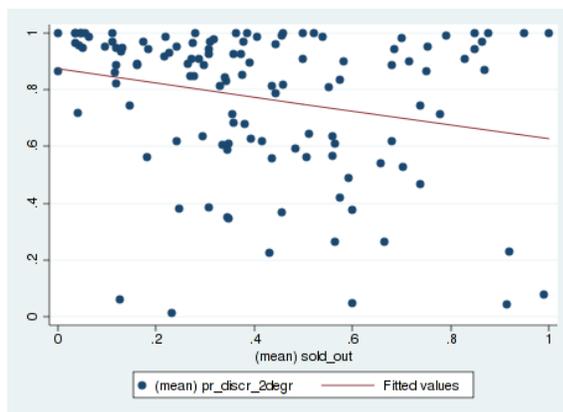

Figure5C. Correlation across artists between second degree price discrimination and modal pricing