The secondary market for concert tickets: theory and evidence[1]

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Abstract
Tickets for many live entertainment events are distributed in a primary market and then resold on a secondary market. How big is the secondary market? Why does it exist? We propose a model based on fairness considerations: because performers do not want to be perceived as gouging fans, they choose to underprice tickets and provide consumer surplus to customers. We then analyse data from surveys we conducted at randomly selected American concerts. We find that resale accounts for 10 percent of all concert tickets purchased. We present additional findings, including the timing of sales and the presence of an endowment effect.

Keywords: Concert tickets; primary market; secondary market; fairness; social constraint; endowment effect

1 Introduction

The resale market for live entertainment events has long intrigued economists. Some high-profile events like the Super Bowl or concerts by

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superstar performers regularly sell out, with tickets resold for multiples of their initial price on a secondary market. Why are the initial prices for these events not set to clear the market, a strategy that would seem to increase artist revenues? Even tickets for lower-profile events are often resold above their list price, especially for good seats. Happel & Jennings (2010: 120—121) summarize the conundrum: *"The puzzling economic question that springs from this longstanding practice is: Why would a primary seller knowingly underprice high-demand goods? Underpricing in the primary market is the driver for the allocation methods of the secondary market, i.e., higher prices, and is actually a deliberate strategy on the part of event sponsors because of any one or a combination of several factors that have emerged over the centuries as we have developed a clearer understanding of ticket markets."*

We address two questions in this paper: How big is the secondary market for concert tickets in the U.S.? Why tickets are apparently not priced to clear the market originally? The first question is relatively straightforward to answer, but one needs appropriate data. Such data have not been available up until now, and we use data from a unique survey we conducted in order to estimate the size of the market. The answer to the second question is not as straightforward. There is no shortage of theories to explain the existence of the secondary ticket market. One hypothesis is that ticket prices are set below the market clearing level to attract a larger crowd and create a "buzz" that increases demand. Another explanation is that fans are an input into the quality of the event, and promoters distribute tickets in a way to select the most enthusiastic fans. Some cite uncertainty of demand as a cause of underpricing. Yet another explanation is that tickets are resold simply because people's plans or interest change unexpectedly. Happel & Jennings (2010) review the existing literature and industry insiders' wisdom and propose a list of eight possible reasons for the primary-market underpricing, some of which we just mentioned. Two (related) listed reasons have actually not been formally introduced in models of the primary and secondary markets for entertainment tickets: fairness and goodwill constraints. Fairness considerations and the feedback between con-

sumers' perceptions and a firm's pricing strategy have been pointed out before (Rotemberg 2011; Courty & Pagliero 2008 and 2010; Anderson & Simester 2010; Sonnabend 2016). To our knowledge, however, no paper has used fairness or social constraints to explain primary market underpricing and subsequent secondary market dynamics.

In the first part of this paper we propose a simple theoretical model of the primary and secondary markets for tickets that introduces two new components: a fairness concern that constrains initial pricing, and an endowment effect that pushes the secondary market price higher by limiting supply. Both lead to a wedge between primary and secondary market prices. According to the fairness concern, performers do not want to be viewed as gouging their fans. They set their price below what the market will bear because doing so leads to greater demand in the long run. As noted by Happel & Jennings (2010: 125): *"… these price constraints create a perception of fairness, a very real, but binding constraint that public attitudes exert on markets."* Our second innovation is to introduce an endowment effect, a phenomenon often reported in laboratory experiments but rarely used in pricing models. This endowment effect increases the value people attach to their concert ticket once they have bought it on the primary market, reducing supply to the secondary market.

In the second part of this paper we bring evidence to bear on the secondary ticket market. Specifically, we have designed and conducted surveys at 30 concerts in the U.S. We began with two large-scale surveys of fans in attendance at a *Bruce Springsteen and the E Street Band* concert in 2002 and a *U2* concert in 2005. We then designed a survey of a smaller number of fans at a larger number of nationally representative concerts in 2006. These surveys provide the first available information on the size of the secondary ticket market, the price and source of resold tickets, the tickets most likely to be resold, and the reasons why customers purchase in the secondary market.

We use the data we collected to expose facts about the business and assess various existing theories of the secondary ticket market. We first estimate the size of the secondary market for concert tickets in

2006 in the United States at $600 million. The average mark-up in the secondary market is about one third over the primary market, implying that promoters and artists leave about $200 million on the table, money that is captured by resellers. We then document various phenomena, including the resale and mark-up rates, the timing of the sales, the price differentials by reseller and the price dispersion on the primary and secondary markets. Interesting findings emerge when we split our sample by price tier, which is strongly linked to seat quality. We find that the best seats are most likely to be resold and that the price mark-up in the secondary market is highest for the best seats. In addition, most fans who bought a ticket on the secondary market said they did so because they wanted to obtain a better seat, not because tickets were unavailable.

The remainder of this paper is organized as follows. Section 2 summarizes some of the various economic models that have been proposed to explain the secondary market. Section 3 presents our simple theoretical model of the primary and secondary market for concert tickets, which introduces a fairness constraint and an endowment effect. Section 4 describes our survey data and section 5 presents our main empirical findings. Section 6 offers concluding remarks.

2 Models in the literature

Several models of the primary and secondary markets for concert tickets have been proposed. We do not attempt here to provide an exhaustive review, but rather present some of the most relevant models and their main features as they relate to primary market underpricing and social interactions.[3] Rosen & Rosenfield (1997) apply price discrimination to ticket pricing, where a promoter optimally sets the price of high- and low-quality seats depending on the various types of buyers and their willingness to spend for each type of seat. While insightful, this model

[3] See Courty (2000) and Depken (2007) for more exhaustive reviews of the literature. See also Connolly & Krueger (2006) and Leslie & Soresen (2014) for a description of the industry and its main players.

focuses on the primary market, and does not raise the issue that is a puzzle for many economists, as we noted in Connolly & Krueger (2006: 676): that this *"pricing results in excess demand for many concert performances, which leads to scalping."* In his study of the secondary market for concert tickets, Swofford (1999) compares the promoter's profit maximization problem with that of the reseller, and suggests that the underpricing of tickets on the primary market may exist due to the promoter facing uncertainty over sales and being more risk averse, to the scalper having a lower cost function, or to the promoter having a long-term revenue function in mind, whereas the reseller is maximizing a one-period revenue function. It is not clear why primary ticket sellers are risk averse, however, especially because they often promote several concerts in a year and can therefore diversify risk. It also seems unlikely that a scalper would have a lower cost function than a large primary market seller like Ticketmaster. Courty (2003) also studies the resale market and rejects the conventional underpricing explanation. He introduces two types of customers with time-varying preferences: the "diehard fans," who secure their tickets early, and the "busy professionals," who have higher valuations but cannot commit in advance. The resellers cater to the latter type, optimally reallocating tickets to the busy professionals with higher valuations as the shows approaches. In the Courty model, prices should be increasing as the concert date approaches and uncertainty is resolved.

Depken (2007) starts from a Rosen & Rosenfield-type model with different types of customers as in Courty (2003), but adds a third category: the speculator. He focuses on the theoretical implications of scalping on the primary-market prices and finds that scalping can raise, lower, or have no effect on prices, depending on the reservation prices for the seats of the different types of buyers. Since the effect is ambiguous, he provides some empirical evidence using data from professional baseball and football ticket prices in the United States. He finds that anti-scalping legislation is associated with higher ticket prices. This fits with a model where the possibility of resale allows speculators to buy on the primary market to later resell to "executive fans" who, like Courty's busy profes-

sionals, only decide at the last minute and are catered by speculators (not directly by promoters). Depken's results would indicate that team owners find it revenue-enhancing to sell to both the high-value fan and the lower-value scalper, moving from an exclusive (high-value) pricing to an inclusive pricing, thus lowering prices.

Depken (2007) asks what happens to prices when laws against scalping are introduced or repealed, but his model does not inform us on the laws' effect on social welfare. For a thorough welfare analysis, one can turn to Leslie & Sorensen (2014). Leslie & Sorensen take primary market prices as given and focus on the mechanics of ticket resale. The strength of their study is in their use of a unique transaction-level dataset of rock concerts in their structural econometric analysis and their attention to several key aspects: the presence of brokers and non-brokers as resellers, costly and endogenous rent-seeking behaviour on the primary market, and the ticket reallocation mechanism on the secondary market, among others. Their study is however limited in terms of answering our two main questions. Firstly, their secondary-market data come from only two, albeit large, resale platforms: eBay and StubHub. They could only provide a partial estimate of the size of the secondary market. Secondly, they do not model the pricing behaviour of promoters and artists on the primary market, so their model, however rich, cannot address the issue of the source of the primary-market underpricing.

An interesting paper by Cheung (1977) features a model with two seat qualities. He proposes that the better seats are underpriced due to an enforcement constraint: the profit-maximising way to keep low-price-ticket holders from moving to a better seat during the performance is actually to make sure none of the good seats are free, which can be achieved by underpricing the good seats. Cheung's model implies that underpricing should be higher for shows that do not sell out, since people cannot easily find an empty seat at a sold-out show.

Becker (1991) introduces the notion of "social influence" on price in the context of restaurant pricing, a notion later exploited by DeSerpa & Faith (1996) as the "mob effect" and by Busch & Curry (2010) who intro-

duce the use of queues as a screening mechanism, making sure that more of the desired customers (the better "input") get tickets to the performance. Becker's (1991) model for eating at a restaurant can be applied to entertainment or sporting events. His key insight is that an individual's demand is a function of the price, but also of the aggregate demand: the more popular a restaurant or a play, the stronger the individual's demand. The consequence is that there are two possible equilibria: one with excess capacity and the other with excess demand. But because demand is discontinuous at the equilibrium price with excess demand, the seller cannot increase prices to clear the market: even a small increase could send demand plummeting. DeSerpa & Faith's (1996) model borrows on Becker's by making an individual's reservation price depend on the crowd's "noise" or reaction. As in Becker, there is excess demand at equilibrium, which DeSerpa & Faith argue is not a miscalculation on the part of the promoters but rather a consequence of the "mob good" phenomenon.

Busch & Curry's (2010) model is closely linked to Becker's and DeSerpa & Faith's but relaxes the necessity to have capacity constraints. They allow the explicit use of line-ups as an extra pricing dimension that the artist uses to screen fans. Consumers vary according to their willingness to pay and to line-up to get tickets. On the primary market, *"there exist consumers willing to pay the posted price—but not to line up."* (Busch & Curry 2010: 42) This situation creates an impression of excess demand. A secondary market thus arises because high-valuation consumers screened out of the primary market because of the line-up costs, that is "low-quality" (in terms of concert input) individuals, may be able to pay ticketholders enough for them to agree to sell their tickets. A problem with models that rely on time or effort as an extra dimension of pricing is that they do not reflect today's reality that most ticket sales are done over the internet and not in person. The need to line up and camp by the ticket booth to obtain the best tickets to a concert has been superseded by the need for a high-speed internet connection. The time-rich/dollar-poor fans that were ready to line up may not have the resources to secure tickets in a digital world. In other words, the artists

may have lost the possibility to use time or effort as an additional, discriminating dimension of pricing.

3 A model of social constraints

Becker (1991), DeSerpa & Faith (1996) and Busch & Curry (2010) all introduce a social aspect in their model: individual demand depends on aggregate demand or on crowd noise, or concertgoers influence the concert experience of others. Yet none invokes the presence of fairness considerations. Happel & Jennings (2010: 126) are emphatic when it comes to this issue: *"The notion of unfairness is writ large in the primary and secondary ticket markets."* In this section we lay out a simple model which accommodates such considerations. We avoid features that would make the model more realistic but detract attention from our main innovation. In particular, we do not introduce seat quality, different types of consumers or professional resellers, capacity constraints, or heterogeneity in artists/promoters' pricing methods, but we do not think that our basic findings would be invalidated by their inclusion in a richer model.

3.1 Description of the model

Our model uses the concept of social constraints stemming from fairness perceptions from the customer, as documented in Kahneman, Knetsch & Thaler (1986) and Roth (2007). Consumers may regard a price as unfair if it deviates from a reference price or if it is based on supply/demand ratios rather than set by a cost-based rule. For example, survey responders find a price increase of shovels after a blizzard to be unfair, but consider it fair if due to an increase in the production costs (Kahneman, Knetsch & Thaler 1986; Gielissen *et al*. 2008). Rotemberg (2011) provides a fine example of how consumers' perceptions of a firm's altruism influences their demand, and hence the firm's pricing. In Rotemberg's model (2011: 952), *"fear of angry reactions leads firms to act as if they were altruistic. They do so because consumers react negatively if firms demonstrate that they are insufficiently benevolent towards them. As a*

result, firms are forced to internalize consumer emotions." In Sonnabend's (2016) model ticket pricing at German club concerts, fans have a concept of what a fair price is, resulting in promoters facing a demand for concert tickets that is kinked at that fair price level. A real-life example along those lines happened when Apple decided to drop the price of its popular iPhone by $200 just three months after it initially went on sale for $599. Loyal Apple fans and early adopters felt like they had been defrauded and expressed their outrage. As a result, Apple quickly reacted by offering a $100 store credit to the early adopters. Highlighting the strong influence of consumers on Apple, in a public letter to customers Steve Jobs wrote *"our early customers trusted us, and we must live up to that trust with our actions in moments like these."* (as cited in Hafner & Stone 2007) Fairness considerations can be strong and may give rise to situations otherwise considered as irrational. For example, Zizzo & Oswald (2001) documented a lab experiment where people were willing to spend their own money to reduce others' incomes, especially if the other was considered wealthy.

In our model, as in Rotemberg's or Sonnabend's, the concept of fairness perceptions is central to the promoter's/artist's pricing problem. In order to build loyalty from a large fan base (who will attend concerts in the future and buy recorded music), the artist wishes to avoid being seen as gouging his fans for money and will thus set prices below the profit-maximizing level. The artist thus internalizes his fans' gouging aversion. To build long-run popularity, the artist has the intention of providing fans with a larger share of consumer surplus than would be the case if the artist were simply maximizing short-run profit. In the presence of scalping, however, the middleman acts as an intermediary between the promoter and the fan, capturing some of the surplus meant for the fan.

Billy Joel explains it this way: *"The brokers that drive the prices up are ripping me off because I'm not getting the money... and they're ripping off the customer because the customer wants the ticket and they know that the market will bear a certain price."* (cited in Spitzer 1999: 2) If Billy Joel knows that *"the market will bear a certain price,"* why would

he still underprice his tickets? The answer, we argue, is that he wants to maintain an image of being fair to his fans and therefore labours to prevent them from being "ripped off." This social constraint leads to underpricing on the primary market, which in turn drives the secondary market. Note that the artist's true consideration for his fans is irrelevant: what matter are the fans' perceptions, whether based on real or pretend concern. This emphasis on perception explains why some artists may desire to capture some of the secondary-market profits by reselling tickets to their own show but need to do so without the public being aware of their involvement. That way, they get to maintain their image and make up for the losses by engaging in resale. This practice is not new and appears widespread, but customers become outraged if they discover artists profiting from the secondary market, as was the case in noteworthy Michael Jackson and Bruce Springsteen concerts (Happel & Jennings 2010).

3.2 Market demand

As a benchmark, we first introduce the conventional market demand. We call conventional market demand the demand for tickets that would prevail if consumers did not penalize artists due to fairness constraints. We start with a very simple setup where each consumer either buys 1 ticket or no ticket, and the size of the market is normalized to 1. Each consumer's willingness to pay (WTP) for a ticket is α_i, where α_i is uniformly distributed between 0 and 1 ($\alpha_i \sim U(0,1)$). A consumer will desire to buy a ticket if his WTP exceeds the primary market price p^p. Formally, individual i's demand is $q_i(p^p) = 1(\alpha_i > p^p)$ and market demand is $Q^M(p^p) = 1 - p^p$. Note that Appendix A contains a more detailed description and resolution of the model.

3.3 Primary market: band demand

Next, we define the consumers' behaviour on the primary market when buying a ticket from the band at the initial offering. We call this the band demand. Compared with the conventional market demand, con-

sumers' demand is reduced because they dislike being gouged by the artist. The WTP of an individual consumer now has the uniformly distributed component α_i *less* a gouging penalty or a gouging aversion term γ which depends on p^p. Here we suppose that $\gamma(p^p) = \gamma_i \times p^p$, where γ_i is independent of α_i and uniformly distributed between 0 and 1 ($\gamma_i \sim U(0,1)$). The gouging aversion thus increases with the price. Note that more complicated functional forms of gouging aversion could be introduced, but with a similar effect of reducing demand. An individual's demand for the band is now $q^B_i(p^p) = 1(\alpha_i - \gamma_i\, p^p > p^p)$: the stronger the aversion, the less likely an individual will be willing to buy for a given price and ticket value α_i. Total demand for the band, $Q^B(p^p)$, will have two components that depend on the primary price p^p. For simplicity, we present graphically the market and band demand in Figure 1, along with the corresponding market and band marginal revenue curves. Formulas can be found in Appendix A.

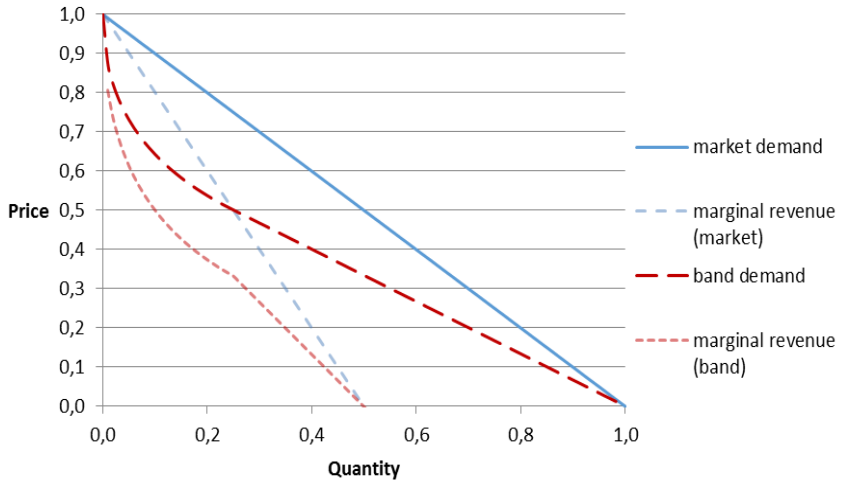

Figure 1: Primary market demand and band demand

It is clear from looking at Figure 1 that the demand for the band appears to be bowed in compared with the benchmark, no-aversion market demand. To illustrate the primary market differently, we present in Figure 2 the market in the (α_i, γ_i) space. Consumers who buy a ticket on the primary market are represented by the area B+C+D. Most models of ticket pricing treat the artist as having some monopoly power, setting a price that equates marginal cost to marginal revenue. As we can see on Figure 1, for any non-decreasing marginal cost function the artist faces, primary market price will be below the price that would have prevailed in the absence of gouging aversion. This is the basis of our explanation for primary market underpricing.

3.4 Secondary market

In our simple model, a secondary market arises because consumers do not impose the gouging penalty on a (re)seller when they buy a resold ticket. In effect, this means that resellers can attain the full potential of the market demand; they are not restricted to the depressed band demand due to fairness considerations. Penalizing the artist with the gouging penalty but not the reseller may seem like a self-inflicted punishment since it prevents high-valuation individuals from purchasing on the primary market and pushes those individuals to pay an increased price for their ticket on the secondary market. This apparently time-inconsistent behaviour from the part of the consumers may be explained by the fairness constraint they wish to impose on the resellers and is consistent with Zizzo & Oswald's (2001) findings that people are willing to pay from their own pockets to punish wealthier individuals, as mentioned previously.

3.4.1 Who sells? (supply to secondary market)

The supply of tickets to the secondary market comes from the resale of tickets by individual customers. Here we make abstraction of professional resellers to highlight the main feature of interest of our model, the gouging aversion. Including them would be akin to allowing a fraction of consumers to have $\gamma_i = 0$ and would perhaps change the magni-

tude of the effects but not the qualitative conclusion. Moreover, a significant portion of the resellers are not professionals but rather individuals with extra tickets who realize they could be better off by selling on the secondary market (as evidenced by Leslie & Sorensen (2014) who estimate that 46% of resellers are not professionals). Our data do not allow us to distinguish professional resellers from consumer-resellers, but just above 3% of concertgoers surveyed said they had sold a ticket for the event—bearing in mind that this is not a representative sample of resellers but of people in the attendance. Of those, 15% sold above face value. An individual will want to resell his ticket if his benefit from selling the ticket is greater than his benefit from holding it. The benefit from selling a ticket is $p^s - p^p$, where p^p is the price on the primary market and p^s the price on the secondary market. The benefit from holding a ticket is the consumer surplus from the primary market, $\alpha_i - \gamma_i p^p - p^p$. Thus a customer will want to sell his ticket (acquired on primary market) if $p^s - p^p > \alpha_i - \gamma_i p^p - p^p$ or $p^s > \alpha_i - \gamma_i p^p$. Note that in order to sell a ticket, an individual must first have acquired one on the primary market, which means that $\alpha_i - \gamma_i p^p > p^p$ must hold. We can thus write these conditions as $(1 + \gamma_i) p^p < \alpha_i < p^s + \gamma_i p^p$. On Figure 2, consumers who want to sell a ticket on the secondary market are represented by area B+C: of the B+C+D who have a ticket from the primary market, those with low enough ticket valuation (B) or those with high enough gouging aversion (C) will be happy to sell their ticket.

3.4.2 Who buys? (demand on secondary market)

An individual will want to buy on the secondary market if he did not get a ticket on the primary market ($\alpha_i - \gamma_i p^p < p^p$) and if his WTP on the secondary market is greater than the resale price ($\alpha_i > p^s$). These conditions can be written as $p^s < \alpha_i < (1 + \gamma_i) p^p$ and correspond to area A on Figure 2: secondary-market buyers have both a high valuation and a high gouging aversion.

3.4.3 Secondary market equilibrium

The secondary market equilibrium will be at the point where the number of tickets on offer is equal to the number of tickets desired. This corresponds to the secondary price p^s such that the fraction selling is equal to the fraction buying, i.e. such that A=B+C on Figure 2. The difference between the primary price p^p and the secondary price p^s is the resale market mark-up.

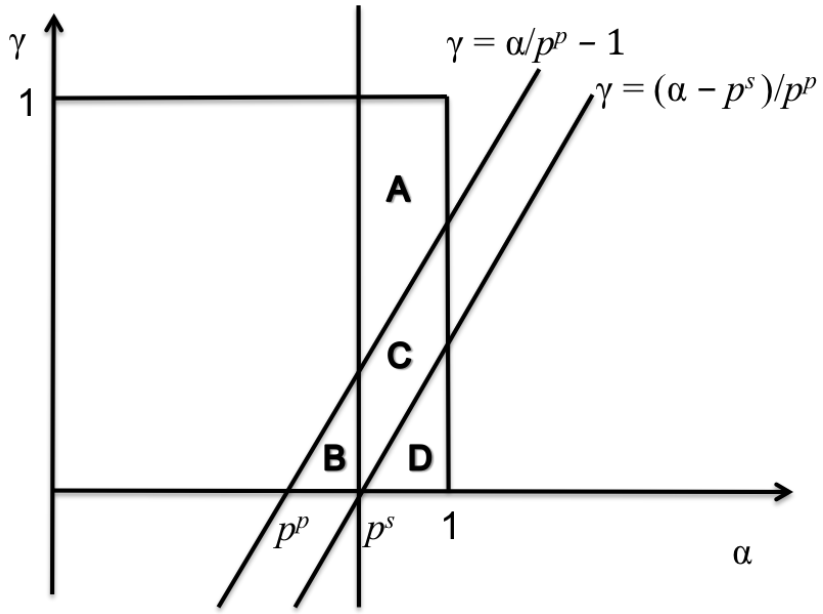

Figure 2: Primary and secondary market buyers and sellers

Note: This figure is for the case where $p^p > ½$.

3.5 Endowment effect

We tweak our simple model with gouging aversion to introduce another parameter that will push the secondary market price up: an endowment effect. In the presence of an endowment effect, the willingness to pay

that ticket holders exhibited in the primary market is not equal to their willingness to sell (WTS) on the secondary market. Once endowed with a ticket, individuals will attach *more* value to the ticket than they did previously, and so will be *less* willing to sell. We can model this as a shift in the distribution of α_i, or as an added component to the WTS: $WTS_i = \alpha_i - \gamma_i p^p + \varepsilon$, where ε is a common and constant endowment effect, which does not depend on α_i or γ_i. In terms of Figure 2, we can visualize this as an increase in the area of triangle D (at the expense of B+C), which represents the primary-market ticket buyers who do not sell on the secondary market. This thus reduces the combined area of B+C, but does not change A. As a result, the secondary market price p^s is pushed up higher than in the no-endowment case in order to clear the secondary market: the price p^s that equalizes the unchanged area A to the reduced B+C is higher.

4 Data

Having laid out a model that uses fairness considerations to explain primary-market underpricing, we now turn to the empirical part of the paper, starting with a description of our data. We conducted two kinds of surveys to study the secondary ticket market. The first type consisted of interviewing large samples of fans in randomly selected seats at two major concerts. The second consisted of interviewing a smaller number of randomly selected attendants at 28 concerts that were selected to be nationally representative. We describe each survey below.

4.1 Superstar concerts surveys

The first survey, which is discussed in Connolly & Krueger (2006), was conducted at a *Bruce Springsteen and the E Street Band* concert that was part of "The Rising" tour at the First Union Center (now Wachovia Center) in Philadelphia on October 6, 2002. The second survey was conducted at a *U2* concert part of the "Vertigo" tour at the Madison Square Garden in New York City on November 22, 2005. For both surveys, the samples consisted of a stratified random cluster sample of seats (a seating section), and people were interviewed shortly before the start of the

show. Lower-tier sections were over sampled for the Springsteen concert, and weights were developed to adjust for the over sampling. For *U2*, sections were selected in proportion to representation in the venue, so the sample is self-weighting. 858 fans were interviewed at the Springsteen concert and 903 at the *U2* concert. Although it was not possible to compute a response rate, compliance with interview requests was very high.

4.2 National Concerts Survey

For the national survey, data were collected during late summer and early fall of 2006. A large concert promoter provided us with a complete listing of all the shows under contract between August 6, 2006, and October 27, 2006. This universe represented a total of 1,068 shows and almost 300,000 tickets. For each week, three shows were selected at random with probability proportional to venue capacity, giving the shows in larger venues a higher probability of selection. Weights were developed to make the sample representative of all concert attendees over the sampled months (see Appendix B). At each selected show, concertgoers in random sections of the venue and the concession stands were surveyed. The venues supplied four fan ambassadors or ushers to conduct the interviews. The Princeton Survey Research Center trained the interviewers and selected random sections of the venue. A total of 3,281 attendants at 28 shows were interviewed. (Two concerts were dropped for administrative reasons.) The sample size varied from 16 to 211 fans per show, with a mean of 141 and a standard deviation of 46.

Questions were asked about how the person obtained his or her ticket, the specific website if purchased over the internet, the price of the ticket, the reason for buying on the secondary market (if applicable), when the ticket was bought and the seat location. Additional questions regarding ancillary spending, how much the respondent liked the lead band and a specific question about the endowment effect (more on this in subsection 5.3) were also asked. Basic demographics were covered (age, gender, occupation). The questionnaires for the superstars' concerts surveys were similar, albeit with less detail on ancillary spending.

The questionnaires for the national and the superstar surveys are reproduced in Appendices C and D.[4] As long as seat location was specified, we were able to match the respondent with the face value and associated fees of his or her ticket, thus providing us with a list price on top of the actual price paid.

5 Findings

5.1 Summary statistics and size of secondary market

We start by addressing our first question: how big is the secondary market for concert tickets in the United States? Table 1 shows summary statistics for the *Bruce Springsteen* concert, the *U2* concert and the national survey. Firstly, we computed the resale rates, i.e. the percentage of tickets sold on the secondary market. Due to a low response rate to the source of ticket question, the resale rate was calculated using the price paid for a ticket for the superstars' survey. A ticket was deemed resold if the price paid was at least 20% above face value. This was not necessary for the nationwide survey, for which the resale rate was computed based on the source of the ticket. Over all concerts, we find that 10% of tickets were bought on the secondary market in our nationwide survey, which is significantly less than the rates hovering around 30% in the superstars' surveys. Next, we look at the prices paid. In the nationwide survey, the average (median) ticket was listed at $81 ($74), and the overall average (median) price paid for a ticket was $88 ($86).[5] Tickets bought from resellers were paid on average $122, and had an average list price of $91, consistent with the hypothesis that more of the better, pricier seats were resold. The secondary market mark-up, computed as the percentage above list price at which a ticket was purchased, is also significantly lower in the nationwide survey than in the superstar survey,

[4] The version included here is Version A. Two versions were printed and randomly assigned. The difference between the two is question 6 (national) or 5 (superstar), which relates to the endowment effect. More on this in subsection 5.3.

[5] There might have been some confusion with respect to the inclusion of the various fees in the price reported. All averages exclude prices of 0, considered as gifts or comped tickets.

with an average mark-up of 36% nationwide vs. 240% at the *Bruce Springsteen* concert and 145% at the *U2* concert. All these summary statistics are consistent with the findings of Leslie and Sorensen (2014), who use data from Ticketmaster, StubHub and eBay regarding 56 concerts during the summer of 2004. They find a resale rate of 4.96%, which is half what we find but their data only cover two outlets for resold tickets. Their price figures line up surprisingly well with ours: they find an average price paid on the primary market of $81, an average resale price of $113 for an average mark-up of 41%, and an average list price of resold tickets of $90.

We now have all the data necessary to estimate the size of the secondary market for concert tickets. With 10% of the tickets being resold, and an average resale price 51% higher than the average list price ($122/$81), we estimate the size of the secondary market to be about 15% that of the primary market. Pollstar, a trade publication of the performance industry, estimates that North American concert ticket sales were $3.6 billion in 2006. Including fees raises the market to about $4 billion, which would suggest that the secondary market was about $600 million. This also suggests that in 2006 artists were leaving around $200 million on the table in extra revenues, a considerable sum that was captured by resellers on the market. According to our model of section 3, these $200 million correspond to the amount of loyalty penalty that the fans impose on the bands, or the value of the gouging aversion that is internalized by the promoters when pricing their tickets on the primary market. We note that these are averages and that they mask considerable heterogeneity across artists and events. Resale rates for individual concerts in our national survey range from 0% to 24%, and average mark-ups from -37% to 155%. Figures from our superstars' surveys suggest that a small number of very popular artists might be "paying" a lot more to "buy" the loyalty of their fans and that a glut of less popular artists are less affected.

	Bruce Springsteen **(Oct. 2002)**	***U2*** **(Nov. 2005)**	**Nationwide Survey (Aug.–Oct. 2006)**
Resale Rate[1]	28.1 %	36.9 %	9.9 %
Source of Tickets			
Primary Market[2]	55.5 %	25.8 %	78.1 %
Ticketmaster, Promoter and Box Office	*55.5 %*	*25.1 %*	*73.9 %*
Fan Club	—	*0.7 %*	*4.2 %*
Secondary Market	25.2 %	30.7 %	9.4 %
Ticket Broker	*15.1 %*	*2.0 %*	*3.4 %*
Internet	*8.5 %*	*28.0 %*	*4.4 %*
Scalper	*1.6 %*	*0.7 %*	*1.7 %*
Unknown/Comped	19.3 %	43.5 %[6]	12.5 %
Average List Price	$75	$114	$81
Average Price Paid[3]	$137	$169	$88
Average Resale Price[4]	$255	$235	$122
Average List Price of Resold Tickets	$75	$97	$91
Average Mark-up[5]	240 %	145 %	36 %
Median Mark-up[5]	220 %	93 %	4 %
N	858	903	3,281

Table 1: Summary statistics, superstar events and nationwide survey

Note: Data from the *Bruce Springsteen* column were collected at the First Union Centre in Philadelphia on October 6, 2002 at a *Bruce Springsteen and the E Street Band* concert part of "The Rising" tour. Data from the *U2* column were collected at Madison Square Garden in New York City on November 22, 2005 during a *U2* concert part of the "Vertigo" tour. *Bruce Springsteen* results are weighted using sample weights. Data for *U2* are self-weighted. See Data section for details on the nationwide survey. Weighted by sample weights.

[1] For the *Bruce Springsteen* and *U2* data, a ticket is deemed resold if the price paid is 20% or more above the list price. For the nationwide survey, the source of the ticket was used.

[2] Respondents who said they obtained their ticket through a friend were assigned friend's method.

[3] Average of price paid for all tickets, excluding zero prices.

[4] Average of price paid for tickets bought on the secondary market, excluding zero prices.

[5] Mark-up is computed as the ratio of the price paid for a ticket in the secondary market relative to its list price, minus one, times 100.

[6] For the *U2* data, 37.9% are missing for the source of ticket. There are however less than 6% missing for the price paid data.

5.2 Additional statistics on the secondary market

Next, we delve deeper into our national survey results and report a series of highlights from our findings. Table 2 presents information on the source of tickets for respondents to our nationwide survey, and table 3 focuses on the secondary-market sources. The market share of scalpers (usually selling at the venue the day of the show) is half that of ticket brokers (online and over the phone/in person combined), who often advertise their tickets on the internet and sell through their websites. Of the tickets bought on the secondary market, eBay and online ticket brokers each account for about 20% of the market. The Herfindahl-Hirschman index (a measure of industry competition and market concentration) for the secondary market is 1,568, indicating moderate concentration.[6] The market is quickly changing however, and those market shares have probably changed since 2006. Since then, TicketsNow has been acquired by Ticketmaster (but for now continues to operate as an independent subsidiary), eBay bought StubHub (they also still operate separately but cross-list their tickets), and Ticketmaster has launched its own TicketExchange program, providing an exchange platform for customers to buy or sell tickets.

Source of tickets	Percentage
Ticketmaster	56.5 %
Promoter	10.0 %
Box office	7.4 %
Fan club	4.2 %
Comped/won	6.5 %
Secondary market	9.4 %
Unknown	6.0 %

Table 2: Source of tickets, nationwide survey

Note: Sample size is 3,281. The 28% of respondents who said they obtained their ticket through a friend were assigned friend's method. Weighted by sample weights.

[6] The Herfindahl-Hirschman index is computed as $H = \sum_{i=1}^{n} s_i^2 = 1568$, where s denotes the market share (in percentage) of a given seller.

Source of tickets (secondary market)	Percentage
Ticket broker (online)	19.7 %
eBay	19.5 %
Scalper	17.5 %
Ticket broker (phone/person)	16.4 %
StubHub	11.8 %
TicketsNow	7.1 %
Craigslist	4.7 %
Razorgator	3.5 %

Table 3: Source of tickets on secondary market, nationwide survey

Note: Sample size is 303. The 28% of respondents who said they obtained their ticket through a friend were assigned friend's method. Weighted by sample weights.

Reason	Percentage
Could get better seats from reseller	50.6 %
Ticketmaster had sold out	14.1 %
Was unsure of ability to attend	11.7 %
Tickets were cheaper than Ticketmaster	8.2 %
Other	15.4 %

Table 4: Reported reason for secondary market purchase, nationwide survey

Note: Answer to the question "If purchased from a secondary seller (e.g. StubHub, eBay, Scalper …), why?" Sample size is 183. Weighted by sample weights.

Table 4 reports the reasons for buying a ticket on the secondary market cited by concertgoers who bought from a reseller. Only 11.7% report being unsure of their ability to attend, providing little direct support for Courty's (2003) model, where the high-value "executive" fans wait until the last minute to buy their seats. The main reason is by far that the respondent could get better seats from the reseller, cited by 51% of the respondents. This is consistent with the findings illustrated in Figure 3, that the resale rate is higher for higher-priced seats. Only 3.3% of the lower-tier tickets are resold, compared with 12.3% of the top-tier seats. Second, but with only 14% of the responses, comes "Ticketmaster had sold out," leading us to believe that even when a

show is not sold out, some fans might want to turn to the secondary market to find good seats.[7] Figure 4 shows that the resale rate increases with the capacity utilization, sold-out or nearly sold-out shows having a higher resale rate. This finding is inconsistent with Cheung's (1977) model which predicts that sold-out shows should feature less underpricing—hence less resale

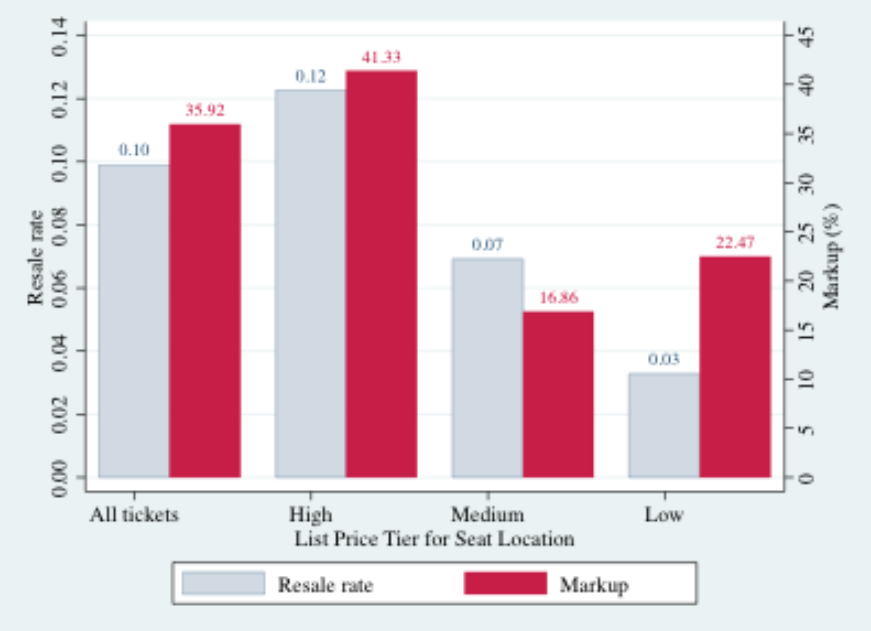

Figure 3: Resale rate and mark-up by list price tier, nationwide survey

Note: Mark-up is computed as the ratio of the price paid for a ticket in the secondary market relative to its list price, minus one, times 100. Weighted by sample weights.

[7] We acknowledge that these answers may not be mutually exclusive. For example, someone may have answered that they could get better seats from reseller, but this could be linked to their uncertainty about their ability to attend: deciding at the last minute may have lead them to only getting good seats through a reseller. Thus, the empirical support to theoretical models should be taken with a grain of salt.

Figure 3 also shows the average mark-up by list price tier. Not only are the best seats more resold, but their premiums over list price are twice that of medium- or low-quality seats. Note that most concerts feature only a limited number of primary-market prices. In our sample, 5 concerts (out of 28) have a unique price, 3 have two list prices, 11 (or 39%) have three, 7 have four and 2 have five distinct prices. A lot of these concerts are in amphitheatres where there is a lawn section, accounting for one of the price levels. We define the first price tier as being tickets in the most expensive category. The second price tier corresponds to tickets in the second most expensive category, and the third tier to the rest of the tickets. While not corresponding exactly to seat quality, we use price tier as a proxy for seat quality, but we acknowledge that quality varies not only between tiers but also within tiers. Note also that our findings are robust to the exclusion of concerts where there is only one price category.

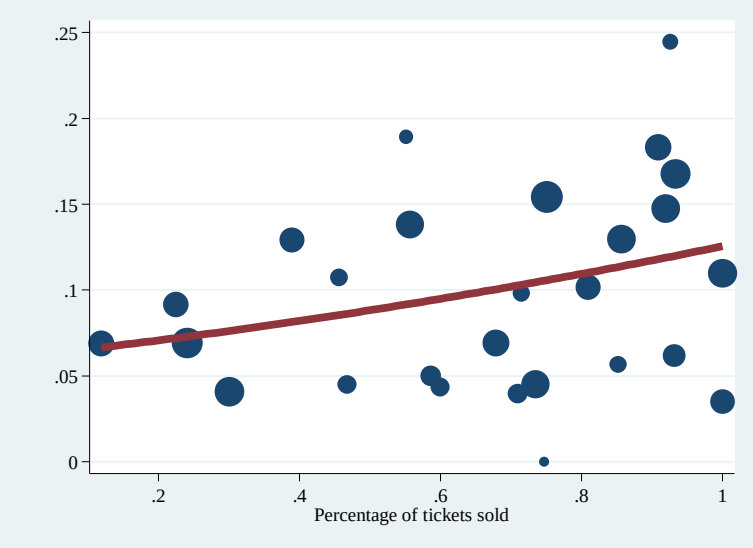

Figure 4: Resale rate and percentage of tickets sold, nationwide survey

Note: Each circle represents one concert and size of circle is proportional to the number of survey respondents. Dark line represents a quadratic fit.

Figure 5 shows the distribution of the primary market prices (by looking at the list price of each ticket) vs. that of the secondary market prices. The secondary market shows more dispersion and a much longer right tail, even when the top 1% of the secondary-market prices are trimmed.

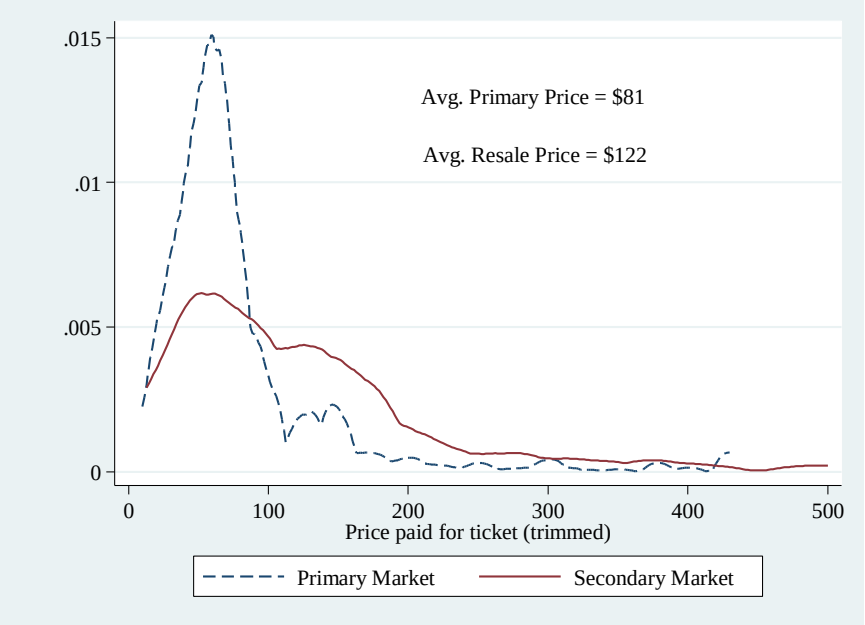

Figure 5: Ticket price dispersion in primary and secondary Markets, nationwide survey

Note: Top and bottom 1% of prices trimmed. Weighted by sample weights. Kernel density computed using Epanechnikov kernel.

Figures 6a and 6b show the empirical cumulative distribution functions of the prices paid on the primary market and secondary market, first for the best seats (price tier 1, Figure 6a) and then for the other seats (price tiers 2 and 3 combined, Figure 6b). Both figures echo the densities of Figure 5: the prices on the primary market are less dispersed than those on the secondary market.

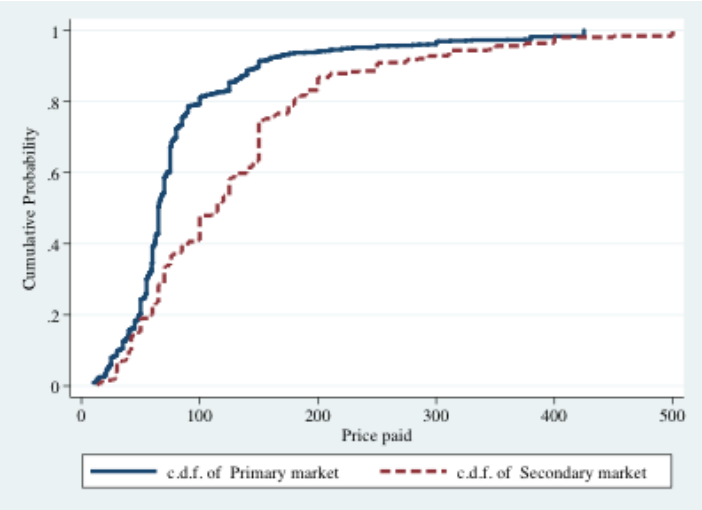

Figure 6a: Cumulative distribution functions of prices paid on primary and secondary market for price tier 1 tickets, nationwide survey

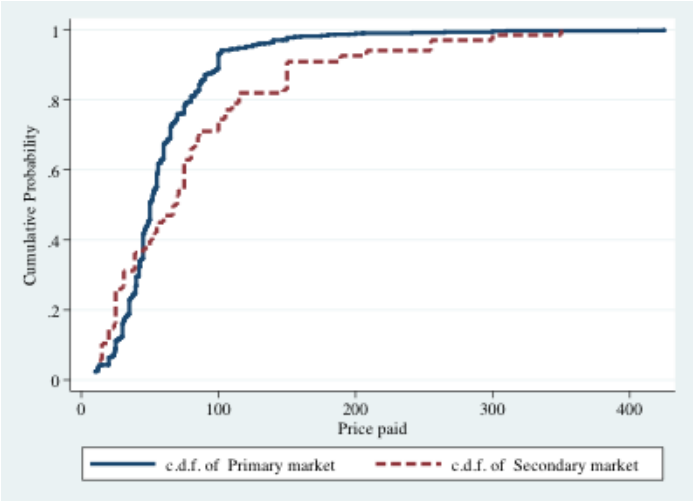

Figure 6b: Cumulative distribution functions of prices paid on primary and secondary market for price tiers 2 and 3 tickets, nationwide survey

Note: Top and bottom 1% of prices trimmed. Weighted by sample weights.

The new element that is apparent from comparing 6a to 6b is that for the best seats, the whole distribution of the primary market is to the left of that of the secondary market, showing resale prices are, on the whole, above list prices for the higher-priced tickets. For the lower-priced tickets (Figure 6b), the two cumulative distribution functions cross at around 35% of cumulative probability. This tells us that for low-quality seats around a third of the distribution of secondary-market ticket prices falls below the primary-market price distribution.

Figures 7a and 7b investigate the timing of ticket purchases by price tier, first for primary-market sales (Figure 7a) and then for secondary-market sales (Figure 7b). On the primary market, the sales patterns for price tier 1 and price tiers 2 and 3 are similar: a clear majority (44 to 53%) of tickets are bought more than two months before the concert, most likely at the initial on sale and the days following it. Sales subsequently go down, to reach about 10% in the final weeks leading up to the concert. On the secondary market, sales are much flatter over time and exhibit slightly different patterns by price tier. Over a quarter of the resale for the best seats happens more than two months before the show, whereas less than 18% of the lower-priced seats resale does. Resale hits a low point two to four weeks before the concert, but sales then pick up in the last couple of weeks for all seat qualities. A quarter of all resale for lower-priced tickets occurs on the day of the concert, as does just above 20% of the resale for price tier 1 tickets.

Figures 8a and 8b show how the secondary-market mark-up and the resale rate evolve as the concert date approaches (this time for all price tiers combined). We find that the secondary-market mark-up decreases as the date approaches, becoming negative the day of the concert, and that the resale rate increases. The first finding does not lend direct support to Courty's model, in which the last-minute high-value fans would drive up the price of the tickets and is consistent with the declining-price anomaly found in auctions (McAfee & Vincent 1993). These figures highlight the dynamic nature of the market for concert tickets and the perishable quality of a ticket: once the show is over a ticket loses all value. As they get closer to the show, resellers still in the possession of tickets

will be willing to lower their price to unload them before the show starts, thus clearing the market at an ever-lower price. This downward pressure on prices as the show approaches could counter the increase in mark-up predicted by Courty's model, even as the busy professionals drive up the resale rate. A deeper analysis would be needed to definitively evaluate Courty's model.

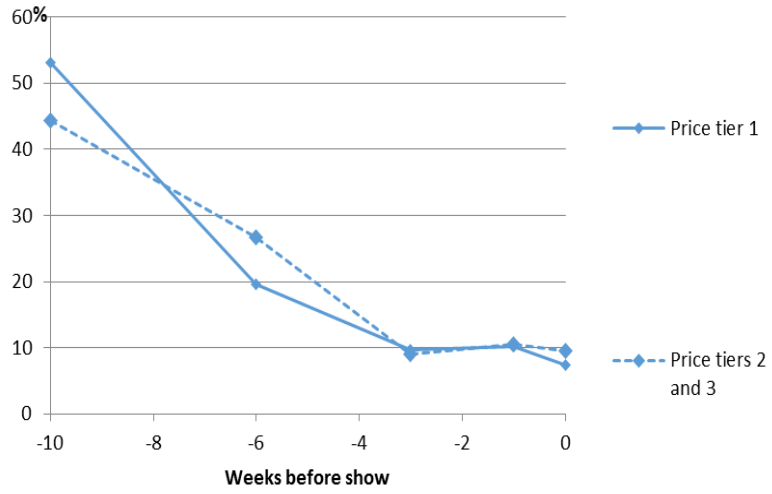

Figure 7a: Distribution of when primary-market tickets were bought by list price tier, nationwide survey

Note: Sample size is 2,017. Weighted by sample weights.

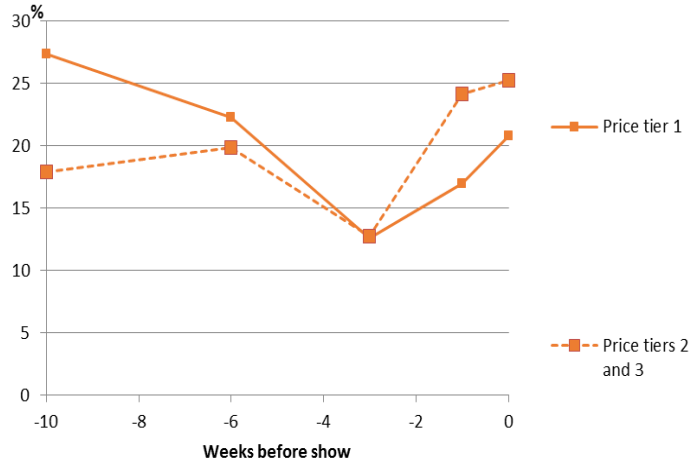

Figure 7b: Distribution of when secondary-market tickets were bought by list price tier, nationwide survey

Note: Sample size is 235. Weighted by sample weights.

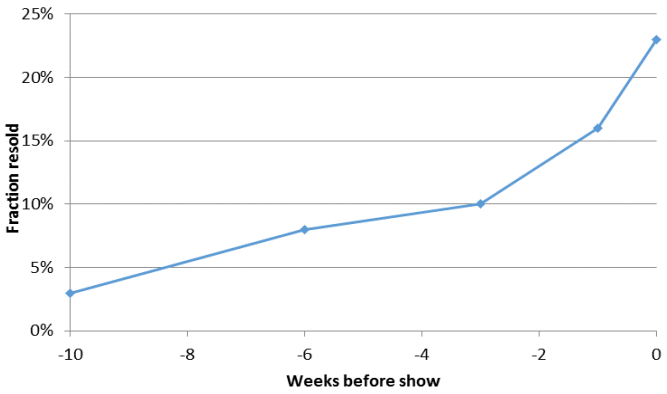

Figure 8a: Fraction of tickets resold by when ticket was bought, nationwide survey

Note: Sample size is 2,885. Weighted by sample weights. Fraction resold is computed by taking all tickets sold a given number of weeks before show and asking what fraction of those tickets was resold.

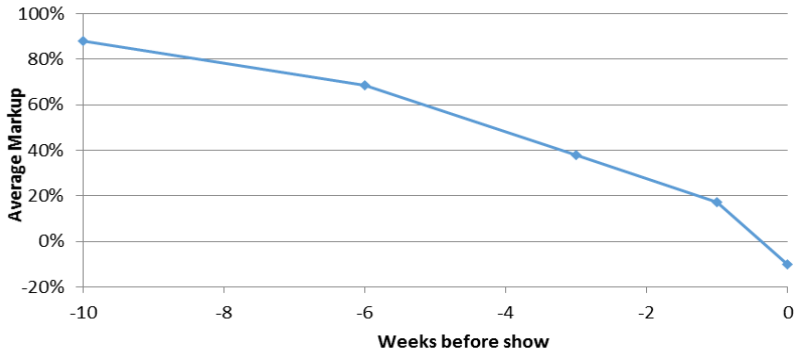

Figure 8b: Secondary market mark-up by when ticket was bought, nationwide survey

Note: Mark-up is computed as the ratio of the price paid for a ticket in the secondary market relative to its list price, minus one, times 100. Sample size is 266. Weighted by sample weights.

In Table 5 we investigate the price differentials between different reselling outlets for tickets bought on the secondary market. To do so, we estimated regressions of the natural logarithm of the price paid on the secondary market for a ticket on source dummies (excluding tickets given as gifts or comped which have a price paid of zero). The different columns in table 5 report the coefficients for the baseline regression and those incorporating controls like the number of weeks in advance of the show that the ticket was bought and show and price level dummies. The biggest secondary-market source, eBay, is the omitted category. We find that scalpers charge a significantly lower price than eBay, ranging from a 19% to 61% discount. It is interesting that this scalper discount still holds when controlling for when the ticket was bought, given that scalping activity is concentrated on the day of the concert. Also, at a discount (compared to eBay) are tickets bought on Craigslist, though the point estimates are not statistically significant due to the small sample size. Results for tickets bought from a ticket broker over the phone or in person are not conclusive, and those for tickets bought on the websites Razorgator and TicketsNow show a positive premium ranging from 9% (but not significant) to a statistically significant 36%.

Explanatory variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
Number of weeks before show that ticket was bought[1]	—	0.033	0.025	0.030	0.021
		(0.013)	(0.013)	(0.012)	(0.012)
Source of Ticket					
Scalper	-0.605	-0.529	-0.192	-0.572	-0.344
	(0.158)	(0.159)	(0.160)	(0.144)	(0.144)
Craigslist	-0.243	-0.216	-0.210	-0.251	-0.126
	(0.260)	(0.257)	(0.257)	(0.232)	(0.226)
eBay	*Base group*	*Base group*	*Base group*	*Base group*	*Base group*
Ticket broker (Phone/Person)	-0.210	-0.223	0.178	-0.135	0.142
	(0.165)	(0.163)	(0.167)	(0.151)	(0.152)
Razorgator and TicketsNow	0.333	0.216	0.497	0.087	0.361
	(0.183)	(0.186)	(0.185)	(0.170)	(0.167)
Ticket broker (Online)	0.248	0.161	0.602	0.065	0.416
	(0.157)	(0.158)	(0.165)	(0.146)	(0.153)
StubHub	0.465	0.413	0.649	0.258	0.524
	(0.172)	(0.171)	(0.171)	(0.157)	(0.155)
List price level[2]					
Level 1	—	—	—	*Base group*	*Base group*
Level 2	—	—	—	-0.585	-0.585
				(0.106)	(0.110)
Level 3	—	—	—	-1.249	-1.443
				(0.264)	(0.277)
Level 4	—	—	—	-0.031	0.129
				(0.303)	(0.299)
Level 5	—	—	—	-0.831	-1.340
				(0.500)	(0.681)
F-test of the joint significance of the source of ticket dummies (p-value)	9.25 (0.00)	5.79 (0.00)	6.11 (0.00)	5.24 (0.00)	5.95 (0.00)
27 show dummies included	No	No	Yes	No	Yes
R-squared	0.23	0.25	0.49	0.41	0.62

Table 5: Price differentials for tickets bought on the secondary market, nationwide survey; dependent variable: Natural logarithm of price paid for ticket

Note: Only those tickets that were bought on the secondary market and for which source is known are used in this regression. Weighted by sample weights. Standard errors in parentheses. Sample size is 197.

[1] This variable is constructed from the answer to the question "When did you purchase your ticket?"

[2] *Level 1* corresponds to tickets sold at the highest list price, *Level 2* the second-highest, and so on.

The one source consistently more expensive than eBay, even when controlling for list price level and thus seat quality to some extent, is StubHub, with premiums fetching up to 50–65% above eBay prices. Tickets on StubHub are sold via fixed price (though resellers using the platform can change their posted price) while eBay functions mostly via auctions, so our results could indicate a higher level of competition among resellers on eBay, which would induce lower prices. It could also be that StubHub prices act as an upper bound on auction-determined eBay prices: a consumer buying on StubHub has the certainty of obtaining the ticket for the (albeit higher) posted price, akin to using eBay's "Buy It Now" option. Put differently, nobody would buy a ticket in an auction at a price higher than the fixed price posted on StubHub (or other fixed-price listings). We did ask people who bought their tickets online whether it was through a fixed price or an auction. Of the concertgoers who bought on eBay, 78% did so through an auction. However, the inclusion of an auction dummy in our regressions does not change the estimated coefficients and does not itself have a statistically significant coefficient.

Table 6 presents various findings related to different survey questions. First, we asked respondents how much they were planning to spend on parking, souvenirs, and at the concession stands. We find that people who bought their ticket on the secondary market are also bigger spenders on souvenirs and concession stands. Given that they also paid more on average for their ticket, this could imply that the people who buy on the secondary market are wealthier and have more income to spend. It would be hard to argue however that they are also bigger fans: we asked concertgoers how many songs by the lead performer they owned, how much they liked the band on a scale of 1 to 5, and the average number of concerts attended in the past 12 months. None of these answers are statistically different between those who bought on the secondary market vs. those who did not.

	Source of Ticket		
	Primary Market	**Secondary Market**	**Statistical Difference[1] (p-value)**
Average amount spent on category of spending			
Parking	$4.21	$4.51	0.51
Souvenirs	$18.26	$24.73	0.00
Concessions	$27.69	$34.02	0.00
Total ancillary spending[2]	$49.84	$60.70	0.00
Average number of songs by performer owned[3]	24	22	0.19
Average answer to "How much do you like the lead band?"[4]	4.37	4.30	0.25
Average number of concerts attended in the past 12 months	4.7	5.3	0.35

Table 6: Answers to various questions, by whether ticket was bought on secondary market, nationwide survey

Note: Weighted by sample weights. Sample size varies by question asked (between 2,692 and 3,202).
[1] The number reported is the p-value of the statistical difference between the primary and secondary market.
[2] Average total spending is computed for individuals with non-missing information on all three spending categories and may not equal the sum of categorical averages.
[3] Answer to the question "How many songs of the lead band have you purchased? (on CD, or for your iPod or MP3 player)"
[4] The answer to that question was on a scale from 1 to 5, where 1 means "not at all," and 5 means "very much."

5.3 Endowment effect

To study the endowment effect, we asked each respondent of the nationwide survey one of two questions: *"Would you have bought your ticket if it would have cost you $300?"* or *"If someone offered you $300 for your ticket, would you have sold it?"* The questionnaire versions were randomly distributed across all respondents. Without an endowment effect, we would expect to see the proportion of respondents say-

ing "Yes" to the buying question to be equal to that of respondents saying "No" to the selling question: if one is willing to buy for a given amount of money *x*, it implies that his valuation of the good is more than *x*. But if one is not willing to sell for *x*, it also implies that his valuation of the good is more than *x*. Thus, the two questions should be flip sides of one another.

Endowment Effect	***Bruce Springsteen* (October 2002)**			***U2* (November 2005)**			**Nationwide Survey (2006)**		
Would you have bought your ticket if it would have cost you $800?	**Yes** 9 %	**No** 91 %	**N** 382	**Yes** 6 %	**No** 94 %	**N** 220			
If someone offered you $800 for your ticket would you have sold it?	**Yes** 50 %	**No** 50 %	**N** 448	**Yes** 32 %	**No** 68 %	**N** 169			
Would you have bought your ticket if it would have cost you $300?				**Yes** 22 %	**No** 78 %	**N** 232	**Yes** 11 %	**No** 89 %	**N** 1,579
If someone offered you $300 for your ticket would you have sold it?				**Yes** 32 %	**No** 68 %	**N** 254	**Yes** 47 %	**No** 53 %	**N** 1,588

Table 7: Endowment Effect, *Bruce Springsteen*, *U2*, and Nationwide Sample of Concerts

Note: At the *Bruce Springsteen* concert and during the nationwide survey, two different versions of the surveys were distributed, each with one of the questions. At the *U2* concert, four versions were used: two per question but with two different amounts. Weighted by sample weights.

However, the buying question suggests that the good is not in the possession of the respondent, while the selling question insinuates that the respondent already has the good. In the presence of an endowment effect, the two questions do not elicit the same valuations anymore: once in a possession of a good (so when asked about selling the ticket) individuals tend to value a good more, even when the value is trivial or the good not particularly useful, such as a souvenir mug (Kahneman *et al.*, 1990).

Our findings are reported in table 7 and are supportive of the presence of an endowment effect. 89% said they would not be willing to pay $300 for their ticket, indicating that their valuation of the ticket must be under $300, yet only 47% said they would have sold their ticket for $300. The same effect can be seen from concertgoers at the *Bruce Springsteen* and the *U2* concerts, to whom we asked similar questions but varying the reference amounts. As we argued in our model description, this endowment effect limits the supply to secondary market, thus driving prices further up.

6. Conclusion

The pricing of concert tickets and other entertainment events provides a challenge to standard economic models. We conducted surveys of fans at several concerts to learn more about the market for tickets. Rather than summarize our results, we conclude by interpreting our results in the context of two economic models.

The first model is standard: when consumers bear more risk for a product, in equilibrium they pay a lower price. This model seems to accord well with our findings on the price premium associated with the source of resold tickets. Tickets that are purchased from eBay or scalpers, which are likely regarded by fans to be the riskiest sources, are less expensive than tickets that are purchased from StubHub, Razorgator or TicketsNow, which provide some protection or recompense for fans who bought fraudulent tickets. Likewise, the tendency for prices to decline as the date of the concert approaches is also consistent with a risk pre-

mium, as the risk of not obtaining a ticket rises as the date of the show approaches. From the point of view of the reseller, the risk of not selling a ticket also increases the closer the time of the concert, thus the pressure to drop prices as time goes by.

Our second model concerns why tickets are systematically priced below their market-clearing level in the primary market. In particular, we find that list prices for the best seats in the venue are more likely to be resold and for a higher premium than the worst seats. Moreover, the secondary market is larger, and the resale premium higher, for superstar performers, who charge the highest prices and who tend to sell out in the primary market. These facts are hard to reconcile with previous models of the secondary market. For example, Cheung's (1977) ingenious model cannot explain why underpricing of the best seats and the resale rate would be higher for concerts that regularly sell out. The model we propose deviates from previous models in one main respect: there is a cost to performers if they are seen as gouging their fans. In the simplest view, fans' perceptions of the performers' dedication to fairness depend on the most visible indicator of the performers' (perceived or real) concern for equity: the price of the tickets. In this situation, demand depends on perceived fairness, and performers (and their agents) would choose to distribute the tickets at below their market price. Another implication of this model is that performers would bemoan the existence of the secondary market charging a higher price. Of course, they could eliminate the secondary market by marking to market, but they prefer not to that because they want to maintain their image of charging a fair price.

Another observation is that the Coase theorem implies that the primary market prices should be irrelevant for who attends concerts and the price that they pay because tickets should be redistributed to those who value them most highly. If tickets do accrue to those who are willing to pay the most for them, then performers cannot influence the price paid by those sitting in the audience. However, evidence that we present concerning the endowment effect suggests that fans who obtain

tickets in the primary market are very likely to hold on to them, even if they would not pay the secondary market price for those tickets.

Many of our findings relate to seat quality: best seats are most resold and for the highest mark-ups. Leslie & Sorensen (2014: 296) abound in the same direction: *"[m]uch of the observed resale activity in our data appears to be driven by unpriced seat quality."* Our simple model of primary- and secondary-market pricing introduced a fairness constraint but stayed away from quality considerations. We believe a more complete model—and an interesting avenue for future research—would feature seat quality as well as capacity constraints, and in particular capacity for good seats: there will always be only one first row. Our model featured one type of heterogeneity: consumers varied according to their willingness to pay and their gouging aversion. Additional heterogeneity could be introduced at the artist level: some performers may be more sensitive than others to their fans' demand for fairness. Particular attention should also be paid to the allocation mechanisms in the primary and secondary markets: if there is excess demand, who gets the tickets? This could also allow for the endogeneity of presence of the resellers and their effort, as in Leslie & Sorensen (2014).

Finally, three developments in ticketing have the potentially to severely cut into the secondary market. Firstly, although the underpricing of good seats is systematic, it appears to be gradually eroding. Krueger (2005) documents that the price of tickets has been rising faster than the overall inflation, especially since the mid-1990s, and especially for the most expensive tickets, and Pollstar Box Office data suggest that this trend has continued. Krueger argues that technological change that has weakened the complementarity between concert attendance and record sales accounts for the rapid rise in concert tickets. As the concert industry moves from a provider of social events to a commodity market, we expect that the social constraint faced by the artists and promoters will lose its power, enabling them to extract more of the high-value consumer surplus by raising the price of the good seats. Note that this could also be done while simultaneously lowering the price of the rest of the

seats, possibly leading to an increase in profits simply by fine-tuning the level of price discrimination by seat quality in the venue.

Secondly, a handful of artists, including Bruce Springsteen, have experimented with "Verified Fan" to distribute tickets. Under this procedure, prospective customers register and apply for tickets. Ticketmaster then evaluates the applicants to ensure that they are not scalpers; for example, by ensuring that they have not applied for an inordinate number of tickets. A lottery or other procedure (loyalty points) is used to allocate tickets to the verified fans. Recipients can resell their tickets, but only to another verified fan. In essence, this procedure ensures that fans receive the surplus from underpriced tickets, essentially by turning fans into scalpers.

A third development is "Garth Mode", so named after Garth Brooks, who has pioneered the approach. In his last tour, Brooks set a below-market price of around $70 for every ticket. Faced with excess demand, together with Ticketmaster and Live Nation, he continually added more shows in each city until the market was saturated at his fixed price. Although the market cleared without scalpers being able to take advantage of arbitrage opportunities because Brooks increased supply to satisfy demand, this placed a heavy burden on Brooks. He often performed two or even three shows in a day. In economic terms, Brooks was off his supply curve and did not maximize utility or income, which is a reason why other superstars may be reluctant to follow Garth Mode.

7 Appendices

Appendix A: Model Resolution

This appendix contains details on the resolution of various parts of the model.

A1. Market demand

For ease of exposition, write the α parameter as being a draw from the random variable *X* uniformly distributed between 0 and 1 and denote primary market price *p* for now.

The market demand is $Q^M(p) = 1 - F^{\alpha}(p) = \int_0^1 dx 1_{\{x>p\}}(x)$, where $1_{\{x>p\}}(x)$ is a function on $\{(x)\in[0,1]\}$ equal to 1 if $x > p$, and 0 elsewhere. $Q^M(p) = 1 - F^{\alpha}(p) = \int_p^1 dx = 1 - p$. Inverse demand is $p^M(Q) = 1 - Q$. Marginal revenue is $MR(Q) = p(Q) + p'(Q)Q = (1 - Q) - Q = 1 - 2Q$.

A2. Primary market: band demand

For ease of exposition, write the α parameter as being a draw from the random variable *X* as above and the γ parameter as being a draw from the random variable *Y*, both uniformly distributed between 0 and 1 and independent of each other.

Market demand for the band is $Q^B(p) = 1 - F^{\alpha/(1+\gamma)}(p) = 1 - F^{\alpha/(1+\gamma)}(p) = \int_0^1\int_0^1 dxdy 1_{\{x/(1+y)>p\}}(x,y)$, where $1_{\{x/(1+y)>p\}}(x,y)$ is a function on $\{(x,y)\in[0,1]\times[0,1]\}$ equal to 1 if $x / (1 + y) > p$, and 0 elsewhere. The cdf $F^{\alpha/(1+\gamma)}$ will depend on the value of *p*, and will have two sections, one when *p* is under ½ and one when *p* is above ½.

For $p \leq 1/2$, the region where $1_{\{x/(1+y)>p\}}(x,y)$ is 1 is when $p(1+y) \leq x \leq 1$ and $0 \leq y \leq 1$.

For $p \geq 1/2$, the region where $1_{\{x/(1+y)>p\}}(x,y)$ is 1 is when $p(1+y) \leq x \leq 1$ and $0 \leq y \leq \frac{1}{p} - 1$.

Thus for $p \leq ½$, $Q^B(p)$ = $1 - F^{\alpha/(1+\gamma)}(p) = \int_0^1 \int_{p(1+y)}^1 dxdy = \int_0^1 (1 - p - py)\,dy = 1 - \frac{3}{2}p$.

For $p \geq ½$, $Q^B(p)$ = $1 - F^{\alpha/(1+\gamma)}(p) = \int_0^{\frac{1}{p}-1} \int_{p(1+y)}^1 dxdy = \int_0^{\frac{1}{p}-1} (1 - p - py)\,dy = \frac{1}{2}\left(\frac{1}{p} + p\right) - 1$.

Inverse demand when $Q \geq ¼$ ($p \leq ½$) is $pB(Q) = 2/3\,(1 - Q)$.

When $Q \leq ¼$ ($p \geq ½$), $pB(Q) = 1 + Q - \sqrt{(1+Q)^2 - 1}$.

Marginal revenue is $MR(Q) = p(Q) + p'(Q)Q$. When $Q \geq ¼$ ($p \leq ½$), $MR(Q) = 2/3\,(1 - Q) - 2/3\,Q = 2/3\,(1 - 2Q)$.

When $Q \leq ¼$ ($p \geq ½$), $MR(Q)$ = $1 + Q - \sqrt{(1+Q)^2 - 1} + \left(1 - \frac{1+Q}{\sqrt{(1+Q)^2 - 1}}\right)Q$.

A3. Secondary market

A3.1. Who sells? (supply to secondary market)

Solution:

When $p^p < ½$ and $p^p + p^s < 1$, the quantity sold (i.e. the proportion of the people willing to sell their ticket) is equal to Prob($(1 + \gamma_i)\ p^p < \alpha_i < p^s + \gamma_i\ p^p$) = Prob(selling) = $\left(p^s - p^p\right)$.

When $p^p < ½$ and $p^p + p^s > 1$ but $p^s < 1$, Prob(selling) = $\left(p^s - p^p\right) - \frac{1}{2p^p}\left(p^p + p^s - 1\right)^2$.

When $p^p < ½$ and $p^p + p^s > 1$ and also $p^s > 1$, Prob(selling) = $1 - \frac{3}{2}p^p$, that is every one with a ticket would like to sell it.

When $p^p > ½$, as long as $p^s < 1$, Prob(selling) = $\frac{1}{2}\left(\frac{1}{p^p} + p^p\right) - 1 - \frac{1}{2p^p}\left(1 - p^s\right)^2$.

When $p^p > ½$ and $p^s > 1$, Prob(selling) = $\frac{1}{2}\left(\frac{1}{p^p} + p^p\right) - 1$, that is every one with a ticket would want to sell it.

A3.2. Who buys? (demand on secondary market)

Solution:

When $p^p < ½$, the quantity people are willing to buy on the secondary market will be 0 if $p^s > 2\ p^p$, and if $p^s < 2\ p^p$, it will be Prob($p^s < \alpha_i < (1 + \gamma_i)\ p^p$) = Prob(buying) = $2p^p - 2p^s + \frac{\left(p^s\right)^2}{2p^p}$.

When $p^p > ½$, as long as $p^s < 1$, Prob(buying) = $\left(2 - \frac{1}{p^p}\right)\left(1 - p^s\right) + \frac{1}{2p^p}\left(1 - p^s\right)^2$.

When $p^p > ½$ and $p^s > 1$, Prob(buying) = 0 since nobody values a ticket at more than 1.

A3.3. Secondary market equilibrium

Solution:
When $p^p < ½$, the condition $p^p + p^s < 1$ will be respected for p^p up to $11/25$, and p^s will be $p^p (3 - \sqrt{3})$.
When $p^p > 11/25$, we switch to the $p^p + p^s > 1$ case and $p^s = \frac{1}{2} + p^p - \frac{1}{2}\sqrt{-10\left(p^p\right)^2 + 8p^p - 1}$.

When $p^p > ½$, as long as $p^s < 1$, we find that $p^s = \frac{1}{2} + p^p - \frac{1}{2}\sqrt{6\left(p^p\right)^2 - 8p^p + 3}$.

Appendix B: Weights for the national survey

Within each concert, the probability of being interviewed is 1/ N_c , where N_c is the number of fans in attendance. The weights are the inverse of the sample size time probability of being interviewed:

$$w_c = \frac{1}{n_c * 1/N_c} = \frac{N_c}{n_c},$$

where w_c is the weight associated with each respondent within concert c, N_c is the attendance at concert c, and n_c is the sample size collected at concert c.

The weight for a given concert within a certain week is the inverse of the capacity for the venue over the total number of seats for the whole week (the sum of all capacities for the shows that week):

$$w_{cwk} = \frac{1}{N'_c / \sum_{c \in wk} N'_c} = \frac{\sum_{c \in wk} N'_c}{N'_c},$$

where w_{cwk} is the weight associated with concert c in week wk, and N'_c is the capacity of the venue for concert c.

The final weight w is the product of these two weights, w_c and w_{cwk}:

$$w = w_c * w_{cwk} = \frac{N_c}{n_c} * \frac{\sum_{c \in wk} N'_c}{N'_c}.$$

Appendix C: Questionnaire for the national survey (Version A)

1. **How did YOU obtain your ticket for tonight's concert?** *(Check one)*
   ☐ Ticketmaster ☐ LiveNation.com ☐ Box Office ☐ Scalper ☐ Friend ☐ WEB/Internet
   ☐ Ticket Broker (Online) ☐ Ticket Broker (Phone or in person) ☐ Other (*Specify:* _____)

1a. **If from a FRIEND, how did the friend obtain the ticket?** *(Check one)*
   ☐ Ticketmaster ☐ LiveNation.com ☐ Box Office ☐ Scalper ☐ Friend ☐ WEB/Internet
   ☐ Ticket Broker (Online) ☐ Ticket Broker (Phone or in person) ☐ Other (*Specify:* _____)

2. **If purchased over the Internet, was it** ☐ Auction ☐ Fixed price

2a. **If purchased over the internet, was it**
   ☐ Ticketmaster ☐ LiveNation.com ☐ Razorgator ☐ Ticketsnow ☐ Ticket Broker
   ☐ Stubhub ☐ eBay ☐ CraigsList ☐ Other (*Specify:* _____)

3. **How much did YOU (or someone else) pay for your ticket?** *(Including all fees)* $ _____

4. **If purchased from a secondary seller (e.g. Stubhub, eBay, Scalper…), why?** *(Check all that apply)*
   ☐ Ticketmaster had sold out ☐ Could get better seats from reseller
   ☐ Tickets were cheaper than Ticketmaster ☐ Was unsure of ability to attend
   ☐ Other (*Specify:* _____)

5. **Did you sell any tickets to tonight's show?** ☐ No ☐ Yes, at face value or less ☐ Yes, above face value

6. **If someone offered you $300 for your ticket would you have sold it?** ☐ Yes ☐ No

7. **When did you purchase your ticket?**
   ☐ On the first day of sale ☐ More than 2 months ago ☐ 1 to 2 months ago ☐ 2 to 4 weeks ago
   ☐ Last week ☐ Today ☐ Other (*Specify:* _____)

8. **How much do you like the lead band?** *(Circle one)* 1 (Not at all) 2 3 4 5 (Very much)

9. **About how many songs of the lead band have you purchased?** *(on CD, or for your iPod or MP3 player)*
   ☐ None ☐ 1 – 12 ☐ 13-24 ☐ 25-50 ☐ 51-100 ☐ Over 100

10. **How much do you think you will spend at the concession stand today?** $ _____

11. **How much do you think you will spend on souvenirs?** $ _____

12. **How long did it take you to get to this event?** *(From departure place to venue entrance)*
   ☐ Less than 15 minutes ☐ 15 – 30 minutes ☐ 31 – 60 minutes ☐ 1 – 2 hours ☐ More than 2 hours

13. **How much did you spend on parking for today's show?** $ _____

14. **What is the location of your seat/ticket?** Section:_____ Row:_____ Seat #:_____

15. **How many concerts have you attended in the past 12 months?** _____

16. **What is your age?** _____

17. **Are you?** ☐ Male ☐ Female

18. **What is your occupation?**
   ☐ Professional ☐ Service ☐ Blue Collar ☐ Unemployed ☐ Home Maker ☐ Student ☐ Retired

Appendix D: Questionnaire for the superstar survey (U2 concert)

Princeton University Concert Survey — Version A1

1. How did you obtain your ticket for tonight's concert (check one)?	☐ Ticketmaster ☐ Box Office ☐ Scalper	☐ Friend ☐ WEB/Internet ☐ Ticket Broker (online)	☐ Ticket Broker (phone or in person) ☐ Other: _____
1a. If from a friend, how did the friend obtain the ticket (check one)?	☐ Ticketmaster ☐ Box Office ☐ Scalper	☐ Friend ☐ WEB/Internet ☐ Ticket Broker (online)	☐ Ticket Broker (phone or in person) ☐ Other: _____
2. If purchased over the internet, was it	☐ an auction	☐ fixed price	
2a. If purchased over the internet, was it	☐ Ticketsnow ☐ Stubhub	☐ Razorgator ☐ eBay	☐ Ticket broker ☐ Other_____
3. How much did YOU pay for your ticket (including all fees)?	$		
4. What is the location of your seat/ticket?	Section _____	Row _____	Seat # _____
5. If someone offered you $800 for your ticket would you have sold it?	☐ Yes	☐ No	
6. When did you purchase your ticket?	☐ Today ☐ Last week	☐ 2 to 4 weeks ago ☐ More than one month ago	
7. What is your age?	_____ years old		
8. Are you?	☐ Male	☐ Female	
9. What is your occupation?	_____		

Information about this survey:

This survey is being conducted by an economist at Princeton University in Princeton NJ. The purpose of the survey is to learn more about the re-sale market for concert tickets and the economics of ticket pricing.

The survey is voluntary. You do not have to participate. If there are any questions you do not wish to answer, you may skip over them.

The information you give us is strictly confidential and will not be used for any purpose other than research on ticket pricing.

If you have any questions about your rights as a participant in this study, please contact the Princeton University Institutional Review Board at (609) 258-3105 or by email at asylvest@princeton.edu

Note: the questionnaire for the Bruce Springsteen and the E Street Band concert was the same, except for the choices for answers to questions 1 and 1a, which grouped together the two ticket broker categories into one.

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