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Integration of Primary and Resale Platforms

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Abstract

Consumers can buy concert tickets from primary platforms (e.g., Ticketmaster) or from consumer-to-consumer resale platforms (e.g., StubHub). Recently, Ticketmaster has entered and been trying to control the resale market by prohibiting consumers from reselling on competing resale platforms. Several states in the United States have passed or are discussing laws requiring tickets to be transferrable on any resale sites, worrying that platform integration—Ticketmaster controlling both the primary and the resale platforms—will increase ticket service fees and harm musicians and consumers. This article establishes a game-theoretic framework and shows that the opposite can happen: platform integration can lower the service fees in both markets, alleviating double marginalization in the primary market and benefiting the musician and consumers. Moreover, with platform integration, the presence of a small number of scalpers can counterintuitively reduce the ticket price and benefit the musicians and consumers. In addition, platform competition in the resale market may harm consumers. This article further shows that these insights apply in other markets (e.g. used goods, peer-to-peer product-sharing markets) and provides suggestive empirical support for the theoretical results.

Keywords

antitrust, channel coordination, consumer welfare, event ticket, platform, regulation, resale, secondary market

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In 2017, the U.S. concert-ticket industry reached over $3 billion in revenue, with more than 20 million consumers having attended at least one concert.[1] Ticketmaster, with over 80% of the U.S. market share, is the dominant primary platform for concert tickets (Roberts 2013). Ticketmaster mainly profits from the service fees paid by ticket buyers. For example, it charged a $17.85 service fee for a $61 ticket of Justin Timberlake's *The Man of the Woods Tour* at Madison Square Garden. The peer-to-peer ticket resale market is also growing rapidly. StubHub, with over 50% share of the U.S. ticket-resale market, has seen a 30% growth rate in revenue in 2015 (Thomas 2016).

Over the past few years, Ticketmaster has expanded its business from the primary market to the resale market. In 2008, it acquired TicketsNow, an online ticket resale platform, for $265 million (Smith 2008). In 2013, Ticketmaster introduced its own "Fan-to-Fan" resale system, Ticketmaster Resale (formerly TM+). Musicians can enroll in Ticketmaster Resale to allow consumers to resell their tickets to other consumers on Ticketmaster. For concerts with Ticketmaster Resale, the primary and resale ticket availabilities are shown on the same seat map (for an example, see Figure 1). In 2014, Ticketmaster received $900 million from ticket resales (Ingham 2015). Moreover, Ticketmaster has been trying to extend its de facto monopoly in the primary market to the resale market by blocking other resale platforms. For example, after signing on as the exclusive resale partner of the Golden State Warriors (GSW) in 2012, Ticketmaster warned GSW season-ticket owners that their tickets would be revoked if resold outside Ticketmaster. Consequently, StubHub saw an 80% decrease in resale transactions of GSW season tickets (Dinzeo 2015). Ticketmaster also introduced the "Paperless Ticket" system (also known as "Credit Card Entry") for some events, which requires consumers to show the credit card used to buy the ticket and a photo ID to enter the concerts, making reselling through other resale platforms very difficult for consumers.[2] Consumers can still resell their paperless tickets through Ticketmaster because it can change the ticketholder's information in its own database.

[1] See https://www.statista.com/outlook/264/109/event-tickets/united-states#market-users.

[2] See https://www.ticketmaster.com/mileycyrus/faq.html.

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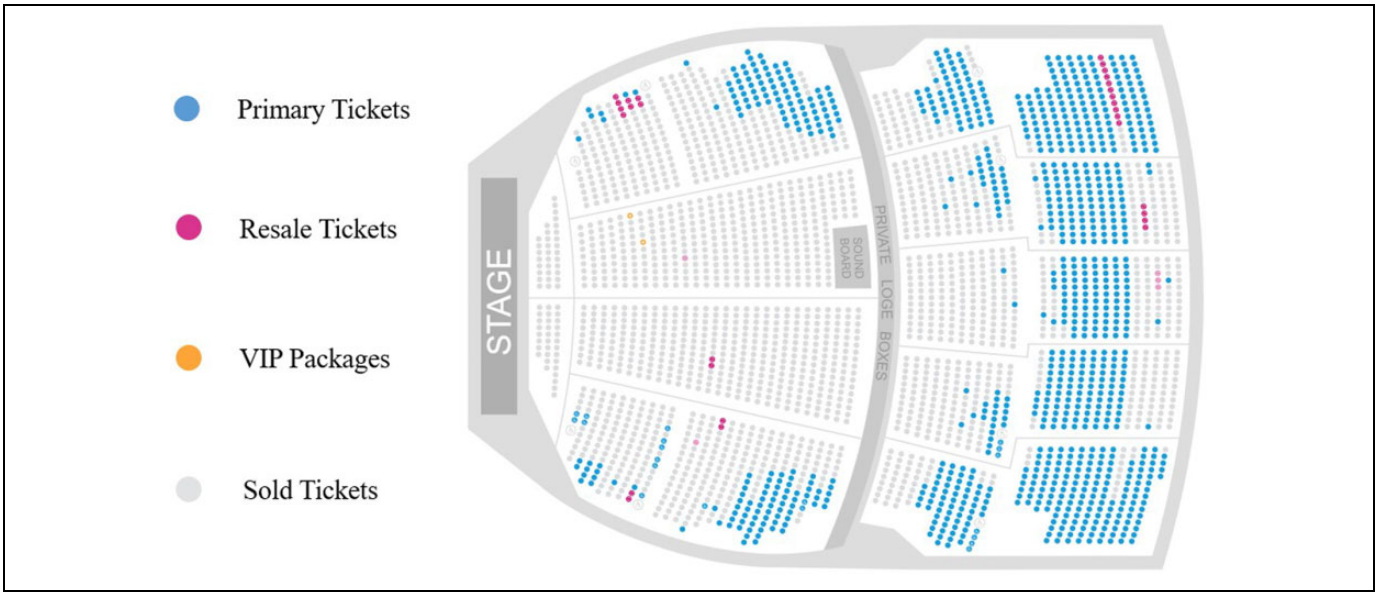

Figure 1. Seat map of a concert enrolled in Ticketmaster resale.

The public reacted negatively to Ticketmaster's anticompetitive practices. StubHub emailed its customers warning that "companies 'like Ticketmaster' are moving to restrictive paperless systems, which could kill the secondary market for tickets" (Indiviglio 2011). StubHub also sued Ticketmaster and GSW in 2015 for creating illegal market conditions, although the lawsuit was later dismissed (Rovell 2015). The Paperless Ticket system has also led to drastic disputes. For example, a spokesman for Consumer Action, a consumer advocacy group, argued that "[it] is wrong to deprive consumers of the right to fairly sell, trade or give away the ticket" (Pender 2017). An article in *The Atlantic* also blamed Ticketmaster for "extend[ing] its near monopoly of ticketing to the secondary market" (Indiviglio 2011). As of 2019, five U.S. states, including Colorado (*Colorado Consumer Protection Act* 2017), Connecticut (*An Act Concerning the Sale of Entertainment Event Tickets on the Secondary Market* 2017), New York (*NY Arts & Cult Aff L §25.30* 2015), Virginia (*Ticket Resale Rights Act* 2017), and Utah (*Ticket Transferability Act* 2019), have passed legislations requiring ticket issuers to offer tickets that can be resold on any resale sites. Ten other states, including Arizona (*AZ HB2560* 2019), Florida (*FL SB392* 2012), Indiana (*IN HB1331* 2020), Massachusetts (*MA H1893* 2011), Minnesota (*MN SF425* 2011), Missouri (*MO HB255* 2017), New Jersey (*NJ S1728* 2018), North Carolina (*NC H308* 2011), Rhode Island (*RI H5362* 2019), and Texas (*TX HB3041* 2013), have previously discussed or are currently considering similar bills. The Virginia legislation was sponsored by state delegate David B. Albo, who lost $400 because he was unable to resell his two paperless tickets for Iron Maiden to his friends. Albo said that the legislation "would help consumers, given Ticketmaster's near-monopoly over big-venue ticket sales nationwide" (Vozzella 2017). It is widely believed that Ticketmaster's control of the resale business will create a ticket-intermediary monolith that will increase the primary-ticket price and harm the welfare of musicians and consumers.

This article, using the concert-ticket market as an example, builds an analytical model to examine how the integration of the primary and the resale platforms (vs. two independent platforms) will affect the primary platform, the resale platform, the consumers, and the upstream suppliers (e.g., musicians). Our main analysis considers two scenarios. In the independent-platforms case, the primary platform and the resale platform are owned by independent parties. This scenario reflects the situation in which Ticketmaster did not enter the resale market. In the integrated-platform case, an integrated platform monopolizes both the primary and the resale markets. This setting captures the situation in which Ticketmaster enters the resale market and uses Paperless Ticket to prevent consumers from reselling tickets on other resale platforms. We also examine a model extension to study the scenario in which the integrated platform competes with an independent resale platform in the resale market (i.e., the integrated platform does not preclude other resale platforms). Figure 2 illustrates these three cases.

In our model, some consumers are uncertain in the first period about whether they can attend the concert, and that uncertainty is resolved in the second period. Consumers are heterogeneous in their probabilities of being able to attend the concert and their valuations of the concert. If a consumer buys a ticket in the first period, she can resell it to other consumers on the resale platform in the second period. Consumers can buy tickets from either the primary or the resale platform, but if the demand exceeds the supply on a platform, consumers may not be able to get a ticket from that platform with some probability. The musician chooses the ticket's face price and the venue size (the number of tickets). In the independent-platforms case, the primary and the resale platforms set their service fees independently. In the integrated-platform case,

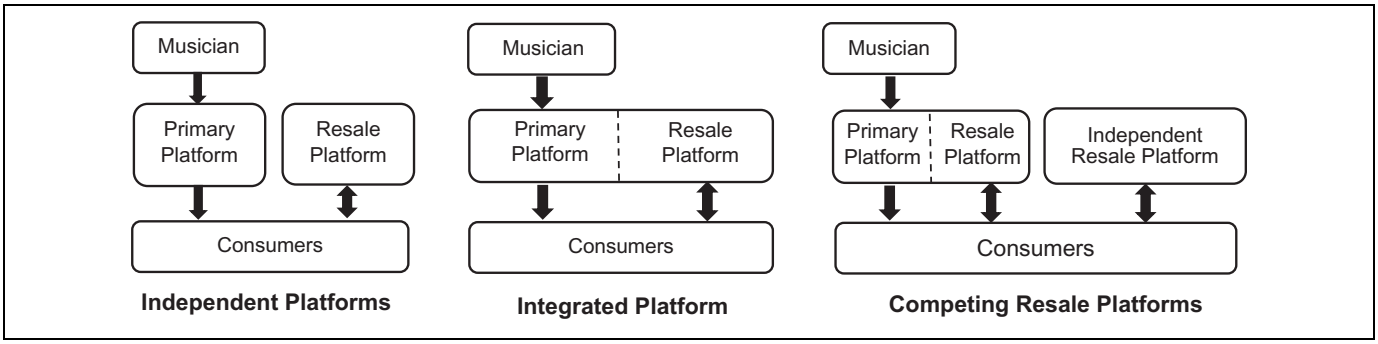

Figure 2. Three types of market structures.

the integrated platform decides the service fees for both markets. The final primary-ticket price paid by consumers is the sum of the face price and the service fee of the primary platform. In essence, the musician and the primary platform constitute a distribution channel in the primary market. The equilibrium resale price is jointly determined by the demand and the supply in the resale market. Consumers have rational expectations about the future prices and the probabilities of being able to get a ticket from either the primary or the resale market.

The conventional wisdom held by many legislators, news media, and consumer advocacy groups in the previous examples would predict that because primary tickets and resale tickets are perfect substitutes to consumers, an integrated platform, which decides the service fees for both the primary and the resale markets, will tend to charge higher fees in both markets than those that two independent platforms will charge. Thus, platform integration—a monopoly's control of both the primary and the resale platforms—will make the consumers and the musician worse off. However, we show that the opposite can happen—platform integration can increase the welfare of both the consumers and the musician. The intuition hinges on the spillover effect from the primary market to the resale market. A lower primary-ticket price will convince more consumers with relatively low likelihood of attending the concert to buy tickets in the first period. These consumers are more likely to resell tickets later, which increases the supply in the resale market and generates more resale transactions. In other words, lowering the price in the primary market has a positive spillover effect on the resale market, potentially increasing the resale profit. In the integrated-platform case, because the integrated platform receives profits from both markets, it will have an incentive to internalize the spillover effect by lowering the primary-ticket service fee (and thus the final price) to increase its resale profit. By contrast, in the independent-platforms case, the primary platform does not have such an incentive because it will not receive any resale fees. Thus, platform integration can potentially benefit consumers because of the lowered price in the primary market. Furthermore, the integrated platform's extra incentive to reduce the primary-ticket price will alleviate double marginalization in the primary-market channel, which will tend to increase the musician's optimal venue size, leading to more consumers being served. As a result, the musician, the platform, and consumers can all be better off.

We also find that the musician and consumers can become better off when the integrated platform has no competition from any third-party resale platform than when it has resale competition, even when the resale service fee is higher in the absence of resale platform competition. This is because the lower the integrated platform's market share of the resale market, the weaker the platform's incentive to reduce its primary-ticket service fee. Thus, the double-marginalization problem in the primary-market channel can be exacerbated. Furthermore, we show that an integrated platform can also have an incentive to lower the resale fee to boost primary sales, because consumers become more inclined to buy tickets from the primary market anticipating a lower fee for their potential ticket resales, consequently making consumers better off. In other words, there is also a spillover effect from the resale market to the primary market. Using data from Ticketmaster.com and StubHub.com, we provide some correlational empirical support for our predictions.

In another extension, we discuss how the presence of scalpers, who buy tickets with the sole intention of reselling them at higher prices, affects the market outcome. We find that, in the integrated-platform case, the existence of a small number of scalpers can lead to a lower ticket price, a higher profit for the musician, and higher consumer surplus. This is because scalpers are more likely to resell tickets than ordinary consumers, so the integrated platform can earn more resale profit if more scalpers buy from the primary market. Therefore, the integrated platform has an incentive to keep the primary-ticket price low enough to attract the scalpers, which can further alleviate the double-marginalization problem and benefit the musician and consumers.

We want to emphasize that, although our main analysis focuses on the concert-ticket market, the main insights of this article can be generalized to broader market settings. Essentially, if the supply in one market positively depends on the size of another market, then letting an integrated entity control both markets can lower the final price and alleviate the double-marginalization problem (if any) in the latter market, which can benefit all channel members in that market as well as consumers. For example, when more consumers buy new books,

more will resell their used books; when more consumers buy new cars, more will share their cars on peer-to-peer car-sharing platforms. Note that these market settings are very different from the markets for complementary products, where it is the product demand (rather than supply) in one market that positively depends on the size of another market (Cournot 1838). In fact, in the aforementioned examples, from the consumer's perspective, the products (firsthand tickets and secondhand tickets, new books and used books, driving a purchased car and driving a rented car) are substitutes rather than complements. The conventional belief—stronger competition between firms selling substitutes will lead to lower prices, alleviate double marginalization in distribution channels, and benefit consumers—may no longer hold in markets with spillover effects. We also illustrate these points with a general model.

Literature Review

This research contributes to the economics and marketing literature on secondary markets for event tickets. Most previous studies have focused on whether allowing consumers or scalpers to resell tickets is beneficial to event organizers and consumers. Courty (2003b) shows that when consumers are uncertain about their valuations at the time of purchase, allowing resales cannot increase the event organizer's profit. Geng, Wu, and Winston (2007) examine a similar setting and show that allowing resales only before the announcement of the second-period price can strictly increase the event organizer's profit. Courty (2003a) shows that the existence of scalpers will limit the event organizer's ability of intertemporal price discrimination and hurt its profit. Karp and Perloff (2005) find that the event organizer can benefit from the entry of scalpers if they can perfectly price-discriminate consumers. Su (2010) shows that the presence of scalpers will increase an event organizer's profit because the event organizer can sell tickets to scalpers early and transfer the inventory risk to them. Cui, Duenyas, and Özge (2014) find that an event organizer can benefit from lower resale transaction costs and from selling consumers an option for buying tickets later. Liao (2019) finds that partially allowing ticket scalping can induce consumers to buy tickets early, thus benefiting the event organizer. Several studies have empirically examined how the existence of resale markets can affect the primary market. Cusumano, Kahl, and Suarez (2008) show that Craigslist's entry into the concert-ticket resale market raises the primary-ticket prices for popular musicians but lowers those for the less popular ones. Leslie and Sorensen (2014) find that the existence of resale markets can increase the allocation efficiency by 5% for major rock concerts, but a third of the increase is offset by the ticket brokers' costly efforts of getting tickets early and the resale transaction costs. Lewis, Wang, and Wu (2019) show that the presence of a secondary market for season tickets of a Major League Baseball team increases the demand for season tickets in the primary market. By contrast, secondary-market regulations, such as minimum-list-price policies, will reduce the demand for season tickets.

Our article differs from the aforementioned literature in two fundamental aspects. First, that literature all considers a direct-selling setting. This work is the first to study how the resale market can influence the strategic interaction between different channel members in the primary market (i.e. the [upstream] musician and the [downstream] ticket platform). Second, the extant literature focuses on whether the musician or the social planner should allow consumers or scalpers to resell tickets. By contrast, our research examines how the musician and consumers are affected by whether the primary platform and the resale platform are owned and operated by an integrated entity or independent entities. We find that platform integration can reduce equilibrium service fees on both platforms, alleviate double marginalization in the primary-market channel, and benefit all parties (i.e., the musician, the primary platform, and consumers) at the same time.

Our article also relates to the literature on retail competition. The general conclusion of this literature is that integrations between downstream retailers will reduce competition and raise the final retail prices, intensifying double marginalization and making both the upstream manufacturers and the consumers worse off (Harutyunyan and Jiang 2019; Li 2002; Padmanabhan and Png 1998; Tirole 1988; Zhang 2002). This is the rationale for the antitrust regulations against many horizontal mergers (Hovenkamp and Shapiro 2017). In contrast, our article shows that platform integration can *lower* the final ticket price in the primary market and *increase* the welfare of the musician and consumers. The difference in findings arises because of the positive spillover effects between primary and resale platforms, which are absent in markets with competing retailers in general.

This article also contributes to the literature on secondary markets for used goods. Swan (1970, 1972, 1975) shows that the existence of the used-goods resale market will not limit a monopoly seller's profits. Rust (1986) shows that if consumers endogenously decide when to resell their durable goods, the monopolist firm may purposely reduce the durability of its product. Anderson and Ginsburgh (1994) find that when consumers have heterogeneous preferences over new and used goods, a used-goods market can benefit a monopoly seller by allowing it to price-discriminate consumers. Purohit and Staelin (1994) consider a car manufacturer selling to end consumers and rental companies, both of which resell their used cars on the resale market. They show that a higher substitutability between used rental cars and new cars will harm the manufacturer but benefit the dealers. Desai and Purohit (1998) consider a car manufacturer's leasing and selling policies in a market with consumers' reselling of their used cars; they find that the manufacturer may choose leasing, selling, or both, depending on the depreciation rates of sold versus leased cars. Hendel and Lizzeri (1999) find that a monopolist can benefit from the secondary market even though the used-goods market will compete with the new-goods market. Shulman and Coughlan (2007) study a monopoly manufacturer's optimal pricing decision when the retailer can buy back and resell used products. They find that under certain conditions, the manufacturer may

find it optimal not to sell any new goods in the second period. The aforementioned literature mainly considers the situation in which consumers use a durable product for a period of time before they resell it. By contrast, in our model, concert tickets can be used only once but can be purchased at different times, and consumers are ex ante uncertain whether they can attend the concert. Our research question—how the integration of the primary and the resale platforms will affect the musician, the platform, and the consumers—is also novel and practically relevant.

Model

Consider a musician (denoted by M) who plans to organize a future concert in a city. He sells the tickets via a primary ticket platform (denoted by P).[3] The musician decides the size of performance venue to rent. His cost for renting a venue is cN, where N is the venue size (the total number of available seats) and $c>0$ is a constant. Let $\overline{N}$ denote the size of the largest venue in the city, so $N \leq \overline{N}$. As is typically the case for Ticketmaster, the musician will choose the face price f for the tickets, and then the primary platform will set a service fee for consumers.[4] Let p denote the final price that a consumer pays for a ticket. Equivalently, the primary platform's per-ticket service fee is $p - f$.[5]

Without loss of generality, we assume that there is a unit mass of consumers (indexed by i) in the market. Consumers are heterogeneous in their valuations for the concert. A fraction α of consumers are "avid fans," denoted by A, whose valuation for the concert is V_A if they can attend it. The rest of the consumers (a fraction $1-\alpha$) are "casual fans," denoted by C, whose valuation for the concert, conditional on attending, is $V_C < V_A$. Consumers ex ante are uncertain about whether they will have future time conflicts with the concert, e.g. a friend's party. Because avid fans value the concert more than casual fans, they are more likely to choose the concert over the conflicting event than casual fans do. Let ρ_i be the probability that consumer i can attend the concert. For tractability, we assume $\rho_i = 1$ for avid fans and $\rho_i \sim \text{uniform}(0,1)$ across the population of casual fans. In the Web Appendix, we relax this assumption by numerically analyzing a model in which both avid and casual fans have the same probability of attending the concert, to show that all the main results remain qualitatively unchanged. Each consumer ex ante knows her own ρ_i, but the platforms cannot identify each consumer's type. If a consumer does not attend the concert, her utility from the concert is normalized to zero. Therefore, a type-i consumer has probability ρ_i of having $v_i = V_i$ and probability $1-\rho_i$ of having $v_i = 0$. Each consumer buys at most one ticket. The tie-breaking rule is that consumers will buy tickets if they are indifferent between buying a ticket and not buying.

Consumers can buy their tickets in two periods. In the first period, casual fans are uncertain about whether they can attend the concert, but in the second period the uncertainty is resolved. Consumers who bought tickets in the first period can choose to resell their tickets on the resale platform (denoted by R) in the second period, even if they can attend the concert themselves. Let r denote the resale price. To acquire a ticket, consumers can buy it from the primary platform at p or from the resale platform at r. In practice, resale platforms (e.g., StubHub, Ticketmaster) usually charge a percentage fee for resale transactions. Let $k \in [0,1]$ denote the resale platform's percentage resale service fee, so a consumer will receive $(1-k)r$ for reselling her ticket. The main analysis considers the case of exogenous service fee k and discusses the main insights. We also study an extension in which the platforms can endogenously choose k.

Next, we describe how the equilibrium resale price r^* is determined in our model. A natural candidate for r^* is the market-clearing resale price at which the number of consumers willing to resell their tickets (the resale supply) is equal to the number of consumers willing to buy resale tickets (the resale demand). However, such a market-clearing resale price may not exist in our setting. This is because in the second period, consumers' ex-post valuations of attending the concert, v_i, can only be V_A, V_C, or zero, so both the resale demand and the resale supply are non-continuous functions. To identify a unique equilibrium resale price r^*, we assume r^* to be the maximum resale price that clears the supply in the resale market with all resale tickets sold at r^*. This definition is conceptually similar to the marketing-clearing price.[6] Note that r^* will be V_A, V_C, or zero in equilibrium. Table 1 exhibits several examples of the equilibrium resale price in different resale-supply scenarios in which the resale demand comes from 10 fans with willingness-to-pay of \$10 and 20 fans with willingness-to-pay of \$5.

One can show that, when $\overline{N} \leq \alpha$ (i.e., the largest venue in the city cannot hold all avid fans), the musician will set the ticket's face price $f = V_A$, and the primary platform and the resale platform will receive zero surplus. We focus on the more interesting case of $\overline{N} > \alpha$ for the remainder of the article. To obtain

[3] For ease of exposition, we refer to a platform as "it," the musician as "he," and the consumer as "she."

[4] In practice, typically, musicians set the ticket's face prices and Ticketmaster makes all tickets available for sale at the same time. Ticketmaster merely sells the tickets on behalf of the musicians. (For details, see https://help.ticketmaster.com/s/article/Purchase-Policy.) Note also that Ticketmaster sets the service fees for tickets on a concert-by-concert basis. For evidence of Ticketmaster setting different service fees for different concerts with the same or similar ticket face prices, see the Web Appendix.

[5] It is equivalent to assume that the primary platform charges a percentage fee of $(p-f)/f$. In practice, Ticketmaster charges percentage fees only in the resale market but not in the primary market. For details, see Figure D1 in the Web Appendix. Moreover, the main analysis assumes that the platform does not dynamically adjust its price. In the Web Appendix, we prove that all results remain qualitatively the same when the platform can dynamically adjust its price.

[6] The definition implies that for any resale price $r > r^*$, the resale demand will be smaller than the resale supply, and that for any $r \leq r^*$, the resale demand will be greater than or equal to the resale supply.

Table 1. Examples of Equilibrium Resale Prices r^*.

Supply of Resale Tickets	Equilibrium r^*
5 fans want to resell tickets	\$10
25 fans want to resell tickets	\$5
35 fans want to resell tickets	\$0

Notes: Fans reselling tickets are assumed to have zero valuations here (i.e., not being able to attend the concert).

closed-form solutions, we assume that $\overline{N} \leq 2\alpha/(1+\alpha)$.[7] These conditions are equivalent to $\overline{N}/(2-\overline{N}) \leq \alpha < \overline{N}$.

The timeline of the game is as follows. First, the musician decides the venue size $N \in [0, \overline{N}]$ and the ticket's face price f. The primary platform subsequently sets the final ticket price p (in effect charging a service fee $p - f$ per ticket). In the first selling period, consumers will decide whether to buy tickets from the primary market. In the second period, consumers learn whether they can attend the concert. Those who successfully bought tickets in the first period can opt to resell their tickets in the resale market. Those without a ticket can choose to buy a ticket from either the primary platform (if tickets have not sold out) or from the resale market, and if they want to buy a ticket, they will try to buy from the cheaper platform first if ticket prices are different on the two platforms. If the demand exceeds the supply on a platform, tickets will sell out on that platform and consumers who fail to get a ticket from that platform can then decide whether to buy from the other platform. Whenever demand exceeds supply, consumers are assumed to have equal chances of getting a ticket. Figure 3 illustrates the event sequence, and the derivation of consumers' utility functions are relegated to the Web Appendix.

Our main analysis considers two scenarios regarding whether the primary and the resale platforms are operated by the same entity. In the case of independent platforms (denoted by IDP), the primary and the resale platforms are operated by independent entities that maximize their respective profits. This case reflects the situation in which Ticketmaster (the primary platform) has not entered the resale market. In the case of integrated platform (denoted by INT), the two platforms are owned by the same entity that maximizes the joint profit of the two platforms. This case reflects the situation in which Ticketmaster enters the resale market and uses its Paperless Ticket system to prevent consumers from reselling tickets on other platforms. Comparing these two cases helps us examine how Ticketmaster's control of the resale market will affect the musician and consumers. In a later extension, we will examine a scenario in which an integrated platform competes with the independent resale platform in the resale market. Table 2 provides a summary of the major notations.

Analysis

We solve for rational-expectation subgame-perfect equilibria. In such equilibria, the musician, the primary platform, the resale platform, and consumers have rational expectations about the resale price and the consumers' probability of getting a ticket from a platform. Given the final price p, the resale percentage fee k, and the venue size N, there may exist multiple equilibria with different consumer beliefs on how many consumers will buy tickets in the first period. If the belief is that many consumers will buy tickets in the first period, consumers may also want to buy tickets early because they believe that there will be few tickets left in the second period. However, if the belief is that few consumers will buy tickets in the first period, consumers may also postpone buying the ticket until they know whether they can attend the concert. To pin down a unique equilibrium, we introduce the concept of the "buying-spree equilibrium." We define the buying-spree equilibrium as the rational-expectation subgame-perfect equilibrium that, among all possible rational-expectation subgame-perfect equilibria, has the highest number of consumers trying to buy tickets in the first period.[8] In the Web Appendix, we prove that the buying-spree equilibrium is unique in our setting. For conciseness, we use "equilibrium" to refer to the unique buying-spree equilibrium in the rest of the article.

Note that when $k < 1 - (V_C/V_A)$, or equivalently when $(1-k)V_A > V_C$, a casual fan will resell her ticket if the resale price is $r = V_A$ regardless of whether her realization of v_i is V_C or zero. By contrast, when $k \geq 1 - (V_C/V_A)$, or equivalently $(1-k)V_A \leq V_C$, a casual fan will not resell her ticket if she has $v_i = V_C$. We divide our analysis into two cases depending on whether $k \geq 1 - (V_C/V_A)$ or $k < 1 - (V_C/V_A)$.

The Case of High Resale Percentage Fee ($k \geq 1 - [V_C/V_A]$)

This subsection considers the case with $k \geq 1 - (V_C/V_A)$. In this case, the casual fans will not resell their tickets when their realized valuation is $v_i = V_C$. We solve the game by backward induction. First, we examine the consumers' buying and reselling decisions given N, f, and p. Clearly, choosing $N < \alpha$ is a strictly suboptimal strategy for the musician, because he can earn a strictly higher profit by setting $N = \alpha$ and

[7] This assumption is to ensure closed-form solutions for the full equilibrium outcome. Our main results will qualitatively hold as long as $\overline{N}$ is not too large. We thank an anonymous reviewer for pointing out that our result applies to situations in which the musician cannot serve all consumers in the market. In practice, the venue size is usually limited (e.g., due to physical constraints) and the potential demand often exceeds the capacity limit, especially for popular artists. Ginsburgh and Throsby (2013) show that 43% of the concerts are sold out in their sample, and the sell-out rates are higher than 85% for artists such as Madonna, Billy Joel, Elton John, and Garth Brooks. Moreover, as we will demonstrate in the "Discussion and a General Model" section, our main insight does not actually require these modeling details of the concert-ticket industry.

[8] This is a reasonable assumption especially for more popular concerts. In reality, consumers often rush to buy tickets as soon as tickets are released, and many concerts sell out in the first few hours. For example, The Rolling Stones sold out 75,000 tickets in 51 minutes for their "14 on Fire" tour in Paris in 2014 (RFI 2014).

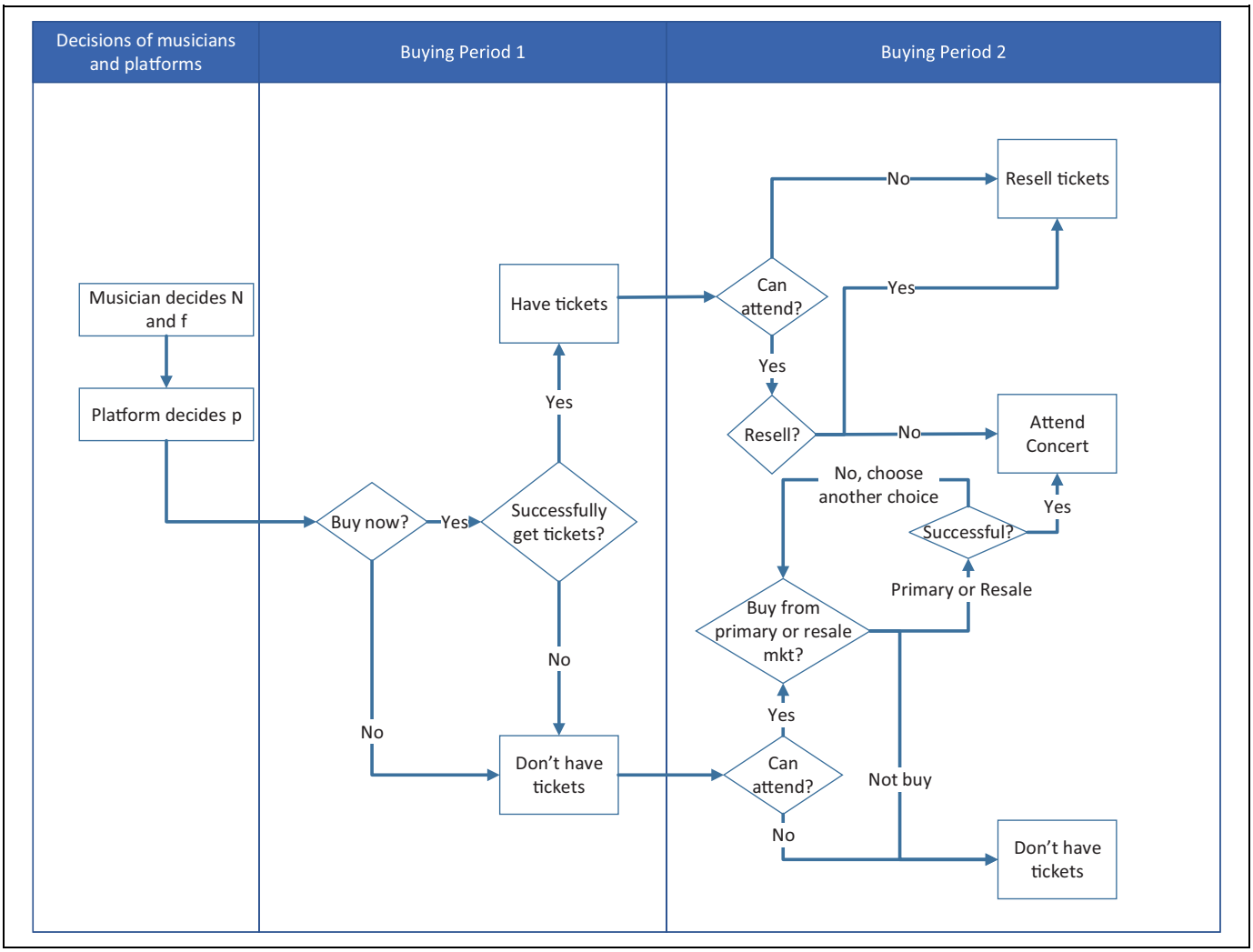

Figure 3. Sequence of events.

Table 2. Table of Notations.

N, $\bar{N}$	Actual venue size and maximum venue size
v_i	A consumer's valuation of the concert
ρ_i	A consumer's probability of being able to attend a concert
V_A, V_C	Valuations of avid fans and of casual fans, respectively
c	Marginal cost for the musician
f	Ticket face price
p	Ticket final price in the primary market
r	Resale price
k	Resale percentage fee
α	Population of avid fans
β	Population of scalpers
π_M, π_I, π_P, π_R	Profits of the musician, the integrated platform, the primary platform, and the resale platform, respectively
INT	The subscript denoting the "integrated-platform case"
IDP	The subscript denoting the "independent-platforms case"

$f = V_A$. Moreover, in the Web Appendix, we also show that the primary platform (in the independent-platforms case) and the integrated platform (in the integrated-platform case) will set $p \in [(1-k)V_A, V_C - \theta[V_C - (1-k)V_A]] \cup \{V_C, V_A\}$, where $\theta \equiv 1 - \frac{\sqrt{(1-\alpha)\alpha[\alpha(1+2N)-\alpha^2-2N^2]}}{(1-\alpha)N} \in (0,1)$. Thus, in the rest of this subsection, we present the analysis only for the variable region with $\alpha \le N \le \overline{N}$ and $p \in [(1-k)V_A, V_C - \theta[V_C - (1-k)V_A]] \cup \{V_C, V_A\}$. Lemma 1 summarizes how the final price p affects the equilibrium market outcome.

Lemma 1: Suppose $p \in [(1-k)V_A,\ V_C - \theta[V_C - (1-k)V_A]] \cup \{V_C, V_A\}$ and $N \in [\alpha, \overline{N}]$. In equilibrium,

(a) if $p = V_A$, all avid fans will buy tickets from the primary market in the first period, casual fans will not buy any tickets, no resale transactions happen, and the primary platform's profit is $\pi_P = (V_A - f)\alpha$.

(b) if $p = V_C$, all avid fans will buy tickets from the primary market in the first period, all casual fans with realized valuation $v_i = V_C$ will try to buy tickets from the primary market in the second period, no resale

transactions happen, and the primary platform's profit is $\pi_P = (V_C - f)N$.

(c) if $(1-k)V_A \le p \le V_C - \theta[V_C - (1-k)V_A]$, casual fans with $\rho_i > \rho^* = \frac{p-(1-k)V_A}{V_C-(1-k)V_A}$ and all avid fans will try to buy tickets in the first period and can successfully get a ticket with probability N/D_1, where $D_1 = \alpha + (1-\alpha)(1-\rho^*) \ge N$ is the first-period primary-market demand. In the second period, the equilibrium resale price is $r^* = V_A$, the resale supply is $S_R = (N/D_1)(D_1 - \alpha)[(1-\rho^*)/2]$, and the resale demand is $D_R = [1-(N/D_1)]\alpha \ge S_R$. The profits of the primary platform and the resale platform are $\pi_P = (p-f)N$ and $\pi_R = kV_A S_R$, respectively.

When $p \ge V_C$, no casual fans will buy from the primary market in the first period, so there will be no consumers reselling tickets in the second period. By contrast, when $(1-k)V_A \le p \le V_C - \theta[V_C - (1-k)V_A]$, tickets will sell out, and some casual fans will try to buy tickets in the first period and later resell their tickets if they cannot attend the concert. An important observation is that, when p decreases in this parameter region, more casual fans with lower ρ_i will try to buy and can successfully get tickets from the primary market in the first period (technically, $1-\rho^*$ increases when p decreases), and these consumers are more likely to resell their tickets. Therefore, a lower primary-ticket price (p) will increase the resale supply, S_R (i.e., $dS_R/dp<0$). We call this effect the spillover effect from the primary market to the resale market. Moreover, in our case, a decrease in p will also increase the resale demand, D_R (i.e., $dD_R/dp<0$). The intuition is that when p decreases, more casual consumers will try to buy tickets in the first period, reducing the avid fans' probability of successfully getting tickets from the primary market, so more avid fans need to buy tickets from the resale market. As a consequence, the lower the final ticket price in the primary market , the more resale transactions and the higher profit for the resale platform.

Decisions of the platform and the musician. Next, we compare the decisions of the platform and the musician in the independent-platforms case and in the integrated-platform case. We start by analyzing the platform's decisions conditional on the musician's choice of f and $\alpha \le N \le \overline{N}$.

First, consider the case of independent platforms. The primary platform maximizes its own profit π_P, which is

$$\pi_P(p) = \begin{cases} (V_A - f)\alpha, \text{ if } p = V_A, \\ (V_C - f)N, \text{ if } p = V_C, \\ (p-f)N, \text{ if } (1-k)V_A \le p \le V_C - \theta[V_C - (1-k)V_A]. \end{cases} \quad (1)$$

The primary platform will never choose $p < V_C$, because it can already sell all tickets at $p = V_C$. In equilibrium, the primary platform will set p to either V_C or V_A, both precluding any resale transaction in the second period.[9] The primary platform will set $p = V_A$ when the population of avid fans is sufficiently large ($\alpha > N(V_C - f)/(V_A - f)$); otherwise, the primary platform will set $p = V_C$.

Next, we consider the integrated-platform case. In this case, the integrated platform maximizes the joint profit of the primary and the resale platforms, $\pi_I = \pi_P + \pi_R$, which is

$$\pi_I(p) = \pi_P(p) + \pi_R(p) = \begin{cases} (V_A - f)\alpha, \text{ if } p = V_A, \\ (V_C - f)N, \text{ if } p = V_C, \\ (p-f)N + kV_A S_R, \text{ if } (1-k)V_A \le p \le V_C - \theta[V_C - (1-k)V_A]. \end{cases} \quad (2)$$

In contrast to the independent-platforms case, even when $p < V_C$, further reducing p can increase the integrated platform's profit if the spillover effect is sufficiently strong. Specifically, if reducing p can significantly expand the resale supply such that $dS_R/dp < -N/kV_A$, then reducing p will increase the integrated platform's profit when $p \in \{(1-k)V_A, V_C - \theta[V_C - (1-k)V_A]\}$. Proposition 1 establishes one of the key results of our research: compared with the independent-platforms case, an integrated platform has extra incentives to lower its price in the primary market to facilitate resale transactions.

Proposition 1: (Platform integration can reduce the primary-ticket price.) In the integrated-platform case, if $\alpha \le \min\left\{\frac{(2-k)V_A - 2V_C}{kV_A}, \frac{V_A(2-k)-2f}{V_A(2+Nk)-2f}N\right\}$, the integrated platform will set $p = (1-k)V_A < V_C$, which is lower than its level in the independent-platforms case. The equilibrium resale price is $r^* = V_A$. The profits from the primary market and the resale market are $\pi_P = (1-k)V_A N$ and $\pi_R = kV_A \cdot \frac{N(1-\alpha)}{2}$, respectively. The integrated platform's total profit is $\pi_I = N\left[V_A\left(1 - \frac{k(1+\alpha)}{2}\right) - f\right]$.

In contrast to the case of independent platforms where $p \ge V_C$, the integrated platform will choose some $p < V_C$ if the population of avid fans (α) is low enough. In this case, although the integrated platform generates less profit from the primary market than when setting $p = V_C$, the platform will gain more profit from the resale market. The intuition that α must be low is as follows. When the population of avid fans is low, many primary tickets will be bought by the casual fans and thus there will be many resale transactions. In other words, the spillover effect is stronger when α is lower. Note that, in our setting, the integrated platform is willing to reduce p only if the resulting equilibrium resale price is high ($r^* = V_A$). This is

[9] This "no resale" result relies on our assumption that avid fans with tickets will always attend the concert. One should interpret the "no resale" result as that in the independent-platforms case the primary platform will have less incentive to encourage first-period purchases from casual fans.

because a high r^* implies a high resale profit margin, which incentivizes the platform to boost resale transactions.

One might expect that the integrated platform will have stronger incentives to set $p < V_C$ to encourage casual fans to buy tickets in the first period when the resale percentage fee (k) is higher, because each resale transaction can generate a higher transaction fee for the platform. However, Proposition 1 indicates the opposite: The condition $\alpha \le \min\left\{\frac{(2-k)V_A-2V_C}{kV_A}, \frac{V_A(2-k)-2f}{V_A(2+Nk)-2f}N\right\}$ is more likely to be true when k is lower. When k is lower, casual fans will be more willing to buy tickets in the first period, because they will pay a lower resale service fee if they cannot attend the concert. As a result, the integrated platform can induce casual fans to buy tickets in the first period by only slightly reducing p, which will not significantly reduce its primary-market profit. Therefore, the integrated platform is more likely to set $p < V_C$ to facilitate resale transactions. In addition, the condition $\alpha \le \min\left\{\frac{(2-k)V_A-2V_C}{kV_A}, \frac{V_A(2-k)-2f}{V_A(2+Nk)-2f}N\right\}$ is more likely to be true when the venue size (N) is larger, because there will be more casual fans being able to get tickets in the first period and reselling in the second period. In other words, the spillover effect is stronger when N is larger, or mathematically, dS_R/dp is proportional to N.

Next, we investigate the musician's optimal decisions for the face price f and the venue size N. We start with the independent-platforms case. Lemma 2 characterizes the musician's equilibrium choices of the venue size (N^*_{IDP}) and the face price (f^*_{IDP}) in the independent-platforms case.

Lemma 2: Let $\alpha_{IDP} \equiv \overline{N}\left(1-\sqrt{\frac{V_A-V_C}{V_A-c}}\right)$. In the independent-platforms (IDP) case:

(a) If $\alpha \le \alpha_{IDP}$, the musician will choose $N^*_{IDP} = \overline{N}$ and $f^*_{IDP} = \frac{\overline{N}V_C-\alpha V_A}{\overline{N}-\alpha}$, the primary platform will set $p^*_{IDP} = V_C$, all avid fans will buy tickets in the first period, and casual fans with realized $v_i = V_C$ will try to buy tickets from the primary platform in the second period. The corresponding consumer surplus is $\alpha(V_A - V_C)$.

(b) If $\alpha > \alpha_{IDP}$, the musician will choose $N^*_{IDP} = \alpha$ and $f^*_{IDP} = V_A$, the primary platform will set $p^*_{IDP} = f^*_{IDP} = V_A$, avid consumers will buy tickets from the primary platform, and casual fans will not buy tickets in either period. The corresponding consumer surplus is zero.

When the population of avid fans is sufficiently large ($\alpha > \alpha_{IDP}$), the primary platform will have a strong incentive to set $p = V_A$ and serve only the avid fans, unless the ticket's face price f is so low as to also make serving casual fans profitable. Because setting such a low f will severely reduce the musician's profit margin, he will rather choose a small venue size ($N = \alpha$) and a high face price ($f = V_A$) to serve only the avid fans and extract all their surplus himself. By contrast, if $\alpha \le \alpha_{IDP}$, the musician will choose a large venue size ($N = \overline{N}$) and a low face price ($f = \frac{\overline{N}V_C-\alpha V_A}{\overline{N}-\alpha}$), and the primary platform will set $p = V_C$ in equilibrium, in which case both the avid fans and the casual fans are served. As we have shown, no resale transaction will occur in either case.

We now investigate the integrated-platform case. Lemma 3 characterizes the musician's equilibrium choices of the venue size (N^*_{INT}) and the face price (f^*_{INT}) in the integrated-platform case.

Lemma 3: Let $\alpha_{INT} \equiv \min\left\{\frac{(2-k)V_A-2V_C}{kV_A}, \overline{N}\left[1-\frac{\sqrt{V_A k\left[V_A k\overline{N}^2+8(1+\overline{N})(V_A-c)\right]}-V_A k\overline{N}}{4(V_A-c)}\right]\right\}$. In the integrated-platform (INT) case:

(a) If $\alpha \le \alpha_{INT}$, the musician will choose $N^*_{INT} = \overline{N}$ and $f^*_{INT} = \left[1-\frac{\overline{N}k(1+\alpha)}{2(\overline{N}-\alpha)}\right]V_A$, the integrated platform will set $p^*_{INT} = (1-k)V_A$, and all consumers will try to buy tickets in the first period. The equilibrium resale price is $r^* = V_A$, and the equilibrium volume of resale transactions is $\frac{\overline{N}(1-\alpha)}{2}$. Consumer surplus is $\overline{N}\left[\alpha V_A k + \frac{(1-\alpha)[V_C-(1-k)V_A]}{2}\right]$.

(b) If $\frac{(2-k)V_A-2V_C}{kV_A} < \alpha \le \alpha_{IDP}$, the musician will choose $N^*_{INT} = \overline{N}$ and $f^*_{INT} = \frac{\overline{N}V_C-\alpha V_A}{\overline{N}-\alpha}$, the integrated platform will set $p^*_{INT} = V_C$, all avid fans will buy tickets in the first period, and casual fans with realized $v_i = V_C$ will try to buy tickets in the primary market in the second period. Consumer surplus is $\alpha(V_A - V_C)$.

(c) If α is not in the regions in (a) or (b), the musician will choose $N^*_{IDP} = \alpha$ and $f^*_{IDP} = V_A$, the integrated platform will set $p^*_{IDP} = f^*_{IDP} = V_A$. Avid consumers will buy tickets in the primary market, and casual fans will not buy tickets in either periods. Consumer surplus is zero.[10]

Part (a) of Lemma 3 is the interesting case: When $\alpha \le \alpha_{INT}$, in equilibrium the integrated platform will charge $p < V_C$ to boost resale transactions. Proposition 1 shows that when α is low and N is large, an integrated platform will have a strong incentive to reduce p to serve more casual fans even if the musician charges a relatively high face price, f. Thus, the musician will be more inclined to choose a larger N to serve both the avid and the casual fans.

Comparison of the independent-platforms case and the integrated-platform case. Having characterized the equilibrium outcomes in the independent-platforms case and in the integrated-platform case in Lemmas 2 and 3, Proposition 2 proceeds to compare the equilibrium outcomes of those two cases to determine how platform integration will affect the market outcome.

[10] The parameter regions of α in (a) or (b) may be empty.

Proposition 2: (Platform integration can alleviate double marginalization.) Suppose $\alpha_{IDP} < \alpha \leq \alpha_{INT}$. Compared with the independent-platforms case (IDP), in the integrated-platform case (INT):

(a) The musician will choose a strictly lower ticket face price and a strictly larger venue size, resulting in a strictly lower final price (i.e., $f^*_{INT} < f^*_{IDP}$, $N^*_{INT} > N^*_{IDP}$, and $p^*_{INT} < p^*_{IDP}$).
(b) The musician's profit is strictly higher and the platform's profits in both markets are strictly higher (i.e., $\pi^*_{M,INT} > \pi^*_{M,IDP}$, $\pi^*_{P,INT} > \pi^*_{P,IDP}$ and $\pi^*_{R,INT} > \pi^*_{R,IDP}$). Consumer surplus is also strictly higher.

Proposition 2 shows that when α is in an intermediate range, platform integration can actually lead to a lower final ticket price, higher profits for the musician and the platforms, more consumers attending the concert, and higher consumer surplus at the same time. Platform integration will give the platform a stronger incentive to lower the final price p (conditional on the musician's choice of f) to serve both the avid and the casual fans, which will alleviate double marginalization in the primary-market distribution channel. This implies that platform integration can allow more of the reduction in face price to be passed through to consumers, so the musician is more likely to choose a larger venue size N and charge a lower face price f to serve more consumers. Specifically, when $\alpha_{IDP} < \alpha \leq \alpha_{INT}$, the musician will choose a smaller venue ($N^*_{IDP} = \alpha$) if the platforms are independent but will choose a larger venue ($N^*_{INT} = \overline{N}$) if the platforms are integrated. In such a case, platform integration can lead to an all-win outcome for the musician, the platforms, and the consumers.

In summary, platform integration can benefit consumers, the musician, and the primary and the resale platforms in two ways. First, Proposition 1 implies that platform integration will incentivize the platform to lower the final price in the primary market to internalize the spillover effect, which can benefit consumers. Second, Proposition 2 suggests that platform integration can alleviate double marginalization in the primary-market channel, which can benefit consumers, the musician, and the platforms.

We want to point out how our setting relates to the setting of markets for complementary products (e.g., game consoles and video games). In a complementary product setting, lowering the price in one market will also lead to more transactions in another market, so a monopoly controlling both markets can result in lower prices and higher consumer surplus compared with having two independent firms control the two markets (Cournot 1838). This finding is similar to ours. However, the underlying mechanism is very different. In the setting of complementary products, a lower price in one market will increase the demand in another market (for the complementary product). By contrast, in the setting of concert tickets, a lower ticket price in the primary market will increase the supply in the resale market. We show that, even though primary tickets and the resale tickets are (perfect) substitutes, letting an integrated entity controlling both markets can still benefit consumers because of the aforementioned spillover effect.

As a side note, besides alleviating double marginalization, platform integration can enhance the musician's incentive to induce resales to extract more surplus from the resale transactions. As we explain next, the integrated platform can more efficiently extract consumer surplus by facilitating resales, thus the musician may also charge an appropriate face price to extract some of the profit gain for himself. This effect will harm consumers but can benefit musicians. To see this effect, let us consider the case with $N = \overline{N}$. If $p = V_A$, the platform can extract all avid fans' surplus but cannot serve any casual fan. If $p = V_C$, then all avid fans can successfully get tickets from the primary market in the first period. There will be no resale in this case, and all avid fans have a surplus of $V_A - V_C$ although the surplus of some casual fans can be extracted. By contrast, if $p = (1 - k)V_A < V_C$, all consumers will try to buy tickets in the first period, so some avid fans cannot get tickets from the primary market and have to pay a higher price V_A to buy from the resale market. Thus, more consumer surplus can be extracted if p is lowered to $(1 - k)V_A$ to facilitate resales, because at the lowered p, all surplus of avid fans who purchase from the resale market is extracted (relative to when $p = V_C$) while some casual fans are also served (relative to when $p = V_A$). In the integrated-platform case, the musician can capture part of the integrated platform's profit gain from the resale transactions by raising his face price. By contrast, in the independent-platforms case, the musician cannot do so because the primary platform does not receive any profit gain from resale transactions. To summarize, platform integration can incentivize the musician to induce resales to indirectly extract some profit gain from the resale market.

Platform integration's effect on the musician's incentive to induce resales is manifested in our results. As shown in Lemma 2 and 3, if $\alpha < \min\{\alpha_{IND}, \alpha_{IDP}\}$, in both the independent-platforms and the integrated-platform cases, the musician will choose $N = \overline{N}$, so platform integration does not affect the equilibrium market coverage through alleviation of double marginalization. However, in this parameter region, platform integration will have an effect on the musician's incentives to induce resales to extract more consumer surplus. Compared with the independent-platforms case, consumer surplus is lower, the equilibrium face price and the musician's profit are higher in the integrated-platform case. We also find that, in this parameter region, platform integration will reduce the social welfare. This is because, though all $\overline{N}$ tickets are consumed, in the independent-platforms case, all avid fans will obtain tickets in equilibrium whereas, in the integrated-platform case, some avid fans will not be able to get tickets from either the primary or the resale market.

The Case of Low Resale Percentage Fee ($k < 1 - [V_C/V_A]$)

If $k < 1 - (V_C/V_A)$, all casual fans will be willing to resell their tickets when $r = V_A$ even when their realized valuation

is $v_i = V_C$. However, if $r \leq V_C$, casual fans will not resell their tickets if $v_i = V_C$.

Lemma 4: If $k<1-(V_C/V_A)$ and $N>\alpha$, then $r^* \leq V_C$ as long as some consumers will resell their tickets in equilibrium.

Note that, in our setting, the equilibrium resale price r^* can only be V_A, V_C, or zero. Lemma 4 shows that the resale price cannot be high (V_A) if k is relatively low. This is because if $r^* = V_A$, the low k will encourage all casual consumers to buy tickets in the first period and resell them later regardless of their realized v_i, which will increase the resale supply so much that r^* can no longer be sustained at V_A—a contradiction. Because the resale platform's profit per resale transaction is $k \times r^*$, if $k<1-(V_C/V_A)$ and $r^* \leq V_C$, the integrated platform will have limited incentive to reduce p to boost resale transactions. It turns out that in equilibrium the integrated platform will never choose $p<V_C$, so there will be no resale transactions. Thus, if $k<1-(V_C/V_A)$, platform integration will not affect the equilibrium outcome.

Extensions and Empirical Support

In this section, we consider several model extensions. First, we examine how the presence of scalpers will affect the market outcome. Second, we study the optimal resale percentage-fee decisions in both the independent-platforms case and the integrated-platform case. Third, we consider the scenario that the integrated platform competes with an independent resale platform in the resale market. Finally, we provide some correlational, suggestive empirical support for our theoretical results.

The Impact of Scalpers

Oftentimes, many scalpers buy tickets from the primary market and resell them at higher prices. According to Scott Cutler, chief executive officer of StubHub, nearly half of ticket resales on StubHub come from "professional" traders (Sullivan 2017). It is generally believed that scalpers make profits by raising the effective prices paid by consumers and thus harm the welfare of consumers and the musicians. The official Twitter account of the rock band LCD Soundsystem derogated scalpers as "parasites" (Horowitz 2017). Scalpers usually use computer bots to buy hundreds of tickets within minutes after tickets start selling. To combat scalpers, former U.S. President Barack Obama signed the Better Online Ticket Sales Act in 2016, which restricts the use of software bots to obtain and resell event tickets. Many U.S. states have also passed legislations banning or restricting scalping behaviors. Ticketmaster has also introduced the Verified Fan system, which can block 90% of buying attempts from ticket scalpers (Brooks 2017). In this extension, we investigate how the existence of scalpers affects ticket prices, profits of the musician and platforms, and the consumers under different market structures (i.e., whether the primary and the resale platforms are independent or integrated).

In this extension, we assume that besides the unit mass of regular consumers (avid and casual fans), there are β number of scalpers who can also buy tickets from the primary platform and resell them on the resale platform. Scalpers have zero valuation for attending the concert, but they move earlier than regular consumers in the first period when buying tickets from the primary platform. The main model in the previous section is the special case of $\beta = 0$. For closed-form analytical solutions, we focus on the parameter region of $\beta \leq [2\alpha-(1+\alpha)\overline{N}]/(1-\alpha)$ (i.e., there are only a small number of scalpers). To illustrate the most interesting result, in this extension, we analyze the case with $k \geq 1-(V_C/V_A)$ and $\alpha \leq \overline{N} \leq 2\alpha/(1+\alpha)$. We show that, even when scalpers have the ability to buy tickets earlier than regular consumers, the scalpers' presence can still result in lower ticket prices and higher consumer surplus and make both the musician and the integrated platform better off.[11] This contrasts the independent-platforms case, in which one can show that, in the same assumed parameter region, the presence of scalpers has no effect on the market outcome, because the primary platform will find it optimal to set a sufficiently high final ticket price (p) so that no scalpers will buy tickets in equilibrium.

First, we analyze the integrated-platform case. We begin by examining the subgame in which the integrated platform will choose its optimal final price p, conditional on the musician's choices of N and f. Similar to the previous section, it is not optimal for the musician to choose a venue size $N<\alpha$, so we need only consider the case of $\overline{N} \geq N \geq \alpha$. Note that the scalpers will buy tickets from the primary market only if p is low enough (i.e., $p \leq (1-k)\widehat{r^*}$) so that they will make a positive profit from reselling.[12] Lemma 5 shows that it may be optimal for the integrated platform to choose p low enough such that scalpers will buy tickets in the primary market.

Lemma 5: Given the musician's choices of N and f, the integrated platform will choose $p=(1-k)V_A$ if and only if $\alpha<\frac{2N(V_A-V_C)}{(N-\beta)kV_A}-1$ and $f<V_A\left[1-\frac{k(1+\alpha)(N-\beta)}{2(N-\alpha)}\right]$, in which case all scalpers and regular consumers will try to buy tickets in the first period, the equilibrium resale price is $r^* = V_A$, and the integrated platform's total profit is $\pi_I = \frac{1+\alpha}{2}\beta k V_A + N\left[V_A\left(1-\frac{k(1+\alpha)}{2}\right)-f\right]$.

It is worth mentioning that when the conditions in Lemma 5 are satisfied, the integrated platform's profit, π_I, increases with the number of scalpers (β). Letting scalpers buy tickets in the first period tends to increase transactions in the resale market because scalpers are more likely (with probability one) to resell the tickets than regular consumers. Consequently, the presence of the scalpers can strengthen the spillover effect. Relatedly,

[11] Our results are qualitatively the same if scalpers and regular consumers have equal probability of getting tickets.

[12] We use "^" over variables to indicate a consumer's rational prediction of those variables.

letting scalpers buy tickets in the first period can reduce the avid fans' probability of getting tickets from the primary market, so more avid fans will need to buy from the resale market at the high resale price $r^* = V_A$, and thus the integrated platform can better extract avid fans' surplus. Therefore, the integrated platform has an incentive to let scalpers buy tickets from the primary market to create transactions in the resale market. To attract scalpers, the integrated platform needs to keep $p \leq (1-k)\widehat{r^*}$ so scalpers can make a profit. In other words, the integrated platform will have an extra incentive to lower the final price on the primary platform.

Define $\alpha_{SCP} \equiv \min\left\{\bar{N}\left[1-\frac{\sqrt{1-\beta/\bar{N}}\sqrt{V_A k[V_A k\bar{N}(\bar{N}-\beta)+8(1+\bar{N})(V_A-c)]}-V_A k(\bar{N}-\beta)}{4(V_A-c)}\right], \frac{2\bar{N}(V_A-V_C)}{(\bar{N}-\beta)V_A k}-1\right\}$. We characterize the impact of scalpers on the market outcome in Proposition 3.

Proposition 3: (Platform integration can make the presence of scalpers beneficial to regular consumers.) Suppose $V_A > [2/(2-k)]V_C$, $\alpha_{INT} < \alpha \leq \alpha_{SCP}$ and $\beta < [2\alpha - (1+\alpha)\bar{N}]/(1-\alpha)$. In the integrated-platform case, the presence of scalpers will in equilibrium strictly reduce the final ticket price p^*. Moreover, if $\alpha > \alpha_{IDP}$ is also satisfied, then the presence of scalpers will strictly increase the musician's profit, the integrated platform's profit and the consumer surplus (excluding scalpers).

Contrary to the conventional belief that scalpers will raise the effective ticket prices paid by consumers and thus reduce consumer surplus, Proposition 3 shows that, with an integrated platform, the presence of a small number of scalpers can benefit the platform, the musician, and the consumers. This is because the presence of scalpers can induce the integrated platform to strategically reduce the primary-market price to encourage resale transactions , which can alleviate double marginalization in the primary market.

Note that Proposition 3 does not suggest that scalpers will *always* benefit consumers and the musician. Indeed, there are several boundary conditions for the presence of scalpers to be beneficial. For example, if the population of avid fans is small such that $\alpha \leq \alpha_{INT}$, the platform will find it optimal to set $p = (1-k)V_A$ to serve both casual fans and avid fans even when there are no scalpers. Under this condition, scalpers will strictly reduce the consumer surplus. Moreover, the segment size of scalpers (β) cannot be too high. If there are too many scalpers, consumers are worse off because fewer tickets will be available for regular consumers in the primary market, forcing too many avid fans to buy resale tickets at higher prices. It is also important to point out that scalpers can benefit the consumers only when the primary and the resale platforms are integrated. In the independent-platforms case, the primary platform does not receive any resale profit, so it has no incentive to reduce the final ticket price to attract scalpers. Thus, with an independent resale platform, the presence of scalpers will not facilitate channel coordination in the primary market.

Endogenous Resale Percentage Fee **k**

Our main model has assumed the resale percentage fee k to be exogenous. In this model extension, we analyze the optimal choice of k for the resale platform. In the independent-platforms case, after the musician has chosen the venue size N and the face price f, the primary platform will set the final price p and the resale platform will set the resale percentage fee k simultaneously. In the integrated-platform case, the integrated platform jointly chooses p and k to maximize its profit. Under the original assumption that avid fans are always able to attend the concert, in the independent-platforms case, the primary platform will always find it optimal to choose $p \geq V_C$ such that no casual fans will buy in the first period. Thus, the resale platform will receive zero profit regardless of its choice of k. Therefore, to allow for a more meaningful comparison of how platform integration affects the equilibrium resale percentage fee k^*, we need both avid fans and casual fans to have some probability of not being able to attend the concert. To this end, we introduce *another* random interruption that can prevent a consumer from attending the concert (in addition to the random factor in the main model). Suppose that the new interruptive events (e.g., mandatory out-of-town travels or personal emergencies) have a probability δ of occurrence, in which case a consumer (both avid and casual) will be unable to attend the concert. Thus, one can show that overall, avid fans can attend the concert with probability $\rho_A = 1-\delta$, and the casual fans can attend with probability $\rho_C \sim$ uniform $(0, 1-\delta)$. Under this assumption, even if only avid fans buy tickets in the first period, there will still be resale transactions because avid fans resell their tickets in the second period with probability δ. To concisely present the results, we consider the case of $\delta \to 0^+$. The qualitative results will still hold true as long as δ is not too large. Proposition 4 reveals how platform integration will change the resale percentage fee.

Proposition 4: (Platform integration can reduce the resale percentage fee.) When $\alpha < \bar{N}[1-\frac{\sqrt{(V_A-V_C)\left[(V_A-V_C)\bar{N}^2+8(1+\bar{N})(V_A-c)\right]}-(V_A-V_C)\bar{N}}{4(V_A-c)}]$, an integrated platform will choose a strictly lower resale percentage fee (k) than that chosen by an independent resale platform (i.e., $k^*_{INT} < k^*_{IDP}$).

Proposition 4 reveals that when the population of avid fans is low, the integrated platform's optimal resale percentage fee k^*_{INT} will be lower than an independent resale platform's choice, k^*_{IDP}. The intuition is as follows. A lower resale percentage fee can incentivize consumers to buy tickets in the primary market, because their future potential reselling cost is lower. In other words, lowering k will have a positive spillover effect from the resale market to the primary market. An integrated platform can internalize the spillover effect and tends to reduce k.

Competition in the Resale Market

This model extension examines the scenario in which the integrated platform competes with an independent resale platform in the resale market. This represents the situation in which Ticketmaster competes with StubHub in the resale market. The competition in the resale market will tend to reduce the resale percentage fee k. For tractability, we assume that the integrated platform and the independent resale platform have the same resale percentage fees k_{COMP} with $k_{COMP} < k$. A fraction ϕ of resale-ticket buyers buy from the integrated platform, and a fraction $1 - \phi$ of resale-ticket buyers buy from the independent resale platform. Although we do not model how k_{COMP} and ϕ are determined in equilibrium, our assumptions reflect that the resale service fee will decrease under competition in the resale market, so we can analyze how competition in the resale market will affect the equilibrium prices, profits and consumer surplus.

One can show that when $k_{COMP} < 1 - (V_C/V_A)$, the integrated platform will choose a final ticket price such that only avid fans will buy in the primary market in the first period, so there will be no resale transactions in the second period. In other words, if the integrated platform anticipates that the presence of a competing resale platform would reduce the resale service fee from k to some $k_{COMP} < 1 - (V_C/V_A)$, then the integrated platform will not reduce its price in the primary market to attract casual fans to buy tickets in the first period. Below, we analyze the more interesting case of $k_{COMP} \geq 1 - (V_C/V_A)$.

Compared with the integrated-platform case without resale competition, one may intuit that introducing resale competition will make consumers better off. Proposition 5 shows that, counterintuitively, resale competition can make the musician and the consumers strictly worse off, even though the resale service fee, k, will decrease.

Proposition 5: (Resale competition can hurt consumers and musicians.) Suppose $\alpha_{INT} > 0$ and $k_{COMP} \geq 1 - (V_C/V_A)$. Then there exists $\phi^* > 0$ such that if $\phi < \phi^*$, then resale competition will strictly increase the final price p and strictly reduce the musician's profit and the consumer surplus.

When the integrated platform's resale market share is low, the integrated platform can capture only a small fraction (ϕ) of resale transactions. Thus, it will have little incentive to reduce p to induce more transactions in the resale market. As a result, the double-marginalization problem in the primary market is less likely to be mitigated, so resale competition can reduce the musician's profit and the consumer surplus.

Suggestive Empirical Evidence

This subsection provides some suggestive empirical support for our theoretical findings. We acknowledge that our empirical results suggest only correlational associations rather than causal relationships. Moreover, the empirical setting is different from our theoretical model setup for paperless tickets, though in both settings the spillover effects between the primary and the resale markets will influence the platforms' pricing decisions in a similar fashion. Thus, one should interpret the results in this subsection as suggestive, indirect, correlational supports for some of our theoretical predictions.

When musicians contract with Ticketmaster to sell tickets on their behalf, they can choose whether to enroll in Ticketmaster Resale program. If they enroll, consumers will be able to resell their tickets on both Ticketmaster and third-party resale platforms (e.g., StubHub). If they do not enroll, then consumers will not be able to resell their tickets on Ticketmaster but can still resell on third-party resale platforms. Many musicians do not enroll in Ticketmaster Resale because they worry that doing so can encourage scalping and result in higher prices (Knopper 2014). It is plausible that some musicians' decisions on whether to enroll in Ticketmaster Resale are not due to their profit-oriented concerns.

Our previous theoretical analysis suggests that platform integration will weakly lower the equilibrium primary-market price and the resale fee percentage. Ticketmaster can profit from both the primary and the resale markets for concerts enrolled in Ticketmaster Resale; thus, according to the insights from our main models, Ticketmaster will have more incentives to reduce its service fee in the primary market for those concerts than for concerts not enrolled in Ticketmaster Resale. Moreover, for concerts enrolled in Ticketmaster Resale, Ticketmaster should have more incentives to reduce the resale service fee than a third-party resale platform like StubHub that does not have sales in the primary market.

Prediction 1: Ticketmaster will set lower service fees on the primary platform for concerts with Ticketmaster Resale than for concerts without Ticketmaster Resale.

Prediction 2: For concerts with Ticketmaster Resale, Ticketmaster will set lower resale percentage service fees than StubHub's for the same concerts.

We manually collected data for all pop and rock concerts in Missouri in 2018 that were on sale at Ticketmaster.com on December 20, 2017. We excluded musicians promoted by Live Nation, the parent company of Ticketmaster. We also excluded concerts with general admission because of their unlimited supply of tickets. A total of 62 concerts satisfy these conditions, 34 of which were enrolled in Ticketmaster Resale. A concert usually has multiple price levels. Our data set contains 199 price levels in total for all the concerts, and we treat each price level of a concert as an observation in our analysis. For each observation, we collected the data on the ticket's face price and the primary-market per-ticket service fee on Ticketmaster,[13] whether the concert is enrolled in Ticketmaster Resale, and the

[13] Some concerts also charge per-order "order processing fees" to "offset the costs of ticket handling, shipping and support" (https://help.ticketmaster.com/s/article/How-are-ticket-prices-and-fees-determined). Because we do not have the data for order processing fees, and they are relatively small (usually below $5 per order) compared with the per-ticket service fee, our analysis will use the per-ticket service fee as a proxy for the total fees on Ticketmaster. We also exclude some fees (e.g., facility charges) that are charged by other entities (e.g., the venue), because those fees are not Ticketmaster's strategic decisions.

Table 3. Summary Statistics.

Variable	Mean	SD	Median	Min	Max
Ticket face price ($)	81.75	63.51	59.00	15.00	345.00
Primary-market service fee ($)	12.26	5.37	10.35	4.85	29.80
Last.fm followers	898,731	949,743	635,605	0	4,328,799
Songkick followers	513,086	663,277	222,592	0	1,791,395
Ticketmaster Resale enrolled[a]	.508	.501	1	0	1

[a]Dummy variable equal to 1 if true, 0 otherwise.

Table 4. Estimation Results (Independent Variable: Primary-Market Service Fee).

Variables	(1) OLS	(2) OLS	(3) OLS	(4) Robust SD
Intercept	7.21***	8.48***	—	—
	(.43)	(.79)		
Ticketmaster Resale Enrolled?	−.88*	−1.77***	−1.15**	−1.15**
	(.50)	(.55)	(.48)	(.46)
Face price	.06***	.06***	—	—
	(.0039)	(.0029)		
Higher-order polynomial of face price	No	No	Yes	Yes
Last.fm follower	—	-1.6×10^{-7}	-1.6×10^{-7}	-1.6×10^{-7}
		(3.4×10^{-7})	(2.8×10^{-7})	(3.2×10^{-7})
Songkick follower	—	7.0×10^{-7}	7.2×10^{-7}	7.2×10^{-7}
		(8.8×10^{-7})	(7.5×10^{-7})	(8.3×10^{-7})
Promoter and venue fixed effect	No	Yes	Yes	Yes
Number of observation	199	199	199	199
R^2	.606	.946	.963	.963

*$p < .1$.
**$p < .05$.
***$p < .01$.
Notes: Standard deviations in parentheses. OLS = ordinary least squares.

concert's promoter and venue information. In addition, we manually collected data for a musician's numbers of followers on Last.fm (an online radio website) and on Songkick (an online music community) as of December 21, 2018, to control for the musician's popularity. Table 3 shows the summary statistics of some variables.

We examine how the enrollment of Ticketmaster Resale affects the primary-market service fee on Ticketmaster with the following regression:

$$\text{ServiceFee}_i = \beta_0 + \beta_1 \times \text{TicketmasterResale}_i + h(\text{FacePrice}_i) + X_i\beta + \epsilon_i. \quad (3)$$

$\text{TicketmasterResale}_i$ is a dummy variable for concert i's enrollment in Ticketmaster Resale. $h(\cdot)$ is a polynomial of the ticket's face price, which is specified as either a linear function or the polynomial leading to the lowest Bayesian information criterion (BIC) for the regression. X_i is the vector of the control variables such as the musician's number of followers on Last.fm and that on Songkick, and the event-promoter and the venue dummies. Prediction 1 predicts that β_1 should be negative.

Table 4 summarizes the estimation results. A concert's enrollment in Ticketmaster Resale is negatively correlated with its primary-market service fee on Ticketmaster. Enrollment in Ticketmaster Resale is associated with a $1.15 drop in service fee on the primary platform, which translates to 11.1% of the median primary-market service fee on Ticketmaster. The finding is consistent with Prediction 1 that the service fee in the primary market is lower for concerts enrolled in Ticketmaster Resale.

We also collected the resale percentage fees on Ticketmaster and on StubHub for all 16 concerts enrolled in Ticketmaster Resale between April 27, 2018 and December 31, 2018.[14] Figure 4 compares their resale percentage fees on Ticketmaster with those on StubHub. For all these concerts, Ticketmaster charges lower percentage fees than StubHub does. A paired t-test also shows that Ticketmaster's resale percentage fee is lower than StubHub's on average: $\text{mean}(\text{Ticketmaster}) = 18\%$, $\text{mean}(\text{StubHub}) = 21.9\%$, $t = 16.19$, $p < .001$. This is consistent with Prediction 2—for concerts enrolled in Ticketmaster Resale, Ticketmaster will have more incentives to charge a lower resale percentage fee than StubHub will.

[14] We collected these data on April 26, 2018, so we were unable to find the resale service fees on StubHub for concerts before this date.

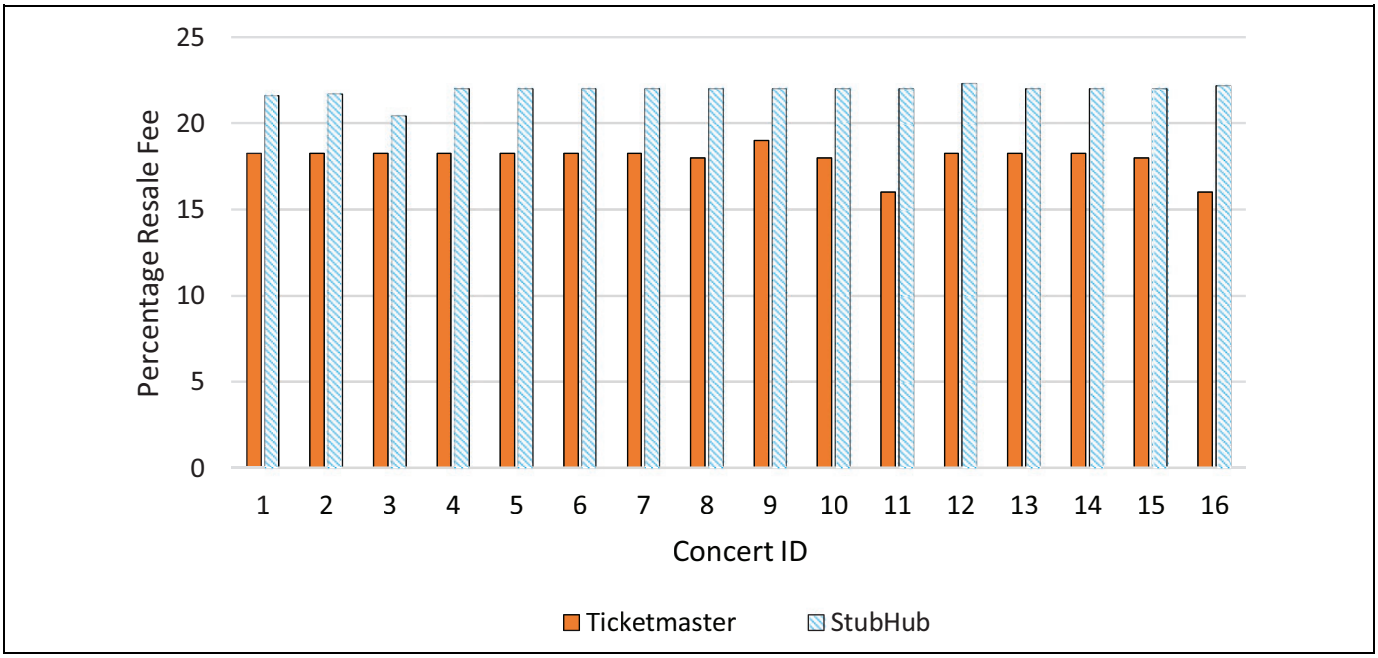

Figure 4. Resale percentage fee: Ticketmaster versus StubHub.

Discussion and a General Model

One main message of this research is that, because of the positive spillover effect from the primary to the resale market (i.e., lowering the price and boosting sales in the primary market will increase the resale supply), platform integration will incentivize the platform to lower the final price in the primary market to internalize the spillover effect, which will alleviate double marginalization in the primary market (relative to the case of independent platforms). In the concert-ticket context, the integration of the primary platform and the resale platform can make the musician, the platform, and the end consumers all *better off*.

Even though our discussion has revolved around the concert-ticket industry, which motivated our research, our main qualitative insight—letting an integrated platform control both the primary and the secondary markets can lead to lower prices and a win-win outcome for the firms and the consumers—can be applicable to other markets with similar spillover features. For example, when a retail platform (e.g., Amazon) sells both new and used books, it may have an incentive to lower the retail price for new books so that more consumers will buy new books, so more consumers will later sell their used books on the platform. Thus, the double-marginalization problem in the primary channel for new books (between the publisher and the retail platform) can be alleviated. Our qualitative findings can also be applied to peer-to-peer product-sharing markets, the product quality and channel-pricing aspects of which have been studied in Tian and Jiang (2018) and Jiang and Tian (2018). Some car manufacturers provide their own peer-to-peer car-sharing services. For example, Mercedes-Benz car owners in Germany can rent out their cars to others on Croove, Mercedes-Benz's own peer-to-peer sharing platform. The insight of our research will predict that a car manufacturer with its own peer-to-peer sharing platform can have an extra incentive to lower its car prices, inducing more consumers to buy cars and later rent out their (underutilized) cars on the manufacturer's sharing platform, which will increase the manufacturer's profit from its sharing platform. We acknowledge that such markets have some differences from the concert-ticket market (e.g., competition in book and automobile markets are more intense, books and cars are not single-use products and depreciate over time, car owners themselves may use the cars some of the time). Nevertheless, our qualitative insight—that an integrated platform, compared with independent platforms, tends to charge lower prices and can benefit consumers—can be generalized to related markets with positive cross-market spillovers, where more transactions in one market will increase the supply of another market.

We formalize this argument with a general model that abstracts away from many institutional details of the concert-ticket market. Consider two related markets—the primary market and the secondary market. Let us label the primary market as market A (e.g., the primary market of concert tickets or cars) and the secondary market as market B (e.g., the ticket resale market or the car-sharing market). Consumers' valuation of a product in market B can be the same as that in market A (as in the case of concert ticket) or can be different from that in market B (as in the case of used-goods or product-sharing markets). The product prices in the two markets are p_A and p_B, respectively. Consumers are indexed by $i \in I$, where I

represents the set of all consumers. Consumer i's probability of buying the product from market A, conditional on p_A and p_B, is $P_i = P_i(p_A, p_B)$. We assume that $\partial P_i/\partial p_A<0$ (i.e., consumers are less likely to buy from market A as p_A increases). If consumer i has bought a product in market A, she will have a probability $\phi_i = \phi_i(p_B)$ of reselling or renting out the product in market B. We assume that $d\phi_i/dp_B>0$: for example, in the concert-ticket market, consumers are more likely to resell their tickets if the resale price is higher. The population of consumers is normalized to one.

The demand in market A is $D_A(p_A, p_B) = \int_{i\in I} P_i\,di$; the supply in market B is $S_B(p_A, p_B) = \int_{i\in I} (P_i \times \phi_i)\,di$. Note that $\partial D_A/\partial p_A = \int_{i\in I} (\partial P_i/\partial p_A)\,di<0$ and $\partial S_B/\partial p_A = \int_{i\in I} [(\partial P_i/\partial p_A) \times \phi_i]\,di<0$. These two inequalities indicate that, in this general model, there is a positive spillover effect from market A to market B—holding p_B constant, a lower p_A will increase not only the demand in market A but also the supply in market B.

Next, we examine how the firms' pricing decisions are different when the two markets are respectively controlled by two independent platforms (the independent-platform case) versus when they are controlled by an integrated platform (the integrated-platform case). The demand in market B is denoted by $D_B(p_A, p_B)$ with $\partial D_B/\partial p_B<0$. Because the products in the two markets are substitutes, we assume $\partial D_B/\partial p_A>0$. The equilibrium price in market B is the market-clearing price p_B^*, at which $D_B(p_A, p_B^*) = S_B(p_A, p_B^*)$. It can be shown $\frac{\partial p_B^*}{\partial p_A} = -\frac{\partial(S_B-D_B)/\partial p_A}{\partial(S_B-D_B)/\partial p_B^*} \geq 0$, because an increase in p_A will reduce S_B (due to the spillover effect) and increase D_B (due to the substitution effect). Therefore, the prices in the two markets tend to move in the same direction. The platform's per-transaction revenue in market B is $k(p_B)$, a function of p_B. For example, if the platform charges a percentage fee z in market B, then $k(p_B) = z \times p_B$; if the platform charges a fixed fee, then $k(p_B)$ is a constant. The platform's marginal cost in market A and B are c_A and c_B, respectively.

In the independent-platform case, platform A's profit is $\pi_A = D_A(p_A, p_B^*) \times (p_A - c_A)$. Assuming that π_A is globally strictly concave with respect to p_A, then platform A's optimal price, $p_{A,IDP}^*$, is the unique solution to the first-order condition given by Equation 4:

$$0 = \frac{d\pi_A}{dp_A} = \int_{i\in I} \left[\frac{dP_i}{dp_A}(p_A - c_A) + P_i\right] di. \quad (4)$$

By contrast, the integrated platform's profit will be $\pi_{INT} = \pi_A + \pi_B = \pi_A + (k(p_B^*) - c_B)\,S_B(p_A, p_B^*)$. If π_{INT} is globally strictly concave, the integrated platform's optimal price in market A, $p_{A,INT}^*$ will be the unique solution to:

$$0 = \frac{d\pi_{INT}}{dp_A} = \frac{d\pi_A}{dp_A} + \frac{d\pi_B}{dp_A} = \frac{d\pi_A}{dp_A} + (k(p_B^*) - c_B) \times \frac{\partial S_B}{\partial p_A} + \frac{\partial \pi_B}{\partial p_B^*} \times \frac{\partial p_B^*}{\partial p_A}. \quad (5)$$

The second and the third terms of Equation 5 show that the integrated platform's price p_A in market A affects π_B, its profit in market B, in two ways. The second term, $(k(p_B^*) - c_B) \times \frac{\partial S_B}{\partial p_A}$, represents how the spillover effect (whose size is $\partial S_B/\partial p_A$) affects the platform's profit in market B. This term is always negative, so the spillover effect due to the decrease in p_A will increase the integrated platform's profit. The third term, $(\partial \pi_B/\partial p_B^*) \times (\partial p_B^*/\partial p_A)$, represents how the reduction of p_A affects the platform's profit in market B through reducing p_B^*. If the spillover effect is strong enough such that $\left|\frac{\partial S_B}{\partial p_A}\right| > \frac{1}{k(p_B^*)-c_B} \times \frac{\partial \pi_B}{\partial p_B^*} \times \frac{\partial p_B^*}{\partial p_A}$, reducing p_A will increase the platform's profit from market B ($d\pi_B/dp_A<0$), so $d\pi_{INT}/dp_A < d\pi_A/dp_A$. This implies $p_{A,INT}^* < p_{A,IDP}^*$ (i.e., platform integration or monopoly control of the primary and secondary markets will lead to a lower price in market A). Moreover, the market-clearing price in market B will also decrease because $\partial p_B^*/\partial p_A \geq 0$.

Conclusion

The main message of this article is that musicians and consumers can benefit from the primary ticket platform's control of the resale market. This is due to the positive spillover effects between the primary market and the resale market—lowering the price or the service fee on one platform will lead to more transactions on the other platform. The integrated platform will tend to internalize the positive spillover effect by lowering the service fees in both markets, which can alleviate the double-marginalization problem in the primary market, so the musician is more willing to choose a larger venue size to serve more consumers. Consequently, the musician, the platforms, and consumers can be better off at the same time. We also find that the presence of a small number of scalpers can lead to lower ticket prices, higher profits for the musicians, and higher consumer surplus. Using data from Ticketmaster and StubHub, we provide some empirical support for some of our theoretical predictions.

Our research has important implications for the ongoing legislation movement on restricting a primary ticket platform's ability to block competitors in the resale market in many U.S. states. The economic concern of such legislations is that platform integration will increase the service fees in the primary and resale markets, which will harm consumers and musicians. In this article, we argue that such reasoning may be flawed because it neglects an integrated platform's incentive to strategically reduce the service fees to internalize the positive spillover effect between the primary and the resale market. Our policy suggestion is that the legislation should be more careful

in restricting the primary platform's control of ticket resales or the price coordination between primary and resale platforms.

This research is also related to antiscalping laws. It has long been debated whether allowing scalping could benefit the ticket sellers and consumers. This article provides another reason why scalpers can potentially play a positive role in the market—that is, their presence may incentivize the integrated platform (with both primary and resale market operations) to set a lower final price in the primary market, which reduces double marginalization in the primary market, potentially making the musicians, the platform, and the consumers all better off.

This article develops an analytical framework to analyze the interaction among the musician, the primary platform, and the resale platform in the concert-ticket industry. The framework provides a foundation for future research on related topics such as second-degree price discrimination. Our article also provides some correlational empirical support for our theoretical predictions. We hope our research motivates future empirical research to more systematically validate our insights or predictions and to further explore how the welfare of the musicians and consumers will be affected.

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