Another Look at Anti-Scalping Laws: Theory and Evidence

Craig A. Depken, II
Department of Economics
University of Texas at Arlington
Office: (817) 272-3290
Fax: (817) 272-3145
E-mail: depken@uta.edu

This paper has benefited from the comments of seminar participants at the University of Texas at Arlington, the 2005 Southern Economic Association annual meetings, and a helpful anonymous referee.

Another Look at Anti-Scalping Laws: Theory and Evidence

Abstract

This paper investigates the impact of anti-scalping laws on the face value of tickets in professional football and baseball. Previous theoretical models have suggested that scalpers might cause an increase in prices at the ticket window because they represent an increase in demand. This paper provides a model in which ticket scalping has an ambiguous impact on ticket window prices, making the actual impact an empirical question. Empirical analysis suggest that in cities with anti-scalping laws average per-game season ticket prices are approximately $2 greater in baseball and $10 greater in football. Anti-scalping laws actually increase team revenues, as the laws have no adverse effect on attendance. Thus, event promoters might have sufficient pecuniary incentive to tacitly or explicitly support anti-scalping legislation.

JEL Classifications: D40, L82, L83.

Keywords: ticket pricing, professional sports, secondary markets.

1 Introduction

Most economists would agree that government intervention in the market process should pass some efficiency criteria. Unfortunately, it is often unclear whether the criteria are met or even considered before government intervention is implemented. One form of intervention economists have found befuddling is the anti-scalping law, which aims to limit the resale of tickets to sporting and entertainment events lest a secondary market lead to high prices and perhaps an "unfair" distribution of a limited number of tickets to a popular event. In 2002, approximately $13.6 billion was spent on professional and amateur spectator sporting events (Census Bureau, 2005, Table 1229), and 28 states and numerous municipalities had laws banning the resale of tickets or limiting the profit that can be earned in a resale (National Conference of State Legislatures, 2002). Given the scope of the professional sports market and the increased legislative efforts to limit or restrict secondary markets for tickets, anti-scalping laws warrant both theoretical and empirical analysis.

The unique characteristics of tickets for entertainment events, specifically their fixed supply and uncertain demand, have motivated economists to investigate the conditions under which a profit-maximizing event promoter will price tickets below what seems to be market clearing. If prices are set below market clearing levels, arbitrage possibilities often create a secondary market for tickets in which prices might be considerably higher than the face value of the ticket. These secondary markets are one target of anti-scalping laws, but just as often anti-scalping laws are heralded as promising lower ticket prices in the primary market, i.e., at the ticket window.

This paper contributes a theoretical model of the impact of anti-scalping laws on the face value of tickets, following in spirit the model of Courty (2003). Courty's model suggests that scalpers cater to "executive fans" who have highly uncertain demand, which is not affected by the presence of anti-scalping laws. Therefore, such laws might not have an impact on the face value of tickets to an event. The model developed herein assumes that speculators have a low residual value of the ticket; the speculator values the high quality ticket only in as much as it is profitable to resell on the secondary market, assumed to occur with a probability less than one. Because the expected value of a ticket on the secondary market might be lower than the willingness to pay by "true fans," event promoters might find it revenue enhancing to price tickets such that both speculators and true fans purchase tickets. However, if scalping is effectively restricted, event promoters might find it revenue enhancing to raise ticket prices. If this is the case, event promoters might have pecuniary reasons to explicitly or implicitly support anti-scalping legislation.

The implications of the model are tested in Major League Baseball (MLB) and the National Football League (NFL). These two sports share many host-cities and the variation of anti-scalping legislation over the sample period allows for possibly different effects in these two leagues given the significant differences in the number of home games and average per-game attendance. The empirical findings prove interesting. Contrary to the cross-sectional evidence found by Williams (1994), it is shown that anti-scalping legislation tends to correlate with higher ticket prices in these two sports. The results suggest that the change in prices that correlates with anti-scalping laws might yield $2 million per year in additional revenue to teams in football and baseball. Therefore, team officials may have sufficient monetary incentive to tacitly or explicitly support anti-scalping legislation in their city.

2 Ticket Scalping Legislation: The Existing Literature

The literature investigating anti-scalping laws is primarily theoretical in nature. The earliest theoretical models assume that speculators increase the demand for tickets at the window, and therefore if anti-scalping laws are fully effective they reduce the demand for tickets at the window and therefore should cause a reduction in ticket prices, ceteris paribus (e.g., Barnicke, 1973, and Williams, 1994). Moreover, limiting access to tickets to only those who plan to attend the event, rather than resell to a higher bidder, makes the distribution of tickets "more fair" (Spitzer, 1999). The intuition offered in support of this claim is that the existence of a secondary market motivates speculators or ticket brokers to purchase tickets for the event and seek to resell them to other, perhaps more wealthy, individuals, thereby limiting access to the event to an elite. Ticket brokers therefore compete with traditional fans for tickets, artificially enhancing demand for the event and increasing prices.

The initial theoretical models in this area focused on the very existence of secondary markets for entertainment events, which suggests that ticket prices are set below static market clearing levels. The first-best result from the point of view of the event promoter is to engage in first-degree price discrimination, charge each person their reservation price, and remove all (or most) of the arbitrage possibilities that lead to secondary markets. However, there is a plethora of reasons for why this first-best approach is not used in practice, therefore justifying an event promoter deliberately setting prices "too low."

DeSerpa (1994) suggests that an event promoter does not play a static pricing game and considers reputation effects which might be adversely affected by setting prices at market clearing levels; event promoters might alienate consumers from future events. Williams (1994) and Swofford (1999) suggest that transaction costs hinder the first-best approach; event promoters can not afford to discover the reservation price of a sufficient number of consumers and therefore find it better to price tickets to sell more, even if at a lower uniform price. In a brief comment, Barnicke (1973) suggests that sufficiently stochastic demand encourages lower ticket prices so that promoters ensure a certain level of ticket revenue while trading off potentially higher revenue associated with greater risk.

Swofford (1999) suggests that speculators have different costs, risk tolerances, and revenue functions compared to promoters and therefore might exist even while not impacting event promoter revenue. Nevertheless, Swofford suggests that promoters are still the most likely to favor anti-scalping laws. In a rejoinder, Spindler (2003) hints that uncertainty in the secondary market would affect the initial demand for tickets and therefore speculators might impact promoter revenue. Spindler also suggests that promoters might support anti-scalping laws even if speculators cause an increase in prices if the laws push some but not all speculators out of the market.

Two recent theoretical models of anti-scalping legislation contribute different views to the debate. Courty (2003) predicts that anti-scalping laws will have no effect on ticket prices in the primary market. The intuition is that ticket sales take place in a sequential game. In the first period, tickets are sold to those with certain demand, although their demand may not be correlated with a high value placed on the event. After the initial round of ticket sales, ticket brokers purchase the remaining tickets in the second round of the game. These brokers attempt to resell these tickets, in a third round of the game, to high value consumers with highly uncertain demand that is not realized until just before the event takes place.

These late or last minute purchases are envisioned as executives or businessmen who would like to attend the event, and if they do they demand high quality seats, but they are uncertain about their ability to attend the event during the first and second rounds of ticket sales. Banning scalping does not change the uncertainty of the executive fan's demand. Therefore, event promoters are unlikely to lower ticket prices simply because scalping is made illegal because the nature of the uncertain demand is not affected by the law. Rather than risk the possibility that good seats are not sold at all, event promoters do not mind the existence of speculators not because prices are increased but because speculators agree to bear some risk in the distribution of tickets across consumer types. The upshot of the Courty model is that the common expectation that anti-scalping laws will make tickets "more affordable" may be misplaced.

In a different approach, Karp and Perloff (2004) model speculators as providing a solution to an information asymmetry problem in which consumers do not have full knowledge about the value of a ticket. Their theoretical model describes a situation in which speculators help event promoters by conveying information. In the absence of speculators, event promoters are not able to convey full information to consumers about the true value of a ticket to the event, fewer tickets are sold and revenues decline. If speculators convey price information to consumers, and thereby ensure a stable revenue-maximizing equilibrium for the event promoter, event promoters are less likely to support anti-scalping legislation.

Which of these various theoretical constructs more accurately describes the actual effects of anti-scalping laws is an empirical question. Unfortunately, there are relatively few empirical investigations of anti-scalping laws. The only empirical paper specifically investigating the impact of anti-scalping laws on the ticket prices to professional sporting events is Williams (1994), who investigates how such laws impact ticket prices in the National Football League. Using a cross section of data from 1992, Williams finds evidence that ticket prices were approximately $2 higher in cities in which scalping is allowed. Williams suggests that speculators provide information about the true level of demand for tickets and therefore team owners raise prices. Yet, this assumes team owners consistently underestimate the demand for their events, which seems highly unlikely in the case of professional football;

the NFL has only eight home games and a high rate of sell-outs or near sell-outs.[1]

Three descriptive papers provide valuable background into the history and intentions of anti-scalping laws during the latter part of the twentieth century. Happel and Jennings (1989) discuss the mechanics of anti-scalping laws, their expected impacts on the primary and secondary markets for tickets, and enumerate the states and municipalities with anti-scalping laws at the time of publication. Happel and Jennings (1995) discuss the ineffectiveness of anti-scalping laws and also list the states and cities with anti-scalping legislation on the books up to the time of publication. Finally, Happel and Jennings (2002) discuss possible ways to create efficient secondary markets for tickets and provide a thorough review of existing models of ticket pricing. These papers provide a valuable data resource by reporting the anti-scalping laws that prevailed at the time of publication. Additionally, the National Conference of State Legislatures (2002) reported on anti-scalping legislation on the books in 2001.

To summarize, the literature on anti-scalping laws is primarily theoretical in nature, with a much smaller complementary empirical literature. The theoretical models focus primarily on the reasons for the existence of secondary markets and how they can be consistent with event promoters seeking to maximize profits. Some theoretical work has also focused on whether the presence of speculators is expected to change the face value of tickets. The few papers that empirically investigate the impact of anti-scalping laws on ticket prices look primarily at the operations of the secondary market and only one focuses on prices in the primary market.

3 A Model of Ticket Prices in the Presence of Scalping

To analyze the effect of anti-scalping laws, it is necessary to derive an equilibrium pricing scheme in the absence of scalping and an alternative equilibrium that applies when scalping is allowed. Then it is possible to compare the equilibrium prices in these two scenarios to determine whether anti-scalping laws would have the stated intended purpose of lowering the face value of tickets. Moreover, it is possible to compare the expected total revenue of the various pricing scenarios to determine whether event promoters would generally favor or disfavor anti-scalping laws.

To this end, the initial analysis is in the absence of scalping. This provides a baseline with which to compare the possible outcomes when scalping is allowed. The general setup is to assume only two types of tickets are provided by the event promoter, low quality and high quality. Both tickets allow

[1] While Williams' analysis is suggestive of the impact of anti-scalping laws, the analysis does suffer from potential problems. First are concerns with the actual data used; he combines price data from 1992, player salary data from 1988, and host-city income from 1987. At the least, such a combination of data in a cross-sectional analysis can lead to inefficient estimates, but if the data are not consistent (in an ordinal sense) between the late 1980s and early 1990s, there is a possibility of unknown specification bias which could invalidate statistical and economic testing. A second concern is in using cross-sectional data. At the time of Williams's study ample data on ticket prices had yet to be collected. However, now there are sufficient data to test the impacts of anti-scalping laws over time, across cities, and across different sport leagues, which might help address unknown omitted variables or specification bias and at the least will help with efficiency concerns.

access to the event but it is assumed that high quality tickets offer something of value compared to low quality tickets, for example better sight lines, proximity to the action, additional amenities, or access to additional services or concessions. Event promoters choose prices to maximize revenues, assuming a non-negative fixed cost for the event and that marginal costs of additional ticket sales are normalized to zero.

A. Ticket Pricing in the Absence of Scalping

In the absence of scalping, assume only two types of consumers: high demand and low demand. Both types desire to see the event live, but are sufficiently heterogeneous in preferences or willingness and ability to pay for the two different types of tickets. Assume the event promoter knows the reservation value of both types of tickets for both types of consumers: low demand types value low quality tickets at V_{LL} and high quality tickets at V_{LH}, whereas high demand consumers value low quality tickets at V_{HL} and high quality tickets at V_{HH}. For consistency, assume that $V_{HL} > V_{LL}$, $V_{HH} > V_{LH}$, $V_{LH} > V_{LL}$, and $V_{HH} > V_{HL}$.

Event promoters wish to maximize the revenues derived from selling tickets. There are three ways for the event promoter to attempt this. First is exclusionary pricing in which all tickets are priced to cause the high-demand types to have zero net surplus and all low-demand types are priced out of the market. A second strategy is inclusive pricing in which all tickets are priced to yield zero net surplus for low demand types and high-demand types enjoy some surplus. The final choice is to choose a price scheme such that consumers self-select into their preferred type of tickets, high-demand types buy high-quality tickets and low-demand types buy low-quality tickets. Consumers maximize their residual surplus while at the same time enhancing the revenue to the event promoter. These possibilities are depicted in Figure 1.

The event promoter can choose a sorting price scheme wherein the price of the low quality ticket is set at V_{LL} and the price of the high quality ticket is set at $P_H = V_{HH} - (V_{HL} - V_{LL})$. In this case, the high demand type is indifferent between a high quality or low quality ticket, i.e., they obtain the same surplus regardless of what ticket type they purchase. Meanwhile, the low demand type will only purchase low quality tickets because purchasing a high quality ticket yields negative surplus. To ensure pure separation, the event promoter would price the high quality ticket at $V_{HH} - (V_{HL} - V_{LL}) - \epsilon$, where ϵ is sufficiently large to ensure perfect sorting.[2]

The event promoter will choose the pricing scheme that yields the greatest revenue. If there are N_L low demand types and N_H high demand types, then the total revenue that is earned using exclusionary pricing, in which all prices are set at V_{HH}, is $TR_X = N_H \times V_{HH}$. On the other hand, the total revenue earned when using inclusionary pricing in which all tickets are sold at V_{LL}, is $TR_I = (N_H + N_L) \times V_L L$. The sorting pricing scheme will yield total revenue of $TR_S = N_H(V_{HH} - (V_{HL} - V_{LL})) + N_L V_{LL}$.

[2]For the remainder, ϵ is assumed to be zero.

The total revenue from the sorting equilibrium is greater than that obtained in inclusionary pricing if $N_H(V_{HH} - V_{LL}) > 0$ which holds if $V_{HH} > V_{LL}$, which is true by assumption. The total revenue from the sorting equilibrium is greater than the total revenue from exclusionary pricing if $TR_S > TR_X$ or $N_H/(N_L + N_H) > V_{LL}/V_{HL}$. This condition simply states that the percentage of high demand types must be greater than the ratio of the value of low tickets by low demand types to the value of low quality tickets for high demand types. In other words, if there is a sufficiently high proportion of high demand types then more revenue is obtained through sorting customers by charging two prices. Assuming this condition holds for the remainder of this discourse, the event promoter finds it in her best interest to choose the sorting pricing scheme.

Thus, in the absence of scalping and using customer sorting, the price of low quality tickets is set at V_{LL} and the price of high quality tickets is set at $P_H = V_{HH} - (V_{HL} - V_{LL})$. The price of high quality tickets (P_H) is the stated target of anti-scalping laws and is therefore the focus of the remaining theoretical derivations. If scalping is allowed is it likely that the face value of tickets will increase?

B. Ticket Pricing in the Presence of Scalping

In most models of scalping it is simply assumed that speculators increase the number of high demand types and that the (average) value placed on high quality tickets by all high-demand types increases, therefore enhancing price P_H. While a few speculators in the market might increase the willingness-to-pay for a few tickets, it is unlikely that this increase would be across the board. To assume that the demand for tickets will increase unambiguously at all price-quantity combinations implicitly assumes that there is a sufficiently large number of speculators in the market or that there is some increase in the true fan's willingness to pay when there is scalping. Neither assumption seems reasonable.

Instead, assume speculators only purchase high quality tickets in hopes of reselling the ticket for a premium in the secondary market. Speculators are therefore considered high-demand types but are differentiated from "true fans" and "executive fans." True fans are those who place considerable value on attending the event and are assumed not to sell their tickets on the secondary market. The executive fan, in the spirit of Courty (2003), places a high value on a single event, perhaps greater than the value to true fans, but has an uncertain demand that precludes purchasing a ticket in advance. Following Courty, the executive fan is catered to by a speculator who purchases tickets in advance with hopes of reselling in the secondary market.

Speculators are assumed to place a small residual value on the tickets they purchase, i.e., they receive little value from attending the game which might be the result of not selling a ticket in the secondary market. The main difference between this model and that of Courty is this recognition of the speculator's low residual value and its potential impact on the face value of tickets.

Therefore, when scalping is allowed two types of consumers can approach the ticket window:

true fans and speculators. If event promoters could differentiate between the two types of high-demand types, then the event promoter would choose between an inclusive, exclusive, or sorting pricing scheme that would yield the highest revenue. Unfortunately, the sorting pricing scheme is only possible if there is another margin on which to differentiate high-quality tickets. This might be possible in certain cases, for example back-stage access at a concert. However, in general it is not possible to differentiate high-quality tickets and therefore it is impossible for the event promoter to choose a sorting pricing scheme that will accurately sort true fans from speculators.

Does the promoter price tickets so that only one of the high-demand types purchase tickets, either only speculators or only true fans (depending on who values the tickets more), or does the promoter choose an inclusive price and sell tickets to both true fans and speculators (even if one type values the tickets more)? The analysis of this problem does not include a sorting pricing scheme if there are no additional ticket characteristics with which event promoters can sort speculators from true fans.

To describe the theoretical implications derived below, in the presence of scalping event promoters may leave ticket prices at the same level they were in the benchmark case derived above. However, the event promoter does have some alternatives. If the non-scalping price is greater than that which would naturally obtain in the presence of scalping, the event promoter will only choose the higher price if it yields greater revenue. On the other hand, if speculators are willing to pay more for tickets than the baseline case derived above, event promoters will only choose this higher price if it enhances revenue. As will be shown next, the impact of scalping on the face value of tickets and therefore event-promoter revenue is ambiguous.

To formalize the decision, assume that the speculator places a residual value on a ticket if he cannot resell the ticket in the secondary market, $R_{SH} < V_{HH}$, but also values the ticket for its expected profit on the secondary market. If $\rho \leq 1$ is the probability that a ticket can be resold to an executive fan who values the event at $V_{EH} \lesseqqgtr V_{HH}$, then the expected value of a ticket for the speculator is $V_{SH} = (1-\rho)R_{SH} + \rho(V_{EH} - \tilde{P}_H)$, where the second parenthetical term is the gross profit of selling a ticket to the executive fan for a price V_{EH} less the cost of the ticket which prevails with scalping, $\tilde{P}$.[3] The combination of the speculator's residual value of the ticket when it is not resold plus the expected profit of the ticket at resale is the total value placed on the high quality ticket by the speculator.

If the value of the executive fan is a positive multiple of the value of the true fan, then V_{EH} can be written as βV_{HH} where $\beta > 0$. This will simplify future analysis by allowing the expected value of the speculator to be written as $V_{SH} = (1-\rho)R_{SH} + \rho(\beta V_{HH} - \tilde{P})$. Before proceeding further, it is valuable to ask whether the expected value to the speculator is greater than the actual value to the true fan. This is an important question because most theories of scalping's impact on the

[3]The executive fan has a high valuation of the event $V_{EH} \geq V_{LH}$ but has uncertain demand. It is assumed that when scalping is allowed, each executive fan can find a ticket reseller if they wish, but the odds that a particular reseller will find an executive fan is less than or equal to one.

face value of tickets assumes that speculators shift the demand curve to the right, which could only occur if speculators place higher value on the tickets than true fans. The value to the speculator is greater than that of the true fan if

$$V_{HH} \quad < \quad \frac{(1-\rho)R_{SH} - \rho\tilde{P}}{(1-\rho\beta)}, \tag{1}$$

which is unlikely to hold, although it is possible. In general, the numerator of the far right hand side of condition (1) will be negative and therefore the condition will fail. Therefore, it is unlikely that the speculator values the ticket more than the true fan.

Given that the speculator likely values the ticket less than the true fan, to determine the impact of scalping on ticket prices, the event promoter asks herself what is the highest price she can charge the speculator without pricing him out of the market. This occurs when the speculator's expected net value of the high-quality ticket is zero, i.e., $V_{SH} = 0$, which implies a price of

$$\tilde{P} \quad = \quad \frac{(1-\rho)R_{SH} + \rho\beta V_{HH}}{\rho}. \tag{2}$$

The comparative statics of equation (2) indicate that $\partial\tilde{P}/\partial\beta > 0$, $\partial\tilde{P}/\partial R_{SH} > 0$, $\partial\tilde{P}/\partial\rho > 0$, and $\partial\tilde{P}/\partial V_{HH} > 0$. All of these marginal impacts make sense. The greater the value to the executive relative to the true fan, i.e., the greater is β, the speculator is willing to pay more at the ticket window. Further, as the speculator himself places greater residual value on the ticket if it is not sold, as the probability of selling the ticket on the secondary market increases, and as the value of the ticket to true fans increases, the speculator is willing to pay more for the ticket in the primary market.

To determine whether speculators increase or decrease price relative to the no-scalping benchmark, assume that the number of high-demand true fans is less than the full capacity of the stadium, i.e., there is an excess supply of tickets at the window at the benchmark price, P_H. If the price that will extract all of the speculator's expected value, $\tilde{P}$, is greater than the benchmark price, the event promoter can raise the ticket price and sell only to speculators or leave the price at P_H and sell to both speculators and true fans. On the other hand, if $\tilde{P} < P_H$, the event promoter can leave price at P_H and sell only to true fans and executive fans, or could lower ticket price and sell to true fans and speculators. Ultimately, the event promoter chooses that price which maximizes revenue.

It is easy to determine whether $\tilde{P}$ is less than the benchmark price P_H, however to expedite the discussion, the condition is cast in terms of β, the multiple of true-fan value enjoyed by executive fans:

$$\tilde{P} < P_H \quad \Leftrightarrow \quad \beta < \frac{\rho P_H - (1-\rho)R_{SH}}{\rho V_{HH}} = \frac{P_H}{V_{HH}} - \frac{(1-\rho)}{\rho}\frac{R_{SH}}{V_{HH}}. \tag{3}$$

The first term on the right hand side of condition (3) is less than or equal to one, assuming the event promoter chooses a sorting pricing scheme in the absence of scalping. The second term is likewise less than or equal to one in absolute value. In general the right hand side of condition (3) will be less than one. Therefore, if the executive fan values the ticket more than the true fan ($V_{EH} > V_{HH}$) then speculators will be willing to pay more than the benchmark price. On the other hand, if the executive fan does not value the ticket as much as the true fan, it is possible that speculators are willing to pay less than true fans.

Note that if the executive fan is only interested in a high-quality ticket, the executive fan might be willing to pay more for a high quality ticket than the true fan even if the true fan places a higher gross value on the high-quality ticket. This is because the price of the high-quality ticket sold to the true fan is tempered by the availability of the low-quality ticket, which the true fan is willing to buy if it yields greater surplus. On the other hand, if the executive fan is interested only in a high quality ticket, the availability of low quality tickets does not alter the executive fan's reservation price for a high quality ticket. Thus, the benchmark price $P_H = V_{HH} - (V_{HL} - V_{LL})$ might be less than the reservation price of the executive fan, βV_{HH}. Indeed, the executive fan can value the high quality ticket less than the true fan and still be willing to pay more if $\beta > 1 - (V_{HL} - V_{LL})/V_{HH}$. For example, if the true fan values a high quality ticket at \$100 and a low quality ticket at \$60, and low quality tickets cost \$20, the executive fan will be willing to pay more than the true fan for a high quality ticket if $\beta > 0.6$.

Is it likely that the executive fan values the high quality ticket less than the true fan? Arguably for the majority of sporting events, especially regular season games, true fans value tickets more than executive fans. True fans follow the players on a daily basis, are emotionally connected to the team's victories and defeats, and are therefore likely to place considerable value on high quality tickets. On the other hand, executive fans likely have little emotional connection to the team, it's players, or it's overall quality, but enjoy the event for the event's sake. Therefore, it is entirely possible that, except for high-profile events such as a Super Bowl or World Series, the true fan places greater value on the high quality ticket than the executive fan.

Whether speculators are willing to pay more or less than the benchmark price charged to true fans in the absence of scalping is itself an interesting question, however the decision of which price will prevail depends on which generates the most revenue for the event promoter. Just because the speculator is willing to pay more (or less) than the true fan does not immediately imply that the face value of tickets will increase (or decrease). If $\tilde{P} > P_H$ is chosen, then all true fans are priced out of the market and only speculators purchase tickets. On the other hand, if $\tilde{P} < P_H$ is chosen or $P_H < \tilde{P}$ is chosen, then both true fans and speculators purchase tickets. In the former case, depicted in Figure 2a, true fans will receive greater surplus than they would in the benchmark case. In the second case, depicted in Figure 2b, speculators earn a positive expected net value from their purchases.

As the event promoter chooses that price which maximizes total revenue, if $\tilde{P} < P_H$ then the event promoter will choose $\tilde{P}$ if $(N_H + N_S)\tilde{P} > (N_H + N_E)P_H$, where N_E is the number of executive fans who will purchase a ticket at the window because speculators are priced out of the market at P_H. The event promoter will choose $\tilde{P}$ if

$$\frac{\tilde{P}}{P_H} > \frac{N_H + N_E}{N_H + N_S}. \tag{4}$$

Condition (4) indicates that if the ratio of the price with speculators relative to without speculators is greater than the ratio of true high-demand fans and executive fans to the combined number of high-demand true fans and speculators, then the event promoter will choose the lower price. The intuition is straightforward. Choosing the higher price P_H will price the speculator out of the market. The only people to buy high-quality tickets are true fans and executive fans. On the other hand, by choosing the lower price, the event promoter sells to both speculators and true fans. If there are more speculators than executive fans, which will occur as long as $\rho < 1$ then it might pay for the event promoter to choose the lower price. This outcome is dramatically different from the predictions of other theories.

To be complete, the price charged in the presence of speculators can be greater than the benchmark price. Event promoters will choose the higher price if it enhances revenue, even though all true fans are priced out of the market. In other words, if $\tilde{P} > P_H$ then the event promoter will choose the higher price if $N_S\tilde{P} > (N_S + N_H)P_H$, or

$$\frac{P_H}{\tilde{P}} < \frac{N_S}{N_H + N_S}. \tag{5}$$

Condition (5) indicates that if speculators comprise a sufficiently large proportion of the primary market the event promoter finds it in her best interest to raise price to $\tilde{P}$ and sell only to speculators.

Do conditions (4) and (5) have any anecdotal connection to the real world. Condition (4) is more likely to characterize a sport such as baseball, which has a large number of home games, generally non-binding capacity constraints, and where the proportion of true and executive fans to the number of speculators and true fans is likely relatively low, as reflected in the number of unsold/unredeemed tickets. In such a sport, the existence of speculators likely reduces prices at the ticket window. On the other hand, for entertainment events in which the value placed on the event by executive fans is considerably more than for true fans, and in which the odds of selling a ticket are considerably higher such as a Super Bowl, it is more likely that allowing scalping will increase the ticket price at the window. This is because it is more likely that the number of speculators as a proportion of the overall market is sufficiently high to make it profitable for the event promoter to raise ticket price.

Anecdotal evidence seems to support this intuition. The average face-value ticket price for the 2002 Super Bowl was $400 (Rovell, 2002), and the face value of Super Bowl tickets in 2005 was $500 (Associated Press, 2005), both values approximately ten times as much as the prevailing average ticket price to regular season NFL games. However, the street price of Super Bowl tickets often exceed two or three thousand dollars. While the true fan might be willing to pay a premium to see their home team in the Super Bowl, the Super Bowl has long attracted non-football fans for it's cache and network effects rather than for its inherent "football" value. In other words, selling tickets to executive fans for more than face value is expected in the case of the Super Bowl.[4]

If $P_H > \tilde{P}$ is the price of a high-quality ticket when scalping is allowed, a prohibition on scalping would have no impact on the price of tickets, similar to the theoretical result of Courty (2003). If event promoters would charge $\tilde{P} > P_H$ in the presence of scalping, then banning the practice would lower ticket prices, consistent with the theoretical models of Swofford (1999) and the descriptive model of Williams (1994). On the other hand, if event promoters find it revenue enhancing to sell to both speculators and true fans at a price $\tilde{P} < P_H$ when scalping is legal but would charge $P_H > \tilde{P}$ when scalping is not allowed, then banning scalping would actually increase prices *at the ticket window*. This last possibility has not been considered in the previous literature.

While counter to the stated intended purpose of anti-scalping legislation, an increase in ticket prices after banning scalping would be consistent with the *qui bono* rule of thumb. If event promoters support anti-scalping legislation, it is unlikely that they expect the legislation to significantly reduce revenue, either through reduced ticket sales, reduced ticket prices, or both. On the other hand, if anti-scalping legislation had little impact on attendance but correlated with increased ticket prices, then event promoters stand to gain after the enactment of anti-scalping laws. An increase in ticket prices is clearly counter to the stated intended impact of banning secondary markets and provides incentive for closer empirical analysis of the impacts of anti-scalping laws on the face value of tickets.

4 The Effect of Anti-Scalping Legislation: Empirical Evidence

The previous section describes a model of ticket pricing in which scalping might reduce the window price of tickets if event promoters have difficulty in screening scalpers from true fans. Making ticket scalping illegal might mitigate the screening problem, after which it is possible that the window price of tickets might actually increase. However, the actual impact of anti-scalping laws is an empirical question.

Herein, two sports are investigated: professional baseball and football. These sports are chosen for two reasons. First, they are the two sports at the extremes of average ticket prices amongst the four major professional sports in North America. Baseball has the lowest per-game season ticket prices whereas football has the highest. Second, these two sports share a large number of host-cities. During the sample period, only Milwaukee, Los Angeles, Toronto, and Montreal (the last two not included in subsequent analysis), had baseball teams but not football teams. On the other hand, Buffalo (NY), Charlotte, Jacksonville (FL), Nashville, New Orleans, Green Bay, and Washington, D.C. had a football team but not a baseball team.[5] Therefore, the overlap of host-cities in football

[4]One wonders why the NFL doesn't raise the prices for Super Bowl tickets even further. However, it might prove politically untenable to increase the price of the tickets to this event to more than ten times the prevailing regular season ticket prices.

[5]During the sample period investigated here Denver and Miami gained a baseball team in 1993, and Phoenix and

and baseball facilitates a comparison of the impacts of anti-scalping laws on ticket prices in these two sports.

The price data employed in the empirical specification is the average per-game season ticket price as reported by the *Team Marketing Report* from 1991-2003. Season ticket prices are used for two reasons. First, the prices reported by the *TMR* are (relatively) consistently measured over time and are, for the most part, representative of the season ticket prices for the most desirable seats in each team's venue, i.e., the high quality tickets.[6] Second, public press reports indicate that season tickets are often the source of tickets for brokers/speculators. Either brokers purchase tickets from season ticket holders or they purchase their own season tickets. It is understandable that speculators would look to season tickets as a primary supply of tickets because most teams offer a discount for season ticket purchases relative to day-of-game or single-game purchases.

The theoretical model assumed that anti-scalping laws have no direct effect on attendance to an event as the model concerns the distribution of rents as team owners alter the window price of event tickets. However, the relationship between ticket price and attendance, well documented by other authors, is not obviated by anti-scalping laws. Therefore, to accurately estimate the impact of anti-scalping laws on ticket prices it is necessary to accurately account for the impact of attendance on ticket prices and vice-versa. Failure to do so can introduce endogeneity bias which can cause misleading inference.

Therefore to estimate the impact of anti-scalping laws on ticket prices, a two equation system is separately estimated for each sport. The first equation models average per-game attendance for team i in season t as a function of ticket price, anti-scalping legislation, and various other factors on which the literature has reached some consensus. The second equation models average per-game season ticket prices as a function of attendance, anti-scalping legislation, and various factors that might influence ticket prices without directly influencing attendance.

For each sport, the two-equation system is specified as

$$\begin{aligned} Q_{it} &= \gamma_1 P_{it} + \beta_1 NOSCALPING_{it} + \delta_1 Z1_{it} + u_{it} \\ P_{it} &= \gamma_2 Q_{it} + \beta_2 NOSCALPING_{it} + \delta_2 Z2_{it} + v_{it}, \end{aligned}$$

where Q_{it} is the per-game attendance for team i in year t, P_{it} is the average per-game season ticket price for team i in year t. The γ's, β's and δ's are parameters to be estimated, and $u_{it} = \alpha_i + \epsilon_{1it}$ and $v_{it} = \phi_i + \epsilon_{2it}$ are zero-mean composite error terms where α_i and ϕ_i are team-specific effects

Tampa Bay gained a baseball team in 1998. In the National Football League, the Houston Oilers moved to Tennessee in 1995, Cleveland moved to Baltimore in 1995, the Los Angeles Raiders relocated to Oakland in 1994, and the Los Angeles Rams relocated to St. Louis in 1994.

[6] Coates and Humphreys (2004) point out that there was a distinct change in how average season ticket prices were calculated after 1996. Since then, the Team Marketing Report has included the price of luxury boxes in the calculation of average season ticket prices.

that are constant over time and ϵ_{jit} is a white-noise error term, $j = 1, 2$. The vector $Z1$ ($Z2$) is comprised of variables thought to impact attendance (price) but not price (attendance) directly. As a benchmark, the two equations are estimated with a single-equation fixed effects estimator, assuming all regressors are uncorrelated with the error terms. The obvious endogeneity concerns are addressed using a two-stage fixed effects estimator, using the unique variables in $Z1$ ($Z2$) as instruments for attendance (price).

The specifications for the two equations are as similar as possible for the MLB and the NFL in order to facilitate comparison of the results, however the specifications differ slightly. The variables thought to directly influence attendance include the host-city population (POP), unemployment rate ($UNEMP$), and real per-capita income ($RINCOME$), the once-lagged team win percentage ($LAGWIN$), whether the team is an expansion franchise ($EXPANSION$), whether the team plays in a domed/retractable roof stadium ($DOME$), the number of other professional franchises in the host-city ($COMPS$), and indicator variables for stadium age ($NEWSTAD0$ - $NEWSTAD10$). The only variable not included in the NFL attendance equation is the domed stadium indicator variable. This variable is dropped because it is time-invariant for NFL teams during the sample period.

The vector $Z2$ in the price equation includes variables thought to directly influence price but indirectly impact attendance. Three variables measure the amount of "competition" a franchise faces in the immediate neighborhood of its stadium. The number of gasoline stations ($GASONEMILE$), grocery stores ($GROCONEMILE$), and restaurants ($RESTONEMILE$) within one mile of each team's stadium were obtained from Mapquest in early 2006. These variables are time-invariant for each stadium but not for each team (as teams move from an older stadium to a new stadium), and are more appropriately interpreted as proxies for outside goods rather than direct measures of substitutes.[7]

To further control for stadium characteristics, an indicator variable for whether a team's stadium is urban ($URBAN$),[8] single purpose ($SPURP$), a time trend that reflects the age of the team's stadium ($STAGE$), and an indicator variable for whether the stadium is less than six years old are also included ($NEWSTADIUM$). The trend towards single-purpose stadiums is expected to cause an increase in ticket prices as sightlines and spectator amenities are targeted towards a particular sport. The stadium age variables attempt to capture two different impacts of stadium age on ticket prices. First, teams in very old stadiums might be able to charge a premium viz-a-viz "middle

[7]A further assumption is that over the period of the sample the level of "development" within a mile of the stadium has remained relatively constant. For a large number of stadiums this is clearly the case. For example, the number of restaurants within a mile of the Ballpark in Arlington (Texas) has not dramatically changed in the past ten years. Inclusion of the number of restaurants in the football specification dramatically reduced the quality of the estimation, primarily because of colinearity with the number of grocery stores within one mile of a football team's stadium.

[8]This variable is somewhat subjective but was determined by a combination of a) whether the number of restaurants within one mile was greater than the median value in the sample, and b) visual inspection of satellite images of each stadium and its immediate surroundings. If a stadium was clearly located in a high-density central city, e.g., the Chicago Cubs, then the $URBAN$ variable was coded with a value of one.

aged" stadiums. However, the novelty effect of a new stadium on attendance suggests that team owners might extract consumer surplus through higher ticket prices in brand new stadiums. The time trend captures the "continuous" influence of stadium age on ticket prices, whereas the new stadium indicator variable captures the "discrete" influence of new stadiums on ticket prices.[9]

The last variable included in the price equation attempts to control for the variable costs incurred by team owners.[10] The variable $RWAMUSE$ is a proxy for the real wages paid in the amusement sector of each team's host city. These data were obtained from the Regional Economic Information System (REIS) available from the Bureau of Economic Analysis. For each host city, the REIS provides the total compensation in current dollars in "amusement and recreation services." Unfortunately, the REIS does not report the total number of employees in this sector, but does report the total number of employees in the "service" sector. The ratio of total amusement compensation to total service employees is used as a proxy for the relative variable costs for each team owner.[11]

Most of the variables included in the attendance equation are common to baseball and football demand studies. Several of the variables in the price equation are somewhat unique but are necessitated by the need for instruments with which to identify both price and quantity. However, $NOSCALPING$, the primary variable of interest as it indicates teams that play in cities where scalping is moderately to severely restricted, warrants explanation. The indicator variable $NOSCALPING$ was created using three sources: Happel and Jennings (1989), Happel and Jennings (1995) and the National Conference of State Legislatures (2002). It seems that once a state or municipality passes an anti-scalping ordinance it is unlikely that the ordinance is repealed, although the state of New Jersey experimented with free markets for tickets by repealing their anti-scalping legislation for a period of 18 months from 1995 through the middle of 1996 (Spitzer, 1999). Extensive search in the public press did not reveal any other experiments of this kind. Thus, starting with the data provided by Happel and Jennings (1989), the $NOSCALPING$ dummy variable is given a value of one if the team plays in a state or city that has an anti-scalping law. For years between the published lists of anti-scalping statutes, the dummy variable takes the same value. It is possible that some states passed their anti-scalping legislation a bit earlier than revealed in the $NOSCALPING$ variable, however it is hoped that this measurement error does not significantly distort the empirical results.

The descriptive statistics and variable definitions are reported in Table 1, the upper panel describing MLB and the lower panel describing the NFL. In baseball, average real ticket prices were \$14, with average per-game attendance of 27,600. Approximately 60% of the observations correspond with a team that played in a host city where scalping was restricted. Approximately 65% of

[9]Different indicator variables for different stadium ages were not statistically different from one another and were replaced with this single indicator variable to save degrees of freedom.

[10]Here I assume the major contribution to a team's variable costs are the wages paid to non-player, non-front-office personnel employed during the team's events.

[11]The REIS data are only available from 1991-2000. Extrapolated data were used for 2001, 2002 and 2003.

the observations correspond with a team that played in a single purpose stadium, 15% with teams that played in domed or retractable roof stadiums, and 17% with teams that played in stadiums less than six years old. Approximately 6% of the observations correspond with an expansion team and lagged win percentage does not equal 500 because of rounding errors. The city characteristics are consistent with other studies that investigate the same time period, such as Coates and Humphreys (2003) and Depken (2004). During the sample period, the average population of MLB host cities was 6.2 million, average real per-capita income was $31,000, average annualized unemployment of 5.25%, and there were approximately 2 other professional sports franchises in town. The proxy for real amusement wages averaged 1.20 with a standard deviation of 0.37. The data provided by Mapquest indicate that there were an average of 9 gas stations, 23 grocery stores, and 93 restaurants within one mile of a baseball stadium.

In the NFL average per-game season ticket prices were approximately $41 in 2000 dollars, with per-game attendance averaging approximately 62,000. During the sample period, approximately 64% of the observations corresponded with NFL teams that played in a city where scalping was restricted. Approximately 45% of the observations corresponded to a team with a single purpose stadium, and 14% that played in a stadium less than six years old. Approximately 3% of the observations corresponded with NFL expansion teams, and lagged win percentage does not exactly equal 500 because of rounding errors. During the sample period, the average NFL host city had 4.7 million people, an average real per-capita income of $30,000, an average annualized unemployment of 5%, and had approximately 2 other professional franchises. The proxy for real services wages averaged 1.21 with a standard deviation of 0.42. The data provided by Mapquest indicate that there were an average of 5 gas stations, 10 grocery stores, and 63 restaurants within one mile of a football stadium, suggesting that there is less development around NFL stadiums (and hence less outside competition for, say, concession substitutes) than at MLB stadiums.

Estimation results of the quantity equation and the price equation for both sports are reported in Table 2 and Table 3, respectively, with all continuous variables (other than time trends) converted to natural logarithms. In both tables, the first two columns report single-equation fixed effects estimates, treating all regressors as strictly exogenous. These results can be used as a baseline for comparison purposes. Columns three and four in both tables report two-stage fixed effects estimates in which the first stage entails regressing the endogenous right hand side variable (price or quantity) against all exogenous variables to obtain a consistent instrument for the endogenous regressor. As can be seen, the endogeneity bias is most notable in the estimated parameter for the endogenous variable itself although some other parameter estimates change slightly.

Table 2 reports the estimation results of the attendance equation. In both the MLB and NFL specifications, the F-test that all the team fixed effects are equal to zero is soundly rejected. The Davidson-MacKinnon (1993) test for endogeneity suggests that price is an endogenous regressor in both sports and that the two-stage least squares estimator is superior to the single-equation approach. For the most part, the estimated parameters have the expected signs and significance and are consistent with the prevailing literature. The positive parameter estimates on ticket prices when using the single-equation fixed effects estimator suggests endogeneity bias affects this parameter. The two-stage approach yields parameter estimates that are negative and not significantly different from one in absolute value. The remaining parameter estimates do not dramatically differ between the two specifications, suggesting that the endogeneity bias manifests in the price variable.

In general, more successful teams enjoy greater attendance in both leagues. Unemployment takes the expected sign in both leagues but is only significant in the NFL. On the other hand, only expansion teams in the MLB enjoy a significant increase in per-game attendance relative to incumbent teams. Consistent with other studies, the honeymoon effect of a new stadium is much longer in the MLB than in the NFL; the honeymoon effect in the NFL essentially evaporates by the third year of a new stadium, whereas in baseball the honeymoon effect is weakly significant even after ten years of a new stadium.

The parameter of primary interest in the attendance equation is that of $NOSCALPING$. In major league baseball, anti-scalping laws do not correlate with a statistically significant change in attendance, suggesting that ticket scalpers do not comprise a significant proportion of those who purchase tickets. On the other hand, NFL teams that play in cities where scalping is significantly curtailed enjoy a weakly significant increase in attendance. Although not a direct test, the positive parameter estimate might indicate that in professional football ticket brokers comprise a larger proportion of those who purchase tickets. If brokers are not successful in selling all of their tickets on the secondary market, for whatever reason, the increase in per-game attendance might indicate a more efficient primary market for tickets, i.e., more true fans are able to purchase tickets.

Table 3 reports the estimation results for the price equation. The first two columns report single-equation fixed-effects estimates and the second two columns two-stage fixed effects estimates. As was the case with the attendance equation, the F-test that the team fixed effects are all equal and the Davidson-MacKinnon (1993) test that attendance is exogenous are soundly rejected.

For both sports, price is positively related to attendance, with football prices being more responsive to changes in attendance than in baseball, reflecting the fact that baseball has much more excess capacity than football. In baseball, more gas stations and restaurants within one mile of the team's stadium put downward pressure on ticket prices, whereas in football more gas stations actually correlate (weakly) with higher ticket prices. Baseball teams, but not football teams, that play in an urban stadium charge a premium over teams that do not. In both sports, teams in older stadiums charge a premium, but only in football is there evidence of an increase in price (beyond the effect of attendance) when a team plays in a stadium less than six years old. Baseball teams that play in a single-purpose stadium charge a premium over those that do not. Finally, in both sports, teams that play in cities with relatively higher variable costs tend to charge more for tickets.

The parameter of primary interest in the price equation is that of $NOSCALPING$. In both sports, the parameter estimate is *positive* and statistically significant. This implies that, after controlling for attendance and other influences on the price of tickets at the ticket window, teams that play in cities where scalping is curtailed charge higher prices than teams where scalping is allowed.

The parameter estimates suggest that baseball (football) teams charge approximately 14.1% (23.6%) more when scalping is banned, *ceteris paribus*. Given the model presented in Section 3, this finding is consistent with either a low probability of a speculator being able to sell his ticket or with a low multiplier between the value of the executive and the true fan. A more concrete test can be derived from taking the ratio of prices that prevail with and without scalping, as in condition (3). Does it make sense that football and baseball teams lower their prices when scalping is legal?

In MLB, the sample average price amongst teams where scalping is banned is \$15.48 per ticket. The results suggest that MLB teams would lower their ticket prices by \$1.97 were scalping allowed. The left side of condition (4) for MLB teams would then be $13.51/15.48 = 0.87$. In this case, the combined number of true and executive fans must be greater than 87% of the number of true fans and speculators for team owners to naturally choose the higher benchmark price even when scalping is allowed.

In the NFL, the sample average price amongst teams where scalping is banned is \$43.28 per ticket. If scalping were allowed, then the average ticket price would be expected to decline by \$9.75 to \$33.53. In this case, the left side of condition (4) would then be estimated as $33.53/43.28 = 0.77$. If the number of true and executive fans that demand tickets to the average NFL team is greater than 77% of the number of true fans and speculators, then an NFL team would choose the higher benchmark price when scalping is allowed. If this is not the case, then scalping will put downward pressure on ticket prices as team owners seek to maximize revenues from ticket sales.

How likely is it that an average team in either sport would naturally choose the higher benchmark price when scalping is allowed? One way to gauge the likelihood is to look at stadium capacity usage. In baseball (football), stadium capacity usage was approximately 56.44% (89.33%) with a standard deviation of 20.84 (12.11). While these figures reflect all ticket types sold, including low-quality tickets sold to low-demand types, if capacity utilization amongst high-quality tickets is approximately equal the utilization of the stadium in general, then it is entirely possible that a lower price is revenue enhancing to team owners in both leagues when scalping is allowed. Once scalping is disallowed, team owners find it revenue enhancing to increase price to the benchmark sorting price in the absence of scalping.

This intuition is supported by the fact that attendance does not change much when anti-scalping legislation is passed. This is especially the case in Major League Baseball. This suggests that team owners stand to gain gate revenue when scalping is banned in their market - team owners can raise price and not significantly reduce their attendance, thereby increasing gate revenue. Indeed, in the case of the NFL, banning scalping possibly correlates with a slight increase in attendance. Any windfall that might result from banning scalping would provide team owners (or event promoters in general) a pecuniary incentive to tacitly or explicitly support anti-scalping legislation.

To put the potential windfall in perspective, assume a baseball team sold 12,500 season tickets per year, the revenue impact would be approximately \$1.97 $\times$ 81 home games $\times$ 12,500 season tickets = \$1.99 million per season, with a 95% confidence interval of [\$311k, \$3.91m]. As reported by *Forbes* Magazine, the estimated average gate revenue during the 2003 MLB season was approximately \$45 million. Hence, the revenue impact of banning scalping would fall between less than one percent and 8.6% of average gate revenue. If a significant increase in gate revenue is anticipated after scalping is banned, team officials might tacitly or explicitly support anti-scalping laws.

Similar calculations suggest that the pecuniary motivations for supporting anti-scalping legislation are no less important for NFL teams. While the estimated impact of banning scalping on the per-game ticket prices to professional football is considerably more than that in baseball, this is offset by the large difference in the number of home games in each sport: 8 in football and 81 in baseball. For example, assume a football team sold 25,000 season tickets per year. Using the results in Table 2, the total revenue effect from banning scalping would be a \$9.75 $\times$ 8 home games $\times$ 25,000 season tickets = \$1.95 million increase in revenue per year, with a 95% confidence of [\$962k, \$3.00m]. As reported by *Forbes* Magazine, the estimated average gate revenue during the 2003 NFL season was \$39.25 million. Hence, the revenue impact of banning scalping might be 2.5% to 7.6%, which might provide sufficient incentive for team officials to tacitly or explicitly support anti-scalping laws.

The evidence from football and baseball suggests that banning scalping actually correlates with higher prices of tickets in the primary market for these entertainment events. Without more intimate knowledge of who is buying tickets before and after scalping is banned it is not possible to determine the welfare effects of anti-scalping legislation. However, the evidence provided in Table 3 suggests that for both football and baseball team owners anti-scalping legislation might provide a windfall in increased gate revenues, perhaps in the area of \$2 to \$3 million per year.

Anti-scalping legislation is almost always passed with the tacit or explicit support of event promoters, who join with local politicians to decry the practice of scalping and so-called "price gouging" for events in which capacity constraints bind. An important question is whether the influence of anti-scalping laws on ticket prices is unique to professional football and baseball or if the impact is more widespread than is generally perceived by the popular media and, perhaps, consumers.

5 Conclusions

This paper reexamines the potential impact of anti-scalping laws on the prices of tickets at the window. Extending a recent theoretical model by Courty (2003), the model developed herein suggests that event promoters can employ exclusive, inclusive, or sorting pricing schemes. Exclusive pricing tends to focus only on high-demand consumers and prices low-demand consumers out of the market. Inclusive pricing sells to all consumers in the market but sacrifices potential revenue to the surplus of high-demand consumers. Sorting schemes select prices that maximize firm revenues while ensuring that consumers accurately reveal their types by maximizing their residual surplus.

This paper differs from previous theoretical models by recognizing that the speculator introduces yet another inclusive-exclusive-sorting pricing decision, one that is more difficult to solve than simply dividing true high-demand and low-demand consumers. Speculators value tickets only as much as it is profitable to sell the tickets in secondary markets and likely place very little residual value on a ticket if it is not sold. Therefore, in a market where scalping is legal event promoters face two types of high-demand consumers at the window: "true fans" who do not sell their tickets and "speculators" who do not want to attend the event. A speculator is not guaranteed to sell his ticket on the secondary market and therefore the expected value of the ticket to the speculator may be less than the value of the ticket to the true fan.

Event promoters might find it revenue enhancing to lower ticket prices when scalping is allowed and sell to both true fans and speculators. On the other hand, if speculators are not in the market it is possible that event promoters will actually increase price because the only individuals at the ticket window are true fans. Therefore, banning scalping might actually cause an increase in ticket prices in the primary market, counter to many previous models and the spirit in which anti-scalping laws are passed. Although closest to Courty (2003), the model developed here is more general in that it shows that scalping can raise, lower, or have no effect on prices at the ticket window.

The implications of the theory are tested in two professional sports: baseball and football. Using data from 1991-2003, it is shown that anti-scalping legislation, which was introduced at different times across the various states and municipalities in the United States, tends to correlate with higher ticket prices in both sports. The empirical results suggest that banning scalping might lead to a revenue windfall of $2 million per year to the team owner, which could explain the often tacit or explicit support for anti-scalping legislation on the part of team officials.

What is still unknown is whether anti-scalping legislation improves social welfare. This question cannot be directly tested without further knowledge of who buys tickets before and after scalping is banned. However, the empirical results presented here suggest that previous theoretical models of the impact of banning secondary markets might not apply to professional baseball and football, although they may well hold in other entertainment markets such as music concerts, Broadway musicals, and symphony performances. The empirical analysis of the effect of anti-scalping laws has lagged behind the theoretical models. Future research might focus on the empirical impact of these laws on the prices that prevail in the primary markets for other entertainment events.

References

Associated Press (2005). "Scalping a Whisper of Former Self," `http://www.sptimes.com/2005/02/06/State/Scalping_a_whisper_of.shtml`, last accessed April 2005.

Bernicke, W.F. (1973). "Questions and Answers," *The Journal of Political Economy*, **81**(3), pp. 796-799.

Census Bureau (2005). *Statistical Abstract of the United States.*

Coates, D. and B. Humphreys (2003). "Novelty Effects of New Facilities on Attendance at Professional Sporting Events," *Contemporary Economic Policy,* forthcoming.

Coates, D. and B. Humphreys (2004). "Price Indexes and Attendance at Professional Team Sports," *mimeo,* UMBC Economics Department.

Courty, P. (2003). "Ticket Pricing under Demand Uncertainty," *Journal of Law and Economics,* **46**(2), pp. 627-652.

Davidson, R. and J. MacKinnon (1993). *Estimation and Inference in Econometrics, 1993*, New York: Oxford University Press.

DeSerpa, A. (1994). "To Err is Rational: A Theory of Excess Demand for Tickets," *Managerial and Decision Economics*, **15**(5), pp. 511-518.

Depken, C. A. (2004). "New Stadiums and Concession Prices: Evidence from Professional Football and Baseball," *mimeo* Department of Economics, University of Texas at Arlington, working paper #04-003.

Happel, S. and M. Jennings (1989). "Assessing the Economic Rational and Legal Remedies for Ticket Scalping," *Journal of Legislation*, **16**(1), pp. 1-14.

Happel, S. and M. Jennings (1995). "The Folly of Anti-scalping Laws," *Cato Journal*, **15**(1), pp. 65-80.

Happel, S. and M. Jennings (2002). "Creating a Futures Market for Major Event Tickets: Problems and Prospects," *Cato Journal,* **21**(2), 443-461.

Karp, L. and J. M. Perloff (2004). "When Promoters Like Scalpers," *Journal of Economics and Management Strategy,* forthcoming.

National Conference of State Legislatures (2002), "Where Ticket Scalpers are Criminals," *State Legislatures,* **28**(3), pp.5.

Rovell, D. (2002). “Lucky Winners Can Buy Tickets at Face Value,” `http://espn.go.com/nfl/playoffs01/s/2002/0131/1320691.html`, last accessed April 2005.

Spindler, Z. (2003). “How Parasites Serve Their Host: A Graphical Analysis of Scalping,” *Public Finance Review*, **31**(6), pp. 694-699.

Spitzer, E. (1999). “Why Can’t I Get Tickets? Report on Ticket Distribution Practices,” State of New Yorks Bureau of Investor Protection and Securities.

Swofford J. (1999). “Arbitrage, Speculation, and Public Policy Toward Ticket Scalping,” *Public Finance Review*, **27**(5), pp. 531-540.

Williams, A. (1994). “Do Anti-Ticket Scalping Laws Make a Difference?” *Managerial and Decision Economics*, **15**(5), pp. 503-509.

Table 1: Descriptive Statistics of the Data

Variable	Description	Mean	Std. Dev.	Min.	Max.
	Major League Baseball (N=341)				
RTIX	Real price of tickets (2000 dollars)	14.07	4.60	8.28	39.83
ATTEND	Per-game attendance in thousands	27.60	8.83	10.04	48.04
NOSCALPING	Scalping restricted (1=Yes)	0.60	0.49	0.00	1.00
SPURP	Single purpose stadium (1=Yes)	0.65	0.48	0.00	1.00
NEWSTADIUM	Stadium is less than six years old (1=Yes)	0.17	0.38	0.00	1.00
DOME	Dome or retractable roof stadium (1=Yes)	0.15	0.36	0.00	1.00
URBAN	Stadium is urban (1=Yes)	0.47	0.49	0.00	1.00
EXPANSION	Expansion team (1=Yes)	0.06	0.24	0.00	1.00
LAGWIN	Once lagged win percentage	499.98	70.25	327	716
POP	Host city population in millions	6.23	5.47	1.60	21.31
RINCOME	Host city real per-capita income[a]	31.02	3.86	25.63	47.18
UNEMP	Host city unemployment rate	5.24	1.80	2.00	10.30
RWAMUSE	Proxy for real wage in amusement industry	1.20	0.37	0.58	2.34
GASONEMILE	Gas Stations within 1 mile of stadium	9.26	6.00	1	28
GROCONEMILE	Grocery Stores within 1 mile of stadium	23.03	29.39	1	150
RESTONEMILE	Restaurants within 1 mile of stadium	93.16	57.91	3	150
COMPS	Number of other professional teams in city	2.31	1.46	0	6
	National Football League (N=361)				
RTIX	Real price of tickets (2000 dollars)	41.35	10.36	21.51	81.89
ATTEND	Per-game attendance in thousands	62.34	9.65	31.82	80.93
NOSCALPING	Scalping restricted (1=Yes)	0.64	0.48	0.00	1.00
SPURP	Single purpose stadium (1=Yes)	0.45	0.49	0.00	1.00
NEWSTADIUM	Stadium less than six years old (1=Yes)	0.14	0.35	0.00	1.00
EXPANSION	Expansion team (1=Yes)	0.03	0.16	0.00	1.00
LAGWIN	Once lagged win percentage	501.27	188.87	62	938
POP	Host city population in millions	4.38	4.30	0.25	18.66
RINCOME	Host city real per-capita income[a]	29.18	6.18	18.17	48.34
UNEMP	Host city unemployment rate	5.02	1.61	2.10	9.80
RWAMUSE	Proxy for real wage in amusement industry	1.21	0.42	0.19	3.12
GASONEMILE	Gas Stations within 1 mile of stadium	5.10	3.29	0	16
GROCONEMILE	Grocery Stores within 1 mile of stadium	9.81	11.9	0	45
RESTONEMILE	Restaurants within 1 mile of stadium	62.68	56.67	3	150
COMPS	Number of other professional teams in city	2.14	1.31	0	5

Notes: Price data obtained from various issues of the Team Marketing Report, and reflect average per-game season ticket prices. Attendance figures obtained from the National Football League and Major League Baseball. Stadium characteristics obtained from Munsey and Suppes. Population obtained from the Census Bureau, income from the Bureau of Economic Analysis, and unemployment from the Bureau of Labor Statistics. Scalping legislation obtained from Happel and Jennings (1989), Happel and Jennings (1995) and National Conference of State Legislatures (2002). Data describe 34 NFL teams and 28 U.S. baseball teams from 1991 through 2003 in an unbalanced panel. Lagged win percentage does not equal five hundred because of rounding. [a] Measured in thousands of 2000 dollars.

Table 2: Estimation Results of Attendance Equation

	MLB (1) F.E.	NFL (2) F.E.	MLB (3) 2SLS-F.E.	NFL (4) 2SLS-F.E.
lnRTIX	0.266***	0.049	-1.046*	-0.985*
	(0.086)	(0.053)	(0.60)	(0.60)
NOSCALPING	-0.048	0.049	-0.148	0.104*
	(0.060)	(0.032)	(0.093)	(0.055)
lnPOP	-0.095	0.100	-0.963*	0.068
	(0.27)	(0.19)	(0.53)	(0.30)
LAGWIN	1.362***	0.164***	2.231***	0.325***
	(0.16)	(0.033)	(0.45)	(0.11)
EXPANSION	0.324***	-0.023	0.337***	-0.007
	(0.081)	(0.066)	(0.11)	(0.099)
DOME	0.085		-0.110	
	(0.12)		(0.18)	
lnRINCOME	-0.918***	0.197	-1.429***	-0.225
	(0.32)	(0.25)	(0.50)	(0.45)
UNEMP	-0.009	-0.035***	-0.039	-0.038***
	(0.016)	(0.0096)	(0.026)	(0.014)
COMPS	-0.034	0.015	-0.017	-0.029
	(0.037)	(0.019)	(0.051)	(0.037)
NEWSTAD0	0.324***	0.059*	0.710***	0.285**
	(0.058)	(0.033)	(0.19)	(0.14)
NEWSTAD1	0.265***	0.061*	0.642***	0.228*
	(0.059)	(0.034)	(0.19)	(0.12)
NEWSTAD2	0.178***	0.042	0.500***	0.147
	(0.058)	(0.038)	(0.17)	(0.094)
NEWSTAD3	0.180***	0.029	0.522***	0.118
	(0.062)	(0.043)	(0.18)	(0.093)
NEWSTAD4	0.254***	-0.057	0.637***	-0.021
	(0.072)	(0.045)	(0.20)	(0.075)
NEWSTAD5	0.176**	0.029	0.604***	0.068
	(0.078)	(0.049)	(0.22)	(0.081)

Dependent variable: Natural logarithm of per-game season attendance. All regressions include team fixed effects. F.E. indicates single-equation fixed effects estimator assuming all regressors are exogenous. 2SLS-F.E. indicates two-stage least squares fixed effects estimator where price is considered an endogenous regressor. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Table 2: Estimation Results of Attendance Equation (cont.)

	MLB (1) F.E.	NFL (2) F.E.	MLB (3) 2SLS-F.E.	NFL (4) 2SLS-F.E.
NEWSTAD6	0.087	0.057	0.397**	-0.038
	(0.080)	(0.067)	(0.18)	(0.11)
NEWSTAD7	0.204**	-0.024	0.566***	0.020
	(0.080)	(0.076)	(0.20)	(0.12)
NEWSTAD8	0.083	-0.001	0.366**	0.019
	(0.079)	(0.061)	(0.17)	(0.093)
NEWSTAD9	0.107	-0.027	0.293**	0.013
	(0.071)	(0.054)	(0.13)	(0.083)
NEWSTAD10	0.149*	0.039	0.277**	-0.023
	(0.081)	(0.053)	(0.12)	(0.089)
Number of Teams	28	34	28	34
R^2	0.62	0.32	.	.
H_0 : Team Effects = 0	15.54***	11.80***	8.63***	5.25***
H_0 : Price Exogenous			9.22***	7.61***

Dependent variable: Natural logarithm of per-game season attendance. See Table 1 for data sources and variable definitions. All regressions include team fixed and year effects. F.E. indicates fixed effects estimator. 2SLS-F.E. indicates two-stage least squares fixed effects estimator. Sample size differs for the NFL because the Houston Texans are dropped in the 2SLS estimation. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Table 3: Estimation Results of Price Equation

	MLB (1) F.E.	NFL (2) F.E.	MLB (3) 2SLS-F.E.	NFL (4) 2SLS-F.E.
lnATT	0.278***	0.499***	0.367***	1.204***
	(0.039)	(0.081)	(0.056)	(0.16)
NOSCALPING	0.128**	0.240***	0.132**	0.210***
	(0.054)	(0.047)	(0.056)	(0.051)
GASONEMILE	-0.029***	0.019*	-0.039***	0.026*
	(0.011)	(0.010)	(0.013)	(0.014)
GROCONEMILE	0.006	-0.008*	0.009	-0.003
	(0.0050)	(0.0047)	(0.0064)	(0.0062)
RESTONEMILE	-0.004**		-0.004**	
	(0.0017)		(0.0018)	
URBAN	0.521***	-0.0483	0.606***	-0.191
	(0.19)	(0.099)	(0.21)	(0.15)
STAGE	0.004***	0.004***	0.003**	0.005***
	(0.0012)	(0.0011)	(0.0013)	(0.0015)
SINGLEPURP	0.495***		0.499***	
	(0.061)		(0.073)	
lnRWAMUSE	0.510***	0.264***	0.511***	0.380***
	(0.055)	(0.037)	(0.063)	(0.053)
NEWSTADIUM	0.028	0.298***	-0.012	0.310***
	(0.040)	(0.042)	(0.044)	(0.056)
Number of teams	28	34	28	34
R^2	0.61	0.44	.	.
H_0 : Team Effects = 0	13.55***	8.98***	12.13***	9.14***
H_0 : Attendance Exogenous			6.77***	45.40***

Dependent variable: Natural log of real ticket prices. See Table 1 for data sources and variable definitions. All regressions include team fixed effects. F.E. indicates single-equation fixed effects estimator assuming all regressors are exogenous. 2SLS-F.E. indicates two-stage least squares fixed effects estimator where attendance is considered an endogenous regressor. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Figures

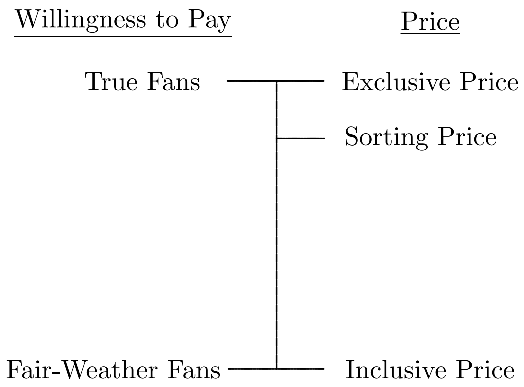

Figure 1: Pricing Schemes in the Absence of Scalping

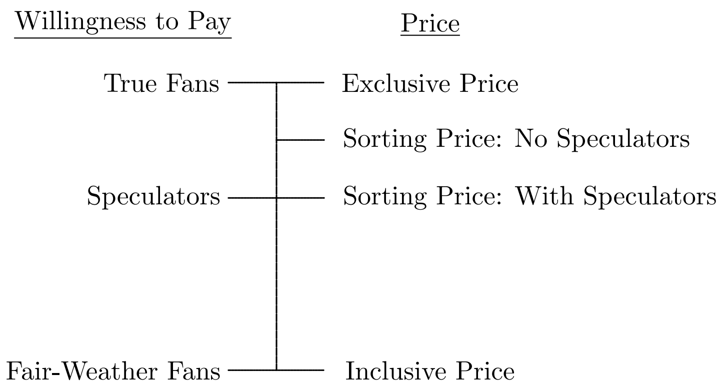

Figure 2a: Pricing Schemes in the Presence of Scalping
(True Fans Have Greater Value than Speculators)

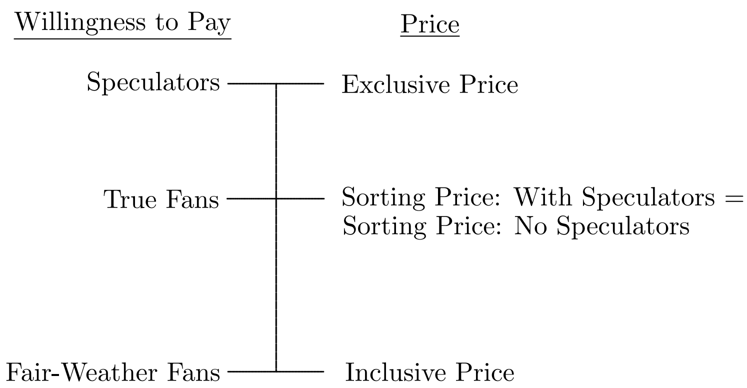

Figure 2b: Pricing Schemes in the Presence of Scalping
(Speculators Have Greater Value than True Fans)