Real Options Applied to Consumer Goods:  
Maximizing Profits and Fan Welfare

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ABSTRACT

The use of pre-sale options for tickets is underutilized in sports. In this study, we show that the use of advanced selling options increases profits, but also increases consumer utility – making both parties better off. Thus, the efficiency gains and profit gains make the adding of options to advanced selling, as opposed to just advanced selling, an optimal strategy. Through this ticket pricing strategy, the organizer can realize a significant increase in profits as a result of a separating equilibrium pricing strategy while simultaneously consumer welfare increases as fans know, with certainty, they have tickets to the game if their team participates. If these options were offered by participants instead of the organizer it also allows the participant to smooth their revenues over time.

Keywords: option pricing, pricing under uncertainty, event tickets, consumer options

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I. Introduction

Financial options allow a company or individual to manage their risk (or take more risk). The use of options, when applied to consumer goods, can be used to increase profits and/or consumer welfare (utility). This study demonstrates that both fan utility and firm/league profits can be increased for any event where participants are unknown and, ideally, the competition is played at a designed site, i.e. a neutral-site game. This option model can be applied to many different neutral-site sporting events where the participants are unknown in advance, such as the Olympics, the FIFA World Cup, the Super Bowl, National Collegiate Athletic Association (NCAA) Football Bowl and playoff games, or any NCAA tournaments (i.e. basketball, hockey, baseball, etc.). These options also work for any other elimination style tournament, such as reality television shows: i.e. American Idol, The Voice, or America’s Got Talent. This form of options can also be applied to other forms of consumer goods, such as airline tickets.2

Although the applications of this model are numerous, we focus on sporting event applications in this study, as previous research has discussed similar strategies focusing on the sports industry. We suggest that the organizer or teams themselves (which is discussed later in the paper) utilizes an option pricing model for tickets, along with traditional advance selling, to maximize profits by generating a separating equilibrium between two types of fans. Whereas the consumer’s utility is also increased relative to an advanced selling strategy. The application of options also allows the event organizer to benefit from the resale of options, transactions that

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2 The application is not limited to sports, this model can also be utilized for flights and hotels where the travel will occur if a given event occurs; their team makes the tournament, if there are no hurricanes at the vacation destination, or just the expectation of a business meeting. Currently Air France and United Airlines allow customers to reserve flight prices at a cost of $7-$20 depending on flight destination and length of option. The option allows the customer to exercise the option for up to seven days, reserving a seat on a specific flight at the fixed price.
would normally be transacted in the secondary or black market via scalping. Although the structure of this study assumes the organizer will offer options, if the organizer does not or chooses not to, participants can offer the options themselves. When the participants offer options each year, whether they make the event or not, they can both increase their overall revenue and smooth their revenue stream over time.

Given the rules established by many tournament organizers, participants are left in a unique situation: the organizer dictates that participants must sell tickets at a predetermined price (face value), which is often significantly below the market clearing price. While these participants cannot sell tickets for more than the face value, the organizer’s bylaws do not disallow the sale of options before the event occurs. This loophole provides the opportunity for the sale of call options, but, ironically, there is no risk associated with a short call because there is no infinite loss function in this structure. The lack of risk on these short calls is the result of there not being any forgone opportunity cost, as the seller cannot sell these tickets above face value (which, with certain events, are always worth more than face value). The ability to sell a long call without bearing the exposure associated with the short call, provide a unique opportunity to increase profits while increasing fan welfare, and if options are offered by the participants directly it could help them also smooth revenue from year to year.

This study provides a model that uses options as a profit enhancement strategy in tournament ticket markets, with the beneficial side effect of also increasing consumer welfare. We expand upon pervious work on consumer options in ticket pricing, which was established by Happel and Jennings (2002) and Sainam et al. (2010).

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3 Scalping has become more common and tolerated. The creation of StubHub and other exchanges, some through the leagues and teams, where sellers can link with buyers for a fee has also created a new dimension to the secondary market.
We contribute to the literature in two specific ways. First, we use a traditional option approach that involves options which do not always end up in the money, while previous literature use an option strategy that is always exercisable. The events that fall into our focus are typically the highest and, in many cases, the most sought after tickets. Thus, any option that is exercisable will be exercised even if the option holder has zero interest in attending the game because it can always be sold at a higher price on the secondary market. This results from the high demand for these tickets and the limited supply which allows the option holder to exercise the option and sell the tickets at a premium. Our approach allows more options to be sold as only those options that have a given team in the game can be exercised, allowing options to be written on all teams that have even a small chance of qualifying for the given game. An added side effect of this strategy is the options will be exercised by fans that are interested in attending the event. Secondly, by using options and advance selling together our model generates a separating equilibrium. This allows an organizer to differentiate between the types of fans, game-based fans and team-based fans; allowing the organizer to increase his revenue while increasing the fan’s utility.

II. Implementing Options in Tournaments

Although tickets exist for the organizer, sponsors, media, game officials, future tournament hosts, and participants; we focus on the distribution by the organizer to the fans, i.e. the general public, and touch upon the implications of allowing participants to issue options themselves. In traditional option underwriting the short position, in this case the organizer or participant bears the risk of the option expiring “in-the-money”. However, given league/tournament rules, there is no downside risk to the short position, the seller, because they
cannot sell the tickets above the face value, even though the ticket’s market value is well above
the face value.

The fan is buying the option to have the right to purchase a ticket to a specified event. If
the team (participant) competes in the event, then the option can be exercised. Since the tickets
can be sold on the secondary market for more than the face value, the payoff function is positive
even when the holder of the option has no value in attending the event. This allows for more
liquidity by allowing speculators into the market. If the designated participant does not qualify
for the event the option is not exercisable and expires worthless.

While the concept of using options to sell tickets may seem new and too complicated for
consumers, there have been several websites in the past and one current website that offer some
type of derivative on sporting events. OptionIt.com, which has recently folded, offered
individuals the opportunity to buy a ticket to a specified regular season or playoff game for a
specific professional and college team via options. The second website, operated by TTR Inc,
called TickettReserve.com, which too has recently folded, used another derivative that employs a
novel pricing technique. TTR defines the derivative offered as a future contract for March
Madness and Rose Bowl tickets. TeamTix is the latest to offer a derivative-based pricing strategy
for sporting events. TeamTix offers futures contracts for a ticket to the BCS National
Championship.

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4 The organizer or participant could offer options for each round before the semifinals but for many tournaments this
adds one more component of uncertainty, location of the game. The uncertainty of location may make certain
destinations more desirable depending on their proximity to the buyer’s home or the other activities the site (city) has
to offer.
5 One reason on why these websites may have folded is because it is difficult to get buy-in from the teams. This is
why we believe an organizer offered option would be best, it would eliminate this problem.
6 See TeamTix website https://collegefootballplayoff.teamtix.com for more information about their pricing and
security offering.
III. Literature Review

Advance Selling

Advance selling occurs when sellers allow buyers to purchase a game ticket preceding consumption, the most common way to buy sporting event tickets. This mode of selling tickets presents issues for buyers since they must incur the uncertainty about future valuation (via through the quality of matchup, the fans’ ability to attend, the weather, traveling, or other distractions). In tournaments, Xie and Shugan (2003) and Shugan and Xie (2004) show that profits from advance-selling do not result from buyer surplus, but from more buyers purchasing in advance due to uncertainty, which occurs due to the large number of different teams that could partake in the tournament. This results in team-based fans for each of the possible teams being interested in the tickets when they are initially sold. This increases the number of people interested in attending the game compared to when teams are predetermined, leaving only the participating teams’ fans interested in attending the game.

Xie and Shugan (2003) also show that a capacity constraint has conflicting effects on the profitability of advanced selling. First, it allows buyers to believe the price will rise in the future as the number of available seats decreases. Second, a capacity constraint reduces the need for advanced sales as a result of there being a natural limitation on the number of seats. Additional studies have looked at the impact of resale (i.e. scalping) on sellers’ profits when analyzing advance selling (see Courty 2003 and Depken 2007).

Consumer Options

Sainam et al. (2010) create a ticket pricing strategy that entails consumer options, which can always be exercised for a ticket to the semifinals, commonly referred to as the Final Four, of March Madness, also known as the NCAA’s basketball tournament. It is important to emphasis
their options are always exercisable, which is one of the constraints we relax in this study. These authors recognize two types of basketball fans: team-based fans, who only desire attending the Final Four if “their” team participates, and game-based fans, who attend regardless of who plays but still have a premium when their favorite team plays. Sainam et al. (2010) show that as long as the expected valuation of the team-based fan (EV\textsubscript{T}) for the Final Four game is less than the expected value of the game-based fan (EV\textsubscript{G}), the league can utilize consumer options to induce different behaviors from the two fans and obtain higher profits from consumer options than from advance selling. These authors find that consumer surplus, on average, increases with consumer option pricing (relative to advance selling pricing), resulting in consumer options leading to a win-win situation.

Cui, et al. (2013) demonstrate that ticket options allows organizers to generate higher profits and reduce scalping, relative to advance selling at a fixed price, using hard tickets or paperless tickets.\textsuperscript{7} We expand these previous studies by developing a pricing strategy that uses both advance selling and traditional options to differentiate between game-based and team-based fans. Our strategy will lead the organizer to extract larger profits while also increasing fan utility. In addition, our pricing strategy allows for more team-based fans to attend when their utility is high.

\textbf{IV. The Separating Equilibrium Pricing Strategy}

Given the many potential applications of real options in consumer goods, we focus the examples in this study on the semifinals of a tournament (specifically March Madness), but know the general model structured here has many additional applications. This structure allows for a direct comparison to Sainam et al. (2010) findings.

\textsuperscript{7} Paperless tickets have been utilized and discussed in the literature to reduce speculators, i.e. scalpers, from entering the market.
Ultimately in all sports there are two types of fans; team-based fans and game-based fans. Team-based fans gain utility if their team makes the game, otherwise their utility is zero. Game-based fans are interested in watching a great game (i.e. a game between two high quality teams) and are not necessarily interested in a specific team playing. It is possible for game-based fans to have a higher utility from watching a specific team play; however this does not impact our findings.

Assumptions

To develop this pricing technique, we need to clarify a few assumptions. While many of the assumptions may seem obvious or intuitive it is important that we lay the foundation for our strategy. First, we assume the expected value to the game-based fan ($EV_G$) is larger than the expected value to the team-based fan ($EV_T$) attending the game, $EV_T < EV_G$. This assumption is consistent with expectations, since game-based fans have a value of attending regardless of who plays, but can also have a higher value for when their favorite team plays. In comparison, team-based fans only have value of attending when their favorite team plays, and a value of zero, or near zero value, otherwise. The only possible way a team-based fan’s expected utility of attending a game can be higher than a game-based fan’s expected utility is when two things occur simultaneously: 1) the team-based fan has a high utility of attending when his favorite team plays and 2) this team has a high probability of playing in the semifinals.\(^8\)

Second, the team-based fan’s willingness to pay for a game involving his favorite team ($U^T_{TI}$) is assumed to be greater than the expected value of the game-based fan (i.e. $U^T_{TI} > EV_G$), which holds for all teams. Where utility for a fan, $U$, has a subscript $T$ indicating a team-based

\(^8\) This also assumes that game-based fans do not have as high a utility as team-based fans when their designated team plays.
fan and subscript $G$ indicating a game-based fan. If the fan’s favorite team is playing in the game it is noted by a subscript + otherwise it is noted by a subscript -.

Third, assume there are team-based fans, $N_T$, for all potential participants in the tournament. This assumption is reasonable since all sports teams have a strong fan base and Sainam et al. (2010) notes that 90% of their survey respondents list their home university (i.e. their alma mater) as their favorite team in the Men’s NCAA Division I basketball tournament. For international play this implies most team-based fans are fans of their home country. It can be extended that fans prefer the participant that they have the strongest connection to, in many cases a geographic preference.\(^9\)

The fourth assumption is that the number of game-based fans, $N_G$, is at least equal to the total number of tickets made available to the team-based fans of the participating teams. This assumption simplifies the model, but can easily be relaxed to end up closer to the extreme cases of all advance sales or only selling options. The organizer can also change this assumption to increase the number of game-based fans or team-based fans in attendance. To put this in prospective, most semifinals are played in large stadiums that can hold at least 50,000 plus attendees. As a result, we propose that the organizer sells 20,000 tickets to the general public allowing the remaining tickets to be provided to sponsors, the media, organizer executives, and the participants. For simplicity, assume half of the 20,000 tickets would be sold via advance selling while the other half would be sold via options. Hence, under this situation, there needs to be at least 10,000 team-based fans in total. Since there are four teams in the semifinals and many sporting events sell one ticket to both semifinal games, 2,500 options can be sold on each

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\(^9\) In the next section when we discuss valuing the options, we are able to relax this assumption.
participant, requiring the $N_T$ for each participant to be 2,500. Given the demand for attendance to these highly sought after semifinals, these assumptions are not restrictive.\(^{10}\)

**The Proposed Model – Team Options and Advanced Selling**

The proposed model does not ignore any fans and provides a ticket opportunity for all interested fans, which separates our work from the previous literature. Restricting the options in this model to only be in-the-money if the designated team makes the Final Four, otherwise the option is worthless, allows this opportunity to occur. In our pricing strategy there needs to be a price for tickets sold via advanced selling ($P_{AS}$), a price for each team’s option ($P_{Oi}$), and an exercise price for each team option ($P_E$). Regardless of which team the option is purchased for, all options will have the same $P_E$. This occurs because all tickets are required to be sold at face value. It is important to note that some teams are going to have a low probability of making the semifinals ($\gamma_i$), but all teams have a positive $\gamma_i$, even if some $\gamma_i$ are close to zero.

For simplicity, we can utilize betting markets in many cases to calculate the probability, $\gamma_i$, for each team. Many betting markets offer wager on different teams making it to a championship game or in many cases divisional championships or semifinals, or even making the playoffs or tournament. For these lines, it is common that lines are offered for each team unless the pool of teams is too large, then the top thirty to forty contenders have individual lines offered with the remainder of the contenders being offered as ‘the field’. Thus, we follow this assumption and offer options for only the top forty contenders with an option for the rest of the field if needed.\(^{11}\) This means if you purchase an option for the field, your option is in-the-money and can be exercised for a ticket to the semifinals as long as one of the teams without a line

\(^{10}\) With the market value of a ticket exceeding the face value every year for many semifinal matchups, the reduction or elimination, of the constraint on the number of game-based or team-based fans is not a restrictive aspect to this model.

\(^{11}\) Simplifying assumption: It is feasible to generate an option for each team.
makes it.\textsuperscript{12} For a discussion of converting betting lines into probabilities see Berkowitz, Depken, and Gandar (2018).

The expected utility of each team-based fan (\(\text{EV}_{Ti}\)) is:

\[
\text{EV}_{Ti} = \gamma_i U^{+}_{Ti}\tag{1}
\]

where \(U^{+}_{Ti}\) is the fans utility of attending the game if their team plays. Note that the fans utility of attending the game if his team does not play (\(U^{-}_{Ti}\)), is zero.\textsuperscript{13} Also, \(\sum_{i=1}^{4} \gamma_i = 4\) as four teams participate in the semifinals.\textsuperscript{14}

For game-based fans their expected utility (\(\text{EV}_G\)) is:

\[
\text{EV}_G = U_G
\tag{2}
\]

As a game-based fan, the same utility is obtained regardless of who plays.\textsuperscript{15}

Now that we know each fan’s expected value the price of each option (\(P_{Oi}\)) and exercise price (\(P_E\)) can be put into the following equation.

\[
P_{Oi} + \gamma_i \times P_E = \text{EV}_{Ti} = \gamma_i U^{+}_{Ti}\tag{3}
\]

This holds for all team-based fans. As a result we have 41 equations, one for each of the top 40 teams plus the field, each with a similar equation, but with different probabilities of making the semifinals.

Now we derive the separating equilibrium prices. If we set \(P_{AS}\) equal to \(\text{EV}_G\), then the game-based fan will buy the ticket in advance. However, since the team-based fans have lower

\textsuperscript{12} This allows for the assumption of \(N_T\) to be reduced for those teams that are not major contenders. Additionally this allows some investors to have an option in the money when their utility is zero. When this is the case they could allow the option to expire or more likely sell the option to someone who wants to attend.

\textsuperscript{13} The value of \(U^{-}_{Ti}\) can be above zero, but still relatively small if the fan receives a small amount of utility from the game even if their favorite team is not playing.

\textsuperscript{14} By making the simplification of only offering an option on the top 40 contenders and one for the rest of the field \(n=41\).

\textsuperscript{15} If the game-based fan has a higher utility for a specific team the expected value of the game-based fan will be \(\text{EV}_G = \gamma_i U^{+}_G + (1 - \gamma_i) \times U^{-}_G\), where \(U^{+}_G\) is the utility the game based fan receives for attending a game with his favorite team and \(U^{-}_G\) is the utility he receives from attending a game where his favorite team is not playing.
expected utility \( (EV_{Ti}) \), one of our assumptions, they will not buy the ticket in advance. Additionally, because the exercise price of all options is set by the NCAA, it will be set equal to the advanced selling price, and thus equal to \( EV_G \).

\[
P_{AS} = P_E = EV_G
\]  

(4)

Since the purchase of the option requires a fee to be paid up front, \( P_{Oi} \), as well as the exercise price, \( P_E \), which by design combines to be more than \( EV_G \) the game-based fan is priced out of the option market.

Given that game-based fans only buy tickets via advance selling; only team-based fans will buy options absent any arbitrage opportunity in the secondary market for tickets. With the market-value of the ticket above the face-value of the ticket, the option value when exercised will be positive and the difference between the market-value and face-value.

With team-based fans deriving utility from seeing their team playing, team-based fans only buy an option for their favorite team and will do so as the cost of the option, \( P_{Oi} \), is below \( EV_{Ti} \). All team-based fans will exercise their option since \( P_E \) is less than their expected utility when their favorite team plays in the semifinals. Now the only question that remains is: what is the price of each option? By plugging in \( EV_G \) for \( P_E \) the option prices \( (P_{Oi}) \) can now be solved using the following equations:

\[
P_{Oi} = \gamma_l \times [U_{T_l}^+ - EV_G]
\]  

(5)

With these prices the strategy would result in the following profit for the NCAA:

\[
\pi^* = 20,000 \times EV_G + 10,000 \times \sum_{l=1}^{n} \gamma_l \times [U_{T_l}^+ - EV_G]
\]  

(6)

By comparing the profits from Sainam et al. (2010) consumer option is:

\[
\pi^*_S = 20,000 \times EV_G + 10,000 \times \gamma_{10} \times [U_{T_{10}}^+ - EV_G]
\]  

(7)
Where $U_{T_{10}}$ is the utility of the team-based fan who has the 10,000th highest $E_{V_{Ti}}$ and $\gamma_{10k}$ represents the probability of the fan’s team making the Final Four. Additionally, under the current advance selling strategy the profits are:

$$\pi_{AS}^* = 20,000 \times E_{V_G}$$

(8)

It becomes clear that our separating equilibrium pricing strategy would allow the organizer to not only provide more fans with an opportunity to attend the game, but also allows the organizer to generate higher profits.

Allowing the options to become worthless provides the organizer the opportunity to sell options to team-based fans for each of the top 40 teams plus the field, or for every team, and also results in a higher proportion of team-based fans attending the semifinals enabling them to see their favorite team play. This not only increases the organizer’s revenue from ticket sales but also has the potential to create a better environment for the games, as more of each teams’ fans are in attendance, creating a more energetic crowd. Given this pricing technique, it allows all the teams to have a large cheering section at the game, which can add more value to both teams and the fans.16

This also allows for a potential increase in overall utility for the fans. Before the teams are decided, fans of every team, through the purchase of these options, know they have tickets if their team makes it.

V. Value of Options and Arbitrage

First and foremost, the use of real options allows more team-based fans the opportunity to obtain a ticket than through the traditional advance selling technique, or through a consumer

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16 Sainam et al. (2010, pg 411) argue “fans are likely to derive some positive externality from the presence of additional team-based fans.”
option strategy where the option is always exercisable. Allowing more team-based fans the opportunity to attend the games when their favorite teams are competing would enhance the experience for all in attendance. As mentioned, if fans enjoy having more of their fans in attendance rooting for their team alongside them, which occurs under this pricing strategy, then providing options can increase expected value, which, in turn, increases the value of the option. Fan welfare also increases as each fan knows they have a guaranteed ticket for the game if their team makes it and will be in a section with others cheering on their team.

Additionally, this pricing strategy reduces the probability of scalping, by allowing team-based fans to purchase tickets through the option market, rather than on the secondary market after the teams are determined. Before the teams are set, each option will have a different price; based off a given team’s odds of making the game. However, once all four teams are determined for the semifinal, each option will sell for the same price: the market-value minus the face-value. If this does not occur an arbitrage opportunity exists; anyone who wants to attend the tournament could buy an option with any of the four teams as the underlying and exercise the option and receive a ticket to the tournament. This could allow a legal way for fans to sell their ticket, through the sale of their option. This also provides a profit opportunity for the organizer, if they act like a broker, by charging a transaction cost per trade, similar to brokers buying/selling financial derivatives. Then the organizer would benefit from each transaction that otherwise would have resulted in scalping.

Potential scalpers and speculators would be able to purchase these options, which would increase the liquidity of the market. Since speculators add liquidity to the market, as they do in financial markets, which benefits the ticket market as a whole.

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17 Assuming the value of sitting in any one teams section is equal to any other section.
This part of the structure also provides the price of each option. Through the Efficient Market Hypothesis (Fama and French, 1996), the price of the option cannot exceed the amount that one would have to bet in order to receive a payoff great enough to buy the tickets at market price when the games occur. Thus, the price of the option is a function on the odds of a team making it that far in the tournament, which is a simple conversion of the money line (see Berkowitz, Depken, and Gandar, 2018).

VI. Implementation by the Participants

The use of this pricing strategy can also be expanded to be utilized by the participants themselves. This opportunity would appeal to each individual team if the organizer does not offer the option or if they want to offer options themselves. This strategy may be best demonstrated in the NCAA market where many universities could be interested in offering options to March Madness, the College World Series, and other national championships that are played at neutral sites. For universities and other sporting event participants offering options directly not only allows for an increase in profits, but it also smoothes profits over the years, as they can sell options even in years where they do not make the tournament or selected round. Although we structure the model around semifinals, this strategy could be utilized by participants for any round in a tournament. Given the league/organizer does not allow participants to sell tickets above face value, the sale of these options, which allows the option holder the right to buy the ticket at face value, would increase the participant’s revenue. This would also allow participants to smooth their revenues over multiple years, because the options would be sold in years they make the tournament and years they do not; without the potential downside risk of being on the short side of a traditional call option because they do not have a loss function.
From a March Madness prospective this perfect hedge allows traditional basketball powerhouses, like Duke and the University of North Carolina (at Chapel Hill), to have high option prices every year, because their odds of making the semifinals, i.e. Final Four, is relatively high. But it also allows all other universities to increase their revenue every year. To the extent that fans are risk averse, fans will continue to buy the options, even in years where the odds of making the tournament are low; providing an opportunity for all universities in both good and bad years to increase revenue.

Universities can also increase their revenue and smooth revenues across the years, by offering options to all rounds of the tournament, especially for the beginning rounds. This works for all teams at all levels of DI play, since every DI conference gets one automatic bid to the tournament. Thus, providing most universities a quantifiable chance of making the tournament. Given that automatic bids exist for all conferences, all universities can increase their revenues by selling options to all rounds of the tournament, rather than just Final Four games.

VII. Conclusion

By offering tickets to future events with unknown participants through both advance selling and option pricing, we show that the organizer benefits from an increase in revenue through a separating equilibrium pricing strategy. In addition, fans end up with increased utility from knowing they have a ticket. Also, more of each team’s fans will be in attendance, which benefits the participants with additional support, and can make the fan experience more enjoyable. Thus, we have both an increase in revenues and an increase in fan utility from this pricing strategy.

The creation of an exchange for these options by the organizer will also benefit the organizer, through transaction fees, while also increasing fan benefits. The organizer would
benefit from increased revenue generated from option fees and transaction fees. The organizer could also be the broker of the option market, allowing the re-sale of the option and continuing to receive the listing fees. These are sales that would have otherwise occurred in the black market, i.e. scalping. Fan’s utility will increase from this strategy as well. This occurs through the guarantee of tickets for team-based fans. Along with this guarantee, there would be an increase in other team fans cheering in the same section for the same team.

When the participants offer the options directly, it will both generate more revenue and smooth revenues over the years even when they do not make the tournament. The benefits to the fans remain the same, as they are unaffected by who offers the option on the ticket.

While this study provides the groundwork for the application of consumer options, there are still questions that need to be addressed. One issue may be to find opening prices. Although this could provide a complication the first time the options are listed, a price that will entice enough interest from fans and provide the originator enough money to generate these options will emerge quickly. Additional issues to consider are how large the transaction fees should be, how liquid these options would be, and the startup costs of creating such a market.
References


