NBA Primary Ticket Market Purchases and Market-Based Dynamic Demand

Brian Mills, University of Florida
Steven Salaga, Texas A&M University
Scott Tainsky, University of Illinois at Urbana-Champaign

Background
Traditionally, the study of demand for professional sports has taken place in the context of game attendance (Villar & Guerrero, 2009). Much of the early demand literature is entrenched in the measurement of effects of uncertainty of outcome (UOH) on fan interest in sports leagues, as a natural extension of Rottenberg's (1956) seminal work in the field, leading to substantial interest in the industrial organization of sports leagues and their favorable antitrust treatment.

However, while these early estimations are useful for macro-level identification of game characteristics that interest sports fans, differential behavior among fans for opposing teams is lost in any demand estimation without identification of different market segments (Forrest, Simmons & Buraimo, 2005). As a result, it is difficult to understand the dynamic characteristics of demand—such as changing team quality at the time of the purchase decision, the timing of the purchasing decision, price changes and willingness to pay within season, or impact of local fandom—that are pivotal variables for managers to understand in the context of ticket pricing and revenue or profit maximization when selling to different consumers.

More recently, research has turned to television viewership to estimate demand, and how demand is differentiated depending on which team to which fans are loyal (Tainsky & Stodolska, 2010; Tainsky, 2010). While inquiry regarding pricing in professional sports has become somewhat prevalent (Salaga & Winfree, 2013; Deihl, Maxcy, & Drayer, 2014), proprietary data sets with specific consumer demographic information are often difficult to obtain and can enlighten the academic literature on sports demand at the micro level. The dynamic effects noted in much of this work could also have implications for attendance and ticket purchase behavior. Therefore, we leverage a new data set to evaluate market-specific effects for game attendance.

Data
Our data contain over 400,000 ticket transactions from 1999 through 2009 from a proprietary National Basketball Association (NBA) team data set. The data includes customer location by zip code, purchase date, price paid, and other demographic variables such as age, marital status, gender, occupation, education level, income level, and presence of children, among others. Additionally, the data contain date of sale and point of sale information—internet, sales call, seat section, etc.—that are pertinent to sales and marketing managers in maximizing sales of tickets to each game. We focus specifically on single game, regular season ticket sales and remove any seats that were given away by the team for free.

We integrate our demographic and ticket purchase data with data from Basketball Reference (2014), which provides information on home and opposing team variables such as win percent, number of all-stars on the team, whether the team made the playoffs in the current or previous year, the teams’ respective playoff seeds, and so on. Team data are integrated into the ticket database at the purchase date level. More specifically, we include team win percent and win percent differences on the day that customers purchased their ticket(s) as a proxy for the expected quality of the match-up. This differentiates our study from previous work, which has been limited by the capacity of the data that often includes only seasonal level quality, or game time quality of the match-up, despite the fact that tickets are often purchased well in advance.

Methods
We first employ ordinary least squares (OLS) to identify differential dynamic influences across consumer types as
they relate to ticket purchase price. We estimate models on three subsets of the data: 1) the entire data set, 2) only home-market consumers, and 3) only out-of-market consumers. Market identification is based on home state, although we are in the process of employing more granular methods of market identification using zip code level data. We test for statistically significant differences in coefficient estimates between the separate home and out-of-market models, while using interactions in the full data set.

We estimate separate models for each data subset using one of two independent variables. The first dependent variable is the real dollar total purchase price for each transaction. These models include a control variable for the number of tickets purchased, as purchases of a larger number of tickets clearly increase the total purchase price. The second model uses per-ticket purchase price. Additionally, due to the possibility of selection issues with respect to the number of tickets purchased—and its clear influence on total purchase amount—we also estimate two-stage least squares to each of the data subsets listed above. This portion of the analysis is ongoing.

**Preliminary Results**

Our models indicate that both home team and opposing team quality are positively associated with total purchase amount among consumers, with some evidence of differences in interest in competitive balance across market types. Out-of-market customers generally spent more in each purchase than home-market consumers. The number of days prior to the game that tickets were purchased show positive effects on the total purchase amount, and mid-week games generally resulted in lower total purchase amounts, though there was little relationship between the total purchase amount and the day of the week that the purchase was made. Only the presence of children and gender were useful predictors of total purchases for the full sample, with children increasing the total amount, and males spending less than females. Finally, as the game date approached and the home team was high quality, the reduction in the amount paid when buying closer to game time decreased.

Specific to out-of-market fans, neither the time between the purchase date and game date nor the distance from the arena showed any effect on total purchase amounts. The win percent of the home team was positively associated with purchase amount; however, out-of-market fans were less responsive to this characteristic. There were no additional effects of the quality of the visiting team for out-of-market, or opposing market-specific customers. Additionally, estimates indicate less interest in uncertainty among out-of-market consumers.

**Discussion and Practical Implications**

We extend the literature on attendance demand, which often attributes demand for uncertainty and team quality to all attendees. However, as noted here, game uncertainty seems to be a characteristic specific to certain fan types. Those traveling long distances to see their team play tend to do so to see a win, rather than a competitive game. This may explain much of the confusion in the UOH literature on direction of effects (Szymanski, 2003). We provide lessons for future economic theory of sports fans and balance as a conclusion to the presentation.

Practically, our results have the potential to inform sales and marketing managers of the implications of both game-level and consumer-level characteristics on demand for tickets at NBA games. Given the apparent differences in fan interest in game uncertainty dependent on market area, marketing and sales tactics should highlight these game characteristics depending on market of the consumer, and the timing of the ticket purchases. Out-of-market fans that make trips to away games seem less sensitive to paying more, suggesting that dynamic pricing strategies should leverage knowledge about whether the customer is a within- or out-of-market attendee.