

**Underpricing in the NFL: What Can Secondary Market Price Tell Us About the Demand for NFL Tickets?**

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The acceptance of variable pricing strategies by an increasing number of professional teams and the substantial growth of the secondary ticket market indicate that many sporting event tickets may be underpriced. Indeed, empirical work has consistently demonstrated that teams set ticket prices in the inelastic portion of gate demand (Fort, 2004). In Denver, Colorado, for example, where the Broncos home sellout streak is in its 43rd year, it is estimated that, with the arrival of Peyton Manning, Broncos tickets on the secondary market increased 64% on a year-over-year basis between the 2011-12 and 2012-13 seasons (Van Riper, 2012). Underpricing in the National Football League (NFL) may reflect the fact that teams need to sell out their stadiums to avoid a TV blackout in their local market or that team owners maximize total revenue generated by all stadium revenue streams tied to attendance, including concessions, parking, and signage (Krautmann & Berri, 2007). Primary market ticket prices, therefore, may not be an accurate reflection of the fans' actual willingness to pay (i.e. demand). The secondary market price, which can fluctuate based on game-by-game demand forces, may consequently be a more reliable measure of fan interest and thus the demand for the NFL product. Our study utilizes secondary market ticket prices to obtain a more accurate and precise estimate of demand and price elasticity.

Borland & Macdonald (2003), a thorough review of sport demand literature, shows that the demand for sporting events has been extensively explored and has traditionally focused on empirical examinations of the factors that influence event attendance. Typical results from their review indicate that attendance is affected by economic considerations (fan income, team market size), supply capacity, the quality of viewing environment for spectators, uncertainty of outcome, and the quality and significance of the contest. These studies normally seek to explain the variance in attendance using a variety of independent variables including ticket price, which is commonly operationalized as a weighted-average price where the weights are determined by the proportion of seats in each price category in the stadium (Krautmann & Berri, 2007). The effect of price has been somewhat inconsistent, however, indicating that a more elaborate treatment of price is "necessary to assess rigorously [its] effects on demand" (Borland & Macdonald, 2003, p. 491). Furthermore, in the NFL, where supply is fixed and high sellout rates are the norm (our data suggests the average capacity sold was 95% for the 2010 regular season), attendance may not be an accurate predictor of demand.

Studies of ticket prices in the primary market have principally focused on the determinants of price either across teams or on a year-over-year basis. Reese & Mittelstaedt (2001), the first study to explore ticket price-setting strategies in the NFL, found that team performance was the most significant determinant, followed by the revenue needs of the organization and several other factors including public relations concerns and the average league price. Later, Rische & Mondello (2003) analyzed the determinants of ticket prices in the NFL using average seasonal ticket prices by team and seasonal price changes over several years, and similarly found that the most important determinants were team performance in the previous season, income of the fans, population of the team's metropolitan statistical area, and whether or not the team was playing in new stadium. Noting the importance of game-by-game fluctuations in demand, (Rascher, McEvoy, Nagel, & Brown (2007) assessed variable ticket pricing (VTP) in Major League Baseball and demonstrated that VTP has the potential to significantly increase teams' ticket sales revenue. However, while prices are no longer uniform over the course of the season, they still reflect only the influences on demand known in advance of the season.

The secondary market is a relatively recent area of exploration that promises new insights on the determinants of ticket demand. Drayer and Shapiro (2009) used transaction data from the online auction site eBay to examine NFL ticket price determinants in the secondary market. The authors created a regression model based on explanatory factors that were identified in the primary ticket market and online auction literature. With final ticket sale price at

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auction as the dependent variable, the authors found that population in the home city, total number of transactions, and face value of the ticket were most strongly correlated with price. In a later, more comprehensive examination of NFL ticket price determinants in the secondary market, Drayer, Rascher, and McEvoy (2012) utilized per-game data for all 32 teams for the 2007-08 season and incorporated several new explanatory variables including week of the season, new stadium, percentage of stadium capacity sold, point spread, and geographic distance between teams. The authors found that prior winning percentages, average face value of the ticket, new stadium, and percentage of capacity sold significantly influence ticket price.

Building on the work of Drayer, Rascher, and McEvoy (2012), which lacked certain variables that we argue are important to the discussion, this study pursues a more accurate and precise estimate of demand and elasticity in the NFL by including new, pertinent demand variables. Specifically, these variables are game day and time, whether or not either (or both) of the participating teams were eliminated from playoffs at the time of the contest, and the total expected points scored (also called the Over/Under). The data set, which was provided by a prominent secondary market firm, contains per-game secondary ticket prices for all 32 NFL teams during the 2010-11 season. Preliminary results indicate that NFL teams are indeed underpricing. In fact, we show that secondary market prices are more elastic than primary market prices and that elasticity increases as demand for the game increases. In addition, early results indicate that the new variables included are statistically significant indicators of demand. Moving forward, as the growth of VTP places greater importance on understanding the influence of game-related variables on fans' willingness to pay, variables such as these will be critically important to the VTP algorithm.