CHAPTER II

LITERATURE REVIEW

The purpose of this chapter is to review the literature on attendance at professional sporting events. In addition, rational addiction models and theories will be surveyed. There is an abundant literature on both of these topics, and each will be discussed based on its relevance to the present research on rational addiction among fans of the National Football League (NFL). First, the chapter will begin by discussing literature on attendance at all types of sporting events. Studies of attendance for both collegiate and professional American football\(^1\) will be examined at the end of the attendance section. Second, this chapter will explore the body of literature on rational addiction, examining current research in the area and discussing how it may be applied to habit-forming goods such as alcohol and cigarettes. The majority of empirical studies that test rational addiction have studied either cigarettes, alcohol, or illicit drugs. The final section of this chapter will discuss an unpublished working paper that applies a rational addiction model to explore attendance and ticket pricing at professional baseball games. FIGURE 2.1 is a visual representation of the available literature pertaining to rational addiction and NFL attendance.

\(^1\) American football as opposed to soccer, known as football elsewhere. In this paper references to football can be assumed to be American football unless otherwise noted.
FIGURE 2.1
Attendance and Rational Addiction Literature

Attendance

There have been a number of studies in the economics literature on factors that influence the consumption of sports, which is generally represented by spectator attendance at sporting events. Economic demand models have been widely used to analyze the factors that determine spectator attendance, and this method has been applied to various sports.

Attendance in Major League Baseball (MLB) has been studied frequently. Kahane and Schmanske test the proposition that roster turnover has an impact on MLB attendance. They hypothesize that fans prefer some consistency in the
composition of the team and that when turnover is high, fans will lose interest in the team. Using data from the 1990 through 1992 MLB seasons, they control for factors such as price, income, population, team quality, league, year, and stadium effects. They use an ordinary least squares estimator and find that turnover does indeed have a significant and negative impact on attendance in MLB.²

In another study on Major League Baseball attendance, McDonald and Rascher explore the effects that special promotions have on game day attendance. They study the overall effect that a promotion has on attendance and also the marginal impact of increasing the number of promotion days on attendance. They use data from the 1996 season for 19 teams. Using ordinary least squares regression, they find that promotions increase game-day attendance by about 14%. There is evidence of diminishing marginal returns with promotions, since increasing the number of promotions has a negative impact on the marginal effect of the promotion. However, the gain of having an extra promotion day is greater than the effect of diminishing returns.³

There have also been some studies on attendance at basketball games. Burdekin and Idson examine the effect that customer discrimination has on attendance for the National Basketball Association (NBA). They use data from the 1980-81 through 1985-86 NBA seasons to test their hypothesis that fans prefer to see players of their own race. They find that attendance is significantly affected by the


racial composition of the team relative to the racial composition of the market area. Teams whose racial composition more closely matches that of the location in which they play have games that are attended more than teams made up of players that do not represent the racial composition of the local area.\textsuperscript{4}

Zhang, Pease, Hui, and Michaud explore the variables that determine whether or not spectators will attend NBA games by developing the Spectator Decision Making Inventory. The inventory includes 20 variables that are believed to have an impact on the decision to attend an NBA game. They survey a random sample of 861 NBA spectators and employ factor and regression analyses to test the validity of the survey results. The factors that they find to be significantly related to game attendance are game promotion, home team, opposing team, and schedule convenience.\textsuperscript{5}

Soccer is another sport that has been relatively well studied. Peel and Thomas investigate the determinants of attendance for professional soccer in England, hypothesizing that games that are not predicable attract bigger crowds. They attempt to isolate the effect of the uncertainty of outcome by using betting odds as a means of measuring the uncertainty and employing ordinary least squares regression. Using data from the 1981-82 season of the English Football League, they find that economic, geographic, and demographic variables play a part in determining attendance at soccer matches. Also, variables related to the quality of the teams and


\textsuperscript{5} Zhang, Pease, Hui, and Michaud, “Variables affecting spectator decisions to attend NBA games,” \textit{Sport Marketing Quarterly}, Volume 4, Number 4, 1995: 29-39
other exogenous variables, such as weather, are found to influence the demand for attendance.\textsuperscript{6}

Dobson and Goddard provide further research on the demand for soccer. They use data from the 1925 to 1992 seasons of the English Football League to test their hypotheses that ticket prices, age of team, fan loyalty, and demographics all play important roles in the demand for professional soccer. They employ two-stage regression analysis, where attendance and loyalty are endogenous variables. They find that team success, price, and loyalty are significant factors that determine attendance in the English Football League.\textsuperscript{7}

Baimbridge examines soccer match attendance at the European Championship that was held in England in 1996. He uses data from the tournament and explores the effects that economic, demographic, and match-specific variables have on attendance at such an event. He uses ordinary least squares regression and finds that the distance between the team’s home city and the tournament site and the quality of the teams are the most important factors that affect tournament attendance.\textsuperscript{8}

There has also been considerable research done on hockey attendance. Studies have examined attendance at the major and minor league levels. Hansen and Gauthier explore the National Hockey League (NHL) and compare and contrast factors that affect attendance in the NHL with the other major professional sports


(NBA, MLB, NFL, Canadian Football League, Major Indoor Soccer League), hypothesizing that there would not be any significant differences in factors affecting attendance at these sporting events. They develop a questionnaire using a Likert 5-point scale regarding attendance based on 40 factors believed to impact attendance and apply it to a sample of 117 teams from the various sports leagues. Using factor analysis and Varimax rotation, they examine the questionnaires. They use ANOVA and Tukey tests to determine significant differences, finding that there are indeed significant differences amongst leagues in the factors that determine attendance. The results of the analysis indicate that scheduling, team roster quality, price, forms of entertainment competition, and convenience for fans are the significant factors that affect attendance for the NHL. Similar factors are found to affect attendance at NFL games, but to varying extents.9

Zhang, Pease, and Smith examine the determinants of minor league hockey attendance. They focus on the role that the broadcast media plays in determining attendance. Using a survey of a random sample of 2,225 minor league hockey game spectators, the authors use regression analysis to determine the factors that affect attendance. They conduct the survey during 6 games of an International Hockey League team during the 1994-95 season. The analysis suggests that broadcasting plays a large part in increasing attendance, with television and radio broadcasting of away games being significant factors in determining the attendance at home games.

The authors conclude that a good broadcasting relationship creates and increases spectator interest.\textsuperscript{10}

As for football, there have been studies done in recent years on the demand for attendance at collegiate as well as professional football games. In their study of NCAA Division II football, DeSchriver and Jensen examine the relationship between attendance at college football games and various economic and game variables. Data is collected for three college football seasons (1994, 1996, and 1999) for all NCAA Division II teams. They use ordinary least squares and fixed-effect regression models to estimate demand equations for Division II college football. Results of the analysis suggest that both the past season and current season winning percentages have an affect on attendance, with the past season’s performance becoming relatively less important than the current season’s performance as the season progresses. Promotional activities, size of the college, and competition within the market were also found to be significant factors in determining attendance at college football games.\textsuperscript{11}

Welki and Zlatoper examine NFL attendance and the factors that affect it. They use data from the 1991 NFL season and employ Tobit analysis. The explanatory variables include economic and demographic factors as well as game-specific variables. The regression analysis indicates that the home team’s winning percentage is an important factor in determining attendance. They also suggest that


higher ticket prices depress attendance and that the demand for professional football appears to be inelastic.\textsuperscript{12}

There are also some studies that attempt to explain fan motivation in their football attendance studies. For example, Kahle, Kambara, and Rose study college football to determine what it is that draws fans to the games. The study uses functional theory of attitudinal motivation to construct and test a model of fan attendance at college football games, based on survey data from 112 students at a large public university in the Pacific Northwest region of the United States. They find that that collegiate football fans were motivated by overall attachment to and love for the team, to achieve some degree of freedom from the stress and anxieties of daily life, and by camaraderie, or a desire for group affiliation.\textsuperscript{13}

These studies provide a solid foundation for research on NFL attendance, but there is at least one factor that seems to be missing from each of these attempts to explain the demand for various sporting events. None of the studies attempt to account for habit-formation in their models. This could prove to be an important omission.

There are some studies in the psychology literature that address addiction to sports, but they mostly discuss the athletes’ dependency on participation in sports and exercise\textsuperscript{14} rather than addressing the issue of fans’ possible habits in the consumption


of sporting events. However, some authors have acknowledged that sports fans may follow sports at least partly because it becomes a habit. Gerdy describes sports as the “all-American addiction,” but supplies only anecdotal evidence to support this claim. Another body of literature on rational addiction explores how habits can be a factor in determining consumption and how this can be tested empirically. The following section will briefly explore the current studies on rational addiction.

**Rational Addiction**

Economic theory regarding the role that habits play in the demand for goods is a relatively new subject. Alfred Marshall initially mentioned the idea in his 1920 textbook. Marshall notes:

“…whether a commodity conforms to the law of diminishing or increasing return, the increase in consumption resulting from a fall in price is gradual; and, further, habits which have once grown up around the use of a commodity while its price is low are not quickly abandoned when its price rises again.”

This was the beginning of the economic study of the effects that tastes and preferences have on demand. However, many economists, including Milton Friedman, have been skeptical at best when it comes to accounting for tastes. Friedman expresses this sentiment in his 1962 book *Price Theory*.

“…The economist has little to say about the formation of wants; this is the province of the psychologist.”

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Nonetheless, attitudes have begun to change in recent decades, and the literature regarding economic research on addiction has expanded tremendously.

Literature on addiction is both abundant and diverse. There are two main subcategories of addiction research that break the literature into the myopic and rational branches. The main difference between the two is that the myopic models only consider the effect of past consumption on present consumption, while ignoring the expected future consumption. The rational school considers both past and future consumption when estimating present consumption. Traditionally, the two are classified separately, although the myopic studies can really be thought of as a special case of the rational model when the effect of expected future consumption is zero. This study will focus on the subset of addiction research that deals with models of rational addiction, since that is the model that will be used in this paper. For a review of addiction literature that includes myopic models see Fenn and Chaloupka.

Rational addiction, according to Becker and Murphy, implies that people make choices according to their consistent utility maximization plan. Rational addiction models, as applied to cigarette demand, examine the notion that past consumption, price, and estimated future consumption have an effect on present consumption.

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consumption. There have been a few studies done regarding alcohol\textsuperscript{21} and some illicit drugs such as cocaine.\textsuperscript{22}

In the body of literature on rational addiction, two main classifications can be made. There are rational addiction models that are discrete and those that are continuous.\textsuperscript{23} The difference between the two lies in the fact that research using a continuous model uses dependent variables that can assume continuous values while discrete models refer to dependent variables that have specific zero-one values. Discrete models have mainly been used to explore starting and quitting rates for smokers\textsuperscript{24} while continuous models have attempted to model present consumption of an addictive good as a function of past, present and future prices, income, and addictive stock of the good.\textsuperscript{25} In either case, the key to the models is that present consumption depends on price, past consumption, and expected future consumption.

Stigler and Becker lays the foundation for rational addiction analysis.\textsuperscript{26} This early research on rational addiction is theoretical in nature and gives no empirical evidence. It sets up the theory upon which later papers with rational addiction models are built. It is in these papers that the idea of habit formation based on utility


maximization is first introduced. Stigler and Becker set up their argument based on an idea of household production. They make a claim that rather than consuming goods, people consume commodities that they themselves produce by using market goods and their own human capital. The commodity itself does not even have to be a tangible good. Stigler and Becker use an example of music appreciation, first employed by Marshall, in their paper. When discussing the idea of diminishing marginal utility, Marshall states:

“…it is therefore no exception to the law that the more good music a man hears, the stronger is his taste for it likely to become.”

The total bundle of commodities that a household consumes is broken down into music appreciation and a vector of all other commodities. The consumer “produces” music appreciation by allocating time to music and human capital contributing to music appreciation. The human capital contributing to music appreciation can be further broken down into inputs of educational attainment and the amount of accumulated music appreciation carried over from the previous period. Using this approach, Stigler and Becker are able to show that present consumption does indeed depend upon past and expected future consumption for addictive goods. Spinnewyn extends this theoretical model and further considers the interaction

27 Ibid.
29 Ibid: 94.
between past and current consumption among utility maximizing consumers.\textsuperscript{31} Iannaccone adapts the Stigler and Becker model of demand for habit-forming goods and applies it to his own model of religious participation that depends on a “stock of religious experience.”\textsuperscript{32}

The most widely cited work on rational addiction is that of Becker and Murphy. In this purely theoretical and fairly complicated work, Becker and Murphy set up the model of rational utility maximization with stable preferences. They lay out the framework that is widely accepted for rational addiction, which claims that the utility function that consumers are maximizing depends on the addictive good, all other non-addictive goods, and the “addictive stock” of the addictive good. The model explores things such as elasticity of demand for addicts versus non-addicts, phenomena such as binges and cold turkey, and the relationship that temporarily stressful events have on permanent addictions.\textsuperscript{33} One of the major contributions of this article is the way in which it defeats the common misconception that cigarette demand is insensitive to price due to the habit-forming properties of cigarettes. The Becker-Murphy model shows that price does indeed play an important role in the quantity consumed of an addictive good. Moreover, a drop in price for an addictive good may have larger effects on long run demand than it would for a non-addictive

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good, since the drop in price affects not only the current period’s consumption but also the future period’s consumption through the addictive stock of the good.\(^{34}\)

This theory of rational addiction has now been tested in numerous empirical studies. Chaloupka provides a simplified and empirically tested version of the Becker-Murphy model. He uses cigarette consumption data from 1976 through 1980, which was obtained from the Second National Health and Nutrition Examination Survey on 28,000 people from 6 months to 74 years of age. Data was also collected by county of residence for prices, taxes, and demographic variables such as age, gender, income, education, race, and, marital status. He separated the groups according to age and education and estimated demand equations separately for each group in order to isolate the effect of time preference on demand. In accordance with rational addiction theory, he finds evidence that, prices and past and future consumption do indeed affect current consumption in his models of cigarette demand.\(^{35}\)

Grossman provides the first published effort that applies the rational addiction model to alcohol consumption. He collected data on per capita consumption of alcohol from National Health and Nutrition Examination Surveys, which also included demographic information. However, the results of his empirical analysis provide little evidence to support the notion of rational addiction for alcohol consumption.\(^{36}\) Waters and Sloan also apply the rational addiction model to alcohol

\(^{34}\) Ibid: 687.


consumption and did indeed find evidence of rational addiction in their study. They use data from the 1983 US Health Interview Survey and found that past and future consumption have strong positive relationships with current consumption. They also found price to be negative and significant in their empirical rational addiction model.\textsuperscript{37}

Becker, Grossman, and Murphy find that past and future prices do indeed influence the present consumption of cigarettes, which concurs with the model in previous theoretical work on rational addiction.\textsuperscript{38} They use annual U.S. data that is broken down by state for the 1955 through 1985 period. They estimate an equation for cigarette demand and employ two-stage least squares regression to estimate a simultaneous model of current, past, and future consumption. Their findings suggest that estimated past and future consumption do indeed have significant, positive relationships with current consumption while the current cigarette prices impact current consumption negatively.\textsuperscript{39} This empirical evidence provides direct support for the earlier theoretical work by Becker and Murphy.\textsuperscript{40}

In a more recent study, Fenn, Antonovitz, and Schroeter test the hypothesis that the 1979 U.S. Surgeon General’s report had a significant impact on cigarette


\textsuperscript{39} Ibid.

demand. The 1979 report provided conclusive evidence about the addictive nature of nicotine in cigarettes. They hypothesized that demand may have been myopic before the warning and rational afterward. They used annual data for the U.S., again broken down by state, from 1955 to 1994. To account for the new information that was published about the cigarettes in 1979, they add a dummy variable to their regression equation that takes on a value of one for every year after 1979. Following earlier studies on rational addiction, the model is tested using fixed effects two-stage least squares. The results suggest that characteristics of rational addiction were evident even before the Surgeon General’s published warning in 1979, further supporting the notion that that rational model is indeed superior to its myopic counterpart. However, they also found that there was indeed a structural shift in 1979, which supports their original hypothesis.

### Rational Addiction and Attendance

Ahn and Lee attempt to apply elements of the rational addiction model to sports consumption in their examination of baseball attendance. They use the possibility of habit-formation as an explanation for the fact that Major League Baseball teams appear to price their tickets below the profit-maximizing price. The

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42 Ibid.

authors posit that this may be due to the fact that the franchises recognize that the consumption of baseball games may indeed be habit-forming. Thus, they price their tickets slightly lower than they normally would in order to attract a larger fan base, knowing that increasing their fan base in any given time period will increase their attendance and gate receipts in subsequent seasons. This study focuses on a life-cycle profit maximization model for teams and examines their pricing strategies. Using pooled data from the 1969 through 2000 MLB seasons and the Generalized Method of Moments as well as Ordinary Least Squares to estimate the demand equation, Ahn and Lee test for habit formation in consumption of professional baseball games. The results of the regression analysis indicate that baseball consumption is indeed habitual, but not necessarily rational.\(^{44}\)

Byers, Peel, and Thomas analyze the possibility of rational habit-formation among professional soccer fans in England.\(^{45}\) Using data from the English Football League and an Autoregressive Fully Integrated Moving-Average (ARFIMA) regression technique, the study examines whether or not habit-formation plays a role in the demand for attendance at soccer games. The results indicate support for the rational habit-formation model, suggesting that habit may be an important factor that influences spectators at professional sporting events. These two working papers provide preliminary evidence for habit-formation. Further research into rational addiction and consumption of professional sports games is warranted.

\(^{44}\) Ibid.

Conclusion

The present study will fuse elements from the body of literature on attendance at sporting events with the current research on rational addiction. The previous research on attendance for sports has not addressed the possibility of rational addictive behavior, with the exception of the working paper on MLB attendance by Anh and Lee.\textsuperscript{46} There has yet to be a paper published that examines the possibility of rational addiction in the demand for sports attendance, and this will be the first to apply the model to the National Football League. Following the earlier work done on attendance, this study will examine the traditional variables used in predicting spectatorship at sporting events to see how they impact NFL attendance. Estimated past and future consumption are added to the model, according to rational addiction theory. The result will be a model that accounts for habit formation in the demand for attendance at NFL games.

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