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THE DYNAMIC COMPETITIVE BALANCE RATIO AS A NEW METHOD OF UNDERSTANDING COMPETITIVE BALANCE AND FAN ATTENDANCE

BY

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DISSERTATION

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ABSTRACT

The theoretical premise of this research can be traced back to seminal studies of economist's Simon Rottenberg (1956) and Walter Neale (1964), who both noted the importance of uncertainty of outcome in attracting spectators to live sporting events. In examining the economics of sport leagues, both researchers came upon this "the uncertainty of outcome hypothesis" (UOH), which is the general premise that fans would rather see a contest in which teams are evenly paired with one another in terms of talent and strength. Stemming from the UOH, came the idea of competitive balance, the concept that there is a relative level of equality in on-field strength between teams in a league (Forrest & Simmons, 2002). Key questions which arise from this literature include: "In what manner can competitive balance be measured?" and "Is competitive balance a significant factor in determining fan attendance at sporting events?"

In order to tackle these issues, along with the prior stated research questions, this dissertation research uses a two-fold approach to investigating competitive balance. Within the literature on competitive balance, there are a great number of metrics which have been developed, however researchers remain divided among which metric(s) are the best. With this in mind, this dissertation approaches this problem by the creation of a new competitive balance metric, the Dynamic Competitive Balance Ratio (DCBR). This metric, which is evolved from prior metrics (Humphreys, 2002), is special in that it allows for a different measure for each team in every time period, and its length can be adjusted for any time period larger than a single season. Thus, through the creation of this metric, this dissertation research attempts to further the competitive balance research through the creation of a new metric in order to correct for several existing issues among current competitive balance metrics.

In the second part of this dissertation, the DCBR is included as part of an economic

demand model to estimate fan demand for attending MLB games from 1980 till the present. In order to do this, a regression model is utilized to estimate results from the panel data set, with proper econometric corrections made to take into account a variety of issues which may arise such as: heteroskedasticity, autocorrelation, the use of fixed or random effects, and so forth. Because of the lack of demand studies in sport which have employed a competitive balance metric as part of the model, through construction and estimation of results, this dissertation provides an important extension of the theoretical understanding of competitive balance by giving further evidence of what effect competitive balance has on a consumer's choice to attend sporting events.

Analysis of the estimated results also provide a more robust picture of the factors which attract (or deter) consumers from choosing to attend MLB games in person, which in turn presents better information for sport managers to understand why fans come to sporting events. Such findings can be directly translated into better decision making in sport management, by informing administrators, owners, and managers as to what factors attract fans to sporting events, as well as the importance of having competitive balance in these sport leagues. It is thus, that this research examines the significance of competitive balance from a variety of levels. From this, it is evidenced that this dissertation research presents a number of contributions, in terms of theoretical knowledge, empirical understanding, as well as practical application of competitive balance and the demand for attendance at sporting events, and thus providing an overall improvement of sport for fans, owners, managers, and other related stakeholders.

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CHAPTER 1: INTRODUCTION

1.1 Introduction

"In sport, even modern sport, we look forward to equal contests. A contest whose outcome is a forgone conclusion does not engage us, save perhaps when the weaker contestant performs bravely enough to win our sympathetic admiration." – South African author J.M. Coetzee (*Diary of a Bad Year, 2008, p76-77).*

The professional sport industry has evolved into a multibillion dollar industry over the last several decades, a far cry from the times when teams passed a hat around the crowd to collect money to pay players. While sport has grown as an industry, fan support is still of great relevance to the professional sport industry. Before the advent of television and other broadcast media, fans attending games were the primary source of revenue for professional sport franchises, but with the evolution of various media types, as well as the boom of commercialism, sport has become less reliant on gameday revenue to finance operations. Despite this, gameday spending and attendance still make up a significant portion of team revenue, and thus fan demand remains a primary issue for sport managers. An important question which emerges from this observation is: "what determines fan support, and how can teams maintain this fan support?" This question is critical not only in that teams still need fans to come to games as a source of revenue, but also in the need to maintain fan support, from which has sprouted factors such as loyalty, and lead to the further branding and commercialization of sport franchises. With this in mind, this dissertation examines the determinants of demand for professional sport.

In undertaking such an analysis, one needs to consider the emergence and development of the field of sport management, which was developed to obtain better understanding of issues which exist within sport. Included within this field is examination of business, management,

economics, finance, diversity, social and other aspects and practices in a sport context. However, it is also vital to consider the importance and nature of sport itself in the field of sport management. Inherent to the nature of sport is the concept of competition. That is, sport competitions are premised upon the pre-condition of having at least two opposed competitors, whether they are teams or individuals. It is this pre-condition which helps to distinguish sport from other activities. Many businesses operate with the goal of eliminating competition in order to become more dominant within an industry. However, sport organizations cannot fully adopt this goal, as destroying the competition would in essence, be destroying the very product they produce and sell to consumers. Organizations which are part of professional sport leagues are placed in a position where they can strive to be good, but being too good is not only bad for business, it could possibly put them out of business. In this manner, competitive balance, the existence of a relative equality of on-field ability of teams, has become an essential concept into understanding professional sport leagues and fan consumption of sport.

While the above observation on the workings of a professional sport league validates the need for a theoretical and empirical examination of competitive balance, there are further aspects and implications of this phenomenon which must be considered, as competitive balance is not only of interest to academics, but has also gained wide use and focus among fans and the media when assessing and discussing the state of professional and amateur sports. Fairness and equality have become very important parts of our society, especially with the rise of the civil rights movement which sought to give everyone fair and equal treatment and opportunities in life. Competitive balance is said to increase with the creation of more uncertainty in matches (Forrest & Simmons, 2002), which in turn generates a perception of leagues being fairer. Thus, it could be said, sport mirrors society in trying to create more fairness within its various

institutions.

As competitive balance has become more recognized by the general public, or at least the fans and media members who focus on sport, sport organizations have taken measures to make games, leagues, competitions, and tournaments fairer to all involved. In other words, public perception of equality or balance in sport leagues has lead to changes in rules, policies and organizational structure to cater to consumers. One example of this is in leagues imposing salary caps to control expenses and also to limit the amount of talent one team can acquire. More specifically to the focus of this dissertation, Major League Baseball (MLB) implemented a luxury tax under which teams that spend above a certain threshold on player salaries must pay a monetary penalty. All of these policies point towards trying to have equal talent distributed among teams, however, not all of these policies are successful.

In his book *Baseball and Billions*, Andrew Zimbalist (1992) discussed the organization of MLB as a business, and showed how league structure and ownership affected the economics and finances of the league. In this examination, issues of competitive balance emerged as a key factor, as the rise of free-agency era was theorized to have brought about better balance within the MLB. Through empirical examination, Zimbalist finds free-agency did indeed bring about better balance. However, Zimbalist notes owners colluded with each other on a number of occasions after the introduction of free-agency, to counter the effects it had on player salaries and movement. It is partly because of this and other acts performed by the owners which lead to competitive balance becoming more focused upon by fans and the media. In their attempts to collude and hence, restrict player movement, not only were owners trying to save money and control the baseball players market by undermining free-agency, they were also hampering the competitive balance in the league.

Since North American professional sport leagues each represent a separate multibillion dollar industry (Forbes, 2008), the profile of these leagues has also increased greatly. Thus, with leagues being more and more considered "big business," there is some necessity in ensuring competitive balance exists among teams, not just to attract additional fans under the implications presented in the MLB Blue Ribbon report (2000), but also in giving the impression of equity and fairness within these leagues.

In order to enhance parity within leagues, many leagues change rules annually in an attempt to create a level playing field. Several rule changes in the last few years sought to do exactly this. One of the most recent changes was the alteration to clock management rules the National Collegiate Athletic Association (NCAA) made before the 2006 football season to speed up games (Wieberg, 2007). This change allows for a shorter game, which in turn gives teams with less talent a theoretically better probability of defeating a more talented team and thus improves competitive balance in NCAA football. While this rule may have been fair, it was only used for one year as fans and coaches did not like the change. So while rule changes and other methods can be used to try and enhance balance, many of the changes made by leagues are influenced by consumer response. It is that, even though competitive balance is something which is desirable to consumers of sport, fans who attend games do attempt to satisfy other desires such as watching: action, tradition, high scoring, home runs, amazing plays, and the exhilaration of being part of a large communal crowd. In this, managers and executives who help to create rules and policies are not able to focus solely just on competitive balance, but also on a large number of other factors in creating a sport product for consumers. Thus, it is very important to understand consumer response, fan behavior, and media perceptions of competitive balance, as there is also a great need for considering the long line of academic work which has

been predicated on competitive balance and the demand for sporting events.

Academic interest in competitive balance can be traced back to Rottenberg (1956) and Neale (1964), who both point to the implications of uncertainty of outcome in sport having a direct effect on fan attendance. Both posit separate, but similar Uncertainty of Outcome Hypotheses (UOH), which state that fans will be more willing to attend matches if they are uncertain about which team will be victorious in a contest. These seminal works spawned a larger body of theoretical and empirical inquiry which, while not completely supporting the UOH, laid an important foundation for the continued use of competitive balance as a determinant of fan demand. It is worth mentioning at this stage, that a great deal of research has been conducted on fan demand in sport, however, most of this research has considered only factors of team strength or uncertainty of outcome in their examination. Notably, competitive balance metrics are not found in most of the sport demand research, and thus there is need for further empirical examination of the relation between competitive balance and the demand for sport.

Furthermore, research into competitive balance is not entirely focused on attendance demand, but also has another component, the analysis of competitive balance (ACB) (Fort & Maxcy, 2003). While the former line of research examines how fans respond to changes in competitive balance, the later examines the evolution of competitive balance, and how various changes in rules and regulations affect the relative level of parity within a league. These two lines of research have very different goals, but it is still possible for a single research project to contribute to both.

This dissertation employs a two-fold approach to develop and analyze a new competitive balance metric. This competitive balance metric will be compared to other metrics, contributing to the ACB literature and will be used in a demand model to better understand consumer demand

for live sporting attendance, contributing to the UOH literature. This two-pronged approach is becoming more of a necessity in the competitive balance research as demonstrated by Lee (2009), and explained by Humphreys and Watanabe (forthcoming). Humphreys (2002) developed the competitive balance ratio (CBR), the metric upon which the new metric in this dissertation is based. Humphreys (2002) not only developed a new metric of competitive balance, but compared it to other metrics over time using data from Major League Baseball (MLB). This work (Humphreys, 2002) also included the CBR in an attendance model, and showed that variation in demand for MLB attendance was explained by variation in the CBR but not by other measures of competitive balance. This dissertation follows a similar approach in investigating competitive balance, as it is important to compare the new competitive balance metric to the existing measures in order to investigate its ability to explain variation in demand. Thus, this dissertation develops a new measure of competitive balance, conducts an analysis of competitive balance using this measure, and uses the results to better understand why fans attend professional sporting events.

It is also important to assess the current state of the literature to build a theoretical and empirical context for this dissertation. Thus, the literature review presented in the second chapter will focus on the demand for sport, the development of the UOH, and competitive balance's evolution and place in the sport literature. Chapter three, develops the new competitive balance metric, the "dynamic competitive balance ratio" or DCBR, and discusses the existing competitive balance metrics. The DCBR and CBR will be explained, calculated, and compared with other competitive balance metrics. The fourth chapter formulates a demand model to analyze demand for attendance in MLB using both the DCBR and other competitive balance metrics as explanatory variables. These competitive balance metrics will be combined

with market characteristics and other variables to explain observed variation in MLB attendance. Finally, the results and conclusions will be presented, with their implications in academic and professional/industrial applications discussed in detail.

1.2 Contributions

The dissertation makes four primary contributions. The first contribution of this dissertation comes forth in the use of a two-fold approach to examine competitive balance. As mentioned earlier, most competitive balance research has focused on either the ACB or UOH lines of research. Thus, through merging these two lines, this dissertation will provide further validity in displaying the importance of considering both lines of research when conducting research investigating competitive balance.

The second contribution is in developing an existing competitive balance metric into the newly formed DCBR, which will provide a new method to measure and assess competitive balance. Currently, there exists a number of competitive balance metrics which capture different elements of competitive balance The DCBR combines multiple years of performance into a single metric for every team a league. In the development of the DCBR, it is believed that the new competitive balance metric will also help serve as an impetus for other researchers to consider new and innovative ways in which to conceptualize and measure competitive balance.

Third, this research will use the DCBR as an explanatory variable in a demand model of live MLB attendance. This study will be one of a few that uses a competitive balance metric in a demand model, and not team strength or other outcome measure. This research will also be one of the first to employ a competitive balance metric with unique values for every team in each season, capturing high frequency variation in competitive balance and the dynamic nature of competitive balance. Other competitive balance measures either do not capture performance

over time, or do not generate unique annual values for each team. Since annual variation in attendance is the focus of much of the literature on attendance in sport, the DCBR can be used to explain annual variation in attendance. Because of this, the findings of this study will increase understanding of the role competitive balance plays in the demand for sport. By constructing a model for live MLB attendance, this dissertation will also contribute further knowledge of the determinants of demand for live sporting events, in this case, that of Major League Baseball.

The fourth contribution of this study is the application of the results to the management of professional sport teams and leagues. While there is some uncertainty about how much attention is given to academic research by professional sport franchises, a recent article from bloomberg.com (Eichelberger, 2009) indicates that at least one MLB franchise, the Cleveland Indians are paying attention to statistical evidence generated from attendance data using academic research methods in making some marketing decisions. Humphreys (thesportseconomist.com, 2009) points out that the evidence uncovered by the Cleveland Indians resembles those in McDonald and Rascher (2000). In a sense the Indians are paying top dollar for empirical results which academic research discovered almost a decade before. This lends some weight to the idea that teams are improving their management decisions by using research-based statistical analysis, especially in today's tough economic climate.

The Blue Ribbon report (Levin, Mitchell, Volcker, & Will, 2000) published by MLB discussed the importance of competitive balance in the ongoing operation and continued stability of the league. This report states that having better competitive balance in baseball is important to the prolonged stability of the league, and there exists a need to equalize the existing revenue disparity between franchises. Thus, there seems to be some reasons to believe that the results from this dissertation can be used to improve the management of sport franchises, though such

actions may not come about immediately.

Through these contributions, this dissertation will have important implications both within and outside of academia. The following chapters will discuss: literature to validate the research which is being proposed, existing competitive balance metrics, the new DCBR metric, the method of analyzing DCBR, and the construction of a demand model to understand the determinants of demand for live MLB attendance. In this, the research presented within this dissertation is believed to be contributing to further theoretical and empirical understanding of competitive balance, the demand for sport, and sport management as a whole.

CHAPTER 2 – LITERATURE REVIEW

2.1 Demand Literature

Examination of the demand for sport by economists has continued for over a half century, and is most often traced back to the seminal work of University of Chicago economist Simon Rottenberg (1956). In this work, Rottenberg (1956) put forth several propositions about the economics of professional sport leagues, including the uncertainty of outcome hypothesis aforementioned in the previous chapter. Several years after Rottenberg's work, another economist named Walter Neale (1964) also discussed the economics of professional sports in which he also put forth his own version of the UOH. The discussion of the UOH in this later work puts forth the idea of a "League Standing Effect", in other words, any type of consumption of a live sporting event will be affected by the relative standings of both of the competitors (Neale, 1964). What further differentiates the later UOH piece (Neale, 1964) is the inclusion of the fourth estate (the media). It is postulated that the individual matches alone are not the only product which is created by sporting leagues; rather they also create league standings and championships which are important in the press coverage and selling of both their own newspapers and the sporting product (Neale, 1964). In essence, this version of the UOH not only ties together the professional sports industry and the press, but also notes the survival of both industries requires a certain level of uncertainty of outcome in order to get consumers to purchase newspapers, magazines, tickets to sporting events, and other related goods

Examination of the UOH is continued by El-Hodiri and Quirk (1971) in their work on antitrust in baseball, where they restate the UOH and find that the antitrust status given to the MLB is justified because of the need to keep balance within the league. The more recent work of Borland and Macdonald (2003) has elegantly reviewed the literature in regards to the demand

for sport, while also theorizing a number of factors which affect demand, including the UOH. In this, the authors (Borland & Macdonald, 2003) state that there exists five main categories of demand: *"(i) form of consumer preferences – habit; age of club; (ii) economic: price – travel costs; income; market size (including demographic composition of population); availability of substitutes (TV; other sporting events); macroeconomic factors (rate of unemployment); (iii) quality of viewing – quality of seating and stadium; stadium size; timing of contest; (iv) characteristics of the sporting contest – uncertainty of outcome; 'success' of competing teams; quality of contest; significance of contest; and (v) supply capacity."* (p.481). In the following sections of this chapter, the review of the demand for sport literature will thoroughly consider each of the five parts of this theorization, as well as provide a summary discussion of the findings and main results within each section of this taxonomy.

The first empirical examination of the demand for sport can be traced back to the work of Roger Noll (1974), who focused on the business of professional sports in North America. While this is the first notable work in the empirical economic inquiry into sport, a chronological regurgitation of the literature will be avoided. Rather, as stated in the previous paragraph, the taxonomy of the five categories of determinants for demand will be used as a means to discuss various factors and important works in the field, especially those which have direct relevance to the theoretical and empirical research conducted within this dissertation.

Research into the first category of determinants of demand, consumer preferences is rather sparse with the most notable works being taking the form of consumer discrimination studies on professional sports. There are a variety of studies which have found evidence of the existence of consumer discrimination in the National Basketball League (NBA), including studies focused on attendance (Kahn & Sherer, 1988; Brown, Spiro, & Kennan, 1991). Notably,

Kahn (2000) revisits his previous work on NBA live attendance discrimination and finds there is no longer evidence of consumer discrimination in more recent years. While there no longer seems to be consumer discrimination against those who attend live games, Kanazawa and Funk (2001) find there is evidence of consumer discrimination in terms of live local cable television broadcasts for the NBA. This study finds those games with a higher number of white players of a certain skill level, had higher television ratings in the home market, thus indicating that there may have been a shift in consumer preferences. Restated, the results hint that those who exhibited discrimination may have moved from attending games in person, to watching the games at home.

What is curious about the research into consumer discrimination in sports is the findings seem to indicate that the NBA is the only league in which such discrimination occurs (Borland & Macdonald, 2003). What these studies do highlight, is there are more habitual and social-psychological behaviors which have an effect on the consumer's demand for sporting events. In more recent years, with the rise of the field of Behavioral Economics, there has been a renewed approach towards understanding these consumer preferences and how they affect decision making, especially in consuming sporting events. Medoff (1986) is widely thought to be one of the first economists to tackle sport from a more behavioral perspective, but it was Lee and Smith (2008) who find evidence of the habitual nature of the consumption of baseball in North America. Using data from both MLB and the Korean Professional Baseball League (KPBL), the researchers employ a Generalized Method of Moments (GMM) model and find the consumption of baseball is habitual in North America. The results suggest Americans are more addicted to the consumption of baseball than Korean consumers, or as it can also be explained, the utility gained by Americans actually increases as they consume more MLB games. Considering these findings

it is clear there is some importance which needs to be placed in considering the consumer preferences, behaviors, and other such social and habitual behaviors when examining the consumption and demand for sport. While this dissertation research follows a neoclassical approach, it will employ the use of variables to try and understand consumer preference to a certain degree. At the same time, findings from research on discrimination hint that within the context of baseball, there has not been as much consumer discrimination, and there seems to be no effect of such behavior on actual game attendance as far as research has shown. In order to take into account some level of consumer preference within this research, several variables will be included within the demand model in chapter four. These variables will be those such as a strike dummy variable that examines the change in consumer preference for MLB after work stoppages. Further details of the strike and other related variables included in the model will be included in the full discussion of variables and data collected in chapter four.

Turning to the second group of demand determinants, economic factors are focused upon. Neoclassical economic theory suggests the price of admission should have an inverse effect on the demand for sport. That is, if ticket prices are higher, there should be lower demand for that sporting event. However, research on professional sporting leagues has given evidence which is quite mixed or contrary to this theoretical belief. While Whitney's (1988) examination of MLB finds price has a miniscule affect on the demand for attendance, further investigation shows price has little or no affect in the consumer demand for attendance (Burdekin & Idson, 1991; Fort & Quirk, 1995; Fort 2005, Quirk & Fort, 1997). Additionally, a variety of research has shown that tickets to sporting events are priced in the inelastic range (Scully, 1989; Fort & Quirk, 1996; Fort and Rosenman 1999a; 1999b). What the empirical results indicate is the prices of tickets are not an effective determinant of demand as predicted by theory, rather there seems to be other

variables which have bigger effects on consumer choice of attending sporting events, or that other gameday purchases such as concessions and parking help teams set prices in the inelastic range (Coates & Humphreys, 2007).

The issue of price is one which is quite important and central to many attendance demand studies done in the field of sport. Borland and Macdonald (2003) report that finding data to construct ticket price variables for datasets is quite difficult, with many studies forgoing the use of ticket price because of issues and unavailability of data. This issue is also somewhat central to this dissertation as the datasets being worked on within this research project initially lacked any manner of price variables. Through the work on this dissertation in regards to both the preliminary exam and proposal presentation, it was believed that price data would be inaccessible for this study. However, fortunately a dataset of price data was found for the timeframe employed within this dissertation research. Previously, the positionality for the case of this research was that price has been found to have very little effect on demand in the empirical examination of the demand for sport, and therefore its exclusion from this study should not affect the results greatly, but ultimately it would be ideal to have price data. With the locating of price data for all teams in all seasons during this time period, along with the justification from basic economic theory that price should affect demand, this dissertation will include ticket price in all of the demand models presented in chapter four.

Continuing the discussion of economic factors as determinants of demand for sporting contests, Borland and Macdonald (2003) point towards other variables such as travel time and distance, income, market specific variables, as well as macroeconomic factors. The distance individuals' travel to attend a sporting event is found widely to decrease the demand for attending an event (Falter & Perignon, 2000; Garcia & Rodriguez, 2002). Somewhat more

intriguing is the marginal effects of travel distance decrease as the distance becomes further, that is while travel has a negative effect, the effect does not continuously grow as one travels longer distances (Baimbridge, Cameron, & Dawson 1996; Carmichael, Millington, & Simmons, 1999). The use of income and other market specific variables can be traced back to early works within the field of sports economics (Noll, 1974; Hart, Hutton & Sharot, 1975). It is important to note the datasets employed in these earlier studies were relatively small, and the statistical methodology and analysis were not as advanced as more recent works, and yet these studies played a very important role in advancing the field (Borland & MacDonald, 2003). While the results focusing on factors such as income and population have had a variety of findings, their inclusion seems to be quite vital in the construction of a demand model, especially in the need to help control for factors like differing income and population in different Metropolitan Statistical Areas (MSA). Precisely because there is such importance placed upon MSA population and income, these variables are a necessity in an economic sport demand model, and are thus included within the demand model constructed in chapter four of this dissertation.

In further examining the "economic" variables within the demand literature, there is a need to consider the use of macroeconomic factors. Curiously, it is found in the empirical work from England that as unemployment rates increases, demand for attendance also increases. It is believed sporting events function as a social activity, and unemployed individuals may often congregate at such events, as they get some sense of community, security, and power from it (Sandercock & Turner, 1981). It is further noted that gross domestic product (GDP) and the average number of working hours for individuals in a region could similarly be important factors in the demand for sport (Borland & Macdonald, 2003). Within this dissertation, macroeconomic factors will be featured, with focus placed on the economic strength of the country (GDP) as well

as the unemployment rate to consider how these larger scale economic variables affect the demand for sport attendance.

The third variable type examined in econometric studies of the demand for sport focuses on the quality of viewing at the match. This line of research can be traced back to the work of Bird (1982). In this, break-through piece Bird (1982) builds one of the more robust models for the demand for attendance in his time, and includes other factors which had not been considered or employed by other researchers, including travel distance, and weather related quality of viewing variables. Findings in regard to weather are quite curious, where in North America there is a lower demand for matches which have bad/cold weather; there is no effect of bad weather on matches in Europe. This helps to highlight two important points, first that weather and viewing quality is important to consider in the demand for sport, and second, depending on the region/sport/continent there may be differences in what affects the demand for sport.

The quality of viewing can also be condensed to the type of seating individuals choose when attending sporting events. Research indicates certain sections, such as standing room areas are more responsive to team performance, than areas where fans sat at matches (Dobson & Goddard, 1992). The majority of early studies which examined stadium age further found the older a stadium was, the lower the demand for attendance at those matches. Borland and Macdonald (2003) argue these studies cannot be fully trusted, as they do not consider the effects of stadium capacity which they believe to be directly correlated to stadium age. Curiously, stadium capacity is considered to be the fifth category of the determinants of demand for sport, as it is the size of a stadium which constrains the supply of tickets which consumers may purchase. More recent works examining the effects of stadium age have also made considerations for the age of a stadium on the demand for sport, while also controlling for

stadium capacity. The results of this study gave similar indications as earlier studies in the field, that older stadiums had a negative effect on attendance. It could thus be said, while there are mixed findings in regards to the quality of stadiums, there is evidence of a higher quality viewing experience improves the consumer demand for live sporting attendance. Within the model included in chapter four, a number of economic variables from this section will be included. Additionally, variables will be included to take into account stadium quality by examining stadium age, as well as controlling for stadium age with a stadium capacity variable. Through the inclusion of the capacity variable, not only is a control for the relationship between stadium age and stadium size included in the model, but also the only variable which can be used to measure supply capacity, the fifth category of determinant of demand for sport.

The fourth category of the determinants of demand are described as the characteristics of the sporting contest, in other words the success of competing teams, quality of contest, significance of contest, and the uncertainty of outcome of the contest (Borland & Macdonald, 2003). The sporting contest can be considered in a variety of ways, including the success (or strength) of teams in the match, quality of the match by the average rank-order of the teams in the match, uncertainty of outcome as measured by the difference in rank-order of the two teams, or the significance of the match (promotion/relegation matches, championships, or other such matches). All of these different permeations of the sporting contest are considered to be important factors in the consumer decision to consume sport games, some of which, such as uncertainty of outcome and quality of match, have been theorized as determinants in previously mentioned works (Rottenberg, 1956; Neale, 1964). Within this dissertation, the quality of contest variable will be in the form of the various competitive balance metrics which will be each included in their own demand model. To further understand and consider how these variables fit

into the demand literature, it is thus necessary to consider the connection between demand for sport, uncertainty of outcome, and competitive balance.

2.2 Demand and Uncertainty of Outcome

Discussion of the uncertainty of outcome line of research in the demand for sport literature could be the subject of a paper or a book in itself, and thus summarizing the key findings and results is quite cumbersome. First, revisiting Simon Rottenberg's (1956) seminal work into the field of sports economics, Rottenberg proposes the invariance principle through his examination of the distribution of talent in professional sport leagues. From his observation's (Rottenberg, 1956), the invariance principle concludes that players will most likely move to the teams that will value them the most. What is important to consider in this, is the presence of teams that are profit-maximizers and win-maximizers. That is some teams will focus their operation and acquiring of talent on maximizing the number of wins, while others will focus on maximizing their profits. Under the conditions of a team attempting to maximize profits, that team will not acquire a level of talent that will put their marginal cost over their marginal revenues. Thus, teams will only be able to acquire a certain level of talent because of the costs of players, and it is thus emphasized (Rottenberg, 1956) that there is some uncertainty as to what point is the profit maximizing one for professional sport teams.

In further discussing the distribution of talent in the labor markets of professional sport teams, Rottenberg (1956) indicates that even if leagues attempt some form of governance or changes to allow for more freedom in player movement, that there should be no change in how players are distributed among teams, as long as there are no transaction costs or barriers to the purchasing and selling of players. This proposition would later be known as the Coase theorem (Coase, 1960) which discussed about the distribution of talent when there are no transaction

costs. From a theoretical sense, this first proposition in Rottenberg's (1956) seminal work lays much of the basis for competitive balance theory, as it theorizes how talent is distributed among teams in a professional sport league. That is, if teams are profit maximizers, any institutional changes made to the players' labor market that have no transaction costs will not affect the level of talent in a league. In turn this will keep distribution of wins constant, and thus will not cause any change in competitive balance in regards to win distribution. It is important to note, that in situations where teams are win maximizers that this proposition will not hold true, and that it is believed that institutional changes to control the labor market will affect the distribution of talent, and hence the competitive balance of the league (Schmidt & Berri, 2003).

This first proposition of Rottenberg's (1956) is not the only one in his seminal work that deals with issues of competitive balance in professional sport leagues. The second proposition is that of the Uncertainty of Outcome Hypothesis (UOH), in which Rottenberg states "uncertainty of outcome is necessary if the consumer is to be willing to pay admission to the game" (p.246). This point is further backed up by the observation that as there is an increase in competitive imbalance within a professional sport league, those teams in the league see a decline in their profits (Rottenberg, 1956). Rottenberg (1956) further reinforces the UOH by presenting a table of the combined revenue of major-league teams, which presents that 57.2 percent of franchise revenue comes from home-game admissions, and 14.1 percent from away-game admissions. However, the evolution of broadcast of sports on television has caused changes to the trends in revenue over time. It is thus important to note that during Rottenberg's time 83.3 percent of revenue came from admissions to games as well as concessions (does not include money for radio and television rights). Even with these changes in revenue distribution trends, attendance revenue is still a major revenue stream for sport franchises, and the numbers highlight the

importance of creating demand for the sport product, and how uncertainty of outcome in matches can directly influence the revenues of teams in professional sport.

Rottenberg's (1956) UOH is also similar to Neale's (1964), which is also known as the "League Standing Effect," in which he states: *"Of itself there is excitement in the daily changes in the standings or the daily changes in possibilities of changes in standings. The closer the standing, and within any range of standings the more frequently the standings change, the larger will the gate receipts, and we may treat this effect as a kind of advertising."* (p. 3). In this, it is discussed that fan willingness to consume sporting events, whether it be: attending in person, listening to a game on the radio, or watching it on television, is directly related to some level of uncertainty existing in the league (Neale, 1964). Thus, if fans are able to predict the outcome of sporting events, it is thus hypothesized that they will be less likely to consume the event in any of the forms it can be viewed (Neale, 1964).

The work of Neale (1964) also puts forward other important theoretical contributions that must be noted, as they describe the very peculiar nature of sport leagues and competition between teams in these leagues. The first, which is directly related to his league standing effect, is what he calls the "Fourth Estate Benefit." In this Neale points out the importance of the media in helping to inform the public about the results of matches and new league standings resulting from the most recent games played. In this manner, Neale (1964) states: *"these reports are a major cause of sales and therefore of direct and advertising revenues to newspapers (and of course to sports magazines): in fact, a case of economies external to the industry."* (p. 3). From this, it can be seen that there are indeed benefits for the media to report the outcomes of games, as well as to the sport industry which can profit off of the media's coverage of sport, its outcomes, and league standings (Neale, 1964). Furthermore, leagues and sport teams are thus

made dependent on sport magazines and other sport related media, and vice-versa, as there is a need for the teams and league to create a product for the media to report on, and the reports from the media compose a great deal of the information that consumers receive about the sporting product (Neale, 1964).

Along these lines, Neale then points out that in order to produce a professional sporting match there must be several factors which need to be taken into account, the most important of which is an opponent to play or fight against in competition. Thus, there must be some level of cooperation between these two competitors to be able to produce a match, as well as progress towards and eventually crowning a league champion (Neale, 1964). It is also concluded that through economic theory, single teams are not considered to be the firm, rather: *"several joint products which are products joint of legally separate business firms are really the complex joint products of one firm, and this firm is necessarily an all-embracing firm or natural monopoly."* (p. 4). It is thus, in this sense that the author (Neale, 1964) is indicating that professional sport leagues are natural monopolies, and that sport teams are cooperating with the press to sell their product to third parties (i.e. the general public).

It is somewhat ironic, that while Rottenberg (1956) and Neale (1964) state very similar hypotheses about uncertainty of outcome and its relation to professional sport teams and leagues, Neale (1964) does not state, acknowledge, or even cite the previously published work of Rottenberg (1956). All of that aside, these two works are important in having laid much of the theoretical foundation of the work into both the uncertainty of outcome and competitive balance, and hence laid the groundwork for the connection between demand for viewing sporting events and some level of uncertainty in the outcome of these matches. These works also help further the theoretical understanding of the nature of competition in leagues, and the need for more than

one team within a league in order to have sporting contests. This theoretical basis thus, not only helps to establish and legitimize much of the work done on uncertainty of outcome and competitive balance, it extends the need for the better operationalization in theoretical and empirical work into these constructs. It is with this in mind, that one important contribution of this dissertation is to help build on both how competitive balance is measured, as well as its direct application to empirical examination of the determinants of demand for consuming live sporting events.

In formalizing an economic model (El-Hodiri & Quirk, 1971), it is acknowledged that it is important to have some balance in leagues, however El-Hodiri and Qurik (1971) do point out that teams will generally want to be stronger than other teams in the league to maximize their own individual franchise profits. In this sense, it is emphasized that teams will still try to acquire a certain level of talent to try and make them competitive, and in many cases stronger than other teams. However, it is pointed out that teams will still be restrained from gathering too much talent as previously mentioned by Rottenberg (1956), when the marginal cost exceeds the marginal revenue gained from buying additional talent (El-Hodiri & Quirk, 1971). It is thus concluded by these researchers that antitrust exemptions are considered to be justified in professional sport because of the peculiar externalities that exist in sport. Furthermore, it is noted that the antitrust exemption given to the MLB has not resulted in changes that have lead to equalizing the playing strengths within the league. Thus, it could be said that while the antitrust status is justified, it is often misused, or not properly employed to optimize balance and uncertainty of outcome within professional sport leagues (El-Hodiri & Quirk, 1971). From this theoretical basis, a great number of researchers began to focus their energies on empirical investigation of the UOH. Within this uncertainty literature the research can be divided into

three segments, those focusing on: match-level, seasonal, and long run uncertainty and their relation to the demand for sport. In the following, each of these three segments will be reviewed briefly to discuss the research into uncertainty, as well as the over-arching themes within this line of literature.

The match-level uncertainty of outcome research focuses specifically on various methods in which to measure the probability or uncertainty of a team winning each individual match they participate in. This approach to investigating uncertainty seems to have been considered by Noll (1974), but it wasn't until Hill, Madura, and Zuber (1982) that match-level uncertainty was used as the sole measure of uncertainty in a sport attendance study. In examining MLB matches, Hill et al (1982) employed the use of the number of games behind the leader for both the home and away teams as a method of measuring uncertainty of outcome in a game. Results of this study indicate that the number of games behind the leader the home team was is more important in regards to attendance than the number of games behind the leader an away team was. This indicates fans may place more importance on team strength, than the relative level of uncertainty between two teams when considering attending any individual sporting contest.

Further advances into the match-level investigation come about primarily in the use of different metrics to try and measure uncertainty of outcome of individual matches. While some studies continued to use the number of games behind leader metric as first employed by Hill et al (1982), others attempted different methods such as the use of quadratic specification to estimate probability of the home team winning (Whitney, 1988), number of games required to make the finals for teams in a match (Borland & Lye, 1989), as well as betting odds (Peel & Thomas, 1997; Carmichael, Millington, & Simmons, 1999; Welki & Zlatoper, 1999). With a number of metrics used to try and examine the uncertainty of outcome at the match-level, there has also

been a variety of findings in regard to uncertainty's relation to match attendance. While some research at the match-level indicates strength is a more important factor in deciding consumer decision to attend a sporting event, other research in this line suggests fans are responsive to uncertainty, but that there are varying thresholds where uncertainty will not matter as much for attendance at sporting events. It is thus, the match-level uncertainty of outcome line of research in the sport demand literature presents what could be at best described as having mixed results (Borland & Macdonald, 2003). It may be at the match-level, fans do not pay as much attention to the uncertainty of outcome of a single specific match, and possibly there is more focus on uncertainty over longer periods of times. Fort and Quirk (2010) also consider the effect of competitive balance from a theoretical standpoint in league's where single-game ticket sales are a dominate form or revenue. Within this, the authors conclude that in sports leagues there is the need for researchers to consider whether there really is a need for more or less balance within some sporting leagues through careful empirical examination. Due to this, there is the need for caution when using these and other factors in constructing models to estimate the demand for sport. With this in mind, the next logical step is to examine seasonal uncertainty of outcome's affect on attendance in sport.

Seasonal level uncertainty of outcome was the first type of uncertainty of outcome research to be investigated empirically. Tracing this line of research back to Noll (1974), who used an average number of games behind leader as a seasonal uncertainty measure, it is found there is a slightly positive relationship between attendance and seasonal uncertainty. Like match-level uncertainty of outcome studies, the seasonal level studies have included numerous methods through which to try to examine the relationship between uncertainty and attendance. Metrics used in these seasonal studies include variables denoting the significance of match in

determining champions or being relegated (Jennett, 1984; Dobson & Goddard, 1992), number of games required to make finals (Borland & Lye, 1989), number of games behind leader (Noll, 1974; Knowles, Sherony, & Haupert, 1992), dummy variables to measure uncertainty (Hynds & Smith, 1994), dummy variable for significance of match (Baimbridge, 1997), and competitive balance measures (Soebbing, 2008b).

In regards to the results of measuring uncertainty of outcome at the seasonal level in attendance studies, the findings show a much stronger link than the match-level studies. While these results are still somewhat mixed, the findings do present a stronger case for the argument that uncertainty of outcome does play a role in the fans decision to attend a sporting event. Furthermore, the few seasonal studies which employed competitive balance variables as a measure of uncertainty have generally found strong results indicating competitive balance also has an effect on fan consumption of attendance. Szymanski (2001) makes a strong case for seasonal uncertainty of outcome being a determinant of demand for sport. Examining attendance in league matches, as well as the FA Cup, the later being a football (soccer) cup competition in which all leagues from every level in England are involved. In this manner, the FA Cup and League placed together in the same study help to serve as a "natural experiment" where the disparity of teams will become even more evident. The results show league matches, where there is more even pairings between teams, had higher attendance, while the FA Cup had much lower attendance (Szymanski, 2001). Thus, in this natural experiment, Szymanski (2001) makes a very good case for the importance of uncertainty of outcome at the seasonal level, and how it can affect consumer demand for the sporting product.

What is somewhat curious though, is the sparse use of competitive balance measures within the uncertainty of outcome literature. While competitive balance is discussed to great

lengths in the literature, few researchers have actually taken it upon themselves to employ competitive balance variables as determinants of demand. Within the three segments of the uncertainty of outcome and demand literature, competitive balance is absent at the match-level and used only a handful of times in the seasonal and long-run studies. Even though competitive balance measures comprise a large percentage of the long-run studies, there have been very few of these studies in general. It is with this as an impetus, that this review of the uncertainty of outcome literature will turn to consider the long-run studies.

The examination of long-run uncertainty of outcome and attendance has also been mostly non-existent, with studies considering the effects of long-run only coming about within the last few decades. The work of Borland (1987) is widely considered to be the first work which considered these implications and empirically tested long-run uncertainty of outcome's relationship with attendance at sporting events. This study however, found no relationship between long-run uncertainty of outcome, as measured by the number of teams competing in the playoffs over the previous three years, and attendance.

More recent studies by Schmidt and Berri (2001) and Humphreys (2002) differed greatly from Borland's (1987) work, as not only did their results find a strong link between uncertainty of outcome and attendance, but both studies also employed the use of a competitive balance metric to measure uncertainty of outcome. The first work by Schmidt and Berri (2001) focuses on the MLB and employs the gini-coefficient of win-percentage as a league wide competitive balance metric. The use of this metric is quite logical, as the gini-coefficient is an often used measure to look at the balance within an industry, and win's (and thus the percentage of games won) is one of the best methods of looking at the performance of sport teams. The results of this study are mixed in finding the gini-coefficient of the previous season has a negative and

significant effect in regards to attendance, where the gini-coefficients for the previous three and five seasons have a positive and significant effect on attendance (Schmidt & Berri, 2001).

Humphreys (2002) also conducted a long-run attendance study in his formulation of the CBR. In this study, Humphreys (2002) examines the MLB in a dataset that spanned an entire century, and also employed a measure of competitive balance. Through employing the CBR, this study examines uncertainty of outcome in five and ten year intervals. Not only do the results of this study show the new measure as being positive and significant in regards to attendance, but it did so with greater explanatory power than other measures of competitive balance which had been previously used within research (Humphreys, 2002).

Having considered the body of literature investigating uncertainty of outcome and the demand for attendance, there are some important points which must be taken into account in the formulation of this dissertation research. Research along the UOH line of attendance studies have shown varied results in terms of the relationship which exists between uncertainty and attendance. Match-level use of uncertainty gave little or no positive effects, seasonal-level uncertainty showed stronger promise, and long-run gave much better results in the investigation of the effects of uncertainty on demand. What this makes a case for is the possibility that uncertainty of outcome, as well as competitive balance, is not something which comes into fruition in shorter periods of time (Soebbing, 2008a). Rather, uncertainty and competitive balance need longer periods of time to play a role in fan learning. In other words, there must be at least one season of play, possibly more for uncertainty and/or competitive balance to play a role in consumer decision making, and thus be a significant determinant of demand for sport.

Considering this, it is quite logical to further conduct empirical examination of long-run uncertainty of outcome and competitive balance metrics' in attendance studies. It is partly with

this in mind that this dissertation research attempts to reuse the CBR in a more dynamic format. Through doing so, the metric employed to measure uncertainty of outcome will be a competitive balance measure, which will be representative of several seasons worth of league and team performances. It is believed through capturing a longer period of time, that this will be more representative of "fan learning" which appears in the prior research focused on the UOH-demand literature. Therefore, its inclusion within the attendance study is validated by the previous findings of Humphreys (2002), as well as the findings of the general body of literature which indicates the responsiveness of sport consumers to measures of uncertainty composed of longer periods of time.

Another issue which comes about within this literature is the issue of the use of competitive balance variables within the empirical examination of demand. Within the realm of sport management and sports economics, there are researchers who believe that competitive balance does not exist, or is not really important in determining consumer choice to attend or view live sporting events. Furthermore, while competitive balance is one way in which uncertainty of outcome can be measured, it is as aforementioned, rarely employed as a variable attempting to estimate demand for sport empirically. Studies in the demand for sport literature which have used competitive balance variables include: Schmidt and Berri (2001), Humphreys, (2002), Soebbing (2008b) and a few others. Ironically, the results from these empirically studies have generally given strong evidence that competitive balance is important in determining the demand for professional sport. Despite this strong empirical evidence, there is a great need for further examination of the effect competitive balance variable's have on consumer demand in a variety of contexts in both professional and amateur sport worldwide.

In the demand literature presented above, as well as in the discussion of the literature, it

becomes quite clear there is indeed extensive research into the determinants of demand, with great focus on testing the uncertainty of outcome's effect on consumer demand for live sport. Research indicates a great need for further investigation of both seasonal and long-run level uncertainty of outcome's relationship with the demand for live sport consumption. Furthermore, as most of these studies have not employed competitive balance variables, there is also a void which is in need of being filled in terms of the research examining competitive balance and the relation it has with the demand for sport. Along these lines, this dissertation research seeks to accomplish several things. First, the UOH will be tested in this dataset through the use of the DCBR competitive balance metric which is formulated in the following chapter. Not only will the use of this variable seek to test the UOH at a seasonal level, but it will do so with a competitive balance variable which is built from multiple seasons of team and league performance. While the approach may not be entirely novel, as others have tested the UOH before at the seasonal level using competitive balance measures, it will be one of a few studies to have done so, and one of the first to use a competitive balance metric with unique measures for every franchise in each season.

Second, this study will attempt a somewhat novel approach to seasonal-level UOH studies through the use of a competitive balance metric which is reflective of several years' performance of teams in as well as the league. In the inclusion of the DCBR, there will be the mix of conducting a seasonal level study, with the use of a variable originally constructed for use in long-run examination of competitive balance and the UOH. Through this, it is believed that because fans are responsive to longer measures of uncertainty, the DCBR will serve as a strong indicator of fan attendance because of its construction of longer periods of team and league performance. Therefore, the instrumentation of the DCBR as an uncertainty of outcome and

competitive balance variable within this study will hopefully help to add to the theoretical and empirical understanding of competitive balance, the UOH, as well as the demand for sport attendance.

Thus, in all of this there are several lines of contribution which can be made from this dissertation research project. Not only will the concepts of the UOH and competitive balance be examined along with their relationship to demand, but the findings will help to give better theoretical backing to the current literature. In the construction of the demand function, better understanding of the determinants of demand for sport will be gained, which will be done by attempting to construct the best possible model for estimating seasonal demand for MLB with the data available. In the following sections, the concept of competitive balance will be considered, as well as the construction and method of analysis for the DCBR. Following the discussion of how the DCBR will be constructed and examined, this dissertation research will progress to a discussion of the attendance model which will be constructed to examine the demand for live attendance in the MLB. Finally, the last section of this dissertation will look at the potential contributions and limitations that exist within this study.

2.3 Competitive Balance Literature

With the increased attention paid to competitive balance by researchers, fans, media, and others, it is important to understand what competitive balance is, as well as how it has evolved into its current form. To highlight the need to understand the nature of competitive balance, one only has to examine the plethora of media articles and fans that often talk about competitive balance, often making incorrect or misguided statements as to what competitive balance is, or the nature of the phenomenon. For example, in a New York Times article published on November 29th (Battista, 2008) one writer states that the National Football League (NFL) which recently

saw its highest point total in a week ever, has a lack of competitive balance because of the recent high scoring. However, this statement is incorrect in that high scoring by all teams in a league is not an indication of a lack of balance. Rather, high scoring by both teams with relatively close scores would seem to be an indication more of bad defense, than of a lack of competitive balance in the league. It is true that if the winning teams were blowing out their opposition in every game during the weekend, then the gap in scoring could be indicative of imbalance, but it also could be a single week of bad match-ups or even an outlier, a single week of very high scoring. Thus, in a theoretical sense just talking about high scoring alone is not truly a sense of discussing whether the NFL is balanced or imbalanced. With such common misconceptions portrayed constantly throughout the media, and thus conveyed to fans, it is important to try to come to a better understanding of competitive balance in research, and attempt to pass on this understanding to sport managers, fans, and media.

Re-quoting the famous lines of Zimbalist (2002), he states: "*competitive balance is like wealth. Everyone agrees it is a good thing to have, but no one knows how much one needs.*" p.111. This quote is true of the current situation in the research and theorization of competitive balance. There is growing literature focused on competitive balance which spreads itself across multiple sports leagues at various levels of sports. Indeed, competitive balance is important, as the idea of having uncertainty and balance is seen to be appealing to consumers (Will, 1999), and there is much thought being put into competitive balance from a research, theoretical, and philosophical aspect (Sanderson, 2002; Fort & Maxcy, 2003). In essence, competitive balance is about equality, and in many ways, about trying to create an equal playing field for those who participate and attend sporting events. A widely cited definition of competitive balance offered by Forest and Simmons (2002) states competitive balance is: "*a league structure which has*

relatively equal playing strength between league members." p.51. Competitive balance literature traces its roots to Neale's (1964) Uncertainty of Outcome hypothesis (UOH), where he discusses that fans are more likely to come to matches where they are unable to predict the winner.

While competitive balance is a general term, there are many different types of metrics (measurements) which can be used to examine this phenomenon. These metrics represent many different ideas of competitive balance. Some metrics focus on winning percentages of teams during a regular season, others focus on championships and playoff appearances, while another focuses on how well leagues are reordered from year to year. Thus, it can be seen there is a vast variety of ideas about how competitive balance can be conceptualized. These metrics will be further discussed in depth in the next chapter of this dissertation.

An often overlooked study of competitive balance and its relation to fan demand is the research presented by Brandes and Franck (2006), who employ several different types of competitive balance metrics to attempt to see if competitive balance brings higher attendance, or if attendance by fans brings better competitive balance. In this, the competitive balance metrics of: standard deviation of win percentage (SDWPCT), C5-Index, Hirschman Herfindahl Index (HHI), and relative entropy are employed. While the SDPWCT and HHI are commonly known and used metrics of competitive balance, the C5-Index and relative entropy are much more novel metrics. The C5-Index is a simple calculation which examines the share of points (earned by wins and ties) in a season among the top five teams. In this sense, it looks at whether the top five teams in a league garner more or less than their ideal share of the points in a league (Brandes & Franck, 2006). Relative entropy, which has been previously employed in a study by Horowitz (1997), is calculated by looking at the percentage a single team has of an entire leagues victories within a single season. This is then divided by the maximum possible entropy level in that

season to give a relative entropy measure (Brandes & Franck, 2006).

This study continues with further complex statistical manipulation such as a vector autoregressive model, but more importantly uses a Granger Causality test to examine whether better competitive balance causes fans to come to matches, or whether fans coming cause better competitive balance. Previous research using Granger Causality by Hall, Szymanski, and Zimbalist (2002) has shown that Granger Causality runs in both directions for pay and team performance for MLB teams since 1995, but in English soccer Granger Causality indicates higher payroll does lead to better on field performance (Brandes & Franck, 2006). Using data from the top-flight German professional soccer league (also known as the Bundesliga) Brandes & Franck (2006) run a series of Granger Causality tests to test several hypotheses, including one to test whether a long-term effect of competitive balance on fan demand exists or not. The findings of the study are quite interesting, in which they (Brandes & Franck, 2006) do not find causality in the sense that competitive balance causes an increase in attendance. Rather it is found that fan attendance at match does Granger cause competitive balance, in other words better attendance is shown to lead to better competitive balance.

Thus, Brandes and Franck's (2006) work shows fan attendance causes better competitive balance in the Bundesliga, which is contradictory to what the various theories dealing with the uncertainty of outcome and competitive balance indicate. It seems much of the change in overall league demand is caused by changes in the demand for weaker teams within the Bundesliga, and there are indications of a variety of complex issues in the organizational structure of European soccer leagues in their transfer systems timing, and relation to when ticket revenues are released to the public (Brandes & Franck, 2006). There is also mention of the possibility of advertising revenue being highly correlated with ticket revenue as discussed by Czarnitzki and Stadtmann

(2002). Moreover, despite these findings, there are various statistical limitations to the study, and further work needs to be done to look at the use of aggregated data. While these findings indicate competitive balance aggregated at the seasonal level may not be a determinant of demand in German soccer, the results do not indicate this is necessarily true for all sports and leagues. Brandes & Franck (2006) even note the Granger Causality can often change, as it did in the study by Hall, Szymanski, and Zimbalist (2002), where Granger Causality showed different things for MLB before and after the 1995 season. Therefore, more work is needed to better understand competitive balance's role as a determinant of attendance. However, it is important to note, as this work (Brandes & Franck, 2006) highlights, that causality needs to be constantly considered in statistical evaluation, and the possibility it is not competitive balance which leads to demand, but rather the demand for sport which leads to competitive balance.

Borland and Macdonald (2003) note some researchers believe competitive balance is often considered as the "gold standard" which all sport leagues and competitions should try to look up to and attempt to achieve. They (Borland & Macdonald, 2003) additionally quote Andrew Zimbalist (2002) who believes quite differently, he states: *"The need for competitive balance has been used as an all-purpose justification for competitive restraints in antitrust cases in the USA and Europe. Given the apparent ambiguities in identifying the nature and scope of the problem, there is good reason for this justification to receive close scrutiny in the future."* (p. 119-120). It is quite clear, that Zimbalist's views of competitive balance is not so much along the line that it is something which affects the nature of competition, but rather that it is marketing tool and buzz word which can be used to help leagues keep their monopoly power and restraint over the sport product.

However, despite Zimbalist's beliefs on competitive balance, it is important to note other

academics have argued against his beliefs, most notably Fort and Maxcy's (2003) reply to his introduction of the competitive balance special issue of the Journal of Sport Economics (2002). The main point of this reply (Fort & Maxcy's, 2003) comes along the lines that Zimbalist (2002) is too concerned with the UOH, and ignores the line of research dubbed the "analysis of competitive balance" (ACB). They (Fort & Maxcy (2003) further state: *"In the recent symposium on competitive balance, guest symposium editor Andrew Zimbalist dismisses offhand much of the extant literature on competitive balance and takes a strong position concerning the best way to measure competitive balance. We find no support for this position in the literature. Furthermore, such a stance goes hand in hand with abandoning an important line of competitive balance analysis."* (p. 158). From this it is further argued there are two distinct lines in the competitive balance literature, and there shouldn't be more focus on any one of the lines than the other (Fort & Maxcy, 2003).

Other researchers have also been more to the point, such as the aforementioned work of Szymanski (2003), who in considering the demand for sport and uncertainty's relationship states: *"Given the supportive studies on the issue of match uncertainty seem to imply that attendance is maximized when the home team is twice as likely to win as the visiting team, the empirical evidence in this area seems far from ambiguous."* (p. 40). From this, it is quite clear that Szymanski (2003) believes the literature and research into the uncertainty of outcome is quite clear in its findings, and it does have some role in determining the demand for the sporting product.

It has been subsequently pointed out (Soebbing, 2008b), that only a few studies of the demand for attendance and sport have employed competitive balance metrics as means of testing the UOH empirically. However, the results of this empirical inquiry shows there is evidence

competitive balance is something which does exist and is a valid incarnation of an uncertainty of outcome measure. Thus, it can be concluded there is a lack of the use of competitive balance measures in the empirical examination of the demand for sport, and there is definite need for further future evolution of not only more research along these lines, but also evaluation of new and different measures of competitive balance in regards to attendance and sport demand.

2.4 Conclusions from Literature and Research Questions

From this wide expanse of literature, it can thus be understood that there is a complex relationship between the demand for sport, uncertainty of outcome, and competitive balance. With deep considerations made to each of these, as well as the theoretical and empirical work which has been done on these concepts within the academic literature, this dissertation seeks to answer a number of questions: Is competitive balance an important factor in the demand for sport attendance? What are some of the other factors which play a role in determining fan attendance at sporting events? How does the DCBR compare to other widely employed competitive balance metrics? Is the DCBR a more suited metric to be used in measuring the demand for sport than other competitive balance metrics? It is with these questions as guidance that this dissertation research seeks to investigate competitive balance and the demand for attendance at MLB games. In chapter three, the focus will be placed on the DCBR, its development, and how it compares to other competitive balance metrics. Thus chapter three can be considered to be following along the lines of the analysis (ACB) line of competitive balance research.

Beyond the creation of the DCBR, this dissertation research strives for further theoretical and empirical contribution in regards to competitive balance. Within the literature, there has been a divide among researchers focusing on either analyzing competitive balance or considering its effect on the demand for sport. This dissertation fills this gap by using a two-fold approach

bringing the two separate lines of research together (ACB and UOH), something which has only been attempted once to date (Lee, 2009). In the first part of this approach, the DCBR is analyzed alongside a variety of other existing competitive balance metrics in order to yield new and important empirical knowledge of trends and changes in competitive balance. This work is not only applicable to the context of MLB, but sport at all levels, and can help to further the understanding of competitive balance and the interrelation between various metrics, as well as when certain metrics may be more appropriate for use in research than others.

In chapter four, the DCBR will be included as part of an economic demand model to estimate fan demand for attending MLB games from 1980 through the end of the 2007 season. In order to do this, a regression model will be utilized to estimate results from the panel data set, with proper econometric corrections made to take into account a variety of issues which may arise such as: heteroskedasticity, autocorrelation, the use of fixed or random effects, and so forth. Because of the lack of demand studies in sport which have employed a competitive balance metric as part of the model, through construction and estimation of results, this dissertation will provide an important extension of the theoretical understanding of competitive balance by giving further evidence of what effect it has on a consumer's choice to attend sporting events. Analysis of the estimated results will also provide a more robust picture of the factors which attract (or deter) consumers from choosing to attend MLB games in person, which in turn can provide better information for sport managers to understand why fans come to sporting events. Such findings can be directly translated into better decision making in sport management, by informing administrators, owners, and managers as to what factors attract fans to sporting events, as well as the importance of having competitive balance in these sport leagues. It is thus, that this research attempts to truly examine the significance of competitive balance from a variety of

levels. From this, it is evidenced that this dissertation research presents a number of potential contributions, in terms of theoretical knowledge, empirical understanding, as well as practical application of competitive balance and the demand for attendance at sporting events, and thus provides an overall improvement of sport for fans, owners, managers, and other related stakeholders.

CHAPTER 3 – MEASURING COMPETITIVE BALANCE

3.1 Competitive Balance Metrics

As mentioned in previous chapters, the UOH can be traced back to Rottenberg (1956), Neale (1964) and a few other early researchers (El-Hodiri & Quirk, 1971; Sloan 1971; Canes, 1974). It was these works which focused researchers towards advancing the ideas proposed by both Rottenberg and Neale, as well as developing new ideas for theories and research into competitive balance. Despite this early theoretical work, competitive balance as an empirical line of research did not emerge until the late 1980's and early 1990's when researchers began developing metrics for measuring competitive balance. From this point on till current times researchers have continued to develop and work on competitive balance research, however within the extant literature only a small number of metrics have been developed. In the following section a few of the more popular metrics will be introduced.

The standard deviation of win percentage (SDWPCT) is the first notable competitive balance metric, which was first proposed by Scully (1989). This metric was also further developed by Fort and Quirk (1995) and is a widely used competitive balance metric. The SDWPCT is composed by taking the mean win percentage for a league and finding the standard deviation from this win percentage. The standard deviation can be either season specific or team specific. When the SDWPCT metric is closer to zero it is indicative of good competitive balance, conversely the higher the number the worse balance is. A season specific version is calculated by finding a SDWPCT for the entire league for each season. The team specific version does a similar calculation, but instead of examining across all the teams in a single year, it looks at a single team across multiple years. Thus there exist two types of SDWPCT which can both present different pictures of competitive balance. Season specific standard deviation

can show how well the overall balance of a league is from one season to the next. The team specific standard deviation, on the other hand, allows a comparison between all the teams in a league over a set time period.

The main problem with the SDWPCT is it only generates a single value for an entire league if the season specific version is used. When used in a panel data set, this can be problematic as it will show all teams as having the same competitive balance metric, when in reality the teams' variability in winning percentage are quite different from one another. Similarly, using the team specific version would only allow a single competitive balance value for each team over a given time period. Just as with the season specific, this single metric for a team is troublesome because it only allows one number to define a team's SDWPCT over any period of time. Thus a team could theoretically have the same competitive balance metric over a hundred year dataset, while actually seeing a large fluctuation and trends of winning during this time (Eckard, 1998; Humphreys, 2002).

Eckard (1998) introduced the Hirfindahl-Hirschman Index (HHI) in his examination of competitive balance in college football. The HHI specifically focuses on championship concentration within a sports league over a given period of time. This metric thus reflects the distribution of championships across leagues. Examining the cartel behavior of the NCAA, the governing body of college football, Eckard (1998) uses the HHI to capture the overall national picture as well as differences in championship distributions across conferences in college football. Through employing the HHI, Eckard (1998) shows how balanced different conferences are by looking at how well distributed championships are among teams in each conference. The HHI is thus very good at showing championship and playoff distribution, but it is quite limited in it only shows the final result of a season. In this way, those which use HHI to measure

competitive balance are not looking at the majority of the games played, but rather end results. Thus, the HHI focused on championships can be problematic as it can show a league as balanced in distribution of championship while the regular season play could be unbalanced, or vice-versa.

In addition to focusing on the share or distribution of championships within a league, the HHI has the ability to measure different types of competitive balance in leagues. The other primary use of the HHI is to measure the market share of wins' (or win percentage) among teams in a season. Through this method an HHI can be constructed for an entire league in a single season, which measures how well the market share of wins is distributed among teams within that league. It is thus, that the HHI can take on what this proposal will dub the "championship" form or the "win-share" form. For the use of this proposal, henceforth the HHI that will be discussed and employed will be the win-share version, as the other competitive balance metrics used will be focused upon the seasonal measure of regular season play. Therefore, it is only logical that the HHI which will be employed in this dissertation research will be one focused upon the win-share of teams during the regular season, as it is another metric through which to consider the body of a single season of play as the SDWPCT does.

Eckard's work did not stop at using the HHI, but also presented the idea of using a variance decomposition to correct for the problem of turnover from one season to the next. Eckard (2001) gives the equation for this variance decomposition as:

$$VAR = VAR_{Time} + VAR_{Cum}$$

VAR_{Time} is the average variance across all the schools in college football and VAR_{Cum} is the variance of win percentage. Humphreys (2002) points out the flaws in this approach by showing only under special cases which occur very rarely, do the two right hand side variances actually sum up to equal the left hand side.

The next competitive balance metric to be introduced was developed by Maxcy (2002) who proposed the Spearman Rank Correlation Coefficient (SRCC) as a competitive balance measure. The SRCC has been used in other settings to show the reordering of companies in terms of strength or market share within an industry. The metric itself generates a number between 1 and -1 which indicates whether there is no reordering in the league (1), perfect reordering (-1), or something in between. This metric of competitive balance allows one to see how teams in a league change in rank from one year to the next. The ideal situation in this case is perfect reordering, where teams move to the opposite side of the spectrum from where they were in the previous year. This method of competitive balance captures something the SDWPCT does not, in that the SRCC examines how ranks of teams change and not just their standard deviations. While this is useful to look at reordering, like the other competitive balance metrics it does not capture the complete picture of whether a league is balanced or not.

The two long-term studies (Schmidt & Berri, 2001; Humphreys, 2002) are novel in the competitive balance literature, because they include a component of turnover in their metrics. This means these metrics describe how the teams in a league place from one year to the next. In both of these studies it is found those periods of five years and longer are positive and significant in determining attendance. These two studies make a strong case for the relationship between UOH and demand for attendance in long-term studies.

Schmidt and Berri's (2001) approach uses a competitive balance metric called the Gini coefficient. This metric uses a component of turnover in it to help measure competitive balance. Used in an attendance model on MLB, Schmidt and Berri (2001) find this metric is significant in regard to attendance. The long-term data set employed displays that over long periods of time there is a relation between attendance and competitive balance in MLB.

One of the more recently proposed metrics of competitive balance is Humphrey's (2002) Competitive Balance Ratio (CBR). This method is a ratio of the averages of the team specific and season specific SDWPCT. The CBR produces a measurement which can only range from zero to one, where zero is representative of a lack of balance, and one is an indicator of having good competitive balance in a league. The CBR is thus calculated (Humphreys, 2002) with the notation:

$$CBR=\bar{o}_T/\bar{o}_N$$

where $\bar{o}_T$ is the average of team specific SDWPCT over a certain time period, and $\bar{o}_N$ is the average of the season specific SDWPCT. This method is one of the more recently developed measurements of competitive balance, and is the one used in this study, to create a new method of using an already established metric of competitive balance. The reason behind using this metric is Humphreys (2002) finds the CBR has more explanatory power in examining MLB attendance than the SDWPCT or HHI, as well as the fact that it allows for an evolving competitive balance metric for each year which takes into account previous seasons' performances. Used by Humphreys (2002) in an attendance study, the CBR also is the only competitive balance variable which is significant in regards to attendance.

Thus, from Humphreys (2002) results and the findings of other researchers, it is shown competitive balance is an important determinant of consumer demand for match attendance. It has also been displayed that there is a relation between UOH and consumer demand, and because competitive balance and the UOH are intertwined it could be hypothesized that both the UOH and competitive balance are significant indicators of the demand for match attendance by consumers. This dissertation research thus proposes a new use of the CBR which can be included in models for predicting and explaining consumer demand for attendance by a slight

modification of the CBR method (Humphreys, 2002). The method being used in the proposed research is the dynamic competitive balance ratio (DCBR), which takes the Humphreys method, and rolls it over periods of time to get metrics that can be used seasonally, but at the same time are representative of several years of team and league performance. The next section will discuss how the DCBR will be used and formulated, as well as present some of the calculations which have been made using the new metric, and how it compares to the original CBR, as well as other competitive balance metrics.

3.2 Forming the Dynamic Competitive Balance Ratio (DCBR)

In order to formulate the DCBR competitive balance metric, the CBR developed by Humphreys (2002) must be considered. As stated in the previous section, the CBR is a ratio of the averages of SDWPCT metrics used by Humphreys (2002) to compare different time periods in MLB in an attempt to find a better metric of competitive balance. In this use of the measurement, Humphreys (2002) creates it to compare the competitive balance of different decades of play in MLB. While this method of using the CBR is very beneficial in comparing across leagues for long time periods, it does not allow for use in a single year because it is an average of multiple years.

This research proposes the CBR be used as a single year metric by using what this paper terms as a "dynamic CBR." This method creates the "dynamic CBR" by calculating the CBR over a five year period to find a metric for a single season. For example to get a metric for year five, a person would calculate the CBR using years one, two, three, four, and five. To get the metric for year six, one would then use the average of years two, three, four, five, and six. This produces a metric using the CBR's multi-season measurement and associates it with a single season. From this a competitive balance metric is produced which has a number of years of data

within it, in the case of this study three and five year DCBR's will be calculated and considered. The reason for employing these two lengths of time will be discussed in further detail later in this section.

While this method is somewhat similar to the season specific standard deviation of win percentage, the DCBR also includes previous season's data. Often in attendance studies, season specific win percentage is used as a variable to try and explain attendance. The problem with this is only a single season's competitive balance is used, and this metric is constantly changing through a season. Using the 'dynamic CBR' method, the current season's SDWPCT is used, but it is also combined with a team specific component as well as the components of previous seasons. This should account for part of the fans expectations as this method produces a metric for each franchise in each year which takes into account knowledge of previous season's play which should influence fan behavior. Furthermore, where most other competitive balance metrics have had a single measurement for a team over a number of years, or a single measurement for an entire league in a single year, the DCBR provides a unique measurement of competitive balance by having a franchise specific numeric in each season.

Thus in terms of methods, this paper follows Humphreys (2002) exact method in calculating the CBR using the same notation:

$$CBR=\bar{o}_T/\bar{o}_N$$

In this dissertation research, DCBR's of both three and five year periods in length are focused upon, not only in an attempt to consider how DCBR's of different lengths reflect different periods of time, but also in considering what may be the optimal length of time to employ when using the DCBR. The use of three and five years may seem somewhat arbitrary, but fans often seem to remember the past few seasons, not just the prior one or two when they talk about the

fortunes of their team. Additionally, the free-agency and salary arbitration rules in MLB are considered in choosing the DCBR time lengths. In the case of salary arbitration, MLB players are eligible for salary arbitration after three years of play, allowing them to attempt to command higher salaries from the team they play for. Players with five years of MLB service who are traded are allowed to demand to be traded or become a free agent, and all players are allowed to become free agents after six years if their contract is expired at this time. Considering this, it seems rather logical to employ three year and five year as the lengths for the DCBR as these time periods are reflective in times when there will be more turnover on MLB rosters. Thus, this dissertation research considers both the three and five year DCBR metrics, which will be further examined and considered side by side with other competitive balance measures in this chapter. This research can thus be categorized as belonging to the ACB line of competitive balance research.

3.3 DCBR Data

The baseball data for this project was gathered from Rod Fort's sports business website, where he makes available sports data for several top professional leagues. Because Humphreys (2002) used MLB to measure attendance in the league from 1900 to present, this dissertation research uses the same dataset, which researchers such as Fort and Quirk (1995), Quirk and Fort (1997), Zimbalist (1992), Humphreys (2002) and others have used when examining competitive balance in MLB. It is important to note that while this study is not purely a replication of Humphreys' (2002) development of CBR, the MLB data he used seemed the logical choice of datasets because of MLB's being a high-profile and highly studied sport league. Additional data were collected for the attendance study portion of this dissertation research project, but this section focuses on the creation of the DCBR metric only, and uses only performance data from

sport franchises and leagues.

Humphreys (2002) focused on each decade from 1900 through the present. The purpose of this dissertation is not to examine a hundred years of competitive balance in MLB. Rather, the focus of this study will be to consider the post-reserve clause period in MLB. Thus, this dissertation chooses the Free-Agency era which dates from 1976 to the present. In 1969, Curt Flood of the St. Louis Cardinals successfully won a court case which found the reserve clause used by MLB owners at this time was in violation of the law. This reserve clause basically kept players under total control of the owners, allowing owners to control salaries and which teams players were allowed to move to. With the end of the reserve clause era, players were able to move freely among teams after their contract ended, thus bringing about the term "free-agency" (Maxcy, 2002), which, in a sense, granted players their "citizenship." (Zimbalist, 1992).

Research by (Fort & Quirk (1995) has shown some competitive balance metrics indicate a difference in balance before and after the free-agency period. Therefore, the 1976 MLB season is the first season used for DCBR calculations. The one problem with the time span chosen is the five year "dynamic CBR" period means the first DCBR metric available is for the 1980 season. Thus this dissertation will examine competitive balance from 1980 to 2007, but will reflect winning percentages for teams dating back to 1976. The use of the three and five year "dynamic CBR" metrics starting from 1980 also gives a several year window for teams to adjust to the creation of free-agency, which in turn should produce a competitive balance metric which may be more reliable. It is with this consideration, which this dissertation focuses on using a five and three year DCBR.

3.4 Results of CBR and DCBR Analysis

Using the methodology above this dissertation research calculates the "dynamic CBR"

over a period of 27 years (1980-2007), using the previous three and five years of data to calculate a single year's metric. To first explore the DCBR, this dissertation considers the very nature of the difference between the DCBR and several of the other more popular competitive balance metrics which are used in a great deal of the competitive balance research. It is important to begin with an examination of the difference between the CBR and DCBR at a league wide level. Humphreys (2002) calculates the CBR for both the American League (AL) and National League (NL) for an entire century. In doing so, Humphreys focuses on calculating and comparing the CBR for each decade against the HHI and SDWPCT for that time period. The one exception to this is that in the 1990's Humphreys focuses on five year segments of time. While Humphreys provides a measure for each period, as mentioned before, the CBR does not provide a yearly estimate of the changes and fluctuations in competitive balance which researchers are keen to examine. With this in mind, the first analysis of competitive balance metrics in this dissertation investigates the differences between the CBR and the three and five year "Seasonal" CBR. These "Seasonal" CBR's are rolling measures which are created by aggregating the DCBR's for each franchise in a year. In this manner, the DCBR is essentially a decomposition of the "seasonal" CBR. By comparing these measures side by side, not only is one able to examine the differences attributable to differing lengths of time in calculating the CBR and DCBR, but also how these changes in the league can be focused upon and discussed.

Other than Humphreys (2002), many other studies have focused specifically on the analysis of competitive balance research (ACB). In ACB research, much of the focus has been on: the development and comparison of new competitive balance metrics, examining trends and changes in competitive balance over time, as well as research investigating whether institutional changes affected competitive balance of a sports league or competition. Multiple studies in the

1980's conducted by Spitzer and Hoffman (1980), Cymrot (1983), and Besanko and Simon (1985) found that there was no significant change in competitive balance because of adaption of free agency by MLB. One study conducted during this time period did find evidence of changes in competitive balance because of free agency attributable to large market teams being more attractive to free agents (Daly & Moore, 1981). However, these studies were all conducted in the early years of free agency, and while most of them support the invariance principle to some extent, there was still the need to consider competitive balance changes after more seasons of baseball had been played.

More recent investigation into the effects of free agency on competitive balance has found an increase in competitive balance in the years after free agency when compared to the pre-free agency period (Fort & Quirk, 1992; Vrooman, 1996). However, Maxcy and Mondello (2006) point out that, when controlling for other institutional and organizational factors, there is no significant change in competitive balance before or after the inception of free agency. In their own article examining all four North American major North American professional sport leagues, Maxcy and Mondello (2006) consider the impact of free agency on competitive balance in professional sport leagues. While the authors do consider a variety of factors which have caused changes in competitive balance in the other North American sport leagues, their analysis of the MLB is quite short. The authors' (Maxcy & Mondello, 2006) argument for a shortened analysis of the MLB, where their article does present more extended empirical examination of competitive balance in other North American professional sport leagues, seems to be that the existing research into MLB competitive balance already presents a fully developed picture of effect free agency has had on competitive balance. Specifically, they point towards evidence of institutional changes (Maxcy, 2002) playing an important role in improving competitive

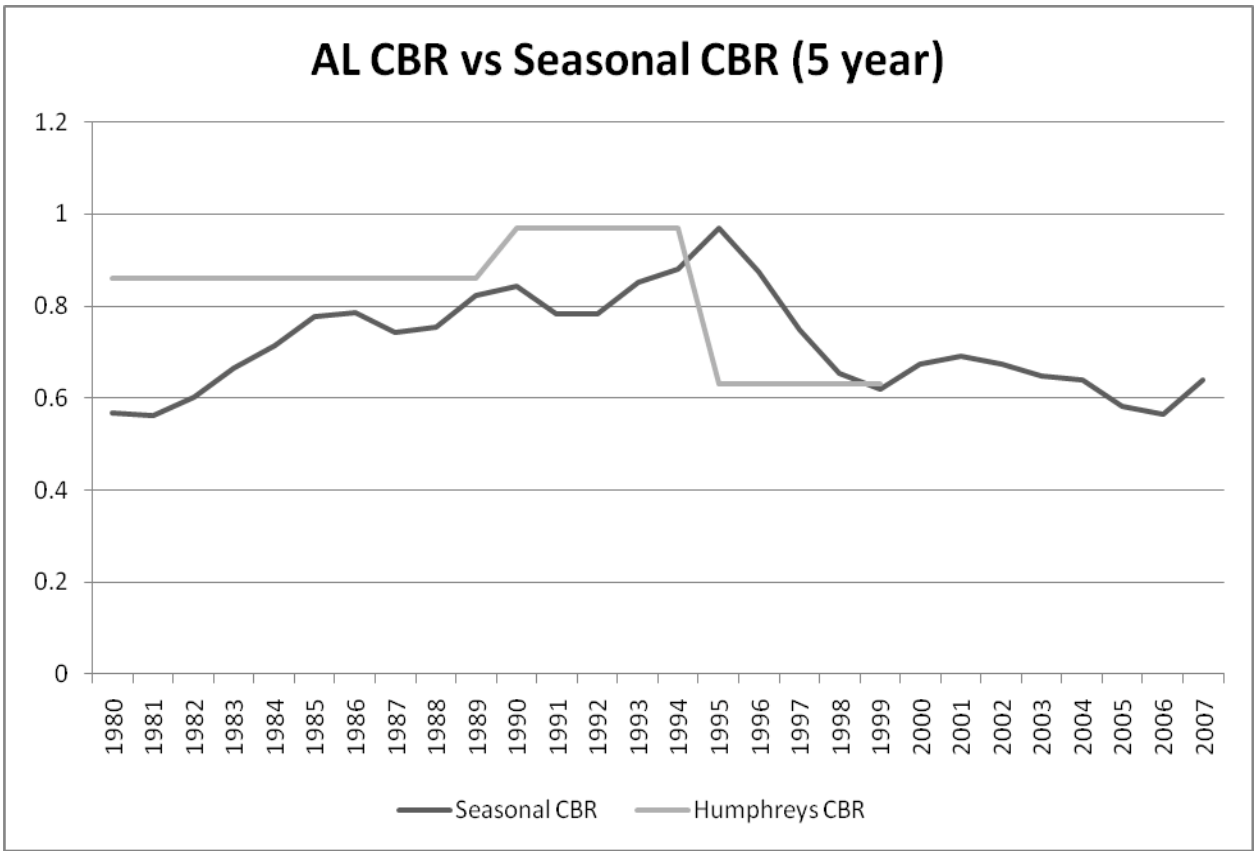

Figure 3.1 – AL CBR vs Seasonal CBR (5 year)

balance, as well theorization of increased transaction costs within the league (Marburger, 2002). The authors do provide a valid reasoning in their limited analysis of post-free agency competitive balance; however, there is still the need to consider more recent trends in competitive balance, as well attempting to understand how the use of the CBR and DCBR may bring different findings in regards to competitive balance during this time period. With this in mind, this dissertation research will consider how competitive balance has changed and evolved during the 1980 to 2007 time period, with prior research findings in mind.

Figure 3.1 through 3.4 shows the results of the CBR calculations made from combining the DCBR's calculated for the purpose of this dissertation alongside the CBR's calculated by Humphreys (2002). Figure 3.1 and 3.3 display the results for the American League (AL) for

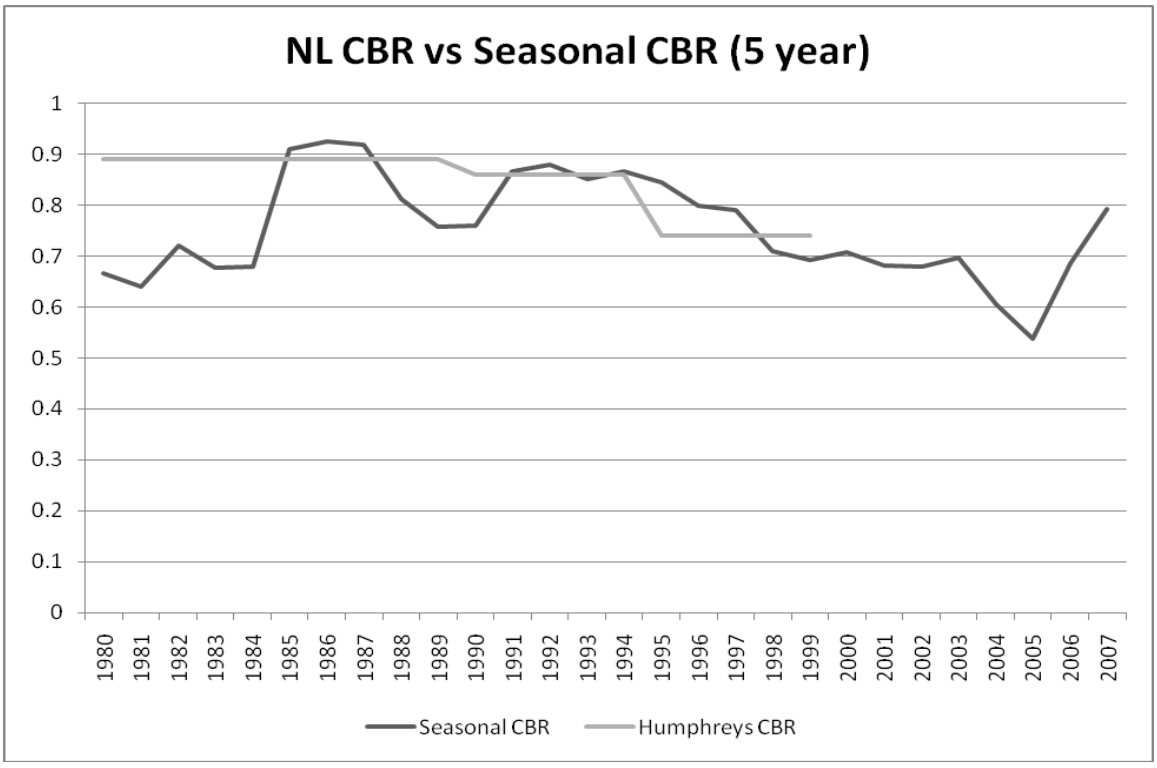

Figure 3.2 – NL CBR vs Seasonal CBR (5 year)

five year and three year periods of length respectively. Figure 3.2 and 3.4 show the results for National League (NL) for five year and three year periods respectively. In this, the NL and AL CBR's are averaged across all teams in the league, and are not the metrics of each individual team. Because each franchise can has their own DCBR metric, it is rather difficult to graphically show all the DCBR's over a 28 year time span, along with the CBR's calculated by Humphreys (2002) which represent time spans of ten or five years. The results show the CBR does fluctuate from year to year, presenting an evolving picture of competitive balance over time in each league. Considering Figure 3.1, it can be seen that there is some year to year fluctuation between the CBR calculated for each season represented by the dark lines. The lighter shaded lines are the Humphreys CBR which is rather analogous with the "Seasonal" CBR's, especially as the 1994 and 1999 CBR's are composed of the same length of time. Likewise, Figure 3.2 displays a similar trend for the NL, with the CBR and seasonal CBR's for a five year period being very

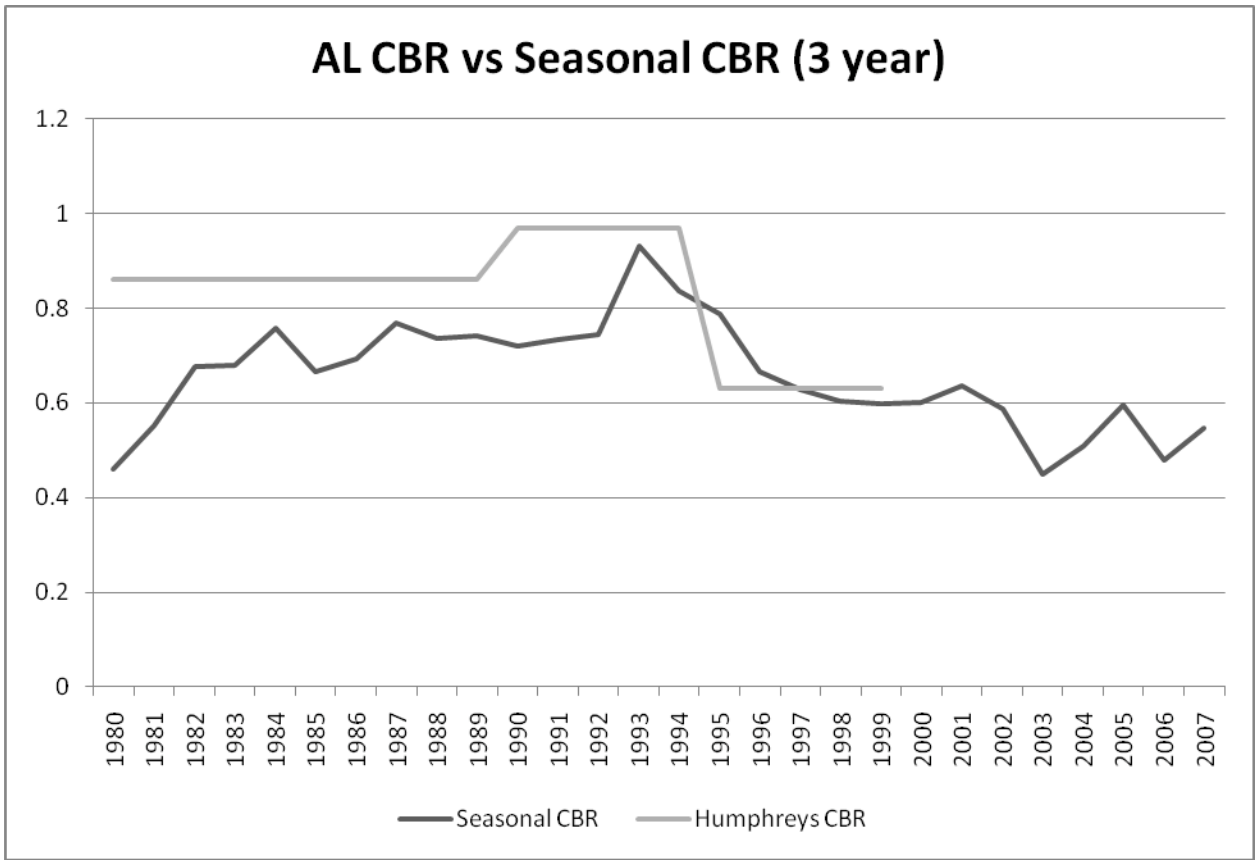

Figure 3.3 – AL CBR vs Seasonal CBR (3 year)

close to one another.

From these graphs, it can be seen the seasonal CBR does give a new and expanded picture of how competitive balance is dynamic and constantly changing from one season to the next. These graphs present a different picture than the CBR calculations used by Humphreys (2002) as can be seen in Figure 3.1 and Figure 3.2. It is known that the CBR used by Humphreys (2002) is a longer use of the CBR, the metric for 1989 calculated by Humphreys (2002) is forward moving because it represents the CBR for an entire decade from 1980 to 1989. The "seasonal" CBR metric for 1989 is actually a CBR calculation made from 1985 to 1989 to show what the CBR is at that exact point in time. Because of this the Humphreys' (2002) CBR and the seasonal CBR included in this paper are somewhat difficult to compare directly,

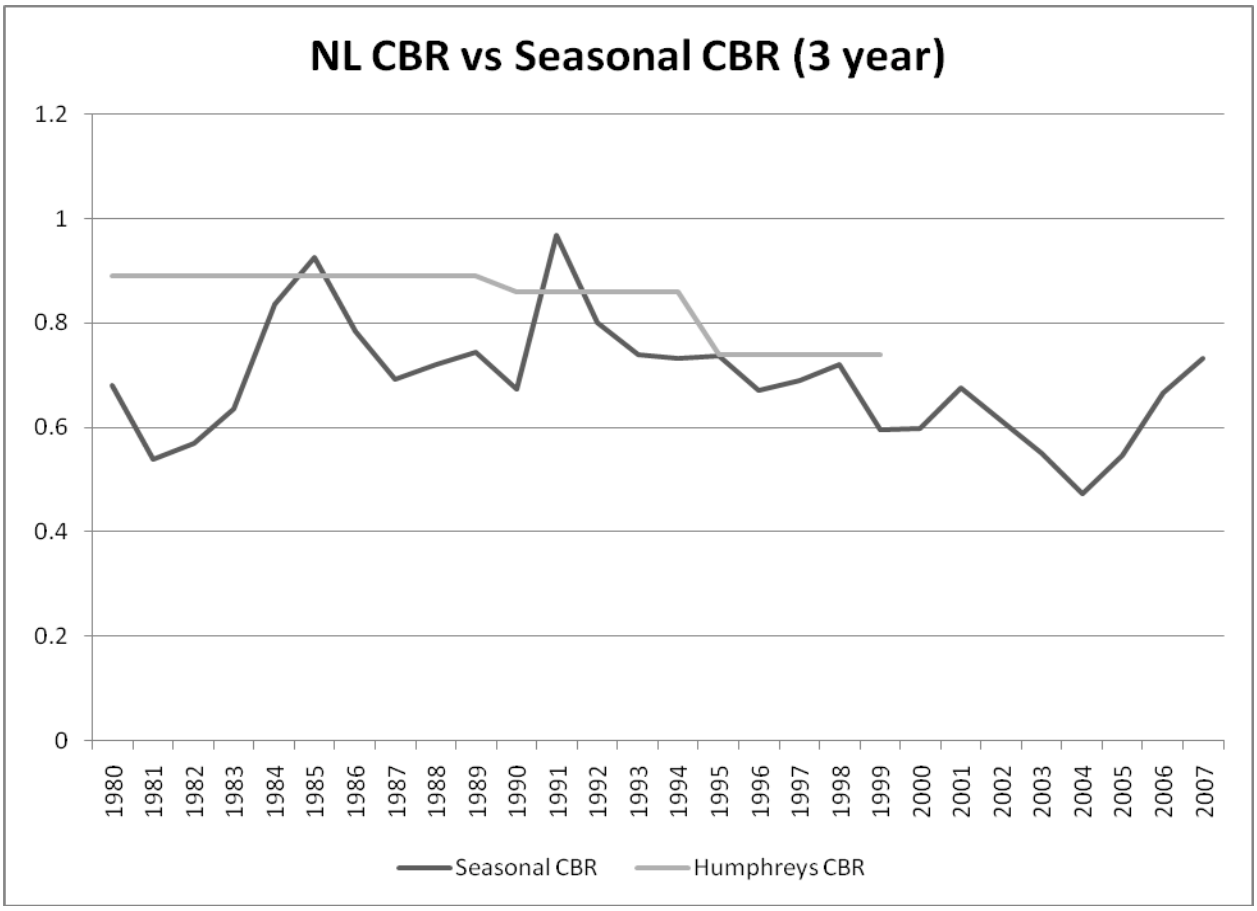

Figure 3.4 – NL CBR vs Seasonal CBR (3 year)

especially in the 1980's where Humphreys considers the league in decade long increments. It is only natural that the NL seasonal CBR in 1989 is shown as being much lower than the CBR for that 1980's decade. Where the decade as a whole may have had good competitive balance, the seasonal CBR in 1989 is reflective of the last half of the decade, and indicates a decline in the balance of the NL during this time. This differentiation is important, in that this example shows that there are different trends which can be identified by rolling the CBR from one year to the next, which may have been harder to identify with a longer period CBR.

Considering what the five year seasonal CBR's have displayed in comparison to the decade long CBR, it is important to consider the importance of length of time in examining the seasonal CBR. Figure 3.3 and 3.4 display the same CBR lengths as calculated by Humphreys

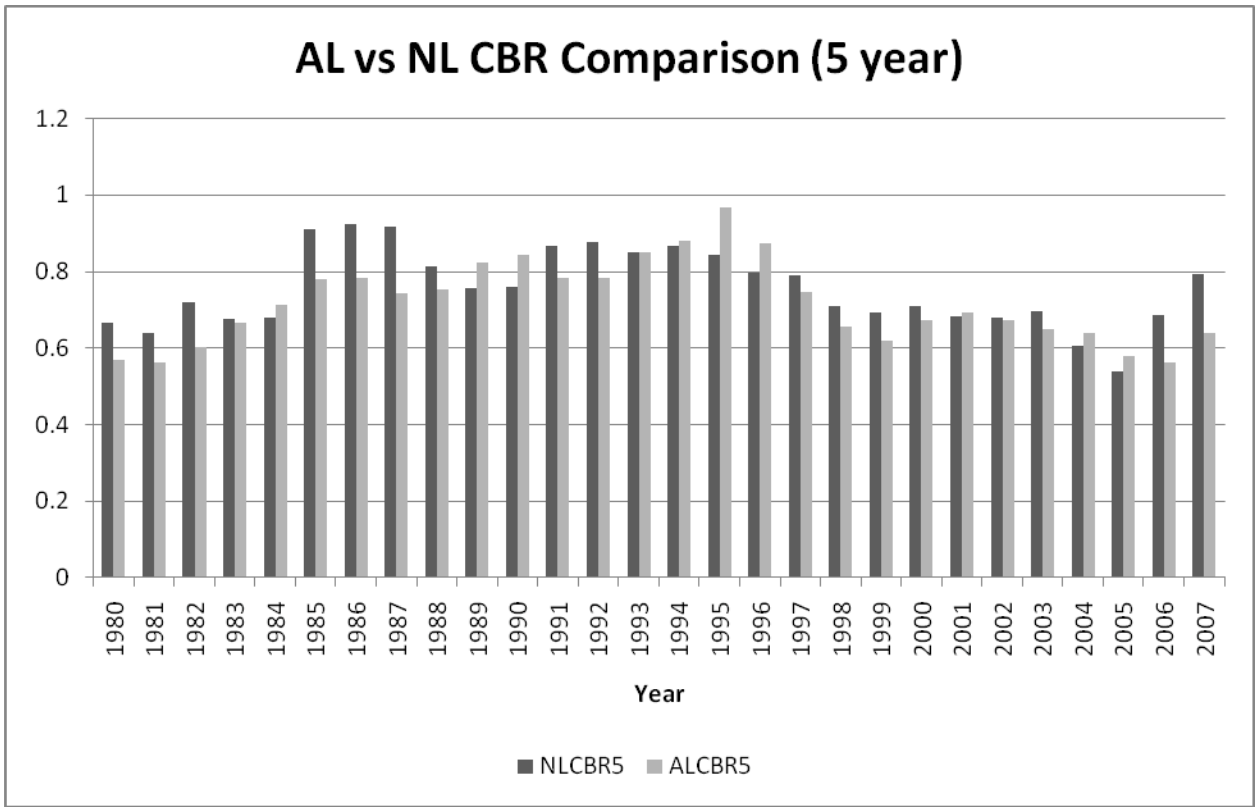

Figure 3.5 – AL vs NL Seasonal CBR (5 year)

(2002), but this time in a graph with seasonal CBR's calculated using three years of data. Where in Figure 3.1, the CBR and seasonal CBR's had been more closely matched to one another, the three year seasonal CBR visualized in Figure 3.3 is not as close as its five year cousin. A similar trend can be seen in Figure 3.4, for the National League as well, indicating that shorter periods of time for a seasonal CBR may present a very different picture of competitive balance than longer time periods. Furthermore, these shorter time periods may often reveal smaller changes which are not as commonly revealed in CBR calculations of longer length. While there may not be an ideal time length for calculating a CBR, especially with the multiple uses and variations competitive balance metrics take on, it is important to consider how the different lengths of time will present different competitive balance findings.

The seasonal CBR being calculated every year also presents another way to compare the

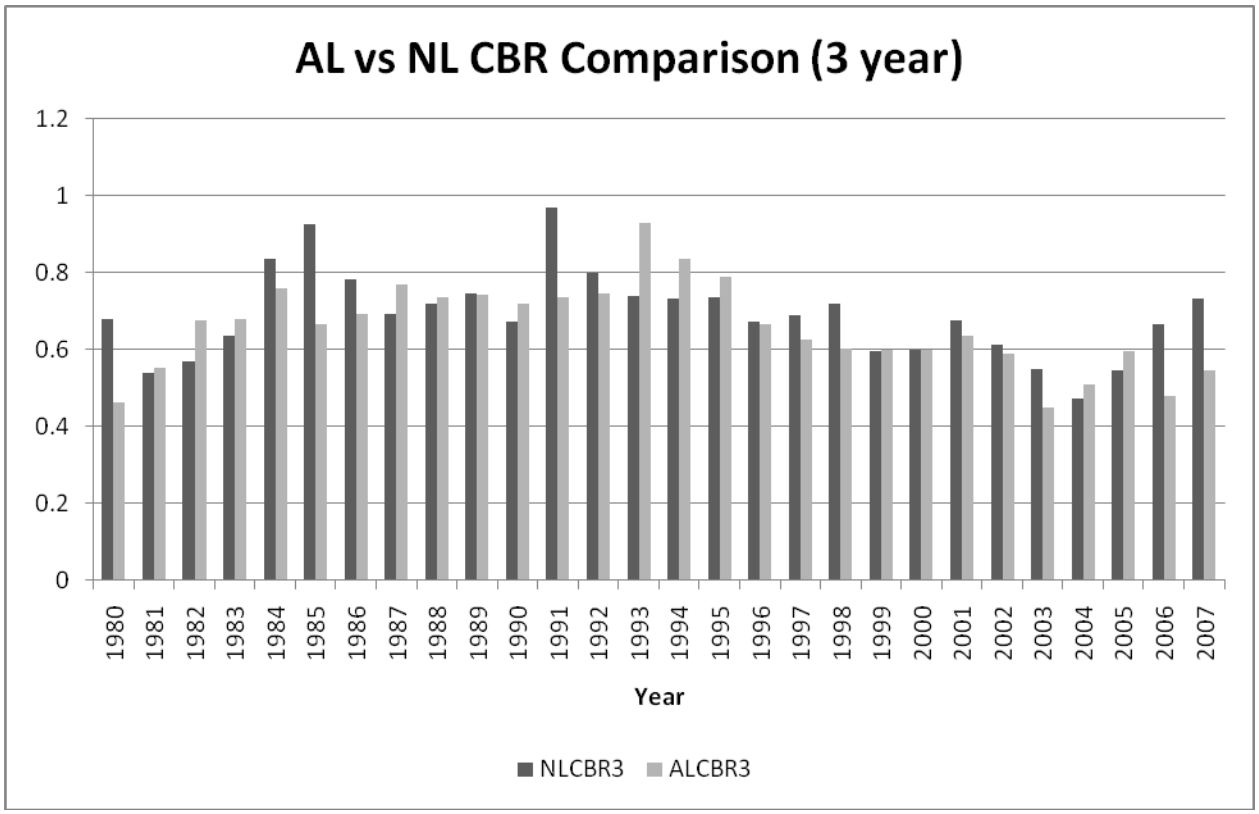

Figure 3.6 – AL vs NL Seasonal CBR (3 year)

competitive balance of one league to another. As Humphreys (2002) notes, other competitive balance measures often need to be adjusted for season length; however, this is not necessary for comparisons made between two CBR measures. In this the seasonal CBR for the NL and the AL can be compared, to consider the question of which league has the better competitive balance. To further examine this question, Figure 3.5 and 3.6 present the comparison of the AL and NL seasonal CBR's, at the five year and three year lengths respectively.

In analyzing the CBR comparison graphs, it can be seen in Figure 3.5 that the NL has better competitive balance than the AL in 19 out of 28 seasons using the five year CBR measure. However, in the three year version seen in Figure 3.6 it is evidenced that the NL has better balance than the AL for only 15 out of 28 seasons. Furthermore, considering how close the metrics are for both of these leagues in a number of seasons, many of seasons may have one

league "higher" than the other, but truly the difference between the two values is not statistically significant. For example, the three year CBR for the NL in 1989 is 0.7451, where the AL has a value of 0.7425. Despite these results, there is still very important information which can be garnered from the creation of the seasonal CBR, in the context of this chapter, the CBR and seasonal CBR can both prove to be an important tool in the analysis of competitive balance (ACB) line of research. As mentioned earlier this new method of using the CBR does help to show the evolution of competitive balance from one season to the next, while also taking into account the competitive balance from previous seasons. From an examination of Figure 3.5 and 3.6, there are several implications which play an important role in the theoretical understanding of competitive balance, as well as some empirical evidence as to trends between the AL and NL over the last three decades.

First from a more theoretical perspective, the CBR allows one to consider the importance of different time periods in considering competitive balance. As it has been argued that there may be no best metric to measure competitive balance, there may also be no best length of time through which a competitive balance metric should be calculated. If we look at the metrics for the year 1989, there is the Humphreys (2002) calculated CBR of 0.92 which spans the entire 1980's decade. Additionally there is the five year CBR for 1989 which has a value of 0.7581, and the three year CBR which has a value of 0.7451. While the three and five year CBR values are rather close to one another in terms of value, the decade long CBR measure for the 1990's is a great deal larger than the two shorter measures. In this, it can be understood that differing lengths of time do play an important role in measuring the competitive balance for a time period. Thus, while the ACB line of research is generally considered to be "atheoretic" to some extent, the empirical evidence provided from the calculations performed in the first part of this research,

as well as an analysis of these numbers does help to provide some theoretically insight into the nature of competitive balance. In this, it is important to consider time lengths and their effect on measures produced when calculating competitive balance metrics, and is something that shouldn't be of concern just for the DCBR and CBR, but also for all other competitive balance metrics which are able to take into account varying lengths of time in their creation. While Zimbalist (2002) argues that the best competitive balance metrics may be those which fans are most responsive to, the purpose of this section is to focus merely on the analysis of competitive balance. The next chapter of this dissertation will further examine the DCBR in comparison to other competitive balance metrics along this line, and their place in a demand model to further consider Zimbalist's thoughts.

Turning focus towards the empirical findings of the CBR calculations and analysis, it is clear that while the NL has generally had more years of higher competitive balance, both the AL and NL have been rather volatile, as there have been 12 switches in which league had the better balance for the three year CBR metric, and 10 switches for the five year CBR metric. In this sense, both leagues have been moving back and forth in terms of having better competitive balance than their rival league. Looking at the correlation between the CBR's during this time period, it is found that both the five year and three year CBR's for the AL and NL are highly correlated. Curiously, the five year CBR is more highly correlated at 0.7193 than the three year metric which has a correlation of 0.658. While it is natural that these two metrics be highly correlated, there is the question as to the relation of the CBR to other competitive balance measures, especially the SDWPCT and HHI. Considering the findings in regards to the research done on the post free agency period, the results from the CBR's presented in each year are slightly different than the findings of Humphreys (2002). Competitive balance does seem to

increase through the 1980's, but this trend continues into the 1990's when using the CBR's calculated for each season. Maxcy and Mondello (2006) argue that Humphreys (2002) results' point towards a decline in competitive balance after its peak in the 1980's. This is somewhat true, even considering the new evidence presented within this dissertation, that is after the early 1990's, competitive balance did indeed decline. Both the three and five year CBR's within this analysis show a decline in AL and NL competitive balance in the late 1990's and early 2000's. However, the inclusion of calculations through the 2007 MLB season show something that these earlier studies have not shown, that there has been an increase in competitive balance over the last few seasons of this dataset. Figure 3.5 and 3.6 both display that competitive balance has not increased enough over the last few seasons to reach its early 1990's or late 1980's level, yet is on the rise nevertheless. However, it is unclear whether this trend is because of free agency, or other institutional changes in the MLB. In either case, it does present the fact that there exists interesting questions which future research can consider when examining the trends of competitive balance in post free agency period.

Examining Table 3.1, one can see the correlation matrix for the competitive balance metrics employed within this dissertation. These metrics were all calculated from the time period of 1980 to 2007, and while the CBR and DCBR metrics focused on multiple seasons of data, the HHI and season specific SDWPCT all were calculated for each individual year. Within the table the DCBR5 refers to the franchise specific DCBR measure that is calculated using five years. Likewise the DCBR3 represents the DCBR for franchises and is calculated using three years. The season specific SDWPCT and RSD (the ratio of the actual to the idealized standard deviation of win percentage) are not both included within Table 1 because of the fact that these two measures are closely related to each other, and both produce virtually the same correlation

TABLE 3.1

Competitive Balance Metric Correlations

	DCBR5	DCBR3	CBR5	CBR3	HHI	SDWPCT
DCBR5	1					
DCBR3	0.6432	1				
CBR5	0.3252	0.2288	1			
CBR3	0.2484	0.3040	0.7575	1		
HHI	-0.0333	-0.0274	-0.0660	-0.1123	1	
SDWPCT	-0.0725	-0.1120	-0.1749	-0.3251	0.1479	1

measures with the other competitive balance metrics. Considering the correlations presented in Table 3.1, it can be seen that there is a very low and negative correlation between the SDWPCT and the CBR metrics. This is not very surprising, as the CBR is composed of a ratio of SDWPCT averages, and the RSD is also composed of an SDWPCT. Furthermore, the negative correlation is explained in that as the RSD is higher the balance in a league is considered to lower. Conversely, with the CBR, when the metric is higher (approaching one), it is a sign of having better balance in a league. While some correlation does exist between the CBR of varying lengths, SDWPCT, and other various metrics produced from the SDWPCT, there is almost no correlation between the HHI and the CBR.

Turning focus to the newly constructed DCBR metrics, it is evident in Table 3.1 that there is a high correlation (0.6432) between the five year and three year DCBR metrics. This is also naturally expected as the metrics are calculated in the same way, and are both composed of very similar time frames. It is also of note, that the both the five and three year DCBR are fairly highly correlated with the five and three year CBR metrics. While the DCBR metrics do have unique metrics for every franchise in each year, the DCBR and CBR metrics are both closely

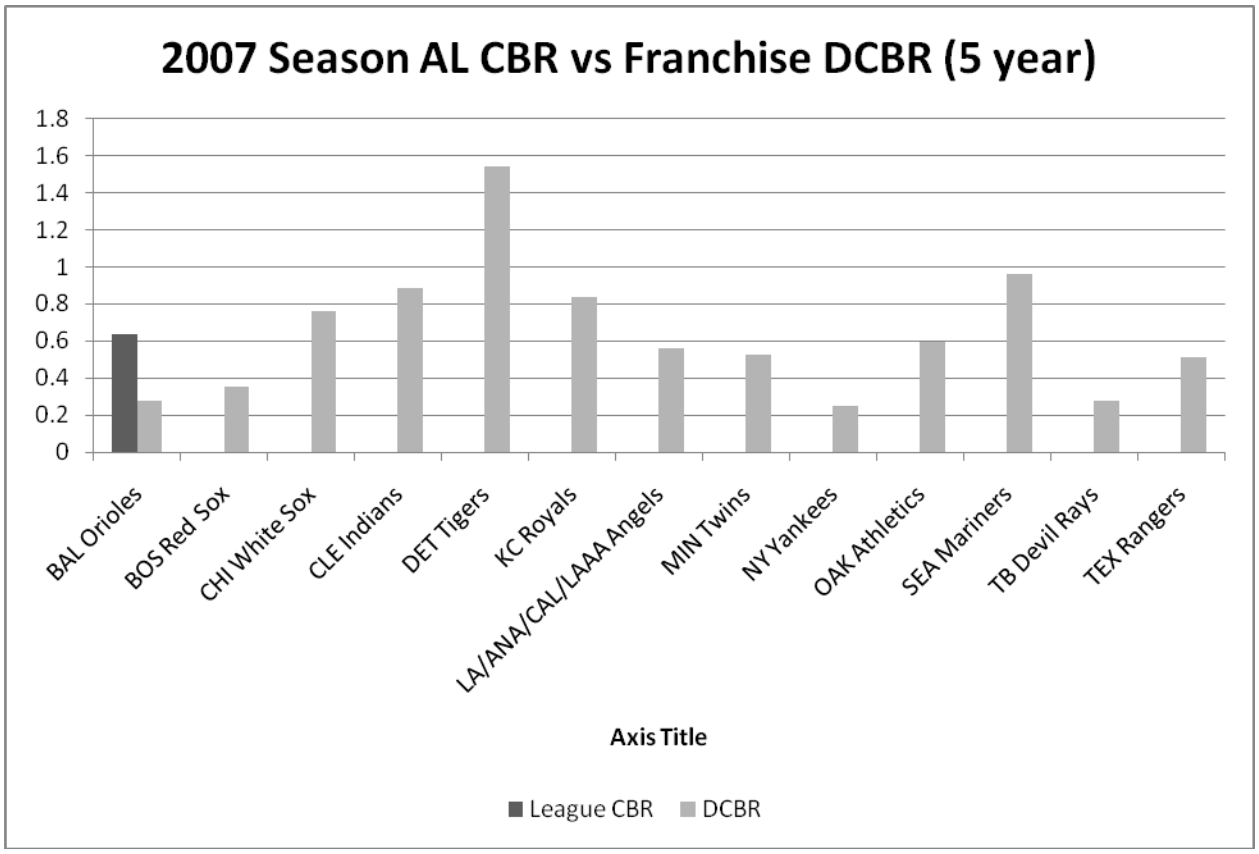

Figure 3.7 – 2007 AL CBR vs AL Franchise DCBR (5 year)

related and calculated in a similar manner, and thus there is clearly some relation between these two metrics. This existing relation between the various DCBR and CBR metrics is something which will be further considered when each both of the metrics are placed into demand models in order to examine the results they produce. While the DCBR/CBR metrics are all related, it is important to note that the DCBR metrics have close to zero correlation with the HHI and SDWPCT metrics. In creating the DCBR, part of the worry was that there would be a very close relation between the DCBR and other metrics, specifically the SDWPCT. However, from the fact that there is little relation between the DCBR and these two other more popular competitive balance metrics, it allows for this research to further consider the DCBR's place as a competitive

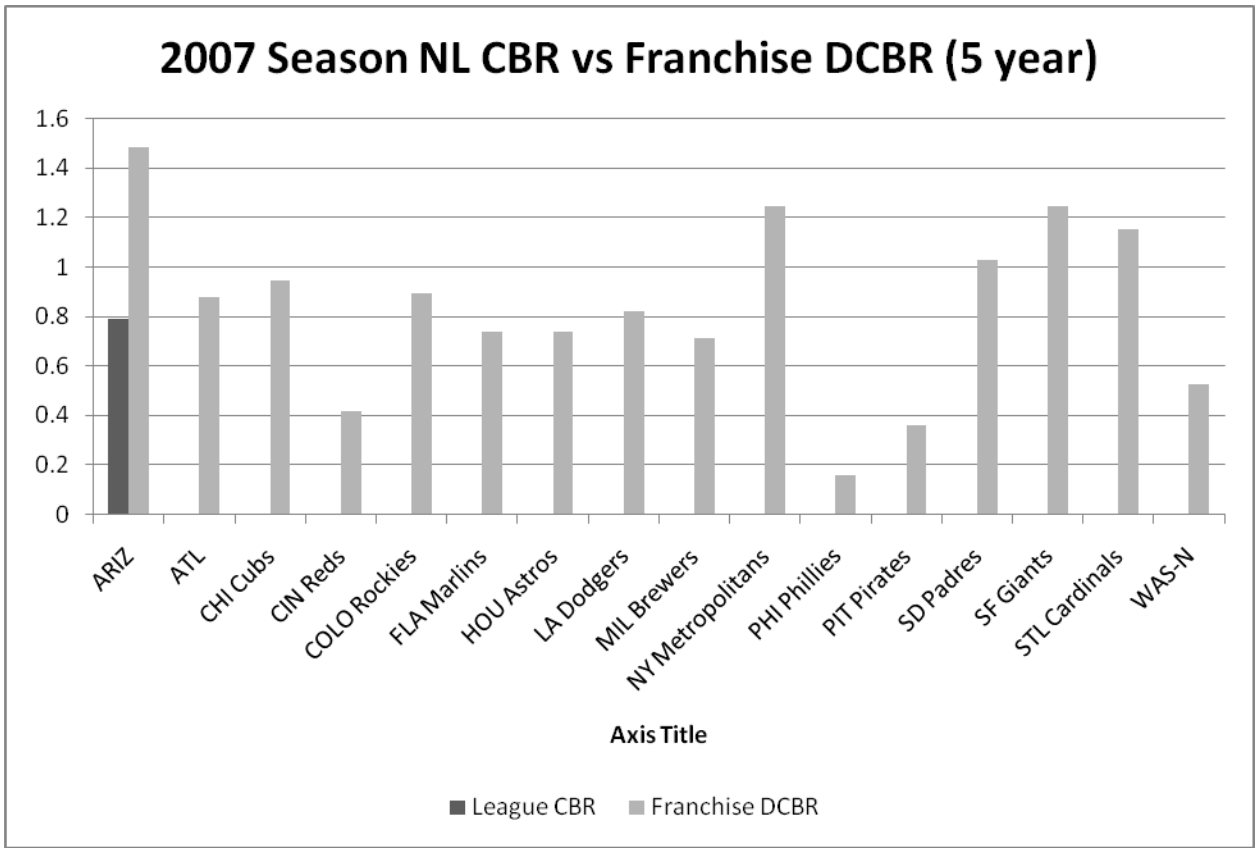

Figure 3.8 – NL CBR vs NL Franchise DCBR (5 year)

balance metric, as well as how it relates and compares to other measures. In all, the analysis of competitive balance and consideration and comparison of the DCBR and CBR to the SDWPCT, HHI, and other competitive balance variables is something which in itself could be the subject of a whole dissertation project. However, within this research the focus is not just on the CBR, but also the newly formed DCBR metric, and its place within the competitive balance research. In the rest of this chapter, the focus will be on the DCBR, and analyzing how: the DCBR is composed, how it relates to the CBR, how individual DCBR's relate from one franchise to the next, and what these results mean for both theoretical and empirical understanding of competitive balance.

The CBR has been widely discussed in its various manifestations, but it is important to also focus on the DCBR as a metric which can be measured for each franchise in each year. In

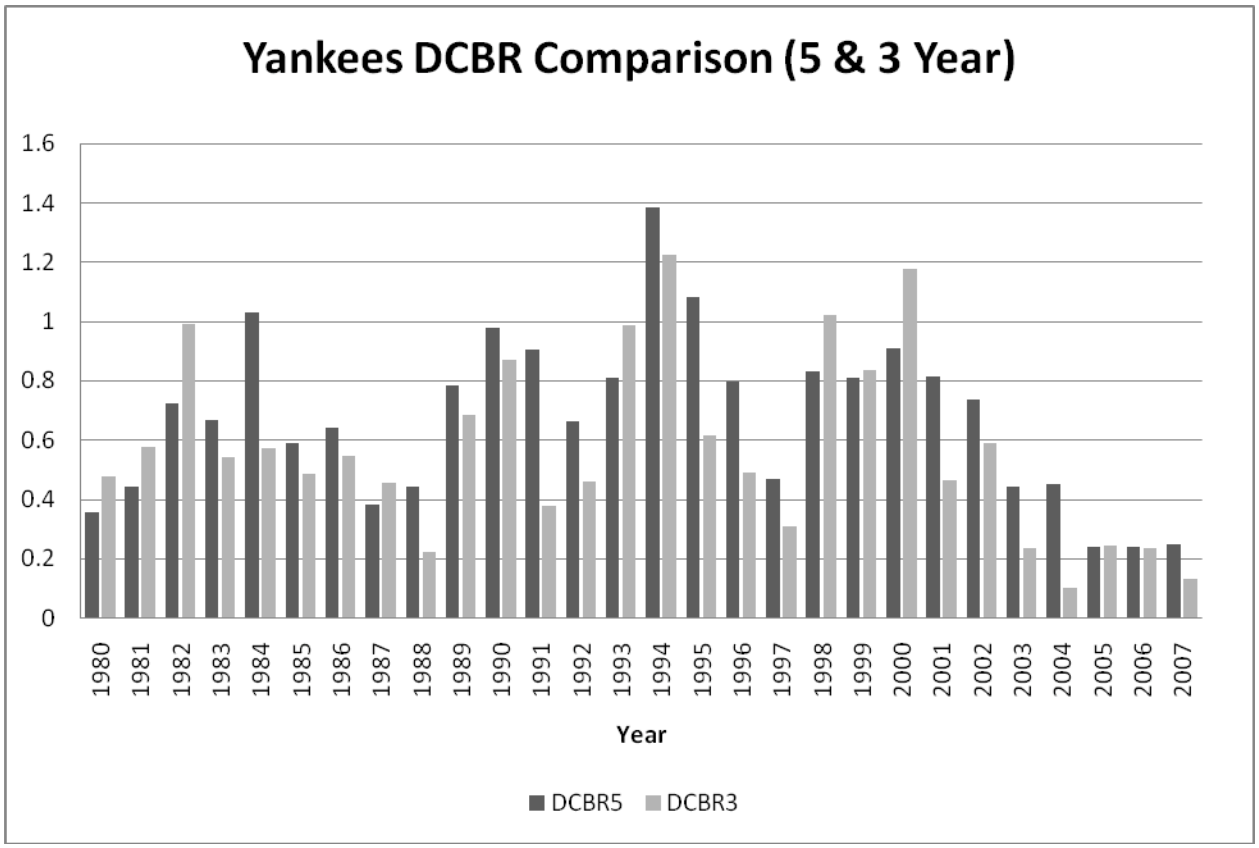

Figure 3.9 – New York Yankees 3 & 5 Year DCBR

this sense, the DCBR produces a unique measure for each franchise in each season. Due to this, there is quite a range of individual competitive balance metrics within a season for the entire league. The DCBR allows for multiple points of analysis in this situation: first, it can be used to compare all the teams in a league in a single season, second, it can be employed to analyze the competitive balance of a single franchise over several seasons, and finally, these two parts can be combined, comparing several franchises over several years. It is this third and final part which is rather unique, as no other competitive balance metric has allowed for such a comparison in which each team has a uniquely calculated competitive balance measure for it in each season. Within the rest of this ACB analysis, these three sections will each be considered in order. First turning to Figure 3.7 and 3.8, one can see the five year DCBR's for each franchise in the AL and NL respectively. Within these graphs the light shaded lines are the DCBR, and the dark shaded

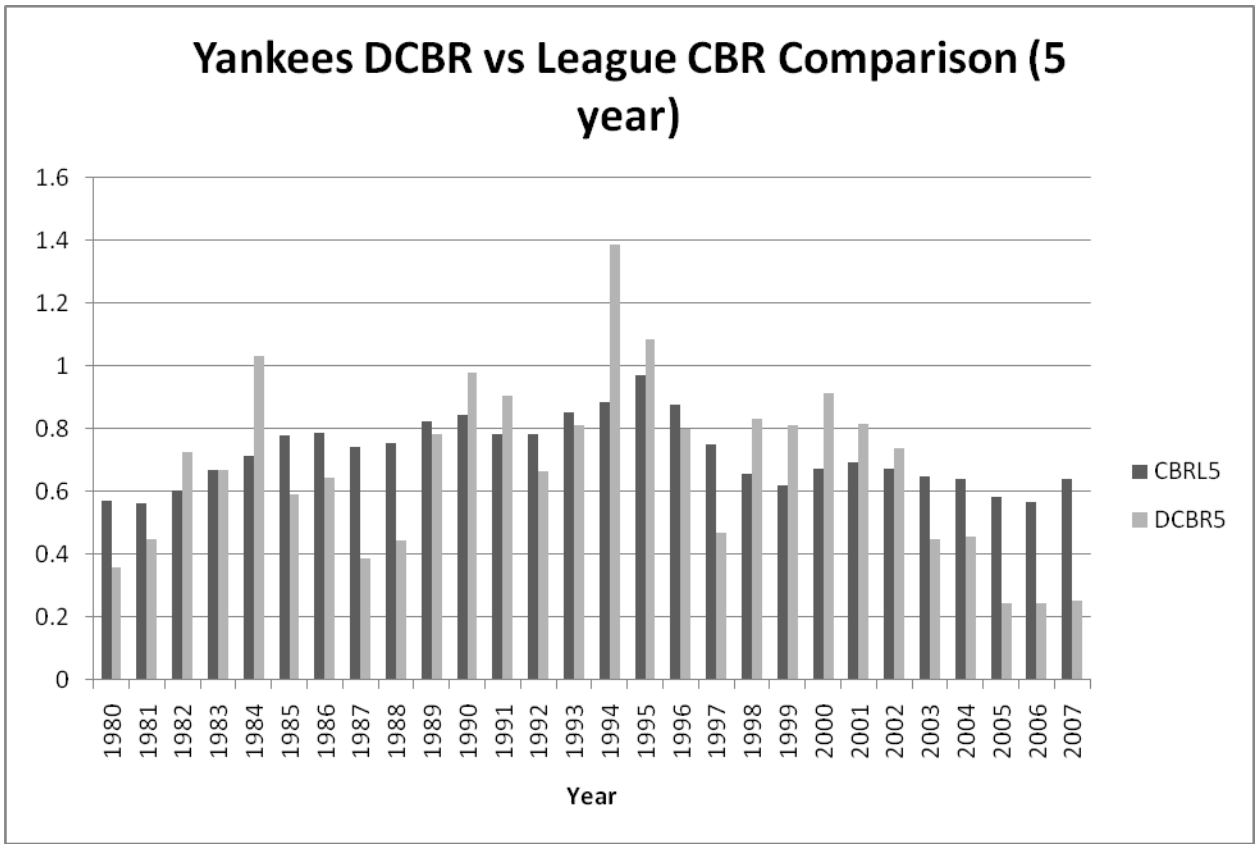

Figure 3.10 – Yankees DCBR vs League CBR (5 year)

bar to the far left is the league CBR for that season. In further examining these graphs, it is clear that across both leagues there is a good deal of fluctuation in DCBR values from one franchise to the next. Within the NL, the DCBR range for franchises is from 0.1599 (Philadelphia Phillies) to 1.4851 (Arizona Diamondbacks) with an average CBR of 0.7922, and the AL teams range from 0.2498 (New York Yankees) to 1.5391 (Detroit Tigers) with an average CBR of 0.6393.

Considering the DCBR at the level of an individual franchise, one can examine Figure 3.9 to view the five and three year DCBR metrics for the New York Yankees. In examining just the DCBR's for a single franchise, it is clear the metric does fluctuate from one year to the next, and while in most years the five and three year metrics are rather close to one another, there are years with drastic differences such as 1984, 1995, and 2001. The cause of these differences can be traced back to the different time lengths of time used to compose these metrics. That is, in the

case of 1984, 1995, and 2001, all of the five year metrics are of a much greater value than the three year metrics, indicating that in the shorter time span there is evidence of more competitive imbalance. This again highlights the importance of the length of time in calculating the DCBR, as well as any other competitive balance metrics. Periods with different lengths are bound to have differing measures, and this is clearly something which researchers in competitive balance should be cognizant of. Further examining Figure 3.9, it is also curious to see the pattern of changes in the competitive balance metric that is specific for a single franchise. While it has been shown both in the previous graphs, as well as in the extant research that competitive balance has declined after the early 1990's for the league as a whole, this graph presents a new piece to that picture. As mentioned several times throughout this dissertation, prior competitive balance metrics have either focused on a single team over several time periods or many teams over a single time period. With the creation of the DCBR, it is now possible to consider the place of a single franchise in a league, and directly compare that to a CBR metric calculated for the entire league. Returning to Figure 3.7 and 3.8 one can examine how each individual franchise DCBR compares to the CBR for their respective leagues in 2007. Additionally, the next image, Figure 3.10 presents a year by year view of how the New York Yankees' five year DCBR compares to the American League five year CBR calculated over this time period. Within this, it is evident that there is quite a drastic difference between the DCBR and CBR in many of the years, especially in a year like 1994 where the Yankees' DCBR exceeded a value of one, something which is impossible for the CBR to do. Additional interpretation of Figure 3.10 can also be made in examining the most recent seasons, especially the time frame from 2005 through 2007. In these years it can be seen that the DCBR is rather high for the New York Yankees, while the CBR for the entire American League over this time period is quite low in

comparison.

The final piece of analysis in considering the DCBR in both its three and five year lengths is in comparing two franchises with one another over the entire 28 seasons that the DCBR was calculated for in this dissertation. For the purpose of this analysis, this dissertation will once again employ the New York Yankees, but will also place them side by side with the New York Mets. There is a variety of reasons why both the Mets and Yankees have been chosen for this analysis. First, competitive balance theory hints that teams from different media markets will have different levels of revenue, and hence will lead to competitive imbalance within a league. With the Yankees and Mets both being from the same MSA, a comparison of these two teams will hopefully control to some extent, the revenue imbalance's between the teams. While the Yankees are noted for having deep pockets and spending large sums on salary every year (around $206 million in 2010), the Mets also are in the top five in spending on player salaries in Major League Baseball (at around $136 million in 2010). Thus, because the marginal revenue gained by spending excessive sums on player talent is sure to decline, the Yankees may spend a good deal more than the Mets, but the talent level of these two teams is probably not as great as the difference between their payrolls. There are other factors which need to be considered in comparing these two teams, such as the fact that they are from different leagues (the Yankees belong to the AL, and the Mets the NL). Thus while a comparison of these two teams will yield some interesting results, there are bound to be a variety of factors which helps to explain why any displayed differences do exist.

Turning to Figure 3.11 and 3.12, one can see the comparison of the DCBR for the Yankees and Mets from 1980 to 2007 in the five year and three year lengths respectively. A cursory glance at both of these graphs immediately presents the fact that the DCBR's for these

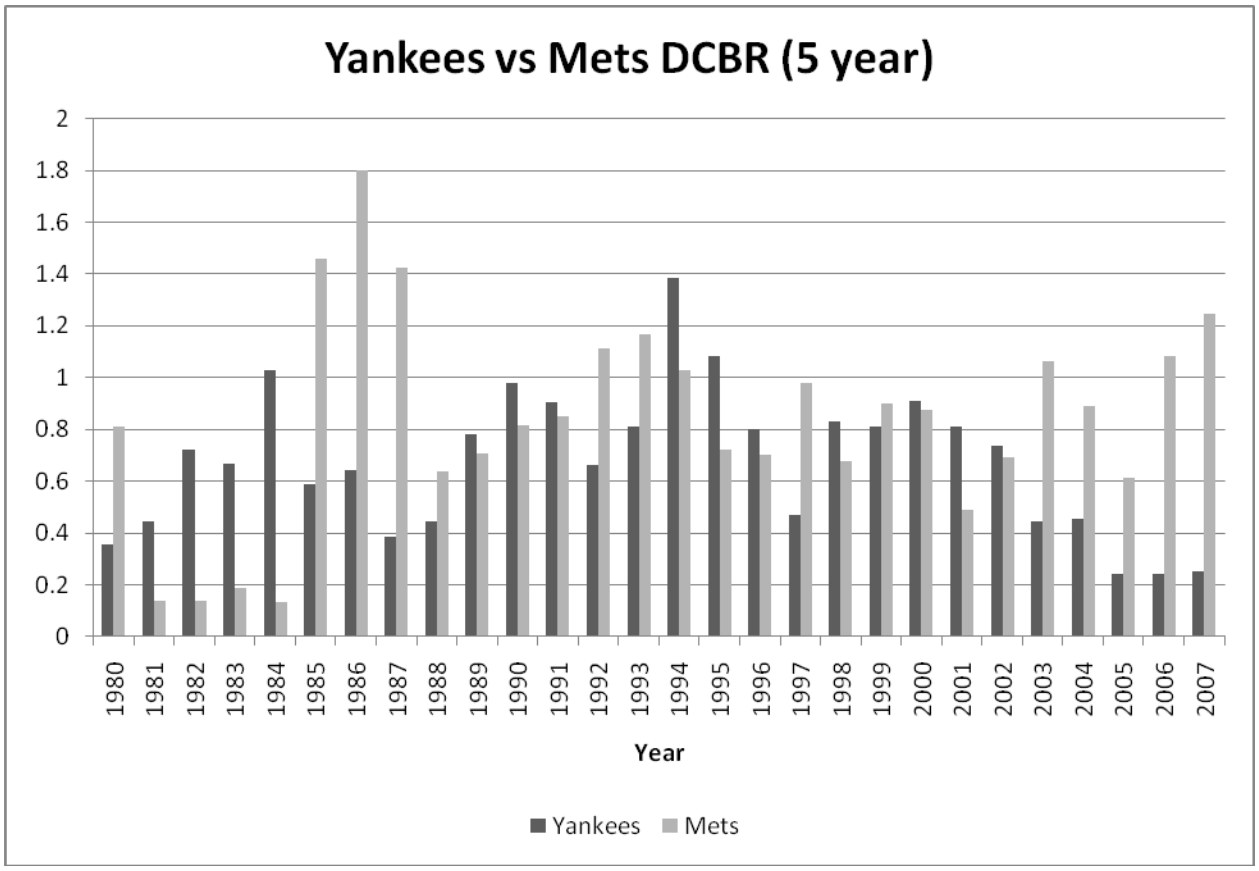

Figure 3.11 – Yankees vs Mets DCBR (5 year)

two teams are drastically different in many of the years. Considering both the five and three year DCBR graphs, it can be seen that while the period from the late 1980's to early 2000's has the DCBR's for both franchises in a relatively similar range, the seasons outside of this range have very different DCBR's. Most noticeable is that while the Yankees initially had a higher DCBR in the early 1980's indicating better competitive balance, the Mets soon over took them in the mid-1980's when the Mets were considered to be the better of these two teams. There is some leveling out through the 1990's when the Yankees won four consecutive World Series titles, yet it is in recent years (starting in 2003) where the DCBR measures for these two teams diverge. That is, when looking at the graph, it can be seen that while the Mets have had a high DCBR indicating good competitive balance, the Yankees have had a very low DCBR, indicating more

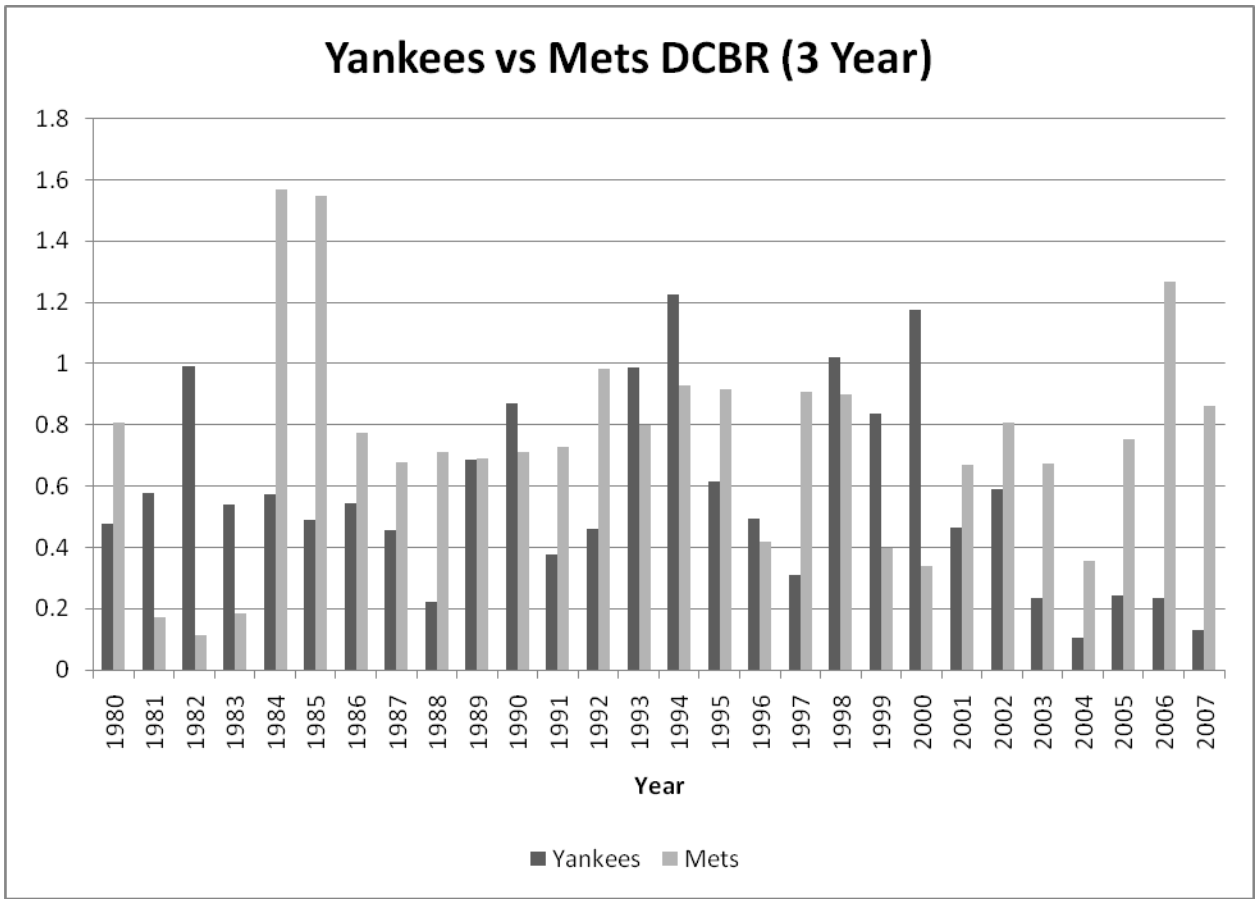

Figure 3.12 – Yankees vs Mets DCBR (3 year)

imbalance. As the DCBR's among all teams in a league are averaged to create a CBR metric, it can be argued that in recent years, the New York Mets have been doing a lot more in terms of bringing balance to their league than the Yankees. This argument is a rather curious one, as the Yankees were considered to be a "dynasty" in the late 1990's, a team that was truly dominant and were pointed out as examples of the lack of competitive balance in the league. However, when looking at the DCBR metrics, it is quite clear that the Yankees were actually boosting the CBR much more in the 1990's than they have been since 2003. It is thus that our understanding and perception of competitive balance can be altered in viewing the results of the DCBR comparison of the Yankees and Mets. Therefore, in considering the DCBR as a new competitive balance metric, it is important that consideration be placed on how it can be employed as a

metric in the analysis of competitive balance line of research, and what information and trends can be garnered from its use that will help to further the theoretical and empirical understanding of competitive balance.

3.5 Analysis of Competitive Balance Conclusions

In examining a variety of competitive balance metrics alongside the newly created DCBR metric, there are quite a few findings and points of interest which have risen from the numerical and graphical analysis presented within this chapter. In creating the DCBR this dissertation attempted to further the rhetoric and consideration of the concept of competitive balance by evolving the metric based on the previously created CBR developed by Humphreys (2002). This methodology of creating a new competitive balance metric is quite interesting as the CBR itself was formed by taking an existing competitive balance metric (SDWPCT) and further evolving it into a new metric. In some sense, the SDWPCT is truly a grandfather metric for the DCBR created within this dissertation. In addition to creation and discussion of the lineage of the DCBR, this analysis section also focused on actually calculating the DCBR over a 28 year time period, through which this metric, as well as a "seasonal-CBR" could also be considered.

In the actual analysis of the CBR and DCBR metrics it was clear that there is some things which have been presented and brought up that are important considerations for existing and future ACB focused research. First, as came up several times in the analysis of competitive balance metrics, there is a need to consider the implications of using time periods of different lengths when measuring competitive balance. It is clear that a single metric reproduced multiple times, each using a different span of time, can result in measures which are quite different from one another. While in general many of the trends presented by the DCBR and CBR are similar to some extent, there is important need to further consider time span in calculating and

developing competitive balance metrics in the future. In addition to this theoretical contribution, there is also a good deal of empirical evidence which has supported much of the findings in the literature focused on the effect of free agency on competitive balance in professional sports. The evidence presented within this chapter helps to further strengthen the case that competitive balance was on the rise in the 1980's, but soon tapered off in the following decade. Examination of the DCBR metrics for this time period corroborate this evidence, but also displays that there was still relatively high levels of competitive balance in the league up until the 1994 strike. Furthermore, most studies into competitive balance and free agency have examined the time period of free agency up until the early 2000's and have come to the conclusion that the MLB has become more imbalanced. Yet the DCBR for the years following this time period displays an upswing in competitive balance in the MLB, hinting towards improvement of competitive balance during this time. While it will be several years before the trend can fully be viewed by collecting more evidence and data, it is clear that there is still the need for further analyzing the patterns and trends of competitive balance during this time period. In this, it is evident that the analysis of competitive balance line of research still has much work which needs to be done, and that the DCBR may be one of the keys to help bring better understanding of competitive balance.

While it is interesting to examine the differences between the CBR and DCBR, ultimately, this is an exercise which can only be taken so far, as the DCBR metric is directly calculated using the same method as the CBR. Probably, one of the more intriguing factors of the DCBR which will be used in the subsequent chapters within this dissertation is its ability to have a measure for each individual team in each year. While the novelty of having an individual measure for each team in every year is important in advancing the theoretical and empirical understanding of competitive balance, this unique feature makes the DCBR somewhat more

difficult to compare to other competitive balance metrics. The question which arises is, how do you compare a competitive balance metric that is different for every team in a year, when other metrics may present the exact same number for all the teams in that year? One method in which this can be done is including the metrics within a demand model to test to see which metric's fans are most responsive to. As Zimbalist (2002) believes, it is important to have a competitive balance metric which fans are truly responsive to. It is thus that within the next section, as part of the analysis of the demand for Major League Baseball attendance, competitive balance metrics will be placed within the demand models to test them. While such an analysis has been conducted before by Humphreys (2002), his analysis examined attendance over the long-run. The focus of this dissertation will be a seasonal (yearly) examination of each metric, including that of the DCBR. The inclusion of the DCBR truly is novel, as there has not been demand for sport research which has placed a competitive balance metric with unique measures for each team in each season in its model. Thus, the next chapter will present the specification of the demand model in which the competitive balance metrics will be included, a discussion of econometric issues, limitations, and results of the regression analysis examining the demand for MLB attendance.

CHAPTER 4 – DEMAND FOR SPORT AND COMPETITIVE BALANCE

4.1 Demand for Attendance and the DCBR

The next stage within this dissertation research is the inclusion of the DCBR into an attendance demand model and to compare its performance and results with other competitive balance metrics. To do this average attendance per game for each franchise in both the AL and NL from 1980 until 2007 was collected. This data was taken from the aforementioned Rod Fort's sports business website. Within the literature chapter of this dissertation, ample background and evidence were presented in regards to the UOH as well as the role of competitive balance in determining fan demand. As one of the primary goals of this study is to test the UOH through the creation of the DCBR competitive balance metric, this variable will clearly be included in the demand model constructed. However, as there is also the necessity of examining how the DCBR stacks up against other competitive balance measures, there will be the need for other variables to be included in separate, but similar models. In order to do this, the model will be run several times, with the small change of including a different competitive balance variable in each one, and then comparing the differences which exist in the results from using different competitive balance metrics.

An additional consideration which needs to be made in terms of competitive balance in the construction of this model is which specific competitive balance metrics should be tested against the DCBR. Because this study will look at seasonal attendance, long-run metrics such as the CBR are more difficult to be included due to its inability to reflect season to season changes in competitive balance. With this in mind, it would seem quite prudent to compare the DCBR against the seasonal idealized SDWPCT as well as the HHI that are discussed previously in the competitive balance metrics chapter of this dissertation research. These metrics are the top

candidates not only because Humphreys (2002) employs these metrics when performing a similar analysis in his creation of the CBR, but also because of their status as being two of the more commonly used competitive balance metrics in both the UOH and ACB lines of competitive balance research.

4.2 Model Specification

In specifying a demand model for MLB attendance in this dissertation, it is important to make note of and discuss: the variables, statistical methodology used to run and examine the data, as well as potential limitations which exist from employing this model. In order to understand the demand for live MLB attendance, this dissertation research will use an attendance variable as a dependent variable as part of a panel data set. In this, the demand model will seek to investigate how the various independent variables which are included are related to the attendance dependent variable. Despite the clarity that attendance will be used, there are various manners in which the attendance variable can be manifested within datasets. Thus, to begin with the specification of this model, the dependent variable will come in the form of total attendance for each franchise in every season included in the dataset.

The total franchise attendance variable has been chosen because it is widely used in other attendance studies within the literature, including Humphreys (2002) CBR examination. Results from this model can help researchers understand how the various independent variables affect total attendance. From this, researchers can extrapolate in general how changes in an independent variable cause fluctuations in attendance for an entire season, as well easily extrapolate and estimate through division how changes will affect average attendance per game. While there exist other forms of attendance variables such as average attendance per game, the average attendance variable can lead to variable issues within the dataset which can cause errors

in the estimated results. Thus for the sake of simplicity, as well as understanding the nature of changes in demand for the entire season's attendance, the total franchises attendance variable is employed within this dissertation research.

Furthermore, this research also uses the franchise specific attendance variable because of the construction of the DCBR as a seasonal competitive balance metric. In this manner, the DCBR will be able to be employed within the study as other seasonal competitive balance measures such as the SDWPCT have been used in research focused into the effects competitive balance has on seasonal attendance. Thus, this model specification will differ from Humphreys (2002) introduction of the CBR, as in that study the CBR is constructed to be used for long-run periods. This study, on the other hand, will evolve the CBR into the DCBR so that it may be employed at the seasonal level, and thus be used in a panel dataset which allows for franchise and market specific effects to be accounted for within the model.

Turning to the consideration of independent variables to be included within this study, the first ones included are competitive balance variables to test the UOH as proposed by Rottenberg (1956) and Neale (1964). As discussed earlier, the DCBR, CBR, idealized SDWPCT, and HHI will all be employed; however they will all be placed in a model separate from one another. Because of this, there will be six models within this dissertation, each of which will all have the same variables, except for the use of these four different competitive balance metrics. This will allow for the testing of the various competitive balance metrics against one another, to see whether certain ones may be more responsive to fan demand for attendance in the MLB.

The use of the three competitive balance variables is predicated on the use of the SDWPCT and HHI in previous research into competitive balance and demand for sport. Various versions of the SDWPCT have been used as one of several measures of fan demand in studies,

notably Soebbing (2008b) finds it is negative and significant in regards to attendance. This result gives indication that better competitive balance in the MLB does bring about higher demand for seasonal MLB attendance. While the HHI has not been included in a seasonal study, it has been included in a long-run study as a potential determinant of demand, where it was found to insignificant in regards to attendance (Humphreys, 2002). Considering the expected results of this study, if the UOH and the evidence surrounding it are contemplated, it is believed that more uncertainty in the form of better competitive balance leads to an increase in attendance. This would mean the DCBR, CBR and HHI variables would be positive and significant in regards to attendance, while the SDWPCT would be negative and significant.

For the remainder of the independent variables within the model being constructed for this dissertation research, these variables will remain static in that they will not change from one model to the next, and will all be included in each of the six models run. In specifying a model for estimating seasonal demand for attendance in the MLB, there is first the need to control for certain factors that are directly related to the competition and organizational structure of the MLB itself. In examining the nature of the organization of Major League Baseball, there is a need to consider the essential differences that exist between teams from the National and American Leagues, and thus the next variable included in this model is a League Dummy which is indicated by a 1 for teams in the AL and a 0 for teams in the NL. While there are effects that may change from one league to the other, probably one of the primary differences which exist between these two is the use or absence of the designated hitter (DH). In the National League pitchers are required to come to bat to attempt to hit the ball, as are all other players. The American League, however, does not require that all field players need to hit, as they allow the DH to hit for a single field player in the lineup, almost always the pitcher. A final reason for the

need for a dummy variable to control for which league a team is in, is that certain teams actually have shifted from one league to another, most notably the Milwaukee Brewers who shifted from the American League to the National League. In addition for accounting for these differences, the league dummy variable also helps to account for various effects such as changes in consumer preferences, travel costs, and competition from other sports and leisure goods during a time period (Humphreys, 2002). General empirical findings in attendance studies have found the league dummy variable to be insignificant in determining attendance (Humphreys, 2002; Soebbing, 2008b), yet at the same time necessary in construction of demand models. As the league dummy picks up league differences, it is believed that the league variable will be significant. The question does remain as to which of the leagues is significant, and hence affects whether the league dummy will be positive or negative. In this, the model will produce results which will give further insight into the differences between leagues in determining attendance.

Further considering the specification of the model for this attendance study, the work stoppages and lockouts need to be considered not only in how they have affected the league, but also in fan perceptions and demand for attendance. In a sense, this dummy variable falls somewhat under a control for various labor disputes in baseball, as well as consumer preference that deplore such happenings in professional sports. From a theoretical standpoint it is believed that fan perceptions of sport leagues, and hence their interest and the demand to attend sporting events drops severely after strikes and other such work stoppages. Empirical evidence further backs up these findings, showing that strike years often have some of the strongest negative effects in the attendance studies which they are included (Humphreys, 2002; Soebbing, 2008b). Due to this, the strike dummy variable included in this study is hypothesized to have a negative and significant effect on attendance.

Following the league dummy variable, there are other factors related to the nature of MLB that need to be considered such as the relocation and expansion of franchises within MLB. Thus, a variable is constructed for Expansion – new teams which have entered a league. However one variable is not included, that of Relocation – teams which have moved from one Metropolitan Statistical Area (MSA) to another. Theoretical understanding of the effects of relocation indicates there will be a positive effect from the relocation of franchises. Contrary to this Depken (2001) argues that such teams will see lower attendance because of a lack of fan loyalty, and Soebbing (2008b) finds there is a significant and negative effect in regards to attendance in the MLB. In the specific case of this dataset, the Expos are the only franchise to relocate. It will thus be in this study, a dummy variable will not be constructed for the relocation of the Montreal Expos. The reasoning for this is that there has only been one relocation in the time frame examined in this dissertation, the Montreal Expos move to Washington D.C. In 2005, their first year in Washington D.C., there is a lack of price data for the Expos (who were renamed to the Nationals). With this in mind the dummy variable for relocation was removed from the model, as was the data line in the panel data set for the Washington Nationals in 2005, as price data was considered to be more important in the modeling of demand for baseball attendance. Thus, within this dissertation the relocation variable is excluded because of the removal of the one variable line that had the data, as well as the exclusion of all Canadian franchises in the data set.

Expansion, on the other hand, has seen four new teams enter the MLB, the: Florida Marlins, Colorado Rockies, Tampa Bay Rays, and the Arizona Diamondbacks. As a dummy variable will be not employed to measure relocation, there will be one used for measuring the expansion of the MLB. It is thought that expansion franchises will often see increases in

attendance, because of a novelty effect, in which fans and other consumers will attend games because the presence of a new professional sport team is considered to be exciting and of high interest for consumers. There is an argument that there will not be as many fans at games because of no existing fan base in new locations, however, in this case it is believed that expansion will have a positive effect on attendance possibly because of novelty. Empirical evidence investigating expansion has found a positive effect on attendance, and thus it is hypothesized that the expansion variable within this study will likewise produce a positive and significant result in regards to attendance.

Another of the major factors in the demand for attendance as put forth by Borland and Macdonald (2003) was the quality of viewing factors. To tackle these factors within this model, variables are constructed for both stadium age, as well as stadium age squared. The stadium age variable is employed to try and find if older stadiums do see a decline in attendance, because they are not as state of the art, or as well designed as newer ones. The stadium age squared variable, is simply constructed through squaring the stadium age, and is used to determine whether the effects on demand because of stadium age are increasing or decreasing over time. Theoretical belief is that while stadium age does have a negative effect on the demand for attendance, the effects are decreasing over time. Therefore it is believed that both from theoretical and previous empirical examination of the demand for sport, that the stadium age variable will be negative and significant, while the stadium age squared variable will be positive and significant in regards to attendance.

These stadium factors alone are not enough, as previous research has indicated that there are major limitations to using stadium age in regards to attendance without controlling for the effects of capacity (Borland & Macdonald, 2003). To rectify this situation, a stadium capacity

variable will be employed that measures the maximum occupancy a stadium can have for MLB games that are played there. Capacity variables within this dissertation have been collected from the Red Book publication for the American League and the Green Book publication for the National League. These two publications serve as year books that are published by MLB, presenting a wealth of information on the league. Within both publications are the official yearly updated capacity numbers as reported by the teams. Thus, these numbers have been pulled from these two books and employed within this dataset as the capacity variable. In this manner, not only will issues of stadium capacity be controlled for, but this will also allow tests to see if stadium size is important in the demand for attendance. It is hypothesized that the capacity variable will be positive and significant in regards to attendance, as the larger a stadium is the higher the potential number of consumers who can attend the event will be.

Returning to the economic variables as discussed earlier in the taxonomy of the determinants of demand, economic factors also include the consideration of price and the local market area. The first economic variable included is that of price, which represents the price of a ticket to gain admission to a MLB game. The price data used within this dataset was collected by examining the aforementioned Red Book for the American League and the Green Book for the National League. The data which is included in these two publications include the various price levels which tickets are sold at for games. What is interesting to note, is that as one moves from the beginning of the dataset in a chronological manner, the number of price points for tickets increases for almost every club. That is, there is greater price dispersion in more recent years for MLB franchises. This does create problems in trying to choose which type of price variable to use. Researchers have suggested employing either the average ticket price or the lowest ticket price for a game. Examining the ticket prices for all the teams in the dataset, it was

clear that there were some teams which were offering tickets to games at $1 a piece, which would clearly define the lowest priced ticket if such a variable is employed within the dataset. While there is a limited supply of tickets at the lowest price level, this does constitute the cheapest price that anyone can pay to enter a MLB game, as long as they are prudent enough to buy the tickets far enough in advance to purchase at this price. Thus the price data to be employed within this regression is the lowest ticket price for each franchise in each season. It is hypothesized that this price variable will have a significant and inverse relationship with attendance, as economic theory indicates that the higher price is the lower attendance will be.

Continuing the discussion of economic variables, next there is need to consider the importance of variables examining local market factors, which are unique to each area that MLB franchises play in. In order to control for different market sizes and other market effects in this study, there is a necessity for a variety of variables to be included. The first two variables are those of the aforementioned Metropolitan Statistical Area (MSA) population and adjusted per capita income. The adjusted per capita income is calculated through taking the Bureau of Economic Analysis (BEA) data and then adjusting everything into 2009 dollars. Theoretical belief suggests the larger a region in terms of population, the higher the demand for sport. Likewise, the higher incomes that individuals within a region, the more expendable income they should have to spend of luxury goods, and thus the higher attendance at sporting events should be. Therefore, the results are hypothesized that both population and adjusted per capita income will be positive and significant in regards to attendance.

While each team's market region has non-sport related effects such as population and income, the presence of rivals is also something which is important to consider. Within the MLB there are several franchises which share the same region, notably the teams located in the New

York, Chicago, and Los Angeles MSA's. Thus, a dummy variable is constructed to measure the effects of rival franchises within the same league. While rival MLB teams may present one kind of rival, there are also several other professional sport leagues that must be considered. To take this into account, three more variables measuring the number of National Football League (NFL), National Hockey League (NHL), and National Basketball Association (NBA) franchises within the same MSA are created. Theory indicates the presence of other rival franchises and sport should reduce the demand for attendance at games, as the rivals present a potential substitute which consumers may choose to consume. Thus, all four of these variables, multiple MLB franchise, NFL, NHL, and NBA franchise are all predicted to be negative and significant in regards to MLB attendance.

Considering the "economic" factors which affect attendance further, there are also macroeconomic variables that can be included within this dissertation. The first of these variables to be included in this dissertation is the unemployment rate which has been used in various studies focused on the demand for sport. Theoretically, it is believed there will be less demand for sport, when the unemployment rate is higher, because fewer individuals will have the purchasing power and income necessary to consume such luxury and leisure goods as attendance at professional sport matches. A handful of empirical findings from Europe run somewhat contrary to this, showing higher unemployment rates cause increases in attendance. However, as noted before, further evidence found that the affect of unemployment in England actually was having an increasingly negative effect on the demand for soccer (Walker, 1993). It is thus, that because this research will be focused upon the demand for MLB games in North America, it is believed that the unemployment rate will have a negative effect on live attendance.

The second macroeconomic variable to be included within this study will be a Gross

Domestic Product variable which notes the overall economic health of the country. In terms of theoretical consideration of recessions, it is believed luxury goods such as attendance at sporting events will see a reduction in demand. Furthermore, where previously many sport managers had considered sport to be "recession-proof", the current economic climate has lead to a variety of negative effects, such as reductions in ticket sales, leagues taking out loans to continue operation, and even some leagues and teams halting play altogether. It is thus, the recession seems to have taken a toll on the sport industry, and with this as an impetus, a GDP variable has been included to examine the effect of the economic health of the country on the demand for MLB attendance. In regards to the expected results of this GDP variable, it should be that the variable will also be positive and significant in regards to MLB attendance.

The last set of variables set to be included within this model has to deal with how technology has changed to consumption patterns of baseball. With the rise of television broadcast media, fans have been granted somewhat better access to MLB games through broadcast and cable television. While Zimbalist (1992) notes there are still many inefficiencies and rules which restrict people being able to watch MLB games in their own market, television is theoretically believed to have decreased the demand for live attendance at sporting events. Thus, to consider this a television time trend variable and a television time trend squared variable is included within this model to try and understand the effects television has had on the demand for MLB attendance. Theory and empirical evidence suggests the television time trend will be negative and significant, and the time trend squared television variable will be positive and significant in regards to attendance. In other words, television trends will decrease the demand for attendance, but with increasing effects over time. For this study, the results from this model are hypothesized to be negative and significant for the television time trend variable, and positive

Table 4.1

Hypothesized Variable Results

INDEPENDENT VARIABLE	HYPOHTESIZED RESULT
Competitive Balance Measure (DCBR)	Positive
Competitive Balance Measure CBR	Positive
Competitive Balance Measure (HHI)	Positive
Competitive Balance Measure (SDWPCT)	Negative
League Dummy	Significant
Strike Year Dummy	Negative
Expansion	Positive
Lowest Ticket Price	Negative
Multiple MLB Franchise Dummy	Negative
NFL Franchises	Negative
NBA Franchises	Negative
NHL Franchises	Negative
Stadium Age	Negative
Stadium Age Squared	Positive
Stadium Capacity	Positive
MSA Population	Positive
MSA Adjusted Per Capita Income	Positive
Unemployment Rate	Negative
GDP	Positive
Television Time Trend	Negative
Television Time Trend Squared	Positive
Franchise Dummy	Mixed Results

and significant for the television time trend squared variable. Finally, a franchise dummy variable is also included within this model to control for franchise specific effects, such as management, front office personal, payroll and other such factors that are unique to each franchise. Table 4.1 displays the full list of variables, along with the hypothesized results which have been discussed in this section. From this, the demand function that is included within this dissertation research takes the form of:

Formula 4.1 – Attendance Demand Function

$$Total\ Franchise\ Attendance_{it}=\beta_0+\beta_1 Competitive\ Balance\ Measure_{it}+\beta_2 League\ Dummy_{it}+$$

$$\beta_3 Strike_t+\beta_4 Expansion_t+\beta_5 Price_{it}+\beta_6 Multiple\ MLB\ Franchises_{it}+\beta_7 NFL\ Franchises_{it}+$$

$$\beta_8 NBAFranchises_{it} + \beta_9 NHLFranchises_{it} + \beta_{10} Stadium\ Age_{it} + \beta_{11} Stadium\ Age^2_{it} + \beta_{12} Stadium\ Capacity_{it} + \beta_{13} MSA\ Population_{it} + \beta_{14} MSA\ Adjusted\ Per\ Capita\ Income_{it} + \beta_{15} Unemployment\ Rate_t + \beta_{16} Recession\ Dummy_t + \beta_{17} Television\ Time\ Trend_t + \beta_{18} Television\ Time\ Trend^2_t + \beta_{18} Franchise\ Dummy_i + \mu_{it}$$

Considering this model, there is also the need to discuss the methodology through which to estimate the data collected for this model. Within the demand for sport literature, there seems to be three primary methods through which researchers have attempted to estimate similar models, the Ordinary Least Squares (OLS) regression, the Generalized Least Squares (GLS), and the Generalized Method of Moments (GMM). While each of these various methods has their merits, this dissertation research will use only the one most suited for within this study. The following discussion, will thus consider the use of each methodology within sport as well as the Tobit/censored regression model, and conclude as to which model is most suitable for use within this research. In this, the data being employed is that of an unbalanced panel data set (Hsiao, 2003), which is a panel data set that does not have the same cases repeating in each time period. For panel datasets in professional sports, it is usually the case that there is not balanced panel data either because of teams being included into a league through expansion, or leagues in Europe constantly changing the composition of their leagues through promotion and relegation.

While not used very widely within sport, GLS has been employed in studies focused on the demand for goods, including a seminal work using the GLS examining the demand for natural gas (Balestra & Nerlove, 1966). Sport researchers Garcia and Rodriguez (2002) discuss the use of GLS, especially in its usefulness with panel data sets. While GLS is considered to be useful for examining models using panel datasets, it can be problematic with sport panel datasets because of the very nature of these datasets having very few teams included. GLS becomes

especially troublesome when the number of teams that are included within a dataset are less than the number of explanatory variables, at which point estimates of the variance of home team effects can no longer be calculated (Garcia & Rodriguez, 2002). Probably, the most notable of the sport research which used GLS, was conducted by Winfree and Fort (2008), who state the need to conduct a GLS because of issues of heteroskedasticity and autocorrelation.

While GLS may be useful for cases such as the one described above, it can prove to be a useful alternative to the OLS in certain situations. Where in an OLS regression there is bias and inefficiency because of the unequal variability of the dependent variable, one may use the GLS to correct for such errors. This occurs because the GLS gives less weight to observations which have a higher variance, and thus gives better estimated results than an OLS would (Gujarati, 2003). Thus, when heteroskedasticity is present within a dataset, GLS serves as one method in which to deal with issues which arise from such problems. Additionally, it can also be used to correct for other issues within panel data sets which will be further discussed later in this chapter. However, while the GLS may be one way to correct for some issues to purely use the GLS because it corrects these things without even giving proper consideration to the data is somewhat premature. Thus, this section will also consider the effects of using the GMM, GLS as well as the regular OLS with the possibility of some corrections in order to construct the best model possible.

Within studies focused on the demand for sport, various researchers (Coates & Humphreys, 2007; Lee & Smith, 2008) have employed the GMM to attempt a two-step method to estimating the demand for professional sport attendance. The use of the GMM in Coates and Humphreys' (2007) examination is used because of issues revolving around the price variables employed within the study. In the discussion of the instrumentation and use of price variables

within demand studies, the authors note price variables are not statistically exogenous, and that because of the monopoly power of MLB, price is quite likely to have some correlation with the error term. Due to this, the use of OLS would be inconsistent and bias, and most studies correct for this through the use of an instrumental variable (IV) estimator. However, rather than use the IV estimator, Coates and Humphreys (2007) use the two-step GMM because of the price variables not being statistically exogenous, as well as the panel dataset they are using not allowing for two-step IV estimation.

A more recent study by Lee and Smith (2008) used both an OLS and GMM regression to consider the habit-forming nature of consuming professional baseball. While results for both the OLS and GMM used in the study produce significant results in terms of the habitual nature of MLB attendance for Americans, the authors note there are issues in the study in regards to the attendance data they have collected. Due to the errors and inconsistency of the attendance data collected at the team level within this study, the authors conclude that an OLS will produce biased and inconsistent results, where as the GMM results would be more trustworthy (Lee & Smith, 2008). Therefore, considering these two studies (Coates & Humphreys, 2007; Lee & Smith, 2008) it is clear the GMM two-step process can be quite useful as a methodology, especially when there is unreliable data which has potential errors within it.

While the GMM is thus very useful in situations where there is some uncertainty as to the nature of the data, or other issues where price variables can't be estimated properly, it would seem the GMM is not necessarily ideal for this study. The data used in this study is widely accepted as a reliable source of data, as the sport business website run by Rodney Fort, Major League Baseball, as well as the government agencies from which the other data are collected, are all considered to be primary sources of obtaining data for empirical examination. In this manner,

the GMM model is not such a necessity for the special effects it provides, and thus will not be employed within this dissertation research project.

Where OLS has widely been employed, some researchers have pointed out issues arising from using OLS, especially in terms of the capacity constraint which sport teams are faced with. Because there is a limited supply in terms of the capacity of fans a sport stadium can hold, using attendance to measure demand can be problematic, especially in those leagues where there are high sellout rates at games (Feehan, 2006). Within the sport literature, a handful of studies have attempted to use the Tobit model in place of the OLS to try and estimate demand for attendance at professional sporting events. Notably the two leagues studied are the Premier League (Kuypers, 1996) and the National Football League (Welki & Zlatoper, 1994), both of which can be considered to be two of the most popular sport leagues in the world. It would seem that in these instances, the Tobit model would be rather applicable, as both of these leagues are often faced with a high percentage of sold out games in comparison to other sporting leagues.

Forest and Simmons (2002), however, argue that the Tobit method should not be used within the sport context. This is backed up by findings of Kuypers (1996) study, which found that only about ten percent of the matches within the Premier League are fully sold out, and thus in need of using a Tobit. Rather it is argued that instead of using a Tobit, researchers can correct for the issue of capacity affecting demand through the use of a stadium capacity independent variable within a regression model (Feehan, 2006). While some researchers (Noll, 1974; Dobson & Goddard, 1999) have used this methodology to control for capacity, Demmert (1973) claims there may be some issues in trying to make corrections in this manner.

For the case of this dissertation, the league being focused upon in the attendance demand study is the MLB, which has a relatively small percentage of sold-out games. In this sense, it

would seem that a Tobit is inappropriate, especially considering the argument made by Forrest and Simmons (2002), as well as the presence of stadium capacity variables within the model to help control for the issue of capacity. Therefore, the Tobit, like the GMM is disregarded for this study, as neither of these methodologies seems to be appropriate in considering both theory and the context of this research.

Thus, the final consideration is placed upon Ordinary Least Squares (OLS) regression or Generalized Least Squares (GLS) regressions, which are commonly used by a large number of empirical studies in the sports economics and sport management literature. From a theoretical standpoint, the OLS and GLS are often used within the sport literature to produce estimates for demand functions, and have proven to be quite useful in helping to understand the demand for sport attendance from both a theoretical and empirical standpoint. Furthermore, while the GMM has been discussed for its various uses, in the case of this research, there does not seem to be any econometric necessity to employ these other methodologies in the examination of the demand for MLB attendance. With both the theoretical and empirical considerations of the use of OLS or GLS within the sport demand literature, this dissertation research will employ one of these methodologies to examine the gathered panel data set.

Considering the econometric issues of panel data sets, there is the need to take into account certain factors, especially the question of whether to use fixed or random effects within the regression model. Through considering this issue, it will be beneficial in also helping to make the final decision of whether to employ OLS or GLS regression in the final analysis of the data. One of the more widely accepted and employed test is the Hausman specification test which examines how two different types of estimators are related to the panel data in question (Hill, Griffiths & Judge, 2001; Stock & Watson, 2003). While a Hausman test can test the

differences between two different sets of variables, its purpose within this dissertation research is to test whether fixed or random effects are more appropriate for being included within the regression model. It is noted (Kohler & Kreuter, 2005) that the *"fixed-effects model controls for all time-invariant differences between the individuals, so the estimated coefficients of the fixed-effects models cannot be biased because of omitted time-invariant characteristics."* (p.240). In other words, fixed effect is a variable used to control for omitted variables such as time in a panel dataset, which are constant from one case to the next but are varying over time. In this, fixed effects are commonly used in panel data regression to control for time variables, in the case of this dissertation the fixed effect can control for any effects that may have occurred in any of the specific years of franchises included within the dataset.

On the other hand, the random effect is employed when omitted variables may change among cases, but are constant over time while other cases are fixed. In this situation a random effect allows both to be included within the regression model (Yaffee, 2003). That is, the random effects assume that there is random variation across cases and that these are not correlated with the independent variables within the same regression model (Baum, 2006; Greene, 2008). In other words, if there is thought to be difference between cases within a model, it is probably a good idea to use random effects. While it can easily be described in such a manner, there is still of course the need to run a statistical test to consider whether to use fixed or random effects. As aforementioned, this can be done using the Hausman test, which is included within many of the functions included in the Stata statistical package used to do the majority of the data work for this dissertation. Through simply storing the estimates calculated by Stata after running the regression model in Formula 1, first with fixed effects, and then with random effects, a Hausman test was performed to test to see whether fixed or random effects should be used in

the regression. The Hausman test was significant, and therefore indicates that fixed effects should be included in the regression model. In this dissertation research, fixed effects will be included by running an OLS regression in Stata with fixed effects in the form of dummy variables for each franchise included. Thus, because of the need to have fixed effects within the regression analysis, this data analysis section will not use GLS, but rather will employ an OLS as originally intended. While this study will use an OLS regression to run the demand function shown in Formula 1, there are more considerations that need to be discussed in order to further validate the use of the OLS.

Within regression modeling, there are several different effects which need to be considered, including, heteroskedasticity, omitted variable bias, and autocorrelation. When certain variables are omitted from a model in which they should be included, there is often the creation of omitted variable bias. It is this issue which plays an important role in the vast attendance literature in sport, because of the difficulty to find price and other variables. Due to this, many studies have had the potential to be plagued by omitted variable bias, and thus this issue remains a central econometric issue in the sport demand literature.

Omitted variable bias is one of several possible causes of heteroskedasticity, which occurs when the error term is not evenly distributed. Among other causes for the presence of heteroskedasticity are outliers, skewed explanatory variables, and so forth. While the GLS method can be used to correct for issues of heteroskedasticity, the need to detect its presence should come before the decision to use the GLS. One method through which this can be done is the Breusch-Pagan Test or the Glejser Test (Gujarati, 2003), which uses a different functional form to test for the existence of heteroskedasticity. Thus, in this study, once the final data set was collected and the regression model finalized a Breusch-Pagan test was run to test for the

presence of heteroskedasticity in the data. With the presence of no evidence of heteroskedasticity, the use of an OLS regression would be the best model to use within this research. However, if there had been evidence of heteroskedasticity, there will be a need to correct for this, which while able to be done through a GLS, can also be done using White's robust standard errors (Gujarati, 2003) or even data transformations in an OLS regression. The White correction has been employed in other research on MLB attendance research (Soebbing, 2008b), so as to generate reliable consistent standard errors to correct for the heteroskedasticity. In the case of this dissertation, such corrections are not necessary because there was no evidence of heteroskedasticity, that is when a normal OLS regression was run on the data, and a Breusch-Pagan/Cook-Weisberg test was run, which produced an insignificant result (Prob> chi2 = 0.5481) and had a small chi squared value of 0.36. This result indicates no presence of heteroskedasticity within the data. Furthermore, because of the use of OLS with fixed effects, an OLS was run in STATA with these fixed effects to check for heteroskedasticity as specified by the STATA online manual focused on dealing with heteroskedasticity in panel data sets (Wiggins & Poi, 2003). The results of these tests also found no presence of heteroskedasticity within the data.

Within this dataset, the issue of multicollinearity, that some variables may be highly correlated, was also need examined. While Gujarati (2003) points out that in some cases it is believed multicollinearity is something which shouldn't necessarily be treated for, a discussion and examination of its presence will be a necessary part of this dissertation research. In cases with the presence of multicollinearity, there may be the need to consider the specification of the model again, and whether some variables needs to be dropped or transformed to try and improve the overall model. To consider the possibility of multicollinearity this dissertation examined

correlation tables for the variables employed within the model. While there was some evidence of possible collinearity between some of the variables, generally the correlations between the variables was not very high. The question remained about whether something should be done about this possible collinearity, especially considering remedies for such an issue would fall along the lines of removing variables from the data set, or finding more data. Adding more data is out of the question as future years of data would require a wait of more years as the post free-agency period is fully covered within this data set. This left two possibilities, to either remove variables from the data set, or to head the words of Gujarati (2003) and not change anything. In the case of this dissertation research, the model was specifically built with each variable chosen to fulfill a specific purpose, and the removal of any of these variables could lead to further omitted variable bias. Therefore, in this research, Gujarati's (2003) wisdom prevailed, and there was no corrections made for any possible collinearity.

Finally, to address the issues of autocorrelation, normally research would attempt to examine for autocorrelation through the use of the Durbin-Watson "d" test or a Breusch-Godfrey test. However in the case of panel data, testing for autocorrelation becomes a little more difficult, as these tests are all designated for time-series data sets. Once again, GLS can be used to correct for issues of autocorrelation, there is still the need for testing for such issues before correcting them. Turning back to the STATA manual (Higgins & Poi, 2003) again, this research ran autocorrelation tests on both OLS and GLS models, to test for autocorrelation. In all cases, it was found that there was no evidence of autocorrelation in either the OLS or GLS models that were tested.

In all, the OLS regression method employed within this section of the dissertation seems to be the ideal model to use after considering the specific econometric issues that this research is

facing. In this, the use of the OLS regression includes the fixed effects which were deemed to be appropriate by the Hausman test. It is important to note that while the GLS can be employed along with fixed effects, it is not something that should be done without the evidence of a variety of econometric issues. As noted by some statistical researchers, it is important to not just choose a regression type based solely on the need for fixed or random effects within the analysis (Bartels, 2009). However, it is noted that while fixed or random is not everything within the statistical analysis, it is still important to consider these when running regression analysis. As there was very little evidence of issues within the data, the use of an OLS regression is considered to be the Best Linear Unbiased Estimator, or BLUE for short. In this, the OLS regression can be considered to be a better model than the GLS with which to run the regression within this research, as there is no need to fix the various issues which the GLS corrects for. Thus, within this dissertation research, an OLS regression is employed for estimating the results, but the choice of the OLS is one that is purposeful for a variety of reasons. That is, while various different methods were considered for use within this dissertation research, the various statistical tests, examination of the data, and the need for fixed effects helped in the choice of the OLS as the method of analysis for the following section. Through the use of the demand function displayed in Formula 1 within an OLS regression, this dissertation research will attempt to determine estimates as to what variables are significant in regards to the demand for MLB attendance. While there are a great deal of econometric issues which can be brought up in any statistical and econometric research, this section highlighted those which are of primary importance not only in constructing this model, but also in making sure the results and conclusions made from them are valid, reliable, and as unbiased as possible.

4.3 Regression Results

Table 4.2

Summary Statistics

Variable	Observations	Mean	Std. Dev.	Min	Max
Attendance	724	2124983	747970	469090	4483350
DCBR5	724	0.746	0.3087	0	2.23
DCBR3	724	0.6835	0.359	0	2.03
CBR5	724	0.7335	0.1039	0.538	0.969
CBR3	724	0.6694	0.1114	0.4496	0.9683
HHI	724	0.1478	0.0394	0.1152	0.3108
RSDLeague	724	1.774	0.3373	1.14	2.69
SDWPCT	724	0.0697	0.0132	0.0449	0.1055
NL	724	0.4972	0.5003	0	1
AL	724	0.5028	0.5003	0	1
Strike Year	724	0.0691	0.2537	0	1
Expansion	724	0.0055	0.0742	0	1
Lowest Ticket Price	724	5.62	2.966	1	22
MLB Franchise	724	0.3094	0.4626	0	1
NFL Franchise	724	1.0414	0.5163	0	2
NHL Franchise	724	0.6243	0.6243	0	2
NBA Franchise	724	0.8923	0.6196	0	2
Stadium Age	724	29.89	24.32	1	96
Stadium Age Squared	724	1484	2184	1	9216
MSA Population	724	5E+06	4E+06	1384897	1.89E+07
MSA Per Capita Income	724	38164	6467.2	26067	63100
GDP	724	7664	3306	2788	14077
Unemployment Rate	724	6.015	1.4202	4	9.7
TV Time Trend	724	43.05	8.112	29	56
TV Time Trend Squared	724	1919	695	841	3136

The panel data needed to estimate the demand model was run using an OLS regression, the summary statistics of the data set can be viewed in Table 4.2. In this, six OLS regressions were run, with Table 4.3 presenting the results of the OLS regression for the five year DCBR, Table 4.4 presenting the three year DCBR in the demand model, Table 4.5 presents the regression results with the five year CBR, Table 4.6 the three year CBR, Table 4.7 the HHI model, and Table 4.8 with the RSD competitive balance metric. Within each regression, there

Table 4.3

Five year DCBR OLS Regression Results

Dependent Variable is Total Franchise Attendance				
	Coeff.	**Std Err.**	**t-stat**	**P> |t|**
DCBR5	153209	66599	2.30**	0.022
AL	236135	199592	1.18	0.237
Strike	-464317	72183	-6.43***	0.000
Expansion	1666016	255911	6.51***	0.000
Price	11483	8984	1.28	0.202
MLB Franchise	-174267	527555	-0.33	0.741
NFL Franchise	-12427	61116	-0.20	0.839
NHL Franchise	51974	101069	0.51	0.607
NBA Franchise	-316882	121191	-2.61***	0.009
Stadium Age	-34863	3797	-9.18***	0.000
Stadium Age Sq	362	49	7.42***	0.000
Stadium Capacity	-7.676	4.206	-1.82*	0.068
MSA Population	0.2630	0.0621	4.24***	0.000
MSA Per Capita Income	36.14	11.40	3.17***	0.002
GDP	343	138	2.48**	0.013
Unemployment Rate	25263	23176	1.09	0.276
TV Time Trend	214418	57501	3.73***	0.000
TV Time Trend Sq	-4158	1253	-3.32***	0.001
Constant	-3841616	1251179	-3.07***	0.002

** = significant at the 10% level, **=significant at the 5% level, ***=significant at the 1% level*

were 724 total observations for the 29 different MLB franchises included within the timeframe examined in this dissertation. Within each table, the shaded regions denote variables that had significant results. One final note is that the Oakland Athletics dummy variable was dropped from the model because of collinearity with the other variables, and thus has three lines through it to indicate this status in each of the models. Within this chapter, the tables will be presented without the franchise effects included because of the size of the tables. The tables in their entirety can be viewed in the first appendix section at the back of this dissertation. While the

franchise effects will not be included here within this chapter, the results will be discussed briefly in regards to those franchises which produced significant effects.

Beginning with Table 4.3, the results for the OLS regression with the five year DCBR metric can be seen. The adjusted R-squared for this model was 0.6061, representing that this model explained about 61 percent of the variation in attendance, which is generally considered to be a good number for a regression on this size of data set. The results of the OLS regression indicated that the five year DCBR was positive and significant at the five percent level, which confirms the UOH that fans are sensitive to uncertainty at sporting events. This point will be discussed further throughout this chapter, as well as in chapter 5 in examining the results and their implications. Within this first model, the league dummy was insignificant; indicating that fan preference did not change depending on the league which a franchise was in. The expansion variable was positive and significant, and the strike variable negative and significant as hypothesized. That is, it is displayed that new teams entering the league will have a positive effect on attendance; strikes will a negative effect. The results for the expansion variable can most likely be attributed to the novelty effect these young franchises have.

The price variable is insignificant, and while this result seems to go against economic theory, research has often found price to be insignificant in the empirical examination of sport attendance. In this model, price is captured as the lowest price of admission to games. In this it is possible that there are measurement problems with the price variable. One possible solution for such problems would be to remove the price variable from the model, however this could potentially lead to omitted variable bias. In testing the model without a price variable, it was found that there was very little variation in the estimated results, and thus the decision was made to keep this price variable within the model.

Next, considering the franchise variables, the NBA variable was negative and significant, indicating that teams that share an MSA with another NBA franchise were likely to have lower attendance than those that did not share an MSA. The MLB, NFL and NHL franchise variables were all insignificant. Stadium Age was negative and significant at the one percent level, while stadium age squared was positive and significant at the one percent level. This shows that fans were less inclined to attend games that were held in older stadiums, however, the effect of age on demand declines over time. This can probably be explained in that new stadiums bring a novelty factor, as well as the fact that the older stadiums such as Wrigley Field and Fenway Park bring a sense of tradition and history which probably increases fan interest in older sporting stadiums. Stadium capacity was negative and significant in this model, hinting that stadiums which were of smaller size experienced greater attendance. The unemployment rate was insignificant, hinting that growth in unemployment did not influence the demand for attendance. Conversely, this model also found that gross domestic product (GDP) was positive and significant, indicating that the financial health of the country may play some role in consumer demand for sporting events. It is possible that phenomenon such as a recession may cause attendance to fall at MLB games. Furthermore, MSA population and per capita income were positive and significant, indicating that MSA's which had higher population and/or higher personal income levels were more likely to have higher attendance. TV Time Trend was positive and significant, and the TV Time Trend squared variable was negative and significant. The results were exactly the opposite of what was hypothesized, as displayed in Table 4.1. These findings indicate that the TV has had a positive influence on baseball attendance, but that this influence is decreasing over time. Potentially, it is that baseball on television may have made fans want to actually attend games in person during this period, but that this effect is declining as the technology in home viewing becomes better,

Table 4.4

Three year DCBR Regression Results

Dependent Variable is Total Franchise Attendance				
	Coeff.	**Std Err.**	**t-stat**	**P> |t|**
DCBR3	118154	53977	2.19**	0.029
AL	256230	199034	1.29	0.198
Strike	-465196	72210	-6.44***	0.000
Expansion	1624450	252803	6.43***	0.000
Price	11827	8995	1.31	0.189
MLB Franchise	-160934	527672	-0.30	0.760
NFL Franchise	-13679	61148	-0.22	0.823
NHL Franchise	38439	100954	0.38	0.703
NBA Franchise	-319004	121230	-2.63***	0.009
Stadium Age	-34803	3800	-9.16***	0.000
Stadium Age Sq	360	48.81	7.37***	0.000
Stadium Capacity	-8.122	4.203	-1.93*	0.054
MSA Population	0.2655	0.0621	4.28***	0.000
MSA Per Capita Income	36.64	11.42	3.21***	0.001
GDP	335	139	2.41**	0.016
Unemployment Rate	25485	23183	1.10	0.272
TV Time Trend	217742	57329	3.80***	0.000
TV Time Trend Sq	-4162	1256	-3.31***	0.001
Constant	-3909069	1248272	-3.13***	0.002

** = significant at the 10% level, **=significant at the 5% level, ***=significant at the 1% level*

cheaper, and more obtainable for consumers.

Finally, in considering the dummy variables for franchises, there were a few teams that were positive and significant, many that were insignificant, and a few which were negative and significant. Those teams which were positive and significant were the Colorado Rockies, Milwaukee Brewers, San Francisco Giants and the St. Louis Cardinals. Those that were negative and significant were the New York Yankees, New York Mets, and the Chicago White Sox. Interestingly, most of these teams are not situated in the west coast. It also may be the case, that

the franchises which are positive and significant in this first model may have some special characteristics, managerial styles, marketing, or loyalty which is not easily identified. Conversely, those franchises which were negative and significant were all in MSA's which were shared with other franchises, however the results indicate that rival MLB franchises do not cause a decrease in attendance. It may be by coincidence that these teams which had negative effects are ones with long traditions, and possibly have managerial styles which are dated, or not conducive to having higher attendance in the current sport environment.

Table 4.4 contains the results of the second OLS regression model. This model is similar to that whose results are displayed in Table 4.3 with the exception of the competitive balance variable, which has been switched to the three year DCBR within this model. The adjusted r-squared statistic for this model was 0.6058, quite similar to the r-squared statistic for the previous model. Rather than simply list all the variables and whether they were significant or not, the discussion will focus on those variables which had differing results than the model with the five year DCBR.

First, examining the competitive balance measure, we find that the three year DCBR was also positive and significant in regards to attendance. While the five year version could be considered to be more significant, the three year version is highly significant, giving even more weight and evidence to the UOH. While most of the variables in this model produced the same results in regards to significance as the previous model, in this model slight fluctuations produced positive and significant results for the Arizona Diamondbacks and Baltimore Orioles at the ten percent level. The next model presented in Table 4.5 fully removes the DCBR competitive balance metric, and replaces it with a general five year CBR metric calculated for each season. The adjusted r-square statistic for this model is 0.6046, again similar to all the

Table 4.5

Five year CBR Regression Results

Dependent Variable is Total Franchise Attendance				
	Coeff.	**Std Err.**	**t-stat**	**P> |t|**
CBR5	-436539	267124	-1.63	0.103
AL	284312	199037	1.43	0.154
Strike	-461705	72341	-6.38***	0.000
Expansion	1520773	249604	6.09***	0.000
Price	11304	9002	1.26	0.210
MLB Franchise	-95669	529566	-0.18	0.857
NFL Franchise	-7150	61274	-0.12	0.907
NHL Franchise	37512	101116	0.37	0.711
NBA Franchise	-310817	121540	-2.56**	0.011
Stadium Age	-35669	3812	-9.36***	0.000
Stadium Age Sq	370	48.94	7.56***	0.000
Stadium Capacity	-7.855	4.213	-1.86*	0.063
MSA Population	0.2598	0.0622	4.18***	0.000
MSA Per Capita Income	32.60	11.52	2.83***	0.005
GDP	479	148	3.25***	0.001
Unemployment Rate	36562	23602	1.55	0.122
TV Time Trend	323309	72323	4.47***	0.000
TV Time Trend Sq	-6053	1460	-4.14***	0.000
Constant	-5492842	1412853	-3.89***	0.000

** = significant at the 10% level, **=significant at the 5% level, ***=significant at the 1% level*

previous models. In calculating the five year CBR for this model, there are two measures for the CBR in each season, one that is unique to NL teams and the other which is unique to all AL teams. Results presented in Table 4.5 display that the five year CBR metric was insignificant, a finding that is opposite than that of the previous competitive balance metric. Finally, the dummy variable for the Atlanta Braves was also positive and significant in this model, where in the previous model they had been close to being significant at the ten percent level.

Continuing to the fourth regression model in Table 4.6, the adjusted r-squared statistic is

Table 4.6

Three year CBR Regression Results

Dependent Variable is Total Franchise Attendance				
	Coeff.	**Std Err.**	**t-stat**	**P> |t|**
CBR3	-141749	245756	-0.58	0.564
AL	279404	199385	1.40	0.162
Strike	-465901	72490	-6.43***	0.000
Expansion	1528770	249983	6.12***	0.000
Price	10823	9012	1.20	0.230
MLB Franchise	-142894	529582	-0.27	0.787
NFL Franchise	-10343	61345	-0.17	0.866
NHL Franchise	39916	101293	0.39	0.694
NBA Franchise	-317479	121688	-2.61***	0.009
Stadium Age	-35384	3821	-9.26***	0.000
Stadium Age Sq	367	49.06	7.48***	0.000
Stadium Capacity	-8.060	4.219	-1.91*	0.056
MSA Population	0.2629	0.0623	4.22***	0.000
MSA Per Capita Income	34.54	11.49	3.01***	0.003
GDP	438	161	2.72***	0.007
Unemployment Rate	33519	24416	1.37	0.170
TV Time Trend	276655	74757	3.70***	0.000
TV Time Trend Sq	-5322	1569	-3.39***	0.001
Constant	-4803456	1450357	-3.31***	0.001

** = significant at the 10% level, **=significant at the 5% level, ***=significant at the 1% level*

0.6032, again nearly the same as the r-squared for the previous model using the five year CBR metric. In this model, the CBR metric employed is a three year measure, which is found to be insignificant in relation to attendance. The only changes in the results when comparing this regression to the previous one is the competitive balance variable, as well as the addition of the Atlanta Braves being positive and significant at the ten percent level.

In the fifth model which was run, an overall r-squared value of 0.6036 was again reported. The fifth model differs from the previous models in that the competitive balance

Table 4.7

HHI Regression Results

Dependent Variable is Total Franchise Attendance				
	Coeff.	**Std Err.**	**t-stat**	**P> |t|**
HHI	-1572874	1608572	-0.98	0.329
AL	282110	199282	1.42	0.157
Strike	-231199	249293	-0.93	0.354
Expansion	1529140	249852	6.12***	0.000
Price	9770	9062	1.08	0.281
MLB Franchise	-138898	529293	-0.26	0.793
NFL Franchise	-11563	61311	-0.19	0.850
NHL Franchise	31117	101573	0.31	0.759
NBA Franchise	-332590	122288	-2.72***	0.007
Stadium Age	-35312	3808	-9.27***	0.000
Stadium Age Sq	369	49.03	7.52***	0.000
Stadium Capacity	-8.037	4.216	-1.91*	0.057
MSA Population	0.2649	0.0623	4.25***	0.000
MSA Per Capita Income	34.21	11.47	2.98***	0.003
GDP	347	144	2.42**	0.016
Unemployment Rate	23666	23852	0.99	0.321
TV Time Trend	232090	58115	3.99***	0.000
TV Time Trend Sq	-4359	1296	-3.36***	0.001
Constant	-3834319	1348195	-2.84***	0.005

** = significant at the 10% level, **=significant at the 5% level, ***=significant at the 1% level*

variable is no longer a DCBR or CBR, but the HHI which is widely used within competitive balance research. The results in Table 4.7 display that the HHI was also insignificant in regards to attendance, a similar finding to the CBR metrics which were included within the previous model. In comparison to the prior models, this model displays virtually similar results. In examining these results it becomes rather clear that across the board; most of the variables in these models have very little change except for small changes in the significance level, which causes a few variables such as the Arizona Diamondbacks and Atlanta Braves to jump back and

Table 4.8

RSD (SDWPCT) Regression Results

Dependent Variable is Total Franchise Attendance				
	Coeff.	**Std Err.**	**t-stat**	**P> |t|**
SDWPCT	2130575	1645185	1.30	0.196
AL	279146	199176	1.40	0.162
Strike	-478048	73133	-6.54***	0.000
Expansion	1487369	251938	5.90***	0.000
Price	10784	9002	1.20	0.231
MLB Franchise	-128974	529141	-0.24	0.808
NFL Franchise	-7231	61342	-0.12	0.906
NHL Franchise	34163	101259	0.34	0.736
NBA Franchise	-318185	121513	-2.62***	0.009
Stadium Age	-35779	3830	-9.34***	0.000
Stadium Age Sq	374	49.31	7.57***	0.000
Stadium Capacity	-8.290	4.214	-1.97**	0.050
MSA Population	0.2645	0.0622	4.25***	0.000
MSA Per Capita Income	32.92	11.56	2.85***	0.005
GDP	497	160	3.10***	0.002
Unemployment Rate	33202	23389	1.42	0.156
TV Time Trend	283392	62113	4.56***	0.000
TV Time Trend Sq	-5672	1416	-4.01***	0.000
Constant	-5049973	1342323	-3.76***	0.000

** = significant at the 10% level, **=significant at the 5% level, ***=significant at the 1% level*

forth between being insignificant and significant.

Table 4.8 displays the sixth and final model run within this dissertation research. The sixth model reported an adjusted r-squared of 0.6040, almost imperceptibly higher than the r-squared for the previous three models (Table 4.5, 4.6, 4.7). The final model is different in that the competitive balance metric this time takes the form of the Ratio between the season specific and idealized standard deviation of win percentage, and is thus noted as the "RSD." Results display that the RSD is insignificant in regards to attendance. In this, the results in the sixth

model are quite identical to the results in the previous model, in that the same variables are all significant in both models, with the signs in the same direction.

In concluding the reports of the results from the six models run within this dissertation, it is quite clear that the findings were rather congruous from one model to the next. The biggest differences that could be found within the models were in the competitive balance metrics, some of which were significant, some of which were not. Additionally, there are a few franchise variables that fluctuated between the gray zone of being significant and insignificant. In all, the results presented within these models were quite informative in producing information about the demand for attendance at Major League Baseball games, and provide very intriguing material to help guide the discussion of the results in the following section.

4.4 Discussion of Results and Potential Future Research

In formulating this dissertation research, focus was placed on both the demand for sport and the role of competitive balance's relation to sport demand. As mentioned several times throughout this dissertation there exists a plethora of studies examining the demand for sport (Borland & Macdonald, 2003), yet there still remains important unanswered questions in this area of research. With this in mind, the goal of this research was driven to create a new competitive balance metric, and use it to address the research questions: What factors affect fan demand for professional sport? What effect does competitive balance have on the demand for MLB games? What can MLB franchises do to help boost attendance at games? Based on the investigation of the above questions, this dissertation research additionally sought insight into what knowledge can be gained for improving the quality of management of sport franchises, leagues, and organizations.

First considering the place of competitive balance in the demand and UOH research in

sport, the demand models estimated in this chapter sought further confirmation of the UOH, as well as testing of the ability of existing competitive balance metrics to explain variation in attendance at MLB games. The results indicate that both of the DCBR competitive balance metrics developed in this dissertation was significant in determining attendance at MLB games. Results in this chapter indicate that the CBR, HHI, and RSD were not significant in regards to explaining observed variation in attendance. These results are surprising, as Humphreys (2002) reports all of these competitive balance metrics had a significant relationship to observed variation in attendance. One explanation for this could be that fans were not responsive to these metrics in the post free agency period. In this case, the DCBR can be interpreted as a metric which better reflects fan's information and decisions, and raises the need for further examination and testing of the relationship between competitive balance and attendance. At this point, the results in this dissertation confirm the UOH, and suggest that there may be some metrics which are more strongly related to fan demand for sport. From this, some researchers (Zimbalist, 2002) may argue that the DCBR may be a more appropriate measure for studying attendance.

From an economic standpoint, it can be argued that these results indicate that the level of balance in a sport league can indeed have an effect on consumer demand for sport. Furthermore, extending into the realm of sports economics, a new competitive balance metric which has unique measures for each franchise in each season has been found to be more responsive to fan attendance than other competitive balance metrics. It could be the case that fans are sensitive to competitive balance at a franchise level, with a level of the performance history built into it. In some sense, it could be that there are multiple things which fans take into account in regards to competitive balance, and while they may view the balance of a league as a whole, there is probably need to regard a balance of the league and the team within a metric as the DCBR and

CBR have done. Thus the theoretical contribution of creating the DCBR is not just in providing a new way to measure competitive balance, but also in possibly bringing out the use of metrics constructed from multiple years of data, that are dynamically moving and being recalculated from one season to the next for a league or franchise. Finally, from a sport management perspective, these findings further the theoretical understanding of why fans go to sporting events, and the importance of competitive balance in considering the consumer's demand to attend sporting events.

The question which arises from the findings of the DCBR being positive and significant in regards to attendance is: what is it about the DCBR which may make it more responsive to fan attendance than other competitive balance metrics. In considering the DCBR, it is clear that it is a metric which captures year to year variation of the team and the league. In this sense, the DCBR is a metric which captures several years of fan perception; in essence it has a component of fan learning integrated into it. That is, the DCBR provides several years of information, and is probably closer to what fans have in their mind when they make judgments about the strength and balance of a sport team and league. While fans do pay attention to the standings of the current year, it is also quite clear that they pay a good deal of attention to what has happened in recent history, and thus focus on several years of play. Taking this into account, it would seem only natural for competitive balance metrics to focus on several years of play. As Schmidt and Berri (2001) showed in their research, fans were more responsive to competitive balance metrics of longer lengths of time. The results from the models presented within this chapter further back up these findings, and make a stronger case for the argument that when competitive balance is being tested against fan demand for sport, there is probably the need to take longer periods of time into account. In this, the DCBR provides a metric which gives this longer period of time,

and is probably a stronger indicator of what fans like and think about when choosing to attend sporting events.

Previously most competitive balance metrics focused simply on single year metrics for an entire league, or multiyear metrics for a single team, the DCBR brings a metric that takes the best of both worlds. It is thus, that prior metrics could not truly give much evidence about both how a team was doing in recent years, as well as how the rest of the league performed in regards to competitive balance. In this, metrics were mostly focused on measuring one of these aspects, diluting the fan's understanding of competitive balance to a single factor. On the other hand, the DCBR metric presents the chance to be able to take into account both the team and a league. Results from this research indicate that fans were more responsive the DCBR than any other metric, and from this it can be argued that this is not only because it takes into account multiple years of play, but that it displays both team and league competitive balance within a single metric. The ability to converge both of these elements into the DCBR metric is something which is unique, and that it is possible that a team specific measure really helps to display how fans respond to an individual team, as well as the league in a whole. Thus, in creating the DCBR for this research, the metric takes into account a number of factors which cannot all be captured in any other single competitive balance metric to date. In this, it does seem from the results that fans truly are focused on several years of play, their own team's balance, as well as the balance of the entire league when they make the decision to consume sports.

Turning away from the discussion of competitive balance results, there are a number of results and findings which demand further discussion after examining the estimates produced by the models within this section. First, considering the league variable it was found that the American League dummy was insignificant in determining attendance in every single model. In

this it indicates that the league which a team is in is not important in determining their attendance. The strike variable presents a much more interesting finding, in that it displayed fan demand for attendance would decrease because of a strike. It is common knowledge that fans are often unhappy and even disgruntled when professional sports has work stoppages, part of the reasoning being that both sides make so much money, that they really have no place to complain. Prior research (Soebbing, 2008) found that the strike variable was indeed negative and significant when examining over 85 years of baseball data. The result in this dissertation backed up these findings, and helps to show the importance of work stoppages in affecting consumer preference to attend sporting events.

One of the last baseball league related variables is that of the variable denoting when new expansion franchises came into the league. The expansion franchise variable was positive and significant as was hypothesized a finding which is naturally explained by the novelty effect. In examining the results of the price variable, it was found that the variable was insignificant in regards to attendance. While economic theory points towards the variable being negative and significant, as mentioned previously, research has found little evidence of ticket price affecting demand for attendance at professional sporting events. Thus, the results for the lowest ticket price variable included within this dissertation is analogous to other research findings, and seem to further back up other academic findings in regard to of ticket pricing in professional sports. From these results, understanding can be drawn by the league in regards to how things such as ticket pricing, strikes, expansion and the different leagues play a role in determining attendance.

Next moving along to variables examining local market areas for each team, it can be seen that having rival MLB franchises within the same MSA had no effect on attendance for those teams. Converse to this, the NBA franchise variable found that the presence of an NBA

franchise in the same area was significant in decreasing attendance. While the MLB is quite naturally in competition for consumers in the same region, it is curious that the NBA would have an impact on MLB attendance when all of the other professional sport leagues were insignificant. A possible explanation comes in the timing of the seasons, which is the NBA playoffs coincide with the beginning months of the MLB season. It is possible that this cross over competes for fans, and that while the NHL has a similar schedule as the NBA, it may be the fans who choose to watch baseball are more inclined to watch basketball before they would watch hockey. Further considering this logic, the MLB season also goes into its playoffs as the NBA season is beginning. Because of this overlap at both parts of the season, and the possible propensity of fans of these sports to possibly cross-over from one sport to the next, it seems logical that the NBA and MLB could possibly be substitutes for one another for sport consumers.

In examining the population and income variables for the MSA, it was found that these were both positive and significant. That is, franchises that played in regions with higher populations and higher income levels tended to have higher attendance. These findings are very straightforward and were easily hypothesized. A location with more people is going to have more people who are likely going to be consumers who will want to attend a sporting event. Additionally, those regions with higher income will also be more likely to have consumers with more discretionary income to spend on luxury goods, such as the consumption of sport tickets. Considering the findings of the franchise and market variables for MSA's, it clearly shows the importance of not only understanding the effect a region, its population and demographics can have on sport attendance, it also shows that competing sport teams can possibly have a negative effect on each other when they are both going after the same pool of sport consumers. From all of this, it can be understood at a theoretical level that the importance of: region, characteristics,

potential substitutes and complements in determining the demand for sport.

In considering the demand for MLB games, it is also important to take into account variables related to the stadium in terms of its age and capacity. Within the regression results, it is clear that stadium age was very important in determining attendance. Attendance tended to be higher at new stadiums, even with controls in the model placed for stadium size (capacity variable). As previously noted, these findings are rather congruous with the novelty effect which is widely cited within sport, that fans are more likely to go to sporting events in the first five years of a new team or stadiums existence. The results within this research seem to help backup these findings, though the stadium age squared variable being significant does show that the drop in attendance after the end of the novelty effect is one that is diminishing over time. That is, the number of fans who stop going to games as a stadium gets older is decreasing in number over time, something that could additionally be explained by the popularity of older traditional stadiums as well.

The stadium capacity variable which served as an important control for the size of stadiums, was also a variable noted by Borland and Macdonald (2003) as being the main economic variable in sport research which could measure supply capacity for sporting events. Within the models presented within this dissertation, it was found that stadium capacity was negative and significant in the models. This indicates that the higher the capacity for a stadium was, the lower attendance tended to be. Translated into other terms, it could be that there was less demand for attendance at larger stadiums, and thus attendance was higher at smaller stadiums possibly because of it being harder to get tickets to games in these stadiums. While this seems to be a plausible explanation for the findings of this research, common sense would tell us that larger stadiums should usually have larger attendance. In the case of the NFL were most of

the games are sellouts, there is probably a direct correlation between stadium size and attendance. However, because MLB plays over 160 games a season and many of these games fall during the daytime in the middle of the week, the MLB witnesses very few sellouts. This would then seem to support the case that it would be the smaller stadiums which could have higher attendance, because the demand for seats at these games should be higher when considering economic theory. This is another point which would be interesting to test in future research, to push forward the theoretical and empirical research examining how stadium size plays a role in determining attendance and the demand for attendance at sporting events.

The next set of variables are the macroeconomic variables which were to be included within this research. While per capita income was already included within the model, it was important to also test the economic health of the country overall, especially considering the effect a recession could potentially have on consumer spending on luxury goods. Case in point, during this most recent economic downturn, the New York Yankees was selling ticket packages that cost $2,500 a ticket for 82 games, or $205,000 a season. One businessmen in New York noted that while their income was high enough for them to continue purchasing Yankees tickets, that he felt it was irresponsible to spend almost half a million dollars on tickets when he could be funneling that money back into his own company to help keep all of his employees employed. With such statements like his, it seemed quite necessary to test the economic health of the country through a GDP variable to measure Gross Domestic Product as well as an unemployment rate variable. Curiously, the unemployment rate variable was insignificant, indicating that the rate at which individuals were (un)employed did not affect the demand for sporting events. The GDP variable, however, was positive and significant in all of the models, hinting that the economic health of the United States as measured in GDP was important in

determining consumer demand for sport. In times when the GDP was lower (such as a recession) individuals would be less likely to consume luxury goods such as tickets to a sporting event. From a theoretical and empirical standpoint, this finding does help to highlight the importance of macroeconomic factors in the demand for sport. Additionally, it also brings information to sport managers that they should pay attention to the economy as a whole, especially when many of their primary sources of revenue are directly tend to consumer spending and purchasing power.

The next group of variables examined within these models was that of the television trend variables, which were aimed at teasing out the affects that television and technology have had on the demand for sport. Previous work by Humphreys (2002) found that there was a significant effect for the television time trend (negative) and television time trend squared (positive) variables. This means that over time television decreased attendance at sporting events, but that this effect was becoming more pronounced over time. The results of the models in this dissertation actually found the opposite of Humphreys' (2002) findings, within the results indicating that television had a positive relationship with attendance, but that the effect that television is having is decreasing over time. It is important to note that Humphreys (2002) examination considers a timeframe almost one century in length, while this dissertation doesn't even consider three full decades. The difference in results could be explained by these time differences, and possibly that within more recent decades, television has possibly helped to increase the visibility of baseball and made individuals more inclined to go and watch games in person. In either case, the influx of television and other technology is something which clearly is having an effect on the modern sports industry, but with the advent of the internet and other online technology, it may continuously become harder to be able to empirically investigate the

effects that technology has on the demand for sport. While the findings in this dissertation are counter to that found in prior research, the difference in time frames suggest changes in how technology has influenced demand for MLB games in more recent years. Further investigation into this subject is warranted, to be able to come to a more comprehensive understanding of the influence of television and other broadcast technology on demand for attending live sporting events.

Finally, this dissertation included dummy variables to account for every MLB franchise within the dataset. The results indicated that there was a strong and positive relationship between the Atlanta Braves, Arizona Diamondbacks, Baltimore Orioles, Colorado Rockies, Milwaukee Brewers, San Francisco Giants, St. Louis Cardinals and attendance. Opposite of this, the New York Yankees, New York Mets, and Chicago White Sox variables were all negative and significant. These findings were rather curious as the majority of the teams that were negative and significant were traditional teams that dated back to the formative years of MLB, and also were franchise which were located in MSA's which had other MLB franchises. There are many potential reasons which these teams could have a positive or negative effect on attendance, but it is interesting to note that both the geographic location and relative age of these franchises. It is possible that there are some unique factors which separate these teams from the rest, such as marketing, promotions, scouting, sales team, however, the results do not present us with any evidence to allow us to make any educated deductions as to what makes these franchises distinct. Future research could potentially deal with some of these issues by using variables to control for issues such as franchise age, tradition, and maybe even region of the country in which they are located.

In all the findings of this dissertation brings about many important empirical findings

which lend themselves to further theoretical understanding of the demand for sport as well as vital information for sport managers. The theory, contributions and importance of this work will be noted at the end of this chapter, and further dwelled upon in the next chapter which will consider the contributions of this dissertation more in depth. In the following section, limitations of this research will be discussed, followed by a synthesis of this chapter leading into the final and concluding chapter of this dissertation.

4.5 Limitations

In specifying the model to be employed within this dissertation, many of the potential limitations which this research could face were discussed. Specifically, the discussion was focused on choosing which method of regression to use, testing for heteroskedasticity, and the use of fixed or random effects, and so forth. The choice of the OLS regression to be employed within this dissertation was chosen partly because of the use of fixed effects within the model, as well as the lack of heteroskedasticity and autocorrelation. Generally, OLS regression is considered to be the best linear unbiased estimator (BLUE), though it can be plagued by heteroskedasticity and autocorrelation, there are methods of correcting this issue such as using White's robust standard errors (Gujarati, 2003) or data transformation. While these methods are used for correcting econometric errors, another method is through the use of the GLS, which is employed when the OLS can possibly give inferences that are misleading, or is potentially inefficient. Though statistical tests indicate that the OLS is most likely the best model for running the regression on the panel dataset within this dissertation, there is still some possibility that another model could have been used to estimate the results for this research. Despite this potential limitation, the justification of the OLS within this model is backed up with statistical tests and literature focused on econometric issues, and therefore while it is acknowledged there

could be potential errors in the choice of the model, it is believed that the OLS was the best choice for this research.

There are other factors which could cause errors and further limitations to this study. Probably one of the biggest is the potential for omitted variable bias, which comes about because of the selection of certain variables for use within this study. It is important to note that a number of variables were omitted from this research, and that their lack of presence in the model could cause errors in the estimation of the results. In the initial stages of formulating this dissertation project, as well as through the preliminary exam and proposal stages it was believed that this research would be faced with omitted variable bias because of the lack of price data. The difficulty of obtaining and using price data with the demand for sport research has been widely noted among academics (Borland & Macdonald, 2003; Jewell & Molina, 2005; Lawson et al., 2008). However, because a source was found for price data, what was thought to be the variable which would cause the greatest problems in terms of omitted variable bias is actually included within the model.

One variable which was omitted from the model was that of the relocation variable, which was for the Washington Nationals' first season. For reasons unknown the data set which provided price data, did not include price for the Nationals first season in America, and therefore the data line was omitted so that price could be included within the regression. This one line of data was the only one which had a measure for the relocation dummy variable, and thus its removal from the data set meant that the relocation variable was also omitted from the model. Thus, the omission of the relocation variable could have caused the results produced from the regression to be biased. Furthermore, Canadian teams were also omitted from this study because of the difficulty in obtaining much of the economic data such as per capita income for the

equivalent of an MSA in Canada. Thus, the Canadian based MLB teams (Montreal Expos and Toronto Blue Jays) were omitted from the dataset because of these issues. It is important to note that in Humphreys (2002) examination of competitive balance and MLB attendance, that he also dropped Canadian franchises because of a similar issue. Thus, while it is acknowledged that dropping these teams from the dataset could cause some errors or unreliability in terms of the estimated results, it is an acceptable practice, especially with consideration in trying to keep the data as reliable as possible.

Another issue which has come up in the examination of sport in empirical research is the size of datasets. Because of the relatively small size and young age of some sport leagues, it is not uncommon to have datasets with only one hundred to two hundred observations within them. Originally it was anticipated that this dissertation research would have around nine hundred observations within, however because of the need to drop various teams, the actual number came out at 724 observations. This number is not small by any means and is one that helps make the findings and results be more reliable by having a dataset that is not considered to be small. While the size of the dataset really is not a limitation of this study, there is also the need to discuss the reliability of the data set and where the data was gathered from. The data within this dissertation was gathered from four main sources, Major League Baseball's website, the Major League Baseball Red and Green books published each year, Rod Fort's Sports Business website, and the Bureau of Economic Analysis website. Each of these data sources can be considered quite reliable, however, there are a few observations that need to be made in regards to how these data are collected, published, and made available for public use.

First, in regards to data published by MLB which is available on their website, on Rod Fort's Sports Business website, as well as the Red and Green books, there is some concern over

certain types of data. While the ticket price data seems to be believable, there is some concern over the attendance data that is published and released, as well as stadium capacity. Originally stadium capacity data was simply collected by finding which stadium a franchise played in each year, and then looking at the capacity for that stadium. However, this data was soon found to not be precise, as the Red and Green books gave different capacity numbers which changed almost every year, even when a team played in the same stadium. That is, franchises were often rearranging the seating numbers in their stadiums to try and find more ways to allow larger numbers of fans to come to games. Because of this, the old capacity variables were thrown out, and the new numbers from the Red and Green book were included.

Probably the most troublesome variable outside of price to deal with in sports is that of attendance. There is always the question of how the attendance numbers are actually tabulated, and how truthful teams are when they report the number of attendees. While events such as the Ultimate Fighting Championship (UFC) not only release attendance figures, but also the number of those who attendees who paid for their tickets, most professional or collegiate sport organizations do not follow this practice. For example, UFC 106, a fighting event sanctioned under the UFC organization had an attendance of 10,529 with total gate revenue around $3 million. This would put the average ticket price to this event at around $285 a person. However, UFC noted that 37 percent of attendee's were actually given complementary tickets, and thus only around 6,600 individuals bought tickets, raising the average price of paid tickets to $485 a person. What is intriguing in looking at the numbers which UFC displays is that one can see how much individuals are truly paying to get into games, and how many of those attending actually paid to get in. If 37 percent of the individuals at an event did not pay to get into the event, than it is not unusual for a price variable to not be significant in determining attendance.

In knowing that individuals do get into sporting events, the question remains how many individuals actually pay to get into a sporting event.

Another attendance issue which exists is in that of padding the numbers, a practice which is well documented in a number of newspaper articles, probably most famous of these is the San Diego Union-Tribune's investigation of Major League Soccer (MLS) attendance. In this it was found that some MLS clubs were making up attendance numbers, a practice which is rather common across all professional sports. It is well documented that teams often roughly estimate the number of people at a game. One well famous example brought up by a sport manager was that he would look at crowd and guess a large whole number such as 10,000. He would then look at the date or time, and tack that onto the attendance. For example a game played on September 3rd, would have an attendance of 10,000 plus 903 for the date, and they would announce attendance at 10,903. In the case of the MLS, it was found that not only was such practices common, but that teams were over-reporting attendance by up to 50 percent (Zeigler, 2006). It is with these examples in mind that the issue of attendance padding is unavoidable when discussing potential limitations and errors which may exist in the data. However, as this practice is widespread, and various franchises most likely have slightly different practices, it is not something which can really be accounted for. Additionally, the franchise specific dummy variables included within the model were inserted to control for franchise specific effects, one of which could possibly include these issues of misreporting attendance numbers.

In all, like any research project there are some limitations and potential errors that exist within this dissertation. While their presence is acknowledged, there were careful attempts in collecting and analyzing the datasets and their locations in order to have the most reliable data possible to be included within the model. Additionally, careful consideration was made in

building the demand model, choosing which method of regression to use, choosing whether to use random or fixed effects, as well as in checking for other potential sources of errors or problems within the data and methodology. Thus while it is acknowledged that there is the possibility of errors and limitations within this study, all efforts were made to correct for any potential or existing limitations, errors, or problems.

4.6 Chapter Conclusion

In this chapter, the newly developed DCBR competitive balance measure was placed within the UOH line of competitive balance research by employing the variable in a demand model to examine whether competitive balance plays a role in the fan demand to attend MLB games. The findings presented strong evidence that the DCBR metric is quite responsive to fan attendance, but that none of the other competitive balance metrics which were tested exhibited any relationship between themselves and attendance. This gives further validation to the creation of the DCBR and its use within a demand model, as the metric has shown to be more responsive to fan demand for attendance than other measures included within the models in this dissertation. Additionally, the findings help to confirm the UOH and the importance of competitive balance in determining attendance at MLB games.

The results of the models also helped to provide further knowledge and evidence about various factors which were also significant in determining attendance for MLB games. The findings show that a number of variables, from a variety of categories all played an important role in either improving or hampering live attendance at professional baseball games in the U.S. Not only do these findings provide empirical evidence, but also helps to build to theoretical understanding into the demand for sports as well as implications for the improved management of professional sport teams. From a theoretical standpoint, the findings help to understand things

such as that price is not significant in determining attendance, and how the economic health of a country can translate into consumer demand for attending MLB games. In this, the models help to bring more knowledge from an economic and sport management standpoint through which to better understand the demand for sport. This theoretical and empirical knowledge can also be translated into direct implications and suggestions for managers within the sport industry. Understanding the theoretical basis of the demand for sport combined with empirical findings can arm sport managers with the knowledge necessary to help make better decisions in managing and operating sport teams to be able to increase the number of fans coming to games, and from this, also increase revenue.

Thus, in all, this dissertation research has now fully presented its empirical findings and proceeded to discuss these findings as well as any limitations or errors which could potential exist within this research. The findings indicate important theoretical, empirical, and practical contributions to sport management, sports economics, and the study of the demand for sport. It is necessary to further discuss these contributions, and thus within the next and final chapter, the focus of the discussion will be on these contributions and the value of the findings and knowledge presented in this dissertation for a variety of academic fields. Additionally, the concluding chapter will also discuss the novelty of the research, and help to bridge the link between academic findings in sport management and the actual practice of managing a sport organization.

CHAPTER 5 – CONCLUSION AND CONTRIBUTIONS

5.1 Conclusion and Contributions

This dissertation focuses on the concepts of competitive balance and the demand for sport. Within this framework, a new competitive balance metric has been developed, extending the CBR developed by Humphreys (2002) in order to capture year-to-year variation in competitive balance as well as to serve as a competitive balance measure in a demand model. This dissertation fulfilled its aim of merging the ACB and UOH lines of competitive balance research, something which has only been done previously by Lee (2009). In chapter three the analysis of the newly created measure, the "dynamic" competitive balance ratio, was conducted alongside other competitive balance metrics to examine trends and changes in competitive balance in the post free agency period. Following this, chapter four directly examined the demand for MLB games by constructing a demand model, which examined the determinants of MLB attendance through a variety of variables including various competitive balance metrics. The findings of these models indicated that the DCBR competitive balance metric was more responsive to fan attendance than other competitive balance metrics in the post free agency time period, and could thus possibly be considered one of the better metrics to employ in examining the demand for attendance. In all of this, the ACB and UOH lines of competitive balance research were thus brought together through the creation and examination of this new competitive balance metric. While a combination of ACB and UOH research in a single study is quite novel within the competitive balance research, this is only one of the many contributions which this dissertation makes in regards to: theory, empirical evidence, knowledge, and practical application.

The first contribution of this study is naturally the combination of the UOH and ACB

lines of research. Lee (2009) clearly saw the importance of bringing together these two lines of research and Humphreys and Watanabe (forthcoming) further discuss the importance and future of competitive balance in merging these two research paths. In the early years of competitive balance research it was that there was more work focused on the ACB line of research, but in more recent years there has been closer to an equal split between the ACB and UOH articles published in research journals. The work within this dissertation as well as Lee's (2009) study and even Humphreys (2002) work display that competitive balance research which considers the ACB and UOH lines is not only informative, but also display a more developed picture of the academic work being done in the field. In this dissertation, the examination of trends in competitive balance helped confirm much of what prior ACB studies had concluded in regards to whether competitive balance had been improving after free agency in MLB. The findings of the DCBR analysis indicate that while it is true that competitive balance had been on the decline in the years after the early 1990's, there is now a trend of improving balance in the last few years (2005 through 2007). In addition to this and other findings which give further understanding to ACB research, this dissertation also produced important results from the UOH line of research. The DCBR created within this research was a significant determinant of attendance for MLB games, which further strengthens the argument that competitive balance is an important factor in consumer decision to attend sporting events. While other competitive balance measure were not significant, it does bring up the possibility that there are certain metrics which may be potentially more potent in capturing fan demand. In this, through merging both ACB and UOH research within this dissertation, a more in depth and focused investigation of the DCBR and other related competitive balance metrics has been possible. Thus, the first contribution of this dissertation research is helping to highlight the importance and necessity for employing this two-fold

approach in research to further theoretical and empirical understanding of competitive balance.

While the ACB line of research has often been considered to be more atheoretical in nature, the work within this dissertation has brought up important points which need to be considered in ACB studies. Primarily, it is shown that using different lengths of time and rolling competitive balance metrics of longer periods of time can produce different results than using a single metric which is recalculated each season by taking into account data from that specific year. In this there is theoretical understanding brought forth by the findings in this dissertation, that the importance of time lengths and overlapping metrics in measuring competitive balance is something which needs to be considered. From an empirical standpoint, the findings were able to not only just reconfirm results of previous research, but also to add on new findings and additional meanings as previously mentioned.

The UOH focused demand research in this dissertation produced empirical findings which also helped to further the understanding of the demand for sport, as well as for the role of competitive balance in the demand for sport. In this a variety of determinants of demand were found to be significant in determining attendance at MLB games. This research helped to determine that factors such as: competitive balance, rival franchises, expansion teams, strikes, stadium age, stadium capacity, population, per capita income, GDP, and television have all played a role in determining attendance at MLB games. This empirical evidence allows researchers to understand the importance these factors have in affecting attendance at professional baseball in America, but also helps to bring forth additional theoretical understanding of the demand for sport. While the results suggest what specifically influences attendance at MLB games, the findings can be translated directly to theoretical understanding of the demand for sport in general. In this, the confirmation of the UOH in the empirical work

relates back to theory by providing evidence that competitive balance and uncertainty of outcome are important factors in determining fan attendance at sporting events. Furthermore, it hints that competitive balance metrics which are longer in length may be more responsive to fan attendance. From a theoretical standpoint it could be argued that fans may not be responsive to competitive balance measures which only take into account a single year. In other words, there may be a level of fan learning which occurs over time, which informs a fan about the balance of a league and/or a team, and thus competitive balance is something which should be measured using measures longer than a season in length.

Thus, in all, there is also direct theoretical contribution in providing evidence that competitive balances as well as the other factors mentioned at the beginning of this paragraph are significant determinants of attendance. From this a better theoretical understanding of what factors may play a role in the demand for sports are identified. Therefore, the empirical findings produced within this dissertation research and their translation into competitive balance and sport demand theory can be considered to be a second important contribution of this dissertation research.

The third contribution which this dissertation makes is in the creation of the DCBR as a new competitive balance metric. While there exist a growing number of competitive balance metrics, it is the case that each metric has potential errors or limitations, and is focused on certain aspects of a season of play. The DCBR does have some of these limitations, but it does attempt to correct for some of these, and like its predecessor the CBR, it does not need to be idealized or adjusted because of different lengths of seasons when calculating it. Furthermore, the DCBR is novel in the realm of competitive balance measures because it produces a unique measure for each franchise in each season. This is something which has not been accomplished by any other

competitive balance metric, and makes the creation of the DCBR all the more important. Thus, the creation of this new metric not only is important in adding another metric, but more specifically, in what this metric does in terms of measuring competitive balance in a unique manner.

The use of the DCBR in both ACB and UOH lines of research within this dissertation found that it produced some rather unique results and insight into both competitive balance and the demand for sport. Empirically it confirmed findings of prior research (Humphreys, 2002; Maxcy & Mondello, 2006), as well as provided results which previously could not be discussed before because of the nature of prior competitive balance metrics. In the ACB section the examination of the New York Yankees and Mets provided a picture of the evolution of competitive balance for a single team, and displayed when these teams were actually helping or hurting the balance of the league they were in. Outside of the ACB contributions which the DCBR has brought forth, there are also the UOH contributions, especially in showing that this new metric is sensitive to fan attendance at MLB games. In this it can be argued that the DCBR has brought forth new empirical and theoretical understanding for both the ACB and UOH lines of research, something which could not have been accomplished without the development of this new metric. Therefore, the creation of this metric is another major contribution which this dissertation research makes to the fields of sports economic and sport management.

In these three contributions, it is clear that there is overlap in the evolution and development of a new metric leading into a two-fold approach to examine competitive balance, and from this creating new knowledge and theoretical understanding of the workings of competitive balance from different viewpoints. These three contributions are all vitally important, especially in helping to validate and show the novelty of this dissertation research, as

being a rigorous exploration of an important topic in the fields of sports economics and sport management. While this information is quite useful and important for academics and researchers within sport management and sports economics, the question arises is how such information can be translated into practical understanding for the improvement of sport management. It is in making this transition from academic to practice in which this dissertation brings part of the fourth and final contribution. The fourth contribution of this research is in the form of what can be garnered from the implications and results of this research, and how they can be applied to the both research and practice. In this, the results lend themselves towards future research within sports economics and sport management, whether it is focused on the demand for sport, importance of competitive balance, or the interactions between sport organizations, fans, and the media. Implications for the management of sport can be in the creation of policy and the management of sport leagues with a better understanding of both the theory and empirical findings which back competitive balance.

As previously mentioned, there have been recent actions by professional sporting franchises towards the use of statistical and economic modeling to better understand what draws fans to games. The use of statistical data to gain competitive advantage in baseball is often associated with Billy Beane, as discussed by Michael Lewis' (2003) book, *Moneyball*, which examines how Beane and the Oakland Athletics used statistical methods to identify players with certain skills which other teams had not traditionally looked for. From using this statistical analysis to find players which didn't fit into the traditional mold of having promising talent, Beane was able to secure talented players at a lower price. While Beane was a pioneer in using statistics to gain a competitive advantage in the player market, it has only been recently that teams have began to use databases, statistical information, and econometric modeling to try and

find what factors lead to higher attendance at sporting events.

As discussed earlier in the introduction of this dissertation, the Cleveland Indians have recently announced their use of consultants to help research which factors help to boost attendance for their home games, partly as a response to the economic recession, and also in the hope of finding ways to maximize the revenue they can bring in on game days. Where historically teams seemed to not have paid as much attention to research and academic findings about the management of professional sport clubs, it would seem there is more open receptiveness towards these findings by clubs as of late. And while there may be several years of wait between when research is published, and teams use of statistical consultants to find similar findings, it is probably only a matter of time before sport franchises come to the realization that they will be able to get similar findings from academics and research findings for a much lower cost. It is thus, the results of this dissertation research have direct implications on helping sport franchises to better understand what factors lead to demand for attendance at their matches. For example, in looking at the demand models, it becomes clear that things such as the health of the economy in the form of GDP is something which helps to determine attendance at MLB games, and thus managers and executives in MLB should be aware of economic trends and what type of effect this may have on attendance and revenue.

Additionally, the results can have important implications for sport franchises, especially those which are reliant on fan attendance as a major revenue stream. While research shows television broadcast fees and commercial sponsorship make up larger percentages of franchise revenue than in the past, most professional sport franchises still have a need and desire to try and bring in as many fans as possible to help maximize game day attendance and revenue. Finally, these results and the measurement created within can be used to better understand the importance

of competitive balance in sport leagues, and can make managers and those within sport management more aware of the need to create balance in sport organizations. As discussed in the introduction to this dissertation, the MLB commissioner established an independent Blue Ribbon panel to look into various economic and financial matters in baseball. In this, it is recommended that the revenue disparity be equalized within the MLB to create better competitive balance within the league, and make the game and the league more attractive to consumers of sport. As the league commissioner himself formed this panel to try and see how the league could improve their operations, it is clear the league has begun to take into account issues of disparity and competitive balance within the league. With this in mind, it is thus believed that this fourth contribution will be more possible than it would have been years ago, as the MLB and its teams seem more aligned towards looking to researchers and academics to help improve their operational and financial well-being.

In considering the Blue Ribbon Panel findings and the results of this dissertation, it is clear that there are a number of policy implications which can be made to help improve both competitive balance and the operations of baseball. First considering the findings that the league dummy variables were insignificant, this hints that the differences which exist in regards to rules for the American League and National League are not important in bringing fans to game. That is, most individuals do not seem to worry about whether there is a designated hitter or not, and thus there is no need to change such rules at the level of on field play. Furthermore, the findings may also suggest that the organizational structure of baseball in regards to which teams are placed into which league may not be important, however, to come to such a conclusion would require further empirical testing.

Probably the biggest finding within this dissertation with policy implications is the

DCBR competitive balance variables being positive and significant. In this regard, those teams which had better competitive balance also had higher attendance. The Blue Ribbon Panel pointed for the need for competitive balance in MLB in order for the league to continue to sustain itself. In the theoretical two-team model of a sport league it was shown that the teams in larger markets would tend to have higher purchasing power. These teams would thus be able to spend more on talent, which thus caused imbalance in sport leagues. Considering a number of remedies for this other sport leagues in North America have created Salary Caps to limit the spending of teams, MLB has only imposed a Luxury Tax. A Luxury Tax operates by taxing teams that spend over a threshold on every dollar they spend. However, in the case of Major League Baseball, the New York Yankees have continued to spend as much money in a season on individual players as others teams spend on nearly their entire roster. In this sense, the luxury tax which was implemented to try and equalize the distribution of talent by keeping teams from overspending has really been quite a failure. On a theoretical standpoint the luxury tax does operate as a better mechanism for distributing talent in a league to some extent, as it is more successful than revenue sharing according to the two-team model.

The more successful remedy in regards to policy in regards to theoretical understanding is that of a salary cap, where teams would be place under a "hard" cap. In such a system no team in a league would be allowed to spend over a certain amount on player talent. Alongside a salary cap would also be the need for a salary floor, especially considering the difference in payrolls between the big and little spenders in MLB. Through installing a salary cap and floor the league would be able to force teams to spend within a certain range on player salaries, which in turn would theoretically provide a better balance in regards to player talent teams acquire, and hence should lead to more balanced play of the field. It is thus, that with the findings of this

dissertation in mind, it is clear that improved competitive balance would also bring higher attendance to games. With this would come increases in revenue for teams, and thus would potentially create an environment for MLB to be more financially stable.

Considering the other findings of this dissertation, there are clear implications of how teams in the league can focus on having fans attend games. Clearly expansion has been successful for franchises in their early years, indicating there are probably still markets which exist in North American which can hold baseball franchises. However, rather than focusing on new expansion, it would seem that avoiding strikes and other work stoppages would be more prudent. The findings of this research and other works which have examined strikes have all found that such work stoppages have severely hampered attendance. With this in mind, it would seem for the best interests of the league to try and avoid the confrontations which cause such work stoppages.

In considering what the MLB and its franchises can do to try and improve the financially wellbeing and continued operations of the league, the recommendations which can be made from this dissertation research can be boiled down to a few important suggestions. First, there is the need for improvements in regards to competitive balance in the league, this could be accomplished through making the luxury tax more harsh or implementing a salary cap and floor system. Second, work stoppages should be avoided at any cost, as they have hit teams hard in regards to attendance, which probably translates to big losses in revenue. Third, MLB should potentially consider if there are any other markets where baseball could be sustained, or if some of the larger markets like New York could benefit from another franchise. Results indicate that expansion has had a positive boost on the attendance of new franchises, and that placing franchises in cities with larger populations and purchasing power is ideal. Fourth, it is clear that

fan enjoy newer stadiums, but that they only do so for a certain amount of time. Building a new stadium for some franchises with attendance issues could help to bring in fans in the short run, but there really needs to be careful examination of whether a new stadium and the long run debt that comes with it is really worth a few years of improved attendance. Finally, the GDP variable in this work indicated that fans are sensitive to the financial wellbeing of a country, and thus raising ticket prices and doing other things which may be seen as greedy may not be the best practice in times of economic downturn and recession. Also, teams and the league should realize that the economic health of this country is an important factor in determining attendance, and thus need to have policies and contingency plans ready for the next time there is any economic turmoil in North America. Through examining and being aware of all of these issues, MLB cold potentially prepare themselves for the factors such as work stoppages and recessions which could hamper attendance, and at the same time take advantage of other knowledge such as expansion and new stadiums which help attendance. In this, MLB and its franchises have a number of courses of actions and policies which could be set which would not only help to improve attendance at their games, but would also lead to increases in revenue generation not just in ticket sells, but also in concessions, parking, sporting merchandise and other goods which fans consume at games.

Thus through these four folds of contribution, this dissertation research displays adequate and significant contributions to both the sports economics and sport management literature. Furthermore, in creation of a new metric, as well as in formation of a demand function and model to test the importance of competitive balance and other variables in the demand for sport, this dissertation displays the original and creative thinking necessary in both writing and creating a dissertation as well as conducting independent research. Not only does this dissertation

attempt to evolve the measurement of competitive balance, but also includes the necessary justification, validation, and positioning for the use of competitive balance in the estimation of the demand for sport. In doing this there is a need for careful thought and analysis in order to evolve a new competitive balance metric from a previous one, as well as the instrumentalization of this metric within a demand model for sport, something which has only been accomplished in a handful of studies in the existing literature.

In terms of future implications this study may have on research within sport management and sports economics, there are a several things that can be considered. First, the theoretical and empirical understandings of competitive balance as well as the demand for professional sport may be better understood from this research. This research also has the ability to stand out, in its evolution of a new competitive balance metric, and from this, hopefully motivate and drive more researchers towards examining and focusing on new metrics and methods in which competitive balance can be researched. Thus, in developing the DCBR from the CBR, this dissertation shows there is still much which needs to be done in this line of research. Additionally, these are not the only parts of the competitive balance and UOH research which needs additional work, as the field has more room for further theoretical work as well. One of the purposes of this research is to show the CBR could be modified into a "new" metric from the current existing method and modified to be used where previously researchers had mainly relied on using the SDWPCT competitive balance metric. The SDWPCT is indeed easier to calculate than the CBR or DCBR, but the DCBR is an easy to understand metric, which depending on the results, may be shown to be quite useful in the estimation of consumer demand for attendance. Thus future research examining competitive balance metrics will need to consider the purpose and focus of their study, and from this consider which metrics may be best suited for the investigation which is

being conducted. Additionally, there is also dire need of further research examining the differences of the new and existing competitive balance metrics.

In conclusion, this dissertation research has been primarily focused on the realm of MLB, however, the methodology could be reapplied to other sports leagues in North American and around the world. The field of competitive balance has focused mainly on the "major" professional sports and collegiate athletics in North America and European football (soccer) leagues. Therefore, a need exists for further work into smaller leagues and other sports in both of these areas as well as other regions around the world. This dissertation research has also shown that there is an important relationship between fan demand for attendance, UOH and competitive balance. Using the "dynamic CBR," a metric altered from the previously created CBR, this dissertation displays there is evidence fans do take into account UOH and competitive balance when making decisions about whether or not to consume MLB. Through this, the research presented within is argued to make several important contributions to the theoretical and empirical understanding of the demand for sport and competitive balance, as well as making important contributions which lead directly back to the better management of sport organizations.

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APPENDIX A: REGRESSION MODELS WITH FRANCHISE FIXED EFFECTS

Table A.1

Five year DCBR OLS Regression Results with Fixed Effects

Dependent Variable is Total Franchise Attendance				
	Coeff.	**Std Err.**	**t-stat**	**P> |t|**
DCBR5	153209	66599	2.30**	0.022
AL	236135	199592	1.18	0.237
Strike	-464317	72183	-6.43***	0.000
Expansion	1666016	255911	6.51***	0.000
Price	11483	8984	1.28	0.202
MLB Franchise	-174267	527555	-0.33	0.741
NFL Franchise	-12427	61116	-0.20	0.839
NHL Franchise	51974	101069	0.51	0.607
NBA Franchise	-316882	121191	-2.61***	0.009
Stadium Age	-34863	3797	-9.18***	0.000
Stadium Age Sq	362	49	7.42***	0.000
Stadium Capacity	-7.676	4.206	-1.82*	0.068
MSA Population	0.2630	0.0621	4.24***	0.000
MSA Per Capita Income	36.14	11.40	3.17***	0.002
GDP	343	138	2.48**	0.013
Unemployment Rate	25263	23176	1.09	0.276
TV Time Trend	214418	57501	3.73***	0.000
TV Time Trend Sq	-4158	1253	-3.32***	0.001
ARIZ Diamondbacks	863318	575593	1.50	0.134
ATL Braves	854247	552398	1.55	0.122
BAL Orioles	891653	542850	1.64	0.101
BOS Red Sox	30111	540081	0.06	0.956
CHI Cubs	-527152	442582	-1.19	0.234
CHI White Sox	-1224752	340822	-3.59***	0.000
CIN Reds	795504	575078	1.38	0.167
CLE Indians	788053	544401	1.45	0.148
COLO Rockies	1598603	576088	2.77***	0.006
DET Tigers	-176186	524767	-0.34	0.737
FLA Marlins	-495624	564245	-0.88	0.380
HOU Astros	488464	552596	0.88	0.377

Table A.1 (cont.)

KC Royals	418402	549812	0.76	0.447
LA Dodgers	331263	540393	0.61	0.540
LAAA Angels	-649656	467067	-1.39	0.165
MIL Brewers	967094	559962	1.73*	0.085
MIN Twins	-53328	528712	-0.10	0.920
NY Mets	-2432597	896406	-2.71***	0.007
NY Yankees	-2289570	829990	-2.76***	0.006
OAK Athletics	***	***	***	***
PHI Phillies	239048	564819	0.42	0.672
PIT Pirates	66449	579149	0.11	0.909
SD Padres	622069	567406	1.10	0.273
SEA Mariners	380298	532029	0.71	0.475
SF Giants	404574	237682	1.70*	0.089
STL Cardinals	1353777	578881	2.34**	0.020
TB Devil Rays	-457518	524719	-0.87	0.384
TEX Rangers	113696	499559	0.23	0.820
WAS-N	-114438	661592	-0.17	0.863
Constant	-3841616	1251179	-3.07***	0.002

** = significant at the 10% level, **=significant at the 5% level, ***=significant at the 1% level*

Table A.2

Three year DCBR Regression Results with Fixed Effects

Dependent Variable is Total Franchise Attendance				
	Coeff.	**Std Err.**	**t-stat**	**P> |t|**
DCBR3	118154	53977	2.19**	0.029
AL	256230	199034	1.29	0.198
Strike	-465196	72210	-6.44***	0.000
Expansion	1624450	252803	6.43***	0.000
Price	11827	8995	1.31	0.189
MLB Franchise	-160934	527672	-0.30	0.760
NFL Franchise	-13679	61148	-0.22	0.823
NHL Franchise	38439	100954	0.38	0.703
NBA Franchise	-319004	121230	-2.63***	0.009
Stadium Age	-34803	3800	-9.16***	0.000
Stadium Age Sq	360	48.81	7.37***	0.000
Stadium Capacity	-8.122	4.203	-1.93*	0.054
MSA Population	0.2655	0.0621	4.28***	0.000
MSA Per Capita Income	36.64	11.42	3.21***	0.001
GDP	335	139	2.41**	0.016
Unemployment Rate	25485	23183	1.10	0.272
TV Time Trend	217742	57329	3.80***	0.000
TV Time Trend Sq	-4162	1256	-3.31***	0.001
ARIZ Diamondbacks	943818	573195	1.65	0.100*
ATL Braves	892259	552321	1.62	0.107
BAL Orioles	894785	543066	1.65	0.100*
BOS Red Sox	30734	540295	0.06	0.955
CHI Cubs	-521574	442690	-1.18	0.239
CHI White Sox	-1238040	340791	-3.63***	0.000
CIN Reds	827140	574979	1.44	0.151
CLE Indians	803098	544608	1.47	0.141
COLO Rockies	1628005	576248	2.83***	0.005
DET Tigers	-155302	524878	-0.30	0.767
FLA Marlins	-459894	563988	-0.82	0.415
HOU Astros	506991	552681	0.92	0.359
KC Royals	411007	549953	0.75	0.455
LA Dodgers	330337	540608	0.61	0.541

Table A.2 (cont.)

LAAA Angels	-665822	467200	-1.43	0.155
MIL Brewers	980374	560233	1.75*	0.081
MIN Twins	-49094	528917	-0.09	0.926
NY Mets	-2421763	896640	-2.70***	0.007
NY Yankees	-2295757	830283	-2.77***	0.006
OAK Athletics	***	***	***	***
PHI Phillies	267477	564849	0.47	0.636
PIT Pirates	110332	578990	0.19	0.849
SD Padres	655790	567154	1.16	0.248
SEA Mariners	381639	532226	0.72	0.474
SF Giants	418301	237421	1.76*	0.079
STL Cardinals	1386275	578687	2.40**	0.017
TB Devil Rays	-455532	524993	-0.87	0.386
TEX Rangers	114303	499751	0.23	0.819
WAS-N	-102113	661699	-0.15	0.877
Constant	-3909069	1248272	-3.13***	0.002

** = significant at the 10% level, **=significant at the 5% level, ***=significant at the 1% level*

Table A.3

Five year CBR Regression Results with Fixed Effects

Dependent Variable is Total Franchise Attendance				
	Coeff.	**Std Err.**	**t-stat**	**P> |t|**
CBR5	-436539	267124	-1.63	0.103
AL	284312	199037	1.43	0.154
Strike	-461705	72341	-6.38***	0.000
Expansion	1520773	249604	6.09***	0.000
Price	11304	9002	1.26	0.210
MLB Franchise	-95669	529566	-0.18	0.857
NFL Franchise	-7150	61274	-0.12	0.907
NHL Franchise	37512	101116	0.37	0.711
NBA Franchise	-310817	121540	-2.56**	0.011
Stadium Age	-35669	3812	-9.36***	0.000
Stadium Age Sq	370	48.94	7.56***	0.000
Stadium Capacity	-7.855	4.213	-1.86*	0.063
MSA Population	0.2598	0.0622	4.18***	0.000
MSA Per Capita Income	32.60	11.52	2.83***	0.005
GDP	479	148	3.25***	0.001
Unemployment Rate	36562	23602	1.55	0.122
TV Time Trend	323309	72323	4.47***	0.000
TV Time Trend Sq	-6053	1460	-4.14***	0.000
ARIZ Diamondbacks	1022476	573526	1.78*	0.075
ATL Braves	934346	553709	1.69*	0.092
BAL Orioles	911799	544211	1.68*	0.094
BOS Red Sox	48396	541633	0.09	0.929
CHI Cubs	-483144	443279	-1.09	0.276
CHI White Sox	-1262681	341295	-3.70***	0.000
CIN Reds	880079	576321	1.53	0.127
CLE Indians	807227	545500	1.48	0.139
COLO Rockies	1661344	577718	2.88***	0.004
DET Tigers	-129350	525930	-0.25	0.806
FLA Marlins	-394128	565428	-0.70	0.486
HOU Astros	565389	554331	1.02	0.308
KC Royals	409326	550872	0.74	0.458
LA Dodgers	365837	541415	0.68	0.499

Table A.3 (cont.)

LAAA Angels	-670299	467945	-1.43	0.152
MIL Brewers	988436	561290	1.76*	0.079
MIN Twins	-29213	530011	-0.06	0.956
NY Mets	-2326791	898284	-2.59***	0.010
NY Yankees	-2274571	831732	-2.73***	0.006
OAK Athletics	***	***	***	***
PHI Phillies	323482	566608	0.57	0.568
PIT Pirates	155824	580445	0.27	0.788
SD Padres	725464	568580	1.28	0.202
SEA Mariners	401154	533257	0.75	0.452
SF Giants	461133	237623	1.94*	0.053
STL Cardinals	1456549	580219	2.51**	0.012
TB Devil Rays	-502156	525320	-0.96	0.339
TEX Rangers	125420	500760	0.25	0.802
WAS-N	62752	666991	0.09	0.925
Constant	-5492842	1412853	-3.89***	0.000

** = significant at the 10% level, **=significant at the 5% level, ***=significant at the 1% level*

Table A.4

Three year CBR Regression Results with Fixed Effects

Dependent Variable is Total Franchise Attendance				
	Coeff.	**Std Err.**	**t-stat**	**P> |t|**
CBR3	-141749	245756	-0.58	0.564
AL	279404	199385	1.40	0.162
Strike	-465901	72490	-6.43***	0.000
Expansion	1528770	249983	6.12***	0.000
Price	10823	9012	1.20	0.230
MLB Franchise	-142894	529582	-0.27	0.787
NFL Franchise	-10343	61345	-0.17	0.866
NHL Franchise	39916	101293	0.39	0.694
NBA Franchise	-317479	121688	-2.61***	0.009
Stadium Age	-35384	3821	-9.26***	0.000
Stadium Age Sq	367	49.06	7.48***	0.000
Stadium Capacity	-8.060	4.219	-1.91*	0.056
MSA Population	0.2629	0.0623	4.22***	0.000
MSA Per Capita Income	34.54	11.49	3.01***	0.003
GDP	438	161	2.72***	0.007
Unemployment Rate	33519	24416	1.37	0.170
TV Time Trend	276655	74757	3.70***	0.000
TV Time Trend Sq	-5322	1569	-3.39***	0.001
ARIZ Diamondbacks	1002228	574421	1.74*	0.081
ATL Braves	896641	554144	1.62	0.106
BAL Orioles	882537	544823	1.62	0.106
BOS Red Sox	8706	541971	0.02	0.987
CHI Cubs	-497293	443995	-1.12	0.263
CHI White Sox	-1258421	341942	-3.68***	0.000
CIN Reds	843921	576846	1.46	0.144
CLE Indians	791899	546400	1.45	0.148
COLO Rockies	1621323	578143	2.80***	0.005
DET Tigers	-156529	526610	-0.30	0.766
FLA Marlins	-435499	565776	-0.77	0.442
HOU Astros	521011	554534	0.94	0.348
KC Royals	387238	551649	0.70	0.483
LA Dodgers	351782	542290	0.65	0.517

Table A.4 (cont.)

LAAA Angels	-667772	468791	-1.42	0.155
MIL Brewers	962409	562009	1.71*	0.087
MIN Twins	-56407	530645	-0.11	0.915
NY Mets	-2369430	899399	-2.63***	0.009
NY Yankees	-2299795	833011	-2.76***	0.006
OAK Athletics	***	***	***	***
PHI Phillies	275807	566744	0.49	0.627
PIT Pirates	116346	580900	0.20	0.841
SD Padres	684768	568943	1.20	0.229
SEA Mariners	377115	533971	0.71	0.480
SF Giants	448096	237880	1.88*	0.060
STL Cardinals	1412673	580525	2.43**	0.015
TB Devil Rays	-511057	526311	-0.97	0.332
TEX Rangers	98073	501336	0.20	0.845
WAS-N	-36615	665283	-0.06	0.956
Constant	-4803456	1450357	-3.31***	0.001

** = significant at the 10% level, **=significant at the 5% level, ***=significant at the 1% level*

Table A.5

HHI Regression Results with Fixed Effects

Dependent Variable is Total Franchise Attendance				
	Coeff.	**Std Err.**	**t-stat**	**P> |t|**
HHI	-1572874	1608572	-0.98	0.329
AL	282110	199282	1.42	0.157
Strike	-231199	249293	-0.93	0.354
Expansion	1529140	249852	6.12***	0.000
Price	9770	9062	1.08	0.281
MLB Franchise	-138898	529293	-0.26	0.793
NFL Franchise	-11563	61311	-0.19	0.850
NHL Franchise	31117	101573	0.31	0.759
NBA Franchise	-332590	122288	-2.72***	0.007
Stadium Age	-35312	3808	-9.27***	0.000
Stadium Age Sq	369	49.03	7.52***	0.000
Stadium Capacity	-8.037	4.216	-1.91*	0.057
MSA Population	0.2649	0.0623	4.25***	0.000
MSA Per Capita Income	34.21	11.47	2.98***	0.003
GDP	347	144	2.42**	0.016
Unemployment Rate	23666	23852	0.99	0.321
TV Time Trend	232090	58115	3.99***	0.000
TV Time Trend Sq	-4359	1296	-3.36***	0.001
ARIZ Diamondbacks	1012567	574205	1.76*	0.078
ATL Braves	890011	553901	1.61	0.109
BAL Orioles	870063	544665	1.60	0.111
BOS Red Sox	8228	541710	0.02	0.988
CHI Cubs	-521503	444588	-1.17	0.241
CHI White Sox	-1263095	341820	-3.70***	0.000
CIN Reds	821800	576917	1.42	0.155
CLE Indians	791980	546137	1.45	0.147
COLO Rockies	1635203	578103	2.83***	0.005
DET Tigers	-157983	526370	-0.30	0.764
FLA Marlins	-422941	565713	-0.75	0.455
HOU Astros	509592	554271	0.92	0.358
KC Royals	377590	551474	0.68	0.494
LA Dodgers	345026	542094	0.64	0.525

Table A.5 (cont.)

LAAA Angels	-666485	468528	-1.42	0.155
MIL Brewers	969377	561812	1.73*	0.085
MIN Twins	-52371	530423	-0.10	0.921
NY Mets	-2371848	898931	-2.64***	0.009
NY Yankees	-2304726	832634	-2.77***	0.006
OAK Athletics	***	***	***	***
PHI Phillies	274625	566448	0.48	0.628
PIT Pirates	105481	580693	0.18	0.856
SD Padres	666897	568819	1.17	0.241
SEA Mariners	381580	533746	0.71	0.475
SF Giants	441985	237787	1.86*	0.063
STL Cardinals	1398835	580323	2.41	0.016
TB Devil Rays	-530123	526585	-1.01	0.314
TEX Rangers	102049	501125	0.20	0.839
WAS-N	-43519	663651	-0.07	0.948
Constant	-3834319	1348195	-2.84***	0.005

** = significant at the 10% level, **=significant at the 5% level, ***=significant at the 1% level*

Table A.6

RSD (SDWPCT) Regression Results with Fixed Effects

Dependent Variable is Total Franchise Attendance				
	Coeff.	**Std Err.**	**t-stat**	**P> |t|**
SDWPCT	2130575	1645185	1.30	0.196
AL	279146	199176	1.40	0.162
Strike	-478048	73133	-6.54***	0.000
Expansion	1487369	251938	5.90***	0.000
Price	10784	9002	1.20	0.231
MLB Franchise	-128974	529141	-0.24	0.808
NFL Franchise	-7231	61342	-0.12	0.906
NHL Franchise	34163	101259	0.34	0.736
NBA Franchise	-318185	121513	-2.62***	0.009
Stadium Age	-35779	3830	-9.34***	0.000
Stadium Age Sq	374	49.31	7.57***	0.000
Stadium Capacity	-8.290	4.214	-1.97**	0.050
MSA Population	0.2645	0.0622	4.25***	0.000
MSA Per Capita Income	32.92	11.56	2.85***	0.005
GDP	497	160	3.10***	0.002
Unemployment Rate	33202	23389	1.42	0.156
TV Time Trend	283392	62113	4.56***	0.000
TV Time Trend Sq	-5672	1416	-4.01***	0.000
ARIZ Diamondbacks	1005358	573840	1.75*	0.080
ATL Braves	898364	553592	1.62	0.105
BAL Orioles	882842	544275	1.62	0.105
BOS Red Sox	459	541438	0.00	0.999
CHI Cubs	-525655	444162	-1.18	0.237
CHI White Sox	-1282198	342215	-3.75***	0.000
CIN Reds	843144	576260	1.46	0.144
CLE Indians	788874	545858	1.45	0.149
COLO Rockies	1643965	577880	2.84***	0.005
DET Tigers	-166247	526153	-0.32	0.752
FLA Marlins	-425918	565275	-0.75	0.451
HOU Astros	522418	553949	0.94	0.346
KC Royals	381440	551117	0.69	0.489
LA Dodgers	336760	541889	0.62	0.535

Table A.6 (cont.)

LAAA Angels	-688666	468671	-1.47	0.142
MIL Brewers	970988	561500	1.73*	0.084
MIN Twins	-52047	530132	-0.10	0.922
NY Mets	-2380652	898455	-2.65***	0.008
NY Yankees	-2327171	832427	-2.80***	0.005
OAK Athletics	***	***	***	***
PHI Phillies	285318	566236	0.50	0.615
PIT Pirates	121032	580337	0.21	0.835
SD Padres	689178	568375	1.21	0.226
SEA Mariners	380216	533448	0.71	0.476
SF Giants	455015	237719	1.91	0.056
STL Cardinals	1420740	579987	2.45***	0.015
TB Devil Rays	-521886	525853	-0.99	0.321
TEX Rangers	94616	500845	0.19	0.850
WAS-N	-2805	664640	0.00	0.997
Constant	-5049973	1342323	-3.76***	0.000

** = significant at the 10% level, **=significant at the 5% level, ***=significant at the 1% level*