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Rodney J. Paul and Andrew P. Weinbach

Competitive Balance in the NFL?

in:

Zur Ökonomik von Spitzenleistungen im internationalen Sport

Herausgegeben von Martin-Peter Büch, Wolfgang Maennig und
Hans-Jürgen Schulke

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Competitive Balance in the NFL?

Rodney J. Paul and Andrew P. Weinbach

Introduction

The National Football League (NFL) ranks among the most successful sports leagues in the world. The NFL regularly plays before sellout or near-sellout crowds, has lucrative television contracts worth billions of dollars annually, and even supports its own network. The success that the NFL has enjoyed over the years has become a model for other sports leagues to follow.

There are a myriad of reasons why the NFL has enjoyed popularity and success. The sport combines strategy with athletic ability in a very physical and even sometimes violent game. Along with the viewer-friendly once-weekly schedule, these attributes make the game relatively accessible to casual fans and complex enough to maintain interest among long-time viewers.

Another characteristic that is often attributed to the relative success of the NFL is the apparent competitive balance among the league's teams. The NFL encourages this perception and takes active measures to foster competitive balance, including a reverse order draft for new players, a revenue sharing agreement, and beginning in 1994, a salary cap. The stated purpose of the salary cap was to level the playing field by making it more difficult for the wealthiest teams to capture a disproportionate share of player talent. Although there are ways of manipulating contracts to temporarily circumvent the salary cap, the cap does limit a team's ability to dominate through spending and therefore encourages teams to spend a relatively similar amount of money on salaries.

It is a common belief that the salary cap has helped the NFL become more competitive. The introduction of the salary cap brought an end to the mini-dynasties of Dallas and San Francisco. Years later, however, when New England won three Super Bowls in four years, the status of competitive balance was

again called into question. Has the introduction of the salary cap made the NFL more competitive? Is the NFL any more competitive now than it was twenty years ago?

To study these questions, we use different measures of competitive balance to compare the NFL before and after the implementation of the salary cap. These measures include the standard measure in the sports economics literature, the standard deviation of win percentage and a new measure of competitive balance, the average pointspread. The average pointspread of games, taken as an absolute value of the pointspread on the game, is introduced as a measure of competitive balance as it is assumed to be an optimal and unbiased predictor of the outcome of a game. The biggest advantage of using the pointspread as a measure of competitive balance is that the pointspread represents consumer expectations prior to the game. Since *ex ante* fan expectations may play a significant role in game attendance and television ratings,[1] using the pointspread as a measure of competitive balance may be superior to using the standard deviation of win percentages. Having insight into the expectations about a game should lead to more meaningful results when studying the impact of competitive balance on fan behaviour, specifically attendance at games and television ratings.

Using a time period for which both the pointspread and historical game records are available (in our sample 1985–2006) and breaking the data into pre- and post-salary cap eras, the standard deviation of win percentage measure of competitive balance produces no significant difference between the pre-cap and post-cap subsets. Depending on how the data is divided, rather than decrease, it appears that the standard deviation of win percentage may have actually increased after the cap. On the other hand, the average pointspread and its standard deviation have both fallen after the introduction of the salary cap. In the most recent time frame (2001–2006), both the average pointspread and its standard deviation are significantly lower than in the pre-salary cap years. Given that the NFL is an organization whose apparent goal is to maximize profits, the primary reason for seeking competitive balance and uncertainty of outcome is to motivate fan interest, which in turn drives ticket sales and television ratings. The *ex ante* pointspread measure supports the often stated proposition that the NFL is more competitive now than it has been in the past.

[1] Paul/Weinbach (2006).

The paper will proceed as follows. Section 2 introduces the use of the pointspread as a measure of competitive balance. Section 3 compares the measures of competitive balance for the NFL over time to determine if it has become more or less competitive since the introduction of the salary cap. Section 4 concludes the paper.

The Use of the Pointspread as a Measure of Competitive Balance

In determining the level of competitive balance in a season or in a particular game, *ex post* data has traditionally been used in the analysis. These *ex post* figures include the standard deviation of win percentage, or various indices of past team performance. A weakness of this type of analysis is that it is backward looking and therefore may be less relevant to consumers than forward looking measures. If the NFL seeks competitive balance as a means to maintain fan interest, participation, and purchases, an *ex ante* measure of fan perception of competitive balance is probably more relevant than an *ex post* analysis of game win percentages.

By using the pointspread markets, we can reasonably capture *ex ante* fan perceptions of upcoming games. Fortunately, there have been vigorous betting markets for the outcome of NFL games in Las Vegas for decades. Betting on the NFL occurs legally in Nevada and in offshore sportsbooks, and has a significant following in illegal markets across the United States.

A betting market for an NFL game essentially behaves as any other financial market, where individuals who believe they are in possession of superior information have an incentive to take a financial position on the game. Over time this incentive structure has been shown to produce remarkably accurate forecasts of game outcomes. Given these properties, along with the advantage of a well-defined market open, market close, and conclusion of the proposition, much has been written in the economics literature using these betting markets to test more general theories of market efficiency, and bettor (investor) behaviour.

In a comprehensive literature review of prior betting market studies, Sauer concluded that the betting market for NFL games was found to be overall very efficient.[2] Zuber et al. reported some inefficiencies in the market when ex-

[2] Sauer (1998).

amining the NFL on a week by week basis,[3] but these findings were refuted by Sauer et al. who found that their forecasts were no more accurate than the pointspread at predicting game outcomes.[4] Overall, in OLS tests of pointspreads, efficiency could not be rejected and the market was found to be remarkably efficient.

The traditional behaviour of the sportsbook, as assumed in research on gambling in football (and other sport) markets such as Pankoff and Gandar et al. and Sauer et al., is that the sportsbook sets a pointspread in the NFL market hoping to divide the betting dollars equally between the favourite and the underdog.[5] If achieved, the sportsbook will then profit as betting in the market for NFL football occurs at an eleven for ten rule. If the opening pointspread does not balance the betting action, the pointspread will move in the direction of the imbalance. For instance, if the favourite is bet more heavily than the underdog, the pointspread will increase and the favourite will be required to win by a larger margin to cover the bet. By the time of market closing, the start of the game, it is assumed that all new information will be processed by this relatively large betting market and the closing line should be an optimal and unbiased predictor of the outcome of a game.

Given these assumptions of the sportsbook and the findings of general efficiency within the market, there is some evidence that bettor preferences may bias the pointspreads within certain subsets of games. The overbetting of favourites and the home team were shown to exist by Golec and Tamarkin as well as Gray and Gray.[6]

Levitt used data from a betting tournament to conclude that the betting market is not arranged like a traditional financial market.[7] Specifically, he concludes that bookmakers have better information than bettors and use this information to set lines that maximize profits, not to even the betting action on both sides of the proposition. This study is problematic in that it is not based on actual betting behaviour of specific agents, but participants in a closed contest. The bettors in this tournament paid an entry fee and therefore likely face marginal incentives that differ from agents wagering money for specific propositions. In addition, the paper relies on one year of data to conclude that bet-

[3] Zuber et al. (1985).

[4] Sauer et al. (1988).

[5] Pankoff (1968), Gandar et al. (1988), and Sauer et al. (1988).

[6] Golec/Tamarkin (1991) and Gray/Gray (1997).

[7] Levitt (2004).

tors tend to overbet favourites, and therefore sportsbooks set lines that are too high because they know bettors behave in this way. In the following year however, the favourites performed quite well against the pointspread, and if bettors were overbetting the favourites during that season instead, the results of a one year study might have concluded that the betting public was better informed than the sportsbook.

It is much more likely, from the large number of studies performed on the NFL, that the betting market is generally efficient, but there are some modest bettor biases that may resist correction because of the transactions costs of betting and market restrictions on the size of bets of placed by informed bettors. Although modest biases may exist, we will assume that the betting market forecasts represent fairly accurate market predictions of the outcome of individual games. Larger pointspreads imply a greater imbalance in team ability, while smaller pointspreads imply relatively more balance. As an *ex ante* measure of competitive balance of individual games, the pointspread provides a more accurate measure of fan perception of competitive balance than standard deviation of win percentages. Given that fan perception ultimately drives fan consumption of the product, the pointspread may be reasonably viewed as a more relevant measure of competitive balance when contemplating the effectiveness of league policies.

Statistical Measures of Competitive Balance in the NFL

As mentioned in the introduction, this paper has two goals. One is to introduce pointspreads as a new measure of competitive balance in NFL games. The second is to determine, through various measures, if the introduction of the salary cap has led to any significant change in competitive balance in the NFL.

The previous section described why and how the pointspread may be used as a measure of competitive balance. This section compares results derived from previously used measures of competitive balance to those found using the pointspread and attempts to determine if the salary cap has had any tangible effect on competitive balance in the NFL.

One standard measure of competitive balance is calculated through the use of the standard deviation of win percentage of teams in the league. This

measure of competitive balance has been used in studies of competitive balance.[8] Although this measure was originally used to examine competitive balance in baseball, its application to other sports is straightforward.

The measure of standard deviation of win percentage is calculated by taking the win percentage of each team in the National Football League for a particular season and then calculating the standard deviation of team win percentages for that season. Figure 1 shows a plot of this measure for the length of our sample, 1985–2006 (the years for which both win percentage and pointspread data were available).

Figure 1: NFL Standard Deviation of Win Percentage

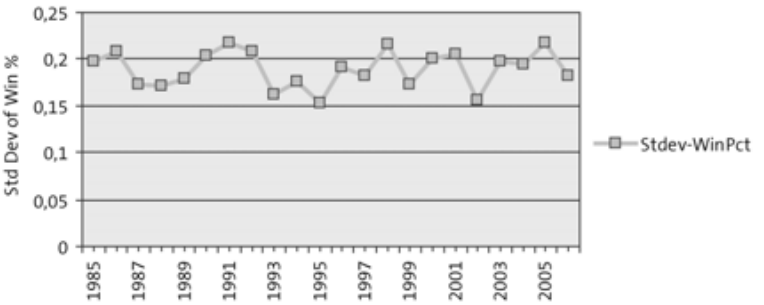

Figure 2 plots the average of the pointspread on NFL football games for each year in the sample. The average pointspread is taken from the perspective of the home team. Positive pointspreads represent home favourites, while negative numbers represent road favourites. The absolute value of the pointspread was also considered, but because the home field advantage contributes to the expected outcome of the game (generally considered to be a roughly 3 point advantage for the home team), the pointspread from the perspective of the home team was considered a better measure. Logically, if all of the teams in the NFL were exactly the same, the average pointspread should be 3 points.

[8] Scully (1989), Quirk/Fort (1997), Eckard (1998, 2001 a, 2001 b), Butler (1995), Zimbalist (1992), Humphreys (2002), among others.

Figure 2: NFL Average Pointspread

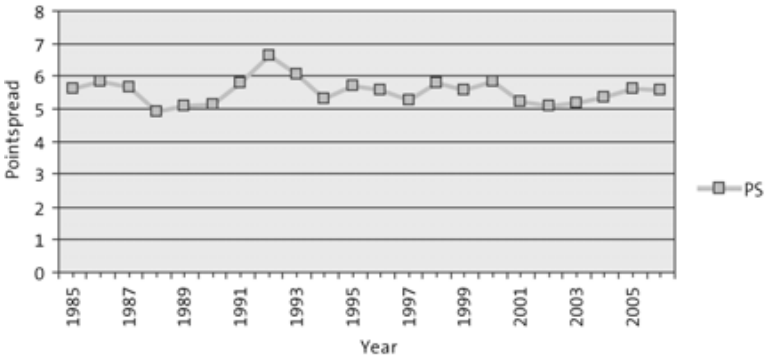

Figure 3: NFL Standard Deviation of the Pointspread

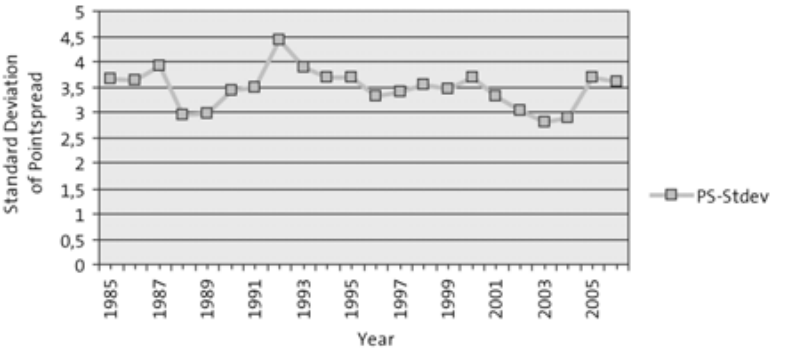

Figure 3 plots the standard deviation of the pointspread on NFL football games for the same time frame. The pointspread is calculated by the same method used in Figure 2, but is presented here as a standard deviation for each year of the sample.

Table 1 shows, side by side, the two measures of competitive balance, the standard deviation of win percentage and the average pointspread, along with the standard deviation of the average pointspread. Averages are compared for the pre-salary cap years (from where the pointspread was available for com-

parison purposes) 1985–1993, all of the years after the salary cap 1994–2006, a time frame allowing for a four-year adjustment period 1998–2006, and the most recent sample of the post-2000 NFL (2001–2006). For each of the post-salary cap year groupings, a t-test for the differences in means was performed and the significance level of the t-test is included in parentheses under the period mean. In addition, significance at the 10 % level is noted by *-notation.

Averages are compared for pre-salary cap years to post-salary cap years, including all years after the cap (1994–2006), years after the cap allowing for an adjustment period (1998–2006), and the years in the post-2000 era. t-statistics are presented for the null hypothesis that the means of the eras are the same. Rejections of the null are indicated with a *.

Table 1: Measures of Competitive Balance in the NFL – Pre- and Post-Salary Cap

Time Frame	Standard Deviation of Win Percentage (Annual)	Average Pointspread (Annual)	Average Standard Deviation of Pointspread (Annual)
Pre-Salary Cap (1985–1993)	0.1910	5.6480	3.5665
Post-Salary Cap (1994–2006)	0.1876 (0.3486)	5.4491 (0.1678)	3.3837 (0.1520)
Post-Salary Cap 1998–2006	0.1931 (0.4095)	5.4496 (0.1785)	3.3278 (0.1088)
Post-Salary Cap 2001–2006	0.1912 (0.4938)	5.3134* (0.0658)	3.2162* (0.0574)

Notes: * t-test that post-salary cap era mean is significantly different than pre-salary cap era mean at a 10 % level.

As can be seen from the first column of Table 1, the standard deviation of win percentage measure of competitive balance has not statistically changed in the pre- and post- salary cap eras. The sample of years from 1994–2006 has a slightly lower standard deviation of win percentage compared to the pre-salary cap era (1985–1993), but it is not statistically significant. Allowing time for adjustment (1998–2006) or looking at only the most recent time frame (2001–2006) shows that the standard deviation of win percentage in the NFL has actually increased during the post-cap period. There is little evidence from

the standard deviation of win percentage measure that competitive balance has changed at all in the NFL.

Looking at the alternative measure of competitive balance, the average pointspread, the results support the notion that the NFL has actually become more competitive over time. In each category of post-salary cap years, there is a decrease in the average pointspread. Games are now expected to be closer, creating more uncertainty of outcome, which fans appear to prefer, and the NFL hopes to deliver. The average pointspread fell from 5.6480, before the salary cap, to 5.4491 after the salary cap. In the post-2000 period, the average pointspread in the NFL has fallen to 5.3134, which is statistically different from the pre-salary cap era, rejecting the null hypothesis of identical means a 10 % level. By this measure, the NFL has become more competitive.

Similarly, the standard deviation of the pointspread has also decreased over time. A smaller variance in pointspread suggests that teams are more evenly matched and there are fewer expected blowouts. These more competitive games are expected to increase fan interest and generate better ratings.

The standard deviation of the pointspread has fallen from 3.5665, in the 1985–1993 pre-salary cap period, to 3.3837 in the 1994–2006 period. The measure fell further to 3.2162 in the post-2000 period. In the 2001–2006 time frame, the standard deviation of the pointspread is statistically smaller than the pre-salary cap years, as the t-test for zero differences in means can be rejected at the 10 % level.

Overall, the new measure of competitive balance, the average pointspread, offers advantages over the standard deviation of win percentage on two fronts. First, the average pointspread itself, being an *ex ante* measure, looks at fans expectations of the outcome of each game, which offers a better picture of competitiveness than the simple *ex post* win-loss record (and its standard deviation). In addition, the standard deviation of the pointspread gives an idea of how closely grouped the NFL teams actually are, as a smaller standard deviation implies that there are likely to be fewer blowouts. This is important to the NFL for television viewership, as fans are more likely to tune in and to stay with the game as long as the outcome is in doubt. On both fronts, the average pointspread is an improvement over the *ex post* measure of competitive balance. In addition, both the average pointspread and its standard deviation have decreased since the salary cap, implying more competitive balance, while the standard deviation of win percentage measure has not statistically changed. These results more closely match public perception of the NFL as an extremely

competitive league, which is at least partially responsible for its popularity in the United States and elsewhere in the world.

Conclusions

This paper introduces a new measure of competitive balance in sports leagues, the average pointspread for individual games, and its standard deviation. The pointspreads, which are determined within a very liquid and active betting market in the United States and around the world, offer advantages over the traditional measure of competitive balance in the literature, the standard deviation of win percentage. The pointspread reflects fan perception *ex ante*, before the games are played, as opposed to the *ex post* nature of the standard deviation of win percentage measure. The *ex ante* information is of utmost importance in this market, as fan behaviour is influenced by their expectations of the upcoming games. The betting market provides an optimal and unbiased estimate of these expectations and therefore can be used to infer the beliefs of fans on the uncertainty of outcome and competitive balance.

Another advantage that the average pointspread offers over the standard deviation of win percentage is that it provides a forecast of how close the game is expected to be. While win percentages merely indicate how many games a team has won, the pointspread gives an *ex ante* prediction of whether the game is expected to be close or a blowout. This is likely what owners and league executives (along with economists) care about when they stress the importance of competitive balance. Therefore, the pointspread may be viewed as superior to the standard deviation of win percentage because it better reflects the goals of the league.

Comparing the pre-salary cap and post-salary cap NFL, the standard deviation of win percentage measure reveals no statistical difference between the eras. In some subsets of years after the salary cap, the standard deviation of win percentage is actually higher, implying a possible decline in competitive balance (but not statistically). The average pointspread and its standard deviation, on the other hand, have both decreased since the introduction of the salary cap. Since 2000, both the average pointspread and the standard deviation of the pointspread show statistically lower figures compared to the pre-salary cap years. This result is more in line with the common perception among the media and fans that the NFL is now a fiercely competitive league.

The use of the pointspread as a measure of competitive balance provides an example of how information generated by prediction (gambling) markets can be helpful in explaining the world around us.

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