Using Betting Market Odds to Measure the Uncertainty of Outcome in Major League Baseball

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Abstract: Betting market odds for Major League Baseball are used to examine the level of uncertainty of outcome and the perceived level of competitive balance. The efficient markets hypothesis cannot be rejected for the years 1990-2006 in Major League Baseball. Therefore, the odds provide an ex-ante measure of the uncertainty of outcome of baseball games in the minds of fans and bettors. The odds for both the American and National Leagues were shown to increase during the 1990s, implying a lower level of the uncertainty of outcome. Bettors and fans believed favorites in Major League Baseball were more likely to win during this time frame. Differences in the average odds, formed ex-ante, compared to win percentages, formed ex-post, help to explain the dichotomy found in Schmidt and Berri (2001) in relation to perception versus reality concerning competitive balance in Major League Baseball.

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Using Odds to Measure the Perceived Level of Competitive Balance in Major League Baseball

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Major League Baseball offers an interesting dilemma in terms of competitive balance. Schmidt and Berri (2001) show that the 1990s, using traditional measures of competitive balance based on win percentages, was the most competitive decade in the history of Major League Baseball. For the same timeframe, however, fans and the media believed baseball became much less competitive. This apparent dichotomy begs the question of how the field of economic research on sports could be so different from public perception. If the 1990s was truly the most competitive decade in baseball, why did the fans and media not recognize this?

One possible explanation is that economists are more acute observers of sporting events and fans in general cannot sort out more competitive play from less competitive play. This explanation may be appealing to economists, especially when sitting around at the sports bar, but does not offer insight into the source of this bias in judgment by fans and the media. Another possible explanation is that the term "competitive balance" means something different to the typical fans and media members who attend and watch countless baseball games. Their version of "competitive balance" may more closely

resemble the term “uncertainty of outcome”, a term familiar to economists that focuses on the doubt, or lack thereof, in the outcome of who will win a sporting event. The economic definition of competitive balance, on the other hand, uses win percentages of the teams, an ex-post figure, to measure competitive balance within leagues on an annual basis.

Although the economic definition of competitive balance is quite useful, there are many reasons to consider that the fan/media definition of competitive balance may be much more useful and important. First, expectations of the uncertainty of outcome are formed ex-ante, when consumer (fan) decisions take place. These decisions include purchasing tickets to the game and the choice to watch the game on television. These decisions are ultimately the most important factors to the league, its teams, television networks, and their advertisers, who are all attempting to maximize profits. Current measures of competitive balance may capture the desires of fans to see close games, but it only can do this after the games have actually been played.

Given understanding fan preferences would be advantageous before games are played, the question remains if there is a way to measure the uncertainty of outcome (the perceived level of competitive balance), before games are actually played. Thankfully, there exists a market that estimates this perceived level of competitive balance. This market is the betting market for Major League Baseball. Odds that exist on baseball games serve as a proxy for the uncertainty of outcome of games. The higher the average odds (in absolute value – as bettors must lay more than a dollar to win a dollar), the more certain the outcome of the game appears. The closer the odds are to even money propositions, however, the more uncertainty of outcome there is in baseball games. The

use of betting lines to estimate the uncertainty of outcome in games is not new as it was used in attendance studies of baseball (Knowles, et al, 1992 and Rascher, 1999) and was directly suggested as a measure of uncertainty of outcome for soccer in Peel and Thomas (1988, 1992) and Forrest and Simmons (2002).

In the past, there has been the specter of market inefficiency as it relates to the baseball betting market. Woodland and Woodland (1994) found a reverse favorite-longshot bias, where favorites were overbet. When correcting for the proper specification of a unit bet, however, as performed in Gandar, Zuber, Johnson, and Dare (2002), the reverse favorite-longshot bias was no longer found in general in the baseball market. If the betting market for Major League Baseball cannot reject the null hypothesis of efficient markets, then the odds give a good representation of the prediction of the outcome of a game. Therefore, the average odds would give a good measure of the uncertainty of outcome. If this measure of uncertainty of outcome reveals something different about market perceptions of baseball games compared to ex-post measures of competitive balance it will help to explain the difference between the findings of Schmidt and Berri (2001) and the general expressed perceptions of the baseball-watching public.

II. Efficient Markets and the Reverse Favorite-Longshot Bias in Baseball

Before proceeding to use baseball betting odds as a measure of the uncertainty of outcome and the perceived level of competitive balance, it is necessary to test whether the betting odds themselves represent an unbiased and optimal prediction of the outcome

of the game. To do this, we test the betting market for Major League Baseball from 1990-2006 compared to the results expected under the efficient markets hypothesis.

In previous research on baseball betting markets, a reverse of the favorite-longshot bias was found in betting markets that use odds rather than pointspreads. The bias was first noted by Woodland and Woodland for Major League Baseball (1994) and the National Hockey League (2001). In both of these leagues, Woodland and Woodland found that favorites were overbet and underdogs were underbet, the opposite result of what was seen in the horse racing studies.

Gandar, Zuber, Johnson, and Dare (2002) and Gandar, Zuber, and Johnson (2004) corrected the studies of Woodland and Woodland in baseball and hockey, respectively, for the proper definition of a unit bet on the favorite and the underdog. In baseball (Gandar, Zuber, Johnson, and Dare, 2002) the reverse favorite-longshot bias was no longer found to be significant, while in hockey (Gandar, Zuber, and Johnson, 2004) the bias was still found to be significant, although less pronounced. Gandar, Zuber, Johnson, and Dare (2002) and Gandar, Zuber, and Johnson (2004) also noted that the bias is not strictly along the lines of favorite/longshot, but also a bias in terms of whether the favorite is playing at home or on the road. In general, it appears that road favorites are significantly overbet in these markets.

Using the betting simulations test outlined in Woodland and Woodland (1994) and updated for the proper use of a unit bet by Gandar, Zuber, Johnson, and Dare (2002), we test the returns to simple strategies of betting the underdog (for the sample as a whole and for subsets of road underdogs and home underdogs) compared to the results expected under the efficient markets hypothesis. In addition, we use the distinction of slight

(underdog odds of less than 1.60) and heavy (underdog odds of greater than or equal to 1.60) underdogs. For each grouping, the number of observations, returns (assuming a one dollar bet), expected returns (assuming efficient markets), and a z-test that actual returns are equal to expected returns. Results are shown in table I below.

Table I: Betting Simulations Testing Efficient Markets in the Baseball Gambling Market 1990-2006

All Underdogs 1990-2006	N	Returns	Expected Returns	Z-Statistic
All	35974	-0.0096	-0.0187	1.4772
Slight	28611	-0.0102	-0.0189	1.3433
Heavy	7363	-0.0074	-0.0175	0.6322
Road Underdogs 1990-2006	N	Returns	Expected Returns	Z-Statistic
All	25284	-0.0010	-0.0184	1.1303
Slight	19228	-0.0069	-0.0187	1.4566
Heavy	6056	-0.0197	-0.0175	-0.1226
Home Underdogs 1990-2006	N	Returns	Expected Returns	Z-Statistic
All	10690	-0.0087	-0.0194	1.5076
Slight	9383	-0.0168	-0.0196	0.2492
Heavy	1307	0.0496	-0.0173	1.7831*

Note - * denotes rejection of the null hypothesis of efficient markets at the 10% level.

In the overall results for the Major League Baseball gambling market from 1990-2006, results are similar to those found in previous seasons by Gandar, Zuber, Johnson, and Dare (2002) as the null hypothesis of efficient markets cannot be rejected for the sample as a whole. Groupings of slight and heavy underdogs in the overall sample also do not reveal rejections of the efficient markets hypothesis. Losses on underdogs are

slightly lower than expected, although still negative for each grouping in the sample of all games[1].

In relation to the home/road distinction noted by Gandar, Zuber, Johnson, and Dare (2002), road underdogs were not found to reject the null of efficient markets. For home underdogs, only heavy home underdogs were found to earn positive profits during this time frame, with a z-statistic that rejects the null hypothesis of efficient markets at the 10% level.

Overall, the odds appear to represent a good forecast of the outcome of baseball games. The efficient markets hypothesis could not be rejected for any of the overall samples from 1990-2006, with only the small subset of games with home underdogs managing to reject the null at a 10% level. Therefore, we will use the odds on baseball games as a measure of the uncertainty of outcome and the perceived level of competitive balance within the league.

III. The Baseball Betting Market and Uncertainty of Outcome

Given the results of the efficient markets tests in the previous section, where the null of efficient markets could not be rejected for the Major League Baseball gambling market, we will now proceed to use these odds as a measure of the uncertainty of outcome of baseball games. Betting odds are formed in a market, where bettors wager on either team against posted odds by sportsbooks. These bettors likely consist of

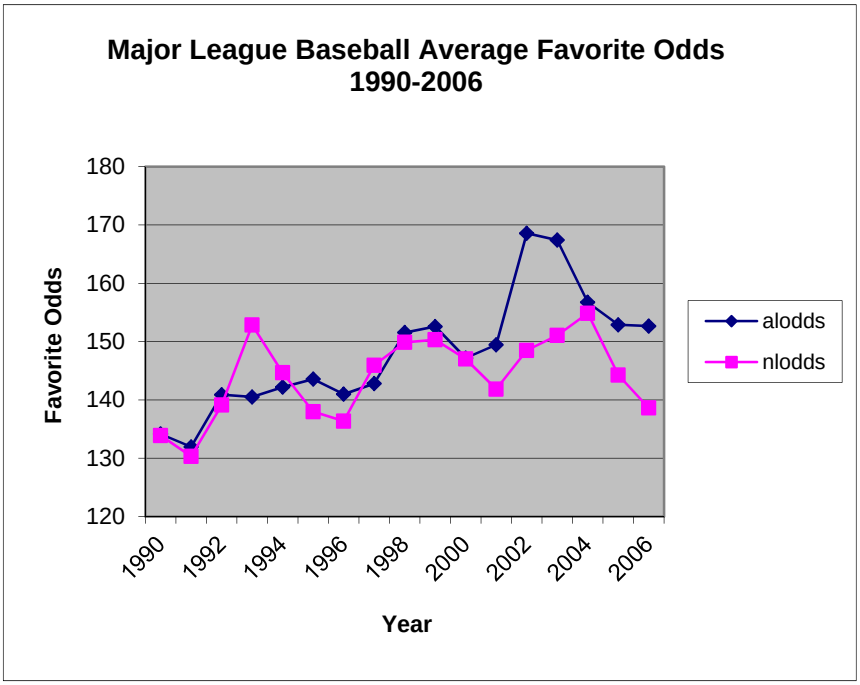
[1] The results for 1990-2006 are similar to those found in the 1978-1989 sample used by Gandar, Zuber, Johnson, and Dare (2002) in that the win percentages of underdogs are slightly higher (although not statistically significant) than the returns implied by efficiency. Given the z-tests are dependent upon sample size, larger samples may still reveal significant results if future baseball results are similar to current and past results.

individuals who closely follow the sport of baseball and also include a multitude of fans of this sport across North America and the world. Odds on baseball games are publicly available to all sports fans, not only gamblers, through publications such as the *USA Today*, many local newspapers, and various websites on the internet.

Observing the betting odds for baseball games may shed some insight into the findings of Schmidt and Berri (2001) and the related comments of the media and fans. Although Schmidt and Berri (2001) found Major League Baseball to be quite competitive during the 1990s, fans and the media thought otherwise. Fans in general perceived baseball as becoming much less competitive during this time frame. What they actually could have been implying, however, is that the perceived level of uncertainty of outcome has lessened during this timeframe. If the uncertainty of outcome of baseball games have changed during the 1990s (and beyond), this will likely be captured in the betting market odds. Games where there are big underdogs (heavy favorites) have a low level of uncertainty of outcome. Games where the odds are closer to even money imply a greater level of uncertainty of outcome. The use of odds as a measure of uncertainty of outcome has been used before in English Soccer (Peel and Thomas, 1988 and 1992; Forrest and Simmons, 2002).

To illustrate how the uncertainty of outcome, as measured by the betting market odds, has changed over the course of our sample, consider the following chart. This chart plots the average favorite odds (in absolute value terms) for each season from 1990-2006. The chart shows the odds in the American League (AL) and the odds in the National League (NL).

Chart 1: Major League Baseball Average Favorite Odds 1989-2006

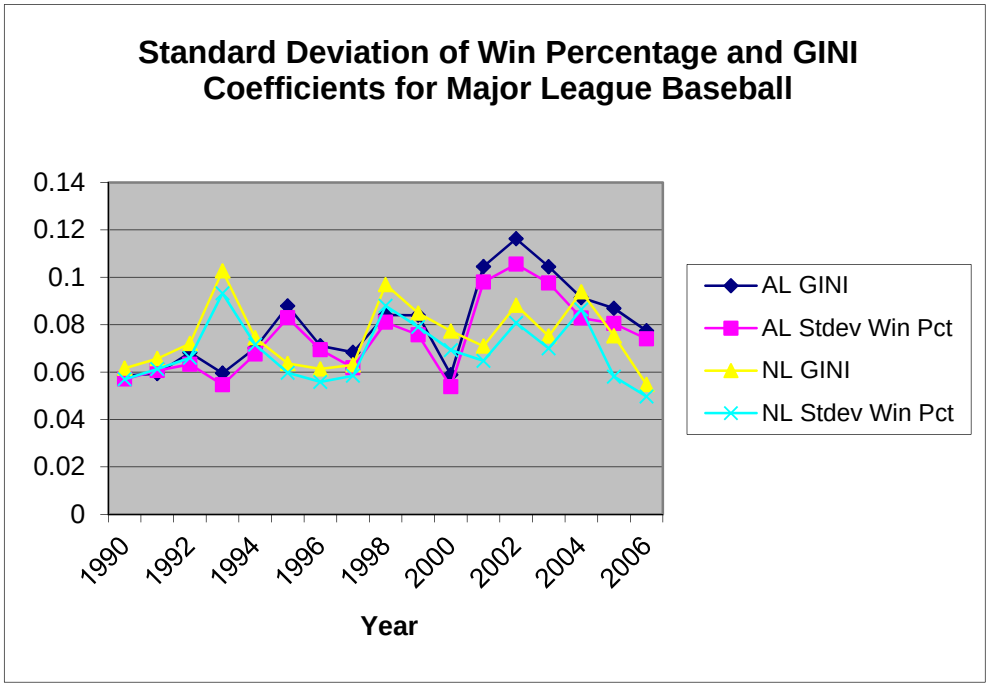


As can be seen in chart 1, the odds on both American League and National League games steadily increased during the 1990s. Both AL and NL odds rose from the low 130s (for odds on the favorite) to slightly above 150, representing a 15% increase in favorite odds. These odds spiked even higher in the early 2000s, with AL odds reaching an average of nearly 170 and NL odds reaching a peak of around 150. In the mid-2000s, however, these odds have settled back down into the low 150s for the AL and low 140s/high 130s for the NL.

Assuming these odds represent the expectations of bettors and fans concerning the outcome of baseball games, it can be seen that fans became increasingly confident in the certainty of outcome of baseball games in terms of the favorite. Actual results do not bear out these beliefs, as noted in measures of competitive balance in Schmidt and Berri

(2001). For comparison purposes to the previous chart, the standard deviation of win percentage and the GINI coefficient on win percentage are shown for both the AL and the NL in chart 2.

Chart 2: Standard Deviation of Win Percentage and GINI Coefficients for AL and NL 1989-2006



Although stable early in the 1990s, spikes occurred in the standard deviation of win percentage and the GINI coefficient in the NL and AL at slightly different times in the mid-1990s before immediately settling back into the levels seen in the early 1990s. By the end of the 1990s, however, a major increase in the standard deviation of win percentage and GINI coefficients occurred and continued into the early 2000s. The AL, with the Red Sox and Yankees rivalry as the driving force, saw the biggest increases (meaning less competitive balance), but the NL increased as well. By the mid-2000s,

however, the levels of the standard deviation of win percentage and GINI coefficients dropped to the level of the late-1990s in the AL and below the lows of the early-1990s in the NL.

Although the ex-post measures of competitive balance were reasonably stable in the 1990s and were shown as historic lows in these averages by Schmidt and Berri (2001), the average odds on baseball games steadily increased. The odds, therefore, give a useful measure of how perception has differed from reality in Major League Baseball. The betting market-based odds provide a measure of the uncertainty of outcome, which has increased during this time frame. The uncertainty of outcome measure affects the *perceived* level of competitive balance in the minds of fans and the media, explaining the dichotomy noted between the actual results and the beliefs of fans and the media.

IV. Conclusions

In an attempt to explain the difference between perception and reality about competitive balance in Major League Baseball, the difference between the perceived level of competitive balance, often thought of by economists as the "Uncertainty of Outcome", and actual competitive balance, as measured ex-post by win percentages, was explored. A way to measure the uncertainty of outcome, and hence, the *perceived* level of competitive balance, was suggested to be the average favorite odds formed in the betting market for Major League Baseball. The average odds represent the ex-ante expectations of bettors and fans of the outcome of upcoming games. The higher the

odds, the more certain fans are of the outcome of the game. The closer the odds to even money propositions, the more uncertainty of outcome there are in games.

The baseball betting market was originally thought to have a reverse favorite-longshot bias (Woodland and Woodland, 1994). This bias implies that favorites are overbet which, for the case of uncertainty of outcomes, means that fans believe the league is less competitive than actual game results reveal. This bias was shown to be a byproduct of an improper measuring of a unit bet by Gandar, Zuber, Johnson, and Dare (2002), and a general reverse favorite-longshot bias was shown not to exist implying more faith in the efficiency of this market. When the efficient markets hypothesis cannot be rejected, the odds can be taken as an optimal and unbiased predictor of the outcome of the game.

For the sample studied in this paper, 1990-2006, which includes seasons immediately after the data set used in the studies of Woodland and Woodland (1994) and Gandar, Zuber, Johnson, and Dare (2002), the reverse favorite-longshot bias was not shown to exist, even with the proper accounting of a unit bet, for the sample as a whole. The only subset where the null of efficient markets could be rejected at the 10% level was for the small group of heavy home underdogs. Therefore, given the efficient markets hypothesis could not be rejected, we use the gambling market odds for baseball as a measure of the expected uncertainty of outcome in baseball games.

These findings help to explain the difference between perception of competitive balance and actual competitive balance as noted by Schmidt and Berri (2001). Schmidt and Berri (2001) showed the 1990s to be the most competitive decade in baseball history, but pointed out that media and the fans did not believe this to be the case. In observing

the betting market odds in relation to this timeframe, it can be seen that betting market participants did believe the league to be less competitive. Odds on the favorite increased in both the American League and the National League during these years.

By measuring the uncertainty of outcome through betting market odds, the perception of the fans and the media can be measured along with the actual results of competitive balance as found by the ex-post measures using win percentages. The odds represent the perceived level of competitive balance of the public and can be used to estimate the difference between the actual state of baseball and its perceived state with respect to competitive balance. This perceived level of competitive balance may ultimately be useful to Major League Baseball and to economists who study the league due to the financial decisions of fans being ex-ante in nature, rather than ex-post. These financial decisions (including the purchasing of tickets, viewing of televised games, buying of licensed merchandise, etc.) are more likely to be based on pre-game fan perception concerning the uncertainty of outcome, rather than ex-post measures of competitive balance.

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