Beyond Moneyball
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I. ABSTRACT

This study provides an updated test of Billy Beane’s Moneyball hypothesis using a panel model over the years 1999-2013. We regressed winning percentage as a function of the original Moneyball variables, which included on-base percentage, slugging percentage, on-base percentage against and slugging percentage against. In turn we created our own model which replaced the “against” statistics with owned run average and fielding percentage. Within both models, we concluded that the coefficient of on-base percentage was significantly greater than slugging percentage, which supports Beane’s theory that in today’s game on-base percentage is more important than slugging in determining winning percentage. These conclusions can be used by major league managers and owners to decide which players to trade for or to pick up in free agency.

II. Empirical Model and Variables

(Bean’s Model): \( \text{WIN} = \beta_0 + \beta_1 \text{OBP} + \beta_2 \text{SLUG} + \beta_3 \text{AGAINST} + \beta_4 \text{SLUG AGAINST} + \epsilon \)

(Klopp/Munson Model): \( \text{WIN} = \beta_0 + \beta_1 \text{OPS} + \beta_2 \text{SLUG} + \beta_3 \text{FEILD} + \epsilon \)

\( \text{WIN} \) = Winning Percentage - Percentage of wins vs losses
\( \text{OBP} \) = On-Base Percentage - Percentage of times a batter gets on base per plate appearance
\( \text{SLUG} \) = Slugging Percentage - Number of total bases (single = 1, double = 2, triple = 3, home run = 4) divided by the total number of at bats
\( \text{AGAINST} \) = On-Base Percentage Against - Percentage of times the opposing team’s batters get on base per plate appearance
\( \text{SLUG AGAINST} \) = Slugging Percentage Against - The total bases the opposing team’s batters get on base divided by their total number of at bats
\( \text{ERA}_9 \) = Earned Run Average - The total amount of Earned Runs given up by a team per 9 innings
\( \text{FEILD} \) = Fielding Percentage - The percentage of times players in the field properly field a hit
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\(*\) season years 1-4 season years

III. Theory and Hypothesis

OBP is hypothesized to have a positive relationship with WINS. As more players get on base, more runs will be scored, resulting in a greater chance of winning.

SLUG is hypothesized to have a positive relationship with WINS. The more runs you get to with each hit, the more likely you are to score, resulting in a greater chance of winning.

OBP AGAINST is hypothesized to have a negative relationship with WINS. The more your opponent gets on base, the more likely they are to score, reducing your chance of winning.

SLUG AGAINST is hypothesized to have a negative relationship with WINS. If your opponent gets more bases with each hit, the more likely they are to score, reducing your chance of winning.

ERA is hypothesized to have a negative relationship with WINS. The lower this number is, the fewer runs a team allows on average. The fewer the number of runs allowed, the greater the chance a team has at winning the game.

FEILD is hypothesized to have a positive relationship with WINS. The more often a ball is fielded without making an error, the fewer runs a team will allow, resulting in a greater chance of winning.

IV. Data

Panel model data set of all 30 MLB teams over 15 years (1999-2013)

Sample size: 450

Data Limitations:
- Due to the highly statistical nature of baseball we had to limit on data in finding sufficient data for our project.

Data Sources:
- ERA, OBP, SLUG, and FEILD data all came from BaseballReference.com
- OBP AGAINST and SLUG AGAINST data came from both ESPN.com and MLB.com

V. Empirical Results

Bean’s Model

Klopp/Munson Model

VI. Conclusions

- As indicated by the adjusted R², 95.8% of the variation in WINS is explained by the Klopp/Munson model. The Bean’s model’s adjusted R² is less at 85.1%.

- On-Base Percentage is significantly more important in determining winning percentage than is slugging percentage in both Bean’s model and the Klopp/Munson model.

- We tested for the effects of the 2005 steroid ban on the importance of OBP and SLUG in determining winning percentage and found no statistically significant implications of the ban.

- We determined that the Klopp/Munson Model predicts winning percentage better than Bean’s does.