

Using the Simulator

The simulator designed for use with this project can be accessed **at no cost** at

<http://moneyballsimulator.info> by clicking the Simulator tab, then selecting the “Online Simulator” option. It is designed to be used in a modern web browser on any operating system.

The data for the free agents from the most recent (completed) offseason is provided through the simulator automatically, and is updated at the start of each MLB regular season by the authors.

Important Note for Instructors: Your students should come to class on simulation day prepared with data collected on all free agents prior to the draft. They should have a draft board (a ranked ordering of players) that is at least as long as 9 times the number of teams in the simulated league, because they may end up drafting in the final position in the final round (round 9), and need to be ready for that contingency! The draft board should contain a player’s name, on-base percentage, slugging average, and salary (minimum salary if unsigned), so that students know the impact of each selection on their ability to select other players.

Opening the simulator program will present the user with options to choose the number of teams and salary cap, respectively. This screen is presented in Figure 1. A season can be simulated with as few as two or as many as ten teams, and with salary caps ranging from \$20 Million to \$40 Million in increments of \$5 Million. After making selections, the instructor advances by using the “Start Simulation!” button at the bottom of the screen. The application

can be restarted at any point by clicking the browser refresh button, but **will not retain any information from the previous simulation.**

When the simulation is started, the draft process begins. There are nine rounds to the draft. The teams of students will select nine players to field a complete batting lineup. Each team will choose one time during a given round, and the order of the teams is determined randomly, with teams sorted in the draft table based on order in the first round. The team that picks first in one round will pick last in the following round, and the positions of all other teams are also inverted from one round to the next. Teams are not permitted to select a player that was already chosen by another team (previously drafted players will no longer appear in the selection menu). Teams are permitted to make one selection per round until they exceed the salary cap chosen by the instructor. If the salary cap is exceeded by a team, then all subsequent selections are forfeited, and the team is filled out with Mendoza Players at the league minimum wage of \$535,000.¹ The draft continues until all teams have nine players. The draft menu is shown in Figures 2 and 3 at various stages of the draft.

Once the draft is complete, the simulator presents the total offensive index for each team, which will be used in simulating the outcomes of the regular season and the playoffs. This screen is presented in Figure 4. Selecting "Simulate Season" will advance the simulator to the results of the regular season.

1 This number was chosen for being the 2017 minimum salary in Major League Baseball, but the true figure changes from year to year.

As seen in Figure 5, the next screen displays the win percentage (from 0 to 1) for each team following the simulated season. These results are used to determine the seeding for the post-season tournament. Clicking "Simulate Playoffs" will advance the simulator to the playoff bracket.

The playoff bracket will appear, showing each round's participants as far as that can be determined. The bracket for an eight-team playoff is shown in Figure 6. The instructor clicks the "Continue" button to advance to the next round of the playoffs. This will fill in the results of the current round of the playoffs (each round is simulated as 7 games), and populate the teams for the following round. The instructor should repeat this process until a champion has been crowned (see Figure 7). After the final round in the playoffs (the "Championship Series"), the instructor can click the browser refresh button to return to the first menu.

Welcome to the Moneyball Simulator!

Please indicate the number of teams competing in the simulation:

2 Teams ▾

Select the salary cap for the simulation:

\$20 Million ▾

Note: At this time, all simulations include playoffs

Start Simulation!

Moneyball Simulator by [Dusty White](#) and Jadrian Wooten. The project is licensed [CC BY NC SA 4.0](#).

Figure 1: Simulator Main Menu

Player Selection

You have selected to play with 8 teams, and a salary cap of \$35 Million.

Current Round: 1

Team Number	OBP	SLG	Payroll	Status
3	0	0	0	On the clock!
4	0	0	0	On Deck
7	0	0	0	On Deck
2	0	0	0	On Deck
8	0	0	0	On Deck
5	0	0	0	On Deck
1	0	0	0	On Deck
6	0	0	0	On Deck

1 - Mendoza Player 

Submit Pick!

Figure 2: Draft Menu (start of draft)

Player Selection

You have selected to play with 8 teams, and a salary cap of \$35 Million.

Current Round: 4

Team Number	OBP	SLG	Payroll	Status
3	0.365	0.525	\$22,050,000	On Deck
4	0.318	0.378	\$35,535,000	On Deck
7	0.378	0.489	\$28,250,000	On Deck
2	0.366	0.511	\$32,250,000	On Deck
8	0.340	0.403	\$22,000,000	On the clock!
5	0.340	0.518	\$32,285,000	Selected
1	0.344	0.489	\$37,100,000	Out of Money!
6	0.362	0.484	\$27,650,000	Selected

26 - Jason Kipnis 

Submit Pick!

Figure 3: Draft Menu (middle of round 4, some teams have run out of salary cap space and can no longer make selections)

Draft Results

Based on the players selected in the draft, team performance is projected as follows:

Team Number	OBP	SLG	Payroll	Team Index
1	0.271	0.342	\$40,845,000	0.884
2	0.301	0.387	\$45,040,000	0.989
3	0.305	0.407	\$39,690,000	1.02
4	0.273	0.326	\$38,745,000	0.872
5	0.316	0.423	\$36,275,000	1.06
6	0.311	0.387	\$38,540,000	1.01
7	0.351	0.434	\$36,360,000	1.13
8	0.301	0.365	\$37,640,000	0.968

Simulate Season

Figure 4: Draft Results and Team Statistics Table

Simulated Season Results

Each team plays each opponent 10 times, resulting in the following outcomes.

A team's win probability in each simulated game is calculated with the following equation:

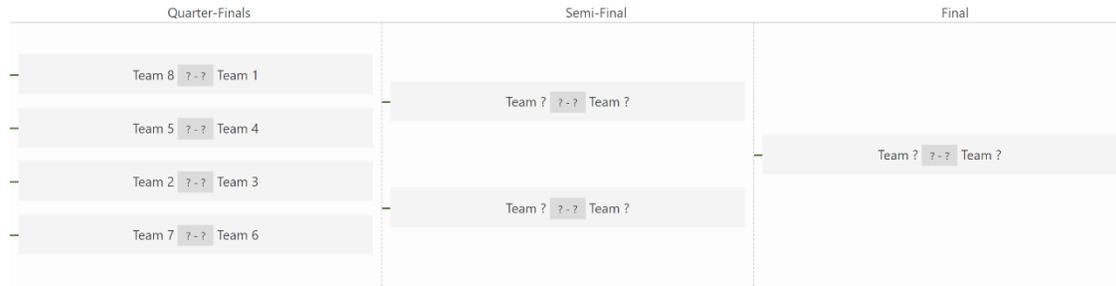
$$\text{Pr}(\text{win}) = 0.5 + 2.032 * (\text{OBP}_{\text{team}} - \text{OBP}_{\text{opponent}}) + 0.9 * (\text{SLG}_{\text{team}} - \text{SLG}_{\text{opponent}})$$

Team Number	Wins	Losses	Win Percentage
1	32	38	0.457
2	28	42	0.400
3	45	25	0.643
4	23	47	0.329
5	47	23	0.671
6	30	40	0.429
7	41	29	0.586
8	34	36	0.486

Simulate Playoffs

Figure 5: Simulated Season Results

The Results of the Tournament



Simulate Round

Figure 6: Playoff Bracket (prior to first round)

The Results of the Tournament



Team 5 is the Champion!

Figure 7: Playoff Bracket (after final round)