How long of a season does it take before talent beats chance?

Talent beats luck...when there is a large sample size. How many games would need to be played for the regular-season champion to align with the most talented team every year?

Daniel Meyer Oct 17, 2014, 9:00am EDT

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In a few days the Royals will appear in their first World Series since 1985, and the Angels will watch on TV. This exciting post season run by the good-not-great Royals, Cardinals, and Giants has led many fans to an existential crisis. "What is the point of it all?" and "Why even play 162 games?" are questions being thrown around as we all lament the reality of a World Series without Mike Trout or Clayton Kershaw.

At this point we all know the playoffs are a crapshoot, but what about the regular season? Tom Tango posted the question last week: How many regular season games would need to be played for the best true-talent team to finish with the best record? Curious, I built a simple simulation to test that very question.

Setup

This is the first baseball simulation I have ever created so bear with me. If you would like to skip to the results you have my blessing, but if you care about the assumptions and simplifications I had to make please read on.

My theoretical league will be populated with 30 teams, each of which has a true talent runs scored and runs allowed per game ranging from 3.25 to 4.75. This spread is very close to the spread observed over the last few seasons. Each team was assigned random true talent levels, but to assure that the league average talent levels of runs scored equaled that of runs allowed I created teams in pairs such that for every team with RS = X and RA = Y there was another team with RS = Y and RA = X.

Now that we have our 30 teams and know their true talent levels, we need to figure out how we will simulate a game. To do this I used an absolute Gaussian distribution scaled to average that team's true talent level. These histograms show that while this is not a perfect way to model runs scored in a game, it is pretty close.

The first chart shows the distribution of actual runs scored for the home team in 2013 with a mean of 4.19. The second chart shows the distribution of runs scored using my Gaussian approximation and a true talent level of 4.00. There are non-trivial differences, but as the commissioner of this league I deem it good enough. To simulate a game I simply call to get a runs scored and a runs allowed from this distribution and the teams true talent levels. If the team scored more than they allowed they would get credit for a win.

Now that we have a mechanism to simulate a game, we can simulate a season by simulating a game multiple times. To start we will use 162, but later we will tinker with season length to see just how many games it takes.

Finally, to run a simulation we just need to play out a full season thousands of times and tally up how often the best true-talent team ended with the best record.

Results

So how often does the most talented team finish with the best record? Unfortunately it is not so clear-cut. As you might imagine, it depends a great deal on just how *much* more talented the best team is than everybody else. In our standard case we will look at a simulation that turned out a batch of teams with the most talented team having a true-talent run differential of 1.05 and the next best team having a true-talent run differential of .93. This is about what the separation between the A's and the Angels was this year. Here are the top five and bottom five teams in our standard case league.

Rank	True-Talent Run Differential
1	1.05
2	.93
3	.93
4	.77
5	.74
-	-
26	-.74
27	-.77
28	-.93
29	-.93
30	-1.05

In 1,000 different 162-game seasons our number one team won the regular season cup 24.9% of the time. This makes the regular season feel like less of a measure of talent than we thought. If we doubled the season length to

324 we see the proportion nudge to 33.7% of the time. For the most talented team to have the best record half the time we need to double the season length twice more. With a 1,000 game schedule the most talented team had the best record 53.7% of the time. To get to 90% we would need a 10,000 game schedule! If we double once more we almost get to 99%; a 20,000 game schedule yields a match 98.1% of the time. The results are summarized in this table and scatter plot, which show a clearly non-linear relationship.

Games	Proportion of Matches
162	24.9%
324	33.7%
500	40.2%
1,000	53.7%
2,000	63.9%
5,000	79.8%
10,000	91.0%
20,000	98.1%

What if the best team is far and away the most talented? Another simulation yielded a best team that had a run differential nearly 25% higher than the next best team. Again here are the top and bottom five teams.

Rank	True-Talent Run Differential
1	1.34
2	1.06
3	.84

4	.80
5	.79
-	-
26	-.79
27	-.80
28	-.84
29	-1.06
30	-1.34

When the best team has this type of separation from the rest of the league in a 162 game season, they will have the best record 36.3% of the time. In double that they are already over 50% and in 5,000 games they win nearly every season.

Games	Proportion of Matches
162	36.3%
324	50.2%
500	63.8%
1,000	83.7%
2,000	93.8%
5,000	99.5%
10,000	100%
20,000	100%

And the case where there is no clear best team? A third simulation yielded a league where the two best best teams had the same run differential to the third decimal.

Rank	True-Talent

	Run Differential
1	1.03
2	1.03
3	1.02
4	.79
5	.79
-	-
26	-.79
27	-.79
28	-1.02
29	-1.03
30	-1.03

This tight pack resulted in a much slower climb and an asymptote at around 50%.

Games	Proportion of Matches
162	18.8%
324	23.0%
500	26.1%
1,000	31.6%
2,000	38.3%
5,000	42.6%
10,000	46.6%
20,000	51.0%

Conclusion

Regardless of the talent spread of the league, it's going to take a lot more games than there is time available before we start to see the most talented team winning the regular season. The likelihood that the best team survives the randomness of October and goes on to win the World Series Trophy is even bleaker. While all this randomness may be unsettling, I don't think anybody is calling for a 20,000 game season, so let us enjoy this great October for what it is: exciting baseball.

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All data used is courtesy of Retrosheet.org