Research Report #5: “Clutch Hitting”

Ashley Robinson

Problem Description

The idea of a “clutch hitter” stirs up a lot of debate within the sabermetrics community, but this report will be attempting to give strength to one side of the argument through research and statistical analysis. This report is going to investigate the statistical concept of “clutch hitting”. There has been a lot of research and experiments that have been performed both supporting and challenging the idea of “clutch”.

Analysis Technique

The idea of “clutch hitting” is a very controversial topic that has been up for debate for decades. There are researchers and mathematicians who have done experiments that support both sides of the argument. Researchers will agree that “clutch hitting” can be defined as situations where the game is on the line and a player comes through to make a play that brings success to their team. (This is a very vague, yet accurate definition) Researchers that have stated that “clutch hitting” does not exist state that there is not enough evidence to prove that it does. But on the other hand, there are researchers that find enough variance in non-clutch and clutch performances amongst players that it suggests that “clutch hitting” does exist.

“Clutch usually is defined as the extent that players change their performance, for better or worse, in high leverage situations. High leverage situations are the most critical moments in games, based on number of runners on base, the score, the number of outs, and the inning of the game” (Sabermetrics, 2012). “Leverage index is a mathematical model of how much more important that late-game situation is” (Carleton). From the article, “In Search of Clutch Hitting”, written by Tom Ruane from the retrosheet website, Ruane conducted an experiment with data that included players whom were thought to be the best “clutch hitters” in the MLB from the years 1960-2004 (Ruane). Ruane compared the hitting percentages of the batters in certain situations of the game: runners in and out of scoring position, runners on base, zero, one, or two out situations, as well as late inning pressure situations. He found that these “clutch hitters” did not tend to perform better in the “clutch” situations as they were expected to. The batting averages and slugging percentages were actually slightly lower when runners were in scoring position compared to their other at-bats. Ruane used what he called the “clutch percentage” which is the difference between the BPS (batting average plus slugging percentage) when runners are in and out of scoring position. He found that this “clutch percentage” was extremely low for hitters that were known to make “clutch” plays when the game was on the line. It was expected that these percentages would be higher when the game was on the line, because that is what we define as “clutch”. Ruane concluded that he did not find much

evidence at all for the concept of “clutch hitting”, considering the “best clutch hitters” in the game did not show any signs of “clutch hitting”.

On the other side of the argument, an article from foxsports written by Russell Carleton, poses the idea that “clutch hitting” might just exist. He explains that clutch hitting is the ability to perform during high leverage situations. The leverage index is a mathematical model that shows how much more important a late-inning situation is than the other less crucial situation. Here is the method he used:

“I examined how, for each player, the leverage of a situation affected his tendencies to swing at the first pitch. There's a separate regression equation for Daniel Murphy, David Murphy and Donnie Murphy. Since every plate appearance has a first pitch and the count is always 0-0 when it happens, I'm able to hold a few things constant. But my program runs a logistic regression looking only at Daniel's at-bats and what he did in them, creates an equation describing his behavior, and then does it again for David, and again for Donnie.

I then took each equation and calculated the chances that each player would swing at a first pitch when the leverage index was 1 (average) and 2 (a situation twice as important as the average situation). Then, I subtracted the two and got a rough indicator of how high leverage began to affect a player (at least on this one behavior). I used a minimum of 250 plate appearances in a season and looked at players from 2009 to 2013. In the past, I'd found that clutch, as described above, had a year-to-year correlation of .074. (I used a method known as auto-regressive intra-class correlation.) For this group, across the five years, the ICC was .30. That's not huge, but we call home runs a true outcome for pitchers with year-to-year correlations in the same neighborhood. I termed this difference between predicted first-pitch swing rate "swing difference”. Some players swing a lot more when the leverage goes up. Some barely notice. A few start to freeze.

Next, I wanted to see if swing difference predicted changes in outcomes. For the years 2009 to 2013, I used the log-odds ratio method (which I have used multiple times before) to create a predicted percentage that each plate appearance would end in a strikeout based on the batter A’s and pitcher A’s usual rates in that area. I did the same for walks and singles and home runs and the rest of it. Next, I looked at all plate appearances in which a batter with 250 plate appearances in that season faced a pitcher with 250 batters faced in that season. I created a binary logit regression in which I had my predicted percentage of a strikeout (for the initiated, expressed in a log of the odds ratio), and then entered in the leverage index for each plate appearance, the swing difference stat for the batter and the multiplicative interaction of swing difference and leverage.

This type of analysis, called a moderator analysis, is well-suited to answering the "clutch question”. If certain players have some sort of clutch factor (and here, we are using swing difference as a rough measure of clutch) then as leverage increases, we

would expect to see those who are higher on this clutch factor to show greater increases (or sharper decreases). That's what the interaction term between swing difference and leverage does. If it's significant, it means that as leverage goes up (or down), the effect it has will depend, at least in part, on that clutch factor.

What I found is that for hitters who show more of an effect on swing difference (leverage makes them swing at the first pitch more), they were less likely than expected to walk and less likely to strike out as leverage went up. Instead, they showed higher rates of both extra base hits and outs in play.

Before we go further, the careful observer will note that there's a certain tautology that goes along with these analyses. I think it doubles as both a feature and a bug. A batter who is more likely to swing at the first pitch in high-leverage situations is probably just more likely to swing in high-leverage situations. It's no wonder he sees a drop in his expected walk rate (and in some sense his expected strikeout rate). And if we're saying that his swing rate drops because of leverage (or at least in accordance with leverage), then it's not surprising that the effect appears." (Carleton).

In conclusion, he states, "Clutch is likely some combination of ability to deal with pressure combined with some particular change in approach, whether conscious or unconscious, that results in slight variations from what we might otherwise expect… These analyses may not completely prove that clutch ability exists, but they do lay what I hope is a foundation for how we might continue the search" (Carleton)

The article from retrosheet and the article from foxsports took two completely different approaches to the "clutch" problem, one much more in depth than the other. The conclusions were different, but this goes to show that there is a lot of debate regarding whether or not "clutch hitting" is real or not. I will attempt to make a stride towards a clear answer with my own research and experiment.

While researching the topic of "clutch hitting" I came across an article from the SABR website that posed the suggestion of using college baseball data rather than MLB data in order to search for "clutch hitting". The SABR article explained that there are not enough variances in MLB data for the concept of "clutch hitting" to appear. The sample variance in MLB is very, very low because professional baseball players are the elitists of the elite and their performances do not vary drastically enough to notice a change that would easily point to "clutch hitting". College teams are required to fill a roster and sometimes that means bringing in some guys that have questionable skills and attitudes. The sample variance of MLB data is much too law to find any evidence for "clutch hitting"; any dip in a player's performance could result in him being moved down to the minor leagues. Although college baseball data will have enough variance to possibly show evidence of clutch hitting, there are issues with the data. NCAA Division III baseball data does not have the depth and detail that retrosheet MLB data has. I will be using the data provided by Webster University for the baseball team. This data does not include all of the situational analyses, like late inning situations, that would be very helpful when assessing "clutch hitting". Where

the concept of "clutch hitting" may exist, there is not enough data. Where there is enough data, there isn't the presence of the concept of "clutch hitting". We must keep this in mind moving forward with the experiment using Webster University's data.

Data Description/Issues

Webster University's baseball data includes situational analyses statistics including: batting averages when runners are on, bases loaded, bases empty, runner on third with two outs, runners in scoring position, and when there is two outs. There also is a statistic for the success of advancing runners. This data will be enough to take a step in the right direction, but as I discussed earlier the data does not have enough depth to prove that "clutch hitting" 100% exists. My experiment has the potential to show that there is a strong possibility that "clutch hitting" exists if I can detect some consistency with the data provided.

Experiment

Using the Webster University's baseball data from 2016, I extracted the "clutch" and "non-clutch" situations from the data. I then compared the averages from the non-clutch and clutch situations from the overall batting average. If clutch were to exist, there would be a significant difference in these averages. If the difference were not significant enough, then there would not be any evidence those points towards the idea of "clutch hitting".

If the evidence points towards the conclusion that "clutch hitting" does exist, there would need to be additional statistical significance tests ran to give the conclusion 100% validity. I did not have time to learn and perform these tests, but I acknowledge that fact that these tests would need to be done.

Results

Player		Overall AVG	Clutch AVG	Nonclutch AVG
12 Bishop, Zach		0.333	0.372	0.267
33 Budrovich, Jacob.		0.250	0.375	0.000
23 Celleghin, Jake		0.238	0.289	0.190
31 Dahncke, Christia		0.000	0.000	0.000
3 Fischer, Ryan		0.091	0.105	0.000
1 Golich, Mike		0.317	0.390	0.238
44 Kammer, Jeff		0.328	0.309	0.409
25 LaHue, Austin		0.167	0.250	0.000
11 Ludwig, Tyler		0.000	0.000	0.000
16 Magruder, Bailey		0.182	0.222	0.100
17 Milosch, Jake		0.273	0.245	0.289
5 Murawski, Matt		0.269	0.132	0.455
30 Naliwajko, Adam		0.286	0.287	0.250
27 Rajkovich, Dylan		0.237	0.250	0.239
22 Smith, A.J.		0.000	0.500	0.000
13 Smith, Brandon		0.252	0.342	0.158
40 Spisak, K.J		0.000	0.000	0.000
20 Thomas, Blake		0.349	0.379	0.314
14 Uhrich, Kyle		0.329	0.318	0.347
0 Wick, Mike		0.377	0.338	0.414
38 Williams, David		0.000	0.000	0.000
2 Wollnik, Matt		0.297	0.294	0.319

All but 6 players had a significantly higher clutch average compared to their nonclutch averages. This suggests that these players tend to have a clutch performance when the game is on the line. The differences in the averages suggest that "clutch hitting" does exist, but further statistical significance would need to be performed to prove this.

In conclusion, this experiment has shown that there is evidence that shows that the idea of "clutch hitting" *does* exist. With more data and a larger sample size, as well as statistical significance tests, I believe that one could easily prove with confidence that "clutch hitting" is real!

References

(2012). Retrieved from crawfishboxes.

Carleton, R. (n.d.). *just a bit outside*. Retrieved from foxsports.
Ruane, T. (n.d.). *In Search of Clutch Hitting.* Retrieved from retrosheet.org.
Statistics. (2016). Retrieved from webster athletics.