Corner 3s – How good are they?

An Open Topic Submission

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# Introduction

The basketball analytics community has been integral in the rise in the understanding of the value of the 3s and particularly of corner 3s [1]. 3 pointers are simply worth more and corner 3s being closer to the basket makes it easier to make. This has led to many articles emphasizing the benefits of the corner 3 [2, 3].

While we agree in a box that corner 3s are good shots, we theorize that corner 3s may not be as good as we once thought. We believe this because basketball is a continuous sport and possessions don’t end once a shot leaves the shooters hand. We hypothesize that possessions following a missed corner 3 are more valuable for the team defending the corner 3. We believe this firstly, because the player shooting the corner 3 is stuck in the corner creating a longer distance for the shooter to travel back on defense to contest a fast break by the defending team. Secondly, longer shots create longer rebounds. Long rebounds contribute to more fast breaks, as it moves the ball farther up the court for the team transitioning to offense and makes it easier to create a good offensive possession.

To verify our hypothesis, we will calculate the percentage of missed corner 3s that end in fast breaks compared to the percentage of other missed shots that end in fast breaks. We anticipate that missed corner 3s will create more opportunities for the opponent to create a fast break. Our findings will enable us to recommend to teams, coaches and players of all skill levels, changes in volume for corner 3 shots or different defensive strategies depending on the location of a shot.

# Data Analysis

Given the data provided from the NBA, we used the Hackathon\_play\_by\_play.txt, Hackathon\_sv\_shot\_summary\_2014-15.txt, and Hackathon\_sv\_shot\_summary\_2015-16.txt datasets as the basis of our data. Since only shot data from the 2014-15 and 2015-16 seasons were provided, the play by play data of those seasons were used.

To quantify fast breaks, we classified them each fast break attempts as a shot attempt or a free throw attempt within 7 seconds (of game time) the missed 3-point shot. The attempts were considered over the actual conversion of the shots as it is simpler and there would be lesser variance based on the shooting percentage of the actual player attempting the shot.

Corner 3s were quantified by finding all 3 pointers that were between 22’ and 24’ 5”. We recognize that this may include non-corner 3-pointers as the top of the 3-point line has a radius of 23’ 9”; however, this is done to take into account for any variations in spacing by the shooter, and we determined that it was it would be unlikely for a shot right along the line. We do acknowledge that if we were to extend this study, we would preferably use the raw SportVU data to ensure that all corner 3s are accounted for.

Since the point of this analysis is to compare the fast-break return the frequency of missed corner three pointers to other shots, we first had to classify missed shots into the following categories:

* Missed two pointers
* Missed corner three pointers
* Missed non-corner three pointers

Then, for every missed-shot event in the play-by-play, we load events that are within seven seconds after the missed shot into a buffer. The buffer is then scanned for shot attempts not originating from the team that originally missed the shot We also checked if the ball gets turned over within these seven seconds to ensure it was only a fast break from the team defending the corner 3.

Afterwards, we tabulate the results we see as we traverse all the events in the 2014-15 season and 2015-16 season. By logging every missed two, three, and corner three, as well as the number of subsequent fast-break plays, we create a relation between fast-break return likelihood as a function of the type of shot missed.

# Discussion

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| --- | --- | --- | --- | --- |
| Year | Type of Shot | # Of Missed  Shots | # Of Fast Breaks | Pct. of Missed Shots Leading to Fast Breaks |
| 2014-2015 | Corner 3s | 1323 | 289 | 21.84% |
| 2014-2015 | 2s | 82,462 | 38,321 | 46.47% |
| 2014-2015 | Above the Break 3s | 38,553 | 18,664 | 48.41% |
| 2015-2016 | Corner 3s | 1,399 | 258 | 18.44% |
| 2015-2016 | 2s | 80,844 | 34,320 | 42.52% |
| 2015-2016 | Above the Break 3s | 41,149 | 17,190 | 43.52% |

0.00

%

10.00

%

%

20.00

%

30.00

%

40.00

50.00

%

60.00

%

2014-15

2015-16

Pct. of Fast Breaks Created from Missed Shots

Corner 3s

2

s

Above the Break 3s

We ran our code across the 2014-2015 and 2015-2016 seasons and found that overall our findings were fairly consistent across both seasons which makes us more confident that our process was implemented correctly. Surprisingly though, we found that corner 3s actually led to a lower percentage of fast breaks than both 2point shots and 3 point shots taken from above the break.

Firstly, we will compare corner 3s to other 2 pt. shots. We theorize that the reason that missed 2s create a higher percentage of fast break opportunities for the opposing team is because the shooter taking the corner 3 is rarely alone in the corner. If the shooter has to run back a farther distance on defense his defender has to also run a farther distance to transition into offense. Secondly, we believe that it makes sense that corner 3s create less fast breaks than above the break 3s for a couple of reasons. The position of the rebound is one important difference between the 2 shots. Corner 3s missed both long and short should usually be rebounded around the baseline. This creates a longer distance for the transitioning team to push the ball in transition and not much of an advantage. However, above the break threes that miss short will have the ball rebounded farther away from the court in a perfect position to create fast breaks. Additionally, the position of the offensive players on corner 3s should be roughly the same as for above the break 3s. This positioning usually has 4 players spaced evenly apart on the perimeter and 1 closer to the hoop. This is important since the player shooting the basketball is focused on following through on his shot and is not often ready to defend a transition opportunity. This means that a corner 3 will usually have at least 2 players above the break ready to run back on defense and an above the break 3 will only have 1. This is a big difference when determining whether an odd-man opportunity is created.

# Conclusion

Our analysis proved our hypothesis wrong; however, we still feel like we have found useful and practical applications in a field that has not been researched in depth. As our research points out that corner 3s have a lesser chance of created a fast break for the defending team we are now informed that corner 3s are even more valuable than previously thought. As our research is new, we would love to look into more of our assumptions and explanations for our analysis. To improve our analysis for future projects, we would use the spatial SportVU data to better classify corner 3s. Additionally, we would improve our classifications of fast break opportunities by looking at Sport VU data and looking at instances where an odd-man rush is created after a missed shot. Finally, we would like to investigate of fast break efficiency is influenced by the previous possessions shot location. We explained our findings using assumptions from our coaching and playing experience. We would also like to investigate these explanations further, by accounting for different teams’ scheme for offensive rebounding. Verifying that missed corner 3s are in fact rebounded closer to the baseline whereas missed above the break 3s are rebounded in the middle of the court. Additionally, we would like to check the positions of offensive players depending on the location of the shot and whether this affects who defends the fast break opportunity in transition. Finally, to finish our analysis we would like to see if shot location has an effect on offensive rebounding percentage.

We feel confident in recommending a higher volume of corner 3s and deem them even more valuable than previously thought. In regards to strategy, we would recommend a more focused effort to get back in transition defense on above the break 3s.

# References

[1] <http://www.sloansportsconference.com/wp-content/uploads/2016/02/1425-Basketball.pdf>

[2] <http://www.basketballanalyticsbook.com/2014/03/29/the>[-importance-of-the-corner-3/](http://www.basketballanalyticsbook.com/2014/03/29/the-importance-of-the-corner-3/)

[3] <http://nyloncalculus.com/2014/11/01/geometry-distance-corner-3s/>