WOLVERINE TOUGHNESS ANALYTICS PROJECT
MAY 2021

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I. Introduction

Over the past couple of weeks, I have conducted projects relating to the Wolverine Toughness statistics for the Michigan Basketball Defense in the season of 2020-2021. To determine the optimal value for our players and better understand situational scenarios, I have created data visualizations and developed a new statistic called Wolverine Toughness Plus Minus (WTPM) regarding individual player's contests rate, makes allowed, and forced misses.

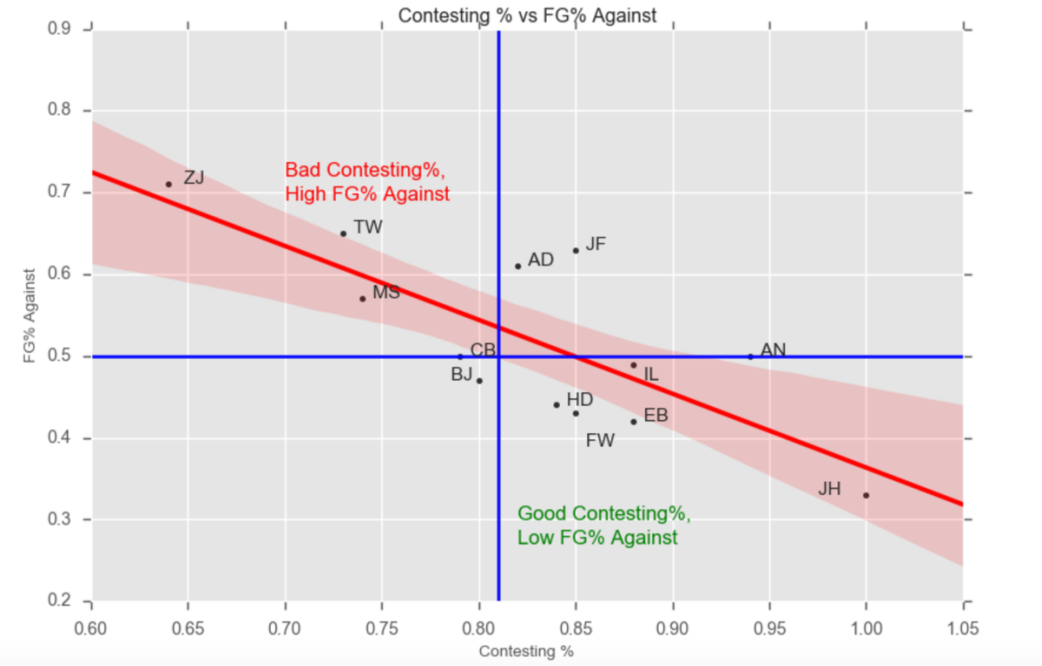
II. Data

All defensive plays for Michigan Men's Basketball that each player was involved in from the 2020-2021 season.

III. Models

I. Contest Rate vs FG% Against
   a. To understand the effect that contest rate has on FG% against and examine which players need to improve the most, I created a scatterplot using each player's season cumulative data.
   b. By looking at the scatterplot, we can see that there is a direct negative correlation between contesting % and FG% against. In simpler terms, as contest rate increases, FG% against decreases.
   c. The scatterplot shows that Zeb Jackson and Terrance Williams need to significantly improve their contest rate to bring down their opponents FG%. Jace Howard on the other hand can be looked at as an example of what we want our contest% to look like. Additionally, Isaiah Livers and Franz Wagner have high contesting% and we will need incoming freshman and returning players to

match or improve upon their ratings.



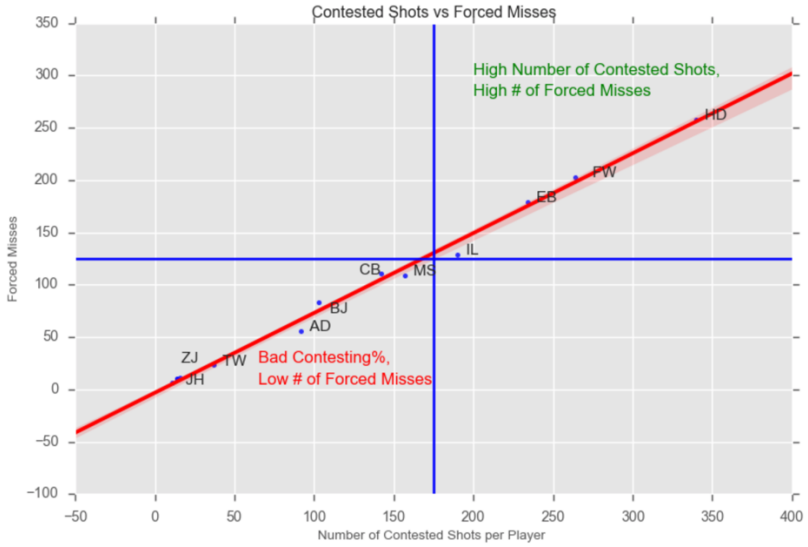
II. Contested Shots vs Forced Misses

a. Next, I wanted to see the effect that contested shots had on forced misses. To understand this relationship, I created another scatterplot using each player's season cumulative data.

b. When looking at the scatterplot below, we can see that there is a direct positive correlation between contested shots and forced misses. As the number of contested shots increases per player, so does the number of forced misses.

c. At a player level, this scatterplot shows the importance of Hunter Dickinson, Eli Brooks, and Franz Wagner to the Michigan Defense in 2020-2021. With Franz declaring for the draft, Brandon Johns will have to pick up his contest rate and the number of forced misses as this past season, his numbers were lower than

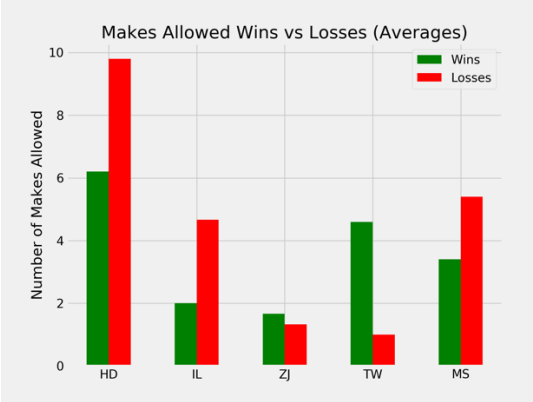
expected for his given playing time.

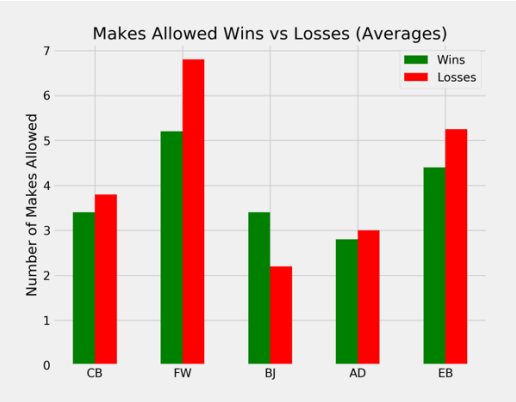


III. Makes Allowed in Wins vs Losses

a. I calculated the average makes allowed per player in all wins this season compared to the makes allowed in all losses. Below, we can see double bar charts showing the difference for each player.

b. Generally speaking, makes allowed for individual players were significantly higher in losses than in wins. More interestingly enough, the biggest difference seems to be with Hunter Dickinson. This shows his importance to the Michigan defense and the overall team performance. In simpler terms, when Hunter plays well defensively, he allows less makes allowed and we win more basketball games.

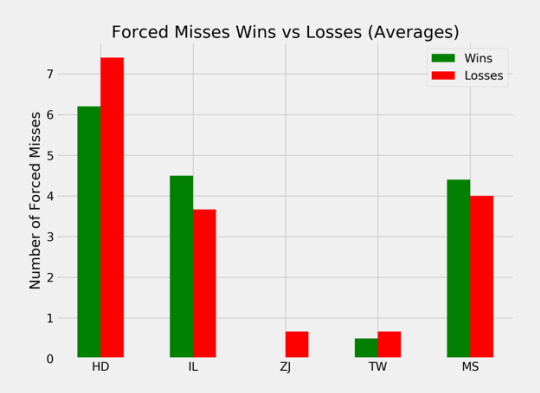


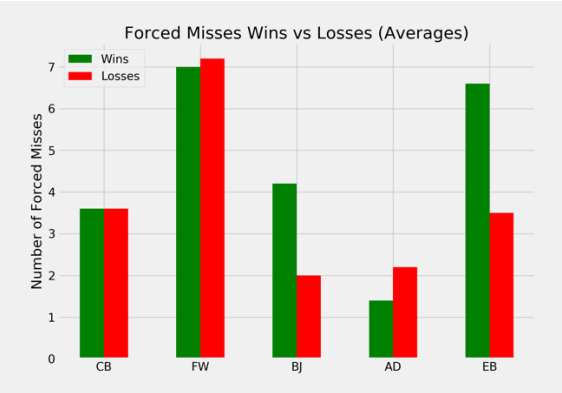


IV. Forced Misses in Wins vs Losses

a. Additionally, I looked into the average number of forced misses in all wins this season compared to losses. Below, we can see double bar charts showing the difference for each player.

b. Interestingly enough, there doesn't seem to be a strong relationship between forced misses in wins vs losses for most players. However, Eli Brooks' average forced misses dropped significantly by about four in losses (compared to wins). This emphasizes the importance of Eli Brooks on the defensive end and our need for him to lock in defensively for games.





V. Wolverine Toughness Plus Minus

a. Lastly, I created a new statistic called Wolverine Toughness Plus Minus. It is calculated for each player for each game by the following:

WTPM = (Number of Contested Shots - Number of Uncontested Shots) + (Number of Forced Misses – Number of Makes Allowed)

b. For instance, if a player has a +5 rating for one game, it means that the player positively helped his defense by 5 possessions. If a player has a -3 rating for one game, it means that the player negatively hindered his defense by 3 possessions. The scale for the scoring system of WTPM is as follows:

-Any score below 0 = Below Expectations

-0-5 = Average, Met Expectations

-5-10 = Good, Above Expectations

-10 and above = Excellent, Heavily Exceeded Expectations

c. Below you will see a chart depicting the Wolverine Toughness Plus Minus rating for each player during the last 10 games. The chart shows that our highest scorers for WTPM were Franz Wagner, Hunter Dickinson, Eli Brooks, and Isaiah Livers. This is important because two of these players will not be with us on the team next year, emphasizing the need for players to step up next year into a bigger role. For instance, Brandon Johns scored a score of +3.2 WTPM and next year, he will have to contribute significantly more defensively to recuperate the high value loss by Franz and Isaiah.

WTPM RATINGS

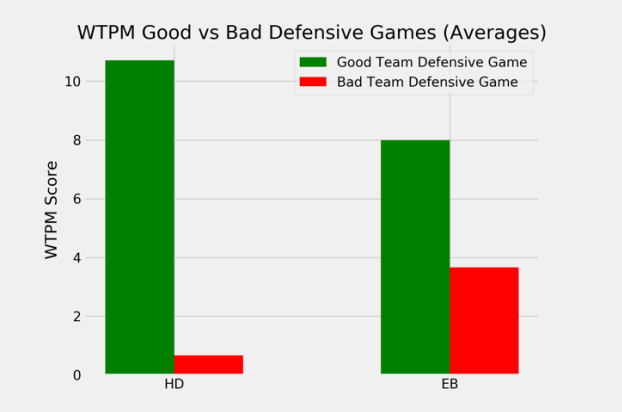
	INDIANA	Illinois	MSU	@MSU	MARYLAND	OSU	TS	LSU	FSU	UCLA	Average
#1 Dickinson	19	0	9	-2	5	13	11	4	-3	21	7.7
#2 Livers	7	9	10	3	3						6.4
#5 Williams						1		0			0.5
#12 Smith	5	-3	6	8	3	4	0	9	5	-1	3.6
#15 Brown	2	1	1	9	6	1	1	6	5	0	3.555555556
#21 Wagner	2	7	2	8	0	15	9	9	12	17	8.1
#23 Johns Jr.	0	0	3	3	1	4	5	12	-1	8	3.5
#25 Howard		2									2
#51 Davis	-3	7	-2	1	-1	4	5	2	0	-1	1.2
#55 Brooks	9	5	14	-2	5	5	13	8	4	6	6.7

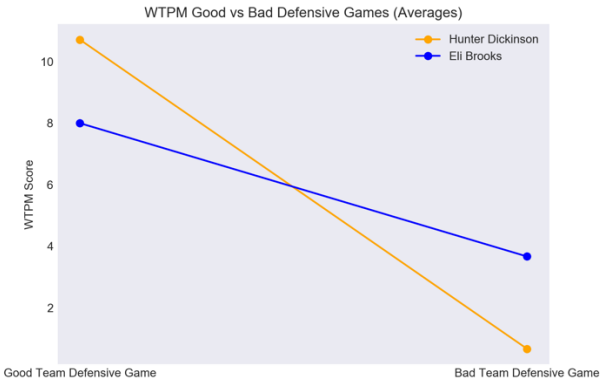
Below Expectations (Below 0)	
Average (0-5)	
Above Expectations (5-10)	
Heavily Exceeeded Expectations (Above 10)	
NA	

c. Another detail I looked into was the WTPM score in good defensive games vs bad defensive games. Good defensive games were quantified as when our points against were below the NCAA average of 69 points and bad defensive games were quantified as when our points against were above the NCAA average of 69 points. When looking at the difference between good and bad defensive games, two names appear to jump out: Hunter Dickinson and Eli Brooks. Their difference in the WTPM was significantly different when comparing good vs bad defensive games. This is important because it shows their importance to Michigan Basketball Defense. When Hunter and Eli show up defensively, our defense seems to be above average. However, when they don't our defensive play significantly drops.

	Good Game Average WTPM	Bad Game Average WTPM	DIFFERENCE
#0 Nunez			
#1 Dickinson	10.714	0.6667	10.0473
#2 Livers	6.667	6	0.667
#3 Jackson			
#5 Williams			
#12 Smith	3.142	4.667	-1.525
#15 Brown	2.285	6.33	-4.045
#21 Wagner	7.571	8	-0.429
#23 Johns Jr.	3	5	-2
#25 Howard			
#44 Faulds			
#51 Davis	0.57	3.33	-2.76
#55 Brooks	8	3.667	4.333

Good Game (PA is below 69 points)	
Bad Game (PA is above 69 points)	





IV. Conclusion

1. **Higher contest rate leads to lower FG% against**
    a. Higher contesting rate led to lower FG% against as there was a direct negative correlation. Additionally, we talked about the significant room for improvement for Zeb Jackson, Brandon Johns Jr, and Terrance Williams and acknowledged the superb defensive play of Jace Howard and Eli Brooks.
2. **Higher number of contested shots leads to a higher number of forced misses**
    a. There was a significant positive correlation between contest shots and forced misses. Hunter Dickinson, Franz Wagner, and Eli Brooks led Michigan defense for this category and are an example of what we should strive for. With Franz declaring for the draft, Brandon Johns will need to increase his number of contested shots and forced misses per game to make up for what has been lost.
3. **We go wherever Eli Brooks and Hunter Dickinson go on defense**
    a. When comparing makes allowed and forced misses in wins vs losses, it was evident that Eli and Hunter's numbers dictated how we played defensively. Eli Brook's number of forced misses dropped by about 4 per game in losses whereas Hunter Dickinson's number of makes allowed increased by about 4 in losses.
4. **Wolverine Toughness Plus Minus significantly changes for Eli Brooks and Hunter Dickinson in good team defensive games compared to bad team defensive games**
    a. Hunter Dickinson and Eli Brooks WTPM score significantly decrease during bad defensive games, when compared to other players. This reveals the importance of their efforts and attentive levels to our play on the defensive end. Additionally, Franz Wagner had a high WTPM average score and it seems that the incoming freshman and Brandon Johns will need to make up for his loss.