Greatest NBA Player of All Time: A Glimpse into the Numbers

The question of who is the greatest NBA player of all time is hotly debated. This is a perennial discussion with no clear resolution. Various sports anchors and media outlets will declare one legend or another, but when the cauldron of names is distilled the three that often remain are LeBron James, Kobe Bryant, and Michael Jordan.

The fact that there is serious debate about this topic year after year suggests there is no obvious answer. Some lean on number of championships to shape their argument while others number of title appearances. Most rely on accolades and achievements such as All-Star selections, MVPs, Playoff wins, and NBA Titles. I want to take a more rigorous approach in attempts to offer an analytical perspective and perhaps settle the debate once and for all.

I utilized concepts of Exploratory Data Analysis (EDA) to derive insight from career regular season statistics taken from *Basketball-Reference.com* for the top three NBA legends in contention to be claimed the Greatest Of All Time (G.O.A.T): LeBron James, Kobe Bryant, and Michael Jordan. I chose to look at regular season statistics because of the significant sample size for which meaningful conclusions could be drawn. Additionally, I felt a discussion about regular season play would add value to a debate focused around playoff results and end of the year awards. The data set used in this report consists of career regular season statistics for each player, with each row representing season statistical totals accumulated by a player for a given year.

Even though only three players' careers were analyzed, there was a total of 1,581 data points used in this study. Before conducting my analysis, I ensured that the contents of my data set were complete and clean for ease of computation. I accomplished this by inspecting my data frame in order to ensure there were zero non-null values within it and that all contents were clearly defined. I also constructed boxplots and time series charts of the games played by each player to identify the outlying seasons for each individual. Once outliers were identified, they were verified by subsequent research in order to understand why the player had a reduction in games played that season which could be accounted for in the ensuing analysis. The effects of these initial efforts ensured processability of the data frame and provided a detailed understanding of the contents and abnormalities within.

The next EDA step I took was to understand career statistical totals each player accumulated for key offensive and defensive metrics. The reason for this is simple. If you want to understand who the best scorer of all time is, you look at who scored the most points in their career. The same can be said for any metric. Career accumulations help bring to light sustained greatness over time and relative greatness when compared to peers. The summary of this analysis is shown in Figure 1.

Figure 1 illustrates the relative strengths of each player. LeBron does a great job finding the open man, his high FG% and eFG% indicate offensive efficiency, and he is a monster on the boards. Michael Jordan is a master of possession with significantly low amounts of offensive turnovers and high amounts of forced defensive turnovers. Kobe Bryant's strength was his sustained excellence leading the bunch in games played.

A closer look at Figure 1 suggests that Kobe Bryant is inferior to LeBron James and Michael Jordan given that the only career statistical claim he has is games played. On the other hand, if Figure 1 is taken as the only point of analysis, the analysis is all but conclusive that LeBron James is the greatest player of all-time as he leads 5 of the 8 key statistical categories. However, this debate is not that simple. The bar chart in the bottom right corner provides significant information: these three players had varying career lengths contributing to their career accumulations. This is important because each player is considered an All-Time

great and included in this analysis because of their sustained excellence and contributions to the game of basketball. As a result, it is as if each player has met the pre-requisite of time played in the NBA to even be considered the G.O.A.T. With this distinguished, I will re-calculate these key statistics but adjust each to become a rate statistic by dividing by the number of games played (except for FG% and eFG%). This will shift our focus away from sustained success but rather at one's ability to dominate a game, which will provide a better indicator of greatness.
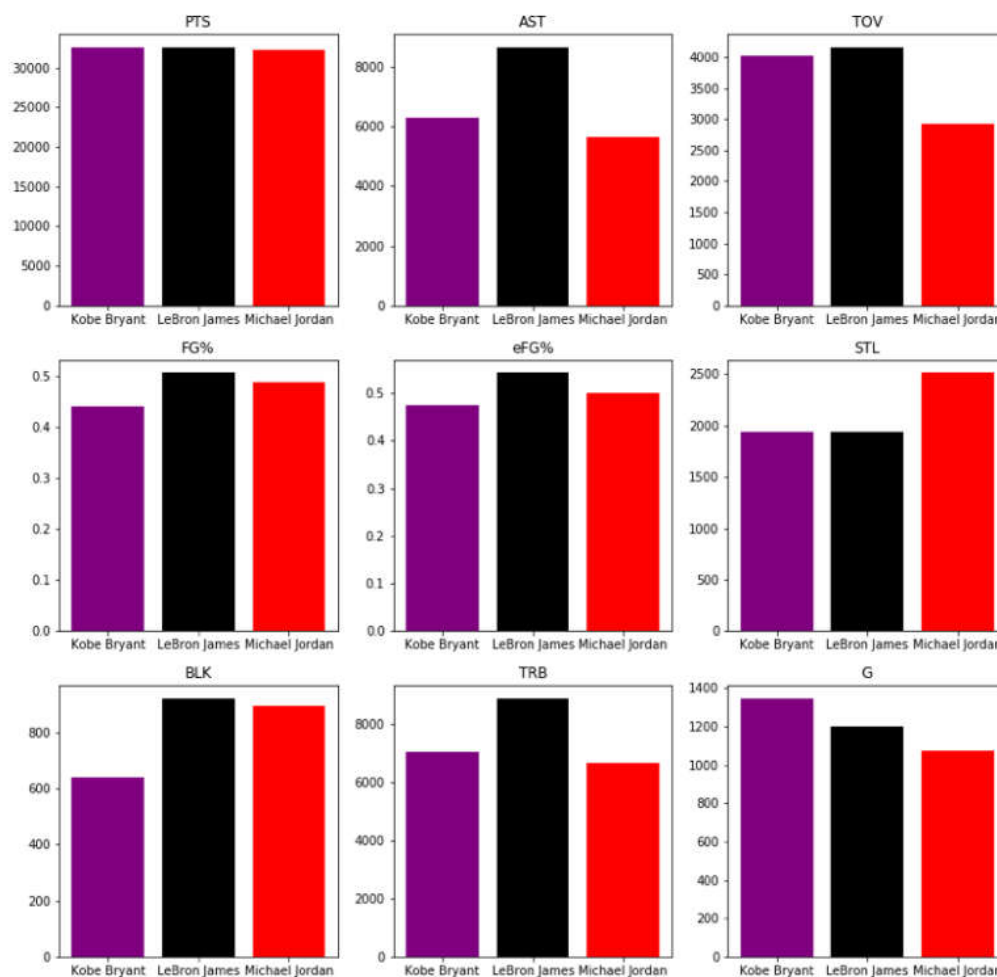

Figure 1. Career accumulation of key offensive and defensive metrics for LeBron James, Kobe Bryant, and Michael Jordan.

Figure 2 shows the same metrics visualized in Figure 1 on a per game basis. What can be seen as a result of this effort is that the ownership as leader of key statistical categories begins to level out between LeBron James and Michael Jordan. Michael Jordan scored more points per game compared to Kobe and LeBron and manages to edge out LeBron for a higher rate of blocks per game as well. Thus, Michael Jordan leads 4 statistical categories, LeBron leads 4 statistical categories, and Kobe Bryant has no claim to any.

The analysis so far concludes that Kobe Bryant can be removed from contention for the claim of greatest player of all time due to his lagging metrics. Also, because Michael Jordan leads the group in the only two defensive categories (BLKs and STLs), it can be concluded that he is the best defender of the group.

Determining who is a greater offensive threat between LeBron James and Michael Jordan requires a more in-depth analysis. Michael was a phenomenal scorer and guardian of the ball while LeBron is great at grabbing rebounds and finding the open man. The two legends have opposing styles of play but each effective in creating offense for their team. One may argue LeBron James has the edge over Michael Jordan due to his higher offensive efficiency indicated by FG% and eFG%. But the idea of offensive efficiency is a great gateway leading us to a more in-depth offensive analysis of the two players first offered up by Stephen Shea and Christopher Baker in their book *Basketball Analytics*.
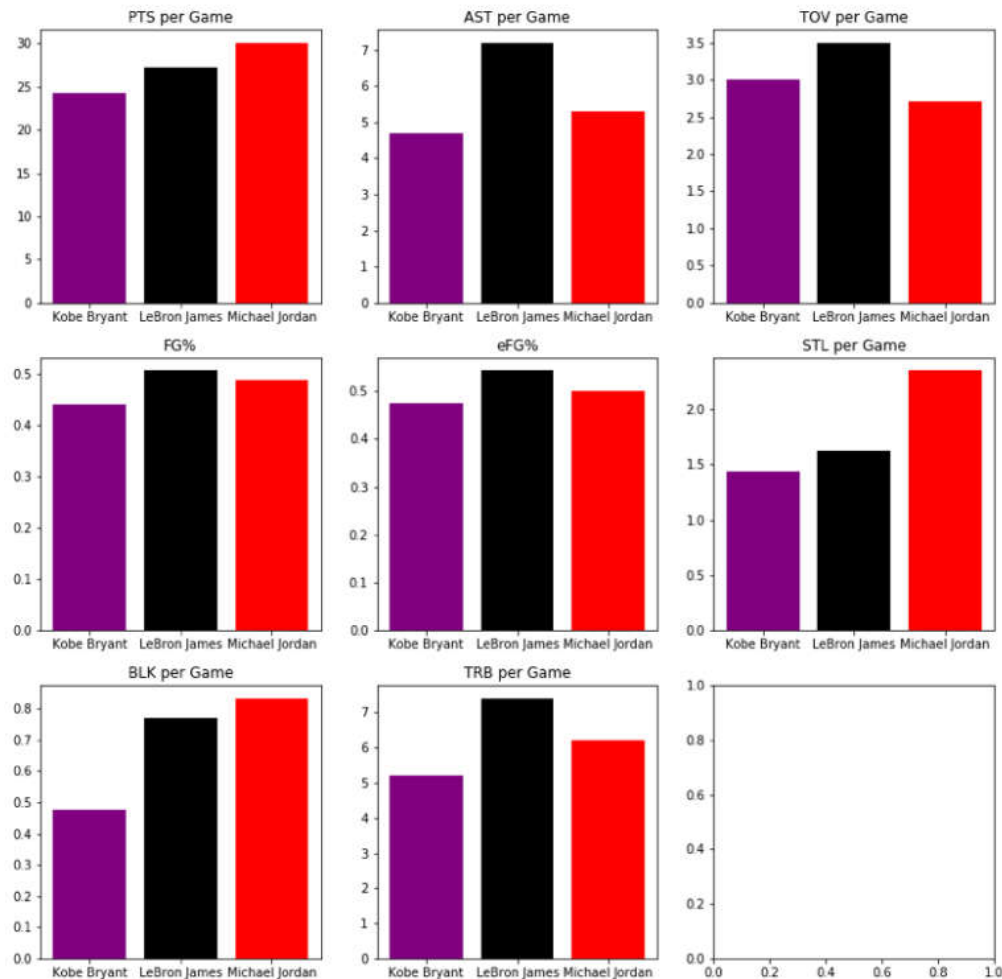

Figure 2. Per game analysis of key offensive and defensive metrics for LeBron James, Kobe Bryant, and Michael Jordan.

Shea and Baker provide a great template for evaluating individual basketball players and their ability to create efficient offense for their teams. The metric they define in *Basketball Analytics* to accomplish this is called a player's Efficient Offensive Production (EOP) and it is used to indicate the *quantity* and *quality* of offensive points created during possessions the player was directly involved in. This metric has rate characteristics by defining a metric called Offensive Efficiency (OE) to understand a player's point return on their offensive possessions. EOP also has statistical accumulation characteristics by multiplying OE by points and assists to account for the amount of offensive contributions.

$$OE = \frac{FG + A}{FGA - ORB + A + TO}$$

I modified Shea and Baker's approach to analyze the three players in this study. I started by calculating the OE for each player in each season they played following the formula above. Then, due to the limited scope of my data set, I multiplied the player's OE for each season by the number of points and assists they scored that season and a 0.76 assist-to-points correction factor. In order to account for the variations in NBA style of play throughout the years, I adjusted the modified EOP value for the season in which the player's offensive statistics were accrued. Then, I divided by the number of games played that season similar to the strategy used when analyzing career statistical accumulations. Lastly, I omitted the player's outlying seasons to adjust for injuries or other professional pursuits. The results of these efforts are displayed in Figure 3.
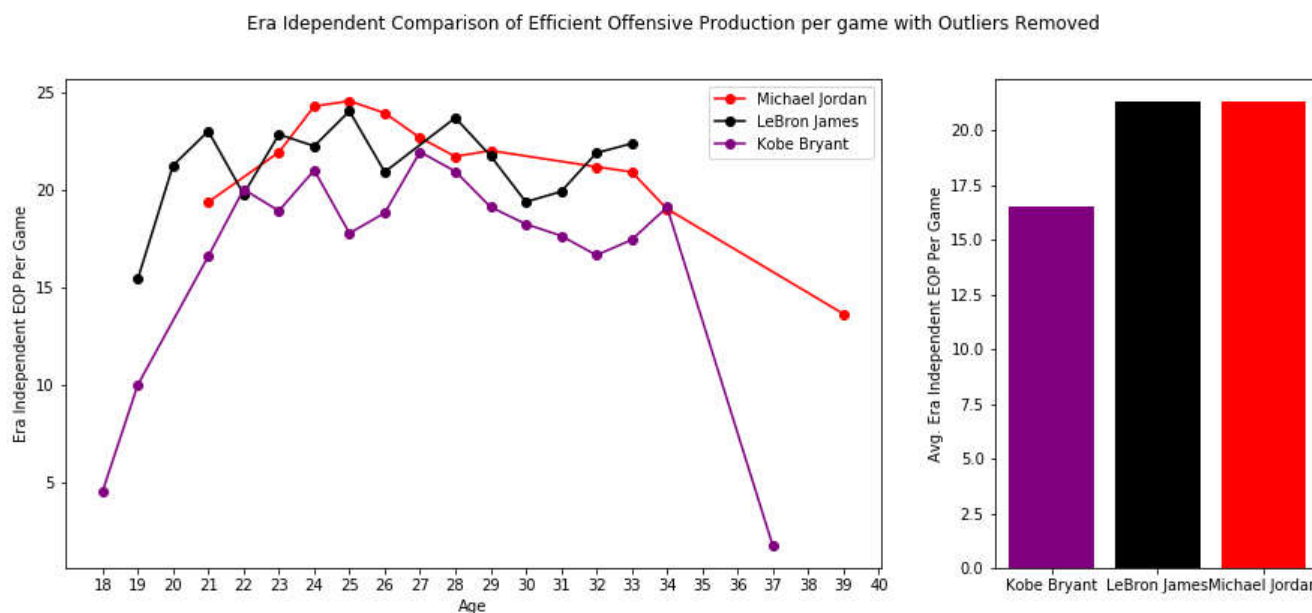

Figure 3. A modified Efficient Offensive Production (EOP) measurement accounting for era and outliers on a per game basis for Kobe Bryant, LeBron James, and Michael Jordan.

The output from this analysis is puzzling, if not frustrating, at first glimpse. Both Michael Jordan and LeBron James accounted for 21.3 efficient points per game over the course of their career. This is quantitative proof that Michael's superior ability to score and protect the ball is equally offset by LeBron's vision and below the rim tenacity. Their contrasting styles of offense have led to equal offensive output. While this is captivating, and further legitimizes their duality of play, it gets us nowhere closure to a resolution. To do so, we must look one layer deeper.

Figure 3 displays the EOP/g statistic for each season of a player's career. It is here we notice that Michael Jordan holds the highest EOP/g and three of the top four EOP/g seasons compared to LeBron and Kobe. As established earlier, we are aiming to understand who is the most dominate player of all time. These two points together provide a convincing tie breaker concluding that Michael Jordan was also the greater offensive player, and suggest he is the G.O.A.T.

However, this analysis is incomplete. First, I only approached the analysis with bottom-up statistics. These are metrics that give credit to a specific individual for completing a task and no credit to the greater unit. I neglected to incorporate top-down statistics which measure an individual's production built on the production of whole lineups. The consequence of this is a reduced ability to evaluate the players' defensive contributions and only capturing individual impacts in a sport where success is heavily influenced on an entire

unit performing well. A complete analysis will require consideration of playoff, international, and clutch time performance using both bottom-up and top-down metrics. Further, other individual analytic models can be used such as those proposed by Dean Oliver in his book *Basketball on Paper* to provide different perspectives on the abilities of these three legends.

      In conclusion, Exploratory Data Analysis techniques were applied to regular season metrics to provide statistical evidence that Michael Jordan is the G.O.A.T edging out LeBron James and eclipsing Kobe Bryant. This was a difficult resolution to come to due to the parity between Michael Jordan and LeBron James. In the future, further analysis will be required to increase one's confidence in this result. Including playoff, international, and clutch time performance as well as top-down metrics and alternative analysis models are needed to complement the work done here.

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