# Evaluating NBA Player Consistency through GARCH Modeling

SPORT MANAGEMENT
TEXAS A&M UNIVERSITY

**Joshua Davila, Texas A&M University**

## INTRODUCTION

- "Basketball is a pretty simple game. What wins is consistency and competitiveness." – Gregg Popovich
- As teams continuously look to improve upon their previous seasons, both coaching staffs and front offices try to build out their teams featuring players that play their role at an exceptional level. Role players are often the backbone of the teams that hoist the Larry O'Brien Trophy at the end of the NBA Season.
- However, many of the standard measures of consistency do not appropriately measure performance over a season. One potential solution is the use of Generalized Autoregressive Conditional Heteroskedasticity (GARCH) modeling to evaluate player consistency.

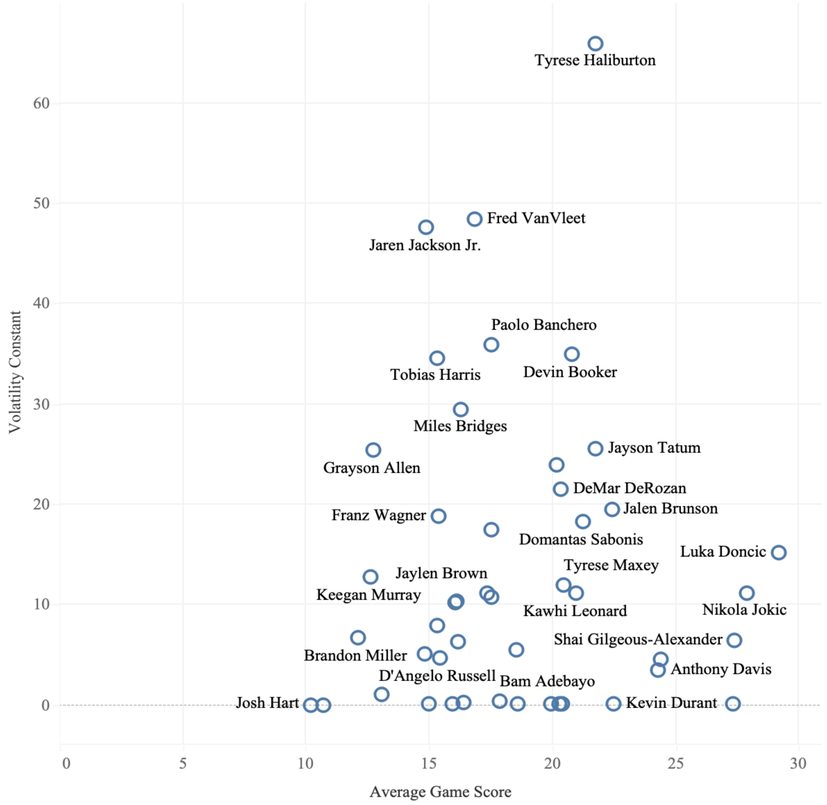
## METHOD

- Focusing on the consistency of performance, this study utilized the abilities of GARCH modeling ("fGarch" package in R) in order to gauge a player's performance consistency. Using GARCH allowed for a measurement of their game-to-game consistency with a focus on the time series nature of a season.

### Generalized Autoregressive Conditional Heteroskedasticity (GARCH Modeling)

- Building on the Autoregressive Conditional Heteroskedasticity modeling (first introduced by Robert F. Engle), Tim Bollerslev introduced the GARCH model in 1986. The improvements made upon the original ARCH model allowed for a more flexible model to help capture the time varying variability. This was done by adding lagged conditional variances into the equation.
- This dataset used was collected using the "hoopR" package in R. The dataset analyzed for this study featured over 26 thousand individual game performances for the 2023-24 NBA regular season.
- Only players participating in an average at least 10 minutes a game for at least 65 games were included in the modeling. All players were then sorted into a ranking to determine their relative consistency compared to other players.

Average Game Score vs Volatility Constant (>32 Minutes per Game)




### 5 Most Consistent Players

| Player Name | Average Game Score | Volatility Constant | Average Minutes per Game | Games Played |
|---|---|---|---|---|
| Drew Eubanks | 6.08 | 1.82E-05 | 15.53 | 75 |
| Joe Ingles | 5.44 | 1.89E-05 | 17.15 | 68 |
| Kris Dunn | 7.05 | 2.02E-05 | 18.95 | 66 |
| Amir Coffey | 5.96 | 2.17E-05 | 20.83 | 70 |
| David Roddy | 5.23 | 2.34E-05 | 18.11 | 65 |

### 5 Least Consistent Players

| Player Name | Average Game Score | Volatility Constant | Average Minutes per Game | Games Played |
|---|---|---|---|---|
| Tyrese Haliburton | 21.77 | 65.92 | 32.23 | 71 |
| Zion Williamson | 19.30 | 58.03 | 31.57 | 70 |
| Fred VanVleet | 16.84 | 48.32 | 36.79 | 73 |
| Jaren Jackson Jr. | 14.88 | 47.59 | 32.18 | 66 |
| Paolo Banchero | 17.53 | 35.87 | 34.78 | 81 |

### 5 Most Consistent Players (Average of > 32 minutes per game)

| Player Name | Average Game Score | Volatility Constant | Average Minutes per Game | Games Played |
|---|---|---|---|---|
| Max Strus | 10.72 | 3.89E-05 | 32.01 | 70 |
| Josh Hart | 10.22 | 4.26E-05 | 33.41 | 81 |
| Pascal Siakam | 18.59 | 4.51E-05 | 33.25 | 80 |
| Coby White | 14.98 | 6.05E-05 | 36.47 | 79 |
| De'Aaron Fox | 20.28 | 6.92E-05 | 35.93 | 74 |

### 5 Least Consistent Players (Average of > 32 minutes per game)

| Player Name | Average Game Score | Volatility Constant | Average Minutes per Game | Games Played |
|---|---|---|---|---|
| Tyrese Haliburton | 21.77 | 65.92 | 32.23 | 71 |
| Fred VanVleet | 16.84 | 48.32 | 36.79 | 73 |
| Jaren Jackson Jr. | 14.88 | 47.59 | 32.18 | 66 |
| Paolo Banchero | 17.53 | 35.87 | 34.78 | 81 |
| Devin Booker | 20.79 | 34.87 | 35.71 | 69 |

## RESULTS

- The player ranked the least consistent for the 2023-24 NBA season was Tyrese Haliburton of the Indiana Pacers (volatility constant = 65.9201), while the player ranked the most consistent was Drew Eubanks of the Phoenix Suns (volatility constant = 0.00002).

## FUTURE RESEARCH

- GARCH modeling can be utilized in tandem with other models such as Vector Autoregression (VAR) and Generalized Autoregressive Score (GAS). This could allow for a more complete look at a player's consistency.
- Future research could also utilize a bigger dataset with more observations. For example, utilizing a combination of GARCH and GAS could be used to help measure the consistency of shooting for an NBA player. They could also be used with other non normal distributions that occur in the data.