

The Impact of Back-To-Backs on NBA Performances

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Background: Back to Backs in the NBA

- Back to backs in the NBA refers to when NBA teams play 2 games in consecutive days.
 - 11/5: New York Knicks vs. Cleveland Cavaliers.
 - 11/6: New York Knicks vs Boston Celtics.
- NBA teams play between 13-16 back to backs every season.
- Extremely controversial topic today:
 - More injuries than ever before: 6,489 total players missed games. Over 10 players were injured for every team over the course of the season.
 - Star players missing out big games.
 - TV ratings are down 2% going into this season.
- We will focus on the second game of the back to back, analyzing the quality of play of starters in those games.



Shooting Efficiency Rationale

- While focusing on the quality of play of starters, we decided to specifically analyze shooting efficiency.
- Shooting Efficiency: In basketball, shooting efficiency refers to how effectively a player converts shot attempts into points.
- Shooting efficiency identifies players that are best at maximizing possessions and impacting the game at a high level
- Understanding how these metrics relate to back-to-backs can tell us about how roles and scoring capacity change when players are fatigued



Shooting Efficiency:

Field Goal Percentage:

- Most basic statistic regarding shooting efficiency.
- Divide the number of made shots by the number of total shots taken.
- Includes both two and three pointers but does not include free throws.
- Expressed as a percentage or decimal.
- Best players shoot close to 50%.
 - Steph Curry: 47.1 %
 - Kevin Durant: 50.2%
 - LeBron James: 50.6%

Effective Field Goal Percentage:

- Adjusts the field goal percentage statistics by giving extra weight to three point shots.
- $eFG\% = (FGM + 0.5 \times 3PM) / FGA$
- Gives extra credit for three point shots made, showing a more accurate picture of scoring effectiveness.

True Shooting Percentage:

- Measures a player's shooting efficiency by combining the value of two point field goals, three point field goals, and free throws into single metric.
- $TS\% = \text{Points} / 2 \times (FGA + .44 \times FTA)$
- Differs from eFG by including both field goals AND free throws, rather than just field goals.

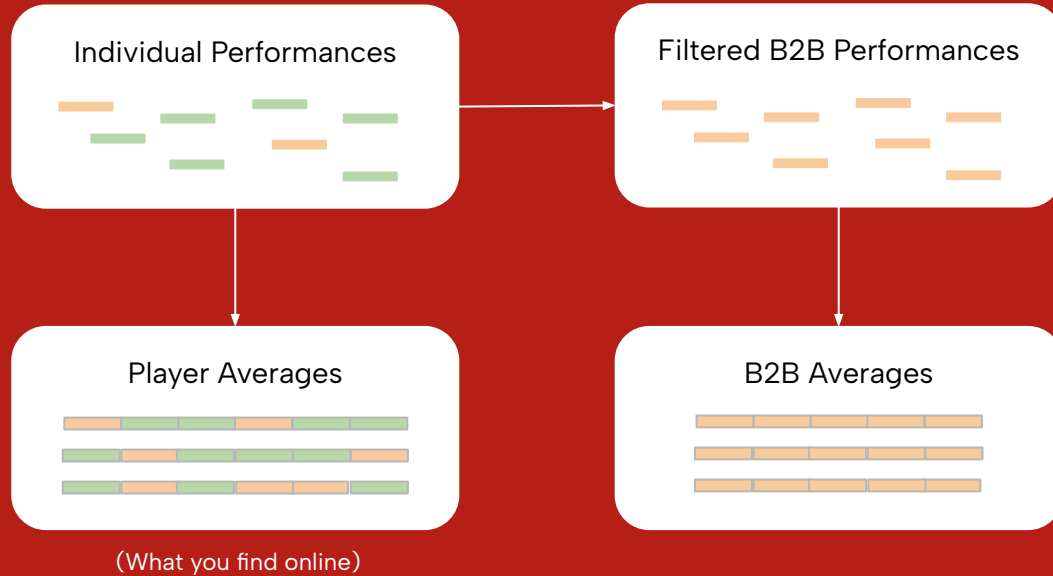
Data Set

	Player	Tm	Opp	Res	MP	FG	FGA	FG%	3P	3PA	...	DRB	TRB	AST	STL	BLK	TOV	PF	PTS	GmSc	Data
0	Jayson Tatum	BOS	NYK	W	30.30	14	18	0.778	8	11	...	4	4	10	1	1	1	1	37	38.1	2024-10-22
1	Anthony Davis	LAL	MIN	W	37.58	11	23	0.478	1	3	...	13	16	4	1	3	1	1	36	34.0	2024-10-22
2	Derrick White	BOS	NYK	W	26.63	8	13	0.615	6	10	...	3	3	4	1	0	0	1	24	22.4	2024-10-22
3	Jrue Holiday	BOS	NYK	W	30.52	7	9	0.778	4	6	...	2	4	4	1	0	0	2	18	19.5	2024-10-22
4	Miles McBride	NYK	BOS	L	25.85	8	10	0.800	4	5	...	0	0	2	0	0	1	1	22	17.8	2024-10-22
5	Rui Hachimura	LAL	MIN	W	35.08	7	14	0.500	1	4	...	2	5	1	2	1	0	2	18	15.9	2024-10-22
6	Jaylen Brown	BOS	NYK	W	29.90	7	18	0.389	5	9	...	5	7	1	1	0	1	3	23	15.6	2024-10-22
7	Rudy Gobert	MIN	LAL	L	35.33	5	8	0.625	0	0	...	11	14	2	0	1	1	4	13	13.9	2024-10-22
8	Julius Randle	MIN	LAL	L	34.32	5	10	0.500	1	3	...	6	9	4	0	0	2	3	16	13.7	2024-10-22
9	Al Horford	BOS	NYK	W	26.08	4	7	0.571	3	5	...	3	3	5	1	1	0	2	11	13.0	2024-10-22

Source: Kaggle

Individual Performances

Data Management



Data Management

PPG Risers in B2Bs

Who?

WHO??
(Knicks Legend)

Player	PPG_Diff
Jared McCain	13.70
Dariq Miller-Whitehead	13.50
GG Jackson II	11.11
AJ Johnson	10.56
Pacome Dadiet	7.54

Filter for significant contributors

(Players who average at least 24 minutes)

Back-To-Back PPG Risers

Player	PPG in all games	PPG in B2B's	Difference
Jared McCain	15.3	29	13.7
Karl-Anthony Towns	24.33	31.71	7.38
Kyrie Irving	24.37	31.17	6.8
Spencer Dinwiddie	10.3	17	6.7
Payton Pritchard	13.86	19.88	6.02
Max Strus	8.5	13.4	4.9
Nikola Jokić	29.7	34.33	4.63
Jalen Brunson	26.08	30.57	4.49
Mark Williams	15.57	20	4.43
Jordan Clarkson	16.63	21	4.37

Back-To-Back PPG Fallers

Player	PPG in all games	PPG in B2B's	Difference
Jordan Poole	20.84	12.29	-8.55
Trae Young	23.25	16	-7.25
Al Horford	7.85	1	-6.85
Anthony Davis	25.74	19.17	-6.57
Trey Murphy III	25.62	20	-5.62
Victor Wembanyama	24.42	19.25	-5.17
Tim Hardaway Jr.	12.16	7	-5.16
Wendell Carter	7.33	2.33	-5
Cam Thomas	24.68	20.2	-4.48
Josh Hart	14.3	9.86	-4.44

PPG is fun to look at but does it reflect a significant trend?

Mean change in PPG in B2Bs: -0.131

...Not really

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Efficiency is the key difference

Aside: What is a P-Value?

In Simple Terms: The percent chance that something could have happened randomly

Example

- If LeBron normally has 27.0 PPG but has 27.1 on (taco) Tuesdays, there is a high likelihood the change is due to random chance so the P-Value might be 75%
- However, if LeBron had 35 PPG on Tuesdays, this seems like it is not due to random chance so the P-Value may be 2%

A “good” P-Value is $< 5\%$

Efficiency – True Shooting

Regular Average
True Shooting %:

57.2%

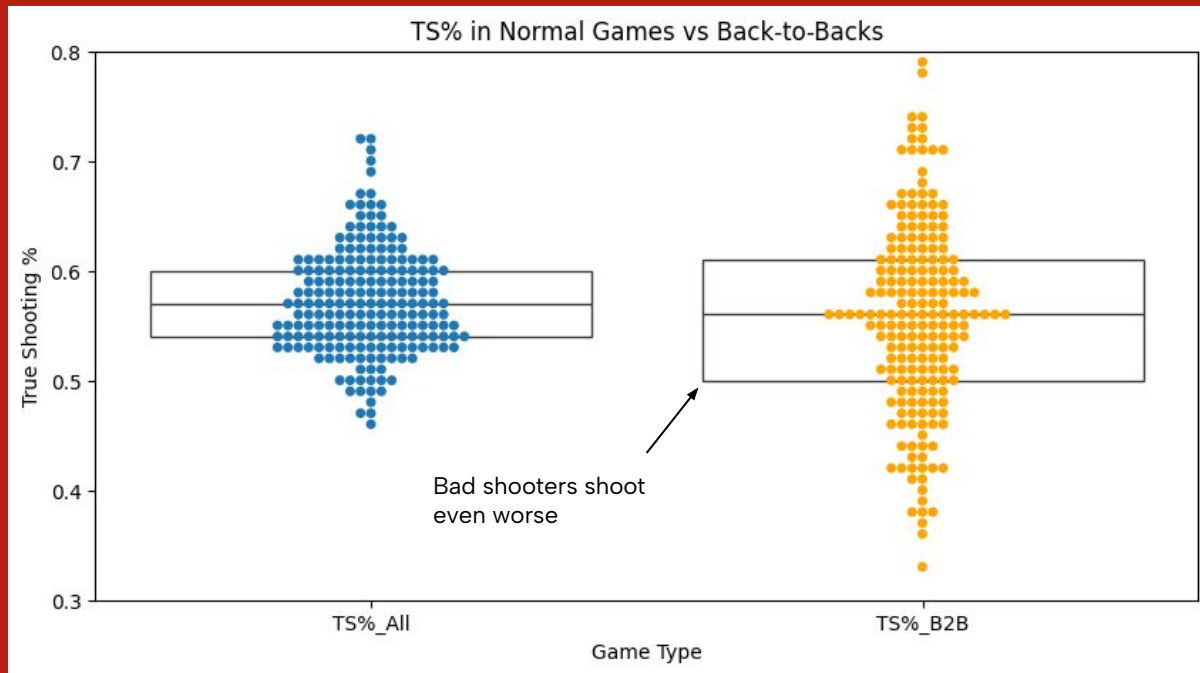


B2B Average True
Shooting %:

55.6%

P-Value: **4.75%**

Efficiency – True Shooting



Efficiency – Effective Field Goal %

Regular Average
Effective Field Goal %

68.6%

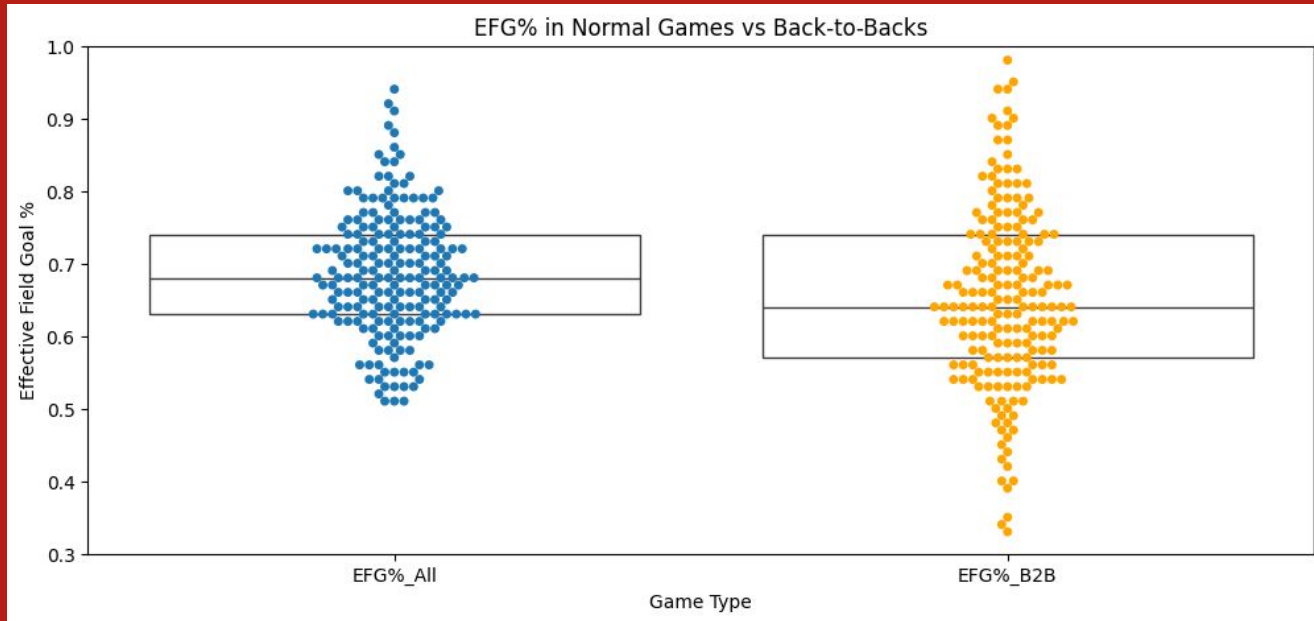


B2B Average True
Shooting %:

66.1%

P-Value: **4.80%**

Efficiency – Effective Field Goal %



Conclusions

- Back-To-Backs result in a significant decrease in player efficiency
 - This decrease appears to be especially pronounced in players who are already low-efficiency scorers
- This type of play is likely less engaging to viewers
- Our suggestions
 - To teams/players: in the second game of back-to-backs prioritize plays that aim to give players opportunities at layups/dunks rather than mid-range shots or three-pointers
 - To the NBA: avoid scheduling the second game of back-to-backs as nationally televised games as they often do not represent the most engaging type of basketball