Biomechanics and Player Availability in the NBA

Jeremy Dumalig | jeremydumalig@uchicago.edu
DATA 25900 | University of Chicago

In the early 2010s, several NBA teams began implementing wearable technology to record biomechanical data with the hopes of optimizing player performance and minimizing injury risk. The rest of the league has followed a similar path over the past decade, posing ethical and financial implications - for example, in contract negotiations - as well as raising concerns about its effectiveness.

Is there a causal link between the use of biomechanics and player availability?

Difference-in-Differences Regression

To answer this question, I used the Difference-in-Differences causal framework, comparing treatment and control groups before and after treatment.

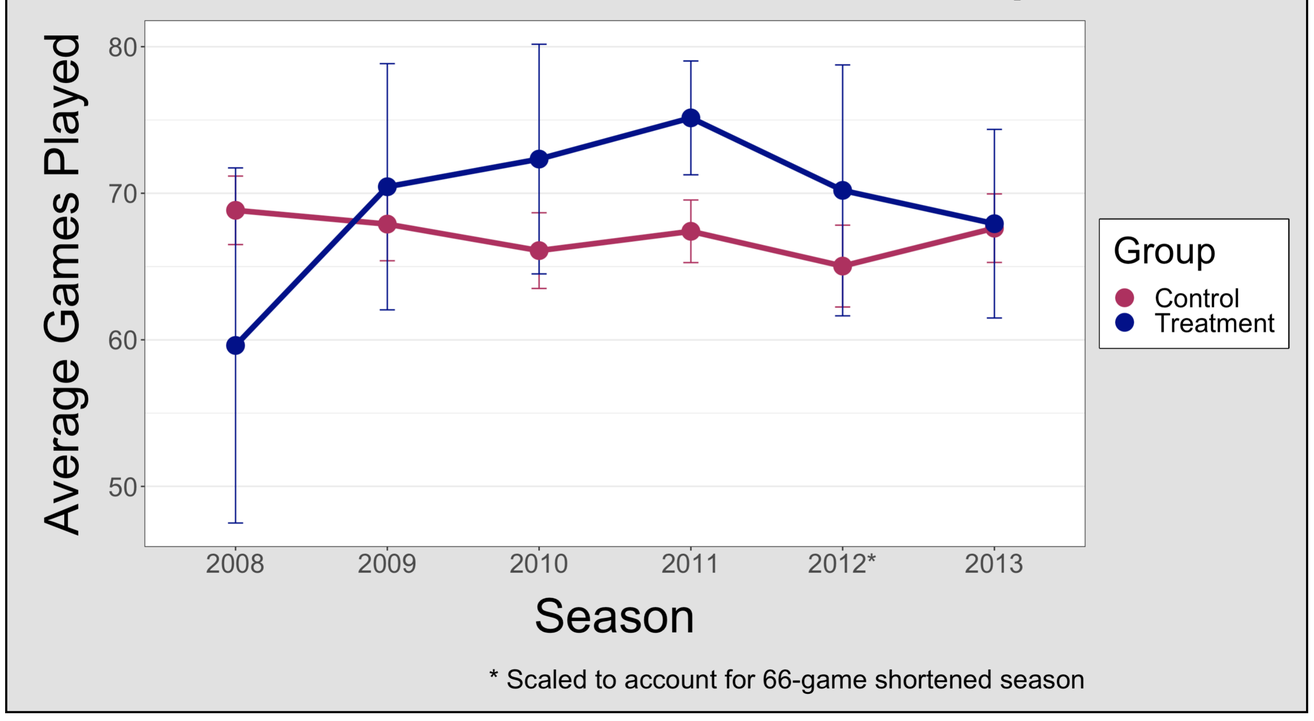
Time Frame: {2013, 2014}

Treatment: use of biomechanics and wearable technology

Treatment Group: San Antonio Spurs, Dallas Mavericks, Houston Rockets, New York Knicks
Control Group: Rest of League (26 teams)

The treatment group consists of the first four teams to publicly use biomechanics prior to the 2013-14 season, according to public records.

Pre-Treatment: Parallel Trends Assumption



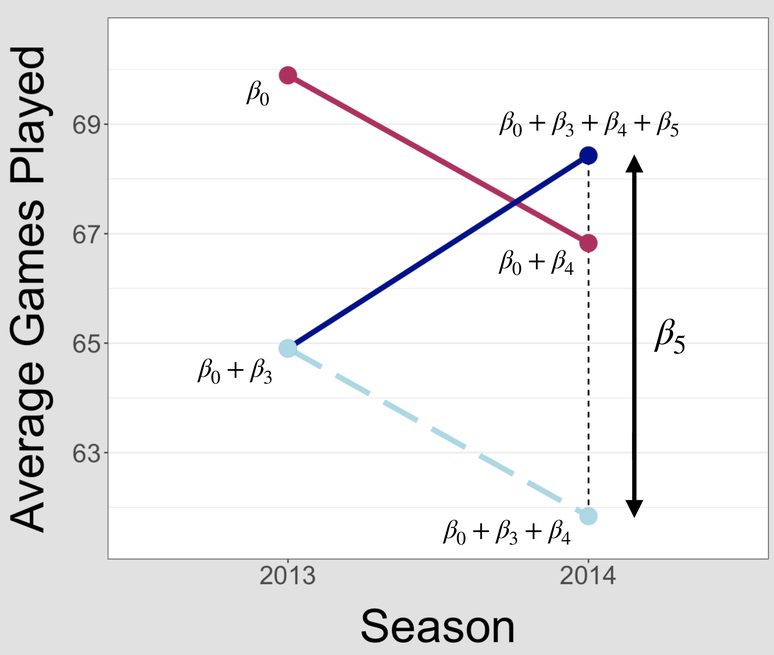
* Scaled to account for 66-game shortened season

Other than Parallel Trends, some of the other main assumptions of the diff-in-diff causal model are exchangeability, consistency, positivity, ignorability, no interference, and the stable unit treatment value assumption (SUTVA).

Linear model , controlling for potential confounders:

$$GP = \beta_0 + \beta_1 \cdot lastGP + \beta_2 \cdot age + \beta_3 \cdot tech + \beta_4 \cdot time + \beta_5 \cdot tech \cdot time$$

Diff-in-Diff Intuition



$$H_0 : \beta_5 = 0 \,|\, H_1 : \beta_5 \neq 0$$

***age* :** player's age during the given season

***lastGP* :** games played in the previous season

***tech* :** dummy variable indicating if the player's assignment group (0 for control, 1 for treatment)

***time* :** dummy variable indicating if the given season was pre or post treatment (0 if 2013, 1 if 2014)

***tech · time* :** dummy variable indicating if *tech* and *time* are both equal to one (β_5 : diff-in-diff estimator)

Linear Model: Coefficients

Difference-in-Differences Estimation

Variable	Estimate	p-value
(Intercept)	67.20	<0.01
lastGP	0.26	<0.01
age	-0.55	<0.01
tech	-3.94	0.249
time	-2.97	0.066
tech:time	7.89	0.101

Additional Notes

- 21 players in treatment group
- 169 players in control group
- Filtering only for players who averaged 15+ minutes, active players in both 2013 and 2014

Promising but Inconclusive

- Diff-in-diff coefficient β_5 = 7.89, not statistically significant
- Fail to reject H_0

Main Limitations

- High variation due to limited sample size
- Load management (intentionally sitting out from a game)
- Lockout that shortened 2011-12 season from 82 to 66 games