A Brief Guide to Wins Produced
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The Excel spreadsheet -- All NBA Players Wins Produced 1973-74 to 2019-20 -- presents a measure of each NBA player's Wins Produced from 1973-74 to 2019-20. Two views are presented. The first lists each player in each season by team. The second ranks all players in each year and presents season totals for each player across all teams the player played for in a given year. It is hoped this data will help anyone in need of a measure of player performance back to 1973-74. The NBA did not track offensive rebounds, defensive rebounds, turnovers, steals, and blocked shots prior to 1973. Consequently -- as the explanation of Wins Produced below makes clear -- one can't measure Wins Produced prior to 1973. Nevertheless, 47 years of player data -- and thousands of player observations -- should help students and professors interested in doing research with NBA data. Very much want to thank Rod Fort for hosting this data and hope many people are able to find it useful!

As the following discussion notes, such data also exists for the ABA, WNBA, and both women and men's college basketball. And the story told by all this data -- with respect to what wins basketball games -- is very much the same across all these leagues.

The Wins Produced Backstory

When I first began thinking about doing sports economics research with basketball data (in the 1990s!) I began by searching for some sort of statistical measure of a player's marginal product. For hitters in baseball -- a group of athletes many sports economists turned to first -- we have many measures that one can directly link to team outcomes. For examples, over 90% of runs scored is explained by a team's OPS (On base percentage + slugging average). One can also explain over 90% of runs scored with a simple linear weights model (see Blass, 1992).

Blass, Asher (1992) "Does the Baseball Labor Market Contradict the Human Capital Model?" Review of Economics and Statistics, 74: 261-268.

For basketball, though, such measures don't exist. There were metrics like "NBA Efficiency", "TENDEX", "Points Created", "Player Efficiency Rating", and "Game Score". But as detailed in *The Wages of Wins* and *Stumbling on Wins*, these measures reward inefficient shooting. So, they are not highly correlated with team wins and not a measure of a player's marginal product. Metrics like Dean Oliver's Offensive and Defensive Rating (and Win Shares -- derived from such measures) do not weight the player statistics in terms of their impact on team wins but rather according to Oliver's estimation of "difficulty". There is no reason to think because something is thought to be "difficult" or "not difficult" that this captures how the factor impacts wins. So, once again, these are not a measure of player's marginal product.[1]

[1] There is also the entire menu of plus-minus measures. The many issues with these metrics was detailed in Berri, David J. and J.C. Bradbury (2010). "Working in the Land of Metricians." **Journal of Sports Economics**, 11, n1; (February): 29-47.

Because I was not able to find a measure that I thought did what needed to be done for research in economics, I set out to create a measure. The metric I created -- which I called "Wins Produced" -- is designed to objectively connect the statistics tracked in the standard basketball box score to team wins. This measure was first detailed in *The Wages of Wins* (and an article I co-authored with Anthony Krautmann). Given that *The Wages of Wins* was a trade book, the explanation of Wins Produced in that book did not include any mathematical equations.

> *Berri, David J., Martin B. Schmidt, and Stacey L. Brook. 2006.* ***The Wages of Wins: Taking Measure of the Many Myths in Modern Sport****. Stanford University Press. Released in paperback in September, 2007.*

> *Berri, David J., and Anthony Krautmann. (2006). "Shirking on the Court: Testing for the Dis-Incentive Effects of Guaranteed Pay."* ***Economic Inquiry****. 44, n3; (July): 536-546.*

The math behind Wins Produced was eventually more completely detailed in Berri (2008 and 2012).

> *Berri, David J. (2008). "A Simple Measure of Worker Productivity in the National Basketball Association." In* ***The Business of Sport****; eds. Brad Humphreys and Dennis Howard, 3 volumes, Westport, Conn.: Praeger.*

> *Berri, David J. (2012). "Measuring Performance in the National Basketball Association." In* ***The Handbook of Sports Economics****, eds. Stephen Shmanske and Leo Kahane; Oxford University Press: pp. 94-117.*

In 2010, the model was updated to account for the diminishing returns aspect of defensive rebounds. This was noted in Berri and Schmidt (2010).

> *Berri, David J. and Martin B. Schmidt. 2010* ***Stumbling on Wins****:* ***Two Economists Explore the Pitfalls on the Road to Victory in Professional Sports.*** *Financial Times Press (Princeton, N.J.)*

And Wins Produced was also detailed in the following textbook:

> *Berri, David J. 2018.* ***Sports Economics.*** *Worth Publishers/Macmillan Education (New York, New York).*

In sum, much has been written about this measure. Over time it has been applied to the study of the NBA, the WNBA, men's college basketball, women's college basketball, and the ABA. The results -- as detailed in Berri (2018) -- indicate that regardless of the basketball data examined the story of what determines wins in basketball is the same. As noted in Berri (2017),

> ***Basketball is a fairly simple game. Teams win because they a) acquire possession of the ball without the other team scoring (i.e., grab defensive rebounds, create turnovers); b) keep possession of the ball (i.e., avoid turnovers, grab offensive rebounds); and c) turn possessions into points (i.e., shoot efficiently from the field and the line).***

Berri, David. 2017. "Boston Celtics Help Clear A Path For LeBron James Back To The NBA Finals." ***Forbes.com*** *(August 23)*
https://www.forbes.com/sites/davidberri/2017/08/23/the-boston-celtics-help-lebron-james-get-back-to-the-nba-finals/#75117206cee2

Given the nature of basketball, a player primarily produces wins by rebounding, forcing turnovers, avoiding turnovers, and shooting efficiently. To see specifically how many wins a player produces, though, we have to take a few steps. And the first set of steps involves ascertaining the value -- in terms of wins -- of each box score statistic.[2]

[2] Much of the following builds upon writing at The Wages of Wins Journal. See
How to Calculate Wins Produced: http://wagesofwins.com/how-to-calculate-wins-produced/
And FAQ: http://wagesofwins.com/faq/

DETERMINING THE VALUE -- IN WINS -- OF EACH BOX SCORE STATISTIC

Step One: Connecting team wins to offensive and defensive efficiency

Offensive efficiency (points scored per offensive possession) and defensive efficiency (points given up per defensive possession) are good for modeling a team's winning percentage. This simple model was noted by both John Hollinger (2002) and Dean Oliver (2004). In Berri (2008) this model is developed mathematically. In addition, Berri (2008) introduces a new measure of possessions. Both Hollinger (2002) and Oliver (2004) note what Berri (2008) refers to as "Possession Employed" (see below). Berri (2008) also introduces "Possessions Acquired". By employing two different definitions of possessions, Berri (2008) -- as detailed below -- presents a model that allows one to ascertain the impact on wins of most of the statistics tracked in the traditional box score (again, one can read Berri (2008) for all the math).

Hollinger, John. 2002. Pro Basketball Prospectus 2002. Washington D.C.: Brassey's Sports.

Oliver, Dean. 2004. Basketball on Paper. Washington D.C.: Brassey's.

Here is the specific model linking winning percentage to offensive and defensive efficiency.

- The model was estimated with data from 1987-88 to 2019-20
- Data taken from Basketball Reference
- Dependent Variable is Winning Percentage

Table One: Team Wins as a function of offensive and defensive efficiency

Independent Variable	Coefficient	t-statistic
Offensive Efficiency	3.1464	98.38
Defensive Efficiency	-3.1202	-86.92
Constant Term	0.4722	10.42

$R^2 = 0.94$

Where

- Offensive Efficiency = Points Scored divided by Possessions Employed (PE)
- Defensive Efficiency = Points Surrendered divided by Possessions Acquired (PA)

and

- Possessions Employed = FGA + 0.4443*FTA + TO – OREB
- Possessions Acquired = FGMopp. + 0.4443*FTMopp. + DREB + TOopp. + TMREB

FGA = Field Goal Attempts
FTA = Free Throw Attempts
TO = Turnovers
OREB = Offensive Rebounds
FGMopp. = Opponent's Field Goals Made
FTMopp. = Opponent's Free Throws Made
DREB = Defensive Rebounds
TOopp. = Opponent's Turnovers
TMREB = Team Rebounds

Again, the derivation of PE and PA is explained in Berri (2008).
The estimation of the coefficient for FTA and DFTM is explained in Berri (2008)

REBTM refers to Team Rebounds that change possession. This calculation is also detailed in Berri (2008)

Step Two: Determine the value, in terms of wins, of points and possessions.

This is done by differentiating the above wins model with respect to Points, Points Surrendered, PE, and PA.

Table Two: **The Value of Points and Possession**

Variable	Label	Marginal Value
Points Scored	PTS	0.032
Possessions Employed	PE	-0.034
Points Surrendered	PTSopp.	-0.032
Possessions Acquired	PA	0.033

Step Three: Determine the value of individual box score statistics

With the value of PTS, PTSopp., PE, and PA determined, we can now ascertain the value of all the individual elements of offensive and defensive efficiency (i.e. PTS, FGA, OREB, etc…).[3]

A field goal attempt costs a team a possession and is worth the value of a possession employed (see the calculation of possession employed). So therefore, a made three-point shot (3FGM) and a made two-point shot (2FGM) is calculated as follows:

Value of 3FGM = 3* value of point score + value of a possession employed = 3*0.032 - 0.034 = 0.064

Value of 2FGM = 2* value of point score + value of a possession employed = 2*0.032 - 0.034 = 0.064

A free throw made is equal to the value of point scored and the value of a free throw attempt. This would be calculated as follows:

Value of FTM = value of Point Scored + 0.4443*value of a Possession Employed = 0.017

A missed field goal is simply the cost of field goal attempt, or the value of a possession employed. Similarly, a missed free throw is simply the cost of a free throw attempted (i.e. 0.4443*Value of a Possession Employed).

And finally, offensive rebounds, defensive rebounds, turnovers, and steals just represent the value of a possession employed or possession acquired.

[3] The model estimated for this example employed data from 1987-88 through the 2019-20 season. Again, one gets very similar results for any basketball league on examines.

Of the statistics tabulated in the box score, only the values of blocked shots, personal fouls, and assists cannot be derived directly from the values of PTS, PE, PTSopp., and PA listed above.

To determine the value of blocked shots, a simple regression was estimated that connected the opponent's made field goals to opponent's field goal attempts, blocked shots, and dummy variables for teams, and years (1987-88 to 2010-20). This model explains 88% of the variation in opponent's made shots. Furthermore, it indicates that each blocked shot reduces the opponent's made shots by 0.628. Since each made two-point field goal by an opponent – as noted in Table Three – costs a team 0.031 wins, each blocked shot is worth 0.019 wins (i.e. 0.628*-0.031).

The value of personal fouls is calculated from the value of the opponent's free throws made. Specifically, we first determine the percentage of personal fouls a player committed on a team. We then multiply this percentage by the number of free throws the opponent of a team made. For example, James Harden committed 14.5% of the Houston Rockets personal fouls in 2019-20. The team's opponents made 1,299 free throws, so Harden is charged with 188.3 FTM(opp.).

The impact of assists will be detailed below. Before we get to that, Table Three reports the values of all the other box score statistics tracked for the players. It also reports the value of various statistics that are only tracked for the team. How these are incorporated in a player's Wins Produced is detailed below.

Table Three
Value of Player and Team Statistics
1987-88 to 2019-20

Player Variables	Marginal Value
Three Point Field Goals Made (3FGM)	0.064
Two Point Field Goals Made (2FGM)	0.031
Free Throws Made (FTM)	0.017
Missed Field Goals (FGMS)	-0.034
Missed Free Throws (FTMS)	-0.015
Offensive Rebounds (REBO)	0.034
Defensive Rebounds (REBD)	0.033
Turnovers (TO)	-0.034
Steals (STL)	0.033
Opponent's Free Throws Made [FTM(opp.)]	-0.017
Blocked Shots (BLK)	0.019
Team Variables	**Marginal Value**
Opponent's Three Point Field Goals Made [3FGM(opp.)]	-0.063
Opponent's Two Point Field Goals Made [2FGM(opp.)]	-0.031
Opponent's Turnovers [TO(opp.)][4]	0.033
Team Turnovers (TOTM)	-0.034
Team Rebounds (REBTM)	0.033

[4] These do not include a team's steals. So TO(opp.) is the difference between the opponent's turnovers and a team's steals.

DETERMINING EACH PLAYER'S WINS PRODUCED

Now that we know the value of each box score statistic (except assists!) we can measure each player's Wins Produced. Here are those steps:

Step One:
Calculate the value of a player's statistical production.

Production = **3FGM*0.064 + 2FGM*0.031 + FTM*0.017 + FGMS*-0.034 + FTMS*-0.015 + OREB*0.034 + DREB*0.033 + TO*-0.034 + STL*0.033 + FTMopp.*-0.017 + BLK*0.019**

NOTE: ***One should note that the above values have been rounded off to three decimals. The results reported below for each player were ascertained without any rounding.***

For James Harden in 2019-20 the calculation would be as follows:

Harden's Production= 299*0.064 + 373*0.031 + 692*0.017 + 842*-0.034 + 108*-0.015 + 70*0.034 + 376*0.033 + 308*-0.034 + 125*0.033 + 188.3*-0.017 + 60*0.019 = 19.42

Harden's P48 = (Production / Minutes Played) * 48 = (19.42 / 2,483) * 48 = 0.375

Step Two: Adjust for teammate's production of defensive rebounds

For the most part, player performance in the NBA does not depend on the player's teammates. Berri and Schmidt (2010) and Berri (2018) both present evidence that basketball players -- relative to athletes in baseball, football, and hockey -- are much more consistent across time.

Although players are consistent, it is the case that we do see some interaction effects in the NBA. To ascertain these effects, the following model was estimated:

> player per minute statistical production (i.e. defensive rebounds per minute) = f(per minute performance in stat the previous season, age, age squared, percentage of games played last two seasons, dummy variable for position played, dummy variable for new coach, dummy variable for new team, dummy variable for year, stability of roster, and the teammates' per-minute production of statistic).

This model allows us to see how a teammate's production of a given statistic impacts a player's per minute performance (after controlling for other factors that explain performance).

For example, consider field goal attempts. Estimating the above model for field goal attempts indicates a one-unit increase in the teammate's field goal attempts per minute will reduce a player's field goal attempts per-minute by 0.833. In other words, most of a player's shot attempts come at the expense of his teammates. And this is why players should not be given credit for taking shots (see Player Efficiency Rating and NBA Efficiency for two metrics where such credit is given). In other words, shooting efficiency – not total points scored — is the primary determinant of a player's offensive effectiveness.

For the other statistics, the results tend to be quite small and/or insignificant. The results also seem to depend upon the sample one considers and the specific independent variables one employs. In other words, the results are not robust. The one exception is seen with respect to defensive rebounds. The impact of the teammate's defensive rebounds tends to similar regardless of sample considered and specific formulation of the model. And that suggests something is going on with respect to player's rebounding on the defensive glass.

More specifically, for the above specification we see that each one-unit increase the teammate's defensive rebounds reduces a player's defensive rebounds per-minute by 0.504. In other words, some of a player's defensive rebounds (apparently about half) are taken from the player's teammates. In contrast, on the offensive glass the teammate's offensive rebounds per-minute do not have a statistically significant effect, suggesting that a player's offensive rebounds do not come from the player's teammates. These results make sense when we consider how teams go for rebounds on each end of the court. On the defensive end one suspects teams will send more players to the boards then they need because the team cannot begin its offensive possession if it doesn't have the ball. Consequently, as already noted, one suspects that some defensive rebounds are just taken from a player's teammates. On the offensive end, though, it's a different story. Teams have to have some players back to play defense. So, the offensive glass sees little competition among teammates, and therefore, offensive rebounds are primarily taken from a player's opponent.

Given this result, here is how one incorporates the impact of a teammate's defensive rebounds in the calculation of a player's Wins Produced.

1. Calculate for each player his teammates' defensive rebounds per minute (TDREBPM). This is calculated as follows: TDREBPM = (Team DREB – Player DREB) / (Team Minutes Played – Player Minutes Played)

2. For each player, multiply the TDREBPM by -0.504. This gives us how many defensive rebounds a player lost to his teammates.

3. Multiple the result of step (2) by the value of a defensive rebound (i.e. 0.033) and then multiply by a player's minutes.

4. Sum step (3) across all members on a team.

5. For each player, the value determined in step (4) is multiplied by the percentage of a player's defensive rebounds a player captured. This gives us the value of the defensive rebounds an individual player captured from his teammates.

6. Subtract step (5) from step (4), and add that value to a player's Production. Then divide this number – we can call this $PROD_{DREBADJ}$ — by minutes played and multiply by 48.

   Now here is what is done intuitively. Essentially, we are determining the number of defensive rebounds a player's teammates are taking from the player. We are also determining the number of defensive rebounds a player is taking from his teammates. The difference – or step (5) – decreases the P48 value for players who take a large number of defensive rebounds and increases the P48 value for players who get relatively few defensive rebounds.

Perhaps surprisingly, this adjustment does not have a very large impact on the evaluation of the players. There is a 0.98 correlation between P48 and $P48_{DREBADJ.}$ So, this adjustment doesn't dramatically alter the evaluation of most players.

For James Harden, the new P48 number is 0.367. In other words, his value – once we adjust for teammates' defensive rebounds – increases.

Step Three: Adjust for Assists

Assists are not part of the construction of offensive or defensive efficiency. But assists do impact outcomes. Specifically, a player's shooting efficiency is related to the number of assists his teammates accumulate. To see this, the following model was estimated.

> player's adjusted field goal percentage = f(player's adjusted field goal percentage last season, age, age squared, percentage of games played last two seasons, dummy variable for position played, dummy variable for new coach, dummy variable for new team, dummy variable for year, stability of roster, the teammates' per-minute production of assists, the teammates' adjusted field goal percentage).

The results from this model were incorporated into Wins Produced as follows.

1. Calculate for each player his Teammates' Assists per Minute (TAPM). This is calculated as follows: TAPM = (Team Assists – Player Assists) / (Team Minutes – Player Minutes)

2. Multiply TAPM for each player by the coefficient on TAPM from the above model, or 0.725.

3. Multiply step (2) by 2. This step allows us to see how TAPM impact a player's points-per-field goal attempts (which is simply Effective Field Goal Percentage * 2).

4. Multiply step (3) by field goal attempts taken. This allows us to see how many points a player scored should be credited to his teammates.

5. Multiply step (4) by the impact points have on wins 0.032. This allows us to see how much of a player's production of wins should be credited to his teammates.

6. Sum step (5) across all players on a team.

7. Allocate the outcome of step #6 across all players on a team by the percentage of assists on the team that are credited to each player.

This approach will increase the value of a player who gets many assists (i.e. who helps his teammates shoot better). And decrease the value of a player who doesn't get many assists. For James Harden – a player who led the Houston Rockets in assists in 2019-20 – his P48 value now rises to 0.435.

Note: In the above formulation, a teammate's effective field goal percentage does have a small and positive impact on a player's shooting efficiency. One should note that the effect is small, and the statistical significance of the effect does depend upon the specific formulation of the model. In other words, this result is not as robust as the result we see for defensive rebounds and assists. So, it is ignored in the calculation of Wins Produced.

Step Four: Incorporate team defense and calculate adjusted P48.

From Table Three we see that there are five factors tracked for the team that are not tracked for individual players. These include 3FGM(opp.), 2FGM(opp.), TO(opp.), TOTM, and REBTM. Each of these statistics are tracked for the team, but not assigned to individual players. In addition, blocked shots are valued in terms of eliminated made shots by the opponent. The value of the erased made shots also has to be included in the team defensive adjustment. This is done by noting the blocked shots by the team (BLKTM).

Having identified the team defensive factors, these are allocated across the players according to the minutes the player plays. In other words, we treat defense as a team activity, not an individual action. This approach allows us to differentiate players who play on good and bad defensive teams. But the data limitations prevent us from differentiating between players who are relatively better or worse on an individual team.

The calculation of DEFTM48 begins with the Team Defense Adjustment.

Team Defense Adjustment = [(3FGM(opp.)*-0.063 + (2FGM(opp.)*-0.031 + TO(opp.)*0.033 + TOTM*-0.034 + REBTM*0.033 – BLKTM*0.0.19)/Minutes Played]*48

Rockets Team Defensive Adjustment = [(880*-0.063 + 2165*-0.031 + 536*0.033 + 36*-0.034 + 429.4*0.033 – 371*0.0.19)/17,380]*48 = -0.272

To calculate DEFTM48 we compare each team's defensive adjustment to the league average.

DEFTM48 = League Average Team Defensive Adjustment – Team Defensive Adjustment

Rockets DEFTM48 = (-0.272)–(-0.270) = 0.002

DEFTM48 is incorporated into each player's value by adding DEFTM48 to each player's P48. The outcome of this calculation is called Unadjusted P48.

Harden's Unadjusted P48 = 0.435 + (0.002) = 0.432

> ***Note: This is called "Unadjusted P48" because we have NOT adjusted for position played yet.***

The average value, in absolute terms, of DEFTM48 is 0.009, so incorporating team defense results in a very small adjustment to an individual player's per 48 minute performance. Furthermore, the correlation coefficient between P48 (adjusted for defensive rebounds and assists) and Adj. P48 in 2019-20 was 0.998. In sum, adjusting for team defense doesn't change our view of a player very much.

Step Five: Adjusting for position played

The average value for Unadjusted P48 is 0.270. But this value is not the same across all positions. As noted in *The Wages of Wins* (and in other writings), centers and power forwards get rebounds and tend not to commit turnovers. Guards are the opposite. The nature of basketball is that teams need guards and big men. Given the nature of the game, players should be evaluated relative to their position averages.

In other words, contrary to what some people tend to say, basketball is not becoming "position-less". It has always been the case that all players are expected to shoot efficiently, rebound, force turnovers, not commit turnovers, etc... But how much players do with respect to these aspects of the game do depend on what position they play. Centers simply do get more rebounds than shooting guards. Therefore, if a player gets eight rebounds per game that means something very different if that player is a center as opposed to that player being a shooting guard.

All of this is illustrated in Table Four. As one can see, the Unadjusted P48 does vary across position played.

Table Four: Value of Unadjusted P48 Across All Positions in 2019-20

Position	Average Unadjusted P48
Point Guards	0.237
Shooting Guards	0.206
Small Forwards	0.225
Power Forwards	0.272
Centers	0.412

To incorporate the position averages we need to identify the position each player plays. For most players this is easy. For a few, though, it can be more challenging. It is important to note that positions in basketball are not like baseball or football. In baseball and football, we can tell position by where a player appears on the field. In basketball, though, position designations are more arbitrary. Consequently, two analysts looking at the same team may designate positions differently. And that means, if you don't like the positions assigned then you can re-evaluate a player at a different position. It is important to remember, it is assumed in this analysis that at all times a team is employing a center, power forward, small forward, shooting guard, and a point guard. So, if you move a player to a new position, you have to make another corresponding move someplace else.

In general, the process employed to estimate position is as follows:

1. Minutes are required to be equal at each position
2. In general, players are allocated across the center and forwards position according to designations found at places like Yahoo.com, ESPN.com, Basketball-Reference.com, etc… and then by height and weight.
3. At the guard positions again we look at position designation, height, and weight. But we also consider the number of assists per minute. The players who

get more assists are generally considered point guards (as opposed to shooting guards).[5]

With positions ascertained, we can now calculate a player's performance relative to the position average. For Harden the calculation would be as follows:

Harden's Relative Unadjusted P48 = Unadjusted P48 – League Average Unadjusted P48 = 0.432 – 0.206 = 0.227

So, per 48 minutes, Harden produced 0.227 more wins than an average shooting guard. Given that he played 2,483 minutes, we can now see that Harden produced 11.7 wins more than the average shooting guard.

Step Six: Calculating WP48 and Wins Produced

If we stop after Step Five we will have a player's production relative to the position average. What we want is a player's Wins Produced per 48 minutes (WP48) and his Wins Produced.

As noted in *The Wages of Wins*, to move from relative wins to absolute wins you need to note the average number of wins produced by a player per 48 minutes. This is quite easy to calculate.

The average team will win 0.500 games. Since a team employs five players per 48 minutes, the average player must produce per 48 minutes 0.100 wins. Because teams do play overtime games once in awhile, the actual average production of wins per 48 minutes is 0.099 (and one should note, all this is true regardless of how you calculate Wins Produced).

Given what we know about an average player, WP48 is calculated as follows:

WP48 = Relative Adj. P48 + 0.099

For Harden the calculation is as follows:

Harden WP48 = 0.227 + 0.099 = 0.326

Again, Harden played 2,483 minutes. If he produced 0.326 wins per 48 minutes, he then produced 16.9 wins for the season.

Harden's Wins Produced = WP48 / 48 * Minutes Played = 0.326/48 * 2,483 = 16.9

Or you can think of it this way. An average player would have produced 5.14 wins in Harden's minutes. We saw in Step Five that Harden produced 11.7 wins more than the average shooting guard. Therefore, Harden's Wins Produced must be 16.9 (yes, there is some rounding here).

The following table reports the same analysis for every player the Houston Rockets employed in 2019-20. As one can see, Harden led the team in Wins Produced. He also led the entire league!

[5] Harden is listed as a shooting guard by most publications. So although he gets many assists, he is evaluated as a shooting guard.

One can also see how closely wins produced tracks to team wins. The Rockets won 44 games in 2019-20. The team's wins produced (i.e. summation of the player's wins produced) is 42.8. So, this measure does allow us to connect what the player do to team outcomes. ***In sum, this does give us an objective measure of a player's marginal product!!***

Table Five: The Houston Rockets in 2019-20

Player	Minutes	Estimated Position	Unadjusted Production per 48 minutes	Wins Produced per 48 minutes	Wins Produced
James Harden	2,483	2.00	0.432	0.326	16.86
Clint Capela	1,279	5.00	0.582	0.269	7.17
Danuel House	1,913	3.36	0.256	0.113	4.51
P.J. Tucker	2,467	4.15	0.277	0.084	4.30
Russell Westbrook	2,049	1.00	0.224	0.087	3.69
Ben McLemore	1,619	2.76	0.213	0.093	3.12
Austin Rivers	1,594	1.38	0.183	0.056	1.88
Isaiah Hartenstein	266	5.00	0.509	0.196	1.09
Thabo Sefolosha	436	4.00	0.293	0.120	1.09
Tyson Chandler	219	5.00	0.434	0.122	0.56
Gary Clark	212	4.00	0.297	0.124	0.55
Jeff Green	407	5.00	0.363	0.051	0.43
Bruno Caboclo	52	5.00	0.489	0.177	0.19
Robert Covington	726	5.00	0.320	0.007	0.11
Luc Richard Mbah a Moute	25	4.00	0.163	-0.010	-0.01
Ryan Anderson	14	5.00	0.220	-0.092	-0.03
Chris Clemons	291	1.00	0.130	-0.008	-0.05
DeMarre Carroll	155	5.00	0.295	-0.018	-0.06
William Howard	13	4.00	-0.439	-0.612	-0.17
Michael Frazier	145	1.00	-0.096	-0.234	-0.71
Eric Gordon	1,016	3.00	0.045	-0.080	-1.70
TOTALS	**17,381**				**42.83**

One should note that Table Five also tells us a story of the Houston Rockets in 2019-20. Yes, the Rockets had the best player. But the Rockets were not the best team in the NBA. Once again, an average NBA player will produce about 0.100 wins per 48 minutes. As one can see, of the players who played at least 500 minutes, only Harden, Clint Capela, and Danuel House were above average. So, the Rockets had the best player in the league. But because they didn't surround him with much help, the team was easily defeated by the Los Angeles Lakers (the eventual champions) in the second round of the playoffs.

The analysis offered for the Rockets was repeated for each team in 2019-20. The results are reported in Table Six.

Table Six: Comparing Team Wins and Team Wins Produced for All Teams in 2019-20

Team	Team Wins	Team Wins Produced	Absolute Difference
Atlanta Hawks	20	16.5	3.5
Boston Celtics	48	50.7	2.7
Brooklyn Nets	35	34.8	0.2
Charlotte Hornets	23	18.4	4.6
Chicago Bulls	22	25.9	3.9
Cleveland Cavaliers	19	16.0	3.0
Dallas Mavericks	43	49.6	6.6
Denver Nuggets	46	41.7	4.3
Detroit Pistons	20	25.4	5.4
Golden State Warriors	15	14.3	0.7
Houston Rockets	44	42.8	1.2
Indiana Pacers	45	41.0	4.0
Los Angeles Clippers	49	50.9	1.9
Los Angeles Lakers	52	48.6	3.4
Memphis Grizzlies	34	33.8	0.2
Miami Heat	44	43.6	0.4
Milwaukee Bucks	56	60.1	4.1
Minnesota Timberwolves	19	23.3	4.3
New Orleans Pelicans	30	33.1	3.1
New York Knicks	21	19.3	1.7
Oklahoma City Thunder	44	40.6	3.4
Orlando Magic	33	33.9	0.9
Philadelphia 76ers	43	42.0	1.0
Phoenix Suns	34	36.9	2.9
Portland Trail Blazers	35	34.2	0.8
Sacramento Kings	31	31.4	0.4
San Antonio Spurs	32	33.1	1.1
Toronto Raptors	53	50.4	2.6
Utah Jazz	44	41.6	2.4
Washington Wizards	25	25.1	0.1
		Average Absolute Difference	**2.49**

As one can see, the average difference between team wins and a team's Wins Produced – in absolute terms – is 2.49 wins. Again, Wins Produced is based on a model connecting wins to offensive and defensive efficiency. So, the small difference between actual wins and the Summation of Wins Produced on a team simply reflects the fact that the efficiency metrics do indeed explain team wins in the NBA.

Table Seven: The Top 30 Players in Wins Produced in 2019-20

Rank	Player	Team	Minutes	Estimated Position	Unadjusted P48	WP48	Wins Produced
1	James Harden	Houston Rockets	2483	2.00	0.432	0.326	16.86
2	LeBron James	Los Angeles Lakers	2316	1.68	0.430	0.313	15.11
3	Giannis Antetokounmpo	Milwaukee Bucks	1917	4.34	0.588	0.367	14.67
4	Damian Lillard	Portland Trail Blazers	2474	1.00	0.407	0.269	13.88
5	Rudy Gobert	Utah Jazz	2333	5.00	0.592	0.279	13.58
6	Jimmy Butler	Miami Heat	1959	2.98	0.442	0.317	12.94
7	Ben Simmons	Philadelphia 76ers	2017	1.00	0.440	0.302	12.69
8	Chris Paul	Oklahoma City Thunder	2208	1.00	0.403	0.265	12.21
9	Hassan Whiteside	Portland Trail Blazers	2008	5.00	0.601	0.289	12.08
10	Luka Doncic	Dallas Mavericks	2047	1.04	0.408	0.271	11.57
11	Kawhi Leonard	Los Angeles Clippers	1848	3.00	0.412	0.287	11.03
12	Anthony Davis	Los Angeles Lakers	2131	4.46	0.479	0.243	10.77
13	Bam Adebayo	Miami Heat	2417	4.48	0.451	0.211	10.65
14	Jarrett Allen	Brooklyn Nets	1852	5.00	0.583	0.271	10.45
15	OG Anunoby	Toronto Raptors	2066	3.04	0.335	0.207	8.92
16	Domantas Sabonis	Indiana Pacers	2159	4.57	0.449	0.197	8.86
17	Khris Middleton	Milwaukee Bucks	1853	3.32	0.369	0.229	8.83
18	Delon Wright	Dallas Mavericks	1570	2.00	0.376	0.270	8.82
19	Mitchell Robinson	New York Knicks	1412	5.00	0.607	0.295	8.67
20	Shai Gilgeous-Alexander	Oklahoma City Thunder	2428	2.23	0.281	0.170	8.60
21	Gordon Hayward	Boston Celtics	1740	3.00	0.356	0.230	8.35
22	Kyle Lowry	Toronto Raptors	2098	1.00	0.327	0.189	8.25
23	Mikal Bridges	Phoenix Suns	2042	3.00	0.316	0.191	8.11
24	DeAndre Jordan	Brooklyn Nets	1234	5.00	0.627	0.315	8.09
25	Ivica Zubac	Los Angeles Clippers	1326	5.00	0.603	0.291	8.03
26	Nikola Jokic	Denver Nuggets	2336	5.00	0.477	0.165	8.01
27	Jonas Valanciunas	Memphis Grizzlies	1845	5.00	0.518	0.206	7.91
28	Brandon Clarke	Memphis Grizzlies	1300	4.00	0.463	0.290	7.85
29	DeMar DeRozan	San Antonio Spurs	2316	3.29	0.301	0.161	7.79
30	Steven Adams	Oklahoma City Thunder	1680	5.00	0.534	0.221	7.74

Table Seven reports the top 30 players in Wins Produced in 2019-20. Again, Harden leads the way. Again, he is the only Rocket player on the list. Meanwhile, the Lakers -- who won the NBA title -- had two of the top twelve players in the league (LeBron James and Anthony Davis).

One should note that these 30 players produced about 311 of the league’s 1059 wins. There were 529 players in the NBA in 2019-20. If we go past these 30 players, we see about 80% of the league’s wins were produced by 140 of the league’s top players. In other words, about 26.5% of the league’s players produced 80% of the league’s wins. In sum, this analysis indicates that most of the league's wins are produced by a minority of the league's players. You need more than one player to be successful. But you don't need more than three or four productive players to dominate the league!

One last note.... as noted above, the results for Wins Produced are quite similar across all sports leagues. The following table -- taken from Berri (2018) -- illustrates this point. Whether one looks at NCAA Women's basketball, NCAA men's basketball, the WNBA, or the NBA; the story we tell is the essentially the same.

Once again, as noted in Berri (2017),

> ***Basketball is a fairly simple game. Teams win because they a) acquire possession of the ball without the other team scoring (i.e., grab defensive rebounds, create turnovers); b) keep possession of the ball (i.e., avoid turnovers, grab offensive rebounds); and c) turn possessions into points (i.e., shoot efficiently from the field and the line).***

Table A6.2
The Impact of Various Player and Team Factors on Wins in the NCAA Women, NCAA Men, WNBA, and NBA

	NCAA Women 2015-16		**NCAA Men 2015-16**		**WNBA 1997 to 2016**		**NBA 1987-88 to 2015-16**	
Player Factors	**Marginal Value**	**Value Relative to Points**	**Marginal Value**	**Value Relative to Points**	**Marginal Value**	**Value Relative to Points**	**Marginal Value**	**Value Relative to Points**
PTS	0.022	1.0	0.025	1.0	0.033	1.0	0.033	1.0
FGA	-0.020	-0.9	-0.026	-1.0	-0.031	-0.9	-0.034	-1.0
FTA	-0.009	-0.4	-0.012	-0.5	-0.014	-0.4	-0.015	-0.5
ORB	0.020	0.9	0.026	1.0	0.031	0.9	0.034	1.0
TO	-0.020	-0.9	-0.026	-1.0	-0.031	-0.9	-0.034	-1.0
DRB	0.021	0.9	0.027	1.1	0.032	1.0	0.033	1.0
STL	0.021	0.9	0.027	1.1	0.032	1.0	0.033	1.0
Team Factors	**Marginal Value**	**Value Relative to Points**	**Marginal Value**	**Value Relative to Points**	**Marginal Value**	**Value Relative to Points**	**Marginal Value**	**Value Relative to Points**
Opp.PTS	-0.023	-1.0	-0.026	-1.0	-0.034	-1.0	-0.032	-1.0
Opp.FGM	0.021	0.9	0.027	1.1	0.032	1.0	0.033	1.0
Opp.FTM	0.009	0.4	0.012	0.5	0.014	0.4	0.015	0.5
Opp.TO*	0.021	0.9	0.027	1.1	0.032	1.0	0.033	1.0
TMREB	0.021	0.9	0.027	1.1	0.032	1.0	0.033	1.0

* - Opp.TO includes steals. Steals are credited to the individual player. Opp.TO that are not steals are credited to the team.
NOTE: This table originally appeared in Berri (2018, p. A-12).