

NBA Player Value

Jonathan Bown

June 13, 2019

The goal of this analysis is to better understand the similarities and differences between three metrics: Win Score, Wins Produced, and Win Share in the context of calculating player output or player value. I'm curious how similar or different these metrics are.

Interpretability

Win Share

Win Share was originally developed by Bill James for baseball in 2002. This is a complicated metric takes up about 75 pages of his original book. It was adapted to the NBA not long after. This metric is used to estimate the number of wins a player produces for his team. The number is based on full season statistics. These statistics are available for each player at basketball-reference.com and the top 20 are shown below.

Table 1: Win Score Top 20

Player	Win Share
James Harden	15.2
Giannis Antetokounmpo	14.4
Rudy Gobert	14.4
Damian Lillard	12.1
Paul George	11.9
Nikola Jokic	11.8
Kevin Durant	11.5
Clint Capela	10.8
Karl-Anthony Towns	10.4
Nikola Vucevic	10.1
Andre Drummond	10.0
Stephen Curry	9.7
Anthony Davis	9.5
Kawhi Leonard	9.5
LaMarcus Aldridge	9.3
Pascal Siakam	9.3
Steven Adams	9.1
Kyrie Irving	9.1
Joel Embiid	8.7
Montrezl Harrell	8.7

Win Score

Win score is calculated as

$$\Delta wins = \text{points} + \text{total rebounds} + \text{steals} + \frac{1}{2}(\text{blocked shots} + \text{assists}) - \text{field goal attempts} - \text{turnovers} - \frac{1}{2}(\text{free throws} + \text{personal fouls})$$

As noted in the textbook, this equation rewards players for positive contributions and penalizes them for negative contributions.

Table 2: Win Score Top 20

Player	Win Score
Rudy Gobert	1441.5
Andre Drummond	1378.5
Giannis Antetokounmpo	1370.0
Nikola Vucevic	1223.0
Karl-Anthony Towns	1205.0
Nikola Jokic	1182.0
Clint Capela	1112.0
Joel Embiid	1064.5
DeAndre Jordan	1041.0
James Harden	1021.0
Ben Simmons	1014.5
Anthony Davis	1012.5
Paul George	980.5
Steven Adams	966.0
Russell Westbrook	964.0
Kevin Durant	943.0
LaMarcus Aldridge	937.5
Hassan Whiteside	918.5
Deandre Ayton	874.0
Willie Cauley-Stein	853.0

Wins Produced

For Wins Produced I am following the formula laid out in The Wages of Wins Journal article titled ‘How to calculate Wins Produced’. This article lays out a complicated formula that involves using regression coefficients with variables that are similar to Win Score. But this method makes adjustments for defensive rebounds, assists, position, and league averages. It is pointed out by the article that some of these adjustments don’t end up making a large difference because of the robustness of the coefficients and league averages. For simplicity I am excluding the adjustment due to position because I don’t have data on the changing positions of each player.

Marginal Revenue Product

The quantity ‘Marginal Revenue Product’ (MRP) is defined as the extra revenue created by an additional worker. You can measure or estimate what the output would be given a number of workers and multiply

that by the marginal revenue per worker to get the marginal revenue that would come from that output. In sports, particularly the NBA, we assume that the output of a firm or team is wins. “We assume that teams produce wins using players as inputs.” (Cite) The value of a player can be written as

$$MRP_{ij} = MR_{win} \times \Delta wins_{ij}$$

where MRP_{ij} is the marginal revenue product of player i when he plays for team j , MR_{win} is the value of an additional win to a team, and $\Delta wins_{ij}$. To calculate each teams cost per win, I am using ending 2018 numbers available in an article titled ‘The NBA’s Chumps and Wise Ones’.

Table 3: MRP Top 20

Player	MRP	Salary	Surplus
Nikola Vucevic	\$77,147,064	\$12,750,000	\$64,397,064
Paul George	\$76,887,732	\$30,560,700	\$46,327,032
Giannis Antetokounmpo	\$67,039,347	\$24,157,304	\$42,882,043
Karl-Anthony Towns	\$61,325,475	\$7,839,435	\$53,486,040
Stephen Curry	\$60,454,693	\$37,457,154	\$22,997,539
Terrence Ross	\$57,041,660	\$10,500,000	\$46,541,660
James Harden	\$56,718,987	\$30,431,854	\$26,287,133
Kemba Walker	\$55,398,450	\$12,000,000	\$43,398,450
Brook Lopez	\$53,791,203	\$3,382,000	\$50,409,203
John Collins	\$52,193,946	\$2,299,080	\$49,894,866
Dewayne Dedmon	\$51,478,915	\$7,200,000	\$44,278,915
Buddy Hield	\$50,802,297	\$3,833,760	\$46,968,537
Luka Doncic	\$50,584,862	\$6,560,640	\$44,024,222
DeAndre Jordan	\$45,238,668	\$22,900,000	\$22,338,668
Anthony Davis	\$44,497,231	\$25,434,263	\$19,062,968
Andre Drummond	\$44,093,772	\$25,434,263	\$18,659,509
Lauri Markkanen	\$43,877,230	\$4,536,120	\$39,341,110
LeBron James	\$43,573,513	\$35,654,150	\$7,919,363
Hassan Whiteside	\$41,992,156	\$25,434,263	\$16,557,893
Rudy Gobert	\$41,122,776	\$23,241,573	\$17,881,203

Which players have the highest surplus?

Which players are the most over paid according to this method?

Where do the Utah Jazz fit in this picture?

Conclusion

Sources:

<http://wagesofwins.com/how-to-calculate-wins-produced/>

<https://dberri.wordpress.com/2006/05/21/simple-models-of-player-performance/>

https://www.basketball-reference.com/leagues/NBA_2019_advanced.html

Table 4: Surplus Top 20

Player	MRP	Salary	Surplus
Nikola Vucevic	\$77,147,064	\$12,750,000	\$64,397,064
Karl-Anthony Towns	\$61,325,475	\$7,839,435	\$53,486,040
Brook Lopez	\$53,791,203	\$3,382,000	\$50,409,203
John Collins	\$52,193,946	\$2,299,080	\$49,894,866
Buddy Hield	\$50,802,297	\$3,833,760	\$46,968,537
Terrence Ross	\$57,041,660	\$10,500,000	\$46,541,660
Paul George	\$76,887,732	\$30,560,700	\$46,327,032
Dewayne Dedmon	\$51,478,915	\$7,200,000	\$44,278,915
Luka Doncic	\$50,584,862	\$6,560,640	\$44,024,222
Kemba Walker	\$55,398,450	\$12,000,000	\$43,398,450
Giannis Antetokounmpo	\$67,039,347	\$24,157,304	\$42,882,043
Lauri Markkanen	\$43,877,230	\$4,536,120	\$39,341,110
James Harden	\$56,718,987	\$30,431,854	\$26,287,133
Stephen Curry	\$60,454,693	\$37,457,154	\$22,997,539
DeAndre Jordan	\$45,238,668	\$22,900,000	\$22,338,668
Anthony Davis	\$44,497,231	\$25,434,263	\$19,062,968
Andre Drummond	\$44,093,772	\$25,434,263	\$18,659,509
Rudy Gobert	\$41,122,776	\$23,241,573	\$17,881,203
Hassan Whiteside	\$41,992,156	\$25,434,263	\$16,557,893
LeBron James	\$43,573,513	\$35,654,150	\$7,919,363

Wins Produced vs. Win Score. (2006, May 25). Retrieved from <https://dberri.wordpress.com/2006/05/26/wins-produced-vs-win-score/>

Table 5: MRP Bottom 20

Player	MRP	Salary	Deficit
Collin Sexton	\$-31,653,470	\$4,068,600	\$27,584,870
De'Aaron Fox	\$-25,200,685	\$5,470,920	\$19,729,765
DeMar DeRozan	\$-24,265,737	\$27,739,975	\$-3,474,238
Shelvin Mack	\$-21,320,889	\$2,029,463	\$19,291,426
Shelvin Mack	\$-21,320,889	\$1,000,000	\$20,320,889
Kris Dunn	\$-20,560,807	\$4,221,000	\$16,339,807
Bruce Brown	\$-19,779,106	\$838,464	\$18,940,642
Shai Gilgeous-Alexander	\$-19,092,527	\$3,375,360	\$15,717,167
Tony Parker	\$-18,805,026	\$5,000,000	\$13,805,026
Ish Smith	\$-14,856,807	\$6,000,000	\$8,856,807
Dennis Smith	\$-13,131,545	\$3,819,960	\$9,311,585
Avery Bradley	\$-12,967,834	\$12,000,000	\$967,834
Josh Jackson	\$-12,866,849	\$6,041,520	\$6,825,329
Jeff Teague	\$-12,474,649	\$19,000,000	\$-6,525,351
Jonathon Simmons	\$-11,989,472	\$6,000,000	\$5,989,472
Tomas Satoransky	\$-11,696,329	\$3,129,187	\$8,567,142
Frank Ntilikina	\$-11,346,761	\$4,155,720	\$7,191,041
Brandon Ingram	\$-11,345,278	\$5,757,120	\$5,588,158
Evan Turner	\$-11,224,620	\$17,868,852	\$-6,644,232
Jalen Brunson	\$-11,132,149	\$1,230,000	\$9,902,149

Table 6: Surplus Bottom 20

Player	MRP	Salary	Deficit
DeMar DeRozan	\$-24,265,737	\$27,739,975	\$-52,005,712
Collin Sexton	\$-31,653,470	\$4,068,600	\$-35,722,070
Jeff Teague	\$-12,474,649	\$19,000,000	\$-31,474,649
De'Aaron Fox	\$-25,200,685	\$5,470,920	\$-30,671,605
Evan Turner	\$-11,224,620	\$17,868,852	\$-29,093,472
Avery Bradley	\$-12,967,834	\$12,000,000	\$-24,967,834
Kris Dunn	\$-20,560,807	\$4,221,000	\$-24,781,807
Tony Parker	\$-18,805,026	\$5,000,000	\$-23,805,026
Shelvin Mack	\$-21,320,889	\$2,029,463	\$-23,350,352
Shai Gilgeous-Alexander	\$-19,092,527	\$3,375,360	\$-22,467,887
Shelvin Mack	\$-21,320,889	\$1,000,000	\$-22,320,889
Ish Smith	\$-14,856,807	\$6,000,000	\$-20,856,807
Bruce Brown	\$-19,779,106	\$838,464	\$-20,617,570
Josh Jackson	\$-12,866,849	\$6,041,520	\$-18,908,369
Jonathon Simmons	\$-11,989,472	\$6,000,000	\$-17,989,472
Brandon Ingram	\$-11,345,278	\$5,757,120	\$-17,102,398
Dennis Smith	\$-13,131,545	\$3,819,960	\$-16,951,505
Frank Ntilikina	\$-11,346,761	\$4,155,720	\$-15,502,481
Tomas Satoransky	\$-11,696,329	\$3,129,187	\$-14,825,516
Jalen Brunson	\$-11,132,149	\$1,230,000	\$-12,362,149