Calculating Player Impact with WAR and Linear Regression

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Wins Above Replacement (WAR) is a statistic used to quantify a player's overall contribution to their team. Originally popularized in baseball, WAR measures a player's impact in both defensive and offensive aspects, allowing for meaningful comparisons with other players in the league or within a team. In recent years, this statistic has been adapted for hockey, providing valuable insights into player performance.

Data Collection

To calculate WAR, data collection is essential. I utilized Hockey-Reference.com to gather relevant statistics for the Utah Hockey Club team. For the three goalies, I collected data on save percentage (SV%), goals against average (GAA), and shots against (SA) for the 2023-2024 season. To calculate Goalie WAR, a Goalie Saves Above Replacement (GSAR) value is needed. I selected Matt Villalta as the replacement/backup due to his relatively rookie status on the team. His save percentage and goals against stats were recorded for this purpose.

For players in other positions, I collected data on player name, age, position, games played, takeaways, and various other statistics, also sourced from Hockey-Reference.com. Additionally, I compiled extensive data on every player in the league to train a linear regression model, which would later be used in calculating WAR.

Calculating Goalie WAR

$$GSAR = Total\ Shots\ x\ (RSV\% - GSV\%)$$

$$Goalie\ War = \frac{abs(GSAR)}{GTW}$$

To calculate Goalie WAR, two key calculations are involved. The first is the GSAR value, which is derived by multiplying the total shots against a goalie by the difference between the replacement goalie's save percentage (RSV%) and the goalie's save percentage (GSV%). This reveals how many more saves a goalie made compared to a replacement. The absolute value of GSAR is then divided by the GTW (Goal to Win) statistic, which typically ranges from 6-8 goals. I used 7, the median of this range. The resulting WAR value indicates whether the goalie's contribution is positive or negative relative to the replacement.

Player Name	SV%	GAA	SA	War Value
Jaxson Stauber	.911	2.81	191	2.265
Connor Ingram	.907	2.91	1461	16.488
Karel Vejmelka	.895	3.35	1089	10.423

After calculating WAR for each goalie, we can see that all three have a positive impact compared to the replacement goalie, with Connor Ingram contributing the most.

Calculating Individual Player WAR

$$oWar = (G \ x \ W_g) + (A \ x \ W_a) + (CF \ x \ W_{CF})$$

$$dWar = (BLK \ x \ W_{blk}) + (TK \ x \ W_{tk}) + (CA \ x \ W_{CA})$$

$$Total \ War \ Value = \ oWar + \ dWar$$

To calculate individual player WAR, a linear regression model was constructed to assess the significance of various statistics in determining a player's value to the team. The model incorporated goals, assists, Corsi (a measure of shot attempt differential), blocks, and takeaways to estimate point shares—a key metric in understanding a player's contribution to team success. I then applied the model's weights to the WAR calculations for each player on the team.

Player Name	oWar	dWar	Total War
J.J. Moser	7.407	-3.353	4.054
Jason Zuker	4.886	-2.697	2.188
Michael Kesselring	5.706	-2.695	3.011
Adam Ružička	0.0551	-0.138	-0.0836

The results indicate that J.J. Moser contributes significantly on offense but has a limited impact defensively. The player with the highest WAR value, Clayton Keller, is shown to be the best all-around player on the team.

Conclusion

WAR values provide a comprehensive measure of a player's contribution to their team, offering insights into both offensive and defensive performance. These values can be particularly useful in evaluating goalies and determining when a player might need to be replaced or traded. Understanding WAR helps teams make more informed decisions about player development and roster management.

While using WAR calculations it is important to consider the limitations, such as the quality and completeness of the data used. These calculations don't consider other aspects of hockey players that can't quantified. Additionally, WAR calculation formulas are constantly debated on, making it hard to find acute and accepted calculations.

Despite these limitations, WAR remains a valuable tool for analyzing player impact, particularly when used in conjunction with other metrics and qualitative assessments.