



# The Effect of Player Performance on Free Agency Contract Value in Major League Baseball

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## I. Abstract

This study estimates the effect of player performance on free agency contract values in Major League Baseball (MLB). We hypothesize that performance, as measured by Wins Above Replacement (WAR), has a positive effect on the contract value. To test this, we specify and estimate a linear regression for contract value as a function of current and lagged WAR values and other control variables. Using data for 82 major league position players during the 2013 and 2014 seasons, our results indicate that three years of lagged WAR values have a significant, positive effect on contract value. The model is used to predict free agent contract values set during the 2015 off-season. This prediction for 25 players has an average error of 35%, without systematic over- or under-prediction.

## II. Variables in Model

Dependent Variable	Variable Definition
SALARY	Log of player's average annual salary over the length of the contract divided by league avg. salary in the contract year
<b>Performance Variables</b>	
WAR(t-i)	Log of player's WAR value for $i^{\text{th}}$ year prior to new contract (+) (i = 1,2,3,4,5)
<b>Other Variables</b>	
YRS	Length of contract (-)
SAME_TEAM	Dummy: One if player re-signed with the same team (-)
NEW_TEAM_AVG_SAL	Log of the average salary of players on the new team (+)
AGE	Age of player at time of new contract (+/-)
PLAYOFFS	Dummy: One if player was in the playoffs the year before signing their new contract (+)
WORLD_SERIES	Dummy: One if player was in the World Series the year before signing their new contract (+)

+/- Indicates expected effect of explanatory variable on SALARY

## III. Theory/Hypotheses

Performance Variables:

- Definition of Wins Above Replacement (WAR)- WAR is a complex performance statistic that is calculated by dividing the number of runs a player contributes to his team by the average number of runs per win.
- WAR(t-i) i = 1,2,3,4,5 - We wanted to determine how past performance, measure by lagged values of WAR, affects current contract value (SALARY).

Other Variables:

- YRS- The length of contract a player signs was expected to have a negative impact on SALARY, because the team wants the player to sacrifice some per year value for the security of additional years on the contract.
- SAME\_TEAM- This dummy variable attempted to capture any "hometown discount" that a player would accept in order to resign with the same team.
- NEW\_TEAM\_AVG\_SAL- Teams with higher payrolls were expected to be willing to pay a higher salary for the same performance level than teams with a lower payroll would.
- AGE- The effect a player's age has on SALARY can change depending on the stage of the player's career.
- PLAYOFFS/WORLD\_SERIES- Dummy variables that we expected to have a positive effect on SALARY due to the extra exposure for the player prior to free agency.

## IV. Data

- We used a cross-sectional dataset for 82 free agents, who signed new contracts in the 2013 and 2014 offseasons.
- The dataset includes the full range of players from back-ups to stars. Annual contract values range from <\$1 million to \$24 million.
- The salary data is from CBS Sports (<http://www.cbssports.com/mlb/salaries/avgsalaries>)
- The WAR statistics are from Fan Graphs database (<http://www.fangraphs.com>)

## V. Empirical Results

Variable	(1)	(2)
Constant	-5.696444 (-2.523)*	-4.371326 (-9.556)*
WAR(t-1)	0.989862 (3.297)*	1.022022 (3.511)*
WAR(t-2)	0.558873 (2.010)*	0.665647 (2.517)*
WAR(t-3)	0.682107 (4.387)*	0.669965 (4.381)*
WAR(t-4)	0.146566 (0.605)	
WAR(t-5)	0.479851 (1.734)*	
YRS	0.127534 (2.255)*	0.159584 (2.966)*
PLAYOFFS	-0.059158 (-0.423)	
WORLD_SERIES	0.319473 (1.525)	
SAME_TEAM	-0.223279 (-1.370)	
AGE	-0.006371 (-0.309)	
NEW_TEAM_AVG_SAL	0.045895 (0.335)	
Adjusted R-squared	0.603568	0.601376
Akaike info criterion	1.783034	1.713128
Schwarz criterion	2.135236	1.859879

\*Statistically different from zero at 5% level. (Newey-West standard errors used to correct for Heteroskedasticity)

## VI. Conclusions

Performance:

- Three years of prior performance (WAR) affects the current average annual salary signed in free agency.

Prediction:

- We tested our model by predicting the annual salaries of 25 free agents who signed new contracts in the 2015 offseason.
- The average error of these predictions when compared to the free agents' actual contracts is 35%, with no systematic over- or under-prediction.