

The Relationship Between Salary and Job Performance: Major League Baseball as an Example

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Preliminary Thoughts

- If job performance can be a successful indicator of salary earned in a competitive market shouldn't this be more widely used
- Health Care
- Education

Research Question

- Can a baseball player's salary be predicted by on field performance? Are salary and on field performance closely correlated?
- Hypothesis: A player's salary is based upon past on field performance.

Goals

- Quantify a player's on field success using baseball statistics
- Track the relationship of a player's on field success with the player's salary
- Test for correlation between salary and on field success in a variety of different scenarios

Major League Baseball Market

- 1800's – mid 1970's little player mobility
 - Player's bound to team for life
- Mid 1970's—Free Agency
 - Player's able to openly negotiate contract with any team after current contract had expired
 - Player mobility increased

Quantifying On Field Success

- Traditional Statistics
 - Batting Average
 - Home Runs
 - Runs Batted In
 - Stolen Bases
 - Runs Scored

Problems with Traditional Statistics

- Batting Average- Luck
- Home Runs- Field dimensions, weather, altitude
- RBI's and Runs- Functions of other team mates success

Moneyball Era

- Oakland Athletics- small market team
 - General Manager- Billy Beane
- On Base Percentage (OBP)
- Slugging Percentage (SLG)

Problems with Moneyball

- On Base Percentage- Overvalues walks
- Slugging Percentage- Doesn't adjust for parks

Sabermetrics

- Bill James – father of sabermetrics
 - “the search for knowledge about baseball”
 - Advanced statistics used to try to solve some of the inadequacies of traditional and Moneyball statistics.

How Sabermetrics Help

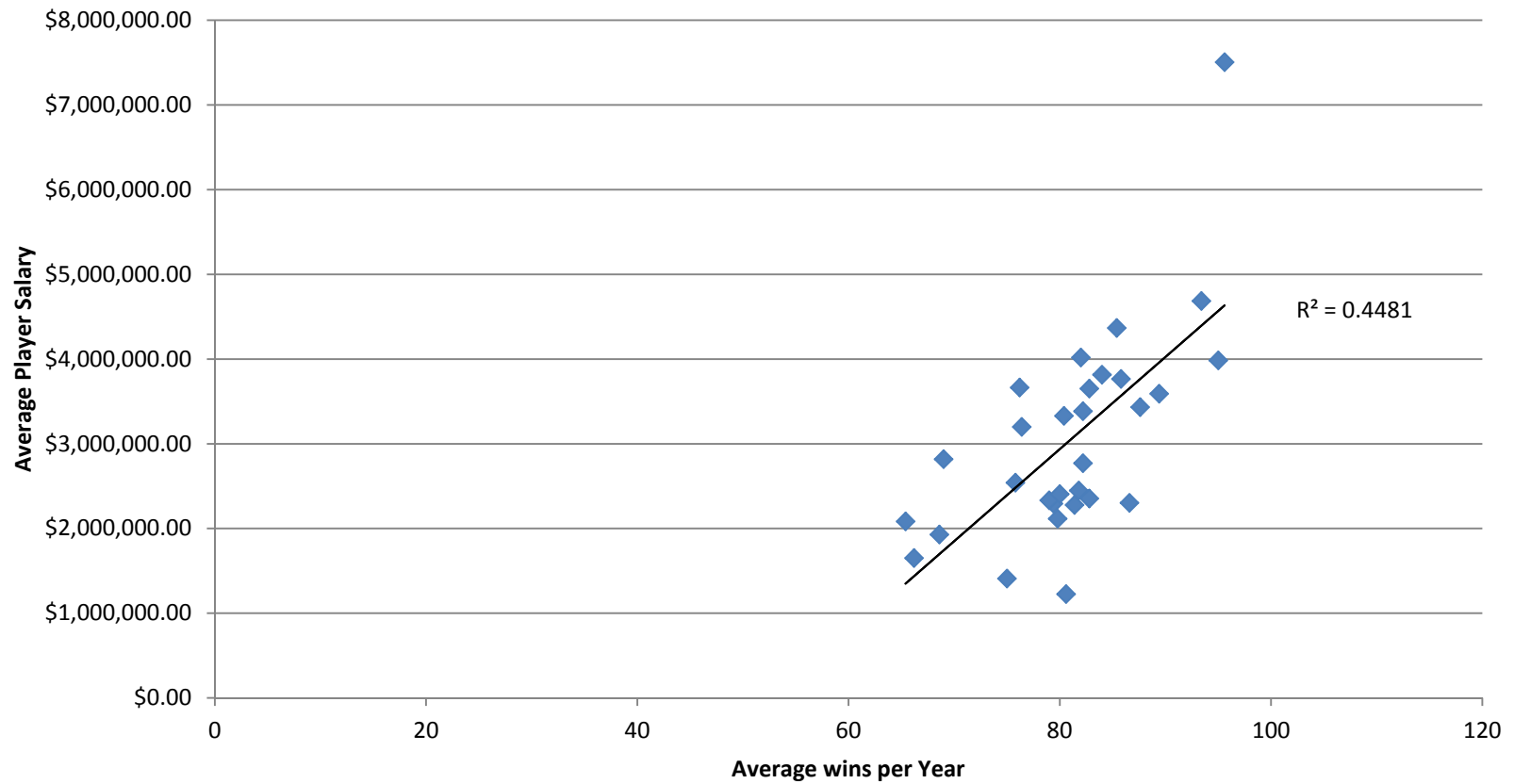
- BABIP- Batting Average on Balls In Play
- Park Factor
- On Base Percentage Plus Slugging (OPS+)
- Adjusted OPS (OPS+)

Data Used

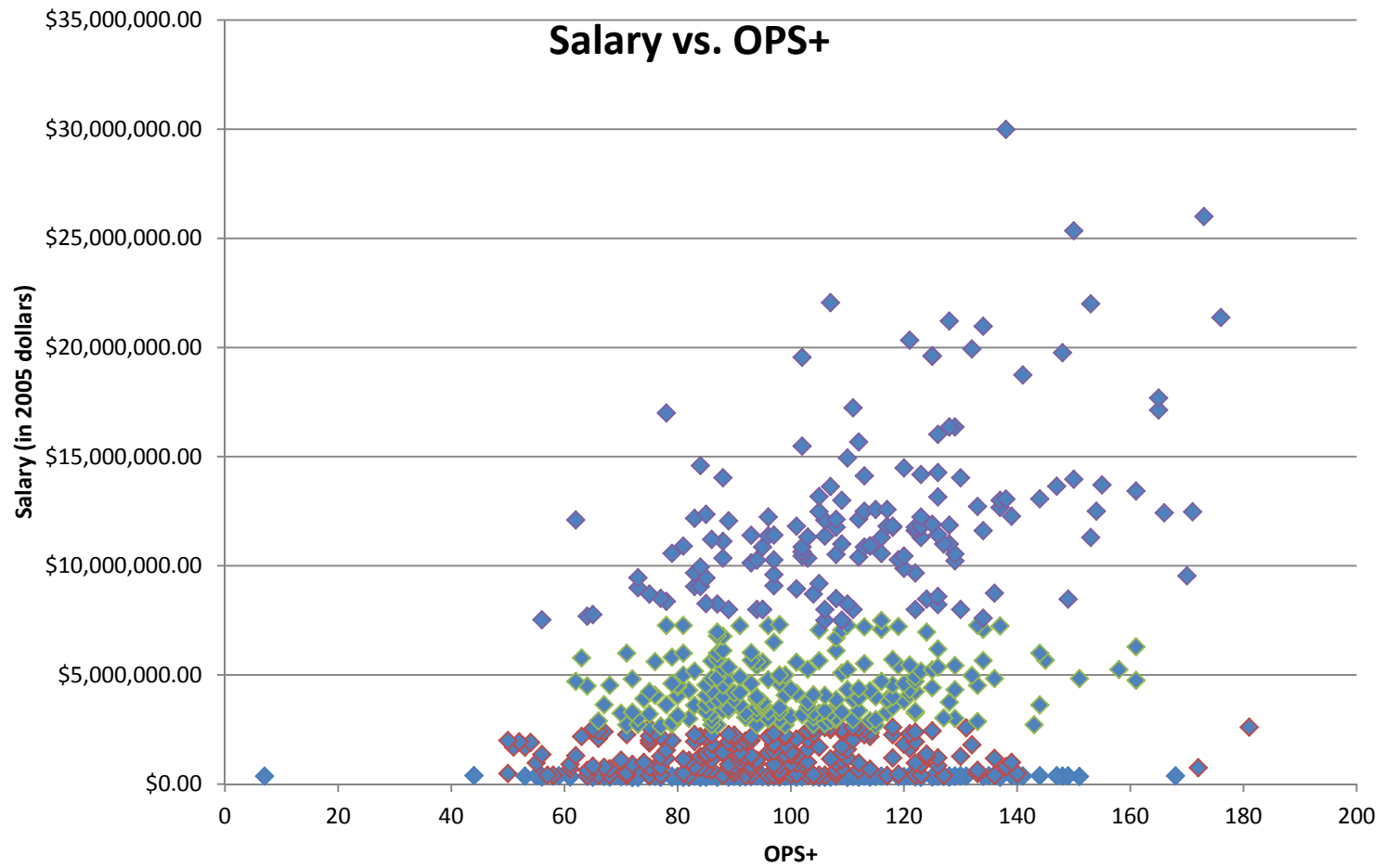
- Three sets of Data
 - Team data- Payroll vs. Performance (Wins)
 - Individual Data 2005-2009 Salary vs. Performance
 - 2010 Free Agent Data- Salary vs. Past Performance

Data Set 1

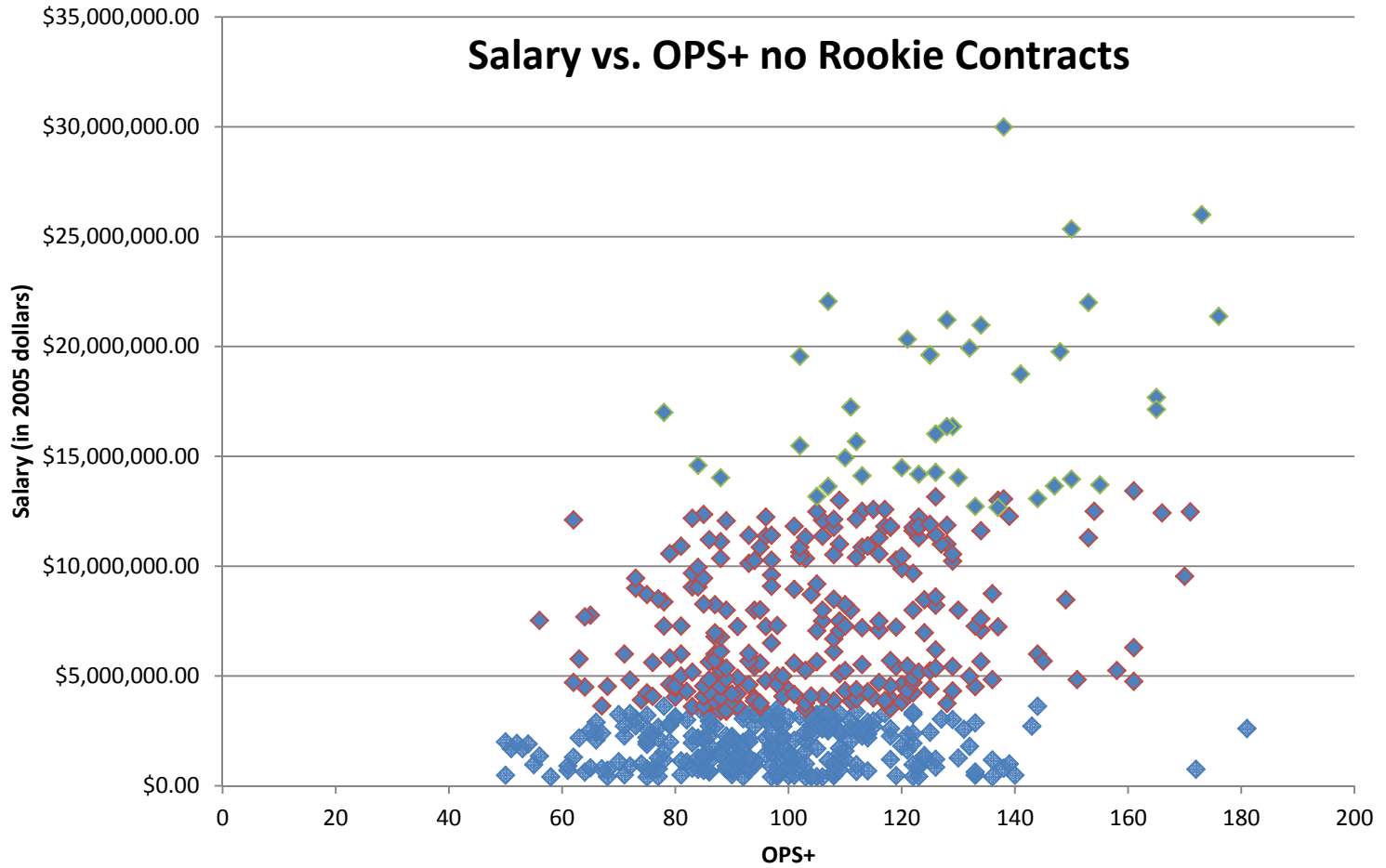
Average Player Salary vs. Average Wins per Year



Data Set 2



Rookie Contracts



Data Set 2: Adding Speed

$$\text{Salary (in 2005 dollars)} = b_0 + b_1\text{OPS} + b_2\text{SB} + e_1$$

<i>Regression Statistics</i>	
Multiple R	0.415316792
R Square	0.172488038
Adjusted R Square	0.169137787
Standard Error	4472069.415
Observations	539

Coefficients	
Intercept	-3226926.459
X Variable 1	30922.18381
X Variable 2	86839.54804

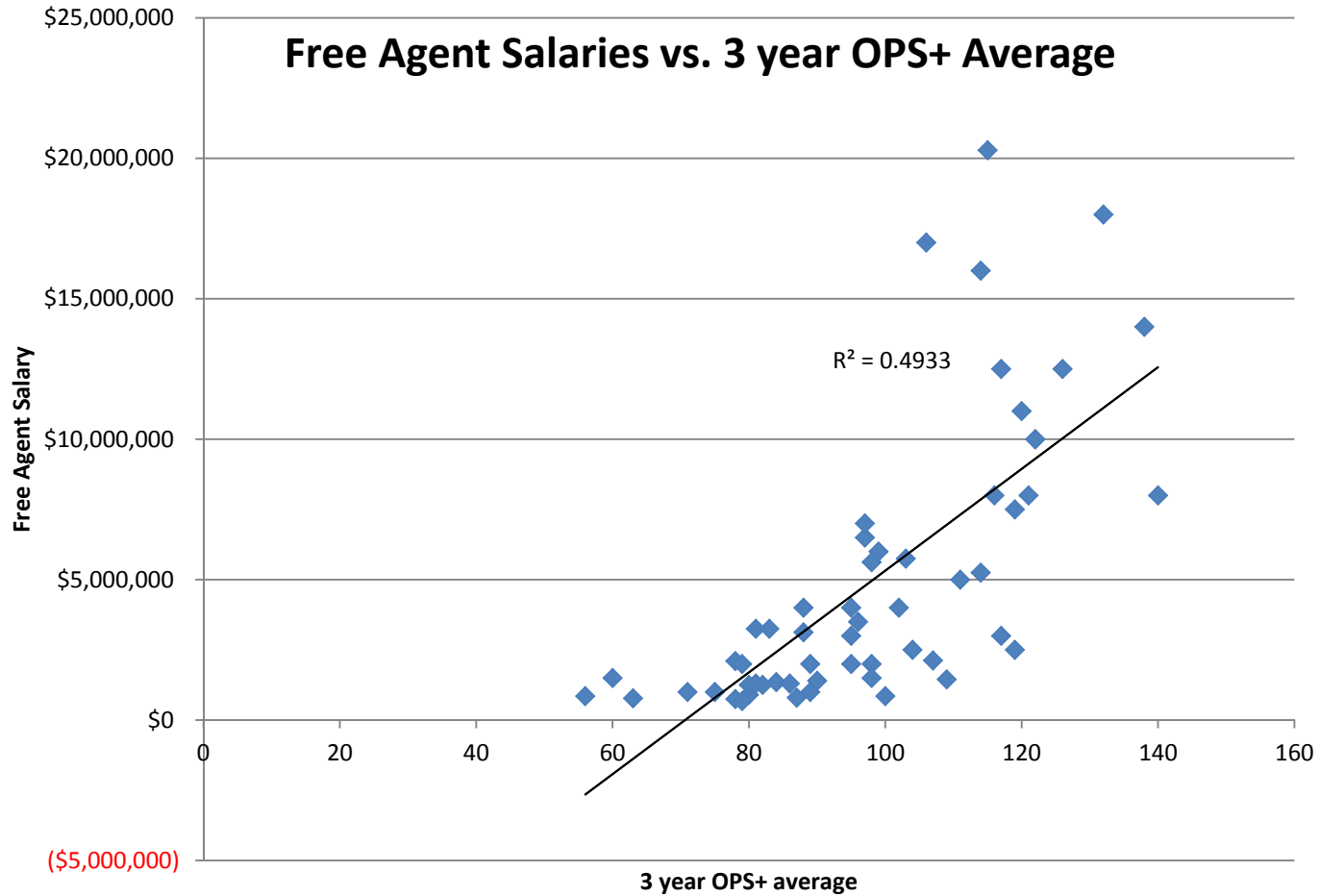
Experience

$$\text{Salary (in 2005 dollars)} = b_0 + b_1\text{OPS} + b_2\text{SB} + b_3\text{EXP} + e_1$$

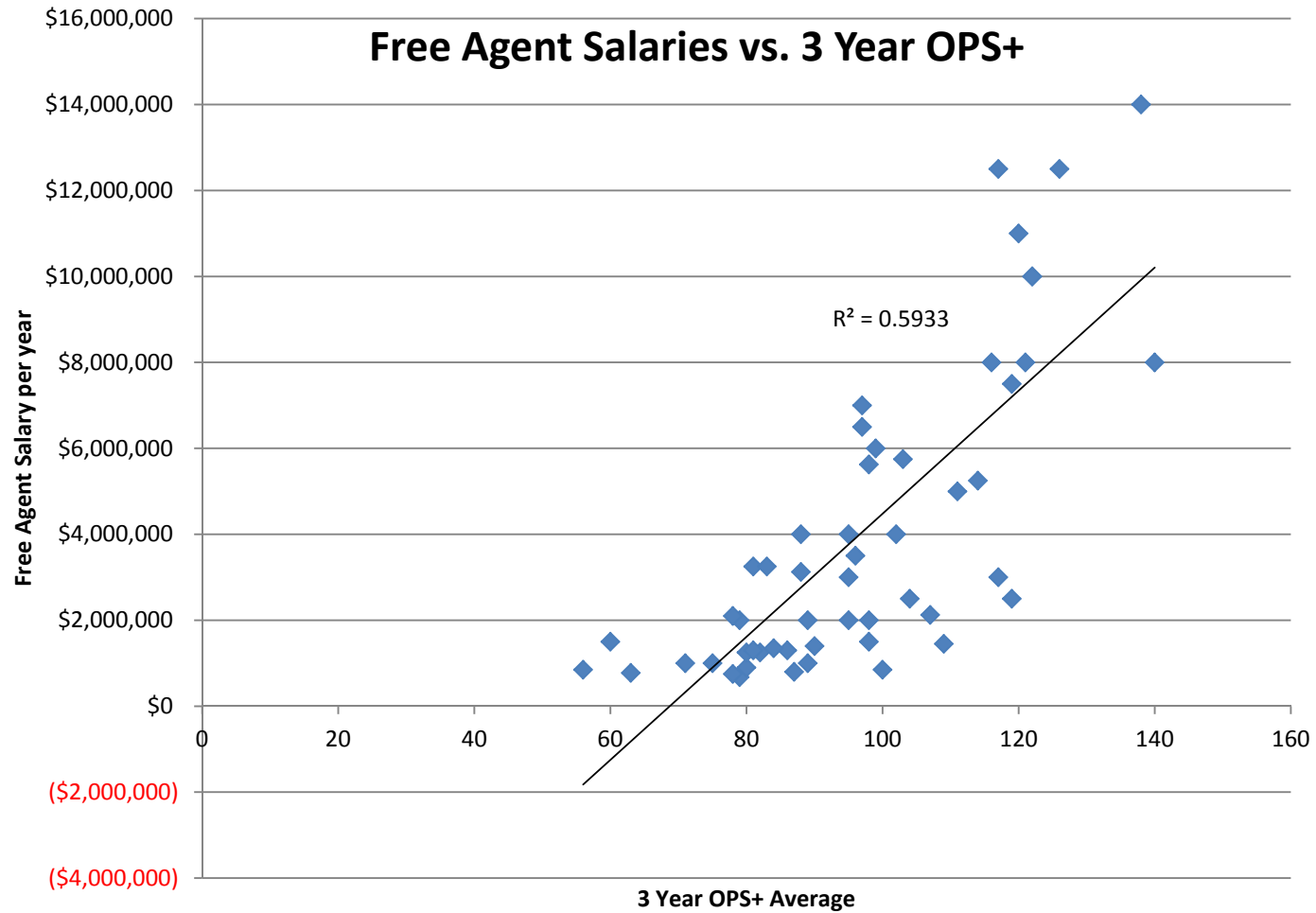
<i>Regression Statistics</i>	
Multiple R	0.629199457
R Square	0.395891957
Adjusted R Square	0.392542004
Standard Error	3847859.944
Observations	539

Coefficients	
Intercept	-8535622.292
X Variable 1	56326.92264
X Variable 2	76913.11271
X Variable 3	649540.9672

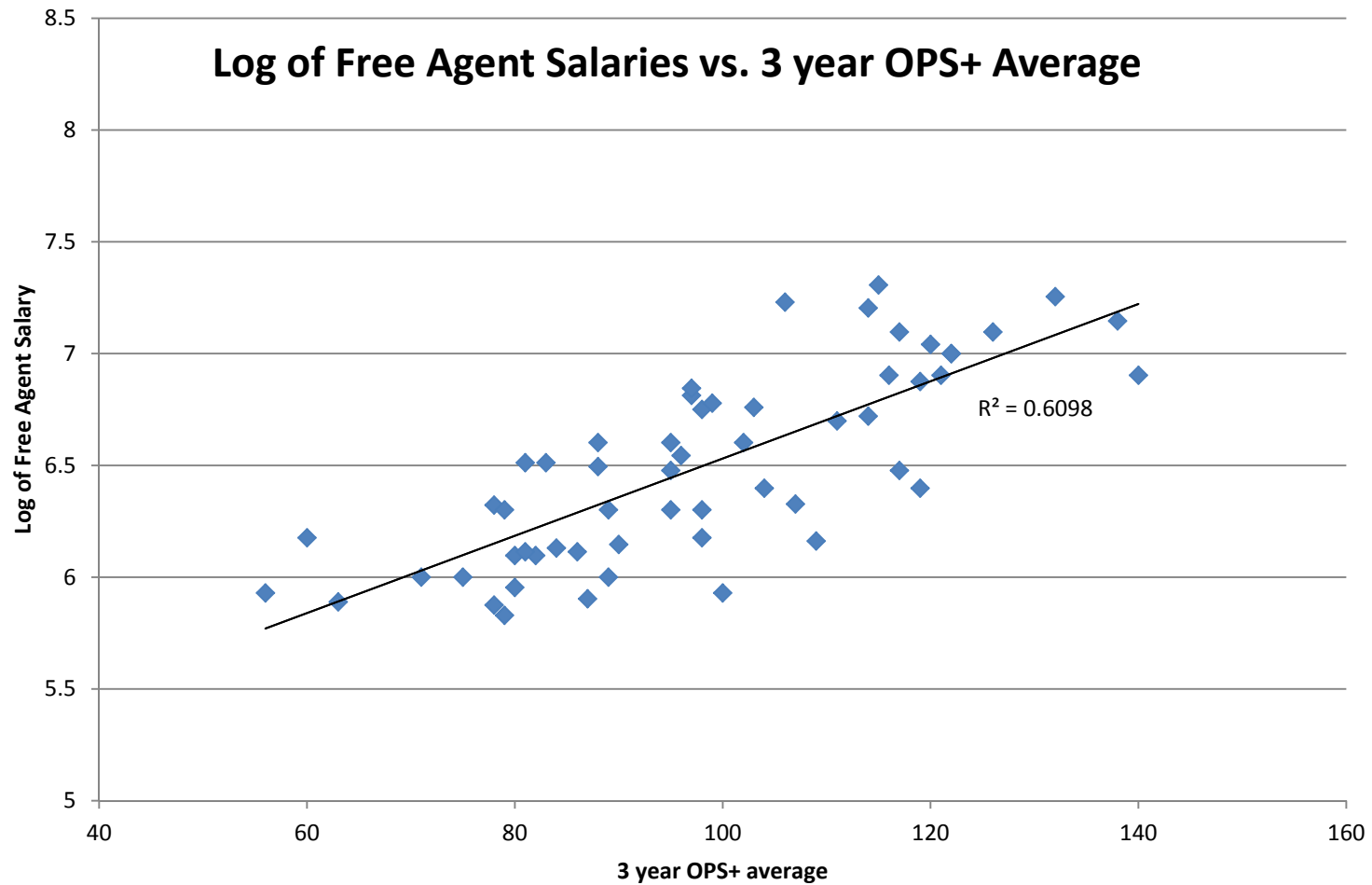
Data Set 3- Free Agents



Taking out the high prices



Logarithm of Free Agent Salary



Adding Speed- Free Agents

$$\text{LOG}(\text{Salary (in 2005 dollars)}) = b_0 + b_1\text{OPS} + b_2\text{SB} + e_1$$

<i>Regression Statistics</i>	
Multiple R	0.798385681
R Square	0.637419696
Adjusted R Square	0.623990796
Standard Error	0.259998111
Observations	58

<i>Coefficients</i>	
Intercept	4.789012936
X Variable 1	0.00327468
X Variable 2	0.016883482

Adding Experience- Free Agents

$$\text{LOG}(\text{Salary (in 2005 dollars)}) = b_0 + b_1\text{OPS} + b_2\text{SB} + b_3\text{EXP} + e_1$$

<i>Regression Statistics</i>	
Multiple R	0.804486979
R Square	0.647199299
Adjusted R Square	0.627229448
Standard Error	0.258875979
Observations	58

<i>Coefficients</i>	
Intercept	4.668238459
X Variable 1	0.003284876
X Variable 2	0.016541719
X Variable 3	0.013641242

Conclusions

- Data Set 1
 - In general more money spent, more wins
- Data Set 2
 - Weak correlations between salary and performance
- Data Set 3
 - Moderate to strong correlations between salary and performance