

Predicting NBA Win Percentage by Player and Team Chemistry

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What is Team Chemistry?

**Can team chemistry be quantified?
Researchers are giving it an honest
attempt**

**Measuring the Immeasurable: Team
Chemistry**

CAN YOU QUANTIFY CHEMISTRY?

Why would someone want to measure player and team Chemistry?

- ▶ Chemistry data can provide insight on who is bringing the team success versus failure.
- ▶ Evaluate how a player before a trade.
- ▶ Draft Kings & Fan Duel

Data

Regular Season: 2-Man Combinations

Share & more ▾ Glossary

		Net (Per 100 Poss)																							
Rk	Lineup	Tm	MP	FG	FGA	FG%	3P	3PA	3P%	eFG%	FT	FTA	FT%	PTS	ORB	ORB%	DRB	DRB%	TRB	TRB%	AST	STL	BLK	TOV	PF
1	D. Jordan C. Paul	LAC	1732:26	+3.7	-3.7	+.063	+1.0	-1.1	+.054	+.071	+7.3	+10.4	-.016	+15.8	+0.5	+3.6	+5.3	+3.6	+2.9	+6.6	+2.8	+1.7	+1.7	-1.3	-4.0
2	B. Griffin C. Paul	LAC	1522:24	+2.6	-4.4	+.054	+0.7	-1.6	+.049	+.061	+7.6	+11.1	-.024	+13.5	+0.2	+2.9	+4.8	+2.9	+2.4	+5.5	+1.8	+1.5	+1.7	-1.1	-4.4
3	C. Paul J. Redick	LAC	1483:09	+3.5	-3.6	+.060	+0.8	-0.3	+.036	+.067	+6.8	+9.7	-.020	+14.7	-0.2	+2.1	+4.8	+2.1	+2.2	+4.9	+3.4	+2.5	+1.6	-1.6	-4.1
4	L. Mbah a Moute C. Paul	LAC	1227:10	+4.6	-4.0	+.073	+0.3	-2.2	+.045	+.077	+6.4	+10.1	-.051	+15.8	-0.4	+1.9	+5.2	+1.9	+2.5	+5.6	+5.3	+2.9	+2.1	-2.2	-3.6
5	J. Crawford C. Paul	LAC	582:59	+3.3	+2.2	+.026	+3.7	+4.1	+.081	+.046	-0.5	-1.0	+.009	+9.7	+0.9	+3.0	+2.6	+3.0	+1.5	+3.4	-0.7	-1.0	+0.8	-0.3	-2.9
6	C. Paul A. Rivers	LAC	538:19	+1.4	+0.8	+.011	+3.1	+5.1	+.050	+.029	+4.8	+6.7	-.004	+10.6	+3.0	+5.9	+1.2	+5.9	+2.0	+4.4	-2.3	+0.6	+0.3	-2.0	-1.6
7	C. Paul M. Speights	LAC	178:15	+7.0	+11.0	+.023	+7.7	+12.9	+.103	+.059	-11.7	-16.0	+.060	+10.1	-2.1	-5.2	-3.6	-5.2	-3.2	-6.9	+2.8	+1.9	+0.1	-5.1	+2.9
8	R. Felton C. Paul	LAC	158:47	+8.5	+6.1	+.068	+1.6	+0.5	+.055	+.073	+3.8	+1.4	+.088	+22.5	+1.3	+3.4	+2.8	+3.4	+2.2	+4.5	+6.6	+0.9	+2.1	-5.2	-4.8
9	W. Johnson C. Paul	LAC	96:24	+3.8	+5.8	+.014	+4.8	+13.3	-.013	+.037	-7.8	-13.3	+.063	+4.6	+1.7	+3.8	+2.3	+3.8	+2.3	+4.8	-1.1	-2.2	+3.0	+2.3	+5.3
10	C. Paul P. Pierce	LAC	88:22	+12.1	+6.0	+.105	+3.3	+2.8	+.059	+.118	-7.4	-6.5	-.106	+20.0	-5.9	-9.2	+3.4	-9.2	-1.9	-4.2	+6.2	+1.4	+0.6	-4.9	-2.2
Player Average			1921:17	+3.7	-2.3	+.055	+1.4	+0.2	+.049	+.064	+5.3	+7.7	-.017	+14.2	+0.2	+2.5	+4.2	+2.5	+2.2	+4.8	+2.5	+1.7	+1.5	-1.6	-3.4

4,000 Rows of Data

Features

Points

Minutes

FG

FG%

3P

3PA

3p%

eFG%

FT

FTA

FT%

ORB

ORB%

DRB

DRB%

TRB

TRB%

AST

STL

BLK

TOV

PF

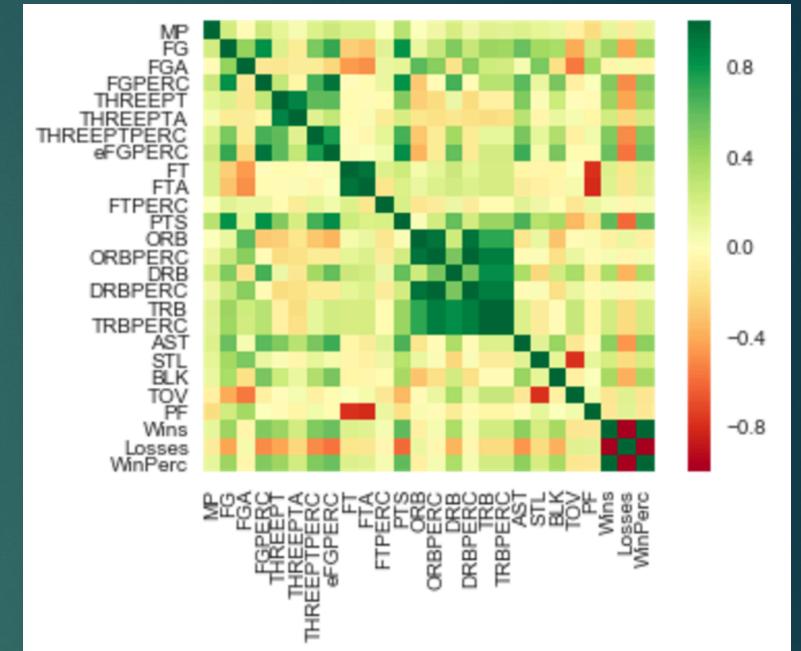
Wins

Losses

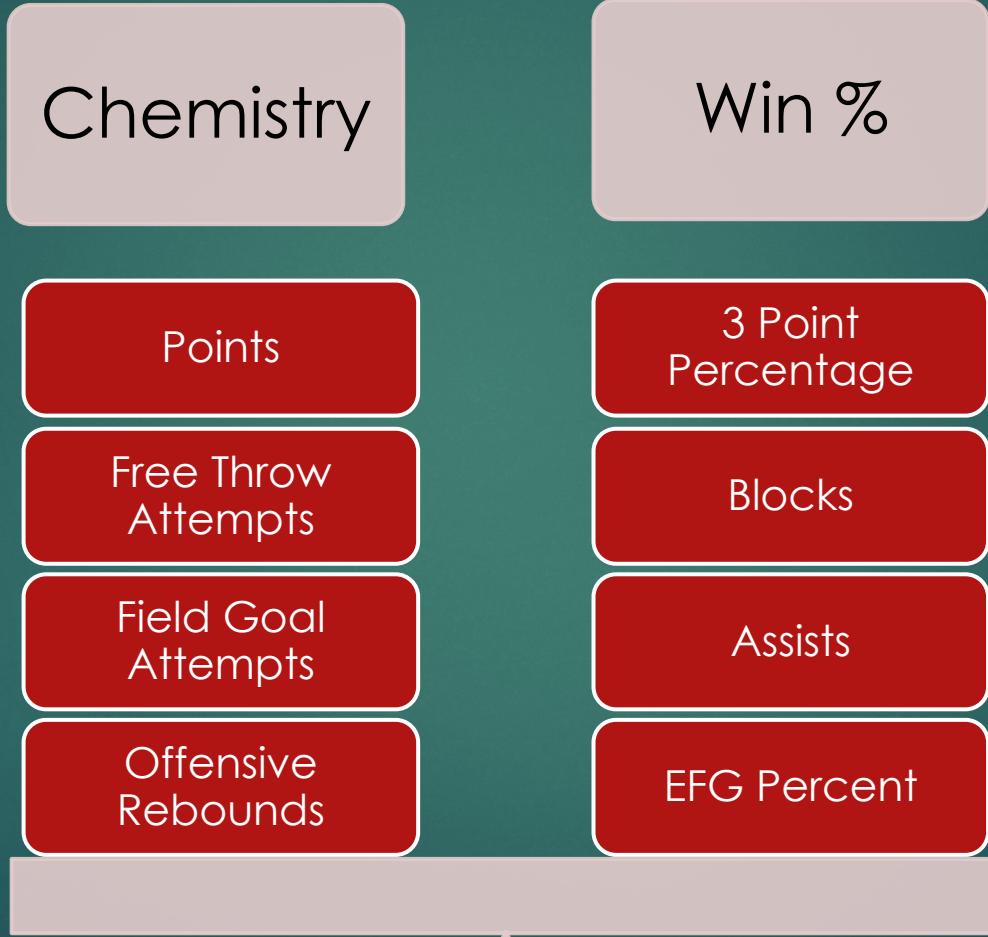
Model #1 Linear Regression

OLS Regression Results

Dep. Variable:	WinPerc	R-squared:	0.368
Model:	OLS	Adj. R-squared:	0.344
Method:	Least Squares	F-statistic:	15.40
Date:	Fri, 21 Apr 2017	Prob (F-statistic):	2.40e-31
Time:	00:06:50	Log-Likelihood:	370.38
No. Observations:	413	AIC:	-708.8
Df Residuals:	397	BIC:	-644.4
Df Model:	15		
Covariance Type:	nonrobust		



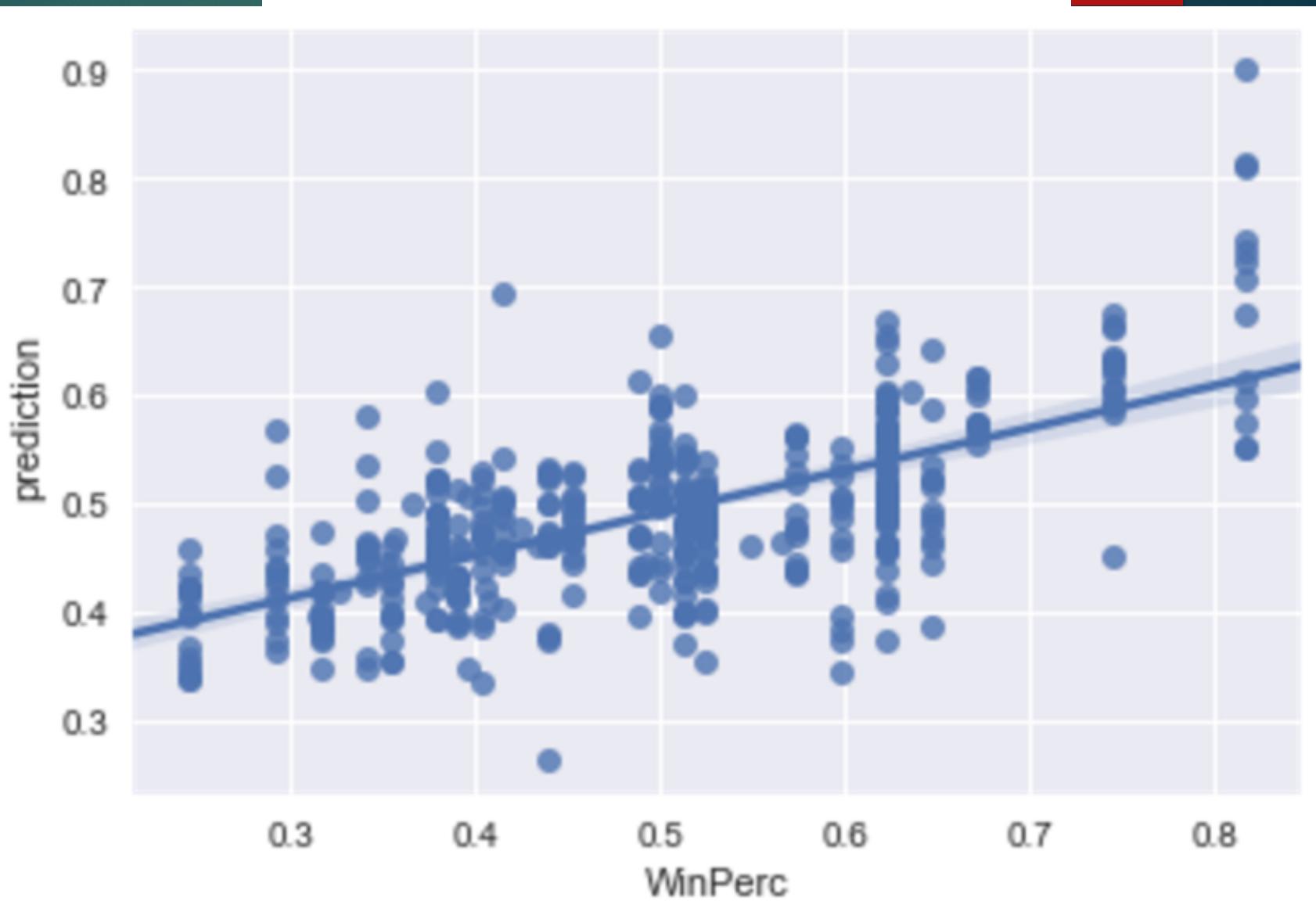
Model # 2: Traits Most Predictive of Team Chemistry According To Win Percentage



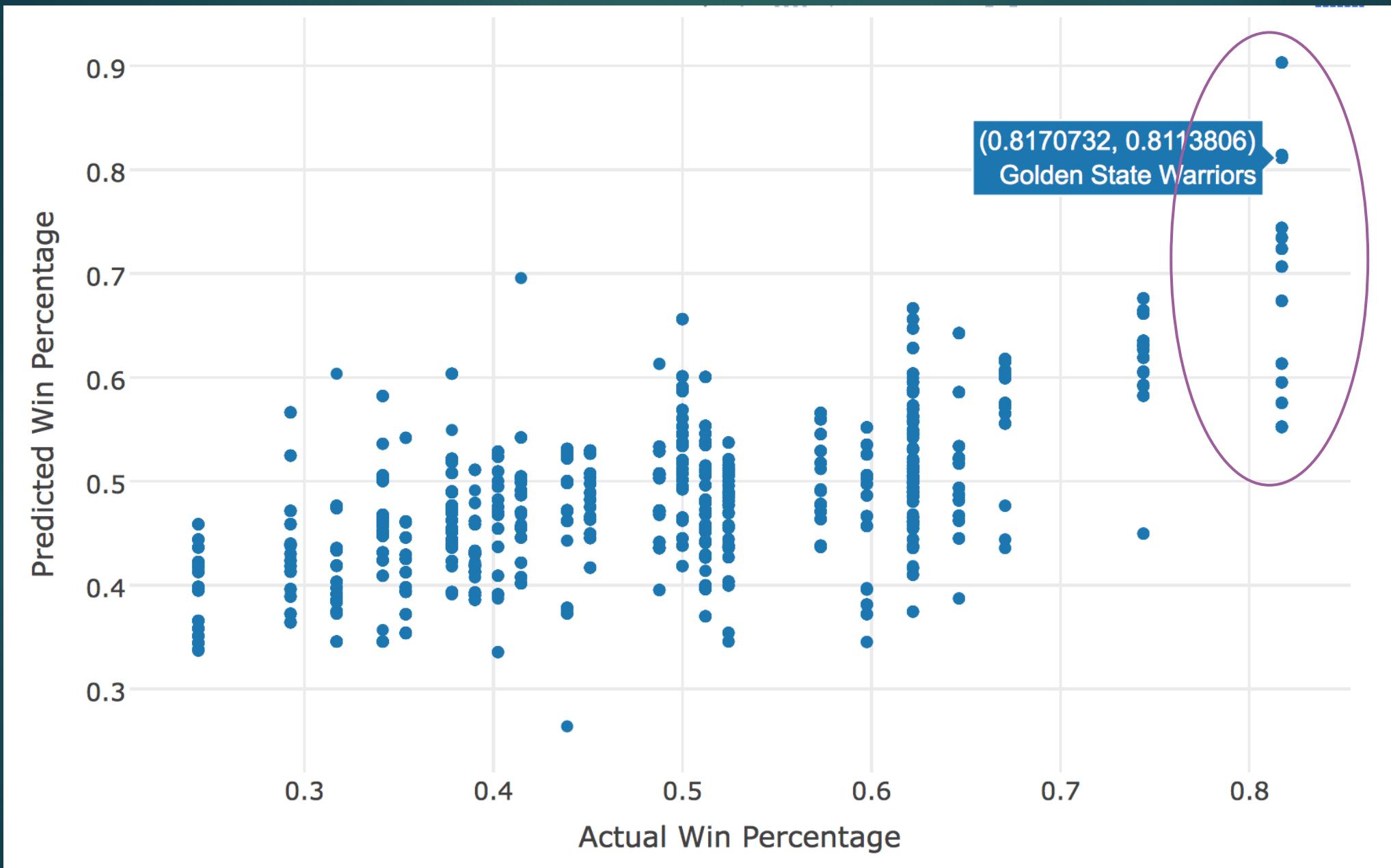
Model 2

- ▶ Ridge Regression
- ▶ R-Squared was 0.378 on the test set

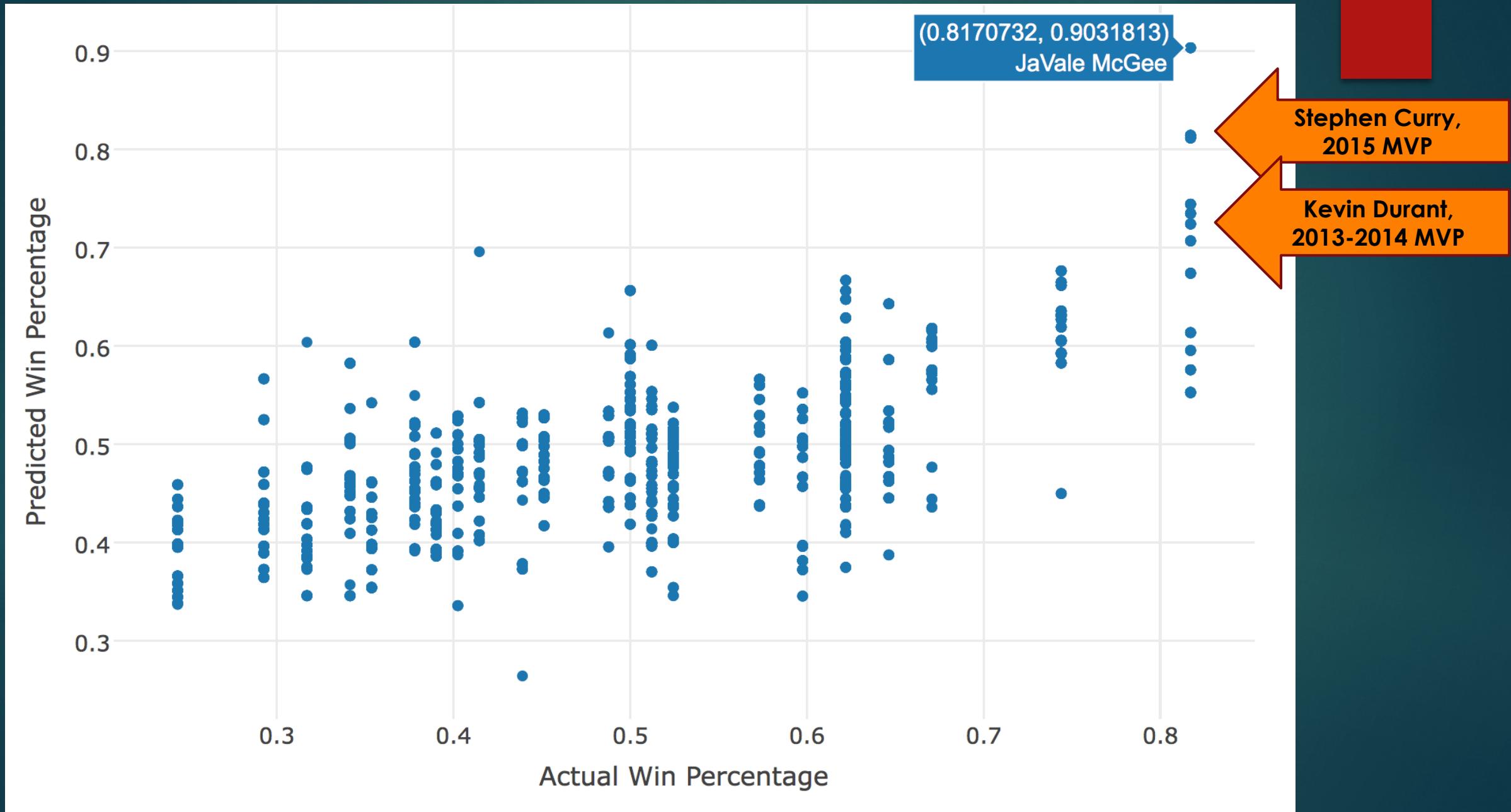
Actual vs Predicted Win Percentage



Actual vs Predicted Win Percentage



Actual vs Predicted Win Percentage



NBA STATS DONT CAPTURE THE GLUE GUYS

➤ JaVale McGee went from being one of the lowest performing centers in the NBA to one of the top.

➤ Does the dirty work, there is no loose ball variable, There is no hustle variable. NBA needs to do a better job of capturing statistics for the glue guys on the team

JaVale McGee: The smart, hard-working player and ‘phenomenal teammate’ Shaq is overlooking



Warriors at their best with JaVale McGee in starting lineup

How JaVale McGee came to be a key piece for the Warriors

https://mcarrie30.shinyapps.io/project_benson/

Project Luther My Data Prediction Plot 

Choose a Player: ▼ Search:

This is NBA Player to Player Stats scraped from basketball-reference.com

	playername	new_lineup	Tm	MP.x	FG.x	FGA.x	FGPERC.x	THREEPT.x	THREEPTA.x	THREEPTPERC.x
3131	Stephen Curry	S. Curry K. Thompson	GSW	1773.17	6.6	0.8	0.071	5.6	7.7	0.089
3132	Stephen Curry	S. Curry K. Durant	GSW	1524.49	6.3	-1.1	0.078	4.4	5.8	0.074
3133	Stephen Curry	S. Curry D. Green	GSW	2044.1	6	-0.3	0.07	4.4	6.4	0.064
3134	Stephen Curry	S. Curry P. McCaw	GSW	640.15	0.1	-1.2	0.008	4.2	9.2	0.022

Showing 1 to 10 of 10 entries

Tools

Plotly

Pandas

Seaborn

BeautifulSoup

Selenium

Feather

Conclusions and Next Steps

- ▶ Model predicted Test Set with a 0.378
- ▶ Add more data
- ▶ Add models besides Regression
- ▶ Continue Work on Dashboard


```
y_pred2 = rcv.predict(X_test)
print(np.exp(y_pred2.min()), np.exp(y_pred2.max()))
```

```
0.372025919213 0.811380591619
```