What does it take to Win?

Comparing MLB Teams’ Records to other Recorded Data

Richard Small
St 380 Final Project
Fall 2009
Sujit Ghosh
Executive Summary

Given that over 2400 MLB games are played each year, one would think that it would be relatively easy to find patterns in the data. I was hoping to be able to compare different statistics and be able to tell which ones were the most important. Then use that knowledge to predict how one team would match up with another. Instead, what I have found is that when looking at baseball statistics, it is particularly difficult to draw any clear conclusions. This is due in part to the randomness of the game. When looking at a baseball team, winning 100 games in a 162 game season is a huge success, only 11 teams have done so this decade. With that said, the difference in records of teams can only be so large. In 2009, the first place Yankees had a .636 season average, while the last place team, the Washington Nationals had a .364 season average. In spite of this small difference in records, some conclusions can still be made: How well a team pitches has more influence on the outcome of the game than hitting or fielding, and that homeruns, although exciting, have little statistical effect on a team's win-loss record.
Table of Contents

Executive Summary  2
Table of Contents  3
Description of Data  4
Statistical Analyses  5
Major Findings  8
Discussion  9
Appendix  10
Description of Data

Baseball is a game of numbers, therefore what better way to compare teams than to look at all of the statistics recorded and computed by Major League Baseball. All of the data is taken from mlb.com/stats. From that page there are 75 different team statistics for the 2009 regular season. They are separated into pitching, hitting, and fielding stats, with each type having 28, 36, and 11 respectively. The stats were collected for all 2430 games in the 2009 regular season. When looking at the data, it is important to compare the R-squared values, along with the equations of the best-fit line. This helps to distinguish between the stats that have real statistical meaning and the stats that are just random.
When comparing each stat to the teams’ overall record, the majority of the statistics are not closely correlated. In order to find the stats that have statistical meaning, it is necessary to first look at the summary of the best fit line through the set of points. The summary includes the value of R-squared. These values are then taken and organized in a readable manner (see table). After understanding what specific stats are the most and least meaningful, one can use R to graph the plots of the most interesting set of data. Once I had reviewed all of the R-squared values, I found that only one relationship returned an R-squared value higher than 0.5. That particular stat was the number of saves. This comes to no surprise, seeing how it is necessary to win in order to record a save (see graph). After comparing all of the r-squared values, it was necessary to see what exactly the plots looked like, and where the best-fit line was drawn. By looking at the plots, it becomes easy to see what the stats are the meaningful ones, and what stats are not.

R-squared values in descending order:

<table>
<thead>
<tr>
<th>abbrev</th>
<th>meaning</th>
<th>R value</th>
<th>Adjusted R value</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>WPCT</td>
<td>winning percentage</td>
<td>1</td>
<td>1</td>
<td>Pitching</td>
</tr>
<tr>
<td>SV</td>
<td>Saves</td>
<td>0.6154</td>
<td>0.6017</td>
<td>Pitching</td>
</tr>
<tr>
<td>WHIP</td>
<td>walks + hits/innings pitched</td>
<td>0.4988</td>
<td>0.4809</td>
<td>Pitching</td>
</tr>
<tr>
<td>K/BB</td>
<td>strikeout/walk ratio</td>
<td>0.4981</td>
<td>0.4801</td>
<td>Pitching</td>
</tr>
<tr>
<td>OBA</td>
<td>on base against</td>
<td>0.4634</td>
<td>0.4442</td>
<td>Pitching</td>
</tr>
<tr>
<td>R</td>
<td>Runs</td>
<td>0.4389</td>
<td>0.4188</td>
<td>Pitching</td>
</tr>
<tr>
<td>ERA</td>
<td>earned run avg.</td>
<td>0.4073</td>
<td>0.3862</td>
<td>Pitching</td>
</tr>
<tr>
<td>ER</td>
<td>earned runs</td>
<td>0.3833</td>
<td>0.3613</td>
<td>Pitching</td>
</tr>
<tr>
<td>R</td>
<td>Runs on-base plus slugging</td>
<td>0.3708</td>
<td>0.3483</td>
<td>hitting</td>
</tr>
<tr>
<td>OPS</td>
<td>percentage</td>
<td>0.3509</td>
<td>0.3277</td>
<td>hitting</td>
</tr>
<tr>
<td>RBI</td>
<td>runs batted in</td>
<td>0.3486</td>
<td>0.3254</td>
<td>hitting</td>
</tr>
<tr>
<td>SLG</td>
<td>slugging percentage</td>
<td>0.3472</td>
<td>0.3239</td>
<td>hitting</td>
</tr>
<tr>
<td>AVG</td>
<td>opponents batting avg.</td>
<td>0.3367</td>
<td>0.313</td>
<td>Pitching</td>
</tr>
<tr>
<td>SVO</td>
<td>save opportunities</td>
<td>0.3328</td>
<td>0.309</td>
<td>Pitching</td>
</tr>
<tr>
<td>SO</td>
<td>Strikeouts</td>
<td>0.3327</td>
<td>0.3089</td>
<td>Pitching</td>
</tr>
<tr>
<td>H9</td>
<td>hits per 9 innings</td>
<td>0.3229</td>
<td>0.2987</td>
<td>Pitching</td>
</tr>
<tr>
<td>PO</td>
<td>Putouts</td>
<td>0.3212</td>
<td>0.297</td>
<td>fielding</td>
</tr>
<tr>
<td>IP</td>
<td>innings pitched</td>
<td>0.3204</td>
<td>0.2961</td>
<td>Pitching</td>
</tr>
<tr>
<td>Statistic</td>
<td>Value 1</td>
<td>Value 2</td>
<td>Category</td>
<td></td>
</tr>
<tr>
<td>-------------------</td>
<td>-----------</td>
<td>-----------</td>
<td>----------------</td>
<td></td>
</tr>
<tr>
<td>INN innings played</td>
<td>0.3204</td>
<td>0.2961</td>
<td>fielding</td>
<td></td>
</tr>
<tr>
<td>SLG slugging percentage allowed</td>
<td>0.3163</td>
<td>0.2919</td>
<td>Pitching</td>
<td></td>
</tr>
<tr>
<td>TB total bases</td>
<td>0.316</td>
<td>0.2916</td>
<td>hitting</td>
<td></td>
</tr>
<tr>
<td>K/9 strikeouts per 9innings</td>
<td>0.3045</td>
<td>0.2797</td>
<td>Pitching</td>
<td></td>
</tr>
<tr>
<td>H Hits</td>
<td>0.2767</td>
<td>0.2508</td>
<td>Pitching</td>
<td></td>
</tr>
<tr>
<td>TB total bases</td>
<td>0.2687</td>
<td>0.2425</td>
<td>Pitching</td>
<td></td>
</tr>
<tr>
<td>HR home runs</td>
<td>0.2628</td>
<td>0.2365</td>
<td>hitting</td>
<td></td>
</tr>
<tr>
<td>HLD Hold</td>
<td>0.2525</td>
<td>0.2258</td>
<td>Pitching</td>
<td></td>
</tr>
<tr>
<td>OBP on-base percentage</td>
<td>0.2329</td>
<td>0.2055</td>
<td>hitting</td>
<td></td>
</tr>
<tr>
<td>AVG batting avg.</td>
<td>0.2157</td>
<td>0.1877</td>
<td>hitting</td>
<td></td>
</tr>
<tr>
<td>BB/9 walks per 9 innings</td>
<td>0.1982</td>
<td>0.1696</td>
<td>Pitching</td>
<td></td>
</tr>
<tr>
<td>XBH extra base hits</td>
<td>0.1926</td>
<td>0.1637</td>
<td>hitting</td>
<td></td>
</tr>
<tr>
<td>H Hits</td>
<td>0.1894</td>
<td>0.1604</td>
<td>hitting</td>
<td></td>
</tr>
<tr>
<td>E Errors</td>
<td>0.1655</td>
<td>0.1357</td>
<td>fielding</td>
<td></td>
</tr>
<tr>
<td>TPA total plate appearances</td>
<td>0.1621</td>
<td>0.1322</td>
<td>hitting</td>
<td></td>
</tr>
<tr>
<td>PA plate appearances</td>
<td>0.1601</td>
<td>0.1301</td>
<td>Pitching</td>
<td></td>
</tr>
<tr>
<td>HB hit batsmen</td>
<td>0.1554</td>
<td>0.1253</td>
<td>Pitching</td>
<td></td>
</tr>
<tr>
<td>BB Walks</td>
<td>0.1536</td>
<td>0.1234</td>
<td>Pitching</td>
<td></td>
</tr>
<tr>
<td>DER defensive efficiency rating</td>
<td>0.1345</td>
<td>0.1036</td>
<td>fielding</td>
<td></td>
</tr>
<tr>
<td>GO/AO ground outs/fly outs</td>
<td>0.1262</td>
<td>0.06143</td>
<td>hitting</td>
<td></td>
</tr>
<tr>
<td>FPCT fielding percentage</td>
<td>0.1262</td>
<td>0.09504</td>
<td>fielding</td>
<td></td>
</tr>
<tr>
<td>DP double plays</td>
<td>0.1242</td>
<td>0.09293</td>
<td>fielding</td>
<td></td>
</tr>
<tr>
<td>IBB intentional walks</td>
<td>0.1135</td>
<td>0.08185</td>
<td>hitting</td>
<td></td>
</tr>
<tr>
<td>A Assists</td>
<td>0.1091</td>
<td>0.07733</td>
<td>fielding</td>
<td></td>
</tr>
<tr>
<td>SHO Shutouts</td>
<td>0.1022</td>
<td>0.0701</td>
<td>Pitching</td>
<td></td>
</tr>
<tr>
<td>BB Walks</td>
<td>0.08682</td>
<td>0.05421</td>
<td>hitting</td>
<td></td>
</tr>
<tr>
<td>NP number of pitches</td>
<td>0.07903</td>
<td>0.04614</td>
<td>hitting</td>
<td></td>
</tr>
<tr>
<td>SB stolen bases</td>
<td>0.07139</td>
<td>0.03823</td>
<td>hitting</td>
<td></td>
</tr>
<tr>
<td>SF sacrifice flies</td>
<td>0.06602</td>
<td>0.03266</td>
<td>hitting</td>
<td></td>
</tr>
<tr>
<td>P/IP pitches per innings pitched</td>
<td>0.06298</td>
<td>0.02952</td>
<td>Pitching</td>
<td></td>
</tr>
<tr>
<td>HR home runs</td>
<td>0.05822</td>
<td>0.02458</td>
<td>Pitching</td>
<td></td>
</tr>
<tr>
<td>GO ground outs</td>
<td>0.05599</td>
<td>0.02227</td>
<td>Pitching</td>
<td></td>
</tr>
<tr>
<td>AB at bats</td>
<td>0.05278</td>
<td>0.01896</td>
<td>hitting</td>
<td></td>
</tr>
<tr>
<td>BK Balks</td>
<td>0.04709</td>
<td>0.01306</td>
<td>Pitching</td>
<td></td>
</tr>
<tr>
<td>HBP hit by pitch</td>
<td>0.047</td>
<td>0.01297</td>
<td>hitting</td>
<td></td>
</tr>
<tr>
<td>SB% stolen base percentage</td>
<td>0.04384</td>
<td>0.009694</td>
<td>hitting</td>
<td></td>
</tr>
<tr>
<td>TC total chances</td>
<td>0.03131</td>
<td>-0.003284</td>
<td>fielding</td>
<td></td>
</tr>
<tr>
<td>X2B Double</td>
<td>0.02441</td>
<td>-0.01043</td>
<td>hitting</td>
<td></td>
</tr>
<tr>
<td>SB stolen bases</td>
<td>0.0243</td>
<td>-0.01055</td>
<td>Pitching</td>
<td></td>
</tr>
<tr>
<td>SB stolen bases allowed</td>
<td>0.0243</td>
<td>-0.01055</td>
<td>fielding</td>
<td></td>
</tr>
<tr>
<td>AO fly outs</td>
<td>0.02294</td>
<td>-0.01196</td>
<td>Pitching</td>
<td></td>
</tr>
<tr>
<td>IBB intentional walks</td>
<td>0.01997</td>
<td>-0.01503</td>
<td>Pitching</td>
<td></td>
</tr>
<tr>
<td>GO ground outs</td>
<td>0.01725</td>
<td>-0.01785</td>
<td>hitting</td>
<td></td>
</tr>
<tr>
<td>AO fly outs</td>
<td>0.01725</td>
<td>-0.01785</td>
<td>hitting</td>
<td></td>
</tr>
<tr>
<td>CS caught stealing</td>
<td>0.01628</td>
<td>-0.01886</td>
<td>hitting</td>
<td></td>
</tr>
<tr>
<td>PK pick-offs</td>
<td>0.01343</td>
<td>-0.0218</td>
<td>Pitching</td>
<td></td>
</tr>
<tr>
<td>GDP grounded into double play</td>
<td>0.01229</td>
<td>-0.02299</td>
<td>hitting</td>
<td></td>
</tr>
<tr>
<td>X3B Triples</td>
<td>0.01192</td>
<td>-0.02337</td>
<td>hitting</td>
<td></td>
</tr>
<tr>
<td>CG complete games</td>
<td>0.008988</td>
<td>-0.02641</td>
<td>Pitching</td>
<td></td>
</tr>
<tr>
<td>CS caught stealing</td>
<td>0.004464</td>
<td>-0.03109</td>
<td>Pitching</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Activity</td>
<td>Value</td>
<td>Category</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>----------------------------------</td>
<td>--------</td>
<td>------------</td>
<td></td>
</tr>
<tr>
<td>CS</td>
<td>caught stealing</td>
<td>0.004464</td>
<td>fielding</td>
<td></td>
</tr>
<tr>
<td>PB</td>
<td>passed balls</td>
<td>0.004135</td>
<td>fielding</td>
<td></td>
</tr>
<tr>
<td>WP</td>
<td>wild pitches</td>
<td>0.004058</td>
<td>fielding</td>
<td></td>
</tr>
<tr>
<td>SO</td>
<td>Strikeouts</td>
<td>0.001716</td>
<td>hitting</td>
<td></td>
</tr>
<tr>
<td>SH</td>
<td>sacrifice hits</td>
<td>0.001539</td>
<td>hitting</td>
<td></td>
</tr>
<tr>
<td>GO/AO</td>
<td>ground outs/fly outs</td>
<td>0.0006582</td>
<td>Pitching</td>
<td></td>
</tr>
<tr>
<td>NP</td>
<td>number of pitches thrown</td>
<td>0.0002604</td>
<td>Pitching</td>
<td></td>
</tr>
</tbody>
</table>

Plot of Saves vs. Record and the best-fit line:
Major Findings

As stated in the summary, the small variation in teams’ records makes it difficult to formulate precise conclusions. However, some usefulness can be drawn from that data. What first pops at, when reviewing the R-squared values, is that the highest seven are all statistics for a pitching team. This gives the impression that when it comes to wins and losses, pitching is more important than hitting or fielding. When looking at the data, it appears that stats like ERA and walks plus hits per innings pitched serve as a better marker for success than hitting stats such as RBI’s, SLG percentage and batting average. As said before, saves is the stat most closely correlated to a team’s record. Other interesting findings were how little direct effect homeruns, walks and fielding errors had on win-loss records.
Discussion

With the majority of the relationships between the stats and the win-loss record having an R-squared value of less than 0.5, there leaves room for many questions. One solution to this problem could be to look at more seasons. One could look at 20 seasons and be able to compare 600 teams compared to only 30 used in this study. Another idea, instead of always comparing the stats to the overall record, could be to look at how they influence each other. For example, one could see if the number of walks received has any effect on the number of runs scored. Another way to expand upon this study would be to look at how the teams match up head-to-head with each other. It would be interesting to see if the results of this study had any meaning when it came time for two teams to match-up with each other.
The R code used:

```r
mlb=read.table("clipboard")
> ab=mlb$AB
> r=mlb$R
> h=mlb$H
> doubles=mlb$X2B
> triples=mlb$X3B
> hr=mlb$HR
> rbi=mlb$RBI
> tb=mlb$TB
> walks=mlb$BB
> so=mlb$SO
> sb=mlb$SB
> cs=mlb$CS
> obp=mlb$OBP
> slg=mlb$SLG
> avg=mlb$AVG
> sf=mlb$SF
> sh=mlb$SH
> hbp=mlb$HBP
> ibb=mlb$BB
> gdp=mlb$GDP
> tpa=mlb$TPA
> np=mlb$NP
> xbh=mlb$XBH
> sbpercent=mlb$SB.
> go=mlb$GO
> ao=mlb$AO
> goao=mlb$GO.AO
> ops=mlb$OPS
> l=mlb$L
> era=mlb$ERA
> cg=mlb$CG
> sho=mlb$SHO
> sv=mlb$SV
> svo=mlb$SVO
> ip=mlb$IP
> pitchinghits=mlb$Hp
> pitchingruns=mlb$Rp
> er=mlb$ER
> pitchinghr=mlb$HRp
> hbpercent=mlb$HBP.1
> pitchingBB=mlb$BBp
> pitchingSO=mlb$SOp
> wpct=mlb$WPCT
```
> pitchingTB=mlb$TBp
> bk=mlb$BK
> wp=mlb$WP
> pitchingIBB=mlb$IBBp
> pitchingSB=mlb$SBp
> pitchingCS=mlb$CSp
> pk=mlb$PK
> pitchingGO=mlb$GOp
> pitchingAO=mlb$AOp
> pitchingGOAO=mlb$GO.AOp
> whip=mlb$WHIP
> pitchingSLG=mlb$SLGp
> oba=mlb$OBA
> pitchingavg=mlb$AVGp
> pa=mlb$PA
> pitchingnp=mlb$NPp
> pip=mlb$P.IP
> hld=mlb$HLD
> kbb=mlb$K.BB
> bb9=mlb$BB.9
> k9=mlb$K.9
> h9=mlb$H9
> inn=mlb$INN
> tc=mlb$TC
> po=mlb$PO
> a=mlb$A
> e=mlb$E
> dp=mlb$DP
> pb=mlb$PB
> fieldingSB=mlb$SBf
> fielding=mlb$CSf
> der=mlb$DER
> fpct=mlb$FPCT
> plot(wl~fpct)
> abline(wl,fpct)
> abline(fpct,wl)
> abline(fpct,wl)
> plot(avg,wl)
> plot(wl,era)
> plot(ERA~wl)
> abline(ERA~wl)
> summary(lm(ab~wl))
> summary(lm(r~wl))
> summary(lm(h~wl))
> summary(lm(doubles~wl))
> summary(lm(triples~wl))
> summary(lm(wl~triples))
> summary(lm(wl~hr))
> summary(lm(wl~rbi))
> summary(lm(wl~tb))
> summary(lm(wl~walks))
> summary(lm(wl~so))
> summary(lm(wl~sb))
> summary(lm(wl~cs))
> summary(lm(wl~obp))
> summary(lm(wl~slg))
> summary(lm(wl~avg))
> summary(lm(wl~sf))
> summary(lm(wl~sh))
> summary(lm(wl~hbp))
> summary(lm(wl~ibb))
> summary(lm(wl~gdp))
> summary(lm(wl~tpa))
> summary(lm(wl~np))
> summary(lm(wl~xbh))
> summary(lm(wl~sbpercent))
> summary(lm(wl~go))
> summary(lm(wl~ao))
> summary(lm(wl~go/ao))
> summary(lm(wl~ops))
> summary(lm(wl~mlb$W))
> summary(lm(wl~l))
> summary(lm(wl~era))
> summary(lm(wl~cg))
> summary(lm(wl~sho))
> summary(lm(wl~sv))
> summary(lm(wl~svo))
> summary(lm(wl~ip))
> summary(lm(wl~pitchinghits))
> summary(lm(wl~pitchinghr))
> summary(lm(wl~mlb$SHBP.1))
> summary(lm(wl~pitchingBB))
> summary(lm(wl~pitchingSO))
> summary(lm(wl~wpct))
> summary(lm(wl~tb))
> summary(lm(wl~pitchingTB))
> summary(lm(wl~bk))
> summary(lm(wl~wp))
> summary(lm(wl~pitchingIBB))
> summary(lm(wl~pitchingSB))
> summary(lm(wl~pitchingCS))
> summary(lm(wl~pk))
> summary(lm(wl~pitchingGO))
> summary(lm(wl~pitchingAO))
> summary(lm(wl~pitchingGOAO))
> summary(lm(wl~whip))
> summary(lm(wl~pitchingSLG))
> summary(lm(wl~oba))
> summary(lm(wl~pitchingavg))
> summary(lm(wl~pa))
> summary(lm(wl~pitchingnp))
> summary(lm(wl~pip))
> summary(lm(wl~hld))
> summary(lm(wl~kbb))
> summary(lm(wl~bb9))
> summary(lm(wl~k9))
> summary(lm(wl~h9))
> summary(lm(wl~inn))
> summary(lm(wl~tc))
> summary(lm(wl~fieldingSB))
> summary(lm(wl~fielding))
> summary(lm(wl~po))
> summary(lm(wl~a))
> summary(lm(wl~e))
> summary(lm(wl~dp))
> summary(lm(wl~pb))
> summary(lm(wl~der))
> summary(lm(wl~fpct))
> plot(wl~cs)
> abline(lsfit(cs,wl))
> plot(wl~ab)
> abline(lsfit(cs,ab))
> abline(lsfit(ab,wl))
> plot(wl~r)
> abline(lsfit(r,wl))
> plot(wl~h)
> abline(lsfit(h,wl))
> plot(wl~doubles)
> abline(lsfit(doubles,wl))
> plot(wl~triples)
> abline(lsfit(triples,wl))
> abline(lsfit(hr,wl))
> plot(wl~hr)
> abline(lsfit(hr,wl))
> plot(wl~rbi)
> abline(lsfit(rbi,wl))
> plot(wl~tb)
> abline(lsfit(tb,wl))
> plot(wl~walks)
> abline(lsfit(walks,wl))
> plot(wl~so)
> abline(lsfit(walks,so))
> abline(lsfit(so,wl))
> plot(wl~sb)
> abline(lsfit(sb,wl))
> plot(wl~cs)
> abline(lsfit(cs,wl))
> plot(wl~obp)
> abline(lsfit(obp,wl))
> plot(wl~slg)
> abline(lsfit(slg,wl))
> plot(wl~avg)
> abline(lsfit(avg,wl))
> plot(wl~sf)
> abline(lsfit(sf,wl))
> plot(wl~sh)
> abline(lsfit(sh,wl))
> plot(wl~hbp)
> abline(lsfit(hbp,wl))
> plot(wl~ibb)
> abline(lsfit(ibb,wl))
> plot(wl~gdp)
> abline(lsfit(gdp,wl))
> plot(wl~tpa)
> abline(lsfit(tpa,wl))
> plot(wl~np)
> abline(lsfit(np,wl))
> plot(wl~xbh)
> abline(lsfit(xbh,wl))
> plot(wl~sbpercent)
> abline(lsfit(sbpercent,wl))
> plot(wl~go)
> abline(lsfit(ao,wl))
> plot(wl~ao)
> abline(lsfit(go,wl))
> plot(wl~go)
> abline(lsfit(go,wl))
> plot(wl~ao)
> abline(lsfit(ao,wl))
> abline(lsfit(goao,wl))
> plot(wl~goao)
> abline(lsfit(goao,wl))
> plot(wl~ops)
> abline(lsfit(ops,wl))
> plot(wl~era)
> abline(lsfit(era,wl))
> plot(wl~cg)
> abline(lsfit(cg,wl))
> plot(wl~sho)
> abline(lsfit(sho,wl))
> plot(wl~svo)
> abline(lsfit(svo,wl))
> plot(wl~sv)
> abline(lsfit(sv,wl))
> plot(wl~ip)
> abline(lsfit(ip,wl))
> plot(wl~pitchinghits)
> abline(lsfit(pitchinghits,wl))
> plot(wl~pitchingruns)
> abline(lsfit(pitchingruns,wl))
> plot(wl~er)
> abline(lsfit(er,wl))
> abline(lsfit(pitchinghr,wl))
> plot(wl~pitchinghr)
> abline(lsfit(pitchinghr,wl))
> plot(wl~pitchingBB)
> abline(lsfit(pitchingBB,wl))
> plot(wl~pitchingSO)
> abline(lsfit(pitchingSO,wl))
> plot(wl~pitchingTB)
> abline(lsfit(pitchingTB,wl))
> plot(wl~bk)
> abline(lsfit(bk,wl))
> plot(wl~wp)
> abline(lsfit(wp,wl))
> plot(wl~ibb)
> abline(lsfit(ibb,wl))
> plot(wl~pitchingIBB)
> abline(lsfit(pitchingIBB,wl))
> plot(wl~pitchingSB)
> abline(lsfit(pitchingSB,wl))
> plot(wl~pitchingCS)
> abline(lsfit(pitchingCS,wl))
> plot(wl~pk)
> abline(lsfit(pk,wl))
> plot(wl~pitchingGO)
> abline(lsfit(pitchingGO,wl))
> plot(wl~pitchingAO)
> abline(lsfit(pitchingAO,wl))
> plot(wl~pitchingGOAO)
> abline(lsfit(pitchingGOAO,wl))
> plot(wl~whip)
> abline(lsfit(whip,wl))
> plot(wl~pitchingSLG)
> abline(lsfit(pitchingSLG,wl))
> abline(lsfit(oba,wl))
> plot(wl~oba)
> abline(lsfit(oba,wl))
> plot(wl~pa)
> abline(lsfit(pa,wl))
> plot(wl~pitchingnp)
> abline(lsfit(pitchingnp,wl))
> plot(wl~hld)
> abline(lsfit(hld,wl))
> plot(wl~kbb)
> abline(lsfit(kbb,wl))
Data used:


ArizonaDiamondbacks NL 162 .432 5565 720 1408 307 45 173 686 2324 571 1298 102 40 .324 .418 .253 41 54 37 47 93 6269 24026 525 71.8 1500 1500 1.06 .742 70 92 4.42 162 4 12 36 55 1447.2 1470 782 711 168 53 525 1158 .432 2343 2 79 27 105 33 13 1602 1508 1.14 1.38 .419 .330 .263 6267 23866 16.49 46 2.21 3.26 7.20 9.14 1447.2 6073 4343 1606 124 133 8 105 33 .7016 .980

AtlantaBraves NL 162 .531 5539 735 1459 300 20 149 700 2246 602 1064 58 26 .339 .405 .254 6208 23487 16.06 71 2.32 3.26 7.58 8.61 1462.2 6198 4388 1714 96 159 12 97 46 .7008 .985
<p>| Team            | League | AL/NL | Wins | Games | Shutouts | Wins | Games | Shutouts | Wins | Games | Shutouts | Wins | Games | Shutouts | Wins | Games | Shutouts | Wins | Games | Shutouts |
|-----------------|--------|------|------|-------|----------|------|-------|----------|------|-------|----------|------|-------|----------|------|-------|----------|------|-------|----------|------|-------|----------|
| Baltimore Orioles AL | 162 | .395 | 5618 | 741 | 1508 | 307 | 19 | 160 | 2333 | 517 | 1013 | 76 | 37 | .332 | .415 | .268 | 46 | 13 | 39 | 25 | 131 | 6233 | 23699 | 486 | 76.3 | 1561 | 1561 | 1.16 | 1.74 | 71 | 94 | 8.28 | 128 | 1.08 | 1.12 | 1.52 | .476 | .353 | .288 | 6359 | 24345 | 17.04 | 61 | 1.71 | 3.44 | 5.88 | 10.28 | 1429.0 | 6040 | 4287 | 1663 | 90 | 151 | 8 | 11 | 19 | 119 | .6931 | .983 |
| Boston Red Sox AL | 162 | .586 | 5543 | 872 | 572 | 76.4 | 1610 | 1610 | 0.99 | .806 | 95 | 67 | 4.35 | 162 | 8 | 11 | 41 | 59 | 1436.2 | 1494 | 736 | 695 | 1678 | 1203 | .856 | 2361 | 5 | 42 | 24 | 151 | 23 | 7 | 1477 | 1531 | 1.03 | 1.41 | .422 | .335 | .267 | 6283 | 24611 | 17.13 | 72 | 2.32 | 3.32 | 7.71 | 9.36 | 1436.2 | 5844 | 4310 | 1452 | 82 | 121 | 10 | 11 | 23 | 151 | .6905 | .986 |
| Chicago Cubs NL  | 161 | .516 | 5486 | 707 | 1398 | 29 | 25 | 161 | 2232 | 592 | 1185 | 56 | 34 | .332 | .407 | .255 | 42 | 65 | 94 | 134 | 6244 | 23864 | 483 | 62.2 | 1451 | 1451 | 1.21 | .738 | 83 | 78 | 3.84 | 61 | 1.71 | 3.44 | 5.88 | 10.28 | 1429.0 | 6040 | 4287 | 1663 | 90 | 151 | 8 | 11 | 19 | 119 | .6931 | .983 |
| Chicago White Sox AL | 162 | .488 | 5463 | 724 | 1410 | 212 | 21 | 161 | 2248 | 534 | 1022 | 113 | 110 | .329 | .411 | .288 | 6359 | 24345 | 17.04 | 61 | 2.32 | 3.32 | 7.71 | 9.36 | 1436.2 | 5844 | 4310 | 1452 | 82 | 121 | 10 | 11 | 23 | 151 | .6905 | .986 |</p>
<table>
<thead>
<tr>
<th>Team</th>
<th>Record</th>
<th>Wins</th>
<th>Losses</th>
<th>Ties</th>
<th>Home Runs</th>
<th>Runs Allowed</th>
<th>Batting Avg.</th>
<th>Pitching Avg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Los Angeles Angels</td>
<td>AL</td>
<td>599</td>
<td>562</td>
<td>883</td>
<td>1604</td>
<td>293</td>
<td>33 173</td>
<td>1054 148</td>
</tr>
<tr>
<td>Los Angeles Dodgers</td>
<td>NL</td>
<td>586</td>
<td>559</td>
<td>780</td>
<td>1511</td>
<td>278</td>
<td>39 145</td>
<td>1480 1.48</td>
</tr>
<tr>
<td>Milwaukee Brewers</td>
<td>NL</td>
<td>494</td>
<td>551</td>
<td>785</td>
<td>1447</td>
<td>281</td>
<td>37 145</td>
<td>1506 1.50</td>
</tr>
<tr>
<td>Minnesota Twins</td>
<td>AL</td>
<td>574</td>
<td>560</td>
<td>817</td>
<td>1539</td>
<td>271</td>
<td>40 172</td>
<td>1470 1.30</td>
</tr>
<tr>
<td>New York Mets</td>
<td>AL</td>
<td>432</td>
<td>545</td>
<td>671</td>
<td>1472</td>
<td>295</td>
<td>49 95</td>
<td>2150 1.44</td>
</tr>
<tr>
<td>New York Yankees</td>
<td>AL</td>
<td>436</td>
<td>558</td>
<td>759</td>
<td>1464</td>
<td>307</td>
<td>21 135</td>
<td>2224 1.65</td>
</tr>
<tr>
<td>Oakland Athletics</td>
<td>AL</td>
<td>463</td>
<td>558</td>
<td>759</td>
<td>1464</td>
<td>271</td>
<td>517 173</td>
<td>1054 1.10</td>
</tr>
<tr>
<td>Philadelphia Phillies</td>
<td>NL</td>
<td>574</td>
<td>559</td>
<td>820</td>
<td>1439</td>
<td>312</td>
<td>35 224</td>
<td>2188 1.14</td>
</tr>
<tr>
<td>Pittsburgh Pirates</td>
<td>NL</td>
<td>385</td>
<td>541</td>
<td>636</td>
<td>1364</td>
<td>285</td>
<td>44 71</td>
<td>1505 1.15</td>
</tr>
<tr>
<td>San Diego Padres</td>
<td>NL</td>
<td>463</td>
<td>542</td>
<td>638</td>
<td>1315</td>
<td>265</td>
<td>31 141</td>
<td>2425 1.25</td>
</tr>
<tr>
<td>San Francisco Giants</td>
<td>NL</td>
<td>543</td>
<td>549</td>
<td>657</td>
<td>1411</td>
<td>275</td>
<td>43 122</td>
<td>2138 1.28</td>
</tr>
<tr>
<td>Team</td>
<td>Div</td>
<td>Wins</td>
<td>Losses</td>
<td>Playoffs</td>
<td>Wins Percentage</td>
<td>Avg</td>
<td>Hits</td>
<td>Avg Hits</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-----</td>
<td>------</td>
<td>--------</td>
<td>----------</td>
<td>-----------------</td>
<td>-----</td>
<td>------</td>
<td>---------</td>
</tr>
<tr>
<td>Seattle Mariners</td>
<td>AL</td>
<td>162</td>
<td>52</td>
<td>106</td>
<td>0.924</td>
<td>1.11</td>
<td>79</td>
<td>6.83</td>
</tr>
<tr>
<td>St. Louis Cardinals</td>
<td>NL</td>
<td>162</td>
<td>52</td>
<td>106</td>
<td>0.924</td>
<td>1.11</td>
<td>79</td>
<td>6.83</td>
</tr>
<tr>
<td>Tampa Bay Rays</td>
<td>AL</td>
<td>162</td>
<td>52</td>
<td>106</td>
<td>0.924</td>
<td>1.11</td>
<td>79</td>
<td>6.83</td>
</tr>
<tr>
<td>Texas Rangers</td>
<td>AL</td>
<td>162</td>
<td>52</td>
<td>106</td>
<td>0.924</td>
<td>1.11</td>
<td>79</td>
<td>6.83</td>
</tr>
<tr>
<td>Toronto Blue Jays</td>
<td>AL</td>
<td>162</td>
<td>52</td>
<td>106</td>
<td>0.924</td>
<td>1.11</td>
<td>79</td>
<td>6.83</td>
</tr>
<tr>
<td>Washington Nationals</td>
<td>NL</td>
<td>162</td>
<td>52</td>
<td>106</td>
<td>0.924</td>
<td>1.11</td>
<td>79</td>
<td>6.83</td>
</tr>
</tbody>
</table>