



Football II

Produced by Dr. Mario | UNC STOR 538



Importance of the Quarterback

❖ Historically Important for Success in NFL

- ❖ Owner
 - ❖ Establish Team Identity
 - ❖ Hire Leadership
 - ❖ Provide Resources
- ❖ General Manager
 - ❖ Evaluate Players
 - ❖ Make Trades and Acquire Players
 - ❖ Final Say on Personnel (20/32 Teams)
- ❖ Coach
 - ❖ Responsible for Player Development
 - ❖ Responsible for On-Field Strategy
 - ❖ Real-Time Game Decisions
- ❖ Quarterback
 - ❖ Throws the Rock
 - ❖ Highest Paid Position



Importance of the Quarterback



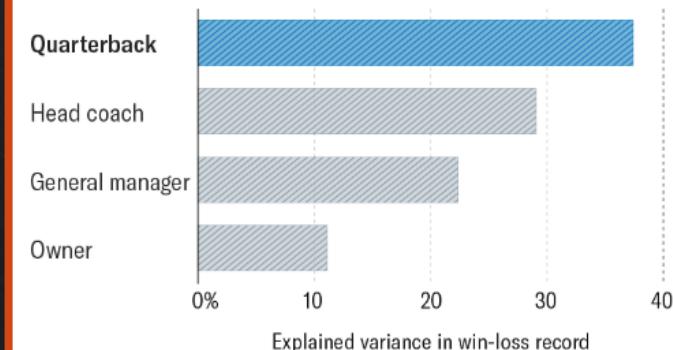
- ❖ We Know All Are Important #Browns
- ❖ What is the Most Important?
- ❖ Analysis Published in Harvard Business Review



- ❖ 38 Years of Data
- ❖ Basic Linear Regression ($RSQ=0.682$)
- ❖ Order of Importance by Percentage of RSQ
- ❖ Comparison of 80s and 90s
 - ❖ Head Coach Effect Unchanged
 - ❖ Owner and General Manager Effects Declined
 - ❖ Value of QB has increased

Quarterbacks Are More Important Than Coaches, GMs, and Owners

A team's success or failure is most dependent on the player receiving the snap.





Metrics for Quarterbacks



- ❖ Article from Bleacher Report
 - ❖ Passing YDS (Bad Metric to Measure Success)
 - ❖ TD/INT (Accounts for Most Important Info)
 - ❖ COMP/ATT (Misleading)
 - ❖ YDS/ATT (Leaves Out Sacks and Touchdowns)
 - ❖ Passer Rating (Accounts for Most QB Information)
 - ❖ Dates Back to 1971 and Hasn't Changed
 - ❖ Minimum = 0 & Maximum = 158.3
 - ❖ Leader in 2018 Was Danny Amendola
 - ❖ QBR (Produced by ESPN)
 - ❖ Created in 2011
 - ❖ Minimum = 0 & Maximum = 100
 - ❖ Compares Outcome to Expected Outcome
 - ❖ Leaders in 2018 Were Patrick Mahomes and Drew Brees
 - ❖ W/G (Classic Problem Similar to Baseball Pitching)

YDS = Yards
TD = Touchdown
INT = Interception
COMP = Completion
ATT = Attempts
W = Wins
G = Games



Metrics for Quarterbacks



- ❖ Advanced Stats from Football Outsiders
 - ❖ Defense-Adjusted Value Over Average (DVOA)
 - ❖ Defense-Adjusted Yards Over Replacement (DYOA)

- ❖ Advanced Stats from Brian Burke (Advanced Football Analytics)
 - ❖ Win Probability Added (WPA)
 - ❖ Expected Points Added (EPA)



YDS = Yards
TD = Touchdown
INT = Interception
ATT = Attempts
SYDS=Sack Yards
S=Sacks



Tom Brady VS Peyton Manning



- ❖ Quarterback's Rating Based on 4 Stats (NFL)

- ❖ Comp/ATT
 - ❖ YDS/ATT
 - ❖ INT/ATT
 - ❖ TD/ATT

- ❖ According to *Wages of Wins* From Regression

$$QB\ Rating = YDS - 3 \times ATT - 30 \times INT$$

- ❖ Estimated Linear Model for Wins

- ❖ Conducted by Brian Burke
 - ❖ Data from 2002-2006

YDS = Yards
TD = Touchdown
INT = Interception
COMP = Completion
ATT = Attempts



Tom Brady VS Peyton Manning



❖Independent Variables for Wins

TRUOPASS = offense (passing yards allowed – sack yards)/passing plays

TRUDPASS = defense (passing yards allowed – sack yards)/passing plays

ORUNAVG= offense rushing yards allowed/rushing attempts

DRUNAVG= defense rushing yards allowed/rushing attempts

OINTRATE= interceptions thrown/passing attempts

DINTRATE= interceptions made/passing attempts

OFUMRATE= offensive fumbles/all offensive plays (not fumbles lost)⁶

DFFRATE= defensive forced fumbles/all defensive plays

PENRATE= each team's penalty yards/all plays, offensive and defensive

OPPPENRATE= opponent's penalty yards/all plays, offensive and defensive





Tom Brady VS Peyton Manning



❖ Results of Regression

Variable	Coefficient	p-value
const	5.2602	0.06281
TRUOPASS	1.54337	<0.00001
TRUDPASS	-1.66731	<0.00001
ORUNAVG	0.91979	0.00071
DRUNAVG	-0.553532	0.04842
OINTRATE	-50.0957	0.0012
DINTRATE	83.6627	<0.00001
OFUMRATE	-63.9657	0.00053
DFFRATE	78.6917	0.0001
PENRATE	-4.48514	0.01283
OPPENRATE	6.5826	0.0004

All Passing Information





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Contribution
from Offense QB





Tom Brady VS Peyton Manning



❖ Comparing Predictions

Interception %	# of Sacks	Yards/Sacks	NFL rating	Net Yards/Attempt	Regression Rating	Our rank	"Wages of Wins" Rating	"Wages of Wins" Rank
1.4	21	128	117.2	7.809682805	157.4433428	1	2769	1
2.7	47	347	104.1	6.223946785	114.4701377	15	1471	13
0.9	21	99	102.2	6.965317919	142.8426456	2	1381	14
2.7	21	124	98	7.305970149	137.6311052	4	2012	3

T. Brady

P. Manning



❖ Correlation Between Regression and *Wages of Wins* Ratings is 0.87



Final Inspiration

All I know is grind.

- Reverend Ray Lewis