



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

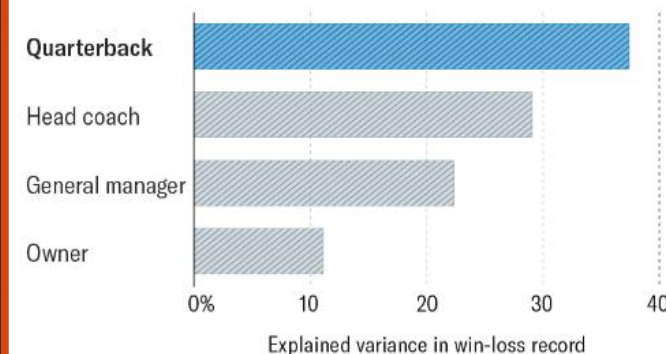


- ❖ We Know All Are Important #Browns
- ❖ What is the Most Important?
- ❖ Analysis Published in Harvard Business Review
 - ❖ 38 Years of Data
 - ❖ Basic Linear Regression ($RSQ=0.682$)
 - ❖ Order of Importance by Percentage of RSQ
 - ❖ Comparison of 80s and 90s
 - ❖ Head Coach Effect Unchanged
 - ❖ Owner 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 Aaron Rodgers



❖ Passer Rating Based on 4 Stats (NFL)

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

❖ Critique: “Any system for rating quarterbacks based on passing statistics is really rating the team’s entire passing game.” –Dean Oliver

❖ Estimated Linear Model for Wins

- ❖ Conducted by Brian Burke (ESPN)
- ❖ Data from 2002-2006
- ❖ Created Total QBR for ESPN in 2016

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





Tom Brady VS Aaron Rodgers



❖ 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

DEFRATE = 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 Aaron Rodgers



❖ 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
OPPPENRATE	6.5826	0.0004

All Passing
Information





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Contribution
from Offense QB

$$QBR (Book) = 1.543(TRUOPASS) - 50.096(OINTRATE)$$





Tom Brady VS Aaron Rodgers



❖ Comparing Ratings in 2016

Player	Our Ranking	OldQBR	TOTALQBR
Matt Ryan	1	117.1	79.6
Tom Brady	2	112.2	79.4
Dak Prescott	3	104.9	77.6
Aaron Rodgers	12	104.2	72.4
Drew Brees	5	101.7	66.8
Kirk Cousins	4	97.2	66.5
Andrew Luck	9	96.4	65.9
Matthew Stafford	13	93.3	65.2
Tyrod Taylor	18	89.7	62.4
Alex Smith	14	91.2	60.8





Tom Brady VS Aaron Rodgers



- ❖ Correlation Between Ratings
 - ❖ Book with QBR (0.9)
 - ❖ Book with Total QBR (0.82)
- ❖ Further Adjustment Needed to Measure the Quality of the Quarterback?
- ❖ Book Points Out the Difficulty in Understanding How the Offensive Line Contributes to the QB's Success





Final Inspiration

All I know is grind.

- Reverend Ray Lewis