EXAMINING BATTED PASSES IN THE NFL

A HIERARCHICAL APPROACH TO EXPLAINING VARIANCE OF AN UNLIKELY EVENT

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BACKGROUND

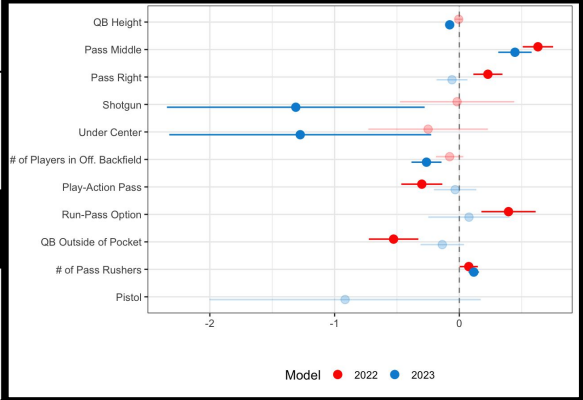
Motivation:
Batted passes result in loss of down
Potential draft bias against shorter QBs

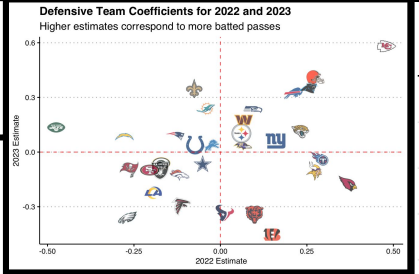
Main Question:
Which explains batted passes more: offensive or defensive characteristics?

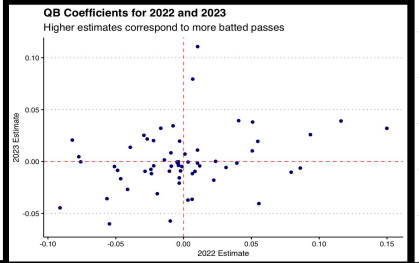
DATA

Detailed charting data and batted passes from **For The Numbers (FTN)** as well as play-by-play and QB information from the **nflverse**

Log Odds Interval Plot of Fixed Effects by Season:
>0 : more likely to create a batted pass
=0 : no conclusive impact
<0 : less likely to create a batted pass







Highest and Lowest QB Random Effect Estimates

Higher estimates correspond to more batted passes

QUARTERBACK	SEASON	ESTIMATE
J.Fields	2022	0.14983385
B.Mayfield	2022	0.11607093
S.Howell	2023	0.11070759
J.Herbert	2022	0.09350120
C.Rush	2022	0.08603160
B.Young	2023	-0.06399508
A.Rodgers	2022	-0.07582443
M.Jones	2022	-0.07721545
G.Smith	2022	-0.08204432
P.Mahomes	2022	-0.09106678

METHODS: MULTILEVEL LOGISTIC REGRESSION

$$\log\left[\frac{\Pr(batted\ pass)}{\Pr(not\ batted)}\right] = B_0 + Q_{q[i]} + D_{d[i]} + BX$$

$$Q_q \sim Normal(0, \gamma_Q^2) \quad D_d \sim Normal(0, \gamma_D^2)$$

Random Effects	Variance 2022	Variance 2023
Quarterback	0.02005	0.01379
Defensive Team	0.08753	0.10844

Random Effects: Quarterback and Defensive Team
Fixed Effects: QB Height, Pass Rushers, Offensive Backfielders, Pass Location, and Formation
*Model fit separately for 2022 and 2023 seasons

RESULTS AND DISCUSSION

Conclusion: Defensive team appears to affect batted passes more than individual quarterbacks. However, our model also maintains that after accounting for individual random effects, an increase in QB height does lead to less batted passes.

Limitations: FTN charting data only available for 2022 and 2023 seasons, model may not capture longer-term trends

Future Work: Incorporate tracking data from NFL Big Data Bowl to more closely examine individual batted passes