

Buying Wins: Determining the Optimal Salary Cap Allocation Strategy in the NFL



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Driving Questions




- 1. How should NFL teams allocate salary cap resources across positions to optimize on-field success?
- 2. When is it worth heavily investing in a star player?

Goal

Maximize “Compensated Wins” – the number of wins a team is effectively “buying” through salary cap management (under the assumption of efficient pay).

$$Compensated Wins_t = \sum_{x=1}^{16} \alpha_x + (\beta_x \times \ln(CapHitPct_{t,pos x}))$$

Data Sources

Source	Description	Use
	Houses financial data related to professional sports teams to be used for player valuation and payroll research.	<ul style="list-style-type: none">• Player contract data• Team salary cap breakdowns
	Comprehensive source for current and historical NFL player and team performance data.	<ul style="list-style-type: none">• Approximate Value (AV) metric• Team performance data
	Provides several advanced metrics to evaluate NFL players and teams.	<ul style="list-style-type: none">• Historical player grades• Offensive/Defensive unit metrics

Approximate Value (AV)

“PFR’s attempt to put a single number on the seasonal value of a player at any position from any year”

- Team statistics determine how many points are divided amongst its players
- Individual statistics and accolades determine the portion of available points given to each player

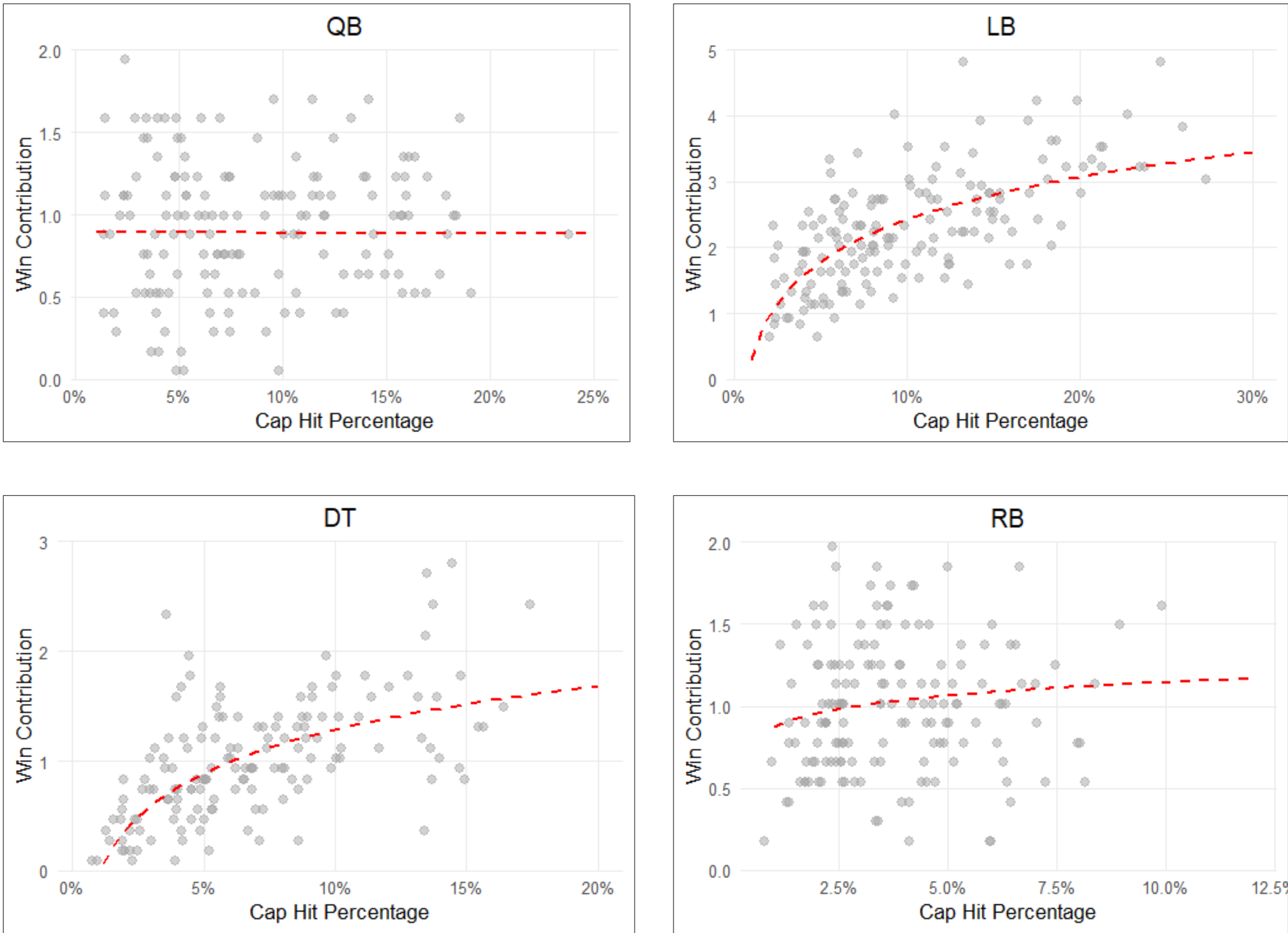
Position	Minimum	Q1	Median	Mean	Q3	Maximum
All Players	-5	1	2	3.39	5	25
QB	-5	1	3	5.42	10	25
FB	0	0	0	0.53	1	9
S	0	1	2	3.04	5	15
DE	0	1	2	3.48	6	20

Optimal Allocation Breakdown

(Change from 2011-2015)

Position	Percent of Cap	Position	Percent of Cap
QB	0.86% (▼7.74%)	DE	12.65% (▼1.05%)
RB	3.03% (▲2.23%)	DT	14.70% (▲4.50%)
FB	0.41% (▼1.69%)	LB	23.71% (▼1.49%)
WR	10.43% (▲4.83%)	CB	7.42% (▲0.32%)
TE	7.29% (▲6.59%)	S	2.97% (▼4.63%)
G	8.14% (▼2.46%)	K	0.33% (▼0.57%)
T	5.56% (▲1.86%)	P	0.33% (▼0.77%)
C	1.85% (▼0.05%)	LS	0.33% (▲0.03%)

Positional Return-On-Investment



Best Allocations

Year	Team	Comp. Wins	Actual Wins
2019	DAL	9.65	8
2020	BUF	9.97	13
2021	BUF	9.57	11
2022	JAX	9.57	9
2023	MIA	9.51	11

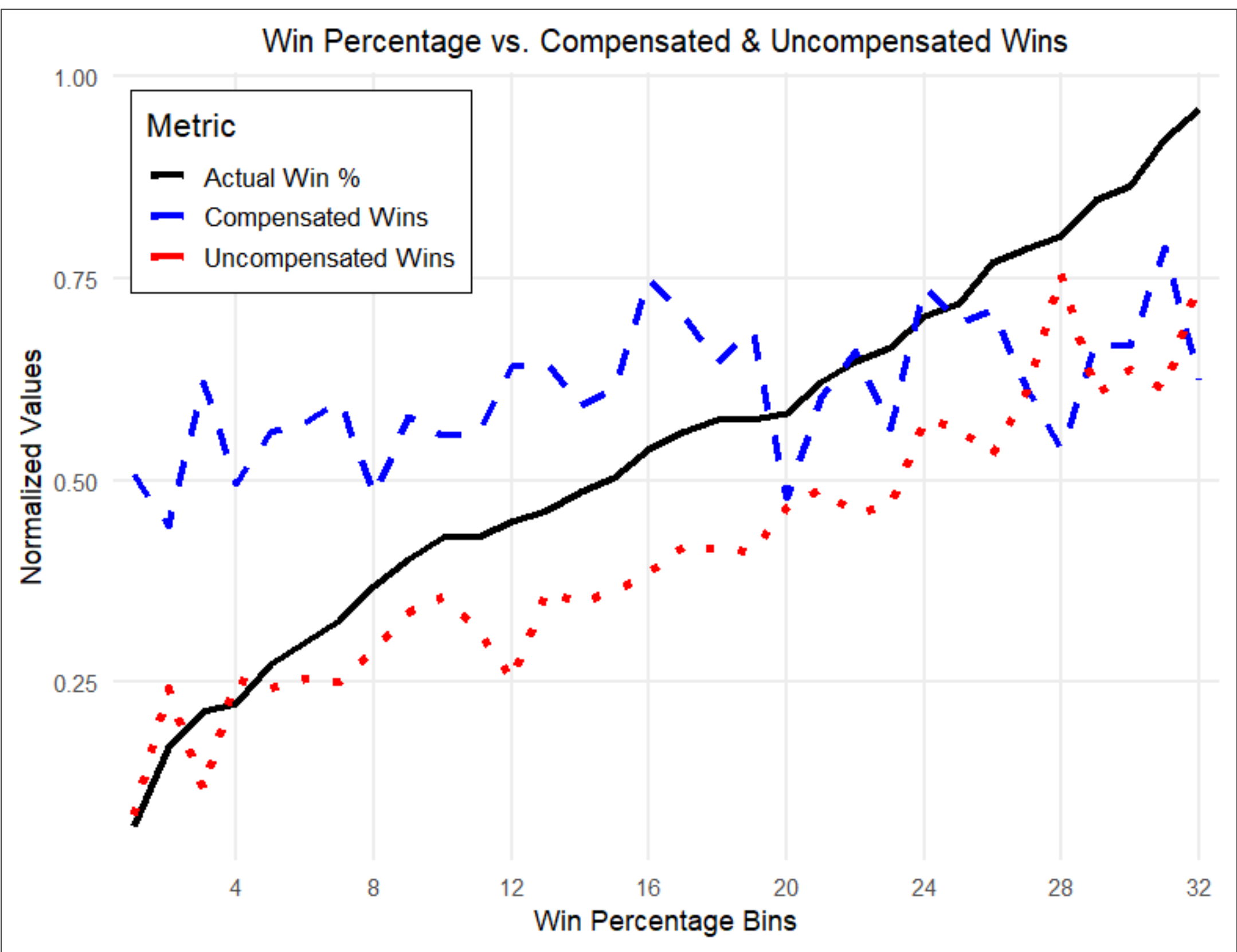
Year	Team	Unomp. Wins	Actual Wins
2019	BAL	8.15	14
2023	DAL	5.82	12
2023	BAL	5.73	13
2019	NE	5.65	12
2022	PHI	5.51	14

Worst Allocations

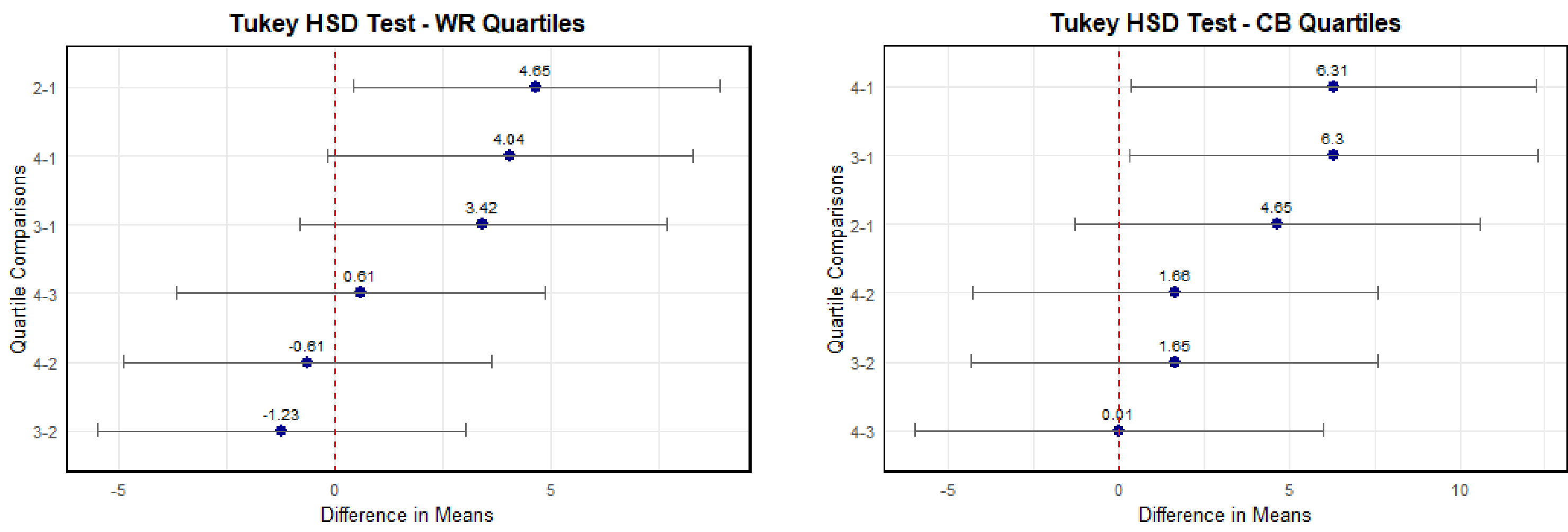
Year	Team	Comp. Wins	Actual Wins
2019	MIA	6.11	5
2020	NYJ	6.08	2
2021	LAR	6.98	12
2022	CHI	6.63	3
2023	ARI	6.76	4

Year	Team	Uncomp. Wins	Actual Wins
2021	NYJ	-5.68	4
2021	JAX	-5.59	3
2019	NYJ	-5.43	7
2023	CAR	-5.08	2
2019	WAS	-4.38	3

Compensated vs Uncompensated Wins



Tukey HSD Tests



- An even distribution strategy among wide receivers and cornerbacks hinders overall team performance
- It is beneficial to invest in at least one expensive, proven player

Conclusions

- The NFL contract market is inefficient (mostly due to the rookie wage scale)
- It is most beneficial to sign star players at the WR and CB positions (as well as QB)
- Focused spending provides a slight competitive edge, but drafting well is the best indicator of success

References

[1] Jason Mulholland and Shane T Jensen. “Optimizing the allocation of funds of an NFL team under the salary cap”. In: International Journal of Forecasting 35.2 (2019), pp. 767–775 (pages 14, 35, 53)

[2] Richard Borghesi. “Allocation of scarce resources: Insight from the NFL salary cap”. In: Journal of Economics and Business 60.6 (2008), pp. 536–550 (pages 12, 15–16).