The NFL Running Back Debate

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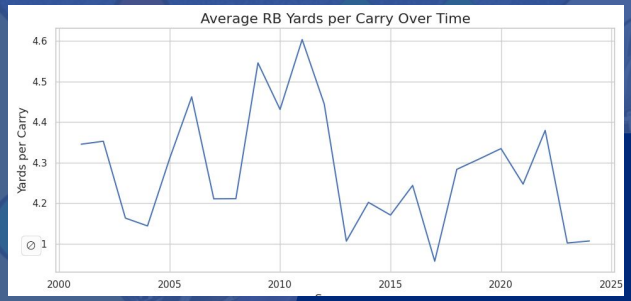
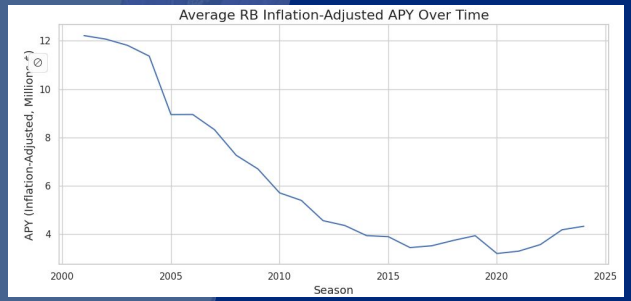
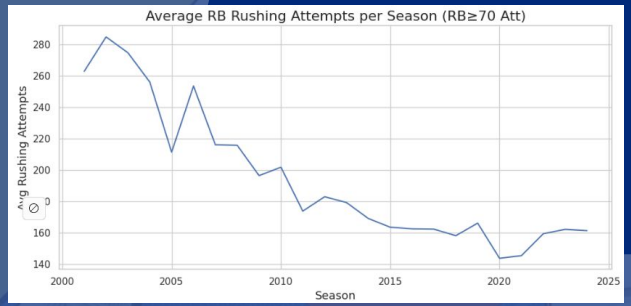
Introduction







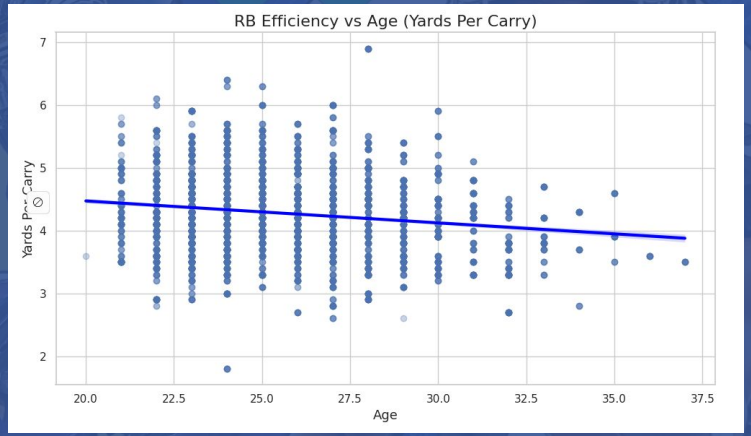
With running backs holding out for periods of time for contract disputes, there is a broad consensus that running backs are less valuable than other skill positions. In today's pass-first NFL, running backs are seeing their value diminish in spite of receivers, quarterbacks, and defensive players signing record-breaking contracts.

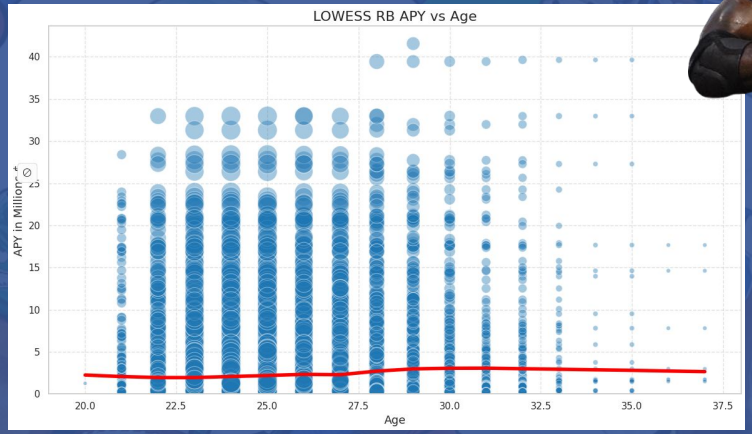
The goal of this project is to use contracts and performance data to evaluate running backs over time and determine whether or not teams are justified the current valuation of the running back market.

Data Sources

Data Source #	Name/Short Description	Description	Purpose	Types	Data Size
1	Pro Football Reference	Individual player stats including Rushing yards, attempts, touchdowns, yards per carry, fumbles, longest rush, yards per game, and the year	Collected via Kaggle API into CSV; The stats are used to measure a player's on-field performance using basic metrics	Kaggle API / CSV	Rows : 7634 Columns : 13
2	OverTheCap	Player contract stats (with inflation considered) which include the year signed, total contract, signing bonus, average per year	Collected via web scraping; this contract data shows how much a player is valued at, this will help to determine value	Web Scraping	Rows : 3608 Columns : 14
3	ESPN	Team-level stats from years 2001-2024, this will include wins and losses as well as team total passing and rushing yards	Scraped ESPN's public API; this took all season stats per team from the years 2001-2024 to find the season outcomes as well as offensive stats.	Web Scraping	768 team's seasons

Running Backs Over Time



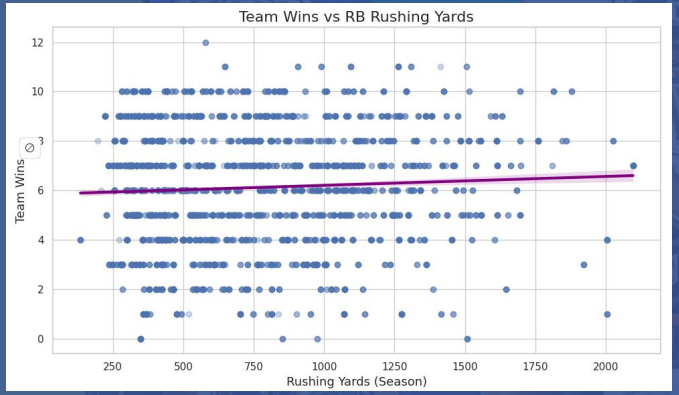


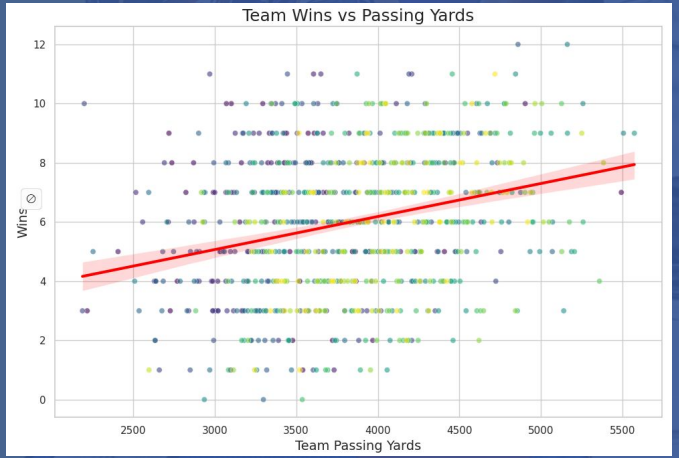
There is a decline in running back efficiency as they age, an average of 0.21 yards per carry is lost per year.

The LOWESS shows there is a significant decrease in running backs over the age of 30.

Despite the average APY increasing with age, the LOWESS regression shows that running backs tend to fizzle out of the league after 27.

Do Rushing Yards Lead to Wins?



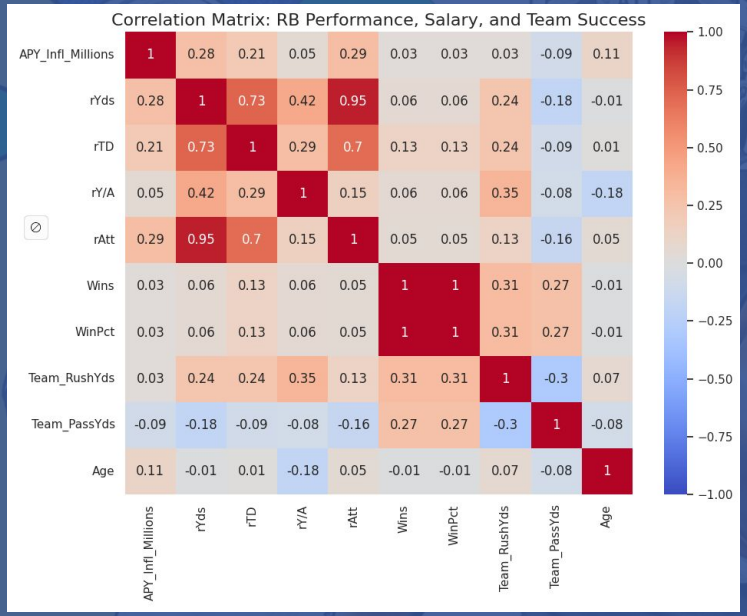


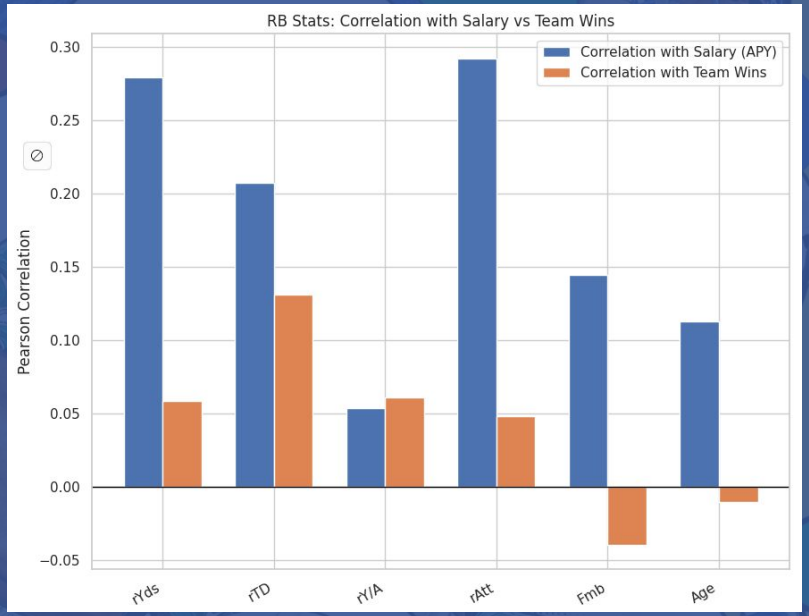
When it comes to passing yards vs rushing yards impact on wins passing yards have a clear stronger positive relationship with team wins. There is a notable clustering around 4000-5000 passing yards -> 8+ win season and 2500-3300 passing yards -> 3-6 win season.

When looking at wins vs Running Back rushing yards, the regression line is almost flat. Running backs with 1600-2000 yard seasons don't consistently come from winning seasons.

This suggests a strong meaningful consistent correlation between passing production and team success. Passing offenses drive modern NFL success and high-performing QBs correlate strongly with winning seasons. This reinforces the idea that success is driven by quarterback play than individual Running Back performance.

Correlation Analysis





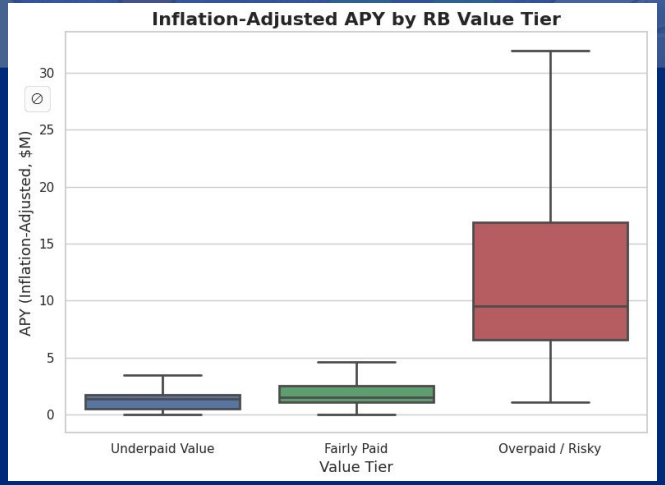
The heatmap shows weak correlations between rushing yards, rushing tds, and yards per attempt and APY or wins.

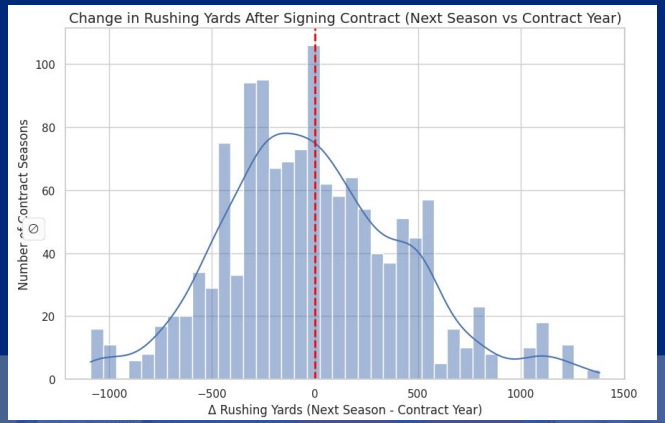
There is a correlation between rushing attempts and APY, this indicates that teams pay running backs for volume, but those stats do not necessarily translate to wins.

There is a slight negative correlation between age and wins, this points to the short-lived value of running backs.

Running Back Value

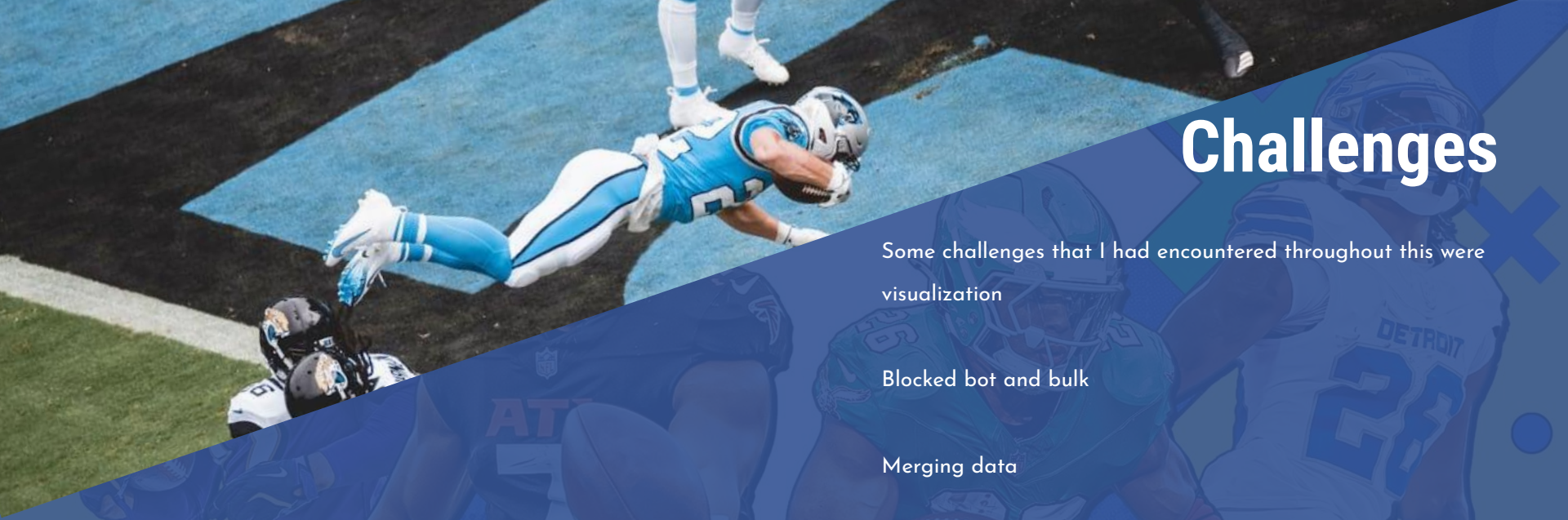
Clusters + post-contract years





Value Tier	APY in mil	Rush Attempts	Rush Yards	Rush TDs	Avg Yards per Rush	Wins
Fairly Paid	$2.04	131.07	552.44	3.84	4.2	6.01
Overpaid	$11.88	185.49	808.58	6.00	4.31	6.14
Underpaid	$1.39	221.64	973.47	7.25	4.36	6.24

On average, running backs regress after signing a new contract



Challenges

Some challenges that I had encountered throughout this were visualization

Blocked bot and bulk

Merging data

Condensing data

Relevant / irrelevant / missing data


Thank You