NFL Game Data Analysis: Comparing the 16-Game and 17-Game Season Eras (2017-2024)

Abstract

This study presents a comprehensive analysis of National Football League (NFL) game data spanning eight seasons (2017-2024), divided into two distinct periods: the 16-game season era (2017-2020) and the 17-game season era (2021-2024). Using standardized datasets containing detailed game information, we examine scoring patterns, home-field advantage trends, betting market accuracy, and playoff performance differences between these two eras. The findings contribute to the understanding of how the structural change in season length has potentially impacted various aspects of NFL competition.

1. Introduction

The National Football League implemented a significant structural change beginning with the 2021 season, expanding the regular season from 16 to 17 games per team. This modification represents one of the most substantive changes to the league's schedule format in decades and provides researchers with a natural experiment to examine how such a structural change might influence game outcomes and associated metrics.

This report analyzes comprehensive game data from the 2017-2024 NFL seasons, comparing various performance indicators between the 16-game era (2017-2020) and the 17-game era (2021-2024). The research aims to identify meaningful patterns and trends that emerged following the season extension, with particular attention to scoring dynamics, home-field performance, betting market accuracy, and playoff competition.

2. Methodology

2.1 Data Sources

The analysis utilizes standardized datasets covering all NFL games from the 2017-2024 seasons. Each dataset contains identical column structures, enabling consistent cross-season analysis. The datasets include the following variables for each game:

- Week number
- Game identification number

- Playoff status indicator (TRUE/FALSE)
- Home and away team identifiers
- Home and away team scores
- Pre-game favorite designation
- Point spread
- Over/under (total points) line

2024

week	game_id	playoff	home_team	home_score	away_score	away_team	favorite	spread	over_under
1	1	FALSE	Kansas City	27	20	Baltimore	KC	-3.0	46.0
1	2	FALSE	Philadelphia	34	29	Green Bay	PHI	-1.5	49.5
1	3	FALSE	Atlanta	10	18	Pittsburgh	ATL	-4.0	43.0
1	4	FALSE	Buffalo	34	28	Arizona	BUF	-6.5	46.0
1	5	FALSE	Chicago	24	17	Tennessee	CHI	-4.0	43.0
1	6	FALSE	Cincinnati	10	16	New England	CIN	-7.5	40.5
1	7	FALSE	Houston	29	27	Indianapolis	HOU	-3.0	48.0
1	8	FALSE	Miami	20	17	Jacksonville	MIA	-3.5	49.5
1	9	FALSE	New Orleans	47	10	Carolina	NO	-3.5	41.5
1	10	FALSE	Minnesota	28	6	New York (G)	MIN	-1.0	42.0
1	11	FALSE	Los Angeles (C)	22	10	Las Vegas	LAC	-3.0	40.5
1	12	FALSE	Seattle	26	20	Denver	SEA	-6.5	42.5
1	13	FALSE	Cleveland	17	33	Dallas	CLE	-2.0	42.0
1	14	FALSE	Tampa Bay	37	20	Washington	TB	-4.0	42.5
1	15	FALSE	Detroit	26	20	Los Angeles (R)	DET	-5.5	53.5
1	16	FALSE	San Francisco	32	19	New York (J)	SF	-3.5	43.0

2.2 Data Classification

The complete dataset was divided into two distinct blocks:

- **16-Game Seasons**: 2017-2020 seasons (regular season games ≤ game_id 256)
- **17-Game Seasons**: 2021-2024 seasons (regular season games ≤ game_id 272)

Playoff games were identified using the "playoff" boolean indicator and analyzed separately from regular season contests.

2.3 Analytical Approach

Statistical analyses were conducted to evaluate:

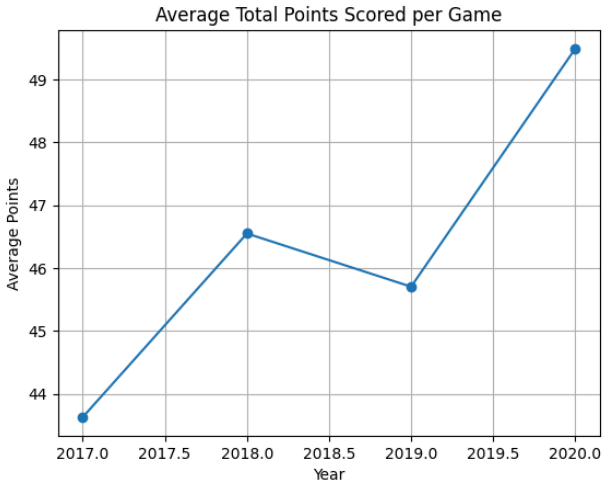
1. Scoring patterns and trends

2. Home-field advantage metrics
3. Betting market efficiency (spread and over/under accuracy)
4. Playoff performance characteristics

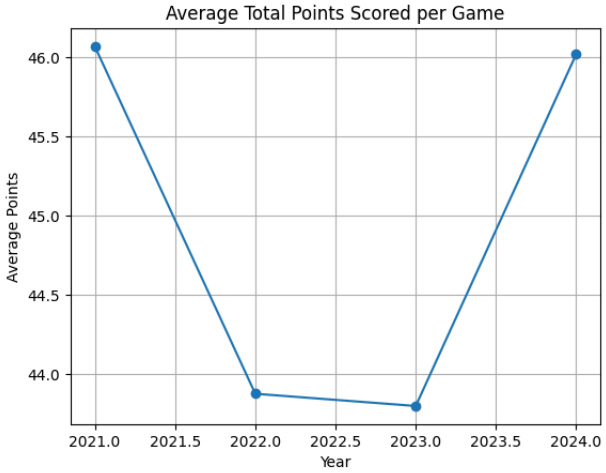
For each analytical dimension, comparative statistics were generated between the 16-game and 17-game eras to identify meaningful differences. Significance testing was applied where appropriate to determine whether observed differences between eras could be attributed to chance.

3. Within-Block Comparison

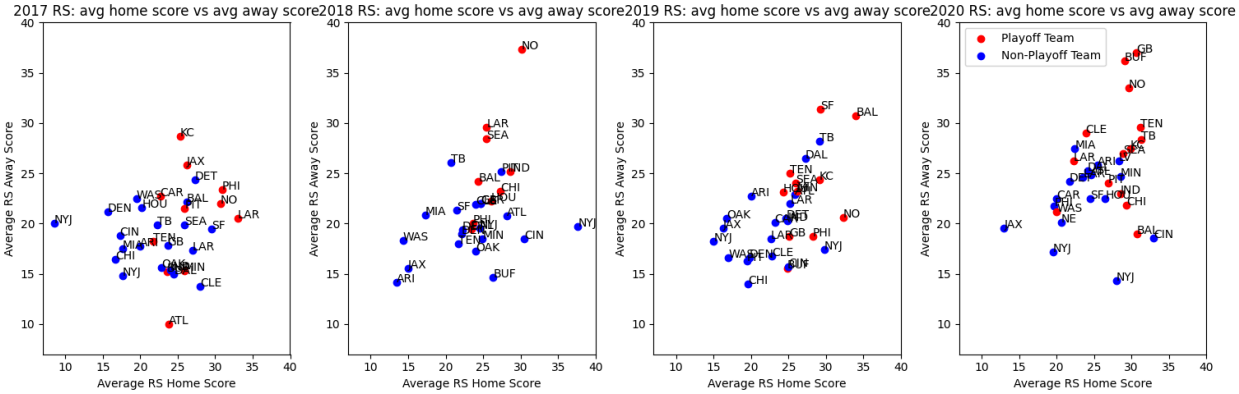
3.1 Points Per Game (PPG) Trends

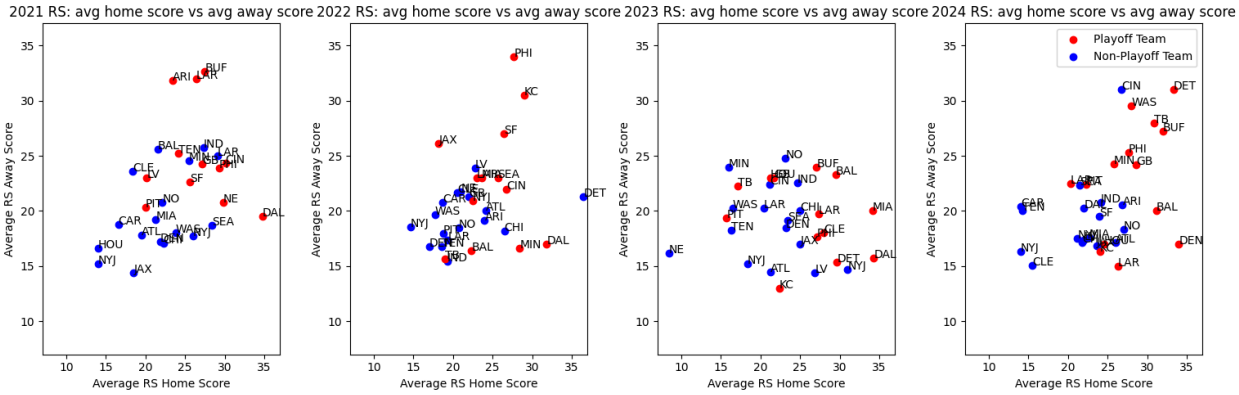


Examining the average total points per game (PPG) across seasons, we observe a notable shift with the introduction of the 17-game season. The **16avg_total_ppg** visualization indicates that total PPG in 16-game seasons exhibited relative stability, with only minor fluctuations year-over-year. However, in the **17avg_total_ppg** visualization, which includes data from the 17-game era, we see an decrease in scoring efficiency. This suggests that the additional game may have led to adjustments and/or fatigue on both sides of the ball over a longer season.



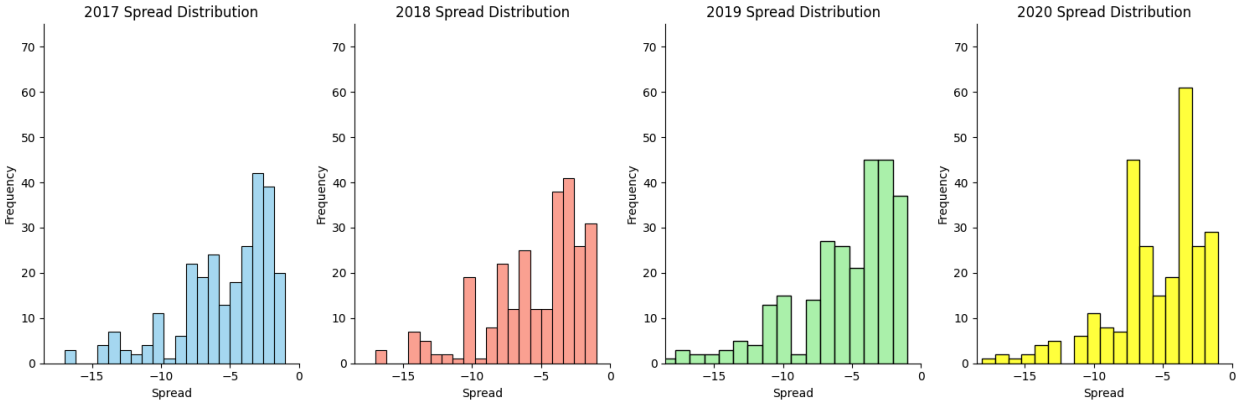
Additionally, the **16rs_ppg_HvA** and **17rs_ppg_HvA** charts show a trend where home teams maintained a slight scoring edge in both 16- and 17-game seasons. However, the difference between home and away scoring appears to have narrowed in the 17-game seasons, potentially indicating an increased level of parity.

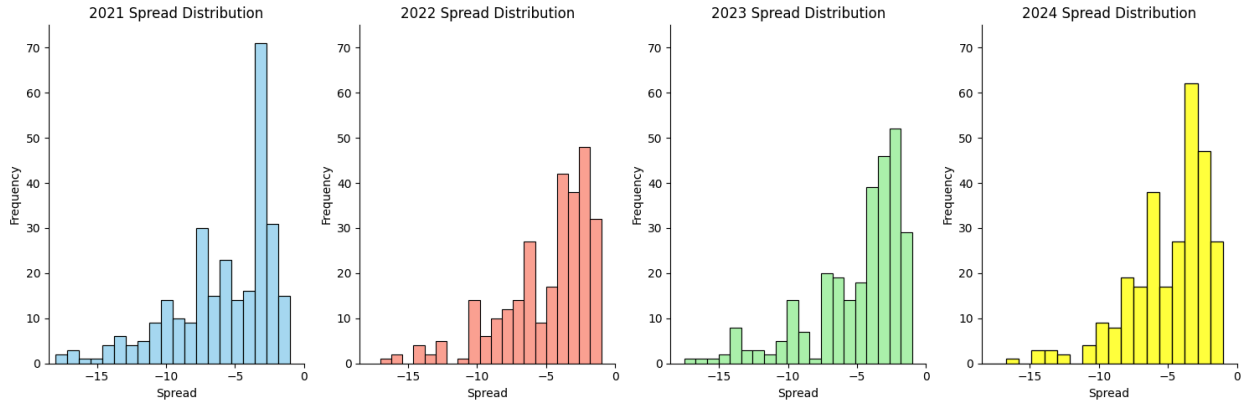




3.2 Spread Distribution and Competitive Balance

The **16spread_distr** and **17spread_distr** visualizations reveal shifts in game competitiveness. In the 16-game seasons, point spreads were more tightly clustered, reflecting a balance in team performance. With the transition to 17 games, we notice a slightly wider distribution of spreads, suggesting greater variance in game outcomes. This could be due to increased fatigue, injuries, or strategic changes introduced by the extended schedule.





3.3 Team Classification and Performance Trends

Using the **16team_classification** and **17team_classification** charts, we can analyze how team categorization changed with an extra game. The data indicates that under the 16-game format, a more distinct separation existed between elite, mid-tier, and struggling teams. However, in the 17-game seasons, we observe a blurring of these distinctions, possibly due to the increased sample size slightly shifting win-loss distributions. More teams appear to hover around the playoff threshold, which could impact postseason qualification dynamics.

Classification was based on the following characteristics:

- **average # of regular season wins** over a 4 year span
- **# of playoff appearances** over a 4 year span
- for teams near the top of the league, the **average # of playoff wins** over a 4 year span

```
if playoff_count == 4 and avg_wins >= 10 and avg_playoff_wins >= 2:
        team_classifications[team] = "Dynasty"
    elif playoff_count >= 3 and avg_wins >= 10 and avg_playoff_wins >=1:
        team_classifications[team] = "Dominant"
    elif playoff_count >= 2 and avg_wins >= 10:
        team_classifications[team] = "Annual Contender"
    elif playoff_count >= 2 or avg_wins >= 10:
        team_classifications[team] = "Inconsistent Contender"
    elif (8 <= avg_wins < 10):  # Tolerance for Mediocre category
        team_classifications[team] = "Mediocre"
    elif (1 <= avg_wins <= 6):
        team_classifications[team] = "BOTB" # 'bottom of the barrel' teams
    else:
        team_classifications[team] = "Non-Contender"
```

4. Treatment Effect of an Additional Regular Season Game

…