

Goal Differential: Home vs. Away (English Premier League Edition)



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Hypothesis:

Home field advantage results in better Goal differentials

We aimed to quantify Home Field Advantage (HFA) in the English Premier League, as determined by Goal Differential.

Additionally, we explored one factor that could impact HFA. Does larger attendance (or crowd size) result in large HFA.

Background: Home field advantage in Premier League

In soccer, being the home team can provide a huge advantage. Factors like fans, playing on your own turf, and things as simple as having your own trainers with you can make the difference in a game.

In the English Premier League (EPL), top class teams tend to stay at the top of the ladder for both home and away results, it is very interesting to see the difference being the home team can make for a soccer team.

Procedure:

Obtained EPL data for: 2016-2017 | 2017-2018 | 2018-2019 seasons

Goal differential_{home or away} = (total goals for – total goal against) / (number of games)

HFA = $GD_{Home} - GD_{Away}$

Analysis conducted in R

Code:

```
3 library(tidyverse)
4
5 setwd("~/Desktop/english-premier-league_zip")
6
7 bpl <- read_csv("data/season-1819_csv.csv") %>%
8   rename(Goals_For = FTGH,
9          Goals_Against = FTAG)
10
11 bpl.home.summary <- bpl %>%
12   group_by(HomeTeam) %>%
13   summarize(Total_Goals_For = sum(Goals_For),
14            t_goals_against = sum(Goals_Against)) %>%
15   ungroup() %>%
16   rename(Team = HomeTeam) %>%
17   mutate(Home = "Home")
18
19
20
21 bpl.away.summary <- bpl %>%
22   group_by(AwayTeam) %>%
23   summarize(Total_Goals_For = sum(Goals_Against),
24            t_goals_against = sum(Goals_For)) %>%
25   ungroup() %>%
26   rename(Team = AwayTeam) %>%
27   mutate(Home = "Away")
28
29
30 season <- rbind(bpl.home.summary, bpl.away.summary)
31
32
33
34 season <- season %>% mutate(GD = Total_Goals_For - t_goals_against, GDPG = GD/19)
35
36
37 season <- season %>%
38   group_by(Team) %>%
39   summarise(HFA = sum(GDPG)) %>%
40   ungroup()
41
```

	Team	Total_Goals_For	t_goals_against	Home	GD
1	Arsenal	42	16	Home	26
2	Arsenal	31	35	Away	-4
3	Bournemouth	30	25	Home	5
4	Bournemouth	26	45	Away	-19
5	Brighton	19	28	Home	-9
6	Brighton	16	32	Away	-16
7	Burnley	24	32	Home	-8
8	Burnley	21	36	Away	-15
9	Cardiff	21	38	Home	-17
10	Cardiff	13	31	Away	-18
11	Chelsea	39	12	Home	27
12	Chelsea	24	27	Away	-3
13	Crystal Palace	19	23	Home	-4
14	Crystal Palace	32	30	Away	2
15	Everton	30	21	Home	9
16	Everton	24	25	Away	-1
17	Fulham	22	36	Home	-14
18	Fulham	12	45	Away	-33
19	Huddersfield	10	31	Home	-21
20	Huddersfield	12	45	Away	-33
21	Leicester	24	20	Home	4
22	Leicester	27	28	Away	-1
23	Liverpool	55	10	Home	45
24	Liverpool	34	12	Away	22
25	Man City	57	12	Home	45
26	Man City	38	11	Away	27
27	Man United	33	25	Home	8
28	Man United	32	29	Away	3
29	Newcastle	24	25	Home	-1
30	Newcastle	18	23	Away	-5
31	Southampton	27	30	Home	-3

Season 16-17 data

	Team	Total_Goals_For	t_goals_against	Home	GD
1	Arsenal	39	16	Home	23
2	Bournemouth	35	29	Home	6
3	Burnley	26	20	Home	6
4	Chelsea	55	17	Home	38
5	Crystal Palace	24	25	Home	-1
6	Everton	42	16	Home	26
7	Hull	28	35	Home	-7
8	Leicester	31	25	Home	6
9	Liverpool	45	18	Home	27
10	Man City	37	17	Home	20
11	Man United	26	12	Home	14
12	Middlesbrough	17	23	Home	-6
13	Southampton	17	21	Home	-4
14	Stoke	24	24	Home	0
15	Sunderland	16	34	Home	-18
16	Swansea	27	34	Home	-7
17	Tottenham	47	9	Home	38
18	Watford	25	29	Home	-4
19	West Brom	27	22	Home	5
20	West Ham	19	31	Home	-12

21	Arsenal	38	28	Away	10
22	Bournemouth	20	38	Away	-18
23	Burnley	13	35	Away	-22
24	Chelsea	30	16	Away	14
25	Crystal Palace	26	38	Away	-12
26	Everton	20	28	Away	-8
27	Hull	9	45	Away	-36
28	Leicester	17	38	Away	-21
29	Liverpool	33	24	Away	9
30	Man City	43	22	Away	21
31	Man United	28	17	Away	11
32	Middlesbrough	10	30	Away	-20
33	Southampton	24	27	Away	-3
34	Stoke	17	32	Away	-15
35	Sunderland	13	35	Away	-22
36	Swansea	18	36	Away	-18
37	Tottenham	39	17	Away	22
38	Watford	15	39	Away	-24
39	West Brom	16	29	Away	-13
40	West Ham	28	33	Away	-5

Team	HFA
Arsenal	1.7368421
Bournemouth	-0.6315789
Burnley	-0.8421053
Chelsea	2.7368421
Crystal Palace	-0.6842105
Everton	0.9473684
Hull	-2.2631579
Leicester	-0.7894737
Liverpool	1.8947368
Man City	2.1578947
Man United	1.3157895
Middlesbrough	-1.3684211
Southampton	-0.3684211
Stoke	-0.7894737
Sunderland	-2.1052632
Swansea	-1.3157895
Tottenham	3.1578947
Watford	-1.4736842
West Brom	-0.4210526
West Ham	-0.8947368

Season 17-18 Data

Team	Total_Goals_For	T_goals_against	Home	GD	GDPG
1 Arsenal	54	20	1	34	1.78947368
2 Arsenal	20	31	Away	-11	-0.57894737
3 Bournemouth	26	30	1	-4	-0.21052632
4 Bournemouth	19	31	Away	-12	-0.63157895
5 Brighton	24	25	1	-1	-0.05263158
6 Brighton	10	29	Away	-19	-1.00000000
7 Burnley	16	17	1	-1	-0.05263158
8 Burnley	20	22	Away	-2	-0.10526316
9 Chelsea	30	16	1	14	0.73684211
10 Chelsea	32	22	Away	10	0.52631579
11 Crystal Palace	29	27	1	2	0.10526316
12 Crystal Palace	16	28	Away	-12	-0.63157895
13 Everton	28	22	1	6	0.31578947
14 Everton	16	36	Away	-20	-1.05263158
15 Huddersfield	16	25	1	-9	-0.47368421
16 Huddersfield	12	33	Away	-21	-1.10526316
17 Leicester	25	22	1	3	0.15789474
18 Leicester	31	38	Away	-7	-0.36842105
19 Liverpool	45	10	1	35	1.84210526
20 Liverpool	39	28	Away	11	0.57894737
21 Man City	61	14	1	47	2.47368421
22 Man City	45	13	Away	32	1.68421053
23 Man United	38	9	1	29	1.52631579
24 Man United	30	19	Away	11	0.57894737
25 Newcastle	21	17	1	4	0.21052632
26 Newcastle	18	30	Away	-12	-0.63157895

27 Southampton	20	26	1	-6	-0.31578947
28 Southampton	17	30	Away	-13	-0.68421053
29 Stoke	20	30	1	-10	-0.52631579
30 Stoke	15	38	Away	-23	-1.21052632
31 Swansea	17	24	1	-7	-0.36842105
32 Swansea	11	32	Away	-21	-1.10526316
33 Tottenham	40	16	1	24	1.26315789
34 Tottenham	34	20	Away	14	0.73684211
35 Watford	27	31	1	-4	-0.21052632
36 Watford	17	33	Away	-16	-0.84210526
37 West Brom	21	29	1	-8	-0.42105263
38 West Brom	10	27	Away	-17	-0.89473684
39 West Ham	24	26	1	-2	-0.10526316
40 West Ham	24	42	Away	-18	-0.94736842

	Team	HFA
1	Arsenal	1.2105263
2	Bournemouth	-0.8421053
3	Brighton	-1.0526316
4	Burnley	-0.1578947
5	Chelsea	1.2631579
6	Crystal Palace	-0.5263158
7	Everton	-0.7368421
8	Huddersfield	-1.5789474
9	Leicester	-0.2105263
10	Liverpool	2.4210526
11	Man City	4.1578947
12	Man United	2.1052632
13	Newcastle	-0.4210526
14	Southampton	-1.0000000
15	Stoke	-1.7368421
16	Swansea	-1.4736842
17	Tottenham	2.0000000
18	Watford	-1.0526316
19	West Brom	-1.3157895
20	West Ham	-1.0526316

Season 18-19 Data

	Team	Total_Goals_For	T_goals_against	Home	GD
1	Arsenal	42	16	Home	26
2	Arsenal	31	35	Away	-4
3	Bournemouth	30	25	Home	5
4	Bournemouth	26	45	Away	-19
5	Brighton	19	28	Home	-9
6	Brighton	16	32	Away	-16
7	Burnley	24	32	Home	-8
8	Burnley	21	36	Away	-15
9	Cardiff	21	38	Home	-17
10	Cardiff	13	31	Away	-18
11	Chelsea	39	12	Home	27
12	Chelsea	24	27	Away	-3
13	Crystal Palace	19	23	Home	-4
14	Crystal Palace	32	30	Away	2
15	Everton	30	21	Home	9
16	Everton	24	25	Away	-1
17	Fulham	22	36	Home	-14
18	Fulham	12	45	Away	-33
19	Huddersfield	10	31	Home	-21
20	Huddersfield	12	45	Away	-33
21	Leicester	24	20	Home	4
22	Leicester	27	28	Away	-1
23	Liverpool	55	10	Home	45
24	Liverpool	34	12	Away	22
25	Man City	57	12	Home	45
26	Man City	38	11	Away	27
27	Man United	33	25	Home	8
28	Man United	32	29	Away	3
29	Newcastle	24	25	Home	-1
30	Newcastle	18	23	Away	-5
31	Southampton	27	30	Home	-3

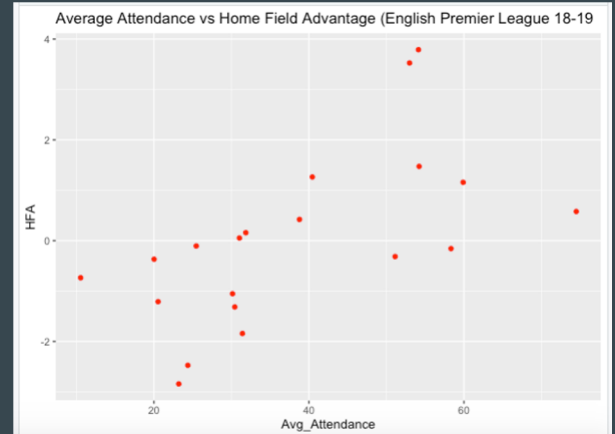
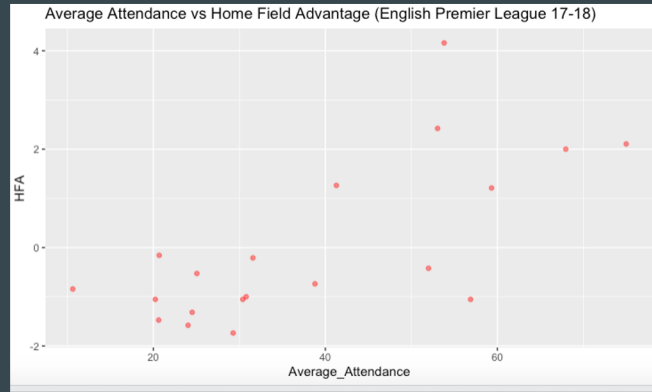
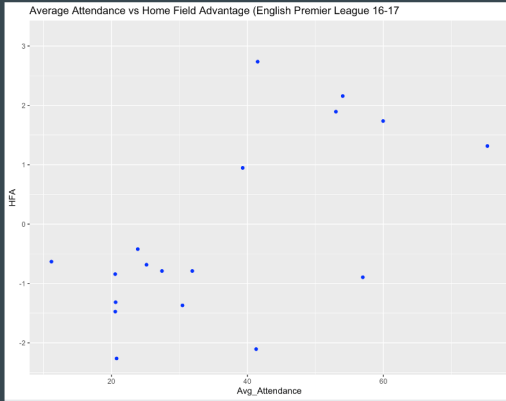
32	Southampton	18	35	Away	-17
33	Tottenham	34	16	Home	18
34	Tottenham	33	23	Away	10
35	Watford	26	28	Home	-2
36	Watford	26	31	Away	-5
37	West Ham	32	27	Home	5
38	West Ham	20	28	Away	-8
39	Wolves	28	21	Home	7
40	Wolves	19	25	Away	-6

	Team	HFA
1	Arsenal	1.15789474
2	Bournemouth	-0.73684211
3	Brighton	-1.31578947
4	Burnley	-1.21052632
5	Cardiff	-1.84210526
6	Chelsea	1.26315789
7	Crystal Palace	-0.10526316
8	Everton	0.42105263
9	Fulham	-2.47368421
10	Huddersfield	-2.84210526
11	Leicester	0.15789474
12	Liverpool	3.52631579
13	Man City	3.78947368
14	Man United	0.57894737
15	Newcastle	-0.31578947
16	Southampton	-1.05263158
17	Tottenham	1.47368421
18	Watford	-0.36842105
19	West Ham	-0.15789474
20	Wolves	0.05263158

HFA effect of attendance

Code:

```
45 season <- season %>% combine()
46
47
48
49 Attendance_1819 <- read_csv("data/Attendance 1819.csv")
50
51
52
53
54 Season_Attendance <- left_join(season, Attendance_1819, by = "Team")
55
56
57
58 Season_Attendance %>% ggplot(aes(x = Avg_Attendance, y = HFA)) + geom_point(color = "red", alpha = 1.2) +
59   ggtitle("Average Attendance vs Home Field Advantage (English Premier League 18-19)")
60
```



Conclusion

- Clubs that historically tend to be bigger (have a larger fan-base) have a much better Home Field Advantage
- Clubs that historically tend to be smaller have negative Home Field Advantage

- Higher attendance means better Home Field Advantage