SCANDINAVIAN SPORT STUDIES FORUM ISSN 2000-088X
VOLUME SIXTEEN, 2025, 47–74

WWW.SPORTSTUDIES.ORG

Mapping the determinants of stadium attendance in Norwegian women's Toppserien soccer league

Lucas Adler & Alex Krumer

Faculty of Business Administration and Social Sciences, Molde University College, Norway

Author contact <alex.krumer@himolde.no>

Abstract

Research question: This study is motivated by the scarcity of research on attendance demand in women's soccer. We aimed to investigate the determinants that shape stadium attendance in Norwegian Toppserien women's league.

Research methods: Data was used from 12 seasons between 2010 and 2023. We employed a multiple OLS regression with more than 30 independent variables to investigate their relationship with attendance.

Results and findings: From relatively low numbers, attendance has increased significantly over the examined period. Toppserien fans appear to respond positively to the level of game quality and the team's performance. Surprisingly, the size of the municipality negatively correlates with attendance, and spillover effects from successful men's teams play only a minor role. Finally, the first round of the season attracts larger crowds.

Implications: The results suggest that the fans of women's and men's Norwegian soccer teams have rather distinct consumer profiles, highlighting the need for tailored marketing strategies for women's teams. To maximize attendance, it also seems advisable to avoid scheduling collisions with mega events and to schedule more games on public holidays. Finally, home games of the first round could be more evenly allocated between the teams.

Keywords: attendance demand, sports economics, stadium attendance, regression analysis, Toppserien, women's soccer

Introduction

In recent decades, research on attendance demand in men's soccer has covered a variety of domestic leagues and international competitions (Schreyer & Ansari, 2022). However, there are only a handful of papers on attendance demand in women's soccer (e.g., Croft & Tena, 2023; Meier et al., 2016; Valenti et al., 2020; Valenti et al., 2024). For comparison, there are at least four studies on attendance demand in Norwegian men's top soccer league (Ermakov & Krumer, 2023; Haugen et al., 2014; Kringstad et al., 2018; Solberg & Mehus, 2014) with not even one on the parallel women's league.

Given such a wide gap in the literature, investigating attendance demand in women's soccer "is not only an important scientific task, but also an important step towards strengthening women's empowerment in general and increasing the interest in women's soccer in particular" (Krumer & Smith, 2023, p.1176). On top of that, we witness a rising global interest in women's soccer as reflected by the record attendance at the 2023 FIFA Women's World Cup (Johnston, 2023), and the growing number of games with attendance above 40,000 fans in the Spanish, English, Mexican, American, Peruvian, and Brazilian domestic leagues.[1] Thus, the aim of this paper is to address this research gap by investigating significant factors that may correlate with attendance in the Norwegian Toppserien soccer league, which is the top league in Norwegian women's soccer.

More specifically, we utilized data from 12 seasons between 2010 and 2023 (excluding 2020-2021 seasons that were affected by COVID-19 restrictions). We found a positive trend in attendance as the average attendance in Toppserien increased almost every year since 2010, culminating in a new attendance record in 2022 when over 11,000 spectators attended a Toppserien match between Rosenborg and Brann (Berg, 2023). In addition, there is rapid growth in the Norwegian media market, exemplified by the recent tenfold increase in the value of Norwegian TV rights for Toppserien compared to the previous agreement, when Norwegian broadcaster TV2 paid NOK 210 mil. for a six-year long contract starting in 2023 (Long, 2020).

However, besides rising attendance and TV rights figures, the median attendance in 2023 was just 316 spectators per match (only 14% of the stadium capacity). And even though Norway is ranked relatively high in UEFA

1 See https://en.wikipedia.org/wiki/List_of_women%27s_association_football_attendance_records.

(2024) and FIFA (2024) rankings, being positioned 11th and 16th, respectively, the recent performance on an international level was substantially worse compared to the 1990's or early 2000's. Thus, there is certainly room for improvement in Norwegian women's soccer.

In our empirical part, we applied a multiple OLS regression to examine the relationship between attendance and more than 30 independent variables, including economic, demographic, sporting, and situational factors. The regression results provide both theoretical and managerial implications that might enhance attendance in Toppserien specifically, as well as attendance in women's soccer generally.

The remainder of the paper is organized as follows. Section 2 presents the literature review on attendance demand. Section 3 focuses on women's soccer in Norway by tracing its origins and evolution over time. Section 4 presents the data and regression framework. The results are contained in Section 5 and discussed in Section 6. In Section 7, we offer concluding remarks.

Literature review

To understand the complex facets of attendance demand research, this section will put a particular focus on the current perspectives and theories. A comprehensive review by Schreyer and Ansari (2022) has noted a consistent upward trend in research on attendance demand in men's soccer, with an average of more than 10 publications per year since 2007, and a notable shortage of papers on women's soccer. That is the reason why most of our literature review is based on studies on men's attendance demand. We categorize the determinants into three broad groups: economic determinants, quality of viewing, and uncertainty of outcome along with the match quality.

Economic determinants

We refer to market size, and certain opportunity costs as the main economic determinants that drive attendance demand. For example, Feehan (2006) indicates that the market size of a team is a major determinant of attendance demand, as larger market sizes are associated with higher stadium attendance. Buraimo et al. (2009), found a positive correlation between the population residing within a five-mile radius and attendance.

Scelles et al. (2013) found a positive impact of the log-urban area population on attendance.

The presence of substitute goods is identified as another determinant influencing attendance at sporting events. Borland and Macdonald (2003) differentiate between direct substitutes, such as televised broadcasts of the same game, and indirect substitutes, including attendance at alternative sporting events, theatres, and cinemas. While increasing TV broadcasts have expanded substitution options in European soccer (Kringstad et al., 2018), research tends to focus on the adverse effects of own team broadcasting rather than on the effects of competing broadcasts. Notably, own-team broadcasts in English Division 1 during the 1999/2000 Season resulted in a significant attendance decrease of 5.6% (Forrest & Simmons, 2006). Research on the influence of TV broadcast in Norwegian men's soccer league (Eliteserien) presents conflicting findings, with some studies indicating increased attendance when a game is televised (e.g., Ermakov & Krumer, 2023; Kringstad et al., 2018) whereas another suggesting a decrease (e.g., Solberg & Mehus, 2014).

In contrast, findings concerning indirect substitutes are more consistent. Most studies indicate a negative impact on attendance from simultaneously televised European soccer competitions (e.g., Buraimo et al., 2009; Forrest et al., 2004; Wallrafen et al., 2019) or by simultaneous broadcasts of other domestic leagues, for instance, English Premier League games (e.g., Ermakov & Krumer, 2023). Finally, the distance between teams (i.e. travel costs) may influence gate attendance negatively, as supported by various scholars (e.g., Falter & Pérignon, 2000; Meier et al., 2016; Valenti et al., 2024).

Scheduling may also play a significant role in attendance demand because of the opportunity costs that are associated with this. For example, according to Krumer (2020), a late kick-off time in the men's Europa League games that take place on Thursdays at 21:05 attract fewer fans than games that start at 19:00. Games on weekends attract larger crowds in a variety of leagues (e.g., Buraimo & Simmons, 2009; Forrest et al., 2004; Krumer & Lechner, 2018). Ermakov and Krumer (2023) showed that Eliteserien games on Saturdays attract larger attendance than Sunday games. Games on non-usual days attract lower attendance in the four top European leagues (Goller & Krumer, 2020). Meier et al. (2016) showed that Women's Bundesliga matches, which are played between 15:00 and 18:30, attract over 5% lower attendance compared to matches that kick off before 15:00. Finally, Baimbridge et al. (1996) showed increased attendance

at public holidays. This effect was also confirmed for Norwegian men's soccer, specifically on May 16th, the day before Norwegian Constitution Day (e.g., Ermakov & Krumer, 2023; Kringstad et al., 2018).

The quality of viewing

The quality of viewing includes those determinants that might affect consumers' comfort and well-being. Here, we refer to stadium quality and weather. For instance, previous research has examined facility conditions, including attempts to validate the "novelty effect", which suggests a relationship between stadium attendance and newly constructed venues. Coates and Humphreys (2005) note that a new facility persistently and significantly increases attendance at sporting events, however, the duration and magnitude of this effect vary depending on the specific sport, with the impact being less pronounced in the NFL compared to the NBA. Further, Feddersen et al. (2006) registered a novelty effect for German men's soccer stadia, finding an increase of 10,7% in attendance in the first five years after construction, while Haugen et al. (2014) estimated a 5-year lasting novelty effect for Norwegian soccer stadiums. However, a recent study by van Ours (2024) stands in contradiction to previous research on novelty effects, since his findings suggest a long-term positive attendance effect for new stadiums in Dutch men's soccer, lasting several decades, rather than a short-term novelty effect.

In terms of weather effects, scholars commonly distinguish between air temperature and precipitation. While these variables have not consistently shown statistical significance across all research, certain studies have identified their importance in specific sports contexts. For example, Ito et al. (2016) observed a notable impact of weather conditions on attendance in J. League Soccer in Japan, demonstrating that rain on matchday reduced attendance by up to 20.5% for certain team combinations when precipitation surpasses 4mm. Similarly, Ge et al. (2020) documented a negative effect on attendance in Major League Baseball games during rainy match days.

Concerning women's soccer, the results vary across different studies regarding the relationship between precipitation and matchday attendance. Croft and Tena (2023) demonstrated a significant effect of rain on stadium attendance for games played in the English Women's Soccer League. However, findings on precipitation for other women's soccer leagues appeared to be limited or statistically insignificant (Meier et al., 2016; Valenti

et al., 2020). Conversely, spectators of women's soccer seem to be more sensitive to air temperature changes. Meier et al. (2016) found that a 1% increase in temperature resulted in a 2,66% increase in attendance in the Women's Bundesliga games. Valenti et al. (2020), focusing on Women's Champions League, and Croft & Tena (2023) on Women's Super League, found a smaller, yet statistically significant effect of the air temperature. The results of men's soccer are mixed. Either the results on temperature are not significant (e.g., Brandes et al., 2013) or significant but with limited impact (e.g., Ermakov & Krumer, 2023).

Uncertainty of outcome and quality of the match

While it is intuitive that some degree of uncertainty of outcome is perceived as necessary for attracting consumers (Rottenberg, 1956), the empirical evidence seems to contradict that consumers prefer a high level of uncertainty of outcome. Peel and Thomas (1988), were among the first to use pre-match fixed betting odds to modulate match outcome uncertainty for English soccer matches in the 1981/82 season, identifying that an increase in the probability of the home team winning also increases the attendance. The authors concluded that "[...] attempts to produce closer competition to increase match uncertainty of outcome with the intention of increasing gate attendances may be undesirable" (Peel & Thomas, 1988, p. 248). In general, according to Szymanski (2003, p. 1156), there seems to be an "emerging consensus that demand for match tickets peaks at the point where a home team's probability of winning is about twice that of the visiting team, i.e., a probability of around 0.66". Other studies on different sports in different countries support the notion that the relationship between uncertainty of outcome and attendance follows an inverted U-shape but is maximized above 50% of the home team winning. These include but are not limited to Major League Baseball (Knowles et al., 1992), ice hockey, handball and basketball in Germany (all in Wallrafen et al., 2019), women's soccer Champions League (Valenti et al., 2020), and basketball EuroLeague (Di Mattia and Krumer, 2023).

However, some studies show that the relationship between uncertainty of outcome and attendance can also resemble a U shape. For example, Buraimo and Simmons (2009) showed that spectators of Spanish men's soccer preferred games where the probability of a home team winning is either very high or very low. To explain the latter, the authors mention a "David vs. Goliath"-effect, where home fans want to be present when their

team wins against a much superior opponent. A study by Pawlowski & Anders (2012) on German men's soccer, supports the U-shape relationship, stating that the less balanced the match, the more spectators will attend, however, they could not find evidence that fans want to see their team play a much inferior opponent, as they found only weak significance for that claim.

Nevertheless, the positive perception of the sporting contest is not only explained by the uncertainty of the outcome. Much research also focuses on the actual team's performance, showing an increased attendance correlating with increased home/away team points (e.g., Buraimo, 2014; Buraimo & Simmons, 2008; Forrest et al., 2005; Pawlowski & Nalbantis, 2015). Moreover, the home/away team's table ranking may affect attendance. For German women's soccer a decrease in one rank (e.g., from position 5 to 4) increases attendance between 0.56% and 0.79% (Meier et al., 2016). For German men's soccer, these results have been even more impactful, as a decrease in ranking of the home and the away team increases stadium attendance by 0.6% and 1.4%, respectively (Brandes et al., 2013).

Women's soccer in Norway

It is impossible to investigate attendance demand patterns in Norwegian women's soccer without tracing its origins and evolution over time. Women's soccer in Norway has a long-lasting tradition and history. The first game between two women's teams in Norway can be traced back to 1921 (Skogvang, 2007). In the following years, only a small number of show matches were recorded, such as an international encounter between Hamar Idrettslag Ladies Team and the women's team of English Bolton Wanderers (Goksøyr & Olstad, 2002). Nonetheless, those matches of women's soccer teams remained a curiosity for decades. Initial efforts to establish women's teams had been largely unsuccessful, also due to the perception of soccer as a game for men (Skogvang, 2007). This perception of sports being too masculine for women was not unique to Norwegian soccer but omnipresent at that time.

Then, from the late 1960s and early 1970s, a shift in Norwegian society is recognizable, partly attributed to the women's movement at the same time, resulting in an intensified perception of equal rights. The strive for gender equality also influenced society's perception of women's soccer (Sisjord et al., 2017). By that time several smaller leagues and associa-

tions for women's soccer were spread over the country (Goksøyr & Olstad, 2002), and even though the Norwegian Football Federation (NFF) was not in favor of women's soccer at all, due to severe pressure the NFF established a women's committee to oversee the development of women's soccer in Norway. Consequently, from 1976 onward women's teams were officially accepted into the NFF (Skogvang, 2007).

Further, Norwegian women's soccer also began to flourish at the international level. In the inaugural edition of the UEFA Women's European Championship in 1984, the Norwegian national team missed the qualification for the main tournament, however, three years later they were victorious in the second edition of the championship. It is said that this success was strongly built on the increasing popularity of women's soccer in Norway, as by 1988 nearly 2500 women's teams were registered at NFF (Skogvang, 2007).

In 1984 an official first division for women was introduced, divided into three regional groups, Østlandet, Vestlandet, and Trøndelag, notably without a group located in Northern Norway. The ten teams in each group played in a round-robin tournament with two games against each of the other teams. Further, the three group champions played in a championship playoff for the Norwegian championship. In 1987, ten women's teams from all over Norway played in a united division for the first time in Norwegian women's soccer in the so-called "1. Divisjon", which was ultimately renamed Toppserien in 1996 (Holm, 2023). The league maintained a ten-team structure until its 20th anniversary, at which point the league association voted to expand the number of competing teams from ten to 12, using a round-robin structure with home and away games for each pair of teams, consisting of 22 matchdays in total.

In 2019, Toppserien underwent another structural change, reducing the number of teams to ten. However, the practical implementation was postponed until the COVID-19 restrictions were lifted in 2022 (Madsen, 2022). Additionally, the competition structure was redesigned. At the end of the regular season that consisted of 18 matchdays, where each team played against each other twice, at home and away, two additional playoffs took place. The championship playoff involved the top four teams from the regular season competing for the title in a round-robin tournament across six additional matchdays. In the second playoff, the top two teams from the 1. Divisjon (2nd tier) joined the six remaining teams from the regular season in Toppserien for an additional seven matchdays in a round-robin tourna-

ment. At the end of this playoff, the bottom two teams were relegated to the 1. Divisjon.

After much criticism regarding the new format, a committee consisting of the Norwegian Football Federation, Toppfotball Kvinner, and other partners assessed the situation and established a new format. This new format involves ten teams playing against each other three times, resulting in a total of 27 matchdays, with the discontinuation of the play-off model, which increased the total number of games played by a single team from maximum 25 in 2022 to 27 games per season, in 2023. The main argument against increasing the number of teams was the great differences in the strengths between the teams (Madsen, 2023).

Methodology

Data and variables

To map the main determinants for attendance in Toppserien, we collected all Toppserien games from 2010 until the 2019 season, as well as games from the seasons 2022 and 2023. The 2020 and 2021 seasons have been excluded due to COVID-19 restrictions. The twelve seasons include a total of 1585 matches. Note that the data on attendance was not available for 13 of these matches. As shown in Figure 1, the median and average attendance in Toppserien increased from the 2010 to 2023 season (N=1572). Including the median helps to account for outliers, as in 2022, two matches attracted over 10,000 spectators each, while in 2023, four matches drew over 4,000 spectators each. As these matches notably skew the average, the median attendance may offer a more meaningful representation in this context.

Overall, 23 different teams competed in Toppserien during the collected period for at least one full season.[2] Table 1 presents the descriptive statistics. The data for the gate attendance was collected from football.no, which is the NFF's official website. Since the actual attendance has a skewed distribution, a logarithm of attendance was applied to create a

2 Note that TIL2020 only played in the relegation playoff in 2022, and therefore only appeared in seven matches, of which two were eliminated due to missing attendance data. Another notable aspect is that in two instances, teams merged with successful Eliteserien clubs during the collected period and participated under new names in Toppserien. These include Trodheims-Ørn that merged with the accomplished Rosenborg BK in 2020, resulting in the team's participation in the top-tier league under the title Rosenborg BK Kvinner. Similarly, IL Sandviken merged with SK Brann Bergen in 2022, which led to the team competing in Toppserien under the name SK Brann Kvinner.

more normal distribution. In addition, we expect that relationships with other variables are relative rather than absolute. Additionally, 31 independent variables along with eleven years indicators have been applied, which will be explained in the following. Note that for 30 games, there was missing data on renovation age or betting odds. Hence 1542 games were considered for the regression analyses that will be described later.

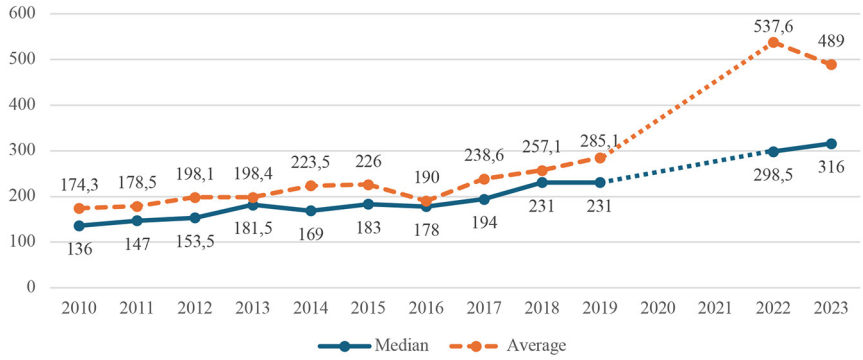

Figure 1. *The Toppserien median attendance and average attendance by season.*

We used betting odds to address the uncertainty of the outcome hypothesis. The betting odds were collected from the website betexplorer.com, which aggregates betting odds from various bookmakers and calculates an average. The winning probability for the home team was calculated by dividing the inverse odds of the home team winning by the book sum, as suggested by Štrumbelj (2014). Thus, home team winning probability and its squared term were used in the analysis. We also used each team's prior-match table position.[3]

Table 1. *Summary statistics.*

Variable	Obs.	Mean	Std. dev.	Min	Max
Stadium Attendance	1,572	265.2	476.5	20	11636
Log(attendance)	1,572	5.30	.639	2.30	9.36
Independent variables					
Home Team winning probability	1,569	.453	.252	.024	.915

3 Following Ermakov and Krumer (2023), the previous season's final table was used as the prior match table position for the first matchday. Those teams that were promoted from 1. Divisjon in the previous season have been allocated to the last two table positions depending on their final position in 1. Divisjon.

(Home Team winning probability)^2	1,569	.269	.240	.001	.837
Home Team table rank before game	1,572	6.36	3.38	1	12
Away Team table rank before game	1,572	6.29	3.41	1	12
Log(Capacity)	1,571	7.37	.916	5.30	10.24
Stadium Age since last renovation	1,545	7.65	7.41	0	61
(Stadium Age since last renovation)^2	1,545	113.4	280.0	0	3721
Domed stadium	1,572	.149	.357	0	1
Weekend	1,572	.842	.365	0	1
Round 1	1,572	.048	.215	0	1
Kick-Off Time before 15:00	1,572	.239	.427	0	1
Kick-Off Time after 17:59	1,572	.097	.296	0	1
May 16th	1,572	.015	.120	0	1
Public Holiday	1,572	.071	.256	0	1
Home Team newly promoted	1,572	.112	.315	0	1
Away Team newly promoted	1,572	.114	.318	0	1
Home Team reigning champions	1,572	.086	.280	0	1
Away Team reigning champions	1,572	.086	.280	0	1
Home Men's Team in Eliteserien	1,572	.256	.437	0	1
Away Men's Team in Eliteserien	1,572	.255	.436	0	1
Home Men's Team in OBOS Ligaen	1,572	.031	.174	0	1
Away Men's Team in OBOS Ligaen	1,572	.031	.174	0	1
Rivalry	1,572	.028	.165	0	1
Collision with Eliteserien	1,572	.281	.450	0	1
Collision with Men's European Cups	1,572	.011	.103	0	1
Collision with Mega Events	1,572	.044	.205	0	1
TV Broadcast on NRK	1,572	.086	.280	0	1
Air Temperature	1,572	10.17	4.97	-7.70	24.40
(Air Temperature-14)^2	1,572	39.31	52.70	.010	470.9
Precipitation (in mm)	1,572	3.48	6.90	0	70.7
Distance	1,572	510.3	450.9	4.30	2276
Log(Distance)	1,572	5.60	1.44	1.46	7.73
Log(Population)	1,572	11.88	1.26	9.70	13.46
Season	1,572	2015.8	3.97	2010	2023

To consider certain stadium characteristics, we used the logarithmic form of stadium capacity (*LogCapacity*), as has been implemented in several other studies (e.g., Besters et al., 2019; Ermakov & Krumer, 2023; Valenti et al., 2024). The capacity data was most often gathered from the clubs' web-

pages or by direct request, however, in some cases, data from third-party webpages (e.g., transfermarkt.com; nordicstadiums.com) had to be used. To account for non-linearity in novelty effects, we used stadium age since last renovation and its squared term. Further, inspired by the results of Coates and Humphreys (2010), that the NFL's December games played in domed stadiums attract up to 9% higher attendance, the dummy variable *Domed Stadium* was included. In total, there are five such stadiums that hosted 15% of the games.[4]

Following Krumer and Lechner (2018) who found that weekends attract larger crowds, a dummy variable that represents weekend games was created. During the collected period, 1323 (84.2%) of Toppserien games were played on weekends, of which 65.6% occurred on Saturdays and 34.4% on Sundays. Thus, while Sunday is the common weekday for Eliteserien games (Ermakov & Krumer, 2023), Saturday is the one for Toppserien, as shown in Table 2.

Table 2. *Distribution of matches by weekday.*

	Toppserien			Eliteserien*		
Weekday	Freq.	Percent	Cum.	Freq.	Percent	Cum.
Monday	66	4.20	4.20	303	11.4	11.4
Tuesday	41	2.61	6.81	32	1.2	12.6
Wednesday	99	6.30	13.10	95	3.6	16.2
Thursday	22	1.40	14.50	97	3.7	19.9
Friday	21	1.34	15.84	139	5.3	25.2
Saturday	868	55.22	71.06	411	15.6	40.8
Sunday	455	28.94	100.00	1563	59.2	100.00
Total	1,572	100.00		2,640	100.0	

* Data Source: Data on Eliteserien was retrieved from Table 1 in Ermakov & Krumer (2023) which used games from the 2009 to 2019 seasons.

Further, the majority of Toppserien games have been played in the afternoon/early evening, with a total of 66.4% of all collected games kicking off between 15:00 and before 18:00, while 23.9% kicking off before 15:00 and 9.7% kicking off at 18:00 or later. That is why two specific time variables, *Kick-Off Time before 15:00* and *Kick-Off Time after 17:59*, have been included to account for games that were played outside the usual Toppserien timeslot, as inspired by Goller and Krumer (2020), Meier et al. (2016), and Storm et al. (2018).

4 The stadiums are LSK-Hallen, Vallhall Arena, Nordlandhallen, Vestlandhallen, and Telenor Arena.

Figure 2 shows the median attendance for each round of Toppserien from the 2010 season until the 2022 season.[5] The figure shows that the first round attracts larger crowds than any other round within a season. Thus, we created a dummy variable *Round 1* to account for the possible uniqueness of the first matchday of the season.

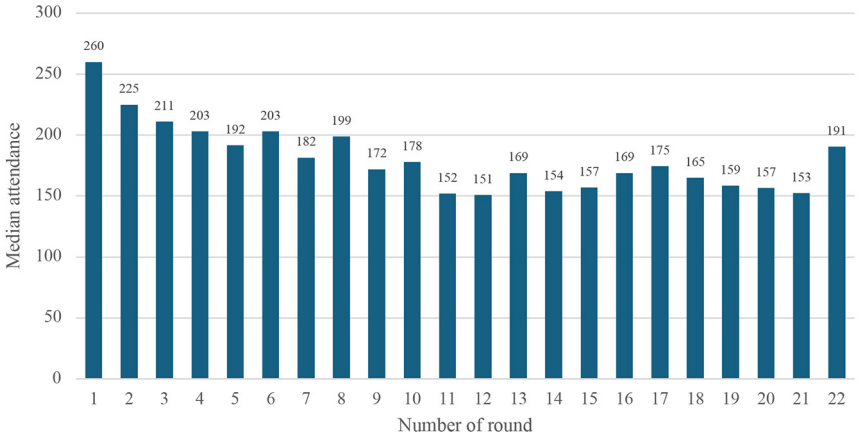

Figure 2. *The Toppserien median attendance by rounds.*

Following Ermakov and Krumer (2023) and Kringstad et al. (2018), we included a dummy variable for games played on May 16th, which is the day before Norwegian Constitution Day and traditionally used as a matchday for Eliteserien, attracting significantly larger crowds. Similarly, the dummy variable *Public Holiday* represents the games played during Norwegian Holidays.

Following Buraimo (2014), and Pawlowski and Nalbantis (2015) who highlighted that attendance rises when teams are promoted to a higher division, two dummy variables, *Home Team newly promoted*, and *Away Team newly promoted* have been included in the analysis. Further, as shown in Storm et al. (2018), games of the reigning champion may attract larger crowds. Therefore, we included two dummy variables, *Home Team reigning champions* and *Away Team reigning champions*.

Further, Croft and Tena (2023) suggest that an adequate analysis of attendance demand in women's soccer should include spillover effects among different teams within the club. Therefore, two dummy variables *Home has Men's Team in Eliteserien* and *Away has Men's Team in Eliteserien*

5 The 2023 season was excluded due to its different number of rounds (27).

were created to account for the games where either the home or away team has a professional men's team within the club, that is competing in Eliteserien. This applied to six different clubs that had women's and men's teams simultaneously playing in Toppserien and Eliteserien. These are LSK Kvinner FK, Rosenborg BK, SK Brann Kvinner, Stabaek, TIL2020, and Vålerenga.[6]

Similarly, we created dummy variables that represent women's teams whose men's teams played in Norway's second tier, the OBOS Ligaen, in the respective season (*Home has Men's Team in OBOS Ligaen* and *Away has Men's Team in OBOS Ligaen*). These are Stabaek, SK Brann, and Åsane. Lastly, following Ermakov and Krumer (2023), rivalries between clubs in Toppserien have been taken into consideration with the dummy *Rivalry*. For that, a similar list of rivalries was used as in Ermakov and Krumer (2023) resulting in 44 such games.[7]

In addition, for each game, we used a natural logarithm of distance in km between the teams. As a starting/endpoint, the location of the team's home stadium was used. The data itself was collected from Google Maps. Table 1 shows that the mean distance is 510 km. To account for the market size, we used data from Statistics Norway (Statistisk Sentralbyrå), the Norwegian Statistics Bureau, to create the natural logarithm of the population size for each year and each municipality where the home team is located.

To investigate whether attendance in Toppserien is influenced by substitution goods, we created several dummy variables. The first, *Collision with Eliteserien,* indicates the collisions between Toppserien and Eliteserien games. The data set included 442 Toppserien games that have been played simultaneously or at least were partly overlapping with Eliteserien. Secondly, *Collision with European Cup* was created to account for whether European men's competition (i.e., UEFA Champions League, UEFA Europa League, and UEFA Conference League) collided with Toppserien matches. The data set only included 17 such matches. Thirdly, *Collision with Mega Events* was created to account for collisions between Toppserien and

6 LSK Kvinner represents a special case. The club emerged from a fusion between the Team Strømmen and Lillestrøm SK in 2009. Consequently, LSK Kvinner plays in the same jerseys and the same stadium as Lillestrøm SK, but according to information on their website, both clubs have not merged entirely (LSK Kvinner FK, 2023). For instance, Lillestrøm SK has a club-owned women's team that competes in the third tier in Norway, besides cooperating with LSK Kvinner FK in Toppserien. However, due to the close relationship between LSK Kvinner FK and Lillestrøm SK, both teams were considered as one club for this variable.

7 See https://en.wikipedia.org/wiki/List_of_association_football_club_rivalries_in_Europe#Norway.

Mega Events (i.e., Olympics, UEFA Men's European Championship, and FIFA Men's World Cup), which happened in 69 games within the dataset. Lastly, as described previously, TV Broadcasts may serve as a substitution good for live sports, thus affecting attendance. Therefore, a dummy variable *TV Broadcast on NRK* was created to account for the live broadcast of the respective match on NRK, which is the Norwegian Public broadcasting company that broadcasts the games for free.

Finally, we created two weather-related variables. The first one is defined as $(Air\ Temperature\text{-}14)^2$, as suggested by Hoffmann et al. (2002). This variable allows us to capture the non-linear effect of air temperature (in Celsius). The second is *Precipitation,* which was measured by rain in mm that fell during the game day. The data on these variables was collected from senorge.no, a collaboration between the Norwegian Directorate of Water and Energy, the National Road Administration, the Norwegian Meteorological Institute, and the Norwegian Mapping Authority.

Regression framework

To map the possible determinants for attendance demand in Toppserien, we used the *Log*(*attendance*) as the dependent variable and all the variables presented in Table 1 that were described above, along with season indicators as independent variables that account for unique features of the relevant year (e.g. participation of the Norwegian women's soccer national team in the FIFA World Cup or UEFA European Championship). Following Ermakov and Krumer (2023), we used all the data as well as a sub-sample of weekend matches only as these represent 84.2% of the data.

To map the determinants of attendance demand in Norwegian women's Toppserien soccer league, we used an OLS estimator. It is important to note that in the context of attendance demand the OLS estimator may yield biased estimates, for instance, when effective demand exceeds the observed one, particularly in cases where games face binding capacity constraints (Feehan, 2006). However, this is less of a problem, in the Toppserien, where stadium utilization averaged only 19.6%. In addition, there were only 14 games (0.9% of the dataset) with stadium utilization above 95%. Thus, it is plausible to assume that effective demand aligns closely with the observed demand. Finally, we employ robust standard errors, which enable the usage of OLS estimator, even in the expected presence of heteroscedasticity (Wooldridge, 2002).

Results

Table 3 presents the regressions' results. Regarding the quality of the match, the results show that the winning probability of the home team has a positive and significant relationship with attendance in the full sample as well as in the sub-sample of the weekend games, represented in Columns 1 and 2, respectively. However, the squared term of winning probability was non-significant in both cases. Additionally, the coefficients of table rankings were found to be significant in both cases. For the home team, an increase in table rank (the decline in position), decreases attendance by about 4%. To put this result into perspective, a drop of one standard deviation (3.38 positions) would result in a reduction of 13% in attendance. For the away team, the marginal effect is -2,7% for every drop in table ranking. Similarly, a drop of one standard deviation (3.41 positions) would result in a reduction of 9.2% in attendance.

Table 3. *OLS estimates for Log(attendance) as dependent variable*

	(1) All Data			(2) Only Weekend		
Variable	Coef-ficient	Robust std. err.	P-val.	Coef-ficient	Robust std. err.	P-val.
Home Team winning probability	.624	.249	0.012	.617	.278	0.027
(Home Team winning probability)^2	-.291	.244	0.232	-.306	.267	0.252
Home Team table rank before game	-.039	.006	0.000	-.043	.006	0.000
Away Team table rank before game	-.027	.005	0.000	-.026	.006	0.000
Log(Capacity)	.088	.019	0.000	.102	.021	0.000
Stadium Age since last-renovation	-.009	.004	0.033	-.012	.005	0.012
(Stadium Age since last renovation)^2	.00002	.00009	0.041	.0002	.0001	0.015
Domed stadium	-.142	.045	0.002	-.152	.049	0.002
Weekend	.106	.066	0.106			
Round 1	.205	.055	0.000	.166	.070	0.018
Kick-Off Time before 15:00	.035	.034	0.303	.037	.036	0.303
Kick-Off Time after 17:59	.055	.064	0.388	-.125	.113	0.271
May 16th	.193	.112	0.084	.120	.143	0.403
Public Holiday	.268	.063	0.000	.194	.090	0.031
Home Team newly promoted	.136	.045	0.003	.091	.052	0.082
Away Team newly promoted	.016	.043	0.710	.043	.046	0.346

Home Team reigning champions	.184	.054	0.001	.176	.061	0.004
Away Team reigning champions	.153	.057	0.007	.126	.065	0.051
Home Men's Team in Eliteserien	.027	.050	0.589	.037	.054	0.493
Away Men's Team in Eliteserien	.053	.035	0.123	.072	.038	0.059
Home Men's Team in OBOS Ligaen	.108	.093	0.248	.118	.104	0.255
Away Men's Team in OBOS Ligaen	-.099	.103	0.337	-.075	.120	0.532
Rivalry	.398	.120	0.001	.425	.146	0.004
Collision with Eliteserien	-.004	.029	0.885	-.026	.033	0.489
Collision with Men's European Cups	-.095	.116	0.413			
Collision with Mega Events	-.178	.054	0.001	-.182	.055	0.001
TV Broadcast on NRK	.362	.061	0.000	.353	.063	0.000
(Air Temperature-14)^2	.0003	.0003	0.406	.0002	.0003	0.491
Precipitation (in mm)	-.002	.002	0.475	.0004	.002	0.868
Log(Distance)	-.067	.011	0.000	-.063	.012	0.000
Log(Population)	-.053	.010	0.000	-.062	.011	0.000
Season Dummies		Yes			Yes	
Observations		1542			1297	
R-squared		0.454			0.467	

Concerning stadium characteristics, all variables have been found to be significant. As in Besters et al. (2019), Ermakov and Krumer (2023), and Valenti et al. (2024), the logarithm of stadium capacity positively correlates with attendance, while the stadium age since the last renovation has a negative correlation with attendance. Every year of age reduces attendance by 0.9%. However, the squared value of age since the last renovation appears to be positive and significant, suggesting that the minimal attendance is achieved 26.5 years after the last renovation , holding all the rest constant. Lastly, playing a match in a domed stadium is associated with reduced attendance.

Regarding scheduling effects, the first round of each season has a positive and significant relationship with attendance. Including the whole data set, the first round attracts 20.5% larger attendance in comparison to other rounds. Including only weekend games, the first round still attracts 16.6% larger attendance. Neither an early kick-off time (i.e., before 15:00) nor a late kick-off time (i.e., from 18:00 onward) has a significant relationship with the stadium attendance. However, the coefficient for late kick-offs on

weekends appears to be negative, while still being not significantly different from the base group (games that start between 15:00 and 18:00). Interestingly, while showing a positive coefficient, the weekend variable is not significant at conventional level (p = 0.106). Games that take place on May 16th attract 19.3% larger attendance (significant at the 10% level). However, if May 16th falls on the weekend, its coefficient is non-significant. Similarly, matches that are played during public holidays attract 26.8% larger crowds, however, this relationship is somewhat smaller on weekend games, with an increase of 19.4%, but still significant at the 5% level.

Newly promoted home teams have a 13.6% and 9.1% larger attendance for all data and weekend games sub-sample, respectively (the latter is only significant at the 10% level). The promotion of the away team appears to have no significant effect on attendance. The results also show that games in which the home team is the reigning Toppserien champions attract 18% more spectators in both cases. When the away team is the reigning champion, attendance increases by 15.3% and 12.6% (p = 0.051) for all data and weekend games sub-sample, respectively.

We find that spillover effects from men's teams are limited. The estimates for the home team having a men's team playing in Eliteserien are non-significant, however, weekend matches attract a 7.2% larger attendance when the away team has a men's team playing in Eliteserien (p = 0.059). Spillover effects through men's teams playing in the Norwegian second tier are not significant. Lastly, a match between two rivals increases attendance between 39.8% and 42.5%.

Games that collide with mega events attract approximately 18% lower attendance in both cases. Collisions between Toppserien and Eliteserien or men's European competitions appear to be non-significant. The results for the *TV Broadcast on NRK* dummy indicate that games that are broadcast on NRK have larger crowds. When it comes to weather, both weather variables, temperature, and precipitation show non-significant results. Further, distance has a significant negative correlation with attendance, hence, the further apart the two teams are located, the lower the attendance. Similarly, the logarithm of the population shows significant negative coefficients, indicating that the larger the local population, the lower the attendance.

Discussion

Uncertainty of outcome and spillover effects

We find a positive and significant relationship between the home team's probability of winning and attendance. Despite a negative sign of the coefficient of (*Home Team winning probability*)^2, which is in line with previous studies that showed that the relationship between attendance and winning probability resembles an inverted U-shape (Buraimo & Simmons 2008; Di Mattia & Krumer, 2023; Valenti et al., 2024), it is important to note that it is far from being significant at conventional levels. These results, which are similar to the findings in Danish men's handball league (Storm et al, 2018), suggest that the fans are interested more in their home team winning rather than seeing a balanced game.

Interestingly, a collision with men's Eliteserien matches does not seem to affect attendance in women's Toppserien games. One might have expected a hierarchy between men's and women's soccer among Norwegian fans, due to different popularity, and therefore a decrease in attendance when a match collides with Eliteserien. However, the lack of impact from simultaneous men's matches suggests that Toppserien fans are dedicated to women's soccer, reflecting the idea presented in Meier et al. (2016) that the German Women's Bundesliga mainly targets dedicated and loyal fans. Moreover, the insignificant spillover effect from home teams suggests that women's and men's teams within the same club may attract different consumer profiles and audiences. This is in line with the findings of Hallmann et al. (2018), who showed that for Japanese women's soccer, women constituted a larger portion of the audience, and the audience was generally younger compared to audiences at men's matches.

The spillover effect of Eliteserien teams for away teams in Toppserien is significant at the 10% level only, and only for the weekend sub-sample. This relationship might be explained by reputation rather than the actual increase in guest fans attending a match. According to Croft and Tena (2023), the recent performance and the reputation of men's teams spill over to their women counterparts. Therefore, while the existence of an Eliteserien team within the home team's club does not affect attendance, as both teams might have rather distinct fan bases, it might create certain curiosity regarding the away team, as spectators expect a higher quality of content when the away club has a good reputation. This further gets underlined as teams that are reigning champions significantly increase attendance. Fans of Toppserien value high-quality matches as evidenced by

the significant association between the teams' rankings and attendance. The result, that an improvement in rankings increases attendance is in line with Croft and Tena (2023) and Meier et al. (2016) that highlight the importance of table position for attendance demand in English and German women's soccer.

Scheduling effects and viewing quality

Moving on to matchday-specific variables, the results indicate that attendance at Toppserien matches is unaffected by climate circumstances. In both regressions, neither the matchday temperature nor the precipitation showed a significant association. These results differ from findings on English women's soccer (Valenti et al. 2024). It further raises the question of why spectators in Norway are seemingly unaffected by weather conditions. Firstly, as suggested by O'Brien et al. (2004), Norwegian inhabitants have developed coping strategies to deal with harsh climate conditions, which could explain their resilience to weather-related factors. Secondly, the league's schedule might be beneficial when meeting weather effects. A typical Toppserien season starts at the end of March or early April and runs until the end of October or early November, with a longer summer break, usually in June and July. Therefore, the statistically coldest months and warmest weeks are excluded from the match calendar, which could explain the insignificance of weather on attendance. Finally, as the attendance numbers in Norwegian women's soccer are comparably very low, it is possible that the audience mainly consists of family members and friends, who are likely to attend the game regardless of the weather conditions.

In the context of weather, playing in a domed stadium was expected to increase attendance. Surprisingly, the results show a significant decrease in attendance when games are played in a domed stadium. However, it is important to note that games in domed stadiums are associated with various observable characteristics that normally indicate an increase in attendance. For instance, the average table ranking of the home team in this sub-sample (5.44) is better than considering games played in a stadium with an open roof (6.52). Moreover, more than 6% of all games held in domed stadiums are classified as derbies, whereas only 2.2% of all games played in open-air stadiums are categorized as such. Yet, games played in a domed stadium are associated with lower attendance. Therefore, there

may be further unobserved characteristics that could bias the result such as, for instance, artificial lighting or the lack of fresh air.

When it comes to further stadium characteristics, a correlation between stadium capacity and attendance was found. While this result reflects findings by various scholars (e.g., Besters et al., 2019; Ermakov & Krumer, 2023; Valenti et al., 2024), it does not necessarily mean that Toppserien clubs need to move into bigger stadiums to increase attendance, because currently, the teams are far from utilizing the full capacity of their stadiums. Further, the results suggest that the stadium age affects attendance negatively. In Toppserien attendance is minimized in stadiums aged 26.5 years after the last renovation. In comparison, McEvoy et al. (2005) found baseball attendance to be minimized in stadiums aged approx. 48 years. Although our results suggest that women's teams might consider modernizing their stadiums at regular intervals to keep spectators in the stadiums, given the low attendance numbers, the absolute effect of such a modernization on attendance is likely to be very small. On top of it, many clubs lack the financial resources to meet this demand. Hence, clubs are forced to either tolerate the negative impact of aging stadiums, try to receive public funding, as Stabæk did recently (Didriksen et al., 2024), or find alternative, more cost-effective solutions to limit its effects.

Consistent with previous research (e.g., Coates & Humphreys, 2010), a positive correlation was found between the first round of each season and attendance. However, the chance to host a first-round match is not evenly distributed among the Toppserien teams. Røa IL, for instance, hosted 10 first-round matches in the observed period, while other traditional Toppserien clubs, such as Stabaek or Arna-Bjørnar, only hosted four first-round matches. Our results indicate that the home team benefits from a 20% increase in attendance. However, given a relatively low median attendance, such an increase only translates into 63 additional tickets. Assuming a ticket price of 100 NOK, the extra revenue is 6300 NOK (approx. 540 Euros) per team for that specific matchday. This is obviously not much, but for larger revenues, it would have made sense for the NFF to consider allocating the first round to the teams equally. The question remains, which mechanism drives this correlation? It's probable that home teams intensify their promotion efforts for their season opener matches more than they do for the other matchdays. However, although Coates and Humphrey (2010) highlighted a positive impact on attendance during the first week, they found that the dummy variable for the team's home opening game was insignificant. Therefore, while promotion certainly increases

attendance, the pure excitement about the start of the season after a long winter break or other unobserved characteristics might also have an effect.

Although the weekend variable has a positive coefficient, it is not statistically significant at conventional levels, which is consistent with the finding by Meier et al. (2016) in German Women's Bundesliga, but not with Valenti et al. (2024) who found a significant relationship between weekend games and attendance in Women's Super League. Further, attendance was not significantly affected by rather early or rather late kick-off times. This suggests that Toppserien fans may not be too responsive to opportunity costs when it comes to game schedules. Nevertheless, Toppserien fans are responsive to the distance they need to travel to attend an away match. This is result is in line with the findings in the German Women's Bundesliga (Meier et al., 2016) and the English Super League (Valenti et al., 2024).

Substitution goods

Consistent with the study on Norwegian men's soccer (e.g., Ermakov & Krumer 2023), we find a positive correlation between TV broadcasts and attendance. Since NRK does not broadcast every match but certain games each season, it is possible that these selected games attract larger attendances regardless, as they are considered high-quality matches. This would explain the positive coefficient.

The negative correlation between *Log*(*Population*) and attendance seem counterintuitive at first, considering that most research on attendance demand found positive relationships between population size and stadium attendance (e.g., Kringstad et al. 2018; Scelles et al., 2013). However, larger municipalities offer a greater variety of indirect substitution goods for the population to choose from. While there are only limited substitutions in small municipalities, such as a few coffee shops or bars, bigger municipalities offer a variety of cinemas, theatres, restaurants, and other sports events. Hence, the results suggest that people might choose different substitutions over Toppserien matches when they are offered the chance, suggesting that Toppserien clubs should be aware of its competition to adjust their marketing strategies.

Conclusion

This paper was motivated by the lack of studies on attendance demand in women's soccer. Stakeholders in women's soccer are very likely to benefit from more research to understand the factors, some of which are unique to women's soccer, that shape stadium attendance. Thus, our main aim was to narrow this research gap by mapping, for the first time, the factors that are associated with attendance in Norwegian top women's soccer division.

Women's soccer in Norway has a long tradition, but the growth is slower, and the popularity is lesser compared to some other women's leagues in Europe. While the highest-attended season in Toppserien, 2023, had a median of 316 spectators per game, the average attendance in the English Women's Super League recently surpassed 7,000 spectators (Deloitte, 2024). However, the increasing attendance figures in Toppserien offer great potential.

The results of this study offer a variety of recommendations for further research. For example, it would be interesting to focus on marketing strategies to develop specialized promotional measures for women's soccer. In addition, further research should focus on the effect of substitution goods to verify and probe more deeply into the finding on the negative relationship between the population size and attendance in Norwegian women's soccer. Finally, to shed more light on attendances patterns in women's soccer in Norway, qualitative approach could be employed with the focus on tradition/culture and local identity.

References

Baimbridge, M., Cameron, S., & Dawson, P. (1996). Satellite television and the demand for football: A whole new ball game? *Scottish Journal of Political Economy*, *43*(3), 317–333. https://doi.org/10.1111/j.1467-9485.1996.tb00848.x

Besters, L. M., van Ours, J. C., & van Tuijl, M. A. (2019). How outcome uncertainty, loss aversion and team quality affect stadium attendance in Dutch professional football. *Journal of Economic Psychology*, 72, 117-127. https://doi.org/10.1016/j.joep.2019.03.002

Berg, M. F. (2023, March 24). «*Engasjement kan ikke bestilles*» [«Engagement cannot be booked»]. *TV2*. https://www.tv2.no/mening_og_analyse/engasjement-kan-ikke-bestilles/15609089/

Borland, J., & Macdonald, R. D. (2003). Demand for sport. *Oxford Review of Economic Policy*, *19*(4), 478–502. https://doi.org/10.1093/oxrep/19.4.478

Brandes, L., Franck, E., & Theiler, P. (2013). The group size and loyalty of football fans: A two-stage estimation procedure to compare customer potentials across teams. *Journal of the Royal Statistical Society Series A: Statistics in Society*, *176*(2), 347–369. https://doi.org/10.1111/j.1467-985x.2011.01033.x

Buraimo, B. (2014). Spectator demand and attendances in English league football. In J. Goddard & P. Sloane (Eds.), *Handbook on the economics of professional football* (pp. 60-72). Edward Elgar Publishing. https://doi.org/10.4337/9781781003176.00010

Buraimo, B., & Simmons, R. (2008). Do sports fans really value uncertainty of outcome? Evidence from the English Premier League. *International Journal of Sport Finance*, *3*(3), 146–155. http://clok.uclan.ac.uk/4676/

Buraimo, B., & Simmons, R. (2009). A tale of two audiences: Spectators, television viewers and outcome uncertainty in Spanish football. *Journal of Economics and Business*, *61*(4), 326–338. https://doi.org/10.1016/j.jeconbus.2008.10.002

Buraimo, B., Forrest, D., & Simmons, R. (2009). Insights for clubs from modelling match attendance in football. *Journal of the Operational Research Society*, *60*(2), 147–155. https://doi.org/10.1057/palgrave.jors.2602549

Coates, D., & Humphreys, B. R. (2005). Novelty effects of new facilities on attendance at professional sporting events. *Contemporary Economic Policy*, *23*(3), 436–455. https://doi.org/10.1093/cep/byi033

Coates, D., & Humphreys, B. R. (2010). Week to week attendance and competitive balance in the National Football League. *International Journal of Sport Finance*, *5*(4), 239–252. https://EconPapers.repec.org/RePEc:jsf:intjsf:v:5:y:2010:i:4:p:239-252

Croft, O., & Tena, J.D. (2023). *A game of two halves: Determinants of attendance in the FA WSL and male team spillover effects* (Working Paper No. 202308). The University of Liverpool. https://www.liverpool.ac.uk/media/livacuk/schoolofmanagement/docs/ECON,WP,202308.pdf

Deloitte. (2024). *Annual review of football finance 2024*. https://www.deloitte.com/content/dam/assets-zone2/uk/en/docs/services/financial-advisory/2024/deloitte-uk-annual-review-of-football-finance.pdf

Di Mattia, A., & Krumer, A. (2023). Fewer teams, more games, larger attendance? Evidence from the structural change in basketball's EuroLeague. *European Journal of Operational Research*, 309(1), 359-370. https://doi.org/10.1016/j.ejor.2023.01.002

Didriksen, N., De Brito Jonassen, A., & Cissé, M. E. (2024, March 18). Stabæk kan få ny milliard-stadion [Stabæk could get a new billion-Kroner stadium]. *NRK*. https://www.nrk.no/stor-oslo/vil-bygge-fotballanlegg-til-1-milliard-kroner-pa-nadderud-i-baerum-for-elitefotballen-1.16799830

Ermakov, S., & Krumer, A. (2023). Saturday in the stadium: On higher attendance on Saturdays in Norwegian Eliteserien soccer league. *European Sport Management Quarterly*, *23*(6), 1800–1818. https://doi.org/10.1080/16184742.2022.2067208

Falter, J., & Pérignon, C. (2000). Demand for football and intramatch winning probability: An essay on the glorious uncertainty of sports. *Applied Economics*, *32*(13), 1757–1765. https://doi.org/10.1080/000368400421101

Feddersen, A., Maennig, W., & Borcherding, M. (2006). The novelty effect of new soccer stadia: The case of Germany. *International Journal of Sport Finance*, *1*(3), 174–188. https://econpapers.repec.org/RePEc:jsf:intjsf:v:1:y:2006:i:3:p:174-188

Feehan, P. (2006). Attendance at sports events. In W. Andreff & S. Szymanski (Eds.), *Handbook on the economics of sports* (pp. 90-99). Edward Elgar Publishing. https://doi.org/10.4337/9781847204073.00016

FIFA (2024, March 15). *Women's world rankings*. FIFA. https://inside.fifa.com/fifa-world-ranking/women

Forrest, D., & Simmons, R. (2006). New issues in attendance demand. *Journal of Sports Economics*, *7*(3), 247–266. https://doi.org/10.1177/1527002504273392

Forrest, D., Simmons, R., & Szymanski, S. (2004). Broadcasting, attendance and the inefficiency of cartels. *Review of Industrial Organization*, *24*(3), 243–265. https://doi.org/10.1023/b:reio.0000038274.05704.99

Forrest, D., Beaumont, J. J., Goddard, J., & Simmons, R. (2005). Home advantage and the debate about competitive balance in professional sports leagues. *Journal of Sports Sciences*, *23*(4), 439–445. https://doi.org/10.1080/02640410400021641

Ge, Q., Humphreys, B. R., & Zhou, K. (2020). Are fair weather fans affected by weather? Rainfall, habit formation, and live game attendance. *Journal of Sports Economics*, *21*(3), 304–322. https://doi.org/10.1177/1527002519885427

Goksøyr, M., & Olstad, F. (2002). *Fotball!: Norges fotballforbund 100 år* [Football!: Norwegian Football Association 100 years]. Norges Fotballforbund.

Goller, D., & Krumer, A. (2020). Let's meet as usual: Do games played on non-frequent days differ? Evidence from top European soccer leagues. *European Journal of Operational Research, 286*(2), 740–754. https://doi.org/10.1016/j.ejor.2020.03.062

Haugen, K. K., Hervik, A., & Gammelsæter, H. (2014). A regression that probably never should have been performed – the case of Norwegian top-league football attendance. *European Journal of Sport Studies*, *2*(2), pp. 61–71. https://www.researchgate.net/publication/265523789_Research_Note_A_regression_that_probably_never_should_have_been_performed_-_the_case_of_Norwegian_top-league_football_attendance_in_European_J_of_Sport_Studies

Hallmann, K., Oshimi, D., Harada, M., Matsuoka, H., & Breuer, C. (2018). Spectators' points of attachment and their influence on behavioural intentions of women's national football games. *Soccer and Society*, *19*(7) 903-923. https://doi.org/10.1080/14660970.2016.1267634

Hoffmann, R., Lee, C. G., & Ramasamy, B. (2002). The socio-economic determinants of international soccer performance. *Journal of Applied Economics*, *5*(2), 253–272. https://doi.org/10.1080/15140326.2002.12040579

Holm, J. (2023, March 2). *Toppserien*. Store Norske Leksikon. https://snl.no/Toppserien

Ito, H., Ai, J., & Ozawa, A. (2016). Managing weather risks: The case of J. League soccer teams in Japan. *Journal of Risk and Insurance*, *83*(4), 877–912. https://doi.org/10.1111/jori.12071

Johnston, N. (2023). Women's World Cup 2023: Record attendance of almost two million. BBC. https://www.bbc.com/sport/football/66517612

Knowles, G. J., Sherony, K., & Haupert, M. (1992). The demand for Major League Baseball: A test of the uncertainty of outcome hypothesis. *The American Economist*, *36*(2), 72–80. https://doi.org/10.1177/056943459203600210

Kringstad, M., Solberg, H. A., & Jakobsen, T. G. (2018). Does live broadcasting reduce stadium attendance? The case of Norwegian football. *Sport, Business and Management*, *8*(1), 67–81. https://doi.org/10.1108/sbm-11-2016-0071

Krumer, A. (2020). Testing the effect of kick-off time in the UEFA Europa League. *European Sport Management Quarterly*, *20*(2), 225–238. https://doi.org/10.1080/16184742.2019.1598456

Krumer, A., & Lechner, M. (2018). Midweek effect on performance: Evidence from the German Bundesliga. *Economic Inquiry*, *56*(1), 193–207. https://doi.org/10.1111/ecin.12465

Krumer, A., & Smith, V. A. (2023). The effect of COVID-19 on home advantage in women's soccer: Evidence from Swedish Damallsvenskan. *American Behavioral Scientist*, 67(10), 1168-1178. https://doi.org/10.1177/00027642221118259

Long, M. (2020, December 22). Norwegian soccer rights value spikes as TV2 secures domestic deal. *SportsPro*. https://www.sportspromedia.com/news/norwegian-soccer-rights-value-tv2-domestic-deal/

LSK Kvinner FK (2023, October 18). *Historie* [History]. LSK Kvinner FK. https://lsk-kvinner.no/om-klubben/administrasjon-copy

Madsen, C. (2022, January 14). *Slik spilles Toppserien 2022* [How to play Toppserien 2022]. NFF. https://www.fotball.no/turneringer/toppserien/2022/spilleplan-toppserien-2022/

Madsen, C. (2023, January 18). *Innstiller på ny seriestruktur for Kvinner* [Recommends new series structure for Women]. NFF. https://www.fotball.no/turneringer/toppserien/2023/innstiller-pa-ny-seriestruktur-for-kvinner/

McEvoy, C. D., Nagel, M. S., DeSchriver, T. D., & Brown, M. T. (2005). Facility age and attendance in Major League Baseball. *Sport Management Review*, *8*(1), 19–41. https://doi.org/10.1016/s1441-3523(05)70031-0

Meier, H. E., Konjer, M., & Leinwather, M. (2016). The demand for women's league soccer in Germany. *European Sport Management Quarterly*, *16*(1), 1–19. https://doi.org/10.1080/16184742.2015.1109693

O'Brien, K., Sygna, L., & Haugen, J. E. (2004). Vulnerable or resilient? A multi-scale assessment of climate impacts and vulnerability in Norway. *Climatic Change*, *64*(1-2), 193-225. https://doi.org/10.1023/B:CLIM.0000024668.70143.80

Pawlowski, T., & Anders, C. (2012). Stadium attendance in German professional football – the (un)importance of uncertainty of outcome reconsidered. *Applied Economics Letters*, *19*(16), 1553–1556. https://doi.org/10.1080/13504851.2011.639725

Pawlowski, T., & Nalbantis, G. (2015). Competition format, championship uncertainty and stadium attendance in European football – A small league

perspective. *Applied Economics*, *47*(38), 4128-4139. https://doi.org/10.1080/00036846.2015.1023949

Peel, D., & Thomas, D. (1988). Outcome uncertainty and the demand for football: An analysis of match attendances in the English Football League. *Scottish Journal of Political Economy*, *35*(3), 242–249. https://doi.org/10.1111/j.1467-9485.1988.tb01049.x

Rottenberg, S. (1956). The baseball players' labor market. *Journal of Political Economy*, *64*(3), 242–258. https://doi.org/10.1086/257790

Scelles, N., Durand, C., Bonnal, L., Goyeau, D., & Andreff, W. (2013). Competitive balance versus competitive intensity before a match: Is one of these two concepts more relevant in explaining attendance? The case of the French football Ligue 1 over the period 2008–2011. *Applied Economics*, *45*(29), 4184–4192. https://doi.org/10.1080/00036846.2013.770124

Schreyer, D., & Ansari, P. (2022). Stadium attendance demand research: A scoping review. *Journal of Sports Economics*, *23*(6), 749–788. https://doi.org/10.1177/15270025211000404

Sisjord, M. K., Fasting, K., & Sand, T. (2017). The impact of gender quotas in leadership in Norwegian organised sport. *International Journal of Sport Policy and Politics*, *9*(3), 505–519. https://doi.org/10.1080/19406940.2017.1287761

Solberg, H. A., & Mehus, I. (2014). The challenge of attracting football fans to stadia. *International Journal of Sport Finance*, *9*(1), 3–19. https://econpapers.repec.org/article/jsfintjsf/v_3a9_3ay_3a2014_3ai_3a1_3ap_3a3-19.htm

Storm, R. K., Nielsen, C. G., & Jakobsen, T. G. (2018). The complex challenge of spectator demand: Attendance drivers in the Danish men's handball league. *European Sport Management Quarterly*, *18*(5), 652–670. https://doi.org/10.1080/16184742.2018.1470195

Skogvang, B. O. (2007). The historical development of women's football in Norway: From "show games" to international successes. In J. Magee, J. Caudwell, K. Liston & S. Scraton (Eds.), *Women, football, and europe: Histories, equity and experiences* (pp. 41-54). Meyer & Meyer Sport. https://www.researchgate.net/publication/315840483_The_Historical_Development_of_Women's_football_in_Norway_From_'Show_Games'_to_International_Successes

Szymanski, S. (2003). The economic design of sporting contests. *Journal of Economic Literature*, *41*(4), 1137–1187. https://doi.org/10.1257/jel.41.4.1137

Štrumbelj, E. (2014). A comment on the bias of probabilities derived from betting odds and their use in measuring outcome uncertainty. *Journal of Sports Economics*, *17*(1), 12–26. https://doi.org/10.1177/1527002513519329

UEFA (2024, March 9). *UEFA rankings*. UEFA. https://www.uefa.com/nationalassociations/uefarankings/womenscountry/#/yr/2024

Valenti, M., Scelles, N., & Morrow, S. (2020). The determinants of stadium attendance in elite women's football: Evidence from the UEFA Women's Champions League. *Sport Management Review*, *23*(3), 509–520. https://doi.org/10.1016/j.smr.2019.04.005

Valenti, M., Scelles, N., & Morrow, S. (2024). The determinants of stadium attendance in elite women's football: evidence from the FA Women's Super

League. *European Sport Management Quarterly*, 1–17. https://doi.org/10.1080/16184742.2024.2343485

Van Ours, J. C. (2024). No novelty effect but a honeymoon that lasts on the attendance effects of new football stadiums. *Sports Economics Review*, 5, 1-14. https://doi.org/10.1016/j.serev.2024.100029

Wallrafen, T., Pawlowski, T., & Deutscher, C. (2019). Substitution in sports: The case of lower division football attendance. *Journal of Sports Economics*, *20*(3), 319–343. https://doi.org/10.1177/1527002518762506

Wooldridge, J. M. (2002). *Econometric analysis of cross section and panel data*. MIT Press.