

Does live broadcasting reduce stadium attendance? The case of Norwegian football

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Abstract

Purpose: Attendance at matches in the smaller European football leagues is challenged by the increased number of live broadcast matches, particularly covering the biggest leagues.

The purpose of this paper is to analyse the effects of live broadcasting, match scheduling and other factors on stadium attendance in the top division of Norwegian football.

Design/methodology/approach: The analysis is based on a fixed effects regression model on attendance at match levels covering the period 2005 to 2011.

Findings: The main results show two different effects. While live broadcast domestic matches on 'free TV' is positively correlated to stadium attendance, the increased number of 'imported' matches from the big-five leagues is a substitute. Moreover, matches played on weekdays have a lower level of attendance than weekend matches.

Practical/Social Implications: The increased number of imported live broadcast football matches from the biggest European leagues influences and widens the financial gap between the biggest and the smaller football leagues. One possible solution for reducing the substitution effect from these matches is a more efficient match schedule in the Norwegian top division in football.

Originality/value: Norway has a small population with a high interest for football. This paper measures effects on attendance in the Norwegian top division in football matches with regards to the increased number of live broadcast matches both from the domestic league and from the big five football leagues.

Keywords: Demand; Football; Broadcasting; Scheduling; Small league

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Introduction

Historically, professional football became a reality in England during the industrial revolution, due to the fact that an urbanised working class now had both the money and leisure time to watch matches at stadiums (Gerrard, 1999). Money and leisure time continue to be a factor in watching football, but instead of attending a stadium, we can now follow sports in front of a screen. One issue in today's European football is whether clubs are able to maintain their level of stadium attendance. This question is of particular relevance due to the substantial growth in live broadcast matches in recent years.

In many of the bigger football leagues the main source of income is the revenue from the sale of media rights.[1] However, stadium attendance is still important in these leagues.

Attendance is itself a source of revenue, but it is also as a driver for other revenue. Spectators at the stadium constitute one part of the product that clubs offer to media companies and sponsors, and as such stadium attendance is always in focus for governing bodies, irrespective of league size.

Sport broadcasting has increased the substitution opportunities for stadium attendees in European football. For a potential stadium attendee, a home match competes with live broadcasting both from this match, parallel domestic league matches, and matches from other leagues. Moreover, the total time spent on watching sport broadcast may also be a limiting factor for attending matches at a stadium. Also traditionally one feared that live broadcasting would be preferred to attendance in person. This fear of empty seats has resulted in so-called blackout rules, limiting the number of live broadcast matches. This is still particularly the case in the National Football League (NFL) in North America and in the English Premier League (EPL) in England.

Comparison of the revenues from sales of media rights shows major differences between large and small leagues. This is not only a fact in absolute terms, but also when calculating the average share of media rights from total revenue. Including international competitions, Deloitte (2012a) calculates that the share in the 2010/11 season among the 'big-five' leagues

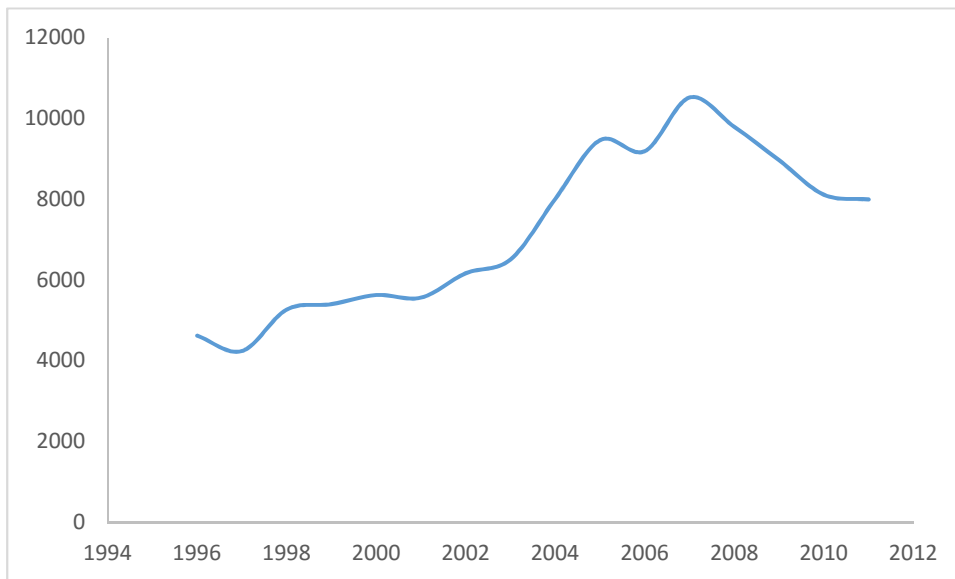
(England, Germany, France, Spain and Italy) varies from 30% (Germany) to 60% (Italy). On the other hand, when holding the prize money from UEFA apart, the share of revenues from broadcasting in 2011 was less than 10% for as many as 35 leagues, while it was about 12% in Norway.[2] This difference is influenced by the growing market for the export of media rights. Here, big leagues can sell their products for a relatively high price, whereas this revenue source is more or less absent in smaller leagues. For example, in the 2010/11 season, 43% of the media revenues in EPL came from export of international rights, while this share was 26% for La Liga in Spain (Solberg and Kringstad, 2014 and TV Sports Markets, 2013).

A growing financial gap between the big five and the smaller European football leagues is also influenced by the difference of costs for the media rights for the big five and the domestic media rights. For the Scandinavian countries combined, the media rights for the EPL cost 72% of the domestic rights in the 2006/07 season (Solberg and Turner, 2010). This share was even higher in other parts of the World: 97% in Australia and 148% in South Korea. In comparison, it was only 2% for Italy.

Based on the above examples, we can anticipate that the positive financial effects of broadcasting are highest for the biggest leagues, while substitution effects seem to be higher for smaller leagues. This paper focuses on the relationship between stadium attendance in small football leagues and the increased availability of live broadcast matches together with more dispersed match scheduling.

The Norwegian top division in football is used as a case in this paper. Gate revenues accounted for about 20% of the total revenues in 2011.[3] Figure 1 shows that the average stadium attendance grew steadily from 1996, peaking in 2007. After that, the decline was so evident that it was heavily commented in the popular press (Haugen et al, 2014).[4] Among possible determinants discussed were the increased number of live broadcast matches and changed match schedules. The motivation behind this paper relates to these determinants in an academic context. The main research question is therefore: What are the effects of live broadcasting and match schedules on stadium attendance in the top division of Norwegian football?

Figure 1:



Source: www.rsssf.no/stats/LeagueAtts.html

There are a number of interesting academic issues when studying factors for attending Norwegian top division football matches. For example, the teams usually play at relatively high quality stadiums that are seldom sold out. Norway has a small population,[5] but the interest in attending matches is relatively high with an average attendance of more than 10,000 at the peak in 2007 (Figure 1). Moreover, Norwegian football clubs share many of their supporters with foreign clubs, especially in England. Hence, analysing spectator demand for the Norwegian top division can reveal interesting aspects beyond the results found in the biggest football leagues. The sub-research question is therefore: How do other factors affect spectator demand in the top division of Norwegian football?

This study covers the period from 2005 to 2011. The period is chosen due to the particular interest related to both the peak in interest and the discussions related to strong growth in the supply of broadcast football, among other a triple in live broadcast matches from the big-five leagues. We therefore prefer this sample for measuring effects on stadium attendance from this increased supply of broadcast football. The analysis is based on unbalanced panel data since the Norwegian football league follows the normal structure in European team sports with promotion and relegation across a hierarchically structured division system.[6] The fixed effects (FE) panel data model allows us to control for the fact that some differences between teams are invariant over time. Additionally, data at match level yield a high number of observations, making it better suited for statistical inferences. The main results show that

spectators react differently to live broadcasting of football. While live broadcasting of domestic matches on ‘free TV’ is positively correlated to stadium attendance, the number of matches imported from the big-five leagues act as a substitute. Moreover, attendance at weekday matches is lower than at weekend matches.

The next section in this paper presents literature regarding the stadium demand for football with a focus on broadcasting and match schedules. Data and a presentation of the FE panel data model and other models follow. We continue with empirical results based on the econometric models. The final section presents conclusions and policy implications.

Literature review

Interest is a key factor in professional (team) sports because it is the main revenue driver as emphasised in the Louis-Schmelling paradox (Neale, 1964). Since this interest is reflected in attendance, spectators at the arenas have always been important for the financial viability of professional team sports. Spectators are both a direct match-day revenue source (Rottenberg, 1956; Andreff and Staudohar, 2002), and an indirect driver of revenues as a part of the sold product (Borland and Macdonald, 2003). This means that even if relative match-day revenues has decreased over time in European football (Andreff and Staudohar, 2002; Deloitte, 2012b), stadium attendance is still important because of the positive correlation to other revenue sources (Késenne, 2007).[7]

The literature has focused upon complementary and substitution effects between attendance and live broadcasting. Complementary effects are related to broadcast advertisements from at least two sources; announcements for the match and pre-match reports. Substitution occurs when potential spectators prefer watching the match or another match on a screen rather than attending the stadium. Indeed, there has always been a fear of live broadcasting as a substitution for stadium appearance, as emphasised by Baimbridge, Cameron and Dawson describing sport and TV in England:

The historical relationship between professional football’s governing authorities and broadcasters has been problematic. Football bodies took the view that televising either UK or even continental matches would significantly reduce attendances (1996, p. 318).

This restrictive attitude is reflected, for example, in English football, where domestic live TV was first permitted in 1983 and only ten league matches were broadcast during the season (Baimbridge et al., 1996). The first live Norwegian league matches on TV were broadcast in 1985 (Skistad, 1997). Also here, only a few matches were shown.

Broadcasting in Europe changed significantly both externally and internally regarding sport from the 1980s. Two of the external factors in Gerrard's strategic map (2000) are highly relevant in this context. These are 'legal changes' through liberalisation of the broadcasting market and 'technological changes' through reaching fans outside the stadium, for example television delivery platforms, digital TV and internet technology.[8]

In many European football leagues, fees for media rights escalated after the deregulation of European broadcasting (Solberg and Turner, 2010). According to the Football Money League (Deloitte, 2012b), broadcasting revenues as a percentage of total revenues for the 2010/11 season was 22% for Bayern Munich, 36% for Manchester United, 38% for Real Madrid, 41% for FC Barcelona and 39% for Arsenal. Moreover, it is not unusual that these revenues amount to more than 50% of total revenues for many of the big-five league clubs (Solberg and Mehus, 2014). In the 2010/11 Football Money League 7 out of the 10 clubs ranked from 11 to 20 were in this situation. This means that revenues from media rights frequently more than compensates any possible negative substitution effects from live broadcast matches. This is, for example, already emphasised in the study of the EPL 1993/94 season by Baimbridge et al. (1996). The recent media deal for Norwegian league football has a value of about €175 over four seasons.[9] Rosenborg BK is the club with highest revenues. However, in the 2011 season only close to 8% of this club's total revenues came from broadcasting,[10] emphasising the increased financial gap between European football leagues.

Regarding substitution effects, today's football leagues respond differently to restrictions on live broadcasting. This can involve maximum share of broadcast matches and the concession for live broadcasting when other domestic league matches are played. While all matches in Norway are broadcast live, it was limited to 138 of 380 matches in the 2010/11 EPL season for the domestic audience. [11] Further, live broadcasting is independent of kick-off time in Norway. Again, the EPL is much more restricted since the blackout rule prohibits live broadcasting within the United Kingdom between 2:45 pm and 5:15 pm on Saturdays.[12] Another example is the NFL in North America, where a blackout rule required that the

matches had to be sold out at least 72 hours before kick-off in order to be live broadcast to the local market.[13]

Export and import of live broadcast football matches has made domestic league football more international. This internationalisation is another stimulus to increased competition between European leagues beyond the two main structural changes in the 1990s through the Bosman verdict and the changed structure of the Union of European Football Association (UEFA) Champions League (see, for example, Gerrard, 2004). An interesting aspect of the large increase in the supply of live broadcast football matches is that this is mainly a problem for smaller football leagues (substitution and increased financial gap). For the biggest leagues this is rather an additional significant revenue driver (Solberg and Turner, 2010).[14]

As a consequence of technological innovation and the previously mentioned dispersed match schedules, the number of possible live broadcast matches (both from domestic and other leagues) has increased remarkably. For the small Norwegian football league, export of broadcast matches has minimal financial value. Rather, the import of football matches from the biggest leagues is a relevant substitute for attending domestic league matches for three main reasons. First, one's own domestic team matches can be seen away from stadium. Second, a large number of matches involving the other teams in the league is broadcast live. Third, matches from foreign leagues are available on a large scale.

Both live broadcast of football matches from one's own league and others are hypothesised to be a substitution for stadium attendance. Forrest and Simmons (2006) show that televised matches from UEFA's Champions League had a negative effect on concurrent matches in the third and fourth tiers in English football. As mentioned above, many Norwegian football supporters not only support a domestic team, but also teams from other leagues, particularly the big-five leagues.[15] The Norwegian Broadcasting Company commenced televising live league matches from England already in 1969, and hence created a close connection between Norwegian football supporters and English clubs.[16] In other words, televised matches from abroad may therefore be seen as a substitute to attending matches at a stadium in Norway. This is emphasised by Solberg and Mehus (2014), claiming that the 'regression analyses also confirmed that fans having a strong preference for foreign football attended less frequently' (p. 14).

Econometric analysis of spectator demand in professional team sports goes back to the 1970s (overview, for example, in Cairns, Jennett and Sloane, 1986, Borland and Macdonald, 2003, Szymanski, 2003, Dobson and Goddard, 2011). Part of this literature has analysed effects on stadium attendance from variables related to broadcasting and match schedules. For example, Baimbridge et al. (1996) found attendance to be significantly reduced if the match was broadcast on a Monday, while it was not significantly changed when broadcast on a Sunday. In a later study of the EPL, Forrest, Simmons and Szymanski (2004) found only one (1996/97) of five seasons (1992/93–1997/98) to be negatively significant regarding attendance on matches televised on Mondays.[17] Additionally, these studies conclude that the financial effects from broadcasting were positive for the clubs in the EPL.

Free-to-air broadcasting was not available for analysis on attendance for live match broadcasting in the EPL mentioned above. However, in studies of the Spanish league by Garcia and Rodriguez (2002) and Buraimo and Simmons (2009), this factor has been included. Garcia and Rodriguez found television to have negative effects on attendance in general, but stronger on free-to-air than on subscription channels. Buraimo and Simmons also found negative effects on attendance when broadcast publically, and significantly stronger in midweek games. On the other hand, subscription TV was not significant, but had a negative sign. Solberg and Mehus (2014) documented that fans were less likely to attend matches at the stadium when broadcast, particularly when broadcast on free TV. These results were from a survey from the Norwegian football league for the 2010 season. According to Allan and Roy (2008) the Scottish Premier League had a reduction of 30% among pay-at-the-gate home team supporters when matches were broadcast live.

Historically, each round was played at a specific time. Therefore, another gradual change is the spreading of match schedules for each round over several days and with different kick-off times. Hence, more matches can be exclusively broadcast live. In Norway, this commenced particularly from 2006 when all matches were broadcast live (Solberg and Mehus, 2014). Several studies find that midweek scheduled football matches have a significantly lower number of spectators (Baimbridge et al., 1996; Garcia and Rodriguez, 2002; Forrest et al., 2004; Buraimo and Simmons, 2009). The same conclusions are found in a study of the second tier in English football (Forrest and Simmons, 2006; Buraimo, 2008). Match day schedule is also a relevant driver in other sports, such as is in major league baseball (MLB) (Butler, 2002; Denaux, Denaux and Yalcin, 2011).

Empirical models

Our models include two variables related to broadcasting: *freeTV* is a dummy variable reflecting whether the match is on channels that are typically included in subscription packages in most households in Norway; the variable *big5TV* is the monthly aggregated number of matches from the big-five leagues broadcast live on channels which are possible to watch in Norway.[18] Regarding the *big5TV* variable, the larger it is, the stronger is the likelihood for overlap with Norwegian matches, and the less spare time is left for the football fan to attend domestic matches. Additionally, a large value also makes it likely that some fans feel that they have had enough of football, at least for some time. As seen in Table 2, the number of matches has grown significantly over the years. A limitation on broadcasting is made by excluding a variable for televised matches from club tournaments arranged by UEFA. This is because only a few of these matches overlap with the schedule for the Norwegian top division, following the model for EPL in Forrest et al. (2004).[19]

Borland and Macdonald (2003) group relevant variables into the following categories: consumer preferences, economic factors, quality of viewing, factors related to the sporting contests, and supply capacity.[20] Recent studies of demand for European football apply FE panel data models on home gate attendance (Allan and Roy, 2008; Buraimo, 2008; Buraimo and Simmons, 2009). The FE estimation takes into account unobserved factors that may be relevant in single-season OLS estimation (Buraimo and Simmons, 2009). This means that by using a FE estimation model, a number of variables that have been related to measurement problems such as ticket prices, income and market size can be omitted (Buraimo, 2008; Allan and Roy, 2008; Buraimo and Simmons, 2009). Therefore, this study does not focus on economic variables since they are hypothesised to be included in the invariant differences between the clubs.

According to Borland and Macdonald (2003) the variables concerning quality of viewing are related to both facilities and timing of the contest. Match scheduling is included using dummy variables for *weekday* and *may16* (a ‘football day’ similar to Boxing Day in England): *weekday* is defined as matches other than Saturday and Sunday, except for the national holidays – Easter Monday, Ascension Day, May 1 and Whit Monday. These days are considered to have the same effect on spectator demand as regular Sunday matches.

Further, according to Borland and Macdonald (2003), earlier studies have found an inverse effect between attendance and stadium age. Because a number of stadiums in the Norwegian football league have been opened or rebuilt in the period relevant to this analysis, we define the dummy variable *stadium*. This is given the value ‘1’ where a stadium has been built or rebuilt during the past five years. The number of years is based on Haugen et al. (2014), who find this variable to be a strong significant driver for attendance in Norway.

The variables within the category ‘sporting contest’ are mainly related to absolute and relative sporting quality between teams. Absolute sporting quality is measured by each team’s sporting success, ranking the home team (*rankH*) and the away team (*rankA*). Relative sporting quality concerns uncertainty of outcome. A limitation on uncertainty of outcome is made by including only match uncertainty. We follow Forrest, Simmons and Buraimo (2005) and Buraimo (2008), defining this variable as the absolute value of (home advantage + home team’s points per game – away team’s points per game), where home advantage is calculated from previous season’s points per game for all home teams minus points per game for all away teams. Empirical evidences from the uncertainty of match outcome are mixed (Borland and Macdonald, 2003).

Based on both geography and historical sporting rivalry, a dummy variable *derby* is constructed to measure whether sporting derby matches attract greater attendance than other matches. This variable is partly based upon subjective judgement. Norway is a country with a relatively large area compared to the population. However, within the country the population density differs significantly. Therefore, we construct this variable to capture both sporting rivalry and geographical proximity where the first is based on historical results (above 1100 points in the all-time table from the top division over the period 1963 to 2011),[21] and the latter is a combination of a maximum distance of 120 km, and two other derbies (between Bodø/Glimt and Tromsø in northern Norway and between Start and Viking in south-west Norway).[22] For example, Buraimo and Simmons (2009) find their variable for derby matches to be a significant driver on gate attendance.

Some leagues experience that one or a few teams are of particular interest, mainly due to extraordinary sporting results. In Norway, Rosenborg BK became such a team during the 1990s. In their study of attendance in Spanish football, Buraimo and Simmons (2009) find that Real Madrid and Barcelona have a significant positive effect on attendance when these

teams are playing away. A dummy variable is constructed Rosenborg's away matches (*rosenborg*).

A challenge arises when it comes to the dependent variable, as there are different procedures between the clubs for reporting the number of spectators at the stadium. All clubs except two reported the total number of spectators as the number of season tickets (independent of attendance) plus the number of single (match) tickets sold. The other two clubs reported the actual number of spectators. Data for the total number of spectators were collected from the Norwegian football association (FA) (see also fotball.no) and from altomfotball.no. Numbers from fotball.no were preferred except when we observed negative values after subtracting the number of seasonal tickets sold. If the number was still negative, we checked with rsssf.com and vg.no, and chose the highest number. Due to uncertainties with the number of seasonal tickets sold (sources were clubs and newspapers), we only present results applying total number of tickets sold as the dependent variable (*tickets*). However, without presenting the results in the paper, we also calculated a variable for match tickets sold as the total number minus seasonal tickets sold.

Some of the regression models in this paper include a population variable. This variable is based on subjective judgement of the market area for each club, and hence the population of this area based on Statistics Norway among others.[23] A summary of descriptive statistics from the Norwegian top division in football for the seasons 2006 to 2011 is presented in Table 1.[24]

Table 1: Descriptive statistics for variables included in our models.

<i>Variables</i>	<i>N</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Skewness</i>	<i>Kurtosis</i>
Attendance (1142–24,894)	1448	9,034.405	4,533.498	0.845	2.955
Free TV (0–1)	1448	0.342	0.474	-	-
Big-five TV (0–164)	1448	39.694	42.069	-	-
Ranking home team (1–16)	1396	8.845	4.360	-0.006	1.846
Ranking away team (1–16)	1396	9.228	4.333	-0.112	1.882
Uncertainty (0.003–3.813)	1448	0.810	0.559	0.993	4.486
Weekday (0–1)	1448	0.213	0.409	-	-
May 16 match (0–1)	1448	0.035	0.184	-	-
Derby (0–1)	1448	0.324	0.468	-	-
Rosenborg away (0–1)	1448	0.066	0.249	-	-
Population (7.348–469.999)	1448	160.100	127.424	1.075	3.118

Note: Ranking home and away teams are the turned table positions where larger values indicate a better standing. Population is given in thousands.

The dummy variable *FreeTV* presented in Table 1 is related to the 495 out of the total 1,448 matches played that were shown on free TV. Out of the 495 matches, 230 were on Sundays, 122 on Mondays, 71 on Saturdays, 23 on Fridays and 49 on other days. Most of these matches had different kick-off times than the other matches played the same day.

Since we are interested in analysing variables that vary over time, we make use of FE models. Hence, we assume that something with the specific football clubs may impact the outcome variables. This constitutes the rationale behind the assumption of the correlation between the entity's error term and the predictor variables. The FE model removes the effect of those time-invariant characteristics from the explanatory variable so that we are able to assess the predictors' net effect (Beck, 2008; Green, Kim and Yoon, 2001). We thus control for all time-invariant differences between the units, so our estimated coefficients will not be biased due to omitted time-invariant characteristics (e.g. ticket prices or purchasing power). To achieve this unit heterogeneity, we thus allow the intercept to vary by unit:

$$[1] Y_{i,t} = X_{i,t}\beta + f_i + \varepsilon_{i,t}$$

The FE models fit dummy variables for each team, which are not reported in the tables. Our model can be formally represented as:

$$[2] \quad tickets_{i,t} = freeTV_{i,t}\beta + big5TV_{i,t}\beta + rankH_{i,t}\beta + rankA_{i,t}\beta + uncertain_{i,t}\beta + weekday_{i,t}\beta + may16_{i,t}\beta + stadium_{i,t}\beta + derby_{i,t}\beta + rosenborg_{i,t}\beta + f_i + \varepsilon_{i,t}$$

We apply this FE model. To include the results of *population* we also include a mixed effects model (ML). The results produced do not deviate substantially from our main model (the FE model).

As our data are ordered hierarchically we have also tested a random intercept multilevel (mixed) model. We consider matches (level 1) to be a subset of home teams (level 2). The object of a multilevel analysis is to account for variance in a dependent variable measured at the lowest level by investigating information from all levels of analysis (Steenbergen & Jones, 2002). The ML model is represented as:

$$[3] \quad Y_{i,j} = X_{i,j}\beta + \alpha + \varepsilon_{ij} + u_{0j}$$

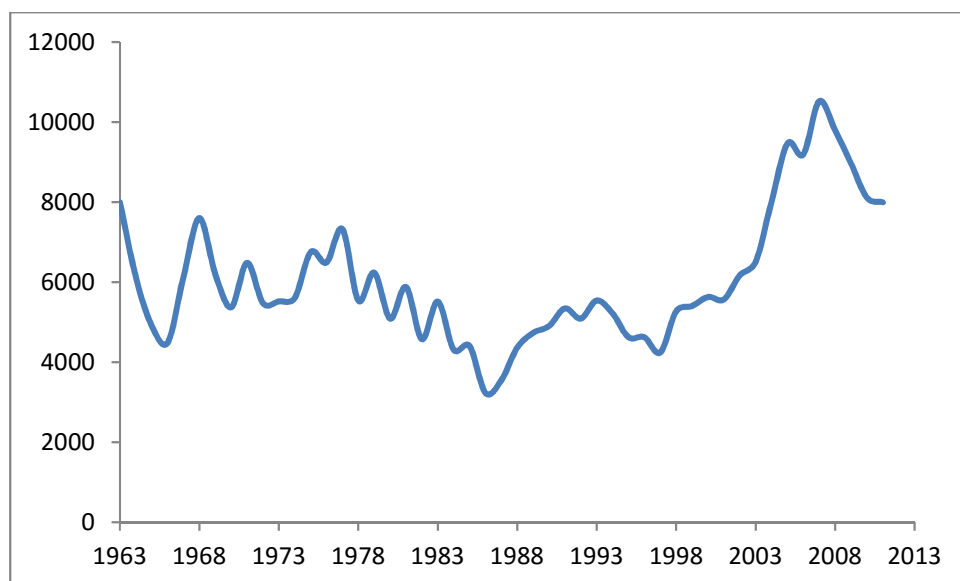
and the ML model becomes:

$$[4] \quad tickets_{i,t} = freeTV_{i,j}\beta + big5TV_{i,j}\beta + rankH_{i,j}\beta + rankA_{i,j}\beta + uncertain_{i,j}\beta + weekday_{i,j}\beta + may16_{i,j}\beta + stadium_{i,j}\beta + derby_{i,j}\beta + rosenborg_{i,j}\beta + population_j\beta + \alpha + \varepsilon_{ij} + u_{0j}$$

Empirical results

As shown in Figure 2, average attendance in the Norwegian top division in football has varied over time. Following the reorganisation into a single top division group in 1963, the first season had an average per match of 7,977 spectators at the stadiums. During the 1980s, popularity was relatively low, not unlike England (see, for example, Dobson and Goddard, 2011).[25] In the Norwegian top division, average attendance rose from 3,230 in 1986 to an all-time high of 10,552 in 2007. Attendance subsequently declined.

Figure 2:



Source: www.rsssf.no/stats/LeagueAtts.html

Table 2 shows the number of teams, average attendance and import of broadcast matches from the big-five leagues for the period 2005–2011. The number of matches available for Norwegian spectators from the big-five football leagues has more than tripled over the sample period. This is largely related to the strong expansion in the number of televised matches from the non-English leagues.

Table 2:

<i>Season</i>	<i>No. of teams</i>	<i>Average Attendance</i>	<i>Live broadc. EPL</i>	<i>Live broadc. other big5</i>	<i>Live broadc. big5 total</i>
2005	14	9,465	207	94	301
2006	14	9,194	253	87	340
2007	14	10,522	245	132	377
2008	14	9,793	260	144	404
2009	14	8,870	274	222	496
2010	16	8,096	287	473	760
2011	16	7,994	281	673	954

Source attendance: www.fotball.no (Norwegian football association). Source live broadcast matches from the big-five football leagues: www.fotballen.eu; own calculations.

The econometric results for the demand study for Norwegian football are presented in Table 3.

Table 3: Relationship between televised matches and tickets, 2005–11.

<i>Variables</i>	<i>Fixed effects</i>	<i>Multi-level</i>
<i>intercept</i>	6,751.544*** (210.569)	2,608.143*** (728.231)
<i>freeTV</i>	323.746*** (124.334)	328.516*** (123.858)
<i>big5TV</i>	-6.508*** (1.249)	-6.510*** (1.243)
<i>rankH</i>	125.603*** (15.314)	126.557*** (15.234)
<i>rankA</i>	67.715*** (14.127)	67.492*** (14.073)
<i>uncertain</i>	54.651 (124.589)	50.412 (124.114)
<i>weekday</i>	-503.726*** (135.298)	-503.417*** (134.771)
<i>may16</i>	2,465.692*** (280.699)	2,472.588*** (279.643)
<i>stadium</i>	1,666.413*** (201.629)	1,664.861*** (199.531)
<i>derby</i>	762.733*** (120.756)	757.147*** (120.228)
<i>rosenborg</i>	1,408.492*** (210.925)	1,404.012*** (210.138)
<i>population</i>	---	24.341*** (4.079)
F/LL	38.41	-12,551
R-square	0.220	---
Groups	22	22
Observations	1,396	1,396

Note: Dummy variables for each team are included but not reported in the table. Population is time constant and thus not included in our FE model. The dependent variable is tickets sold for each match (including season tickets). Standard errors are shown in parentheses. Levels of statistical significance are indicated: *significant at 10% level; **significant at 5% level; ***significant at 1% level.

The models in Table 3 calculate all but the variable *uncertainty* to be strongly significant. The empirical results suggest a two-sided effect from broadcasting on stadium attendance in the Norwegian top division in football. If a domestic league match is shown on free TV, the results indicate a higher stadium attendance, *ceteris paribus*. On the other hand, the total

monthly number of matches broadcast from the big-five leagues has a substitution effect, consistent with Forrest and Simmons (2006) and Solberg and Mehus (2014). This fits with public arguments of supply surplus of broadcast live football, and that football consumers do not have time to follow this supply.[26]

Match schedule affects attendance. While May 16 (Norwegian football's 'boxing day') has a positive effect on attendance, it is negative on weekdays. This is consistent with the literature. Also consistent with the literature, is that sporting success and rivalry are strong significant drivers on attendance. On the other hand, uncertainty of match outcome is not significant at all, reflecting the findings from English football in Buraimo (2008).

For the total number of tickets sold, the new or rebuilt stadium variable is positive significant, consistent with Haugen et al. (2014). However, this variable is insignificant when excluding season tickets. The implication is that better stadium comfort has a positive effect on the number of season tickets sold, but not on the sale of single-match tickets. Further, the results confirm that as an away team, Rosenborg is of particular interest for the other home teams' spectators.

Except from the insignificant stadium variable, our single match tickets models follow the results from the models presented, but with the *freeTV* variable significant on 5 % level. The results are further confirmed applying semi-log methods both on total and single match tickets.

Discussions and policy implications

This study has focused upon two variables regarding TV and stadium attendance in the top division in Norwegian football. These are domestic matches live broadcast on TV from stations with high penetration, and the monthly number of matches available from the big-five leagues in Europe. The FE panel data analysis finds the first to have a strong significant positive correlation with stadium attendance. This is opposite of the statement from the survey of the 2010 season in the same division by Solberg and Mehus (2014), claiming that 'Fans of clubs that were featured the most often on free-to-air TV channels attended fewer matches than others' (p. 3) and for Spanish football in Garcia and Rodrigues (2002). However, this variable is probably not only driven by complementary and substitution effects, but also from the fact that during the sample period these TV matches were selected

by the broadcasting companies. Hence, these matches may therefore have been of particular interest to the TV audience. Consequently, the selection of the broadcast matches on free TV may be a driver for the positive determinant, if control variables such as derby matches are not able to capture all dimensions of this interest.[27] Indications show that the selection of live broadcast matches drives the *freeTV* variable, so the Norwegian FA should be careful in letting the broadcasting companies do this job.

The other TV variable, based on matches from big-five leagues, shows that the increased number of TV matches from these leagues has significantly reduced attendance in the Norwegian top division in football. This result may confirm the concern expressed by commentators in the Norwegian popular press about substitution effects driven by the increased supply of imported TV matches. It is also consistent with Solberg and Mehus (2014, p. 3) finding that ‘Fans who had strong preferences for foreign football attended less frequently’.

For the analysed period, this paper shows that the highly increased number of imported live broadcast football matches from the big five leagues has significantly reduced attendance at the domestic football matches in Norway. Whether this can be interpreted as a crowding out effect for similar smaller leagues could be a relevant topic for future research, as research up to now mostly have been focused on bigger leagues.

The strength of the substitution effect of broadcasting matches in general, is affected by the differences in marginal costs between watching the match on TV and stadium attendance. Usually, the TV match has a marginal cost equal to zero because subscription fees cover a certain time period, and compared to attending a match at stadium transportation costs and time costs (opportunity costs) are lower (Solberg and Mehus, 2014). Further, complementary effects from the increased number of big-five league TV matches may be low from advertising effects for domestic matches, even though there can be some advertisement during the football programs related to the imported TV matches. Moreover, the increased interest for the sport from higher number of imported matches on TV seems not to be an important determinant, because it probably has a diminishing marginal effect.

A possible driver for the substitution effect indicated by the significant negative big-five league TV variable that should be of particular interest for the Norwegian FA is the extended

Norwegian football season during the sample period. Table 4 presents an overview of the number matches played in March and November in the Norwegian top division over these seasons.

Table 4:

Season	2005	2006	2007	2008	2009	2010	2011
Matches in March and November	0	7	7	14	23	32	25
Total number of matches	182	182	182	182	240	240	240
Per cent	0	3.85	3.85	7.69	9.58	13.3	10.4

Note: Own calculations

From Table 4, we see that the Norwegian football season has had an earlier start (in spring) and later finish (in the autumn). Hence, the number of matches in the winter months has increased during the sample period both in absolute and relative terms. This means that a larger part of the Norwegian league matches not only are played within the season for popular winter sports, but also within the big-five league season.

The Norwegian FA is responsible for the match schedule, and might therefore be able to reduce the consequences of the substitution effects by establishing a match schedule that gives preference to domestic league matches when there is less substitution involving matches from the other leagues. A problem here is that the analysis in this paper finds the alternative of scheduling more matches outside weekends also to have a negative effect on demand. However, one advice may be to schedule league matches in weekends instead of Norwegian FA cup matches.

Another strategy for the Norwegian FA is to work towards a reintroduction of restrictions (both domestic and through the governing bodies of UEFA and FIFA[28]) when it comes to matches on TV. This follows Solberg and Mehus (2014, p. 3) claiming that ‘Hence, regulation on televised football might be necessary to maintain attendance levels’. However, this suggestion seems unrealistic both because of the globalisation of sports, and not least because it goes against the interest of Norwegian football fans, who in general are not only dedicated to a domestic club, but also to clubs within the major European football leagues.

An implication from the substitution effects with the increased number of broadcast matches from the big-five football leagues is that this may be a driver of the wider financial gap between the small Norwegian football league and the big-five leagues. The argument is based on the combined effects from Norwegian football fans paying the big leagues by watching imported matches and at the same spending less money on Norwegian football, *ceteris paribus*.^[29] Further research is required to find whether this is a general trend across the smaller leagues in Europe. If so, it might be an argument for regulations on broadcasting described above, or maybe it can reintroduce changed structure among the smaller leagues, as was apparent for the discussion of the so-called Atlantic league back in time (Dobson and Goddard, 2001).

The methodological focus has been on the FE panel data model since this model captures economic and market-size variables. These variables have traditionally been difficult to measure (see, for example, Borland and MacDonald, 2003; Downward and Dawson, 2000), giving an advantage for such models in demand studies. On the other hand, admission prices, income and market size are not measured explicitly. Therefore, information about these hypothesised determinants for attendance in the Norwegian top division in football is demanded for future research. Another model has been tested (multilevel), and confirms the results presented in the FE model. However, because of lack of reliable economic data, this model is limited (used only for control purposes).

Another methodological issue of relevance is whether time dummies should be included as explanatory factors. What happens when these dummies are included in the FE model is that the *big5TV* variable will be insignificant. Important here is the question which factors account for changes in attendance during the sample period. Is it a general time trend or is it due to changes in the variables mentioned? What can be seen, for example, is that the correlation coefficient between time and the *big5TV* variable is .487. The relevant question related to whether time dummies should be included must be related to the hypothesis in this paper, that the TV variables are possible determinants for the number of stadium spectators. Therefore, we omit the time dummies from the final regressions.

A weakness of this study is the sample period ending in 2011. As such, the data sample will not capture recent seasons. However, this period shows a tripled number of televised live

matches from the big five football leagues and the data sample has close to 1,400 observations. Comparing the results from the analysed period in this paper with the upcoming period could be of relevance for future research.

Conclusions

This paper analyses demand for football in a small country. There are several results. First, a live broadcast football match is positively correlated to the number of tickets sold for that match. In the top division in Norway, this is probably driven by the selection procedure of these matches. Second, there are significant substitutional effects when the number of matches broadcast live from the big-five football leagues increases. Third, weekday matches have lower attendance than weekend matches. Further research is required to find whether these results are general for smaller European football leagues.

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¹ See for example the European Club Licensing Benchmark Report Financial Year 2011 (www.uefa.org/MultimediaFiles/Download/Tech/uefaorg/General/01/91/61/84/1916184_DOWNLOAD.pdf).

² Source: The European Club Licensing Benchmark Report Financial Year 2011 (www.uefa.org/MultimediaFiles/Download/Tech/uefaorg/General/01/91/61/84/1916184_DOWNLOAD.pdf).

³ See for example the European Club Licensing Benchmark Report Financial Year 2011 (www.uefa.org/MultimediaFiles/Download/Tech/uefaorg/General/01/91/61/84/1916184_DOWNLOAD.pdf).

⁴ Table 1 in Solberg and Mehus (2014, p. 5) shows that the variation in attendance is higher in the Norwegian league than in the big-five leagues and the Netherlands after year 2000. England and Spain had relatively stable attendance. The trends in Germany and the Netherlands were positive, while they were negative in France and Italy.

⁵ The population of Norway in 2011 was close to 5 million (Statistics Norway, www.ssb.no).

⁶ The season in Norwegian football is from spring to autumn, unlike for example the big-five leagues.

⁷ For the 2011 season, we have calculated this correlation coefficient to be 0.875 in Norway when using average attendance and pre-season budgeted revenues. Sources: www.vg.no and *Dagens Næringsliv* January 11, 2012. Moreover, in a study of effects of broadcasting on revenues, Cox (2012) applies a number of variables similar to those used in demand studies.

⁸ See Gratton and Solberg (2007) for an overview over the structure of the supply side of sport broadcasting.

⁹ www.abcnheter.no/nyheter/2008/11/30/77551/slik-fordeles-tv-pengene, retrieved 13.06.2017. Own calculation based on the average exchange rate for 2010 (www.norges-bank.no/Statistikk/Valutakurser/valuta/EUR).

¹⁰ Based on own calculation from the 2011 profit and loss account (source: www.rbk.no).

¹¹ news.bbc.co.uk/2/hi/business/7875478.stm

¹² www.punditarena.com/football/english-football/scurtin/premier-leagues-3pm-blackout-explained

¹³ www.nfl.com/news/story/0ap3000000480822/article/nfl-suspends-local-blackout-policy-for-2015

¹⁴ For example, in the English FA Premier League the equal share of overseas TV-revenues was almost 30% higher than the equal share part (about 50%) of domestic TV-revenues. Source: Premier League 2010/11 season review.

¹⁵ By 31. May 2012, the Norwegian Supporters' Union for British football had 105,590 members (supporterunionen.no).

¹⁶ www.nrk.no/sport/fotball/tippekampen-40-ar-1.6845845

¹⁷ Forrest et al. (2004) suggest that a possibility for the different results between the two studies of the 1993/94 season can be related to Baimbridge et al. not controlling for the negative effects of matches played midweek. See Gratton and Solberg (2007) and Solberg and Turner (2010) for televised football as an export product.

¹⁸ Note that since the duration of the season in Norwegian football is from spring to autumn, there is a large variation during the season dependent on how strong the substitution from imported football is.

¹⁹ On the other hand, they included this variable in their model for the level two, showing significant negative effects between 8% and 16%.

²⁰ Capacity will not be treated as an explanatory factor here. See the critical remarks of Dobson and Goddard (2011).

²¹ www.nifs.no/maraton.php

²² Even though this is a relatively long distance, these matches are seen as geographical derbies because these teams want to be best in their region.

²³ In addition, information from unpublished PhD work by Hallvard Johnsen is applied.

²⁴ Parts of the data applied in this paper are from Frøysa and Rødal (2012).

²⁵ Janssens and Késenne (1987) question whether professional football could continue in Belgium due to the increased level of costs combined with reduced revenues resulting from ‘decreasing attendance’ (p. 305).

²⁶ Some commentators consider that people are getting bored with football, simply because there is too much of it.

²⁷ To test the causality issue between *freeTV* and *attendance* we have performed an additional fixed effects model, including dummy variables for each match-dyad. This gives us a total of 412 dyads (there are two dyads for each team combination, as they differ in who is the home and who is the away team). Such a model takes into account the proposed selection effect (as we now look at the effect within each dyad), and should as such sort out most of the question on causality. We find that there is a negative (252,723) effect of *freeTV* on attendance. However, this is not significant (standard error of 131.755).

²⁸ The Union of European Football Associations and the Fédération Internationale de Football Association.

²⁹ See Solberg and Turner (2010) for further discussion.