Impacts of the Great Recession on sport: Evidence from English Football League attendance demand

Babatunde Buraimo[a], Giuseppe Migali[b] and Rob Simmons[c]

[a]Management School, University of Liverpool, Chatham Building, Chatham Street, Liverpool, L69 7ZH, UK.
[b]Department of Economics, Lancaster University, Bailrigg, Lancaster, LA1 4YW, UK and Magna Graecia University
[c] Corresponding author: Department of Economics, Lancaster University, Bailrigg, Lancaster, LA1 4YW, UK and University College Cork; email: r.simmons@lancaster.ac.uk.

Abstract

This paper investigates the impact of the 2007-09 Great Recession on attendance demand in the English Football League. We identify causal effects of variations in local unemployment rates on club matchday attendances using a difference-in-difference methodology applied to specific treatment and control group clubs categorised according to severity of local unemployment increase during the recession period. We find that treatment clubs in Tiers 3 and 4 suffered an attendance reduction of 10.5% purely through rising unemployment in local TTWAs containing clubs' stadia after controlling for a large set of confounding influences. Smaller but still significant effects are found in alternative specifications, including the incorporation of Tier 2 clubs into the analysis.

1. Introduction

The aim of this paper is to causally identify, using a revised version of the standard difference-in-difference method, the consumer response to an adverse labour market shock emanating from a large-scale economic recession. Specifically, we show how the large recession of 2007 to 2009, induced by financial crisis, affected matchday attendances in the English Football League through a labour market shock expressed as large increases in unemployment rates.

Recessions impact economic sectors and regions by different mechanisms and different magnitudes (Fingleton *et al*., 2012; Kitsos and Bishop, 2018; Cainelli *et al*., 2019). A thorough analysis of impacts of a large recession on consumer demand must therefore confront the problem of heterogeneity of treatment. In our study, data on local labour market unemployment rates from Travel to Work Areas (henceforth TTWAs) facilitate club-level investigation of recession impacts. We explicitly model the effects of spatial and temporal variations in TTWA unemployment rates on attendance in the English Football League.

The local unemployment rate is used here as a key indicator of the state of local economy which may affect consumer (fan) choices to attend sporting events. High local unemployment rates are associated with low availability of jobs, including job losses, and less good wage offers. Employment and wage offers are worse in recession and expectations of future career earnings are scaled down. Moreover, fan attendance at sports events is partly habitual and the attendance habit will be broken for fans most affected by recession-induced adverse labour market conditions.

Hence, a large-scale recession has the potential to generate reduced attendances at sporting events. We expect impacts to vary considerably by locality and by club league status. The top divisions of most European football leagues enjoyed robust and growing

attendances over the period immediately before and after the recession of 2007 to 2009, with the notable exception of Italy Serie A (Boeri and Severgnini, 2014; Buraimo *et al*., 2016). The majority of games at the majority of Premier Leagues in the post-recession period featured sell-out crowds with low variation of within-club and within-season attendances (www.european-football-statistics.co.uk).

Our study examines the English Football League, which comprises the three tiers of English professional football underneath the English Premier League. Unlike the Premier League, very few Football League games sell out; within-club and within-season variation in team attendance demand is much greater than for the Premier League. This greater variation gives rise to the possibility that recession could have harmful effects on attendances at some Football League clubs depending on how severe the labour market consequences are for particular localities.

The focus on English Football League clubs is pertinent for substantive economic reasons. Top division clubs rely on broadcast and commercial revenues as their primary income streams with matchday gate receipts rather less important as sources of investment in team playing squads and club facilities (Szymanski, 2017). In contrast, most clubs in the English Football League, especially those in third and fourth tiers, lack access to lucrative broadcast rights fees and large commercial sponsorships and are more reliant than higher-level clubs on gate receipts.[1] Many clubs in lower divisions in European football are at risk of insolvency (Szymanski, 2017; Scelles *et al*., 2018; Szymanski and Weimar, 2019). This insolvency risk could simply reflect poor club management and poor on-field team

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[1] English professional football is organised in four hierarchical tiers. Tier 1 is the Premier League. The Football League comprises Tiers 2 to 4. Tier 2 is currently branded as the Championship while Tiers 3 and 4 are termed League One and League Two. The Tiers are linked via promotion and relegation.

performances relative to expectations. But the risk of insolvency could also be heightened by adverse labour market conditions induced by recessionary shock.

If increases in local unemployment transmit to lower club attendances, then gate revenues fall and afflicted clubs could fall into a spiral of declining revenues and worsening sporting performances in turn leading to financial failure. This is particularly important for fans of lower division teams who tend to have strong social attachments to their local clubs with community identity as an important motivator for active fan support (Barlow and Forrest, 2015). In this scenario, loss of consumer welfare from club insolvency could be substantial.

The direct effects of recession on attendance demand through adverse labour market conditions are potentially reinforced by breaks in consumption habit. Sports fans exhibit considerable habit persistence in their active support (Borland 1987; Forrest and Simmons, 2006; Ge *et al*., 2020). Recessions can lead to short-term lack of motivation to attend sporting events which eventually turns into permanent absence from stadia as fans reassess their leisure spending patterns.

The treatment in our analysis is the magnitude of recession measured by a relatively large increase in local TTWA unemployment rate over the recession period 2007 to 2009. The clubs located within treatment TTWAs are compared with clubs situated in control group TTWAs that had relatively smaller increases in unemployment rate. The categorisation of clubs is based on percentiles of the distribution of TTWA change in unemployment rate and is explained in detail below. We find that treatment clubs in Tiers 3 and 4 suffered an attendance reduction of 10.5% purely through rising unemployment in local TTWAs containing clubs' stadia, after controlling for a large set of confounding influences. Smaller but still significant effects are found in alternative specifications.

The remainder of the paper proceeds as follows. Section 2 outlines literature and our key hypotheses. Section 3 details our econometric model and data. Section 4 reports our results and robustness checks for Tiers 3 and 4. Section 5 repeats the analysis with Tier 2 clubs included. Section 6 concludes.

1. Literature and hypotheses

The relationship between recessionary shocks and labour market indicators is firmly established. For example, Stumpner (2019) finds that a one standard deviation increase in exposure to demand shocks, measured by county-level household debt to income ratios, explains a three percentage point difference in employment growth in the United States recession of 2007 to 2009.

Tourism and leisure industries are well-represented among sector-specific studies of impacts of recessions on consumer demand, typically showing reduced consumer spending in these sectors following economic downturns (Smeral, 2010; Alegre and Pou, 2016). Studies of recessionary impacts on the sports industry are rarer. Eakins (2016) uses the Irish Budget Survey to evaluate expenditure on sporting categories in 2004/05 and 2009/10, i.e. before and after the 2007 to 2009 recession. Eakins finds that expenditure on 'attendance at sporting events' was negatively related to number of working members in the household in each survey wave. However, the marginal effects of more working members of household on spending on visiting sports events are lower in the post-recession wave, falling from 1.16 to 0.88 for a second working household member.

Scholars have attempted to separate socio-economic and sporting determinants of attendance demand (Borland and Macdonald, 2003). Using a two-step procedure to model club seasonal attendances over 1925 to 1992, Dobson and Goddard (1995) estimate impacts of 1961 Census-derived proportion of economically active males in the local population on

their constructed measure of 'core support' and find significant, positive effects. Dobson and Goddard note the lack of availability of consistent monthly or annual local labour market data that guided the authors towards estimation using a single snapshot Census.

Baimbridge *et al*. (1996) model gate attendances in the English Premier League for a single season, 1993/94. Their focus is the impact of live television broadcasts on gate attendance rather than any labour market effects. They include regional unemployment rate as a control variable, where regions are the 10 Government Office Regions applicable at that time. These regions are very broad in geographical area and are heterogeneous in industry and labour market characteristics. Contrary to intuition, Baimbridge *et al*. (1996) find a significant, positive coefficient of unemployment rate on team attendances. The authors attribute this curious result to the fact that larger and more successful Premier League clubs tend to be located in inner-city urban areas such as Liverpool and Manchester which experienced large increases in unemployment in the previous two decades through declining manufacturing industries.

Other attendance demand studies have used labour market indicators as socio-economic covariates. For example, Jennett (1984) finds a negative and significant coefficient of local unemployment rate on home team matchday attendances in the Scottish Premier League between 1975/76 and 1980/81. This study includes part of a severe recession (the 1979/80 and 1980/81 seasons) but could not assess the impacts of this recession on attendances. Using a panel of Major League Baseball team seasonal (not matchday) attendances from 1970 to 2000, Zygmont and Leadley (2005) find a negative and significant effect of previous season local population area unemployment on attendance demand. Specific recession effects were not considered, however.

To our knowledge, the only study that investigates the impact of a recession on attendance demand directly is Hong *et al*. (2013) on Major League Baseball covering games in the 2008 and 2009 seasons. Their choice of recession impact variable is the Federal Reserve Bank of Philadelphia index of coincident indicators generated at state level from measures of employment, unemployment, hours worked in manufacturing and earnings. A larger value of this composite index denotes more prosperous economic conditions. The authors find a significant and positive effect of the index on baseball team attendances. The impact is very large with 6.5% out of 6.7% decline in attendances attributable to the movement in the composite index.

Compared to previous published work, our study examines local impacts of recession on attendances and considers before and after effects in a causal manner. We use the standard difference-in-difference (henceforth DID) method applied to constructed treatment and control groups to model impacts of recession-induced unemployment rate movements on attendance demand. The difference-in-difference method has been previously applied in attendance demand studies to model impacts of corrupt practices in Italian football (Buraimo *et al*., 2016) and the effects of player suspensions for performance enhancing drugs violations in Major League Baseball (Cisyk and Courty, 2017).

Our null hypothesis states that the effect of the recession of 2007 to 2009, at local TTWA level, on treated English Football League club attendances is not statistically different from zero. The alternative hypothesis states that the average treatment effect on the treated is statistically significant and negative. Our empirical analysis shows that we can confidently reject the null hypothesis. Hence, attendances at treatment clubs immediately following the recession were lower than for specified control group clubs, after controlling for a wide set of

sporting covariates which are standard to the literature (Forrest and Simmons, 2006; Coates and Humphreys, 2012; Coates *et al*., 2014; Buraimo *et al*., 2016; Martins and Cro, 2018).

2. Econometric model and data

We aim to identify the causal effect of the 2007 to 2009 Great Recession on club attendances. We focus initially on Tiers 3 and 4, currently branded as English Football League One and Two. These tiers each have 24 teams that play each other twice in a season, home and away. Three teams are promoted from and relegated into Tier 3 while four teams are promoted from and relegated into Tier 4. Two teams are relegated from Tier 4 to be replaced by two teams from the National League as the fifth tier of English football.

Measured in terms of GDP per capita, the UK recession began in the fourth quarter of 2007 and lasted five quarters until the fourth quarter of 2008. The recession would have primarily impacted football clubs during the 2007/08 season and to some extent in the 2008/09 season, where a season lasts from August to May. Labour market indicators tend to lag behind GDP with persistent effects that vary considerably by locality according to age structure and occupational and industrial compositions of TTWAs. We define *PostRecession* in our data as seasons 2008/09, 2009/10 and 2010/11. The season directly impacted by recession, 2007/08 will be omitted from analysis.

Our choice of post-recession seasons is determined by consideration of Office for National Statistics (henceforth ONS) graph plots of GDP per capita and aggregate UK unemployment rate. These show relatively low GDP per capita and relatively high aggregate unemployment rate up to 2011, compared to pre-recession levels. ONS estimates that GDP per capita took five years to recover (in July to September 2013) to pre-recession levels. Given the sluggishness of economic recovery and persistently high unemployment after 2011

in most TTWAs we perform a robustness check below to extend our sample period to 2014/15.

A Travel to Work Area is a self-contained labour market where the majority of commuting occurs within the boundary of the area.[2] TTWAs are designed so that relatively few commuters cross TTWAs on their way to work. Criteria for defining a TTWA are: i) 75% of residents work in the area ii) 75% of people who work in the area also live in that area and iii) a minimum economically active population of 3,500.

TTWAs are reviewed every 10 years to reflect population movements and changes in commuting patterns. We use the 2001 edition which has 185 TTWAs in England and Wales. TTWAs vary considerably in population size and geographical area. Some clubs in our sample have stadium locations on the periphery of their towns or cities. However, we found no case where the TTWA of stadium location differed from the TTWA of town or city centre as defined by location of local authority main offices.

The largest TTWA by population and geographical area is London which includes all areas within the boundary of Greater London. Therefore, a single TTWA may contain multiple Football League clubs (Nottingham, Sheffield and Stoke are examples of TTWAs that each contain two clubs). Our regression models will include home team fixed effects to control for unobserved heterogeneity amongst clubs.

It is possible that Tier 3 and Tier 4 clubs are located in poorer areas that might be more susceptible than richer areas to high unemployment induced by the recession. To check

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[2] See https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/articles/traveltoworkareaanalysisingreatbritain/2016.

for this we obtained ONS data on per capita income by local authority. We performed a two sample t-test of means with unequal variances to test the null hypothesis that average income of local authorities containing Tier 3 and 4 football clubs (as at August 2006) was equal to average income of local authorities not containing Tier 3 or 4 clubs. The alternative hypothesis was that average income with clubs was less than average income without clubs.

The average income of local authorities with clubs was £13,959 and without clubs was £15,348. This difference was statistically significant ($p = 0.009$). Noting that incomes are somewhat higher in London, we removed London from the comparison. The average income with clubs was then £13,585 and without clubs was £14,214. This difference was no longer statistically significant at the conventional 5% level ($p = 0.065$). Hence, outside of London, Tier 3 and 4 clubs do not appear to be located in poorer areas. However, the contribution of London to income differences and the characteristic that London contains multiple clubs do point to a need to perform a robustness check on our empirical results where London is excluded from the analysis.

By using local TTWAs we are assuming that club support is based within the local TTWA. We acknowledge that some support may well come from outside the local TTWA but we consider the incidence of long-distance support to be small and unlikely to be of statistical or economic significance. Previous literature offers some evidence in support for this claim. Buraimo *et al*. (2009) modelled Tier 2 English Football League attendances in the 2000s. They defined a club's catchment area by a radial distance of 10 miles from the stadium. This was divided into two zones: 0 to 5 mile miles and 5 to 10 miles from the stadium to obtain homogeneity of travel costs from each zone. Using 2001 Census microdata, Buraimo *et al*. (2009) found that home club population from 0 to 5 miles was a statistically significant predictor of attendances while population from 5 to 10 miles was statistically

insignificant. Although the authors modelled Tier 2 attendances only, we predict similar results for Tiers 3 and 4. If anything, we expect fans of lower tier clubs to travel shorter distances than fans of typically larger Tier 1 and Tier 2 clubs. Even a 10 mile journey would still place fans of most clubs in our sample within the same TTWA as the stadium.

In order to estimate causal effects of recession on football club attendances, we require valid treatment and control groups. In estimation, we construct a dummy variable, *Treatment*, equal to one for clubs in the treatment group. We then interact *Treatment* with *PostRecession* to construct our focus variable, *Treatment*PostRecession.* Ideally, we would like to categorise a treatment group of clubs that was impacted by the recession and compare this with a control group which had no recessionary impact. However, very few TTWAs had zero growth in unemployment over the recession period 2007 to 2009. We categorise treatment and control group clubs according to the distribution of change in TTWA unemployment rates between August 2009 and August 2007. We map club stadium postcodes to contiguous TTWAs from the Office of National Statistics data base. Our control group will be clubs located within TTWAs that had 'small' changes in unemployment rate while our treatment group is formed of clubs within TTWAs that had 'large' changes in unemployment over the recession period. For valid inference in a difference-in-difference model we require the presence of common trends in attendances for treated and control groups in the counterfactual situation of no treatment (i.e absence of recession). This assumption cannot be tested, thus we provide graphical evidence of similar trends before treatment (i.e. before the recession), and we assume that those trends would have remained parallel in the counterfactual situation of no treatment.

To separate 'small' and 'large' changes in TTWA unemployment rates, we inspect the distribution of this variable and consider the common trends assumption according to different top and bottom N^{th} percentiles of the distribution, set at 15, 20 and 25.[3]

The top N^{th} percentile forms our treatment group of clubs while the bottom N^{th} percentile yields our control group. At lower percentiles, we expect the common trends assumption to be satisfied but sample sizes of treatment and control groups will be relatively small. The variation in unemployment rate will also be small and the control group clubs will have experienced small changes in unemployment, although not zero. At higher percentiles, it is likely that the common trends assumption may not hold and the variation in unemployment rate for control group clubs will be higher, although hopefully not overlapping with treatment group clubs. Sample sizes for treatment and control group clubs will be higher at larger threshold percentiles of the distribution of change in TTWA unemployment rate. Table 1 shows details of numbers of treatment and control group clubs and changes in unemployment rate for treatment and control group clubs by selected percentile thresholds.

INSERT TABLE 1 HERE

There is a tradeoff between validity of common trends and sample size. As thresholds increase, sample size rises but the common trends assumption is cast into doubt. The estimated coefficient on *Treatment*PostRecession* will be biased downwards because the control group has relatively large variation in unemployment rates.

To evaluate the common trends assumption we rely on graphical evidence similar to Bradley and Migali (2009). From the distribution of change in unemployment rates, we

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[3] We have tried all percentiles from the 5th to the 35th but we have decided to focus only on the 15th, 20th and 25th for the reasons explained in the text. The results are available upon request.

regress log attendance of treatment and control group clubs against year dummies with the 2007/08 recession season as baseline. Figure 1 shows graph plots of coefficients for Tier 3 and 4 clubs located in the Nth percentiles of change in TTWA unemployment, where N is 15, 20, and 25. We repeated the exercise for Tier 2, 3 and 4 clubs and this revealed similar looking graph plots.

INSERT FIGURE 1 HERE

Following Bradley and Migali (2019), we require that the treatment and control group clubs are closely aligned in Figure 1 and show constant, positive variation of less than 2% in pre-recession period (seasons 2003/04, 2004/05, 2005/06 and 2006/07). Our reading of Figure 1 is that the common trends assumption is valid for Tier 3 and 4 at the top and bottom 20% of the distribution of change in unemployment rate. When we bring Tier 2 clubs into consideration, the common trends assumption is still valid at the the same 20% threshold. For 15% threshold with Tier 3 and 4 clubs, the common trends assumption also holds but we argue that sample sizes drop unnecessarily. For the 25% threshold, the common trends assumption does not hold as the treatment and control group variations are not constant and the control group variation is in the negative region in 2004/05. The critical threshold margin is then 20%.

At the 20% threshold, the conditions of constant, positive variation in treatment and control group coefficients are satisfied. More concretely, when we switch from 20% to 25% threshold for Tier 3 and 4 clubs, we have the same number of treatment clubs (14) but the number of control group clubs rises from 16 to 20. We get a similar result when Tier 2 clubs are included. Moving to the 25% threshold creates greater variation in unemployment rates for the control group and the coefficient of *Treatment*PostRecession* will fall. Since we are

making a judgement based on reading of graph plots, we offer estimates of

*Treatment*PostRecession* for different thresholds as a sensitivity check (see Table 5).

Hence, we categorise the treatment group of clubs, *Treatment*, as those clubs in the

top 20% of the distribution of change in TTWA unemployment rate. The control group is the

set of clubs in the bottom 20%. For the English Football League as a whole, the mean

difference in unemployment rate is 2.5 and 1.4 percentage points, for treatment and control

groups respectively, and the two groups do not overlap. We proceed on the basis that the

treatment is the severity of recession as measured by the top 20% of distribution of TTWA

change in unemployment rate.

Figure 2 shows the geographical distribution of treatment and control group clubs

across England and Wales for Tiers 3 and 4. Treatment and control group clubs are

geographically spread throughout England and Wales and are not spatially concentrated,

subject to one notable exception revealed in Figure 2. We observe that the London TTWA

exhibits both a strong presence of control group clubs and complete absence of treatment

group clubs. To test whether the presence or absence of clubs in the London TTWA affects

our results we perform a robustness check below where London is removed from our sample.

INSERT FIGURE 2 HERE

Having set up our variables, *PostRecession* and *Treatment*, our regression model is

then:

$$Log\ A_{igt} = \alpha_i + \delta_t + \beta_1 Treatment_i + \boldsymbol{X_{igt}\gamma} + \beta_2 Treatment_i * PostRecession_t + \varepsilon_{igt} \qquad (1)$$

In (1), the subscripts i, g and t denote home team, game and season respectively. The

dependent variable, *Log A_{igt}*, is log matchday attendance in regular season, α_i represents home

team fixed effects and δ_t denotes season fixed effects. *PostRecession$_t$* is a dummy variable

coded one for post-recession seasons 2008/09, 2009/10 and 2010/11 and coded zero for pre-recession seasons 2003/04, 2004/05. 2005/06 and 2006/07. Results are exactly the same with or without the inclusion of a dummy variable for *PostRecession*; this is because *PostRecession* is perfectly correlated with season dummies after 2007/08.

X_{igt} is a vector of control covariates with γ denoting a vector of coefficients to be estimated. Our focus variable of interest is the interaction term *Treatment*PostRecession* which is coded one for a treatment team in the post-recession seasons and zero for control group teams in all seasons, and for treatment team in the pre-recession period. ε_{igt} is an error term with standard properties.

The DID estimator is the pooled OLS estimate of β_2, the coefficient of the interaction between *Treatment* and *PostRecession*. From section 2 above, we aim to test for $\beta_2 = 0$ as our null hypothesis, against $\beta_2 < 0$ as our alternative hypothesis.

We have a flexible regression-based estimator that includes relevant football specific covariates as controls. Since we use pooled data across various Tiers of the English Football League, each covariate is interacted with Tier dummy variables. Our control variables are defined as follows with descriptive statistics shown in Table 2. *Weekday* is a dummy variable coded one for games played on Monday, Tuesday, Wednesday, Thursday or Friday. *LogAttendanceLastSeason* is log home team average attendance in the previous season, included to capture habit effects. *HomeProb* and *HomeProbSquared* are probability of home win and its square calculated from betting odds where these are conjectured to be the most up to date and best available forecast of the home team's chances of winning a given match. Much attention has been devoted by sports economists to the outcome uncertainty hypothesis where attendance increases with home win probability but at diminishing rate with a possible turning point within sample (Buraimo and Simmons, 2008, 2009; Martins and Cro, 2018).

HomePerf and *AwayPerf* are the values of points per game accumulated in a season thus far for home and away teams respectively in a given match. *Distance* and *DistanceSquared* are distances in miles between stadia of home and away teams where we predict that increased distance deters away fans from attending games due to greater travel costs. *DistanceSquared* captures non-linearity in the effect of distance. *Derby* is a dummy variable representing games of local rivalry. *ChampsLeagueITV* and *ChampsLeagueSky* are dummy variables to denote concurrent broadcasts of midweek Champions' League games featuring English teams by terrestrial ITV or satellite Sky TV, respectively. Following Forrest and Simmons (2006) and Wallrafen *et al*. (2019) we predict that concurrent Champions League TV broadcasts will result in lower midweek attendances for Football League clubs.

INSERT TABLE 2 HERE

3. Results for Tiers 3 and 4

Table 3 reports raw match-level difference-in-difference estimates of the effect of *PostRecession* on the treatment teams in Tiers 3 and 4 in the sample, using a 20% threshold from the distribution of TTWA change in unemployment rate. For Tiers 3 and 4 we have 14 treatment clubs and 16 control group clubs identified in Figure 2. Recall that the pre-recession seasons are 2003/04 to 2006/07 while the post-recession seasons are 2008/09 to 2010/11. The 2007/08 season is omitted. The raw difference-in-difference estimator is given as:

$$[A_{ia} - A_{ib}|Treatment = 1] - [A_{ia} - A_{ib}|Treatment = 0] \qquad (2)$$

where A_i is mean attendance at team i and subscripts a and b denote pre-recession and post-recession periods respectively.

We observe a substantial reduction in attendances of treatment clubs relative to control group clubs for Tiers 3 and 4 and with 20% threshold for difference in unemployment rate. This recession-induced reduction in mean attendance is just over 2,000 or 33% of pre-recession treatment group value. The small rise in control group attendance reflects changes in club composition in Tiers 3 and 4 due to promotion and relegation. The raw estimate does not consider potentially confounding control variables. Nor does it include team and season fixed effects.

INSERT TABLE 3 HERE

We proceed to estimate equation (1) for Tiers 3 and 4 including home team, season and month fixed effects. The latter controls for variations in attendances by month of the season where we expect larger attendances early and later in the season (August, September, April and May), *ceteris paribus* (Forrest and Simmons, 2006). The fixed effects models always deliver jointly significant team coefficients. A Hausman test rejects the null hypothesis that the team fixed effects are uncorrelated with the regressors. Our model is estimated using panel corrected Prais-Winsten standard errors.[4] This estimator incorporates both heteroskedastic and contemporaneous correlation across club panels with an AR(1) process assumed for autocorrelation of the disturbance term (Forrest and Simmons, 2006).

In preliminary estimation we included just one additional control covariate, *log regional income*, but the coefficient on this variable was not statistically significant in any of the estimations shown here so this variable was dropped. Also in preliminary estimation, we included an additional interaction term *TreatmentAway*PostRecession* alongside *Treatment*PostRecession*. *TreatmentAway* is a dummy variable coded as one for away teams

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[4] xtpcse in Stata 16.

located in TTWAs with high increase in unemployment between 2007 and 2009. We hypothesise that some away fans may be deterred from travelling to games if they reside in areas adversely affected by recession. This hypothesis is not supported by the data. The coefficient on *TreatmentAway*PostRecession* was insignificant (at 10%) in all estimations shown here and again this variable was dropped from the models. Perhaps travelling away fans in the English Football League are sufficiently unaffected by recession to continue their away support, regardless of adverse labour market conditions in areas of the local clubs. Alternatively, the number of away travelling fans may be very small and with low variation, especially in lower Tiers of English football.

Column (1) of Table 4 reports estimates of our preferred model using the top and bottom 20% of the distribution of change in TTWA unemployment rate. Ceteris paribus, treatment group clubs in Tiers 3 and 4 have higher attendances than control group clubs on average. Our match-level control variables perform very much according to our priors. Games in Tier 4 (League Two) feature lower attendances than games in Tier 3 (League One). The coefficient on *weekday* is negative and significant for both Tiers 3 and 4. The coefficients on *LogHomeAttendanceLastSeason* are positive and statistically significant in each Tier. We see a larger coefficient, and hence greater habit persistence, for Tier 4 compared to Tier 3.

INSERT TABLE 4 HERE

For each Tier, we find that attendance falls with bookmaker-derived *ex ante* probability of home win. However, the coefficient on squared home win probability is positive; attendance falls at increasing rate with home win. The turning points for home win probability are 0.52 and 0.46 for Tiers 3 and 4 respectively, each within sample. Our estimated U-shaped relationship between attendance and home win probability is in line with

evidence from English Premier League and top divisions in Italy, Portugal and Spain (Buraimo and Simmons, 2008, 2009; Buraimo *et al.*, 2016; Martins and Cro, 2018). This result is contrary to the much-discussed uncertainty of outcome hypothesis in sports economics where home fans are conjectured to attend more as their teams show increased win probability but increases in attendance drop off and may even turn negative as home win probability rises. One rationale for the contrary U-shaped found in the literature and confirmed here is the loss aversion hypothesis proposed by Coates *et al.* (2014).

In line with intuition, coefficients on *HomePerf* and *AwayPerf* are positive and significant. Longer travel distances between opposing teams are associated with lower attendances but the effect is non-linear, again a standard result from the literature (Forrest and Simmons, 2006). *Derby* has a positive and significant coefficient for Tier 3 only. Tier 4 did not feature any matches of local rivalry through our sample period.

Consistent with other studies, live broadcasts of UEFA Champions' League games featuring English clubs are associated with lower Football League attendance for games played concurrently (Forrest and Simmons, 2006; Wallrafen *et al.*, 2019). Over our sample period, live broadcasts of Champions' League games were shared between free-to-air ITV and cable operator Sky TV. Each broadcast platform is associated with lower gate attendance in Tiers 3 and 4 with marginal effects of between 8.8% and 16.0%, using the formula $e^{\beta} - 1$, which we apply throughout for evaluation of marginal effects of dummy variables. For each Tier, we find a larger negative impact on attendances from free-to-air ITV broadcasts as opposed to Sky TV, probably due to the larger audience reach of the terrestrial platform. Overall, the results from our control variables give confidence in the plausibility of our estimates in Table 4, column (1).

Turning to our *Treatment*PostRecession* focus variable, we find a statistically significant negative effect of recession on attendances of treatment clubs i.e. those located in TTWAs with substantial increases in unemployment over the recession period, 2007 to 2009. From column (1), the point estimate of the average treatment on treated effect (ATT) for clubs in Tiers 3 and 4 is 10.5%. This is substantial although clearly considerably less than the raw DID effect shown in Table 3, but this simply illustrates the need to consider club and season fixed effects alongside sporting specific control covariates.

When potentially confounding control variables are included, we find that lower division football clubs located in TTWAs with large unemployment increases are not immune from recession. A recessionary shock on its own, independent of sporting performances, delivers lower gate attendances in treatment Tier 3 and Tier 4 clubs.

Szymanski (2017) highlights the greater risk of financial insolvency for teams in the English Football League, as opposed to English Premier League teams in receipt of large broadcast and sponsorship revenue streams. Szymanski argues that serially correlated shocks to sporting performance, including relegation to lower divisions, are root causes of financial insolvency (see also Scelles *et al*., 2018; Szymanski and Weimar, 2019). Our results point to an additional source of shock that might threaten insolvency, i.e. adverse external labour market conditions brought about by recession. Recessionary shocks can endanger clubs' balance sheets independently of any downturn in sporting performance.

We noted above from Figure 2 the absence of treatment clubs from the London TTWA and the strong presence of control group clubs in the same area. Ideally, we would like the geographical spread of treatment and control groups of clubs to be very similar. In this respect, the absence of treatment clubs from and concentration of control group clubs in the London TTWA provides threats to our identification strategy.

As a robustness check, we drop all seven control group clubs located in the London TTWA from our sample leaving nine control group clubs, based on the 20% threshold. We show estimates from the resulting sub-sample in Table 4, column (2). The key coefficient on *Treatment*PostRecession* remains statistically significant with a marginal effect on attendances of 6.5%, rather less than when London clubs are included.

The impacts of recessionary shock on attendance demand occur in two stages; first, the impact of recession on local labour markets and second, the effects of changes in unemployment on attendance choices by fans. These stages will be blurred if fans weigh expectations of unemployment and reduced earnings capability in their attendance demand decisions. The impacts of recession on attendance demand will vary across localities with differential impacts through time according to the speed of recovery of local labour markets. The 2007-09 recession resulted in lingering adverse labour market effects afterwards with very sluggish recovery in many localities. This would suggest that the impacts of recessionary shock on club attendance demand might be long lasting.

The sample used for our main estimates in Table 4, column (1) stops at 2010/11. In a further robustness check, we extend the post-recession period to finish at 2014/15. This will take account of any lingering, persistent effects of recession on club attendances some time after the recession was over. According to ONS, recovery of economic activity and employment from recession was slow and that it took five years (up to 2013) for economic activity to return to pre-recession (2007) levels. The persistent impacts of recession on some local labour markets in England and Wales could have sustained the adverse impacts of recession on club attendances long after the 2007/08 recession season. Given that unemployment lags behind economic activity by up to two years, we take 2014/15 as a revised final season.

The resulting sample period is 2003/04 to 2014/15 and estimates are shown in column (3). The marginal effect of *Treatment*PostRecession* remains statistically significant although lower than our main estimate, 5.4% down from 10.5%. This suggests that the 2007 to 2009 recession did indeed have long-lasting, rather than just temporary, adverse effects on attendance demand for treatment clubs although the impact is less over the longer time period reflecting the varying extent and timing of recovery of local areas from the recession.

Our treatment and control groups of clubs thus far use a 20% threshold from the TTWA distribution of change in unemployment rate. The threshold was chosen to deliver a sharp demarcation between treatment and control groups in terms of change in unemployment over the recession period. As noted in Section 3 above as the threshold for top and bottom percentiles of the distribution of TTWA change in unemployment is raised so more treatment and control group clubs are admitted into the samples for estimation and the coefficient on *Treatment*PostRecession* should fall. This is indeed what happens, as shown in Table 5. At the 15% threshold the marginal effect of *Treatment*PostRecession* is 10.1% close to the estimate at the 20% threshold. The small numbers of treatment and control group clubs in the 15% case give rise to concern over generalisation of our results and we prefer the estimates in Table 4, column (1) that use the 20% threshold. At the 25% threshold, the marginal effect of *Treatment*PostRecession* is 8.4%, slightly less than 10.5% in the preferred estimate at 20% threshold and still statistically significant. However, we should recall that thresholds of 25% and greater violate the common trends assumption. We conclude that our estimates vary across thresholds in the predicted manner and note that they are always statistically significant.

INSERT TABLE 5 HERE

To further assess the validity of our main model, we perform a placebo test assuming that the recession took place in 2006. Thus, we consider the variation in unemployment rate between 2005 and 2007, and we select the treatment and control group TTWAs belonging to the top 20% and bottom 20% of this unemployment variation, respectively. We then merge the attendance data and we are able to identify the revised sets of clubs included in the treatment and control groups. We use the same specification as in column 1 of Table 4 and we estimate the new model, restricting to the seasons between 2004 and 2008, before the "real" recession took place, and we exclude the season 2006. As expected, the coefficient of the interaction term *Treatment*PostRecession* is not statistically significant when using Tiers 3 and 4 (p value = 0.33). This result gives us more confidence in the validity of our main estimations.

4. Results for Tiers 2, 3 and 4

Next we bring Tier 2 (Championship) clubs into the analysis with estimates reported in Table 6. Tier 2 has a broadcast rights deal with Sky TV, with very little access for Tier 3 and 4 teams, while those Tier 2 clubs that were relegated from Tier 1 (Premier League) bring with them a financial cushion in the form of 'parachute payments' from the far more lucrative Premier League TV rights deal. Tier 2 clubs tend to be larger in market size and typically have longer histories as professional football clubs than those in Tiers 3 and 4.

Hence, Tier 2 has quite distinct characteristics from Tiers 3 and 4 and these are reflected in long-term attendance per club variations where the time-series pattern for Tier 2 more resembles Tier 1 than Tiers 3 and 4. The reward for successful sporting performance in Tier 2 is promotion to the Premier League, which is awarded to three teams out of 24 each season. The importance of this prize might confer some immunity of fan support from

adverse labour market conditions created by recession. Fans of Tier 2 clubs might also exhibit greater attachment loyalty to their teams. Their attendance behaviour patterns might be more influenced by sporting variables than economic conditions, especially in comparison to Tiers 3 and 4.

INSERT TABLE 6 HERE

Essentially, we might expect treatment club attendances in Tier 2 to be less responsive to recessionary shock than treatment clubs in Tiers 3 and 4. From Table 6, we find little evidence for this claim. Regressions of log attendance on season dummies continue to offer support for the common trends hypothesis using the top and bottom 20th percentiles to define treatment and control group clubs. With Tier 2 included, our procedure delivers 22 treatment group clubs and 19 control group clubs. The impacts of control covariates are not much different when Tier 2 clubs are included. The marginal effect of *Treatment*PostRecession* goes down only slightly from 10.5 percent to 9.4 percent when Tier 2 treatment and control group clubs are included using the 20% threshold. From Table 5 column 2, this result is not sensitive to cutoffs at 25%, at which threshold the common trends assumption is again violated. From Table 6, columns 2 and 3, we see that the marginal effect of *Treatment*PostRecession* is 6.1 per cent with London clubs excluded and 5.7 per cent when the sample period is extended to 2014/15, a similar pattern to the sample without Tier 2. Our results therefore appear to be robust to the inclusion of Tier 2 clubs.

To check robustness further, we consider Tier 2 clubs on their own with regression results reported in Table 7. The 20% threshold for change in unemployment is again applied as this continues to support common trends. The key marginal effect of *Treatment*PostRecession* is 7.9 per cent, less than for Tiers 3 and 4 but still substantial and still significant at the 1% level. When we perform our robustness checks for exclusion of

London TTWA and extended sample period, the patterns of marginal effects are as before for Tiers 3 and 4 with average treatment of treated impacts of 6.2% and 5.7%, respectively. Hence, we conclude that, considered on their own, Tier 2 club attendances were also adversely and substantially affected by the Great Recession.

INSERT TABLE 7 HERE

As a further robustness check, we perform the same placebo test as above in Section 4, where the recession is supposed to happen in 2006, with Tiers 2 to 4 included. Similar to Tiers 3 and 4, the coefficient of the interaction term *Treatment*PostRecession* is not statistically significant when using Tiers 2, 3 and 4 (p value = 0.24). The coefficient actually becomes positive and significant when we restrict estimation to Tier 2 only (p value = 0.044). These results reinforce confidence in our estimates.

5. Conclusion

We have investigated the impact of the 2007-09 recession on attendance demand in the English Football League. We identified causal effects of variations in local unemployment rates on club matchday attendances using a difference-in-difference methodology applied to specific treatment and control group clubs categorised according to severity of local unemployment increase during the recession period. We found that treatment clubs in tiers 3 and 4 suffered a substantial attendance reduction of 10.5% purely through rising unemployment in local areas close to clubs' stadia after controlling for a large set of confounding influences. This effect was smaller, around 5% to 7%, but still statistically significant in alternative specifications. When Tier 2 clubs were included, the impact of recession on attendance was only slightly less, at 9.4% in our preferred estimation.

We regard our difference-in-difference method to be superior to inclusion of local unemployment rate as an additional covariate in an attendance demand model estimated by ordinary least squares. Such a model delivers just a single estimate of impact of unemployment that represents correlation rather than causation. That approach is unwarranted when impacts of recession on local labour markets vary considerably within and between standard UK economic regions. Our approach was to categorise treated clubs as those located in areas with greatest exposure to the 2007 to 2009 recessionary shock. Classification of treatment and control group clubs facilitates causal estimation using the difference-in-difference method where we have evidence in support of the underlying common trends hypothesis.

Our analysis cuts through regional stereotypes. The treated clubs cover most of England and Wales although they are absent from London and the South East. The North West region is a good example of the heterogeneity of labour market effects from the recession. This region contains both treatment and control group clubs. Oldham Athletic and Rochdale are treatment clubs while Morecambe is a member of the control group.

The current recession induced by the Covid-19 pandemic represents an entirely different experience to the financial crisis of 2007-09. During the pandemic, football ceased to operate during lockdowns in virtually all countries where football is played professionally (with the curious exception of Belarus). We consider that our empirical method of assigning clubs to treatment and control group clubs according to local variations in unemployment rate carries over to analysis of the effects of the Covid-19 pandemic on European football attendances. As football resumes after the Covid-19 pandemic with fans again present at stadia, we recommend our method as means of estimating the effects of Covid-19 induced

recession on attendance demand in the financially fragile English Football League and for other leagues more generally.

In recent years, several English Football League clubs have suffered relegation due to points deduction penalties associated with financial failure. If a club goes into administration the team incurs a 12 point penalty which can lead directly to relegation (Bolton, Macclesfield and Wigan are recent examples). Bury FC was wound up and exited the League due to bankruptcy. Recessionary shocks can compound problems of financial failure and corporate governance in League clubs. Presently, the Football League receives two forms of financial subsidy from the Premier League: 'parachute' payments specifically for clubs relegated from the Premier League and more general 'solidarity payments' spread amongst League clubs (Wilson *et al*., 2018; Wilson *et al*., 2020). Our results suggest a further source of financial difficulty for clubs through impacts of rising unemployment that reinforces the need for stronger financial regulation in the Football League. Moreover, there is a case for making payments from the Premier League more nuanced with targeting towards clubs that are expected to be financially vulnerable to adverse external economic conditions.

Supplementary material

Supplementary material is available online at the OUP website. These are the data and replication files.

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Figure 1 Assessing the common trends assumption for Tiers 3 and 4, 2003/04 to 2010/11.
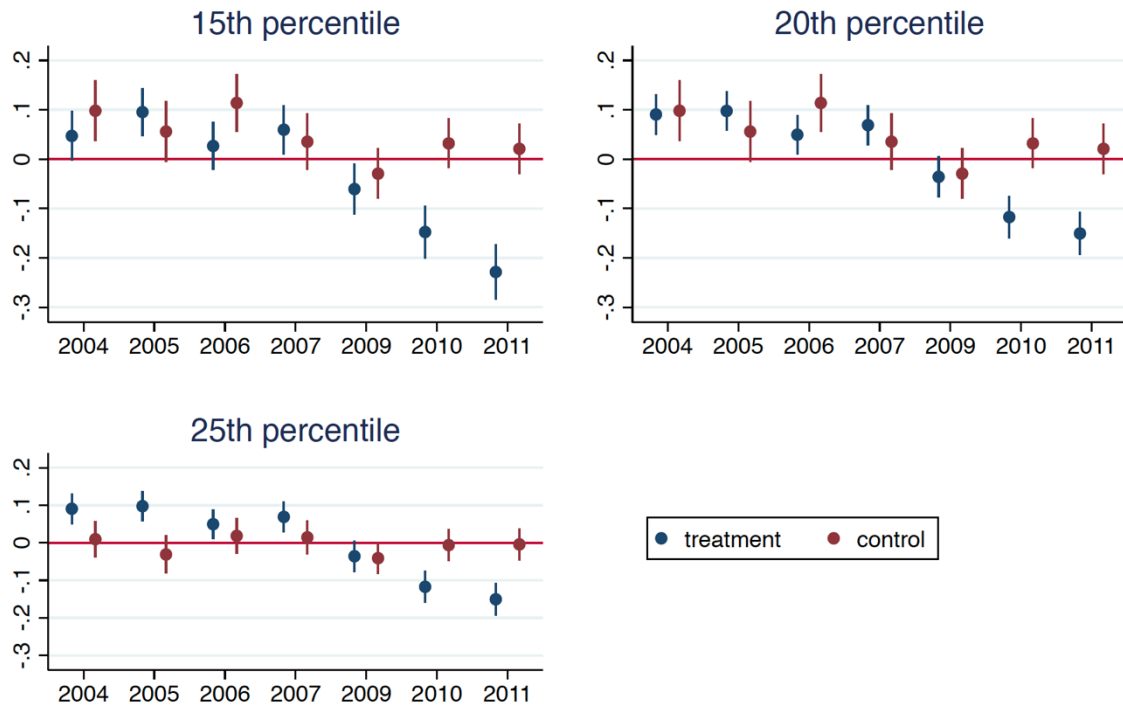
Figure 2 Tiers 3 and 4 treatment and control group clubs in England and Wales; 20% threshold of distribution of difference in unemployment rate.
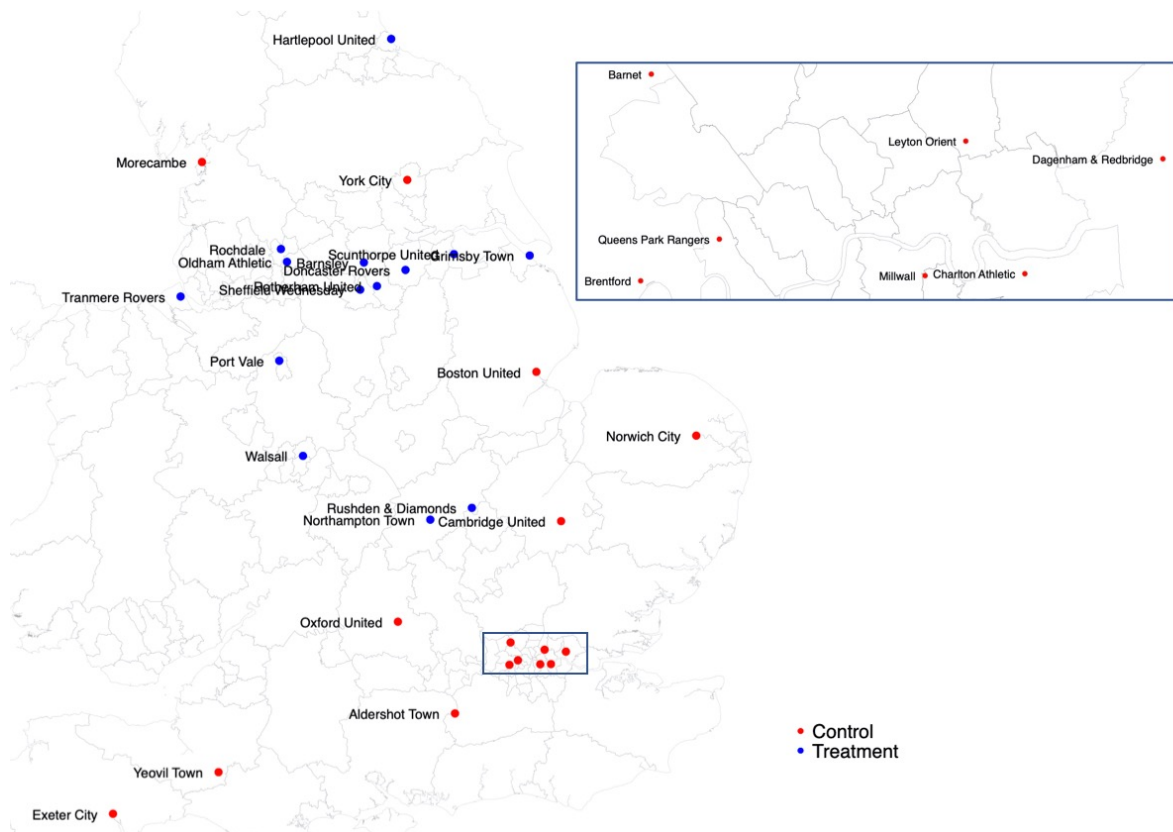
Table 1 Numbers of treatment and control group clubs at selected thresholds of distribution of difference in unemployment rate

	15% threshold	20% threshold	25% threshold
Tiers 3 and 4			
Difference in unemployment rate; treatment	2.61	2.52	2.52
Difference in unemployment rate; control	1.33	1.33	1.38
N treatment clubs	9	14	14
N control group clubs	16	16	20
N treatment TTWAs with clubs	9	11	11
N control TTWAs with clubs	10	10	14
Tiers 2, 3 and 4			
Difference in unemployment rate: treatment	2.62	2.52	2.53
Difference in unemployment rate: control	1.36	1.36	1.39
N treatment clubs	15	22	22
N control group clubs	19	19	24
N treatment TTWAs with clubs	13	16	16
N control TTWAs with clubs	11	11	16

Source: Authors' calculations.

Table 2 Descriptive statistics of variables. 20% threshold of distribution of difference in unemployment rate for Tiers 3 and 4; N = 2859.

Variable	Mean	Standard deviation	Minimum	Maximum
LogAttendance	8.488	0.530	7.133	10.286
LnAttendanceLastSeasonTier3	5.037	4.350	0.000	10.108
LnAttendanceLastSeasonTier4	3.498	4.069	0.000	8.748
Treatment*PostRecession	0.220	0.414	0	1
Tier3	0.574	0.495	0	1
Tier4	0.426	0.495	0	1
Weekday	0.290	0.454	0	1
September	0.114	0.317	0	1
October	0.112	0.316	0	1
November	0.076	0.264	0	1
December	0.099	0.299	0	1
January	0.107	0.309	0	1
February	0.114	0.318	0	1
March	0.130	0.336	0	1
April/May	0.159	0.366	0	1
HomeProbTier3	0.248	0.224	0.000	0.767
HomeProbTier4	0.187	0.223	0.000	0.731
HomePerfTier3	0.772	0.732	0.000	3.000
HomePerfTier4	0.573	0.732	0.000	3.000
AwayPerfTier3	0.793	0.767	0.000	3.000
AwayPerfTier4	0.582	0.738	0.000	3.000
DistanceTier3	66.804	75.697	0.000	322.066
DistanceTier4	44.480	62.782	0.000	306.948
DerbyTier3	0.002	0.042	0	1
Tier3ChampsLeagueITV	0.030	0.172	0	1
Tier4ChampsLeagueITV	0.021	0.142	0	1
Tier3ChampsLeagueSKY	0.024	0.152	0	1
Tier4ChampsLeagueSKY	0.013	0.113	0	1

Source: Authors' calculations. Attendance figures are from various editions of the Rothmans/Sky Sport football year book and www.transfermarkt.com.

Table 3 Raw Difference in Difference. Average attendances 2003/04 to 2010/11 for control and treatment clubs; tiers 3 and 4; 20% threshold.

	Statistic	Pre-recession	Post-recession	Difference
Treatment	Mean N	6,302.40 1078	4,874.19 629	-1,428.20
Control	Mean N	5,214.14 543	5,863.72 609	649.58
Difference-in-difference	Mean			-2,077.78

Source: Authors' calculations.

Table 4 Regression results. Dependent variable is log attendance for tiers 3 and 4 using panel corrected standard error (PCSE) with AR(1) disturbances; 20% threshold.

	(1)		(2)		(3)	
	Coefficient	$|t|$	Coefficient	$|t|$	Coefficient	$|t|$
Treatment	0.0345**	(2.465)	0.049***	(3.134)	0.025*	(1.786)
Treatment*PostRecession	-0.111***	(5.413)	-0.067***	(2.829)	-0.056***	(3.131)
Tier4	-0.806***	(3.114)	-0.259	(0.764)	-0.597**	(2.553)
Weekday	-0.0293***	(3.299)	-0.019**	(2.023)	-0.036***	(4.454)
LnAttendanceLastSeasonTier3	0.929***	(68.688)	0.979***	(71.755)	0.916***	(73.336)
LnAttendanceLastSeasonTier4	0.985***	(44.694)	0.975***	(28.794)	0.978***	(50.822)
HomeProbTier3	-3.080***	(9.280)	-3.130***	(8.785)	-2.120***	(8.651)
HomeProbSquaredTier3	2.940***	(7.964)	2.900***	(7.322)	2.090***	(7.732)
HomeProbTier4	-1.240**	(2.302)	-1.620***	(2.801)	-1.280***	(3.229)
HomeProbSquaredTier4	1.360**	(2.339)	1.730***	(2.797)	1.440***	(3.231)
HomePerfTier3	0.133***	(7.799)	0.122***	(6.554)	0.158***	(11.414)
HomePerfTier4	0.089***	(5.357)	0.092***	(4.810)	0.085***	(6.033)
AwayPerfTier3	0.044***	(3.862)	0.038***	(3.333)	0.060***	(6.050)
AwayPerfTier4	0.064***	(3.877)	0.060***	(3.602)	0.0537***	(4.143)
DistanceTier3	-0.002***	(13.641)	-0.003***	(13.453)	-0.003***	(17.832)
DistanceSquaredTier3/1,000	0.006***	(8.907)	0.007***	(9.210)	0.007***	(11.916)
DistanceTier4	-0.005***	(13.877)	-0.005***	(13.520)	-0.004***	(16.987)
DistanceSquaredTier4/1,000	0.015***	(10.346)	0.016***	(10.113)	0.013***	(13.066)
DerbyTier3	0.218***	(3.887)	0.203***	(3.645)	0.240***	(4.384)
Tier3ChampsLeagueITV	-0.148***	(7.650)	-0.156***	(7.660)	-0.141***	(9.531)
Tier4ChampsLeagueITV	-0.136***	(5.709)	-0.131***	(5.205)	-0.168***	(9.692)
Tier3ChampsLeagueSKY	-0.084***	(3.907)	-0.087***	(3.695)	-0.095***	(5.035)
Tier4ChampsLeagueSKY	-0.119***	(3.691)	-0.128***	(3.790)	-0.127***	(4.772)
Constant	1.280***	(9.698)	0.907***	(6.505)	1.110***	(10.022)
Observations	2859		2408		4593	
R^2	.996		.996		.995	

Models (1) & (2) 2003/04-2010/11; model (2) excludes London clubs; model (3) 2003/04-2014/15; models with home team fixed effects, month and season dummies. $^{*} p < 0.1$, $^{**} p < 0.05$, $^{***} p < 0.01$.
Source: Authors' calculations.

Table 5 Sensitivity checks for different thresholds of TTWA change in unemployment rate.

Tiers	Threshold (%)	Coefficient	$|t|$	Marginal effect	Observations
3 and 4	15	-0.106***	4.619	-0.101	2,299
	20	-0.111***	5.413	-0.105	2,859
	25	-0.088***	5.240	-0.084	3,285
2, 3 and 4	15	-0.120***	6.878	-0.113	3,582
	20	-0.099***	6.814	-0.094	4,503
	25	-0.076***	6.264	-0.074	5,176

AR(1) models with home team fixed effects, month and season dummies.
Source: Authors' calculations

Table 6 Regression results. Dependent variable is log attendance for tiers 2, 3 and 4 using panel corrected standard error (PCSE) with AR(1) disturbances; 20% threshold.

	(1)		(2)		(3)	
	Coefficient	$|t|$	Coefficient	$|t|$	Coefficient	$|t|$
Treatment	0.018	(1.587)	0.013	(0.992)	0.011	(0.905)
Treatment*PostRecession	-0.099***	(6.814)	-0.063***	(3.280)	-0.053***	(3.481)
Tier3	-0.763***	(4.183)	-1.049***	(4.980)	-0.877***	(5.688)
Tier4	-1.656***	(6.106)	-1.447***	(3.981)	-1.522***	(7.639)
Weekday	-0.030***	(4.443)	-0.020***	(2.846)	-0.033***	(5.336)
LnAttendanceLastSeasonTier2	0.818***	(61.475)	0.828***	(53.103)	0.813***	(76.587)
LnAttendanceLastSeasonTier3	0.929***	(74.075)	0.975***	(77.733)	0.919***	(72.657)
LnAttendanceLastSeasonTier4	0.993***	(44.871)	0.986***	(28.934)	0.986***	(49.423)
HomeProbTier2	-1.147***	(3.993)	-1.163***	(3.423)	-0.792***	(3.912)
HomeProbSquaredTier2	0.982***	(3.265)	0.991***	(2.799)	0.738***	(3.392)
HomeProbTier3	-3.044***	(9.158)	-3.079***	(8.498)	-2.119***	(8.585)
HomeProbSquaredTier3	2.888***	(7.852)	2.810***	(6.969)	2.072***	(7.668)
HomeProbTier4	-1.219**	(2.264)	-1.623***	(2.784)	-1.297***	(3.243)
HomeProbSquaredTier4	1.346**	(2.319)	1.733***	(2.784)	1.469***	(3.255)
HomePerfTier2	0.058***	(4.623)	0.041**	(2.563)	0.075***	(6.717)
HomePerfTier3	0.130***	(7.816)	0.118***	(6.277)	0.159***	(11.624)
HomePerfTier4	0.090***	(5.386)	0.095***	(4.793)	0.089***	(6.108)
AwayPerfTier2	0.021***	(2.757)	0.016*	(1.860)	0.033***	(5.142)
AwayPerfTier3	0.042***	(3.790)	0.033***	(2.982)	0.058***	(5.869)
AwayPerfTier4	0.063***	(3.860)	0.060***	(3.546)	0.053***	(4.120)
DistanceTier2	-0.001***	(7.784)	-0.001***	(6.164)	-0.002***	(10.635)
DistanceSquaredTier2/1,000	0.003***	(4.656)	0.003***	(3.603)	0.004***	(6.331)
DistanceTier3	-0.003***	(13.479)	-0.003***	(12.945)	-0.003***	(17.663)
DistanceSquaredTier3/1,000	0.006***	(8.788)	0.007***	(8.794)	0.007***	(11.870)
DistanceTier4	-0.005***	(13.728)	-0.005***	(13.513)	-0.004***	(16.685)
DistanceSquaredTier4/1,000	0.015***	(10.251)	0.016***	(10.054)	0.013***	(12.792)
DerbyTier2	0.096***	(4.474)	0.105***	(4.400)	0.090***	(5.405)
DerbyTier3	0.215***	(3.881)	0.201***	(3.661)	0.240***	(4.441)
Tier2ChampsLeagueITV	-0.044***	(3.565)	-0.040***	(2.799)	-0.060***	(5.808)
Tier3ChampsLeagueITV	-0.148***	(7.862)	-0.158***	(7.781)	-0.145***	(10.026)
Tier4ChampsLeagueITV	-0.134***	(5.622)	-0.129***	(5.122)	-0.169***	(9.971)
Tier2ChampsLeagueSKY	-0.055***	(3.562)	-0.058***	(2.864)	-0.055***	(4.308)
Tier3ChampsLeagueSKY	-0.081***	(3.809)	-0.080***	(3.422)	-0.093***	(5.001)
Tier4ChampsLeagueSKY	-0.116***	(3.545)	-0.121***	(3.583)	-0.125***	(4.698)
Constant	2.051***	(14.719)	2.010***	(12.410)	1.967***	(19.325)
Observations	4503		3626		7115	
R^2	0.996		0.996		0.996	

Models (1) & (2) 2003/04-2010/11; model (2) excludes London clubs; model (3) 2003/04-2014/15; models with home team fixed effects, month and season dummies. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Source: Authors' calculations.

Table 7 Regression results. Dependent variable is log attendance for tiers 2 only using panel corrected standard error (PCSE) with AR(1) disturbances; 20% threshold.

	(1)		(2)		(3)	
	Coefficient	$|t|$	Coefficient	$|t|$	Coefficient	$|t|$
Treatment	-0.008	(0.435)	-0.082***	(4.955)	-0.015	(0.821)
Treatment*PostRecession	-0.082***	(4.260)	-0.064***	(3.060)	-0.059***	(3.027)
Weekday	-0.030***	(3.639)	-0.019*	(1.920)	-0.031***	(4.504)
LnAttendanceLastSeasonTier2	0.813***	(56.461)	0.783***	(51.726)	0.795***	(67.321)
HomeProbTier2	-1.194***	(4.172)	-1.257***	(3.811)	-0.823***	(3.922)
HomeProbSquaredTier2	1.032***	(3.440)	1.107***	(3.224)	0.775***	(3.467)
HomePerfTier2	0.063***	(5.114)	0.055***	(3.703)	0.073***	(6.946)
AwayPerfTier2	0.022***	(2.819)	0.020**	(2.180)	0.033***	(5.204)
DistanceTier2	-0.001***	(7.827)	-0.001***	(6.819)	-0.002***	(10.657)
DistanceSquaredTier2/1,000	0.003***	(4.627)	0.003***	(3.982)	0.004***	(6.412)
DerbyTier2	0.090***	(4.472)	0.092***	(4.068)	0.082***	(5.089)
Tier2ChampsLeagueITV	-0.045***	(3.355)	-0.046***	(2.900)	-0.065***	(5.698)
Tier2ChampsLeagueSKY	-0.048***	(3.252)	-0.050***	(2.752)	-0.054***	(4.280)
Constant	2.105***	(14.253)	2.462***	(15.033)	2.149***	(17.802)
Observations	1644		1218		2522	
R^2	0.997		0.997		0.998	

Models (1) & (2) 2003/04-2010/11; model (2) excludes London clubs; model (3) 2003/04-2014/15; models with home team fixed effects, month and season dummies. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Source: Authors' calculations.