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RECESSION ON SPORT:
EVIDENCE FROM ENGLISH
FOOTBALL LEAGUE
ATTENDANCE DEMAND**

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**IMPACTS OF THE GREAT RECESSION ON SPORT: EVIDENCE FROM
ENGLISH FOOTBALL LEAGUE ATTENDANCE DEMAND**

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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 around 9 per cent purely through rising unemployment in local areas close to clubs' stadia after controlling for a large set of confounding influences. This result is robust to several alternative specifications.

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 (Cainelli et al., 2019; Fingleton et al. 2012; Kitsos and Bishop, 2018). 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 (Buraimo et al, 2016; Boeri and Severgnini, 2014). 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 lack access to lucrative broadcast rights fees and large commercial sponsorships and are more reliant on gate receipts. Many clubs in lower divisions in European football are at risk of insolvency (Scelles et al., 2018; Szymanski, 2017 and Szymanski and Weimar, 2019). This insolvency risk could simply reflect poor club management and poor on-field team performances relative to expectations. But the risk of insolvency could also be heightened by adverse labour market conditions induced by recessionary shock.

If increased local unemployment transmits 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.

We use TTWA unemployment rate data to construct treatment and control groups of English Football League teams according to size of increase in unemployment rate through the recession period of 2007 to 2009. We find that treatment clubs in tiers 3 and 4 suffered an attendance reduction of 9 per cent purely through rising unemployment in local areas close to clubs' stadia after controlling for a large set of confounding influences. This result is robust to several 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. Section 5 concludes.

2. 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 (Alegre and Pou, 2016; Smeral, 2010). 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, Zygmunt 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 per cent out of 6.7 per cent 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 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 significant from zero. The alternative hypothesis states that the local average treatment effect 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 (Buraimo et al., 2016; Coates and Humphreys, 2012; Coates et al., 2014; Forrest and Simmons, 2006; Martins and Cro, 2018).

3. Econometric model and data

We aim to identify the causal effect of the 2007 to 2009 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.

Our construction of treatment and control groups follows Bradley and Migali (2019). 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. To construct the categories, we map club stadium postcodes to contiguous TTWAs from the Office of National Statistics data base. In practice, very few British TTWAs were not impacted by the recession in the strict sense that they had zero change in unemployment rate between 2007 and 2009. Therefore, we construct our control group of teams from those clubs located within TTWAs that had ‘small’ changes in unemployment rate while our treatment group is formed of clubs that had ‘large’ changes in unemployment over the recession period.

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.

Given this timing, for each club present in the 2007/08 and 2008/09 English Football League seasons we compute the matched TTWA difference in unemployment rate between August 2007 and August 2009. We then categorise the treatment group of clubs, *Treat*, as

those clubs in the top 25 percent of the distribution of change in unemployment rate. The control group is the set of clubs in the bottom 25 per cent. 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. Crucially, the minimum treatment group difference in unemployment rate is 2.3 percentage points while the maximum control group difference in unemployment rate is 1.5 percentage points so the groups do not overlap. The treatment is then the severity of recession which affects virtually all club TTWAs but to different degrees.

Figure 1 shows the geographical distribution of treatment and control group clubs across England and Wales. 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 1. We observe that the Greater London area 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 Greater London area affects our results we perform a robustness check below where Greater London is removed from our sample. As a further robustness check we match clubs in treatment and control group categories on the basis of observed recent League standings. We perform a pre-selection of the sample using pre-recession data and then estimate our model using the reduced sets of treatment and control group clubs.

INSERT FIGURE 1 HERE

Having set up our variables, *PostRecession* and *Treat*, our regression model is then:

$$\text{Log } A_{igt} = \alpha_i + \delta_t + \beta_1 \text{Recession}_{it} + \mathbf{X}_{igt}\boldsymbol{\gamma} + \beta_2 \text{Treat} * \text{PostRecession} + \varepsilon_{igt} \quad (1)$$

In (1), the subscripts *i*, *g* and *t* denote team, game and season respectively. The dependent variable, *Log A_{igt}*, is log matchday attendance, α_i represents team fixed effects and δ_t denotes

season fixed effects. $PostRecession_{it}$ 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. We do not include a dummy variable for $Treat$ as this would be subsumed under team fixed effects. 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 $Treat*PostRecession$ which is coded one for a treated team in the post-recession seasons and zero for control group teams in all seasons, and for treated 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 $Treat$ and $PostRecession$. We exploit the panel structure of the data by using team and season fixed effects. 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 Tiers 3 and 4 of the English Football League, each covariate is interacted with Tier dummy variables. Our control variables are defined as follows with descriptive statistics for continuous variables shown in Table 1. $Weekday$ 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, 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.

TABLE 1 HERE

The validity of the DID estimator of equation (1) rests upon the 'common trends hypothesis'. This states that the time effects δ_t are similar for treated and control group teams. There is no formal test available for this assumption, but we follow Bradley and Migali (2019) by setting up some graphical evidence. For treated and control group clubs, in Tiers 3 and 4, we plot the variation in attendance by season between 2003/04 and 2010/11, with the recession season 2007/08 as reference category. In Figure 2, we show the variation for the clubs on the 25 per cent threshold of change in unemployment rate. Before 2007/08, treatment and control groups of teams are closely aligned, exhibiting a positive variation in attendance of no more than 1%. After 2007/08, we observe a considerable divergence, as treatment group attendance declines while the control group attendance variation remain stable at zero. This evidence supports the validity of the common trends hypothesis in our setting.

FIGURE 2 HERE

4. Results

Table 2 reports raw match-level difference-in-difference estimates of the effect of *PostRecession* on the treated teams in Tiers 3 and 4 in the sample, using a 25 percent cutoff from the distribution of TTWA change in unemployment rate. For Tiers 3 and 4 we have 14 treated clubs and 20 control group clubs. 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:

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

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 treated clubs relative to control group clubs. This recession-induced reduction is 29%. However, this estimate does not consider potentially confounding control variables. Nor does it include team and season fixed effects.

INSERT TABLE 2 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).

Column (1) of Table 3 reports estimates of our preferred model. In pre-estimation we included just one additional control covariate, *log regional income*, but the coefficient on this variable was not statistically significant so this variable dropped from subsequent estimations. 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 3 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 0.44 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 et al., 2016; Buraimo and Simmons, 2008, 2009; Martins and Cro, 2018). This result is contrary to the much-discussed uncertainty of outcome hypothesis in sports

⁴ `xtpcse` in Stata 16.

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. Each broadcast platform is associated with lower gate attendance in Tiers 3 and 4 with marginal effects of between 8.9 and 14.3 per cent, using the formula $\exp(\text{coefficient}) - 1$. For Tier 4 especially, we find a larger negative impact on attendances from free-to-air ITV broadcasts as opposed to SKY, 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 3, column (1). Turning to our *Treat*PostRecession* focus variable, we find a statistically significant negative effect of recession on attendances of treated 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 9.2 per cent, using the formula $\exp(\beta) - 1$. This is

substantial although clearly considerably less than the raw DID effect shown in Table 2, 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 treated Tier 3 and Tier 4 clubs. Moreover, in the longer term, many fans lose the habit of attending games after the recession has passed and this loss of habit leads to further attendance reductions in subsequent seasons. Noting the larger habit effect in Tier 4 compared to Tier 3 from our estimates, Tier 4 teams that already have low attendances will not recover attendance growth fully in a later period of economic recovery.

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: adverse external labour market conditions brought about by recession. Recessionary shocks can endanger clubs' balance sheets independently of any downturn in sporting performance.

Robustness checks

We estimate seven further regression models as variants of equation (1) as robustness checks. First, we include an additional interaction term $TreatAway*PostRecession$ alongside $Treat*PostRecession$. $TreatAway$ is a dummy variable coded as one for away teams 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. In estimates of equation (1), identical in coverage of variables to Table 3 Column (1) but not reported for brevity we find the coefficient on *TreatAway*PostRecession* is imprecisely estimated as -0.026 with *p* value of 0.102. 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.

We noted above from Figure 1 the absence of treatment clubs from the Greater London area 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 treated clubs from and concentration of control group clubs in the Greater London area provide threats to our identification strategy.

As a robustness check, we drop all nine control group clubs located in the Greater London area from our sample. We show estimates from the resulting sub-sample in Table 3, column (2) with 11 remaining control group clubs. The key coefficient on *Treat*PostRecession* remains statistically significant with a marginal effect on attendances of 4.8 per cent, rather less than when London clubs are included.

Since the representation of London clubs might signal a disparity in observed characteristics of treatment and control group clubs, we further refine our 25% threshold sample using a reweighing approach. We exploit the observed average league positions over five seasons prior to the recession season of 2007/08, to estimate a logit model on the probability of being treated, and we compute the inverse probability weighting (the inverse of

the propensity score)⁵. An initial test to assess the balance between treated and control shows a large standardized difference in the average league position. We repeat the test using the inverse probability weighting to balance the treatment groups and we observe a drastic reduction of the standardized difference. Hence, we re-estimate a weighted version of equation (1) using the inverse probability weighting. When this approach is applied to our sample of Tier 3 and 4 clubs, and with inclusion of the same control covariates as for Table 3, the key coefficient on *Treat*PostRecession* is -0.049 and is statistically significant at the one per cent level (*t* statistic of 3.25). This is further demonstration of robustness of our results.

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 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 3, column (1) stops at 2010/11. In a further robustness check, we extend the post-recession period to finish at 2014/15. The resulting sample period is 2003/04 to 2014/15 and estimates are shown in column (3). The

⁵ Data on other club characteristics, such as payrolls or revenues, are not available for many teams in Tiers 3 and 4, thus a propensity score matching approach cannot be fully performed.

marginal effect of *Treat*PostRecession* remains statistically significant although lower than our main estimate, 3.7 per cent down from 9.2 per cent. This suggests that the 2007 to 2009 recession did indeed have long-lasting, rather than just temporary, adverse effects on attendance demand for treated 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. We note the lingering impacts of recession on some local labour markets in England and Wales which would have sustained the adverse impact of recession on club attendances long after the 2007/08 recession season.

Our treatment and control groups of clubs thus far use a 25% cutoff from the TTWA distribution of change in unemployment rate. The cutoff was chosen to deliver a sharp demarcation between treatment and control group in terms of change in unemployment over the recession period. We next perform sensitivity checks on alternative cutoff points determined as 15% and 30%.

If we designate top 15% and bottom 15% of the distribution of TTWA clubs, the separation of treatment and control groups by difference in unemployment over 2007 to 2009 becomes somewhat sharper. Conversely, if we categorise the treatment and control groups according to difference in unemployment the demarcation between groups becomes less sharp.

Table 4 shows the mean difference in unemployment for treated and control groups and associated numbers of included clubs across 15%, 25% and 30% cutoffs at top and bottom of the TTWA distribution of change in unemployment.

TABLE 4 HERE

As is expected, the mean difference in unemployment rate converges between treatment and control groups as the cutoff percentage is raised. Also, the number of clubs admitted into treatment and control groups increases through the range of cutoff points. Table A1 in the Appendix shows the identities of treatment and control group clubs across the 15%, 25% and 30% cutoffs points for difference in TTWA unemployment rate.

TABLE 5 HERE

Table 5 reports our regression results for the alternative 15% and 30% cutoff points. From column (1), we find a 11.2 percent marginal effect of *Treat*PostRecession* on team attendances for the 15% cutoff with more narrowly defined treatment and control groups as compared with 25% cutoff. The marginal effect from the 15% cutoff is larger than that from the 25% cutoff. 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 3, column (1) that use the 25% threshold.

From Table 4, we do not see a great deal of difference in mean change in unemployment rates between treatment and control group clubs with the 30% threshold as compared to the 25% threshold. This is a descriptive suggestion that Tier 3 and 4 treatment clubs are immune from effects of recessionary shock. However, Table 5, column (2) reports a statistically significant effect of 5.5 per cent of *Treat*PostRecession* for the 30% cutoff.

Five more treatment clubs are included with the 30% cutoff compared to 25%. The addition of these clubs turns out to have non-trivial consequences when we re-examine the regressions of log attendance against season dummies to check for common trends, as in Figure 2. For the 30% threshold, we find considerable differences on pre-recession trends between treatment and control groups. We infer from this that the common trends assumption is violated for the 30% threshold but not for the 25% threshold. On this basis, we again prefer

the estimates in Table 3, column (1) which use the 25% threshold for distribution of change in local unemployment rate.

Our final robustness check brings Tier 2 (Championship) 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. For these reasons, 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 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 treated Tier 2 club attendances to be less responsive to recessionary shock than treated clubs in Tiers 3 and 4. From Table 6, this is only partly what we find. Regressions of log attendance on season dummies continue to offer support for the common trends hypothesis. The marginal effect of *Treat*PostRecession* goes down only slightly from 9.2 percent to 7.9 percent when Tier 2 treatment and control group clubs are included. Our results are satisfyingly robust to the inclusion of Tier 2 clubs.

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 9 per cent purely through rising unemployment in local areas close to clubs' stadia after controlling for a large set of confounding influences. This result was robust to several alternative specifications.

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 Greater 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 treated clubs while Blackpool and Carlisle United are members of the control group.

The current recession induced by the Covid-19 pandemic represents an entirely different experience to the financial crisis of 2007-08. 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.

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Figures

Figure 1. Geographical distribution of treatment and control clubs across England and Wales for 25% cutoff.

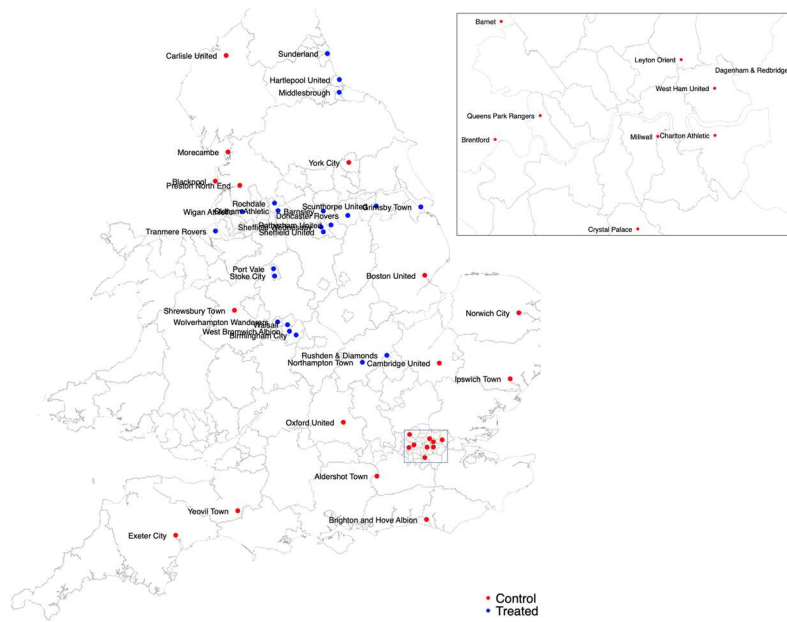
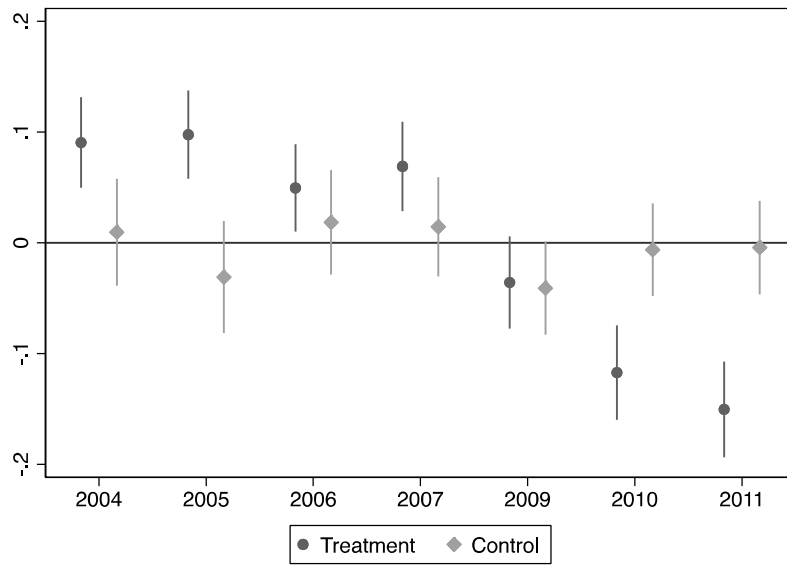


Figure 2 Common trends for top and bottom 25% of change in unemployment rate.



Tables

Table 1. Descriptive statistics for continuous variables. Top and bottom 25% of change in unemployment rate; Tiers 3 and 4

Variable	N	Mean	SD	Min	Max
Attendance	3285	5720.68	3740.87	1253.00	29313.00
LogAttendanceLastSeasonTier3	3285	5.17	4.33	0.00	10.11
LogAttendanceLastSeasonTier4	3285	3.39	4.06	0.00	8.75
HomeProbTier3	3285	0.26	0.22	0.00	0.77
HomeProbSquaredTier3	3285	0.12	0.11	0.00	0.59
HomeProbTier4	3285	0.18	0.22	0.00	0.73
HomeProbSquaredTier4	3285	0.08	0.11	0.00	0.53
HomePerfTier3	3285	0.79	0.73	0.00	3.00
HomePerfTier4	3285	0.55	0.73	0.00	3.00
AwayPerfTier3	3285	0.81	0.77	0.00	3.00
AwayPerfTier4	3285	0.56	0.73	0.00	3.00
DistanceTier3	3285	71.89	79.80	0.00	322.07
DistanceTier4	3285	43.01	62.33	0.00	306.95

Table 2. DID – Average attendances 2003/04 to 2010/11

Attendance	Pre-recession	Post-recession	Diff
Treat = 1	6,320 (121.91) N = 1,078	4,874 (110.60) N=629	1,428 (180.59)
Treat = 0	5,425 (8490.26) N = 768	5,884 (166.50) N = 810	-459 (180.05)
DID			1,887 (180.27)

Note: standard errors in parentheses

Table 3. Panel corrected standard error (PCSE) model with AR(1) disturbances; Tiers 3 and 4 with home team fixed effects, month and season dummies; 25% cutoff.

	(1)		(2)		(3)	
Treatment*PostRecession	-0.088***	(5.24)	-0.047***	(2.96)	-0.036**	(2.23)
Tier4	-0.894***	(3.57)	-0.467	(1.41)	-0.609***	(2.72)
Weekday	-0.033***	(3.93)	-0.026***	(2.89)	-0.036***	(4.52)
LogAttendanceLastSeasonTier3	0.930***	(68.07)	0.986***	(71.59)	0.923***	(70.96)
LogAttendanceLastSeasonTier4	0.985***	(45.31)	0.995***	(28.36)	0.979***	(56.05)
HomeProbTier3	-3.160***	(10.51)	-3.200***	(10.23)	-2.170***	(9.67)
HomeProbSquaredTier3	3.060***	(9.27)	3.030***	(8.83)	2.160***	(8.80)
HomeProbTier4	-1.080**	(2.15)	-1.350**	(2.53)	-1.120***	(3.01)
HomeProbSquaredTier4	1.230**	(2.27)	1.490**	(2.61)	1.250***	(3.03)
HomePerfTier3	0.119***	(7.98)	0.108***	(6.68)	0.146***	(11.54)
HomePerfTier4	0.082***	(5.08)	0.086***	(4.67)	0.083***	(6.13)
AwayPerfTier3	0.042***	(3.97)	0.036***	(3.43)	0.057***	(6.32)
AwayPerfTier4	0.069***	(4.29)	0.067***	(4.06)	0.054***	(4.47)
DistanceTier3	-0.002***	(13.98)	-0.003***	(13.60)	-0.003***	(18.75)
DistanceSquaredTier3/1000	0.005***	(9.40)	0.006***	(9.61)	0.006***	(12.71)
DistanceTier4	-0.005***	(13.92)	-0.005***	(13.47)	-0.004***	(17.36)
DistanceSquaredTier4/1000	0.014***	(10.08)	0.014***	(9.75)	0.012***	(13.27)
DerbyTier3	0.231***	(4.11)	0.220***	(3.99)	0.254***	(4.67)
Tier3ChampsLeagueTV	-0.140***	(7.65)	-0.147***	(7.78)	-0.137***	(9.68)
Tier4ChampsLeagueTV	-0.126***	(5.46)	-0.122***	(4.93)	-0.161***	(9.48)
Tier3ChampsLeagueSKY	-0.083***	(4.19)	-0.084***	(3.98)	-0.095***	(5.50)
Tier4ChampsLeagueSKY	-0.104***	(3.35)	-0.110***	(3.38)	-0.117***	(4.66)
Constant	1.320**	(10.18)	0.878**	(6.32)	1.080**	(9.74)
Observations	3285		2834		5286	

Models (1) & (2) 2003/04-2010/11; model (2) excludes London clubs; model (3) 2003/04-2014/15; month and season dummies.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4. Mean difference in unemployment by distribution cutoffs: Tiers 3 and 4 (*G to check*)

	Treatment group	Control group
15% cutoff		
Difference in unemployment	2.61	1.34
N clubs	9	16
30% cutoff		
Difference in unemployment	2.52	1.38
N clubs	14	20
30% cutoff		
Difference in unemployment	2.45	1.40
N clubs	19	21

Table 5. Sensitivity checks for 15% and 30% cutoff of TTWA change in unemployment rate. Panel corrected standard error (PCSE) model with AR(1) disturbances; Tiers 3 and 4 with home team fixed effects, month and season dummies; 15% and 30% cutoff

	(1)		(2)	
	15% cutoff		30% cutoff	
Treatment*PostRecession	-0.106***	(4.62)	-0.054***	(3.62)
Tier4	-1.200***	(4.13)	-0.670***	(3.33)
Weekday	-0.024**	(2.46)	-0.037***	(4.73)
LogAttendanceLastSeasonTier3	0.899***	(49.69)	0.965***	(101.01)
LogAttendanceLastSeasonTier4	0.988***	(37.50)	0.979***	(60.11)
HomeProbTier3	-2.940***	(8.34)	-3.300***	(11.39)
HomeProbSquaredTier3	2.840***	(7.26)	3.100***	(9.60)
HomeProbTier4	-0.640	(0.98)	-0.988**	(2.33)
HomeProbSquaredTier4	0.757	(1.06)	1.170***	(2.58)
HomePerfTier3	0.130***	(7.03)	0.117***	(8.52)
HomePerfTier4	0.096***	(4.95)	0.086***	(5.88)
AwayPerfTier3	0.046***	(3.54)	0.041***	(4.05)
AwayPerfTier4	0.070***	(4.05)	0.082***	(5.84)
DistanceTier3	-0.003***	(12.14)	-0.002***	(14.73)
DistanceSquaredTier3/1000	0.006***	(7.92)	0.006***	(9.83)
DistanceTier4	-0.005***	(12.58)	-0.004***	(14.77)
DistanceSquaredTier4/1000	0.016***	(9.46)	0.012***	(10.49)
DerbyTier3	0.590***	(7.85)	0.236***	(4.22)
Tier3ChampsLeagueITV	-0.151***	(7.05)	-0.136***	(8.42)
Tier4ChampsLeagueITV	-0.153***	(5.58)	-0.124***	(5.49)
Tier3ChampsLeagueSKY	-0.091***	(3.67)	-0.082***	(4.60)
Tier4ChampsLeagueSKY	-0.100**	(2.27)	-0.114***	(3.82)
Constant	1.510***	(8.94)	1.090***	(10.41)
Observations	2299		4054	

Models (1) & (2) 2003/04-2010/11; model (1) is 15% and model (2) is 30%, month and season dummies.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 6 Panel corrected standard error (PCSE) model with AR(1) disturbances; Tiers 2, 3 and 4 with home team fixed effects, month and season dummies; 25% cutoff.

Treatment*PostRecession	-0.076**	(6.26)
Tier3	-0.479***	(3.05)
Tier4	-1.410***	(5.68)
Weekday	-0.033***	(5.17)
LogAttendanceLastSeasonTier2	0.839***	(76.44)
LogAttendanceLastSeasonTier3	0.930***	(73.29)
LogAttendanceLastSeasonTier4	0.988***	(46.33)
HomeProbTier2	-1.050***	(3.81)
HomeProbSquaredTier2	0.916***	(3.18)
HomeProbTier3	-3.150***	(10.41)
HomeProbSquaredTier3	3.030***	(9.19)
HomeProbTier4	-1.040**	(2.06)
HomeProbSquaredTier4	1.190**	(2.19)
HomePerfTier2	0.070***	(5.91)
HomePerfTier3	0.117***	(8.01)
HomePerfTier4	0.083***	(5.08)
AwayPerfTier2	0.026***	(3.43)
AwayPerfTier3	0.041***	(3.98)
AwayPerfTier4	0.069***	(4.25)
DistanceTier2	-0.001***	(8.62)
DistanceSquaredTier2/1000	0.003***	(5.09)
DistanceTier3	-0.002***	(13.97)
DistanceSquaredTier3/1000	0.005***	(9.41)
DistanceTier4	-0.005***	(13.65)
DistanceSquaredTier4	0.014***	(9.86)
DerbyTier2	0.104***	(5.06)
DerbyTier3	0.229***	(4.11)
Tier2ChampsLeagueITV	-0.039***	(3.42)
Tier3ChampsLeagueITV	-0.142***	(7.96)
Tier4ChampsLeagueITV	-0.127***	(5.51)
Tier2ChampsLeagueSKY	-0.053***	(3.49)
Tier3ChampsLeagueSKY	-0.081***	(4.15)
Tier4ChampsLeagueSKY	-0.102***	(3.22)
Constant	1.790***	(16.35)
Observations	5176	

2003/04-2010/11; month and season dummies included

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Appendix

Table A1 Treatment and control group clubs in Tiers 3 and 4 according to top and bottom N% of TTWA club distribution of difference in unemployment rate

Control clubs	15% cutoff	25% cutoff	30% cutoff	Treated clubs	15% cutoff	25% cutoff	30% cutoff
Aldershot Town	✓	✓	✓	Barnsley	✓	✓	✓
Barnet	✓	✓	✓	Darlington	✗	✗	✓
Blackpool	✗	✓	✓	Doncaster Rovers	✓	✓	✓
Boston United	✓	✓	✓	Grimsby Town	✓	✓	✓
Brentford	✓	✓	✓	Hartlepool United	✓	✓	✓
Brighton and Hove Albion	✗	✓	✓	Huddersfield Town	✗	✗	✓
Cambridge United	✓	✓	✓	Kidderminster Harriers	✗	✗	✓
Carlisle United	✗	✓	✓	MK Dons	✗	✗	✓
Charlton Athletic	✓	✓	✓	Northampton Town	✗	✓	✓
Colchester United	✗	✗	✓	Oldham Athletic	✓	✓	✓
Dagenham & Redbridge	✓	✓	✓	Port Vale	✗	✓	✓
Exeter City	✓	✓	✓	Rochdale	✓	✓	✓
Leyton Orient	✓	✓	✓	Rotherham United	✗	✓	✓
Millwall	✓	✓	✓	Rushden & Diamonds	✗	✓	✓
Morecambe	✓	✓	✓	Scunthorpe United	✓	✓	✓
Norwich City	✓	✓	✓	Sheffield Wednesday	✗	✓	✓
Oxford United	✓	✓	✓	Swindon Town	✗	✗	✓
Queens Park Rangers	✓	✓	✓	Tranmere Rovers	✓	✓	✓
Shrewsbury Town	✗	✓	✓				
Yeovil Town	✓	✓	✓				
York City	✓	✓	✓				