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Changing Competition Design and Spectator Turnout: Evidence from the League of Ireland

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Abstract: We contribute to the literature on demand for football by investigating the effect of variations in competition design on spectator turnout. We examine attendance in the League of Ireland Premier Division for two periods with alternative league formats, estimating club-fixed effects regressions. Our results show that the change did not increase average attendance. Many determinants of attendance are robust to the reorganisation and balance measures are consistent under both formats. Like past evidence from the League, habit, team form, scheduling and travel are important determinants. Our results speak to league administrators and club owners attempting to optimise revenues.

I INTRODUCTION

The aim of this paper is to exploit a variation in competition design in the League of Ireland (hereafter LoI) Premier Division to investigate if the factors impacting attendance demand are sensitive to different league formats. We consider the LoI before and after the start of the 2018 season, when a switch occurred from

an unbalanced triple round-robin format, where 12 teams participated in 33 matches, to a quadruple round-robin structure with ten teams (36 matches). The addition of an extra round of fixtures increased the frequency of matches between the same club pairings and brought symmetry to the competition by removing the ambiguity associated with the scheduling of a third fixture.

While a further round of fixtures ended the uneven format, theoretically the greater the number of times teams encounter each other, the less uncertain the championship outcome becomes (Olson and Stone, 2014; Pawlowski and Nalbantis, 2015). Surprising individual match results would be expected to have a lesser impact under the new design. At the level of individual fixtures however, the new smaller division would be expected to reduce the variation with respect to team quality and improve match-level balance.

The consequences of this design change are not reserved to balance implications, and the structural adjustments generate many questions of interest (Dobson *et al.*, 2001). First, the additional set of fixtures in the LoI increased the number of derbies. A greater number of matches against a rival could increase engagement for specific supporters (Lenten, 2008). That said, additional derbies could potentially reduce the intensity of these fixtures. Second, the opportunity cost for fans would vary as they are now guaranteed two opportunities to see every opponent at home. Extra matches may become less meaningful or exhaust fan interest. Third, fans may place a lower value on upsets. While it is not the intention of this paper to investigate how these factors varied, the combined alternations to the league structure would be expected to influence turnout by changing the attractiveness of the contest and nature of the individual match product (Cairns, 1987).

A well-developed body of research exists on attendance demand in football, however very little investigation of how spectators react to these format changes has been undertaken.[1] This topic was only in the purview of the earliest generation of attendance demand research as many recognised leagues have not meaningfully reorganised their competition design to produce natural variation.[2] Both Jennett (1984) and Cairns (1987) are exceptions. They focus on Scottish football organisation from the 1970s to early 1980s. Jennett (1984) investigates the impact of a policy change in light of the stark turnout declines in Scottish football, finding that uncertainty of outcome is an important determinant of match attendance. Cairns (1987) considers attendance demand after the Scottish League's format change in

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[1] Past research has empirically considered many aspects of demand for football, focusing on both stadium demand and broadcast viewership across European leagues (Peel and Thomas, 1992; Forrest and Simmons, 2002; Czarnitzki and Stadtmann, 2002; Buraimo and Simmons, 2008; Pawlowski and Anders, 2012; Schreyer *et al.*, 2016; Martins and Cró, 2018; Caruso *et al.*, 2019).

[2] Format changes are more common in peripheral leagues that are subject to less research attention. For the 2018/2019 season, six UEFA countries changed the format of their top tier competition: Armenia, Austria Cyprus, Czech Republic, Moldova, and Republic of Ireland.

1975 which saw the introduction of new divisions and smaller league sizes. Gains and losses, owing to the new structure, were found to be club-specific and that uncertainty of seasonal outcome (coefficient of variation of seasonal point totals) did not markedly change under the new design. In general, the introduction of a Premier Division was successful in stanching the attendance decline (Cairns, 1987).

Given the limited research on this topic, the aim of this paper is to build on Reilly (2015) – the first to model attendance demand for the LoI Premier Division – and other past investigation of re-organisation effects. We do this by investigating the determinants of spectator turnout under alternative league designs. Our empirical analysis considers the two seasons prior and the two seasons after the design change, covering four seasons in total from 2016 to 2019.

To our knowledge, this paper represents a rare and contemporary effort to measure the determinants of stadium attendance under dissimilar competition formats *within the same league*. This comparison is our primary contribution. Past research considering the impact of different league formats has relied on simulations (Goossens *et al.*, 2012) and comparisons across smaller leagues (Pawlowski and Nalbantis, 2015). Prior research considering the impact of repeat fixtures has only studied audience demand in the context of a consistent league format (Peel and Thomas, 1996). As there are few variations that cannot be controlled for between the design change, this LoI scenario offers a natural experiment to explore the impact of competition format on attendance (see Considine and Gallagher (2018) for a similar approach to changes in Gaelic games formats and Burkitt and Cameron (1992) for league reorganisation in rugby).

The paper has practical implications beyond Irish shores. Understanding the determinants of attendance demand is particularly important for smaller European leagues. Peripheral competitions such as the LoI typically struggle to attract supporters, yet still rely on gate receipts as a key income stream viz-à-viz broadcasting revenue. For example in 2017, 29 per cent of income for LoI clubs was derived from stadium attendance – this is the joint second highest of all UEFA members (UEFA, 2019).[3] Thus, our results speak to comparably sized UEFA members who are considering experimenting with their league design.

The paper continues as follows. The next section provides a brief background to the LoI and the competition design change. Section III explores literature on demand modelling for the League and presents descriptive statistics on attendance demand. Section IV outlines the data, measures and specifies the empirical model. Section V reports the results. Section VI considers the practical implications that emerge from the findings. Section VII concludes the paper.

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[3] Other major shares of aggregate revenue include UEFA funding and sponsorship/commercial deals. A comparison across UEFA domestic leagues is provided in the most recent benchmarking report.

II BACKGROUND

Since the early 1980s LoI organisers have enacted many polices aimed at stemming the tide of a widely documented decline in stadium attendance (Whelan, 2006; Goldblatt, 2019). Rule changes have included trialling a new points system to incentivise more attacking play (1981/1982 and 1982/1983); introducing and amending the promotion/relegation mechanism; introducing a split season (1992/1993 and 1993/1994); and instating a calendar year fixture schedule in 2003. 'Summer Soccer' sought to position the LoI so that part of the competition avoided clashing with English football. In addition, it offered fans a more attractive product (i.e. improved seasonal playing conditions) and was advantageous to clubs participating in European competitions. Irish clubs would now have the benefit of encountering European rivals who were only starting their pre-season training.[4] While these factors are often considered as potentially positive consequences of the calendar change, the shift did position the LoI in general competition with the Gaelic games Championship.

A switch to a four-match round-robin from a three-round league is the latest innovation in the LoI's competition design. This was one of many recommendations emerging from the 2015 Conroy Report, commissioned by the Football Association of Ireland (FAI). The report argued that a ten-team Premier Division, rather than the twelve-team league at the time, with an increased number of games, would lead to "more occasions" (Conroy Consulting, 2015 pg.40). This is a recommendation that is recognised in the academic literature across sports. Namely, that league restructuring is commonly motivated by the view that an alteration can improve attendances generally or for specific clubs (Dobson *et al.*, 2001).

Akin to the motivations of many past changes, the impetus to shift to the quadruple round-robin, with fewer clubs, was intended to increase attendances. The Conroy Report envisioned that a change in structure would lead to the creation of a more sustainable and attractive football product. When this transition took place in 2018 the competition design of the LoI was consistent with many UEFA counterparts.[5]

III ATTENDANCE DEMAND IN THE LEAGUE OF IRELAND

Reilly (2015) and Jena and Reilly (2016) were the first to model attendance demand for the LoI Premier Division and First Division (second tier). For the Premier Division, Reilly (2015) finds that important factors impacting stadium attendance

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[4] Butler and Butler (2017) provide a detailed overview of league competition changes since 1970.
[5] The UEFA (2019) benchmarking report provides an overview of football schedules in Europe. The quadruple round-robin is now the second most popular design among UEFA members – 13 leagues currently adopt this format.

include fixture quality, team form, derby matches and both seasonal and match-level outcome uncertainty. In addition, he finds that certain scheduling effects, such as whether a match is on a Friday, and travel distances are important to spectators' attendance decision.

Jena and Reilly (2016) examine turnout for the second tier of Irish football. Again, fixture quality, recent form and travel distances are statistically significant determinants of demand. Their results imply that fans' appetite for competitive balance vary between the first and second tier. Jena and Reilly (2016) show that fans in the First Division have a stronger preference for balance, in comparison to those in the Premier Division.

Table 1 provides an updated overview of attendance demand in the LoI. The summary statistics indicate that the mean and median attendance remained relatively constant under the three-round design. Both the mean and median increase after the design change in 2018.[6]

Table 1: League of Ireland Stadium Attendance Summary Statistics

Season	Mean	Median	Min	Max	Average Capacity Used %	Matches
2012	1,574	1,228	151	6,067	26	179
2013	1,552	1,411	170	4,703	24	197
2014	1,522	1,140	139	6,219	24	194
2016	1,471	1,268	273	5,453	32	198
2017	1,889	1,537	305	6,983	40	198
2018	2,124	1,908	271	6,672	44	180
2019	2,162	2,104	392	7,021	45	180

Source: Reilly (2015) from 2012 to 2014; Extratime.ie (2019); Soccerway.com (2019).

It is important to note that three relatively weaker clubs were relegated from the Premier Division after the design change, so the number of teams decreased to ten. In 2017, three teams were relegated (Galway United, Finn Harps and Drogheda United) and only one team (Waterford FC) was promoted. Although the summary statistics point to an increase in average attendance demand on foot of the design change, lower attendances, typically associated with poorly performing teams, were exported to the second tier.

The highest attended match in the dataset was the Dublin derby between Shamrock Rovers and Bohemian in 2019 (7,021). The lowest attended match was Bray Wanderers and Sligo Rovers (271) in 2018. Table 2 considers spectator turnout by club. Seven clubs participated in the Premier Division in all four seasons under investigation. In total, our dataset includes observations on home attendance for 16 different clubs.

[6] 2015 data are omitted as a complete dataset was not available at the time of data collection.

Table 2: Average League of Ireland Attendance by Club

Club/Season	2012	2013	2014	2016	2017	2018	2019
Bohemian	1,488	1,517	1,480	1,641	1,964	2,101	2,989
Bray Wanderers	965	891	695	957	965	688	–
Cork City	2,761	1,965	3,776	2,531	4,558	4,086	2,505
Derry City	1,446	1,438	1,109	1,519	1,570	2,128	2,633
Drogheda United	975	780	1,032	–	815	–	–
Dundalk	894	1,950	2,534	2,738	2,705	2,801	2,780
Finn Harps	–	–	–	1,222	1,254	–	1,158
Galway United	–	–	–	1,169	1,359	–	–
Limerick	–	1,638	766	–	1,584	998	–
Longford Town	–	–	–	488	–	–	–
Shamrock Rovers	2,990	2,780	2,284	2,041	2,638	2,720	3,444
Sligo Rovers	3,007	2,342	1,971	1,752	1,721	1,803	1,996
St. Patrick's Athletic	1,455	1,687	1,358	1,097	1,583	1,664	1,896
UCD	487	486	400	–		–	739
Waterford FC	–	–	–	–	–	2,289	1,599
Wexford FC	–	–	–	569	–	–	–

Source: Reilly (2015); Extratime.ie (2019); Soccerway.com (2019). Missing observations indicate that clubs did not participate in the League during that season. Athlone FC, Monaghan United and Shelbourne AFC are excluded as they do not feature in our empirical analysis.

IV DATA, MEASURES AND MODEL

To study attendance demand across competition formats, we collect match-level data for four seasons: 396 matches in 2016 and 2017 under the triple round-robin and 360 matches in 2018 and 2019 under the quadruple round-robin. In total our dataset includes 756 fixtures.

Our dependent variable, stadium attendance (log scale) is obtained from www.extratime.ie. Where attendance data are not available from this website, turnout is sourced from www.soccerway.com. We collect data on a range of factors influencing demand. These determinants, and the specification of our forthcoming empirical model, are generally consistent with previous studies modelling attendance demand for football (i.e. Peel and Thomas, 1992; Buraimo and Simmons, 2008, Pawlowski and Anders, 2012; Pawlowski and Nalbantis, 2015; Martins and Cró, 2018; Nielsen *et al.*, 2019).

4.1 Outcome Uncertainty
An important empirical consideration when modelling attendance demand is the measurement of match outcome uncertainty. This is theoretically accepted as one

of the most important determinants of demand for live sport (Rottenberg, 1956; Fort and Quirk, 1995).[7] The customary interpretation necessitates a positive relationship between competitive balance and fan interest. Tight contests should, theoretically, be preferred to mismatches. We utilise the standard measures applied in the literature to capture these determinants and differentiate between short-run outcome uncertainty (match-level) and medium-term outcome uncertainty (seasonal-level or championship uncertainty).

We begin by creating an uncertainty index to measure match-level balance. This is based on the method used by Theil (1967) and derived from betting odds provided by bookmakers (www.oddsportal.com) on the three potential match outcomes. Bookmaker odds are a useful tool to proxy short-run outcome uncertainty as they control for non-observable characteristics potentially impacting a match result, such as home team advantage, team confidence, injury crises, etc.

The use of bookmaker odds to infer balance does come with a set of assumptions. First, we assume that betting markets are efficient. The evidence on the efficiency of these markets is mixed (Forrest and Simmons, 2008; Direr, 2011; Sinkey and Logan, 2014; Buckle and Huang, 2018). Dobson and Goddard (2011) offer a general discussion of this topic. Second, while there is a strong economic incentive for bookmakers to price odds correctly, these companies are not directly attempting to predict outcomes but rather to profit from shifting risk effectively across a portfolio of sports. Outcome predictions are derivatives of this objective. To this effect, bookmakers may develop sophisticated strategies to ensure an aggregate, rather than match-level, profit.

Assuming odds include important information on match outcomes, and transforming the odds to probabilities (correcting for the overround), we use the win and draw likelihoods to establish the Theil Index using Equation 1.[8]

$$THEIL = \Sigma_{i=1}^{3} \frac{Pi}{\Sigma_{i=1}^{3} Pi} \log \left(\frac{\Sigma_{i=1}^{3} Pi}{Pi} \right) \tag{1}$$

where P is the probabilistic value of a home win, away win or draw respectively using adjusted bookmaker odds.

The Theil Index is positively correlated to outcome uncertainty and will reach its highest value if all match outcomes are equally likely. Assuming fans prefer more balanced matches, one would expect attendance demand to increase as the Theil values rise.

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[7] It is noteworthy that the evidence is mixed insofar as greater short-run balance increases demand (Coates *et al.*, 2014; Budzinski and Pawlowski, 2017).

[8] The overround is the bookmaker practice of including a profit margin in the prices offered to bettors. In our dataset this is typically between 6 per cent and 8 per cent on any given match. We correct for this proportionally across all three outcomes. While this is a simple and common approach, it does have limitations such as not accounting for favourite-longshot biases (Cain *et al.*, 2000; Štrumbelj, 2016).

Championship or medium-term uncertainty is also a motivating factor to attend live matches. Theoretically, spectator demand would be expected to remain stable and increase when the possibility of winning a trophy persists. A natural attendance decay is expected when a team exits the title race. To capture seasonal uncertainty, we employ the Janssens and Kesenne (1987) measure outlined in Equation 2. *UCS* is an index to account for whether a team is still in contention for the title. This was originally applied in the context of Belgian football and in various other football contexts thereafter (e.g. Czarnitzki and Stadtmann, 2002; Pawlowski and Anders, 2012). This can be applied to both championship uncertainty for the home team (UCS_H) and the away team (UCS_A) for a given fixture.

$$UCS = \frac{100}{C_{CS-G}}, \text{ IF } C_{CS-G} \leq m - 3t, \text{ 0 otherwise} \qquad (2)$$

where *UCS* is positive if the margin between the points required to be league champions C_{CS} and the points a team has previously accumulated (G) is less than the difference between the total possible points attainable in a given season (m) and the maximum number of points that can be accumulated until the certain fixture ($3t$). If $C_{CS-G} > m - 3t$ teams are deemed to have exited the championship race.

Like the Theil Index, *UCS* is positively correlated to medium-run uncertainty. While this is an ex-post approach to modelling championship outcome uncertainty (as the level of points needed to win a league is only known after the fact), it is a reasonable proxy and one would expect a positive relationship between attendance and *UCS*.

4.2 Habit, Form and Reputation

Past research finds evidence in support of habit persistence in the behaviour of football fans (e.g. Pawlowski and Nalbantis, 2015; Martins and Cró, 2018). Thus, it is important to take account of habitual activity. Attendance demand in the LoI can be a consequence of recurring behaviour. Measuring habit persistence is necessary as it controls for the routine choices of fans that are not impacted by variations in conditions across matches or extended time periods. We use the standard metric in the literature to capture habit persistence; the average home attendance of a club in the previous season.

We measure the impact of current form by considering recent performances for the home team only. This is a measure of quality and is calculated as the number of points won in the previous three home matches. As away supporters make up a relatively small share of attendance, we expect the effect of away form to be negligible. Furthermore, given that away support tends to attract a partisan fanbase, we envisage that this type of demand is inelastic and independent of form for many fixtures.

Supporter relationships with a club go beyond short-term performances. As such, we also consider the long-term reputation of a club. We apply the Czarnitzki and Stadtmann (2002) formula (see Equation 3) to quantify the relationship fans have built with a club over time. This measure considers the final league position of a club over a set number of previous seasons. Given the LoI is subject to greater financial volatility and less short-run dominance when compared to almost every other UEFA league (Szymanski, 2015), we consider this relationship over three seasons ($T = 3$).[9]

$$REP = \Sigma_{t=1}^{T} \frac{n}{x_t\sqrt{t}} \text{ where } T = 3 \qquad (3)$$

where: x_t is a club's finishing position in the LoI.
t is the season.
n is the number of teams in the League in season t.

This reputation score is calculated for all clubs.[10] This index is applied to both home and away teams and is positively correlated with previous success.

4.3 Scheduling and Match-Specific Features

First, we establish a simple indicator to capture the design change *(FORMAT)*. Second, we consider the impact of scheduling factors by classifying monthly indicator variables *(MONTHS)*. The motivation to include these variables is that earlier and later rounds of the seasons could attract a higher following. Furthermore, as the LoI is played during a single calendar year, fixtures in the summer months could impact attendance. For example, fans may opt to take summer holidays.[11] We suspect that fans are attracted by the novelty of the beginning of the season and have a stronger preference to attend when a club's final position is in sight. Furthermore, we include an indicator variable to denote whether the match was held on a *WEEKDAY* (Monday to Thursday). LoI matches are mostly held on Friday nights and, on occasion, Saturdays and Sundays.[12] Deviations from this standard scheduling format would be expected to negatively impact attendance.

Finally, we consider match-specific conditions and opportunity cost as determinants. We include a control for a *DERBY* match.[13] We used indicators for

[9] For example, the LoI has had six different league champions in the ten seasons from 2009-2018. Only four other UEFA members have had more winners over this period (Georgia, Latvia, Hungary and Kosovo).
[10] Promoted clubs were given a value of the final position (+1).
[11] Other disruptions also occur during this summer period. For example, Paton and Cooke (2005) find that attendances at English cricket tended to be higher during the school summer holidays.
[12] Sligo Rovers typically play home fixtures on Saturday evenings.
[13] We include Dublin derbies (Bohemian vs Shamrock Rovers; Shamrock Rovers vs St. Patrick's Athletic; Bohemian vs St. Patrick's Athletic) and provincial derbies (Derry City vs Finn Harps; Cork City vs Waterford).

the primary substitutes (*SUB*). These are defined as televised English Premier League (EPL) matches and Republic of Ireland international matches from the 2016 UEFA European Championship Finals that clash with domestic fixtures. We measure climatic variables (i.e. temperature and rainfall) prior to kick-off using data from the nearest weather station to the stadium (using www.timeanddate.com and met.ie). We control for travel distances to account for cost-side factors associated with attendance and measure the distance between home grounds in kilometres using Google Maps. We also include a square term of travel distances in our empirical model to capture the non-linearities associated with away fans travelling (c.f. Baimbridge *et al.*, 1996). Finally, we include season indicator variables for our analysis of the restricted samples. Table 3 provides an overview of the dependent and independent variables used in the empirical model.

4.4 Empirical Models
We begin by estimating a full regression model to establish whether the format change impacted attendance demand. This is captured by *FORMAT*. Following this, we consider the determinants of demand under the alterative structures for restricted samples.

Our empirical specifications of stadium attendance are represented in Equation (4) (full sample) and Equation 5 (restricted samples), where Log $(ATT)_{ijt}$ is a measure of the turnout at each fixture comprising of fans for the home team *i* and away team *j* according to the competition structure at time period *t*. Home club fixed effects are included and ε is the error term assumed to have classical properties.

$$
\begin{aligned}
\text{Log } (ATT)_{ijt} = {} & \beta_0 + \beta_1 FORMAT + \beta_2 THEIL + \beta_3 UCS_H + \beta_4\, UCS_A + \\
& \beta_5 \text{ Log } (HABIT)_H + \beta_6 \text{ Log } (HABIT)_A + \beta_7\, FORM + \beta_8\, REP_H + \beta_9\, REP_A + \\
& \beta_{10}\, WEEKDAY + \beta_{11}\, DERBY + \beta_{12-13}\, SUB_{(EPL,\ Euro\ 2016)} + \beta_{14}\, TEMP + \\
& \beta_{15}\, RAIN + \beta_{16} \text{ Log } (TRAVDIS) + \beta_{17}\, TRAVDIS^2 + \beta_{18-25}\, MONTHS + \varepsilon
\end{aligned}
\tag{4}
$$

$$
\begin{aligned}
\text{Log } (ATT)_{ijt} = {} & \beta_0 + \beta_1\, THEIL + \beta_2\, UCS_H + \beta_3\, UCS_A + \beta_4 \text{ Log } (HABIT)_H + \\
& \beta_5 \text{ Log}(HABIT)_A + \beta_6\, FORM + \beta_7\, REP_H + \beta_8\, REP_A + \beta_9\, WEEKDAY + \\
& \beta_{10}\, DERBY + \beta_{11-12}\, SUB_{(EPL,\ Euro\ 2016)} + \beta_{13}\, TEMP + \beta_{14}\, RAIN + \\
& \beta_{15} \text{ Log } (TRAVDIS) + \beta_{16}\, TRAVDIS^2 + \beta_{17-24}\, MONTHS + \beta_{25}\, SEASON + \varepsilon
\end{aligned}
\tag{5}
$$

Several points concerning the specification and our approach are worth noting. First, we purposefully do not control for entry fees as there is very little (if any) price variation across clubs. To our knowledge, all clubs price discriminate, charging €15 for adult entry, €10 for student/OAP and €5 for children. On occasion, clubs also offer supporters currently seeking employment a discount. Second, no quality data are available on demographic characteristics of LoI

Table 3: Variable Overview

Variable	Description	Type	Source
ATTENDANCE	Match-level stadium attendance (log scale)	Metric	Extratime.ie| Soccerway.com
FORMAT	Triple or quadruple round-robin	Indicator	–
THEIL	Match-level outcome uncertainty index derived from betting odds	Metric	Oddsportal.com
UCSH	Championship or medium-term uncertainty for the home team	Metric	Season results
UCSA	Championship or medium-term uncertainty for the away team	Metric	Season results
HABITH	Average home attendance of the home club in the previous season (log scale)	Metric	Extratime.ie| Soccerway.com
HABITA	Average home attendance of the away club in the previous season (log scale)	Metric	Extratime.ie| Soccerway.com
FORM	The number of points won in the previous three home matches for the home team	Metric	Season results
REPH	Reputation of the home team based on final league position over the three previous seasons	Metric	Past league tables
REPA	Reputation of the away team based on final league position over the three previous seasons	Metric	Past league tables
WEEKDAY	A Monday to Thursday fixture	Indicator	Extratime.ie
DERBY	Dublin and provincial derbies	Indicator	–
EPL	Televised English Premier League matches overlapping with fixtures	Indicator	SkySports.com| Extratime.ie

Table 3: Variable Overview (Contd.)

Variable	Description	Type	Source
EURO 2016	Republic of Ireland international matches from the 2016 UEFA European Championship Finals	Indicator	UEFA Schedule
TEMP	Minimum temperature (in Celsius) for the hour of match kick-off	Metric	Timeand date.com|met.ie
RAIN	Whether rain fell during the match time	Indicator	Timeand date.com|met.ie
TRAVEL DIS	The distance between home grounds in kilometres (log scale)	Metric	Google.ie/maps
MONTHS	Nine months of the LoI season (February to October)	Indicators	Extratime.ie
SEASON	The season the fixture was scheduled (2016 to 2019)	Indicators	Extratime.ie

attendees. Therefore, we do not include any population controls. These would likely be crude if introduced to the model.[14]

Third, we do not control for televised LoI fixtures on the Irish national broadcaster (RTÉ). Televised matches are commonly broadcast due to the importance of the fixture. Including this measure would raise endogeneity concerns as these fixtures are not selected randomly by broadcasters. This specific endogeneity problem features in the literature modelling attendance demand for football (e.g. Reilly, 2015; Martins and Cró, 2018). Unlike some past studies that attempt to overcome this by using instrumental variables, we cannot identify a clean instrument that would allow us to overcome this problem. Thus, we omit this variable from the model.

Finally, in contrast to numerous papers on the topic of attendance demand that employ censored or truncated models, our empirical strategy is to estimate an OLS equation with club fixed-effects. We opt for the latter as controlling for individual club-effects absorbs heterogeneous traits found across the different units (i.e. omitted demographic and income variables). Tobit models feature in the literature on attendance demand frequently as in many leagues' stadia reach capacity. Upper limits need to be accounted for. Generally, in football attendance studies, circa 95 per cent of actual stadium capacity is taken as full capacity. We record only 12 LoI matches over the four seasons (1.5 per cent of the data) where full stadium capacity was reached and only 16 LoI matches where 95 per cent of stadium capacity was reached (2.1 per cent of the data). In short, there is minimal evidence of any latent demand in the LoI.[15] Cox (2018) offers an overview of the regression techniques used to model turnout, highlighting the common adoption of OLS fixed-effects and tobit models.

V RESULTS

Table 4 presents the results for a full model for the LoI under both competition formats and Table 5 shows the results for determinants for restricted samples. All estimates include robust standard errors. First, we note that *FORMAT* is not statistically significant – despite the alteration to the competition design. We find no evidence that moving to the new design increased aggregate attendance demand.

We find no evidence that short-run uncertainty impacts stadium attendance for the full sample, and it is not significantly different under either design (*THEIL*). Championship uncertainty for the home team (UCS_H) is highly significant and

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[14] There are other variables we measure that were not included in the final specification such as the number of days between home Premier Division matches or matches prior to and after the summer break. These are omitted as they are often confounding factors impacting the time periods such as international and European scheduling.

[15] Capacity was reached in specific fixtures; six of the 12 capacity attendances were for matches involving Shamrock Rovers and Bohemian.

positive for both designs. The results indicate that habit persistence ($HABIT_H$ and $HABIT_A$) is a feature of attendance demand across both formats. This is consistent with the recent literature (Pawlowski and Nalbantis, 2015; Martins and Cró, 2018). Controlling for features that differ across fixtures, past attendances are a strong predictor of future attendance.

As expected, we find that current *FORM* is an important determinant of stadium attendance, albeit the strength of this effect diminishes for the earlier design. There is no evidence however of longer-term reputation impacting fans decisions to attend under either format. This is not entirely surprising given that the fortunes of clubs in the LoI can change relatively quickly. There have been many recent instances where LoI clubs rise and quickly decline after becoming champions.[16]

Considering scheduling factors, we expected turnout to be non-linear. This relationship has been found to exist in other peripheral UEFA leagues (Pawlowski and Nalbantis, 2015; Martins and Cró, 2018). Including monthly indicator variables, we find the earliest period of the LoI season experiences higher levels of match attendance. We consider this as evidence of novelty for fans on the return of the competition. This higher level of demand dissipates by April each season – approximately six to eight games into the new season. The *WEEKDAY* scheduling of fixtures induces a significant, negative effect on attendance demand under both formats. This, along with the monthly demand findings, are factors explored in Section VI.

The presence of the Republic of Ireland at the 2016 UEFA European Championship Finals did however have a negative and statistically significant effect. During this period, fan attention was fixed on the fortunes of the national team (and perhaps the entire competition given the Republic of Ireland's presence) and a significant number of domestic football supporters travelled to France.

As expected, *DERBY* matches positively impact demand under both formats. Introducing an additional match between rivals did not dilute the strength of a derby as a determinant of demand.

Competing EPL broadcasts fail to impact turnout under either league design. The absence of any significant impact of televised EPL for the two most recent seasons is consistent with recent evidence from other smaller leagues (Nielsen *et al.*, 2019).[17]

While most of the attendance figures are reported as a finalised sum, the data for Derry City are often approximated. As the club is based in Northern Ireland, they are subject to a different taxation code. VAT on football matches is treated

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[16] Following on from winning the League over the last ten years, performances for Bohemian, Shamrock Rovers, Sligo Rovers and St Patrick's Athletic declined. In the case of Bohemian and St Patrick's Athletic, this involved relegation battles not long after winning the league.

[17] The Republic of Ireland vs Italy Euro 2016 group match coincided with the weekend return of the LoI and the Republic of Ireland vs France round-of-sixteen match took place on the weekend of LoI fixtures.

Table 4: Results – Attendance Demand Full Sample

DV: Log Attendance	2016-2019	
Variable	*Coefficient*	*RSE*
FORMAT	0.083	(0.032)
THEIL	0.054	(0.036)
UCS_H	0.047***	(0.005)
UCS_A	0.012	(0.004)
$HABIT_H$	1.014***	(0.031)
$HABIT_A$	0.104***	(0.022)
FORM	0.247***	(0.046)
REP_H	0.046	(0.011)
REP_A	0.031	(0.008)
WEEKDAY	−0.202***	(0.031)
DERBY	0.313***	(0.057)
EPL	−0.029	(0.031)
EURO 2016	−0.366***	(0.097)
TEMP	−0.055	(0.004)
RAIN	−0.047	(0.027)
TRAVEL DIS	−0.102***	(0.022)
TRAVEL DIS²	0.002	(0.001)
FEB	0.460***	(0.073)
MARCH	0.175***	(0.062)
APRIL	0.013	(0.054)
MAY	0.011	(0.046)
JUNE	0.030	(0.050)
JULY	0.034	(0.050)
SEPT	−0.078	(0.048)
OCT	−0.065	(0.058)
CONSTANT	5.907***	(0.269)
R^2	0.764	
N	756	

Source: Authors' analysis.
Note: Level of statistical significance: 1 per cent***; 5 per cent**; 10 per cent*. Robust Standard Error in Parentheses. Autumn as base *MONTH*.

differently to clubs located in the Republic of Ireland. To check the robustness of the results in light of the potential for 'estimate-only' data for one club, we re-estimated the models excluding Derry FC. We find no evidence of any systematic variations in the original results and no evidence of changes in the statistical significance of the coefficients across league formats.

Reilly (2015) provides an important benchmark to compare our findings. Comparable to this study, we find that *FORM* and UCS_H significantly and positively

Table 5: Results – Attendance Demand Restricted Samples

DV: Log Attendance	2018 and 2019		2016 and 2017	
Variable	*Coefficient*	*RSE*	*Coefficient*	*RSE*
THEIL	0.036	–	0.045	(0.051)
UCS$_H$	0.041***	(0.009)	0.035***	(0.008)
UCS$_A$	0.018	(0.016)	0.009	(0.004)
HABIT$_H$	1.221***	(0.217)	0.830***	(0.064)
HABIT$_A$	0.112***	(0.034)	0.238***	(0.034)
FORM	0.260***	(0.052)	0.133*	(0.070)
REP$_H$	0.167	(0.049)	0.015	(0.014)
REP$_A$	0.033	(0.010)	0.005	(0.010)
WEEKDAY	−0.194***	(0.039)	−0.166***	(0.043)
DERBY	0.243***	(0.071)	0.242***	(0.077)
EPL	−0.031	(0.035)	−0.063	(0.051)
EURO 2016	–	–	−0.250***	(0.083)
TEMP	0.001	(0.004)	−0.007	(0.005)
RAIN	−0.003	(0.035)	−0.013	(0.035)
TRAVEL DIS	−0.106***	(0.001)	−0.136***	(0.032)
TRAVEL DIS²	0.001	(0.001)	0.001	(0.001)
FEB	0.435***	(0.091)	0.427***	(0.105)
MARCH	0.172**	(0.086)	0.165**	(0.078)
APRIL	0.041	(0.075)	0.016	(0.067)
MAY	0.009	(0.070)	0.000	(0.057)
JUNE	−0.065	(0.071)	0.082	(0.059)
JULY	−0.046	(0.074)	0.073	(0.066)
SEPT	−0.113	(0.074)	−0.060	(0.062)
OCT	−0.071	(0.085)	−0.050	(0/074)
SEASON	−0.022	(0.040)	0.808**	(0.036)
CONSTANT	−1.170	(1.297)	0.162	(0.532)
R²	0.822		0.783	
N	360		396	

Source: Authors' analysis.
Note: Level of statistical significance: 1 per cent***; 5 per cent**; 10 per cent*. Robust Standard Error in Parentheses. August as base *MONTH.*

impact turnout. Furthermore, we find consistent effects relating to *DERBY* matches, and opportunity cost regulators (*TRAVEL DIS*, *TEMP*, *RAIN*). Our results confirm the statistical (non)significance of the coefficients found in Reilly (2015). Contrasting to Reilly (2015), we find no evidence that short-run outcome uncertainty impacts stadium attendance under either competition format. It is of note however that we use a different measure to capture match-level uncertainty.

In general, the results suggest a high level of continuity regarding the determinants of demand across seasons. Despite the switch from the triple to the quadruple round-robin, limited evidence exists to suggest attendance demand at LoI matches is affected by competition design.

VI PRACTICAL IMPLICATIONS

If optimising attendances, and subsequently revenues, is the objective of clubs and league organisers, what policy recommendations can be made from these results?

First, the high degree of continuity between both formats implies that extending, or reducing, the league does not meaningfully impact fan behaviour. As such, this should license administrators to experiment further with *marginal* formats shifts. To significantly increase attendances however, more fundamental design changes would be required. This could range from shifts that replicate other European leagues to more radical changes. For example, administrators could again opt for a split analogous to the Scottish Premiership. Under this model a season is split into two phases where clubs play each other three times and thereafter the competition divides into a top and bottom half. Depending on performance, clubs play further matches within their section and cannot be placed outside this section. This design was previously implemented for only two seasons (1992/1993 and 1993/1994) and administrators may deem it timely to revisit this format.

A range of far-reaching and riskier options also exists outside the current round-robin format such as geographical division of teams and end of season "play-offs", or moving to a Champions League qualification model with seeding. A radical shift however would require high levels of planning, consultation and agreement between many stakeholders such as clubs, players unions, supporter groups and UEFA. This would be a costly administrative task and achieving a political consensus between stakeholders would be challenging.

Encouragingly, we find that adding additional derby matches does not diminish their value. Derbies significantly increases stadium attendance under both formats. Achieving greater symmetry allowed the League to increase the frequency of these matches, which are typically higher quality fixtures. However, not every club has a local rival, thus any benefits from the inclusion of additional derbies are distributed to specific clubs.

The results can offer practical guidance specifically to organisers in charge of scheduling. The significant and negative weekday effect is restricting matchday revenue generation for clubs. While the scheduling of some midweek fixtures is likely unavoidable, due to clashes with international/European competitions and player welfare considerations, the need to minimise the number of weekday fixtures emerges as clear recommendation from the results. Given that midweek scheduling is likely unavoidable, it is important to ensure equity in the distribution of midweek

matches so that no individual club plays a disproportionate number of Monday to Thursday matches. Finally, on the issue of scheduling, the negative 2016 UEFA European Championship Finals effect should offer guidance to administrators who decide on the dates for summer breaks.

Further practical solutions to optimise attendances can be offered outside of scheduling. Given the importance of habit to match attendance, coupled with the higher attendance earlier in the season, clubs should focus on developing strategies to attract and retain fans for home matches in April. Attendance tends to decay after earlier months. Targeting this window, when the hype associated with a new season has worn off, may serve to build fan identification and stem the attrition of casual fans. Other options could include having pricing discounts during the standard holiday periods, i.e. during July and August. With appropriate marketing and pricing incentives in place, a more partisan fan base could be grown.

VII CONCLUSION

Theoretically, it is expected that the design of a competition impacts fan interest in sport. We exploit a variation in competition design to investigate if the factors impacting spectator demand are affected by a format change in the context of the LoI. We model the determinants of stadium attendance for two seasons under a triple round-robin and for two seasons under a quadruple round-robin. While the format change would be expected to bring about more frequent and higher quality matches, the trade-off is further fixture duplication and an expected reduction in championship uncertainty.

Despite the format change, the results indicate that the shift to a quadruple round-robin with fewer teams did not increase attendance. The results point to continuity between the determining factors of demand under the old and new formats, despite adjustments to the balance levers. The results show strong evidence of habit persistence and are consistent with the literature on many findings; current form, derbies, scheduling and travel distances are important determinants of turnout under both formats.

The take-away message for league policymakers is that tweaks to the competition format will not result in significant changes to aggregate demand. Adjustments will likely only impact individual clubs rather than bringing league-wide impacts. While specific strategies to foster habit formation are challenging to pinpoint, a precise policy recommendation arises from the scheduling effect we identify – there is a need to ensure as many fixtures as possible take place between Friday night and Sunday afternoon.

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