

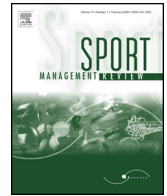


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From *schadenfreude* to *mitfreude*? Estimating viewership loss and rivalrous relationships in otherwise neutral markets

Hojun Sung^a, Brian M. Mills^{a,*}, Scott Tainsky^b

^a Department of Tourism, Recreation & Sport Management, University of Florida, P.O. Box 118208, Gainesville, FL 32611, United States

^b Department of Recreation, Sport & Tourism, University of Illinois, Urbana-Champaign, 1206 South Fourth St., Champaign, IL 61820, United States

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ABSTRACT

We measure the loss in viewership over the course of National Football League games to identify engagement of out-of-market viewers throughout the contest, and how this is moderated by the presence of a rival team in the game. Our analysis reveals that out-of-market viewers are more likely to stay tuned throughout a game when their local team's rival is ultimately the game winner. This brings about important considerations in the context of measuring the effect of rivalry on demand. Our results point toward future research within the context of in-group bias and *mitfreude* behaviors in rivalrous relationships such that viewership depends not only on home team and in-group competitiveness, but also highlights preferences such as out-group competitiveness, or lack thereof. We therefore suggest an amendment to the Neale and Rottenberg frameworks to include how rivalry induces competitive complementarity.

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1. Introduction

A game between two professional sports teams – and the aggregation of these games across the league – comprise the essence of the league product that clearly requires both cooperation and competition on the part of league members (Borland & Macdonald, 2003; Neale, 1964; Rottenberg, 1956). In past work, the complementary nature of a league's competing firms (teams) has been shown to enhance overall interest in games, ultimately affecting overall franchise and league demand (Xu, Sung, Tainsky, & Mondello, 2015). This could eventually impact league organization, policy, and scheduling that leverages complementarities among otherwise competing franchises.

Rivalry then may play a crucial role to elucidate the complimentary relationship between competing teams in professional sports leagues. In particular, sport is replete with various rivalries, offering a product that differentiates itself from other competitive outcomes in leagues. With the formation of heated rivalry, the reward of defeating a rival may amplify the utility fans obtain from a victory as compared to other league games against non-rivals (Havard, 2014; Mahoney & Moorman, 1999). In general, the formation of sports leagues has allowed the scheduling of games and championships that have prompted the development of systematic rivalries often specific to divisional alignment or geographical location (Blair, 2011).

* Corresponding author.

E-mail addresses: hsung@ufl.edu (H. Sung), bmmills@hph.ufl.edu (B.M. Mills), tainsky@illinois.edu (S. Tainsky).

Ultimately, the organization of a league such that various outcomes have value to consumers – not just for the league championship, but for superiority over other teams and rivals – allows a risk reduction from the perspective of league revenues. Specifically, being high in the standings usually results in higher levels of game interest, particularly if both teams are in a championship race. However, the existence of rivals may mitigate lost revenues when (at least) one team is low in the standings and the match has little to no impact on the outcome of the championship hunt. This possibility raises the question of optimal scheduling such that leagues can maximize overall interest in games where not all teams are serious contenders for the championship.

One of the ways in which this may be addressed is through capitalizing on the possibility of increased interest in rivalry matches. Evidence of implied interest in rivalry matches has been addressed to some extent in the sports economics literature on attendance demand (Buraimo & Simmons, 2008; Forrest & Simmons, 2002; Forrest, Simmons, & Szymanski, 2004); however, the continued engagement of viewers of television broadcasts specific to rivalry and viewer market affiliation has gone largely unexplored. Further, there has been little study investigating rivalry in the context of otherwise neutral markets, largely due to the limitations with aggregate attendance demand estimation.

To address these gaps in the literature, this paper investigates the impact of rivalry on broadcast ratings of National Football League (NFL) contests, the most watched sport in the United States. We build upon the novel findings of Xu et al. (2015) that neutral market and non-neutral market fans have differentiated engagement throughout NFL games depending on the margin of victory or loss in the game. However, we do so by identifying how rivalry moderates out-of-market game viewership throughout contests featuring rivals of the viewing market's team. This allows for the estimation of rivalry effects on viewer engagement irrespective of home team participation in the contest, and includes moderating effects of the local market's rival being ahead or behind. We further provide evidence of spillover effects from rivalry that may increase overall viewership for the league.

2. Background and literature

2.1. Fan demand and rivalry

While somewhat limited, past work investigating demand in sport has identified evidence of positive rivalry effects on interest in sporting contests, with much of this research centered on attendance for international soccer (Buraimo & Simmons, 2008; Forrest & Simmons, 2002; Forrest et al., 2004). In the context of major U.S. leagues, Paul (2003) evaluated the determinants of attendance of the National Hockey League (NHL) for both the U.S. and Canadian teams – which had adopted an unbalanced schedule such that there were more games between regional rivals – finding that divisional rivalry games had positive effects on attendance. In Major League Baseball, several studies have addressed rivalry and demand (Beckman, Cai, Esrock, & Lemke, 2012; Lemke, Leonard, & Tlhokwane, 2010), with further evidence of attendance increases as a result of interleague rivalries (American League versus National League), often based on geographic distance (Beckman et al., 2012). Additionally, both Sanford and Scott (2016) and Szymanski and Winfree (2014) estimated significant and positive effects of rivalry on college football demand. However, identification of what represents rivalry in the context of consumption behavior is less developed in the literature.

With respect to rivalry perceptions, Havard, Wann, and Ryan (2013) and Havard and Eddy (2013) qualitatively addressed rivalry in the context of conference alignment, finding a need for replacement when rival teams leave the conference. The interest in finding a new rival indicates that fan consumption behaviors may be increased through ensuring that these rivalrous relationships exist. Havard (2014) begins to address some of the relationships between fans and rivals of their favorite teams, and how these rivalries are perceived. For example, it was found that sports fans derive enjoyment from their rival's failure, defining the phenomenon as Glory Out of Reflected Failure (GORF), an extension of *schadenfreude*: gratification evoked by the misfortune of others (Dalakas & Melancon, 2012; Heider, 1958). In this case, fans have preferences for a losing rival team, even when that team is not playing their local market team.

Leach, Spears, Branscombe, and Doosje (2003) suggested that in-group *schadenfreude* is evoked when a targeted/superior out-group suffers the misfortune under certain conditional factors. Additionally, in-group *schadenfreude* was elevated when an out-group outperformed in sporting competition (Leach & Spears, 2009). These findings were further supported by Cikara, Botnick, and Fiske (2011), finding neurological evidence suggesting the *schadenfreude*-behavior of sport fans when watching a rival baseball team falter. Moreover, *schadenfreude* was more likely to be invoked when an envied or competitive, higher-status out-group suffered from a misfortune (Cikara & Fiske, 2012).

Despite the fact that the perception of rivalry and intentions among fans has been closely addressed in the sport management literature (Havard, 2014), we note that our focus in this work operationalizes rivalry in the demand context as it relates to fan consumption behaviors. Therefore, further inquiry is necessary to ensure consistency in framing across the literature, and how these perceptions and intentions align with consumption behavior for those fans that do not have allegiance to either team in the contest.

Until recently, the desirability of games *not* featuring the local team in general has gone understudied due to the lack of ability to distinguish fans of different teams at sporting events in aggregate level data. And while smaller scale survey studies have addressed fan interest in viewing games, much of this work used intention reporting to understand differences in preferences as predicted by attitudes toward given teams (Mahoney & Howard, 1998; Mahoney & Moorman, 1999), rather than actual fan viewership behavior. Therefore, there is room to evaluate this behavior and identify its consistency with

reported attitudes and intentions found in past work. In particular, it is unclear whether only *schadenfreude* results in increased consumption behaviors by rival fans, or whether there are additional behavioral consequences derived from the rivalrous relationship.

Notably, the aforementioned studies recognizing the value of viewing contingencies across a league do not employ in-person attendance as the outcome variable, as was tradition in studies of this kind until recently. Besides the inability to measure demand outside of the local market, other limitations of attendance data include issues with censoring of data in sellouts, the inability to account for within-game exits, and issues with price elasticity when using average price levels.

Television ratings data, however, enable scholars to circumvent a number of these limitations, and allow for measurement of within-game changes in viewership. More recent work has begun to identify behavior of out-of-market fans using television broadcast ratings, leveraging viewer location information provided along with these data (Tainsky & Jasiolec, 2014; Tainsky, Xu, Salaga, & Mills, 2014; Tainsky, Xu, Mills, & Salaga, 2016). We expand upon this literature here using rivalry as our context and television ratings data to extend the understanding of rivalry from the out-of-market consumer, offering the advantage of revealing various consumption patterns unavailable in attendance data (Alavy, Gaskell, Leach, & Szymanski, 2010; Forrest, Simmons, & Buraimo, 2005; Meehan, Nelson, & Richardson 2007; Tainsky, 2010).

More specifically, Tainsky and Jasiolec (2014) investigated viewership of out-of-market games in the NFL through traditional demand shifters, finding that fans from markets that did not have a local team competing in a game were more likely to watch that game when a team from their own division was participating. Additionally, Tainsky et al. (2014) found that fans were more likely to watch out-of-market playoff games if their own team was also participating in the postseason, while Tainsky et al. (2016) identified interest in out-of-market games was moderated by uncertainty over the local team making the playoffs.

This body of work identifies a key complementary relationship among franchises within a sports league, showing that there exists contingent interest in other league games based on local team quality. Most relevant to this work, Xu et al. (2015) identified the moderating effect of score margin by using within-game ratings changes. Specifically, they tested the magnitude of loss in viewership within winning, losing, and neutral markets over the course of the game as it related to the score, exhibiting that viewers residing in the winning market – presumably mostly made up of fans of that team – were less affected by the score margin and tuned in longer than viewers residing in the market of the losing team. Most notably, neutral market fans tended to behave similarly to the losing market fans, tuning out as the score margin increased and the game outcome became more certain.

The work from Xu et al. (2015) elucidates effects predicted by Coates, Humphreys, and Zhou (2014) with behavior consistent with loss aversion for losing market fans, and interest in outcome uncertainty among neutral market viewers. We build upon these specific results by estimating the moderating impacts of rivalry on fan viewership retention as predicted by score margin and neutral fan location. We examine consumption patterns of the NFL viewership to estimate viewership engagement in games featuring rival opponents of the local team. In general, rivalry takes center stage in this study, both for the practical value it may play in determining viewership and for our enhanced theoretical understanding of how rivalry relates to the complex relationship among competing franchises in the same league. We use our findings to motivate further development in the literature on the theory of rivalry and its role in fan interest and attachment.

2.2. Formation of rivalry

Internationally, sports rivalry often occurs congruent with geographical boundaries. The most salient of rivalries are the derbies between teams in nearby European professional soccer leagues. For instance, *El Clasico*, taking place between FC Barcelona and Real Madrid, attracts over 400 million spectators in more than 30 countries all over the world (Goal, 2012). Within North American sports, both geography and divisional alignment can contribute to rivalry. However, the NFL and other North American leagues are not confined to neighborhood rivalries, in part due to territorial rights which ensure regional franchise monopolies. In the rare case that teams are located in the same metropolitan area, they are separated into the American Football Conference (AFC) and National Football Conference (NFC), with even further divisional separation within each conference. This does not preclude the possibility of broader regional rivalry, and many of the divisions are grouped by geographical direction (i.e., North, South, East, and West). Nevertheless, the structure and influence of rivalry in North American professional sports consumption has largely resulted in varying definitions in the literature.

It was not until recently that the sport management literature began to pay further attention in defining rivalry in sports. While some distinct definitions have been proposed more recently (Havard, Wann, & Ryan, 2013), they are often difficult to operationalize in the context of consumer behavior in the face of competition for scarce resources. There is therefore substantial room to understand rivalry from a behavioral perspective in addition to the fan intention and attitudinal perspective. Quintantar, Deck, Reyes, and Sarangi (2015) surveyed perception of rivalries in intercollegiate football conferences and found that schools with more success are more likely to develop a uni-directional rivalry: lower level schools saw them as rivals, but they did not see these schools as their rivals or equals. Further, the authors found that many rivalries among schools in same state strongly impacted the intensity of bi-directional rivalry.

From the perspective of rivalry formation, Kilduff, Elfenbein, and Staw (2010) found that similarity, repeated competition, and historic competitiveness between competitors were the pivotal antecedents of rivalrous relationships. Similarly, Tyler and Cobbs (2015) identified 11 elements of rivalry which include the frequency of competition, defining moment, relative dominance, and cultural similarity. These findings are aligned with earlier works of interstate and firm rivalry. For example,

prior research shows that recurring disputes and historical issues are essential in the formation of interstate rivalry (Goertz & Diehl, 1993; Vasquez, 1996; Vasquez & Leskiw, 2001), and the similarity of and dominance within the industry helped to determine the intensity and directional relationship among rival firms (González-Moreno & Sáez-Martínez, 2008; Smith, Grimm, Wally, & Young, 1997). These findings have important implications for fans of rival teams in terms of direction and intensity of the rivalry; however, current rivalry empirical frameworks have not fully captured this in the context of demand, and there has been little research on fans of rival teams that are not competing in the game of interest.

Given this history, and some ambiguity over the definition of a rival (Tyler & Cobbs, 2015), divisional alignment provides an operationalized context into rivalrous relationships between teams. Anecdotally, most rivalries in the NFL come from frequency of matches and in the pursuit of a divisional, conference, or league championship. For example, the Washington Redskins and Dallas Cowboys make up one of the most heated rivalries in the league. However, the geographic distance between Dallas and Washington precludes the consideration of a region-based rivalry, and the two teams remain in the NFC East division despite the location of the Cowboys in Texas. Alternatively, the Eagles and Steelers – both teams from the state of Pennsylvania – are not considered heated rivals in the context of league outcomes given their affiliation within the NFC and AFC, respectively. Although there is a nontrivial level of regional rivalry between these teams, there is substantially less impact on league playoff outcomes than when the Steelers play the Baltimore Ravens, who are in the same division, but a different state.¹ We, therefore, define rivalry based on divisional alignment in this work.

Using the divisional alignment, we identify viewers in markets watching games that do not feature the local team, but that feature at least one divisional rival. This allows the evaluation of relative sustained fan interest throughout the game in the case that the otherwise neutral fans' rival is ahead (or behind). For example, we estimate the sustained viewership of a Washington Redskins fan for a game that features the Dallas Cowboys and Philadelphia Eagles (two divisional rivals) or a game that features the Dallas Cowboys and the San Diego Chargers (one divisional rival), each relative to the viewership of these fans for a Chargers-Browns match-up (no divisional rivals). Here, we are particularly interested in the moderating relationship of rivalry in the otherwise neutral-market behaviors found in Xu et al. (2015). Specifically, we ask the question: do Washington Redskins fans (defined as those in the Washington, DC market) consume games featuring the Dallas Cowboys – but not the Redskins – and is this different from what is found for Redskins fans when viewing a game that does not feature a rival, such as a Chargers-Browns matchup? Using the Washington, DC market (home of the Redskins) as an anchor example here, we estimate differences in the following match types in our inquiry.²

- 1) NFC East vs. Non-NFC East (not featuring Redskins).
- 2) NFC East vs. NFC East (not featuring Redskins).
- 3) Non-NFC East vs. Non-NFC East (not featuring Redskins).

Our interest is specifically in the differences between the first and/or second options featuring an in-division team, and the third option, featuring only out-of-division teams. This identifies the propensity of games featuring a market rival to reduce viewership loss throughout the contest, relative to a game not featuring a divisional rival of the local team. We further evaluate the direction of the impact depending on whether the market's rival is ahead or behind, allowing estimation of whether local rivalry reduces (increases) lost viewers in the context of a rival losing (winning) a game by a wide margin.

2.3. Landscape of NFL television broadcasts

Since the conference and division realignment in 2002, the NFL has 32 teams divided into two conferences (i.e., AFC and NFC) with four divisions each. Each team plays 16 regular season games over a 17 week span. These games are comprised of six home and away games against divisional rivals, six intra-conference matches, and four inter-conference matches. The games are broadcasted on Thursday (starting in 2006), Saturday (limited), Sunday, and Monday. The Sunday afternoon AFC games are broadcast on CBS whereas FOX broadcasts the NFC games. Inter-conference game rights were determined by the visiting team's conference. Thursday night games were televised on NFL Network in our sample, while ABC (1970–2005) and ESPN (2006–current) have televised Monday night games over its history. Televising out-of-market games are determined cooperatively between the NFL and the network affiliates in each market.

In 2004, the NFL signed \$8 billion worth of contracts with Fox and CBS – which was approximated to be a 25% increase from the previous deal – along with a five year deal worth of \$3.5 billion with DirecTV (Stewart, 2004). The NFL signed \$27.9 billion in contracts with major networks in the U.S., agreed upon in 2011 and commencing in 2014, which was an increase of more than 60% from the previous deal (Badenhausen, 2011; Futterman, Schechner, & Vranica, 2011). In turn, revenue from game broadcasts has become increasingly important to the overall revenues of pro sports teams in the U.S., highlighting the importance of understanding demand for these broadcasts. We restrict our focus on ratings prior to 2010 as to not straddle two broadcasting landscapes that could change the way games were broadcast in neutral markets.

¹ In fact, Philadelphia is much closer geographically to Baltimore than is Pittsburgh.

² We note that we use a broader sample of markets in our empirical specification, but use Washington, DC as an illustrative example.

3. Data and methods

3.1. Data and dependent variable

Our data consist of Nielsen Local People Meter household ratings for the 2007 through 2009 regular seasons. The data include 23 of the 25 largest markets in the U.S., with the New York and Oakland/San Francisco metropolitan areas removed due to complications with having two local NFL franchises, obscuring identification of likely local fan allegiance. We include ratings only for markets that do not have a local team competing in the game being televised. Further, four of the markets included in the data are not home to an NFL team, making them fully neutral in the context of rivalrous viewership of any game. This leaves us with 5645 out-of-market ratings observations for 618 unique regular season games.

Our dependent variable is the percentage drop in household ratings between the highest rating during the game broadcast, and the end of game rating (*RatingsDrop*). *RatingsDrop* therefore measures the rate of viewer exits during the progress of the game. This variable is measured as in Xu et al. (2015):

$$RatingsDrop = \frac{Ratings_{Peak} - Ratings_{Last}}{Ratings_{Peak}} \in \{0, 1\}$$

Here, we identify the *Ratings_{Peak}* as the highest rating recorded during the broadcast, and *Ratings_{Last}* as the final reported rating for the broadcast at the end of the game.

We focus specifically on *RatingsDrop* in order to differentiate this work from Tainsky and Jasielec (2014) and understand the dynamic nature of viewership of NFL games. By looking at the changes in ratings over the course of the game – from the peak to the end – our estimations can help to understand the propensity for relative scoring and rivalry characteristics of a given game to retain viewership relative to games not featuring a rival. The moderating impact of relative score is of particular interest, which would not be well estimated in the context of aggregate ratings across the entire game. Therefore, we add to the literature by further elucidating the dynamic behavior of fan viewership in these games, and provide evidence of best practices in maximizing sustained viewership in otherwise neutral markets.

In general, we specify the following demand function in explaining our dependent variable, *RatingsDrop* as,

$$RD_{ijt} = f(GC_{ijt}, FE_{ijt}, RV_{ijt})$$

where *RD* is the ratings drop dependent variable for team *i* competing against team *j* ($i \neq j$) in season *t*. Our dependent variable is then explained by the linear function of $f(\cdot)$ with game characteristics vector (*GC*), fixed effect dummy variables vector (*FE*), and rivalry explanatory vector (*RV*), in which our central interest lies. Our empirical specification directly estimates the linear parameters of *GC*, *FE*, and *RV*.

3.2. Control variables

We include dummy fixed effects for *Network*, *DayOfWeek*, *WeekOfSeason*, *Season*, *Market*, and each of the competing teams (*Team*) in both estimations.³ We further include control variables describing a number of game quality characteristics. First, the total current win percentage of the two competing teams entering the game (*TotalWinPct*), and the summed win percentage of the two teams in the prior year (*TotalLagWinPct*) are used to identify effects of the total game quality on *RatingsDrop*. The sum of winning percentages of the competing teams quantifies the absolute expected quality of a game from both previous and current records, similar to previous studies of Monday Night Football (Paul & Weinbach, 2007).

The use of current season winning percentages precludes the use of the first game of each season, and therefore these observations are dropped from our sample, reducing it to 5229 total observations. Further, we include the absolute value of the difference between win percentages for the two teams in the current season at the time of the game (*AbsWinDiff*), and the difference in their win percentages at the end of the prior season (*AbsLagWinDiff*) to account for the relative team quality levels in the game and proxy expectations about uncertainty in the game outcome. We further include the sum of the total number of seasons in existence for each of the two teams in the game to control for general historical impacts of fan interest (*TotalAge*). This historical component can account for established familiarity of an old team or originality of a new team within the league to the fans (Tainsky & McEvoy, 2012) and increased match frequency (Kilduff et al., 2010; Tyler & Cobbs, 2015), which in turn affect the fan behavior in watching rival team's games. Finally, we include the margin of victory (*ScoreMargin*) and squared margin of victory (*ScoreMargin*²) in each game as in Xu et al. (2015) to identify score margin impacts on viewership loss throughout the contest.

3.3. Model estimation

Using the *RatingsDrop* variable, we evaluate two models of interest using various estimation strategies and standard error specifications. These models include: (1) a model estimating the effect of a game featuring one or two rivals of the viewing

³ We note that one of the networks airing NFL games – ESPN – only televised Monday night games, and therefore this indicator is dropped from all estimations due to collinearity with the Monday indicator.

Table 1
Summary statistics.

Variable	N	Mean	SD	Minimum	Maximum
<i>RatingsDrop</i>	–	0.1688	0.1745	0.00	0.909
2007	1751	0.3349	–	0	1
2008	1720	0.3289	–	0	1
2009	1758	0.3362	–	0	1
Sun	3603	0.6890	–	0	1
Mon	971	0.1857	–	0	1
Thu	523	0.1000	–	0	1
Fri	23	0.0044	–	0	1
Sat	109	0.0208	–	0	1
CBS	1505	0.2878	–	0	1
ESPN	971	0.1857	–	0	1
FOX	1260	0.2410	–	0	1
NBC	969	0.1853	–	0	1
NFLN	524	0.1002	–	0	1
<i>TotalAge</i>	–	99.728	35.122	15	176
<i>TotalLagWinPct</i>	–	1.1213	0.2524	0.25	1.813
<i>TotalWinPct</i>	–	1.1669	0.3670	0.00	2.000
<i>AbsLagWinDiff</i>	–	0.2001	0.1488	0.00	0.937
<i>AbsWinDiff</i>	–	0.2988	0.2493	0.00	1.000
<i>ScoreMargin</i>	–	12.500	10.035	0.00	59
<i>OneDivTeam</i>	584	0.1117	–	0	1
<i>TwoDivTeams</i>	148	0.0283	–	0	1
<i>DivisionalAhead</i>	352	0.0673	–	0	1

market, and (2) a model estimating the effect of whether the viewing market's rival ended the game ahead or behind.⁴ We estimate both models using standard errors robust to heteroscedasticity, and because individual contests appear more than once throughout the data set, we also fit our models with errors robust to clustering at the game level.⁵

The structure of our raw data call for the use of a Tobit model due to the range of the dependent variable noted above. In particular, our variable is censored at zero, and therefore we must estimate our model by first identifying the conditional probability of the latent change in demand, $y^* \leq 0$. We address this limited dependent variable problem using the classical Tobit model, as estimation with a non-negative dependent variable would result in inconsistent coefficient estimation (Amemiya, 1973). The Tobit model is weighted with this conditional density, and estimated as $y_i^* = \beta_j x_i + \varepsilon_i$, with error term $\varepsilon_i \sim N[0, \sigma^2]$. In this way, estimates of *RatingsDrop* cannot be expected to be below zero, and our coefficients are properly estimated and applied within the given range of the dependent variable.

We first estimate the effect of the simple presence of a rival playing in the game by including indicator variables of whether one or two of the teams competing in the game are within the viewership markets' division, respectively. These dummy variables are denoted as *OneDivTeam* and *TwoDivTeams*, respectively. This model is structured as:

$$\begin{aligned} & RatingsDrop_{ijt} \\ &= \beta_0 + \beta_1 AgeTotal_{jt} + \beta_2 TotalLagWinPct_{jt} + \beta_3 TotalWinPct_j \\ &+ \beta_4 AbsLagWinDiff_{jt} + \beta_5 AbsWinDiff_j + \beta_6 OneDivTeam_j \\ &+ \beta_7 TwoDivTeams_j + \beta_8 ScoreMargin_j + \beta_9 ScoreMargin_j^2 \\ &+ \beta_{11-13} Network_{ij} + \beta_{14-17} DayOfWeek_j + \delta_j + \gamma_j + \tau_t + \omega_j + \varepsilon_{ijt}. \end{aligned}$$

In this specification, *RatingsDrop*_{ijt} is the drop in ratings from peak viewership in market *i* for game *j* in season *t*, and ε_{ijt} is the market-game-season specific error term. Market effects are entered as δ_j , team-level effects are represented by γ_j , seasonal effects are represented by τ_t , and ω_t identifies the weekly within-season effects. We do not denote whether the teams competing in the game are home or away, as this seems unlikely to affect out-of-market viewership interest. Rather, each game includes two team dummy fixed effects specific to each team competing in the game. While the effects are subscripted with the game identifier, *j*, for simplicity, it is important to note that these are specific to the teams competing in game *j*. As noted earlier, the model is estimated first with errors robust to heteroscedasticity, and subsequently with errors robust to clustering by game.

As noted earlier, we also address the directional relationship between the rival and the score margin. In particular, we denote whether the rival was the winning or losing team in the game. These directional estimations exclude any games where *both* teams playing are rivals of the local market, reducing the sample size to 5081. The variables of most interest to our market rival analysis include the margin of victory (*ScoreMargin*), an indicator that there is a divisional rival playing in the

⁴ We note that we remove games featuring two rivals of the viewing market, as the directional effect of the rivalrous relationship is not estimable when both teams competing in the game are a rival of the viewing market's team.

⁵ Each game is televised in different markets, resulting in an observation for each market that each game is televised.

given game (*DivisionRival*), and an indicator that the divisional rival is the winner or loser of the game (*DivisionRivalAhead*), which allows identification of revealed preference for the divisional rival winning or losing the game. We further interact this last variable with *ScoreMargin* (and its squared term) to evaluate how the presence of a division rival moderates the directional score margin influence. The following model is again estimated both with standard errors robust to heteroscedasticity and clustered by game:

$$\begin{aligned} &RatingsDrop_{ijt} \\ &= \beta_0 + \beta_1 AgeTotal_{jt} + \beta_2 TotalLagWinPct_{jt} + \beta_3 TotalWinPct_j \\ &+ \beta_4 AbsLagWinDiff_{jt} + \beta_5 AbsWinDiff_j + \beta_6 DivisionRival_j \\ &+ \beta_7 DivRivalAhead_j + \beta_8 ScoreMargin_j + \beta_9 ScoreMargin_j^2 \\ &+ \beta_{10} DivRivalAhead_j * ScoreMargin_j + \beta_{11} DivRivalAhead_j \\ &* ScoreMargin_j^2 + \beta_{12-14} Network_{ij} + \beta_{15-18} DayOfWeek_k + \delta_j + \gamma_j + \tau_t \\ &+ \omega_j + \varepsilon_{ijt}. \end{aligned}$$

Table 2
Regression estimations for games featuring rival of local team.

Error specification	White	Cluster	White	Cluster
Intercept	0.21325*** (0.04856)	0.21325** (0.08665)	0.21183*** (0.04915)	0.21183** (0.08676)
Mon	0.15809*** (0.03917)	0.15809** (0.07029)	0.15272*** (0.03959)	0.15272** (0.06999)
Sat	-0.08017** (0.03717)	-0.08017 (0.05176)	-0.08465** (0.03735)	-0.08465 (0.05213)
Sun	-0.03106 (0.03831)	-0.03106 (0.06837)	-0.03205 (0.03873)	-0.03205 (0.06790)
Thu	0.00219 (0.03422)	0.00219 (0.03738)	-0.00079 (0.03447)	-0.00079 (0.03735)
FOX	0.05754*** (0.01042)	0.05754** (0.02262)	0.05510*** (0.01061)	0.05510** (0.02282)
NBC	0.16160*** (0.00883)	0.16160** (0.02077)	0.15831*** (0.00898)	0.15831*** (0.02097)
NFLN	0.14779*** (0.02030)	0.14779** (0.05866)	0.14739*** (0.02072)	0.14739** (0.05840)
TotalAge	0.00026* (0.00015)	0.00026 (0.00032)	0.00029* (0.00015)	0.00029 (0.00033)
TotalLagWinPct	-0.03024** (0.01369)	-0.03024 (0.02616)	-0.02644* (0.01387)	-0.02644 (0.02630)
TotalWinPct	-0.02818*** (0.00827)	-0.02818 (0.01817)	-0.03087*** (0.00842)	-0.03087* (0.01823)
AbsLagWinDiff	-0.08214*** (0.01977)	-0.08214** (0.03681)	-0.08089*** (0.01993)	-0.08089** (0.03681)
AbsWinDiff	-0.08863*** (0.01260)	-0.08863*** (0.02498)	-0.08904*** (0.01284)	-0.08904*** (0.02518)
ScoreMargin	0.01494*** (0.00038)	0.01494*** (0.00085)	0.01503*** (0.00040)	0.01503*** (0.00087)
ScoreMargin ²	-0.00028*** (0.00002)	-0.00028*** (0.00005)	-0.00028*** (0.00002)	-0.00028*** (0.00005)
OneDivTeam	-0.02232*** (0.00809)	-0.02232** (0.00887)	-0.00664 (0.01275)	-0.00664 (0.01501)
TwoDivTeams	-0.02193 (0.01402)	-0.02193 (0.01486)	-	-
DivisionalAhead	-	-	-0.04107** (0.01640)	-0.04107** (0.02018)
DivAhead*ScoreMargin	-	-	-0.00072 (0.00134)	-0.00072 (0.00142)
DivAhead*ScoreMargin ²	-	-	0.00014* (0.00007)	0.00014 (0.00009)

***, **, * refer to statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors in parentheses. All models include fixed effects for *Market*, *Season*, *WeekOfSeason*, and each team competing in the context (*Teams*).

4. Results and discussion

4.1. Summary statistics and control variables

Summary statistics of all variables included in both model estimations can be found in [Table 1](#). To summarize, the average *RatingsDrop* in our data is 16.9%, with a maximum of 90.9%. The majority of games occur on Sundays, 68.9%, with Monday (18.6%) and Thursday (10.0%) following as the more common game days. Games are mostly evenly split across ESPN, FOX, CBS, and NBC – all between 18 and 29 percent of games – while the NFL Network airs fewer games than the other networks. The average combined age of teams competing in the games is about 100 years, and the average score margin is about 12.5 points. Just over 11% of our data feature at least one team in the division of the viewing market, and about 60% of these result in wins for the divisional team.

The results of our model estimations are presented in [Table 2](#). There was no substantive difference across seasons in our sample, and we therefore do not present the year fixed effects in the table. We also exclude dummy fixed effects estimates for *WeekOfSeason*, *Teams*, and *Market*.⁶ Beginning with the remaining control variables, we find that *RatingsDrop* is significantly larger on Mondays than any other day of the week.⁷ Given the lateness of games on Mondays, and the fact that the game is contested during the traditional work week, this is largely unsurprising. Further, there are larger drops in ratings for FOX, NBC, and the NFL Network than for games aired on CBS (our base level). However, the reasons for these differences are unclear.

Related to the game- and team-specific variables, *TotalAge* was not predictive of changes in *RatingsDrop*. We find limited evidence of *TotalWinPct* and *TotalLagWinPct* in the models with clustered standard errors, although there is a statistically significant reduction in viewership loss in the models with errors only robust to heteroscedasticity. Nonetheless, *AbsLagWinDiff* and *AbsWinDiff* had statistically significant impacts on our dependent variable in both model specifications. In particular, viewers in neutral markets as a whole are more likely to remain tuned into a game when the anticipated difference in relative quality of the two teams is *larger*, holding constant the margin of the score in the game. This result tends to identify an effect contrary to that of Rottenberg's Uncertainty of Outcome Hypothesis (UOH; 1956).

The *ScoreMargin* variable and its squared term highlight a nuance related to the UOH in this context similar to that of [Xu et al. \(2015\)](#). The competing effects we find for *AbsWinDiff* and *ScoreMargin* indicates that neutral fans are more likely to remain tuned in longer when there is at least one high quality opponent competing in the game. As the game progresses, they tune out if the *ScoreMargin* gets too large (at a diminishing rate, as estimated by the squared term for this variable). This could also indicate that neutral market viewers are particularly interested in seeing an upset from an underdog ([McGinnis & Gentry, 2009](#)), an issue of interest in demand literature more recently ([Coates et al., 2014](#)).

4.2. Impacts of team rivals

Moving to our variables of interest for this study, and beginning with the estimations without an indicator of the directional score as it relates to the local market's rival team, we find reduced *RatingsDrop* when at least one of the teams competing in the game is also within the local market's division. The reduction in viewership loss for these games is approximately 2.2% points, or about 12.3% of the average *RatingsDrop* number in our sample; however, there is no additional effect of having two divisional teams in the game.

While this gives credence to the ability of rivals to capture otherwise neutral market viewers for longer periods, it does not speak to the preferences these viewers have toward the rival winning or losing. We address this interest in the last two columns of [Table 2](#). In these models, coefficient estimates indicate that viewers residing in a market with a divisional rival of one of the teams in the televised game are actually *more likely* to stay tuned when their divisional rival is the ultimate game *winner*. The effect is estimated at nearly double that of simply having a divisional team in the game, and at first glance reveals an apparent preference toward the rival winning the game.

However, this effect would seem rather counterintuitive, and further explanation is necessary in trying to disentangle the coefficient estimates presented. To begin, it is clear that the *ScoreMargin* influences viewers in general, and they are more likely to turn off the game, as before, when the game outcome is more certain. However, there is no additional interaction effect for divisional rival markets. Taken together, the net effect of the *AbsWinDiff* variables, *ScoreMargin*, and *DivisionalAhead* may indicate that these fans are staying tuned to games featuring the divisional rival in hopes of seeing a late game loss or upset of that rival.

Past work measuring fan intentions ([Havard, 2014](#)) does not match the revealed behavior in our data, indicating that understanding actual behavior by fans may be necessary in generating policy prescriptions and managerial implications. While further investigation is needed to understand the specific reasons for continued viewing of rival wins, the seemingly contradictory findings indicate that intentions and attitudes may not be particularly predictive of consumption. Specifically, researchers should be cautious in assuming that outcomes that are not (consciously) demanded by fans would necessarily imply a subsequent lack of consumption.

⁶ Estimates for dummy fixed effects coefficients for *WeekOfSeason*, *Teams*, and *Market* are available upon request from the authors.

⁷ Our baseline day is Friday, chosen simply by alphabetical order of the days.

Perhaps most interestingly to league organizational concerns, the effect of a rival retaining interest in an out-of-market game identifies an uncertainty of outcome-based risk-reduction for the league by creating rivalry. The existence of more rival markets for the game may ultimately mitigate the lost interest due to lopsided standings, and turn attention of more fans toward games that have no true bearing on these standings, but where head-to-head outcomes are relevant in the rivalrous context. [Szymanski and Winfree \(2014\)](#) begin to address this possibility by simulating college football realignment to maximize interest from rivalrous relationships. The growth of super conferences that include more teams with stakes in games of conference rivals may be a way to capture this additional out-of-market interest.

Alternatively, while surprising in the NFL context, there could be an in-group preference for conference teams in other games. In collegiate football, for example, it is possible that fans of a Big Ten team prefer to see other Big Ten teams win their respective bowl games as a representation of the quality of the Big Ten Conference. Likewise, a fan of the Bundesliga may root for Bayern Munich in UEFA Champions' League matches even if she is a supporter of Borussia Dortmund. While this could also be the case for the NFL, the relationship between team fans and the conference seems less rigid. Nevertheless, the effects found here call for future research into the behavior of neutral market fans when watching their rival team win or lose.

There are likely a number of complex relationships that would be well-served by survey data that could further support the findings here. In fact, [Quintanar et al. \(2015\)](#) take the literature in precisely this direction with U.S. college football. Further work in this area could provide expanded context for rivalry, and frame its definition in future work on demand and fan consumption behavior. This would directly inform research on spillover effects in the sports league context, and optimal league organization that maximizes fan utility from numerous relationships seen as highly rivalrous by fans.

5. Conclusion

In extending the influence of rivalry on out-of-market or otherwise neutral market viewership, there is substantial room for growth in the literature on both the behavioral definition and impact of rivalry on consumption. We begin to address these issues with a dynamic estimate of demand throughout game contests, and the effect of divisional rivalry on viewer engagement. We find games featuring a neutral market team's on-field rival are less likely to be turned off, particularly when that rival is the winner of the game. This last finding presents a challenge to the traditional thought on rivalrous relationships that tends to suggest rivals are unequivocally adversaries.

There is the possibility that multiple levels of in-group membership – team, division, and conference – allow for further characterization of rivalrous behavior at various levels ([Havard, 2014](#)). It is plausible that fans may root for a rival team as an extension of their own division or conference, regarding these teams as their extended in-group members, something that is perhaps more common in some leagues than others. Here, we may see rival market fans act as home fans, and Bask in Reflected Glory (BIRGing; [Cialdini, Borden, Thorne, Walker, Freeman, & Sloan, 1976](#)) or participate in Cutting Off in Reflected Failure (CORFing; [Snyder, Lassegard, & Ford, 1986](#)). On the other hand, these very well could be games that retain interest as the viewers stay tuned in with hopes of seeing their rival lose the game.

Given the results here, we suggest two lines of future research. First, the definition of rivalry requires further development within the literature on sports economics and sport management, particularly as it relates to the revealed behavior of consumers. Divisional, regional, or historical rivalry may all be relevant in the North American sport context. However, they may have different impacts on rival fan viewership patterns. We find that divisional rivalry may have aspects of basking in reflected glory, despite its usual applications in the context of home fan allegiance. In particular, this could reveal a more nuanced relationship between the in-group bias and *schadenfreude* behaviors normally expected in this context. Future research would be well-served to broaden the scope of in-group bias as it relates to conference alignment and rivalrous interests when the local team is not competing. This also takes the recent work of [Delia \(2015\)](#) in the direction of not just multiple group identities, but different identities that are both conflicted with and nested within one another.

Secondly, we suggest further dynamic understanding of viewership patterns within-game. Due to the limitations in our data, we cannot discern if rival markets are viewing games to the end in close games in hopes of their rival losing – and turning off a game early when they know their rival will lose – or watching due to interest in the rival's win in the context of an in-group bias as it relates to conference alignment. Further analysis is needed to disentangle this possible relationship with additional measures throughout the game of changes in viewership alongside real time score changes, as in [Alavy et al. \(2010\)](#).

In general, accounting for the intensity, direction, and duration in examination of rivalry within the context of demand for sport should be of primary concern in future research. The intensity indicates the degree of animosity built upon a relationship where stronger hatred can induce greater demand. Further, the direction of the relationship is important in order to accurately estimate the dynamics of the behavior. Recent work has begun to establish methods dealing with intensity as well as unidirectional and bidirectional rivalry ([Quintanar et al., 2015](#)), something that would be well-served by determining consumption behaviors based on these phenomena. The relationship can be bidirectional, as both of the teams identify each other as a strong rival, or unidirectional, in which case only one team builds a sense of rivalry through lopsided matches or as an objective to overcome for championship. Lastly, duration can be multifaceted as the rivalry formation can be either from frequent match ups or a single event with larger implications. Furthermore, it is plausible that the new rivalry brings demise of the old, while old rivalry returns in the future that may create a life cycle of the relationship. All in all, from our study and with consideration of these elements collectively, we suggest the following framework of rivalry, borrowing from findings in more general economic and management literature on firm competition.

Either for the pursuit of championship or ecstasy of victory, the significance of the divisional games carries added importance which, in turn, evolves into a rivalrous relationship. The intensity of rivalry may then be at its peak where the competitions are close to even or highly uneven, in which the latter case is more likely to develop a unidirectional rivalry either for enduring, demising, or burgeoning rivalrous relationship. Furthermore, in the case of a rival team being part of a representation of the larger affiliation, rival teams may then serve as complementary products in the absence of a home team. In this way, our empirical evaluation may reveal *schadenfreude* giving way to *mitfreude* – a shared joy – under certain conditions, where fans of a rival team become part of the extended divisional or conference affiliation. This, in lieu of being the most hated team within the league, the rival may in fact become an alternative favorite team for these fans to consume. As noted, the college football bowl game context would be a particularly useful place to test this sort of behavior.

For leagues in particular, the rivalrous relationship built on sporting and economic competition for limited resources – the championship and fandom – ultimately results in a net increase in aggregate fan interest across multiple teams. This increase is a direct extension of the Neale (1964) and Rottenberg (1956) framework, in that competitiveness breeds interest, and the literature can come full circle in developing an understanding of optimal league structure that fosters these types of relationships among fans and their rival teams.

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