At the stadium or at home: the effect of broadcasting matches

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Abstract

Purpose – The purpose of this paper is to analyse simultaneously the effect of attendance at the stadium on the size of the TV audience, taking into account the effect of price and uncertainty of outcome hypothesis on both the TV audience and stadium attendance. The paper assumes that a home-team effect exists and influences potential spectators' decision to go to the stadium or to stay at home.
Design/methodology/approach – The data set consists of all 228 matches broadcast live and on open air from the Brazilian League across the seasons 2013–2015. The econometric approach of the present paper is based on three simultaneous equations through the Three-Stage Least Square estimator. This method is chosen in order to avoid endogeneity between ticket prices and live attendance and, consequently, with the television audience, too.
Findings – This work finds a correlation between TV audience and attendance at the stadium. However, it has been demonstrated that those matches that are more expensive have a larger TV audience. Scheduling and UO appear to be relevant for TVs and clubs. Scheduling is relevant, as weekend matches have a smaller TV audience but higher attendance at the stadium.
Practical implications – The findings indicate that Brazilian football clubs should find optimal prices for matches in order to maximise both TV audience and attendance.
Originality/value – Analysing simultaneously the effect of attendance at the stadium on the size of the TV audience, taking into account the effect of price on all three of these variables, is new. Another novel aspect is the use of data on audience size to observe a possible substitution effect. The authors also distinguish between home and away matches, assuming that a home-team effect exists and influences potential spectators' decision to go to the stadium or to stay at home.

Keywords Attendance, Broadcast, Substitution effect, TV audience, Uncertainty of outcome

Paper type Research paper

Introduction

Although the transfer of players represents an important share of the revenues of clubs (17 and 13 per cent of total revenues in 2014 and 2016, respectively), the main sources of revenues for Brazilian football clubs are likely the same as in most other countries: TV contracts, match-day revenues, advertising and sponsorship. In 2017, 42 per cent of the revenues of Brazilian clubs were from TV contracts, and 15 per cent were generated by ticket sales (Itau BBA, 2018). In that sense, attracting fans to the stadium and capturing a large share of TV spectators are relevant issues for the football industry. Moreover, both kinds of spectators contribute indirectly to increasing other sources of revenues, such as advertising, sponsorship and merchandising. Oh *et al.* (2017) assert that the stadium

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occupancy rate should be considered when analysing sports broadcasting media and marketing, as the atmosphere in the stadium when the match is broadcast can attract new visitors to the stadium in the future.

The debate about the effect of broadcasting matches is still open and probably will continue as new channels such as the streaming of matches will appear. This discussion exists because there are mixed effects of broadcasting matches. On one side, there are complementary effects, such as the promotion of matches with announcements and pre-match reports. On the other hand, there is a substitution effect when potential spectators prefer to watch the match at home or at the pub on TV (Kringstad *et al.*, 2018). In general, the influence of the live broadcast of football matches on attendance has been studied. However, in most of cases, the fact of having broadcast matches has been reflected as a dummy variable that only indicates whether the match was broadcast or not.

The determinants of the audience of live-broadcast football matches have also been an object of study in the literature. In this type of study, the dependent variable is audience or TV share. Usually, these studies do not include price as an explanatory variable.

Suspense has been shown to be a key factor in the enjoyment of sports media (Peterson and Raney, 2008). This is in line with the uncertainty of outcome hypothesis (UOH) that has been analysed often in sports. Moreover, football scheduling has been considered an important factor for the audience on TV and attendees at the stadium. This can be a tool to increase the value of clubs as well as of broadcasters.

In this paper, we want to analyse simultaneously the possible effect of attendance at the stadium on the size of the TV audience, taking into account the effect of price on both attendance and the TV audience. Moreover, we study the UOH for both kinds of spectators. Studying these three variables simultaneously is new, as is the use of data on the size of the audience to observe a possible substitution effect. We also distinguish between home and away matches. Our perspective is different than what Forrest *et al.* (2005) assume, as they consider that in TV matches, there is no home-team. We assume that a home-team effect exists and influences whether potential spectators go to the stadium or stay at home.

Theoretical background

The effect of broadcasts on attendance has being studied, with different results. One of the first papers on the topic was written by Baimbridge *et al.* (1996). They include in their study dummy variables to identify if the matches were broadcast by Sky and advertised on BBC prior to the matches' kick-off. They conclude that the net financial consequences of live transmission are positive for Premier League teams, although live transmission reduces attendance.

Allan and Roy (2008), using a dummy variable to identify matches broadcast live in the Scottish Premier League (SPL), found that matches that are broadcast live reduce pay-at-the-gate home-team supporters by 30 per cent in the SPL. García and Rodríguez (2002) observe similar behaviour in the Spanish *La Liga*, where broadcast matches have reduced the demand for tickets. Forrest and Simmons (2006), using a set of dummy variables for TV coverage, show that televised matches from UEFA's Champions League have a negative impact on the attendance of third- and fourth-tier matches in England. Cox (2012), analysing the English Premier League (EPL), asserts that matches broadcast live on television can be considered as a substitute for watching at the stadium. However, he found that broadcasting live has a small negative effect on gate revenue for the best-performing clubs and a much larger effect for the worst-performing clubs. He only considers a dummy variable to reflect whether the match is broadcast live or not.

Studies on the determinants of the demand for football on TV have been also popular. One of the topics analysed has been the effect of the uncertainty of outcome (UO) on the demand for broadcast football matches. Forrest *et al.* (2005) underline the positive effect of

UO on the size of the TV audience. Alavy *et al.* (2010) analyse 248 EPL matches using TV viewership ratings. In this case, the analysis refers also to UO and its effect on the size of the TV audience minute-by-minute. The difference in the preferences of viewers regarding UO in different markets was studied by Gasparetto and Barajas (2018).

The demand for football has not been restricted to Europe. Tainsky (2010) studied broadcast demand for the National Football League (NFL). In this case, the explained variable was the average number of viewers watching a telecast in the market. A couple of years later, Tainsky and McEvoy (2012) analysed TV demand by focusing on the average percentage of viewers watching TV. They focussed on matches that were broadcast in markets without NFL teams. The focus of this study was on broadcast scheduling.

Few works analyse simultaneously attendance at the stadium and the TV audience. Buraimo (2008) and Buraimo and Simmons (2009) introduced two models analysing, first, attendance and, in a second step, the TV audience, with an instrument in the second model for home attendance. Cox (2018) analysed different behaviours of spectators at the stadium and on TV in relation to uncertainty. The former prefers more certain matches, while TV spectators are attracted to more uncertain matches. Buraimo *et al.* (2010) found that stadium attendance in English and Spanish leagues responds to a series of factors in a similar manner; however, the effects of broadcasting on match-day attendance vary across the two leagues.

The influence of scheduling on TV viewership and stadium attendance has also been an object of study as clubs try to maximise home attendance and broadcasters search for the maximum audience rating (Wang *et al.*, 2018). Kringstad *et al.* (2018) pay attention to scheduling as well.

We could conclude that the study of the determinants of attendance at the stadium and of the size of the audience of live-broadcast football matches is a topic of interest in the literature. Moreover, both types of demand should be studied together. Nevertheless, to study demand, one of the elements to consider should be the price. It is important to remark that most studies have omitted this variable. Although Allan and Roy (2008), Buraimo (2008), Buraimo and Simmons (2009) and Kringstad *et al.* (2018) affirm that fixed-effect panel-data models allow for the omission of variables such as ticket prices that can create measurement problems, we think that including ticket prices in the study can bring new insights. Therefore, we will contribute with a three-stage least square estimator (3SLS) model explaining, first, the price, next, attendance and finally, the size of the TV audience.

There are some factors that have been presented in the literature as a limitation of the study of attendance – for example, the presence of season-ticket holders (Forrest *et al.*, 2005). However, in this study, we analyse Brazilian football, which has a very limited number of season-ticket holders. Other problems in attendance are the presence of sold-out matches (Buraimo, 2008; Buraimo and Simmons, 2009). Again, the Brazilian case does not require the use of the Tobit model, as there are no censored variables because there are no sell-outs (see Table I).

Policies such as revenue-sharing aimed at promoting a more uncertain match may have a different effect on TV and stadium demand. In that sense, it is of interest to understand the

	Obs	Mean	SD	Min.	Max.
TV audience	228	2,714,891.00	781,036.30	1,209,802.00	4,755,888.00
Attendance	228	19,890.31	12,128.59	0.00*	63,501.00
Price (*Reais*)	226	35.00	17.06	7.33	109.43
Stadium capacity	228	44,735.74	21,463.45	14,000.00	78,838.00
Occupancy rate (%)	228	48.02	22.62	0.00	98.28

Notes: *Two matches were played at closed gates due to sanctions from Brazilian Superior Court of Sports Justice. These observations have been excluded in the econometric analysis

Table I. Summary statistics of the dependent variables and stadium

effect of UO on attendance and viewership. Scheduling may also be an important factor to analyse, as it is one of the elements that can be modified when establishing policies.

Still, there is room to develop the possible simultaneous effect on attendance by taking into account some peculiarities of the broadcast market, the UO and scheduling. The aim of this paper is to analyse the audience for broadcast matches while considering some specific features of attendance and price, paying special attention to UO and scheduling.

Methods

The data set consists of all 228 matches broadcast live and on open air in the Brazilian League across the seasons 2013 to 2015 by *Rede Globo* in the States of Rio de Janeiro and Sao Paulo. That free-to-air channel only broadcasts Brazilian League matches in Rio de Janeiro with the presence of (at least) one team among Botafogo, Flamengo, Fluminense and Vasco and in São Paulo with the presence of (at least) one team among Corinthians, Palmeiras Santos and São Paulo.

The econometric approach of the present paper consists of three simultaneous equations through the use of the 3SLS. This method is chosen in order to avoid endogeneity between ticket prices and live attendance and, consequently, with television audiences, too. Indeed, one endogenous variable is regressed on a set of explanatory variables, and the predicted value of this variable enters in the following step. In the present case, first, ticket prices are estimated. Next, the predicted values for ticket prices are used in the attendance equation. Finally, predicted attendance enters in the television-audience equation. The general model is presented as:

$$p = \beta_0 + \beta_1 w + \beta_2 theil + \beta_3 q + \beta_4 mv + \beta_5 r + \beta_6 r^2 + cfe + team\,fe + \varepsilon$$

$$a = \gamma_0 + \gamma_1 \hat{p} + \gamma_2 \hat{p} \cdot h + \gamma_3 d + \gamma_4 w + \gamma_5 theil + \gamma_6 cap + cfe + team\,fe + season\,fe + month\,fe + \varepsilon$$

$$tv = \delta_0 + \delta_1 \hat{a} + \delta_2 \hat{a} \cdot h + \delta_3 dist + \delta_4 \hat{p} \cdot h + \delta_5 d + \delta_6 w + \delta_7 theil + cfe + season\,fe + month\,fe + \varepsilon.$$

Three dependent variables are used in this work: television audience (*tv*), attendance (*a*) and ticket prices (*p*). The average number of viewers in each broadcast match measures television audience. This information is collected by Kantar IBOPE Media in Brazil and was provided by *Vinicius Paiva* (www.blogteoriadosjogos.com/). The attendance variable represents the number of attendees at each football match – there is no distinction between season-ticket holders or not, or between home and away supporters. However, these issues would not be a problem, since in Brazilian football, there are almost no season-ticket holders, and the majority of attendees (almost all, in most of the cases) are home-team supporters. This variable (*a*) has passed through a log-transformation. These data were collected from the official webpage of the Brazilian Football Confederation (CBF). Ticket prices are measured by match-day ticket revenue divided by total attendance (average ticket price), and the data were also collected from the CBF's official webpage.

Ticket prices (*p*) are explained by the UO (*theil*) – measured by the Theil Index; a weekend dummy (w); match quality (*q*); the difference in the market value of both teams (mv); the round and its squared term (r and r^2). Attendance (*a*) is explained by predicted prices ($\hat{p}$); an interaction between ticket prices and when the teams from Rio de Janeiro or São Paulo are playing at home ($p \times h$); the UO (*theil*); a derby dummy (*d*); a weekend dummy (*w*); and stadium capacity (*cap*). Television audiences (*tv*) are explained by predicted attendance ($\hat{a}$); the interaction factor between attendance and when the teams from Rio de Janeiro or São Paulo are playing at home ($a \times h$); the logarithm of the distance between the

stadium where the match is played and the home city of the researched teams (*dist*); the interaction between ticket prices and when the teams from Rio de Janeiro or São Paulo are playing at home ($p \times h$); the UO (*theil*); a derby dummy (*d*); and a weekend dummy (*w*).

Home-team fixed effects (*i*) are employed in both the attendance and the price equations, aiming to capture some non-observable effects like fans' preferences and habits as well as any clubs' decision which may influence pricing strategy or changes in their supporters' intention to attend any particular match. The teams analysed are Botafogo, Flamengo, Fluminense and Vasco in Rio de Janeiro and Corinthians, Palmeiras, Santos and São Paulo in São Paulo. They are chosen because all broadcast matches in Rio de Janeiro had at least one of those four teams playing, and broadcast matches in São Paulo had at least one of those other four teams taking part in the game.

City fixed effects (*c*) are used in the audience and attendance equations. For both cases, the different size of the markets is the main reason to employ it. Indeed, São Paulo has almost two times more habitants than Rio de Janeiro has. At the same time, one-point-audience represents around 90 per cent more television viewers in São Paulo than in Rio de Janeiro. At the same time, specific leisure options in each city would affect differently the willingness to watch or attend a football match in both markets. Month and season fixed effects (*m* and *t*) are also employed in all three equations, aiming to control for the impact on the equations of any seasonal influence.

The Theil Index is used to analyse the impact of the UO. This index was developed by Theil (1967) and is largely employed in the sports-economics literature in papers such as Peel and Thomas (1992), Czarnitzki and Stadtmann (2002), Buraimo and Simmons (2008) and Pawlowski and Anders (2012), for example. The values are calculated using betting odds, and these data come from OddsPortal' website (www.oddsportal.com). Higher values of the *theil* variable represent more balanced matches. Its impact on both audience and attendance is unclear, as some papers support the influence of the UO on fans' interest, whereas other papers reject this influence.

As explained before, the free-to-air channel only broadcast Brazilian League matches in Rio de Janeiro and São Paulo with the presence of (at least) one among their four local teams. However, this channel broadcast both home and away matches. In this sense, the distance between their cities to the place where the match is played influences television consumption. The logarithm of distance (*dist*) is used to capture this effect. Moreover, the interaction between attendance and a dummy when these teams are playing at home is also employed. This variable ($a \times h$) aims to identify a replacement effect between audience and attendance, where those matches played at home reduce the number of television viewers.

An interaction term between ticket prices and playing at home ($p \times h$) is employed. This variable tries to capture a substitution effect between TV audience and attendance. A positive influence of this factor means that fans prefer to watch a particular match at home if clubs decide to charge higher ticket prices. Football matches on free-to-air television are broadcast twice a week in Brazil: on Wednesday at 10 p.m. and on Sunday at 4 p.m. The weekend dummy variable (*w*) tries to identify fans' preferences regarding the day of the game. Broadcast matches on Sunday are expected to have lower demand than matches on Wednesday, based on Gasparetto and Barajas (2018). The derby dummy variable (*d*) is used in order to detect a possible increase in broadcast demand from the rivalry of the two teams playing. In the present case, all matches among Botafogo, Flamengo, Fluminense and Vasco in Rio de Janeiro and among Corinthians, Palmeiras, Santos and São Paulo in São Paulo were considered derbies. Buraimo and Simmons (2009) find evidence of higher audiences in this kind of match in Spanish football; likewise, Gasparetto and Barajas (2018) show this effect in Brazilian League.

Stadium capacity (*cap*) is used as a control variable in the attendance equation, as larger stadiums can accommodate a larger number of attendees. The capacity constraint is not an

issue in Brazilian football, as during the whole sample period (2013–2015), no match reached full occupancy in the stadium. The occupancy rate in the Brazilian League during the researched period was around 48 per cent (see Table I).

Brazilian football clubs employ a match-by-match basis for ticket sales. Indeed, prices are habitually announced about one week before a home match. In this sense, prices are sensitive to some factors, and these factors should be controlled for. In the price equation, besides the UO and the day of the week, some other explanatory variables are used: match quality (q); the difference in the market value of both teams (mv); the round of the match and its squared term (r and r^2), as mentioned above. The q variable is measured by the sum of the points of both teams playing divided by the maximum number of points in that particular match. The mv variable is a measure of the closeness of the quality of each team – values close to zero mean teams with similar quality, while higher values mean large differences between the opponents. Market-value data come from the *Transfermarkt* website (www.transfermarkt.com/). Round and round squared (r and r^2) aim to identify possible changes in ticket prices regarding the fixtures.

Substitution effect: home matches being televised

The free-to-air channel always broadcasts Brazilian League matches with the presence of (at least) one of the local teams playing. The channel mainly broadcasts these matches when those clubs are playing as an away team (82.46 per cent of the broadcast matches in the sample). However, as an alternate for home fans that cannot go to the stadium, sometimes, the free-to-air television broadcasts home matches, too (17.54 per cent). In this case, one would think that a substitution effect may exist, where fans decide to watch the match at home instead of going to the stadium – or even the opposite, where more fans decide to attend the match, thereby reducing the audience level. Therefore, the current data set has been split in order to identify if this replacement occurs in those 40 matches when the television channel broadcasts a home game. However, the TV audience is much broader, and some spectators can join when the perceived quality of the match is high (Oh *et al.*, 2017).

Two systems of equations with 3SLS are used to deal with this issue. The first model relates to the effect of attendance on the TV audience, and the second system relates to ticket prices. Some explanatory variables are excluded in this step, and fewer control variables are used due to the reduced number of observations ($n = 40$).

Results

General model

Table II presents the results of all three systems of equations. The general model explains 80 per cent of broadcast demand, 42.3 per cent of attendance and 19.8 per cent of ticket prices. The results reveal that attendance has a statistically significant and positive effect, increasing broadcast demand. This result suggests that the substitution effect between both variables does not exist, but that higher attendance rates increase television interest in the match. Nonetheless, it seems to be a misunderstanding. As 82.46 per cent of the sample represents matches played away, the positive correlation between television audience and live attendance would suggest that good matches – those which are crowded at the stadium – attract television viewers. At the same time, no substitution is found regarding playing at home and larger attendance. Moreover, the distance from their cities to the stadium where the match is being played has no impact. Therefore, it may be interpreted that "couch potato" fans do not decide to go to the stadium based on the distance to the stadium when it is an away match.

Ticket prices have no impact in the attendance equation. Even though this result seems to be unusual for economic theory, García and Rodríguez (2009) show a set of papers that

Table II.
Outputs of the regression models

Variables	General model			Home matches: attendance			Home matches: price		
	Audience	Ln(attendance)	Price	Audience	Ln (attendance)	Price	Audience	Ln (attendance)	Price
Ln(attendance)	*272,712***			*479,283***					
	(70,862)			(156,652)					
Attendance×playinghome	20,473								
	(25,350)								
Ln(distance)	44,519								
	(32,259)								
Price		0.00272			0.00771		*9,957***	−0.000569	
		(0.00495)			(0.0121)		(4,517)	(0.0122)	
Price×playinghome	*6,358***	−0.00104							
	(2,880)	(0.00297)							
Theil	*897,195***	*−1.859****	*−74.36****		−1.227	*−65.84***		*−1.936**	*−68.66***
	(408,049)	(0.600)	(16.40)		(1.039)	(26.80)		(1.051)	(27.35)
Derby	*251,774***	0.430***		*289,489***	*0.344***		*315,259***	*0.409***	
	(117,833)	(0.162)		(136,535)	(0.169)		(136,527)	(0.170)	
Weekend	*−716,383****	*0.200****	2.873	*−802,040****	*0.573****	*10.04**	*−496,246****	*0.611****	*10.60**
	(54,405)	(0.0721)	(2.308)	(206,087)	(0.176)	(5.425)	(162,901)	(0.177)	(5.442)
Stadium capacity		1.16e−05***							
		(1.78e−06)							
Match Quality			7.745			*57.26***			*70.34***
			(9.273)			(26.83)			(27.45)
Mkt value difference			−0.0670			0.200			0.176
			(0.0578)			(0.140)			(0.144)
Round			−0.600						
			(0.415)						
Round2			0.0120						
			(0.0102)						
Constant	−196,535	10.87***	104.0***	−762,184	10.49***	73.90***	3.296e+06***	11.29***	72.13***
	(931,616)	(0.764)	(18.06)	(1.445e+06)	(1.162)	(26.38)	(217,915)	(1.176)	(26.84)
Club FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
City FE	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No
Month FE	Yes	Yes	Yes	No	No	No	No	No	No
Season FE	Yes	Yes	Yes	No	No	No	No	No	No
Observations	226	226	226	40	40	40	40	40	40
R^2	0.806	0.423	0.198	0.661	0.643	0.570	0.679	0.637	0.576

Notes: Standard errors in parentheses. *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

find similar results to our result. However, the positive value of the interaction term between ticket prices and playing at home in the audience equation indicates that larger audiences result when clubs charge higher ticket prices – even though it does not reduce statistically the demand for tickets for the same match. Indeed, higher ticket prices do not take fans away from the stadium, but there is an increase in the TV audience in these situations. In this sense, it could indicate that fans are interested in these matches, but perhaps those prices charged by clubs are higher than fans judge as "fair". Therefore, fans simply choose to watch at home because it is free of charge. Therefore, Brazilian football clubs should find optimal prices for those matches in order to maximise both the TV audience and attendance.

The UO has an opposite effect on broadcasts and on ticket demand. The results show that television viewers are attracted by short-term competitiveness, corroborating some papers such as Forrest *et al.* (2005), Scelles (2017) and Cox (2018). On the other hand, the present findings indicate that fans prefer to attend unbalanced matches at the stadium, as evidenced by Buraimo and Simmons (2008), Coates *et al.* (2014) and Martins and Cró (2018). At the same time, the results demonstrate that clubs charge high prices when the match is unbalanced – it might also evidence a dynamic pricing strategy.

The derby dummy variable increases both audience and attendance ratios. This finding satisfies our expectations, being in line with Gasparetto and Barajas (2018) and Buraimo and Simmons (2009) for broadcast demand as well as with Buraimo and Simmons (2008), Madalozzo and Villar (2009) and Martins and Cró (2018) for the demand for tickets. In the present work, the findings show that this kind of match increases television viewers by around 250,000 and increases live-attendance spectators by more than 40 per cent.

The weekend dummy variable indicates the opposite behaviour by fans regarding football consumption. Audiences tend to be smaller for Sunday matches – around 700,000 fewer viewers – corroborating Gasparetto and Barajas (2018), whilst weekend matches demonstrate higher demand than on weekdays, as Madalozzo and Villar (2009) find in the Brazilian League, too.

Substitution effect models

The possible substitution effect that a home match would have on the television audience is examined in the two subsequent models. As mentioned in the Methods section, the first one concerns the influence of the number of attendees on the size of the TV audience, and the second one concerns the influence of ticket prices. The first model explains 66 per cent of the audience, 64 per cent of attendance and 57 per cent of prices, while the second one explains 68 per cent of the audience, 64 per cent of attendance and 58 per cent of ticket prices.

The results show that attendance has a positive impact on audience. The fact that the free-to-air television channel is broadcasting a home match does not imply any reduction in the average audience, but indeed larger audiences are found in matches where attendance is higher. Therefore, it would be interpreted that attractive matches drive fans for both methods of consumption: live attendance (at the stadium) and on television.

On the other hand, the findings from the third model indicate that expensive ticket prices influence fans' decision to watch broadcast football. Indeed, an increase of R$ 1.00 in ticket prices is correlated with an increase of around 10,000 viewers. Further works on the team-level might provide optimal values for some different kinds of matches, aiming to maximise both broadcast and ticket demand. Although broadcast rights represent around 42 per cent of the total revenue of Brazilian football clubs (Itau BBA, 2018), the low attendance rates – less than 50 per cent of full capacity, on average – allow clubs to find better strategies for selling tickets, increasing both match-day revenue and the stadium atmosphere.

The specific systems analysing only home matches demonstrate the preferences of fans for unbalanced matches, as does the general model. Although this result rejects the classical hypothesis about the positive influence of the UO by Rottenberg (1956) and Neale (1964),

this finding is in line with recent literature, such as Buraimo and Simmons (2008), Coates *et al.* (2014), Cox (2018) and Martins and Cró (2018).

The other explanatory variables show similar effects and marginal impacts in both models. A derby match increases by around 300,000 the number of viewers and by 40 per cent the number of attendees at the stadium. Matches on Sunday have around 500,000 fewer viewers but 61 per cent more attendees than those on Wednesday. Moreover, the price equation shows that clubs are charging high prices when the match seems to be unbalanced, but weekend matches are more expensive than those games played on weekdays, and high-quality matches strongly raise tickets prices. The big change in the R-squared (from 20 to 57 per cent) in the price equation seems to be related to some omitted home-team variables in the general equation. However, the consistency of the results among the systems confirms that the equations are not misspecified.

Conclusions

The present paper analyses simultaneously price, attendance and audience for the first time. We think that price is a relevant variable to include in any model of attendance, and it is not enough to include fixed effects in the model, as Allan and Roy (2008), Buraimo (2008), Buraimo and Simmons (2009) and Kringstad *et al.* (2018) affirm. Moreover, the findings regarding prices indicate that Brazilian football clubs should find optimal prices for matches in order to maximise both the TV audience and attendance. This is relevant as broadcasting rights and match-day tickets together account for more than 60 per cent of the revenues of football clubs in Brazil. Moreover, as stadium capacity is less than 50 per cent in the Brazilian league, room for improvements is shown.

In conclusion, this work shows a correlation between TV audience and attendance at the stadium. However, it has been demonstrated that those matches that are more expensive have a larger TV audience. On the one hand, it might happen due to the fact that usually those matches would be more attractive. On the other hand, it may show that a group of fans cannot afford to pay expensive ticket prices and therefore is watching the match at home. Therefore, the Brazilian Football Association, television channels and football clubs should focus on this relationship in order to satisfy the interests of all groups of fans.

Scheduling and UO appear to be relevant for TVs and clubs. Scheduling is relevant as weekend matches have a lower TV audience but higher attendance at the stadium. It seems that the taste for balanced or unbalanced matches is different for those that watch matches at the stadium or at home. The former prefers if the local or visiting team has more chances to win than if the result is uncertain. This means that they may prefer a clear victory for their team or to see a strong opponent. This information is relevant for clubs and broadcasters, as identifying an optimal schedule would maximise the overall interest of fans.

This work provides valuable findings for decision makers in the football industry. Live attendance, TV audiences and ticket prices are crucial elements for clubs, television channels and fans. In addition, the results of this research add important considerations to the sports-economics and management literature as well. Possible further steps for this analysis relate to the rotation of variables and robustness checks on separate subsamples of broadcast matches when the team is playing at home and away.

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