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Summary: This paper aims to analyze and identify variables that influence public attendance at football matches in Brazil. Deriving a demand curve for public attendance at football stadiums in the Brazilian Football League from 2003 through 2006, this paper highlights four main explicative variables: stadium infrastructure, team performance, expected quality, and uncertainty. Data were drawn from over 1,800 matches and the econometric models uses OLS regressions and panel data form. The study analyzes fixed and random effects models in an attempt to identify the most efficient model. The results reflect a series of variables that influence attendance, particularly ticket price, local derbies, the hometown of the visiting team (Rio de Janeiro or São Paulo), recent performance, risk of relegation, and the role of promotional strategies in distributing tickets.

1 – Introduction:

The attendance demand at matches is a frequent topic of study in the economics of sports. The most common approach is a demand equation with economic or social factors that determine attendance for each kind of sport.

Some papers use demand equations to propose a more efficient structure for the sport leagues, analyzing the main factors that determine attendance in an attempt to maximize the sport potential as a function teams' allocation and matches determination (see: El-Hodiri and Quirck, 1971; Rivett, 1975; Jones, 1969; Jones and Fergunson, 1988; Jones, Schofield and Giles, 2000; Dobson, Goddard and Wilson, 2001; Garcia and Rodriguez, 2001). Other studies approach the profit maximization goal of teams and their impact by examining the economics of sport. They base their research on the question: would the teams' driving goal be revenue, profits, titles or entertainment maximization[i]? Also, an interesting aspect of attendance is the question regarding home field advantage (on this subject, see: Fergunson, Stewart, Jones and Le Dressay, 1991, and Boyd and Boyd, 1988).

The central aim of our study is to discuss the factors that determined attendance at the Brazilian Football League matches from 2003 to 2006[ii]. We chose to use a panel specification to isolate each match between two teams – with and without home field advantage - as the "individual" that repeats itself during the period. Using this econometric tool, we are able to capture and recognize the unobservable characteristics of each match throughout the given period. Our conclusions show that factors related to structure of ticket distribution, match quality, team performance, and uncertainty drastically affect the attendance numbers[iii].

This paper is organized in 5 sections. Following this introduction, section 2 presents the dataset and the econometric model. Section 3 presents and discusses the variables, section 4 reports the results, and section 5 offers a conclusion.

2- Dataset and Econometric Model:

Since 2003, the first division of the Brazilian Football League has been disputed by running points. Besides conferring the Brazilian League Title, the League also identifies four teams for the *Libertadores* Championship – the Latin America Football Cup – and expels the four lowest-classified teams to the Brazilian Football second division. As of 2003 the *"Estatuto do Torcedor"* (Fan's Rules and Rights) was also applied. Highly relevant to this study, the main implications of the Fan's Rules and Rights consist in the policy of ticket-selling, disclosure of income and attendance numbers, previous setting and obligation to comply with the match calendar, besides the rules of demoting teams to second division as well as promoting them to first division. Assuming the data about Brazilian Football has been significantly reliable since the application of the Fan's Rules and Rights, we have additional reason to limit our time span to the period 2003 – 2006.

Throughout this four-year period, 1,946 matches took place in the first division of the Brazilian Football League. We cite the *"Tabelão da Revista Placar"* (Placar Magazine's Ranking and Information) as our source. One of the most reputable sports magazines in Brazil, the *"Placar Magazine"* has covered Brazilian Football matches since 1971[iv].

The information we have is a pannel dataset. For each observation (match), we use three sub-indexations: year (*t*), home team (*j*) and visiting team (*k*). The endogenous variable, *log of paying public* – which we will henceforth call "attendance variable" - , assumes the form Y_{jt}. The independent variables have three types: the ones with three

indexations (for example, average ticket price), that are represented by the vector X_{jkt}; the ones that vary only by year and home team (for example, recent performance of home team), which are grouped in the vector Z_{jt}; and, finally, the ones that vary with year and visiting team, which are represented by the vector V_{kt}. There are also some variables that depend solely on the specific characteristics of the teams (for example, the so-called "classic match" of opponents from the same city). These variables are in the vector W_{jk}.

In order to control omitted variables or unobserved impacts that could result in an inconsistent model, we consider the specific effects of: home team ε_j, visiting team Φ_k and season η_t, isolated from the natural residual term u_{jkt}. Our general model specification is:

$$Y_{jt} = X_{jkt}A + Z_{jt}B + V_{kt}X + W_{jk}\Delta + \varepsilon_j + \Phi_k + \eta_t + \mu_{jkt}$$

where A, B, X e Δ are the parameters' vectors.

The econometric method to the model estimation will be fixed and random effects of panel data model. We discuss the specifications and more details of econometric methods in section 4.

3 – Variables:

To control different aspects that influence football attendance, we divide our variables into four groups: structural characteristics, expected quality, performance and uncertainty of the match. Table 1 presents the variables, main characteristics, and expected estimated coefficient signal.

Structural variables include the ticket price (in the case of a normal good, the increase in price has an adverse effect on the attendance), per capita income of the city where the matches will be held (that may capture substitute goods to the football match,

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for example), the stadium capacity, weekday on which the match takes place (if the match is held during the weekends – Saturdays and Sundays – they are better attended than the ones held on weekdays – Wednesday), number of matches in which the team enjoys homefield advantage by month (if there is an effect, we expect that with more games played, attendance is lowered by match) and, finally, the Nestle Promotion. Nestle Promotion is expected to have a distribution effect.

As common sense would suggest, football is a very popular sport in Brazil. However, fans usually face financial restrictions when purchasing tickets and/or have difficulty accessing ticket booths. Football match tickets in Brazil are sold mainly at stadiums[v]. Since 2005, Nestle, the main sponsor of the Brazilian Football League, has bought a large number of tickets and distributed them among football fans[vi]. This variable may therefore have a significant bearing on the distribution effect of ticket sales.

The second group of variables is related to match quality, which represents the fans' expectations of the match final score. Brazilian football teams participate in state, national, and international championships. We expect that holding one of these titles may lead fans to think that the team has a higher probability of winning the match. There are the "classical" games. These matches involve greater rivalry between teams. Usually, the teams are from the same city; fans from both teams therefore go to the stadium, increasing attendance.

Many football spectators prefer to attend matches played by teams from Rio de Janeiro and São Paulo in particular. Finally, we include an indicator variable for teams from the previous year's second division**.** We expect that fans are more avid when attending football matches and watching their team play with better competitors.

The performance and uncertainty variables are related to the homefield advantage and ranking at each match, as well as the number of games remaining until the end of the championship.

4 – Empirical Results:

We estimated two equations: one using fixed effects**,** and the other using random effects. Results are shown in Table 2. After that, we tested using Hausman and, since the null hypothesis could not be rejected, we assumed that the random effect is consistent and efficient.

Results presented in Table 2 indicate that the structure variables have the expected impact, and, except for the number of matches with homefield advantage, all the estimated coefficients are significant. The average ticket price presents a negative and less than one estimated coefficient. This means that the increases in price have the adverse effect of decreasing attendance in lower proportion, i.e., if we consider each team as the monopolist of its goods – a reasonable enough assumption -**,** we can say that they are not maximizing profits, because they are choosing to place their price at the inelastic portion of the demand curve. This result is not surprising, since we usually see teams manipulate ticket prices to increase attendance without regard for[vii].

Per capita income has a negative signal, which indicates that football football as a good in higher demand for low-income people, i.e., they have fewer options for leisure substitute goods. Stadium capacity also increases attendance, as expected, since smaller stadiums do not have sufficient capacity for large public attendance**,** a negative effect for both teams. Teams nevertheless usually have more than one location for playing at their disposal. It is not hard to imagine that attendance is predicted before the stadium for a match is chosen**.**

Nestlé promotion had a positive and very significant effect – the highest of the model. This result made some interpretations possible. The standard view is that accessibility to the promotion captured a public that does not attend matches often. This line of reasoning suggests that potential attendance is greater than what is actually revealed. More locales for ticket sales and increased accessibility the public – for example, selling tickets on line would greatly increase the participation of fans.

Regarding the expected quality of the match, three variables have more impact: local rivalry ("classic matches"), the opponent being from Rio de Janeiro or São Paulo, and expressive championships won in the previous year, with the interesting aspect that if the visiting team is a recent championship winner the impact is greater than if the home field team were in that favorable position[viii].

Another impact variable is the dummy that represents returning to the first division – for teams relegated on previous years and, by winning the second division league, they return to the first division. For the bigger teams – with more tradition - , the effort to return to the first division may increase the fans' identification with the team. For smaller teams, it may be the reverse: fans try to attend the games while their team does not get expelled from the first division.

Performance variables had the expected results. The team with home field advantage sees impact from both its recent performance as well as ranking position. The visiting team has only a positive effect on attendance if it is well-ranked at the time of the match. This result indicates that the first positions at the championship have an impact on fans' decision to go to the stadium and recent results do not have the same influence.

The only variables that had results vaguely different from what was expected were the ones related to uncertainty. As expected, when the championship is coming to

an end, more people choose to attend the matches. However, we did not find significant results with the index of ranking position between the teams. This result is unexpected, because the uncertainty is greater for the teams that are in closer positions at the ranking[ix].

After this analysis for each individual variable, we estimate the contribution of each in terms of attendance. Table 3 presents the results for the more significant impacts. The more important effects are (in decreasing order): Nestlé Promotion, classic match, home field advantage team ranking position, visiting team being from São Paulo or Rio de Janeiro, chances of relegation from first division at the end of the championship, points of the home field team in the last 3 matches, ticket price, and the visiting team's recent titles.

During the period, the average ticket price was R$ 10 (ten *reais*). According to the estimation, giving 50% discount on the ticket would increase the public attendance only in 16%. This means that the price strategy presented by the teams during the analyzed period does not appear to be pointing to the maximizing profit decision. They could increase the price of the ticket, and the attendance would decrease very slowly and in lower proportion than the price increases because the demand is inelastic at this point.

If we measure the impact of other variables, especially some indicator variables, we will see that the Nestlé Promotion may increase the attendance by 84%, a change even bigger than the impact of classic matches, which is 78%. These results show that the ticket-selling operation is still too weak and has room for great improvement.

From Table 3 we can conclude that the structure variables have higher impact on attendance than the other variables. Promotions mean more publicity for the match, which may imply more interest in the game. The expected quality of the match is

strongly influenced by the visiting team, since the more significant estimated coefficients depend on their recent performance. The home team performance and the uncertainty variables have a less significant effect on attendance, meaning they have less influence on the decision to attend the match.

5- Conclusion:

In this study, we estimate a demand equation for attendance at the Brazilian Football League for the period 2003 – 2006. Using the panel data methodology, we conclude that there is relevance in the majority of the estimated variables and, in each different group of impact; we find at least one strong impact.

The ticket prices and exchange ticket promotions – structure variables-, classic games and visiting teams from Rio de Janeiro or São Paulo – expected quality variables -, ranking position and points won at the last three games – performance variables -, and, finally, the risk of relegation – uncertainty variable – have the greatest impact on the public.

With a more stable schedule of games and league rules, the teams are able to plan other methods of selling tickets (such as season tickets, for example) and ensuring fan loyalty. Besides this point, Brazil will host the most important football competition, the 2014 World Cup. Many of the investments directed at stadium infrastructure, accessibility, and amenities therefore merit rethinking.

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Table 1: Descriptive Statistics and Expected Impact of Variables

N=1.851

	Mean	Standard Deviation	Expected Impact
Structure			
Log (ticket price)	2,2223	0,4325	-
Log (Per capita income/1000)	2,3715	0,4002	?
Log (Stadium Capacity/1000)	3,6843	0,5485	+
Weekday	0,2453		-
Nestlé Promotion	0,0832	1,0883	+
Home field advantage games per month	3,0729		-
Expected Quality			
National or International Title Last Year (Home team)	0,0989		+
National or International Title Last Year (Visiting team)	0,0972		+
State Title (Home team)	0,2863		+
Classic match	0,0881		+
2nd division last year	0,0859		+
Visiting team from SP/RJ	0,3323		+
Performance			
Points at the last three games (Home team)	3,7526	2,3274	+
Points at the last three games (Visiting Team)	4,1653	2,3528	+
Ranking position (Home team)	11,2469	6,8037	-
Ranking position (Visiting Team)	10,8131	6,7420	-
Uncertainty			
Ranking position difference	7,5835	5,3251	-
Chance of being the league leader	0,1659		+
Chance of going to the *Libertadores* Cup	0,3031		+
Chance of leaving the Relegation Group	0,3323		+
Game position in the schedule	22,5176	12,4777	+

Table 2: Attendance Demand: estimated coefficient
Endogenous variable = log (attendance)
N = 1851

	Fixed Effects		Random Effects	
	Coef.	p-valor	Coef.	p-valor
Constant	8,9036	0,000	10,5353	0,000
Structure				
Log (ticket price)	-0,2446	0,000	-0,2440	0,000
Log (Per capita income/1000)	dropped		-0,7070	0,001
Log (Stadium Capacity/1000)	0,1012	0,009	0,1082	0,005
Weekday	-0,1255	0,000	-0,1251	0,000
Nestlé Promotion	0,6608	0,000	0,6607	0,000
Home field advantage games per month	-0,0050	0,700	-0,0043	0,740
Expected Quality				
National or International Title Last Year (Home team)	-0,0064	0,910	-0,0029	0,959
National or International Title Last Year (Visitor team)	0,2139	0,000	0,2141	0,000
State Title (Home team)	-0,0377	0,319	-0,0353	0,346
Classic match	0,6299	0,000	0,6267	0,000
2nd division last year	0,1994	0,006	0,2123	0,003
Visiting team from SP/RJ	0,3053	0,000	0,3053	0,000
Performance				
Points at the last three games (Home team)	0,0693	0,000	0,0695	0,000
Points at the last three games (Visiting Team)	-0,0027	0,678	-0,0028	0,664
Ranking position (Home team)	-0,0294	0,000	-0,0294	0,000
Ranking position (Visiting Team)	-0,0075	0,001	-0,0075	0,001
Uncertainty				
Ranking position difference	0,0041	0,122	0,0041	0,120
Chance of being the league leader	0,1470	0,002	0,1482	0,001
Chance of going to the Libertadores Cup	-0,0566	0,146	-0,0569	0,143
Chance of leaving the Relegation Group	0,2842	0,000	0,2858	0,000
Game position in the schedule	0,0047	0,000	0,0047	0,000
Hausman Statistic			3,78 (Prob>Chi2 = 1.000)	

Table 3: Variable Impacts

Variable	Average Impact
Structure	
Nestlé Promotion	84%
Ticket Price (variation of R$ 5)	16%
Expected quality	
Classic match	78%
Visiting Team from SP/RJ	23%
National or International title (visiting team)	22%
Performance	
Points at the last three games (Home team)	45%
Ranking position (Home team)	36%
Uncertainty	
Chance of leaving the Relegation Group	21%

[i] See Fergunson et al (1991) and Boyd and Boyd (1998).

[ii] We began our dataset in 2003, the year when the present rules regulating the Brazilian football league were established. According to these rules, the team that scores the most points during the season wins the championship, where all teams have matches among them, one with home field advantage and the other without this advantage. Therefore, there is no playoff season in the Brazilian Football League.

[iii] Regarding Brazilian football, Souza and Angelo (2004) approach the attendance demand for the Brazilian Football Championship of 2002. This paper reaches some conclusions in line with demand equation investigations. Because 2002 was an atypical year for the Brazilian Football League, however, the low availability of data regarding attendance and team revenue do not help the model specification.

[iv] During the period analyzed in our study, some teams were punished by Athletic Justice and had to play the match without any attendance. These games were excluded from the dataset. Also, although the existence of the "*Estatuto do Torcedor*" requires the clubs to disclose the income and attendance for each match, some matches do not have these reports. In 2005, the Brazilian Football League cancelled eleven games under suspicion of arbitrage manipulation. These games were held a second time with open gates, i. e., without charging the public. For effect of attendance, we do not include these games. To calculate the punctuation and ranking, we use the results from the second time the match was disputed. Our final database has 1,851 games.

[v] There is no Internet website that sells football tickets or delivery system for fans that are unable to purchase tickets at the stadium.

[vi] The consumer buys Nestlé products at the supermarkets and exchanges for football tickets.

[vii] This is somewhat surprising. For the most part, Brazilian football teams have high debt, including belated payments to players.

[viii] According to a research conducted by Datafolha, a reputable Brazilian research institute, in 2006, a large percentage of fans, even from different states, favored teams from São Paulo or Rio de Janeiro. The only exception is in the southern region of Brazil, where fans cheer for southern teams.

[ix] At this Championship, some games are called "six-point games". While each victory is worth 3 points, ties mean one point and zero signals defeats. However, if one team is in 5th place, for example, and the other in 6th place, if the team in higher rank wins, it climbs 3 points ahead of the losing team and prevents the latter from winning 3 points. The losing team, in turn, could lose a position. That is the explanation for the "six-point games".