FEDERAL UNIVERSITY OF CEARÁ

CONTEXTUS
REVISTA CONTEMPORÂNEA DE ECONOMIA E GESTÃO
Contextus – Contemporary Journal of Economics and Management

ISSN 1678-2089
ISSNe 2178-9258

www.periodicos.ufc.br/contextus

The influence of sports performance on economic-financial performance: An analysis of Brazilian soccer clubs from 2013 to 2017

A influência do rendimento esportivo no desempenho econômico-financeiro: Uma análise com clubes de futebol brasileiros durante 2013-2017

La influencia del rendimiento deportivo en el rendimiento económico-financiero: Un análisis con clubes de fútbol brasileños durante 2013-2017

https://doi.org/10.19094/contextus.2020.44392

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Article Information
Uploaded on 03 June 2020
Final version on 26 August 2020
Accepted on 28 August 2020
Published online on 02 November 2020

Interinstitutional Scientific Committee
Editor-in-chief: Diego de Queiroz Machado
Associated Editor: Thiago Henrique Moreira Goes
Evaluation by the double blind review system (SEER / OJS - version 3)

ABSTRACT
This study examined the relationship between sports performance and economic-financial performance in the subsequent year based on the revenue sources of Brazilian sports clubs from 2013 to 2017. Sports performance was measured by the position in the national league and the overall team performance in all championships. To measure economic-financial performance, we used net revenue and other revenue sources, such as broadcasting, matchday, commercial, and player sales. Using panel data analysis, we found that team performance positively and significantly affects clubs' economic-financial performance in the subsequent year. However, these effects were shown to be very heterogeneous when we compared different measures of team performance and types of revenue sources. The findings confirm the export market pattern in Brazil since the revenue from player sales was the variable most explained by previous sports performance.
Keywords: soccer clubs; financial performance; team performance; revenue; Brazilian soccer.

RESUMO
O estudo examinou a relação entre o desempenho esportivo e o desempenho econômico-financeiro no ano subsequente, com base nas fontes de receita dos clubes desportivos brasileiros entre 2013 a 2017. O desempenho esportivo foi medido com a posição no campeonato nacional e o resultado geral em todos os campeonatos. Já para o desempenho econômico-financeiro, utilizou-se a receita líquida, *broadcasting*, *matchday*, *commercial* e venda de jogadores. Usando análise de dados em painel, o desempenho esportivo afeta positiva e significativamente o desempenho econômico-financeiro dos clubes, contudo os efeitos foram heterogêneos quando são comparadas diferentes medidas de desempenho esportivo e tipos de receita. Por fim, há confirmação do padrão de mercado exportador no Brasil, com a necessidade de alienação de atletas, uma vez que a receita de vendas de jogadores foi a variável mais explicada pelo desempenho esportivo anterior.
Palavras-chave: clubes de futebol; desempenho financeiro; desempenho esportivo; receita; futebol brasileiro.

RESUMEN
El estudio examinó la relación entre el rendimiento deportivo y el rendimiento económico-financiero en el año siguiente, basándose en las fuentes de ingresos de los clubes deportivos brasileños entre 2013 y 2017. El rendimiento deportivo se midió con la posición en el campeonato nacional y el resultado general em todos los campeonatos. Para el desempeño económico-financiero se utilizó los ingresos netos, los ingresos por transmisión, la venta de boletos, el patrocínio, y la venta de jugadores. Utilizando análisis de datos del panel, el rendimiento deportivo afecta positiva y significativamente el rendimiento económico-financiero, sin embargo, los efectos fueron heterogéneos al comparar diferentes medidas de rendimiento deportivo y tipos de ingresos. Finalmente, hay una confirmación del patrón del mercado de exportación en Brasil, con la necesidad de alienar a los atletas, ya que los ingresos de las ventas de jugadores fue la variable más explicada por el rendimiento desportivo anterior.
Palabras clave: clubes de futbol; rendimiento financiero; rendimiento deportivo; receta; fútbol brasileño.

How to cite this article:
Gonçalves, R. S., Mendes, R. C., Henriques, F. M., & Tavares, G. M. (2020). The influence of sports performance on economic-financial performance: An analysis of Brazilian soccer clubs from 2013 to 2017. *Contextus – Contemporary Journal of Economics and Management*, 18(17), 239-250. https://doi.org/10.19094/contextus.2020.44392

1 INTRODUCTION

Sports clubs have become one of the main contemporary leisure options regarding sports practice, social interaction, and entertainment consumption. In this context, soccer stands out as one of the most popular sports in the world. It engages the attention of millions of people, evokes strong emotions, and has an enormous impact on economy (Vargas, 1995; Soriano, 2010; Holanda, Meneses, Mapurunga, De Luca & Coelho, 2012).

Competitive capacity is one of the main competencies required in this sector, and professional sports clubs are formed to win or achieve an outstanding position in the competitions in which they participate. As such, the causes of a soccer club's success or failure inevitably lead to questions about how they operate on and off the field and, especially, how they are managed. In this sense, several studies demonstrate that the increase in the club's wealth, by expanding its investment capacity, increases the probability of obtaining a better performance in competitions (Szymanski & Kuypers, 1999; Göllü, 2012; Dolles & Söderman, 2013). Thus, income growth is a fundamental objective, and revenue generation is important for soccer clubs, as it is for any business.

In Brazil, soccer is a billionaire business. In this context, one of the Brazilian clubs' concerns is to improve their financial performance. The issue of measuring the performance of soccer clubs in Brazil became palpable with the obligation to publish financial statements, after the enactment of the law number 10.672/03. From this moment on, it was possible to assess the financial performance of these entities and investigate relationships between their financial performance and sports performance (Dantas, Machado & Macedo, 2015; Jahara, Mello & Afonso, 2016; Santos, Silva, Costa & Cavalcante, 2020).

Previous research shows that there is a lack of studies using different revenues types as a metric for economic-financial performance. Also, one can question whether team performance on the field affects subsequent revenues or whether greater revenues result in better sports performance. It seems plausible that there is a virtuous circle: good performance implies higher revenues, and the resulting revenues can be further invested in improving sports results (Barajas, Fernandes-Jardon & Crolley, 2005; Bollen, 2010; Augusto-Eça, Magalhães- Timotio & Leite Filho, 2018). Thus, this paper seeks to answer the following question: What is the impact of sports performance on the revenue generation in the subsequent year for Brazilian sports clubs? In this sense, the present research aims to examine the relationship between sports performance and economic-financial performance in the subsequent year, using different revenue sources of Brazilian soccer clubs in a panel from 2013 to 2017.

The relevance of this research is justified because it addresses the relationship between sports performance and economic-financial performance using different revenue sources and the results of the clubs in all competitions in which they participate, which makes up an unexplored approach in the academic field in Brazil. In addition, soccer is a subject of interest for various audiences, such as fans, government, sponsors, managers, athletes, etc. It is worth mentioning that the high tax debts of clubs affect society because whenever a public manager creates a program for refinancing public debt, the population loses financial revenue due to the discount in interest and fines, so there is a need to study the impacts on clubs' revenues.

This study presents differentials and innovations in comparison to other studies aiming at understanding the reason for variations in clubs' revenues. First, differently from many previous studies that used standard regression models, we use panel data regression with fixed effects, since it better allows investigating how the variation of sports performance over time impact subsequent revenues. In addition, one of the variables we use to measure sports performance includes the clubs' performance in several competitions, while other studies used only the ranking provided by the Brazilian Football Confederation.

The article is structured in five sections, including this introduction, followed by a literature review, where we present the most recent research on the relationship between economic-financial and sports performance, the main soccer championships in Brazil, and the methods and concepts related to the measurement of sports performance and financial performance of soccer clubs. In the third section, the methodological procedures used in this research are presented. The fourth section presents the analysis and discussion of the results. Finally, the fifth section presents final remarks about the results, their limitations and proposals for future research.

2 THEORETICAL FRAMEWORK

Regarding the relationship between sports performance of soccer teams and their economic-financial performance, it seems that most previous studies expect that positive sports results will lead to financial improvements in clubs. Next, a brief discussion of relevant previous research on the subject will be held.

2.1 Previous Studies on the Sports Performance - Economic-Financial Performance Relationship

Szymanski and Kuypers (1999) carried out the first research and stated that the variation in revenues during the 1996/97 season is 82% explained ($R^2 = 0.82$) by the teams' rank in the English league in that season. When these authors analysed a longer period (1978 to 1997), there was an increase to 92% ($R^2 = 0.92$). Therefore, they concluded that winning teams, in the long run, would probably attract higher revenues.

The study by Barajas et al. (2005) pointed out that club revenues were highly impacted by sports results during the period from 1998 to 2002 in Spanish soccer. The authors estimated a simple linear regression model for each type of revenue (sports, TV, marketing, season tickets and pool) with the explanatory variables of sports performance being the inverse of the final position in the national championship, points earned, and weighted sum of the performance in all tournaments.

Pinnuck and Potter (2006) calculated the correlation of sports performance and financial outcomes in the period from 1993 to 2002. The authors used panel regressions and found that sports performance has a positive impact on marketing revenues.

Bollen (2010) sought to ascertain whether the best performance on the field implied higher revenues in Dutch soccer in the interim from 2004 to 2009. The author used simple linear regressions, similar to the research by Barajas et al. (2005) and found that sports results highly explain the revenues generated by clubs.

Augusto-Eça et al. (2018) analyzed the relationship between sports performance/management efficiency and the financial performance of Brazilian sports clubs in the period from 2009 to 2013 using panel data regression. The research used the "Ranking Pluri de Conquistas" to measure sports performance and concluded that the relationship is positive, but not significant.

Research by Dimitropoulos and Limperopoulos (2014), Ferri, Macchioni, Maffei and Zampella (2017), Pereira (2018), Ferreira, Marques and Macedo (2018), Andrade Junior and Piva (2019) studied how much economic and financial results explained subsequent sports performance. The present work, on the other hand, seeks to analyze how much sports performance explain different types of revenues in the subsequent year (financial performance), as done by Barajas et al. (2005), Bollen (2010), Augusto-Eça et al. (2018).

Next, the main championships played by the Brazilian clubs that make up the sample of this study will be presented.

2.2 Main Competitions Played by Brazilian Clubs

The evaluation of sports performance is not simple. Its calculation depends on the competition and the proxies for sports performance (e.g., goals scored, percentage of victories, audiences present, among others). Next, we explain the rules and formats of the competitions and how the sports performance of the clubs are measured.

The "A series" (first division) of the Brazilian Soccer Championship, also known as "Brasileirão", currently consists of 20 (twenty) teams. All teams play against all clubs in the championship in two rounds, making a total of 38 (thirty-eight) matches during the season. The competition uses the points system, with the following criteria: 3 (three) points per victory; 1 (one) point per tie; 0 (zero) points for defeat. The ranking order depends on the number of points. The tiebreaker criteria are number of victories, goal difference, pro goals, direct confrontation, fewer red cards, fewer yellow cards, and raffle. The second division (the B series) has the same format. It is worth mentioning that the A series teams that, at the end of the championship, rank at the last four positions will be demoted to the second division. On the other hand, the first four teams of the second division will be promoted to the first division (Confederação Brasileira de Futebol, 2019).

The "Copa do Brasil" (another national championship) is played in seven phases, in the simple elimination system (the so-called "playoffs"), in round-trip matches, with the participation of all professional Brazilian soccer clubs (Confederação Brasileira de Futebol, 2016). The clubs in the Copa Libertadores enter the tournament from the round of 16 onwards. Based on the specific regulation of the competition (from 2013 to 2016) the champion has a guaranteed place in the Copa Libertadores da América in the following year.

Drummond, Drummond and Silva (2014) state that the Copa Libertadores da América is the main soccer competition in the Americas. Its first edition was held in 1960 and organized annually by CONMEBOL (the South American Football Confederation). The stronger the country, the more clubs can participate. Some clubs are directly qualified, and other clubs has to play in the preliminary rounds based on a system of matches with home and away matches. The group stage consists of eight sets of four teams, resulting in six matches for each club. Numbers one and two of each group go to the second round. Subsequently, the teams participate in a knockout system with one game at home and one away. It should be noted that the champion will have a guaranteed place in the FIFA Club World Cup (Confederação Sul-Americana de Futebol, 2016).

Copa Sul-Americana (also known as COMEMBOL) has been a continental competition for South American soccer clubs organized by CONMEBOL since 2002. The tournament is played in six stages through a system with direct elimination (matches at home and away for each team) until the definition of the champion. As of 2017, ten teams disqualified from the Copa Libertadores da América also won the right to compete in the Copa Sul-Americana in the same year (Confederação Sulamericana de Futebol, 2016).

Other important competitions disputed by Brazilian clubs are state championships (for example, Rio de Janeiro championship and Minas Gerais championship) and regional championships (for example, the Copa do Nordeste). However, due to the different regulations and models of each tournament, as well as the fact that many of these championships do not have representative clubs in national competitions, in this work, the main competitions played by Brazilian clubs are the Brazilian Championship

("Brasileirão"), Copa do Brasil, and the two main South American championships (Copa Libertadores da América and Copa Sul-Americana). The following sections discuss the measurement of sports performance and financial performance.

2.3 Main Competitions Played by Brazilian Clubs

This section presents the main concepts and models used to measure sports performance according to the literature.

2.3.1 Championship position (LPOS variable)

The final classification of the national championship can be used to assess the sports performance of the soccer club. Bollen (2010) states that this measure is not very functional, as it has an inverse relationship with most of the variables used. The sign of the regression coefficient will be negative due to a normal classification allocating the lowest value to the team with the best performance. Therefore, this is the reason why the authors work with modified variables. The "classification measures", POS (n, p), where POS is a monotonous decreasing function of classification. Dobson and Goddard (2001) propose the linear function:

$$POS(n,p) = \frac{n + 1 - p}{n}$$

where n is the number of teams participating in the competition and p is the position they reached in the tournament. Along this line, the formula used by Szymanski and Kuypers (1999) is:

$$LPOS(n,p) = \log\left(\frac{n+1-p}{p}\right)$$

For example, if the team is the champion of the Brazilian championship (which includes 20 teams), it assumes the value of p = 1 and n = 20. In this case, the log would be between 1.3010 and -1.3010 for the first and the last placed team, respectively.

2.3.2 Composite index of all championships (IND variable)

Measuring sports performance in eliminatory competitions becomes more complex. Baimbridge (1997) and Koning, Kroolhaas, Renes and Ridder (2011) examined knockout championships and did not develop a method for assigning values. In fact, no author has suggested a measurement model until Barajas et al. (2005). His method was also used in the studies of Bollen (2010), Rocha (2016), and Pereira (2018).

Because elimination systems do not work either on a classification basis and do not use points, Barajas et al. (2005) developed a method to express the position of an team within the knockout tournament. The authors used the Copa Del Rey, the UEFA Champions League and the UEFA Cup. The current research will use the same logic for the Copa do Brasil, Copa Libertadores de América and Copa Sul-Americana.

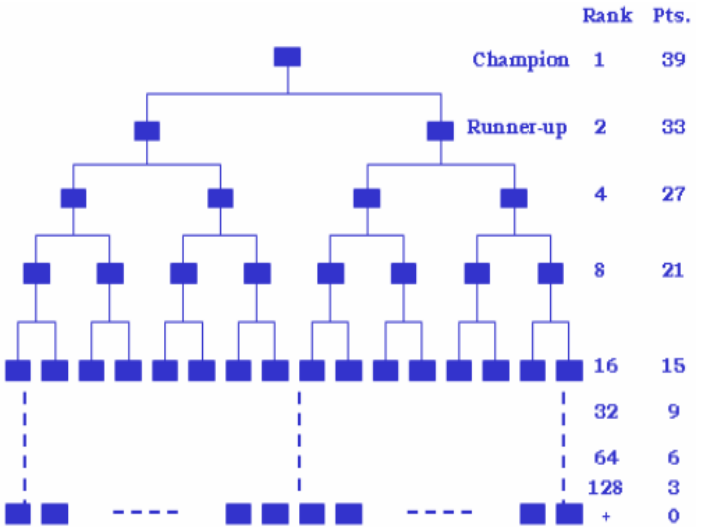

Figure 1. Sports performance measurement for knockout competitions.
Source: Barajas, Fernandez-Jardon and Crolley (2005).

Figure 1 shows the position and points scheme for cups with eliminatory systems. Barajas et al. (2005) developed a ranking, and it was assumed that the champion would be placed first and the runner-up would be placed second. Below these two places, the authors adopted the same level for unclassified teams. For example, the two eliminated semifinalists do not play each other to determine who came in third or fourth. Therefore, it was decided to classify the two losing semifinalists as 4th. In previous rounds, the same principle applies, and teams that were eliminated from competition at the same level received the same rating. For this reason, all teams that lost in the quarterfinals were classified as 8th. Consequently, the eight teams eliminated in the previous round are in 16th position, the 16 teams eliminated in the previous round are classified as 32nd and so on. Then, the authors performed a to / from according to "Rank" and "Pts." shown in Figure 1. Finally, the team absent from the tournament received a score of zero. For example, Flamengo club was champion of the 2013 Brazil Cup, and 39 points were awarded. As the Copa Sul-Americana has one stage less, the maximum score was up to 33 points, and for example, the Chapecoense team, champion of the Copa Sul-Americana 2016, won 33 points.

Barajas et al. (2005), Bollen (2010), Rocha (2016) and Pereira (2018) used a different methodology for the UEFA Champions League, and the current study adopted the same logic for the Copa Libertadores de América. Due to the lesser importance of the first stages of the competition and in order not to penalize the clubs that qualified directly, one point was attributed for each game won and 0.5 for the tied games during the qualifying rounds. The points of the

games played during the group stage are in accordance with the following criteria: 3 points for victories and 1 for ties. To weigh the qualification for the next stage (round of 16), additional 5 points were applied for approval in that stage. The sum of one point (total of 6) was attributed to the classification in the later stage (quarterfinals), 7 for semifinals and 8 in the finals. In addition, 3 points were also awarded for the victory and 1 for the tie during the finals, which is played as an elimination competition. For example, the São Paulo club in 2016 had the following score: victory and tie in the qualifying round (1.5) plus two wins and three ties in the group stage (9) plus elimination in the semifinal (7) plus two wins in the stage final, one in the round of 16 and another in the quarterfinals (6), totaling 23.5.

To combine all important competitions, a composite index (IND) was created that consists of the points obtained in each competition. These points are weighted according to the importance of the competition for the overall assessment of the team's performance. Matias and Menezes (2013) assert that the Copa Libertadores de América and the UEFA Champions League are the largest continental competitions managed by CONMEBOL and UEFA. Considering that Pi represents the points achieved in competition i and αi represents the weight of each competition considered (Copa do Brasil, Copa Libertadores da América and Copa Sul-Americana), then the composite index (IND) can be expressed as:

$$IND = \sum_{i=1}^{4} \alpha_i P_i$$

Barajas et al. (2005) defined the weights to develop the composite index, taking into account the relative importance of each tournament. The Copa do Brasil is weighted as 1; The Brazilian Championship ("Brasileirão") and the Copa Sul-Americana is weighted as 2; Copa Libertadores da América has a weight of 3. The authors did not give much weight to the Brazilian Championship due to the large number of matches and, consequently, the accumulated points already have a bonus value, especially for the A series teams that accumulate points for having been champions at B series. It is worth noting that the index did not consider the FIFA Club World Cup, as European clubs believe it is a less important competition. This index is expressed as:

IND = Copa do Brasil Points + 2 x Copa Sul-Americana Points + 2 x Brasileirão Points + 3 x Libertadores Points

2.4 Measurement of Economic-Financial Performance

There are numbers of metrics, financial and non-financial, that can be used to compare clubs, including number of fans, broadcast audience, and number of victories. Deloitte (2019) assesses the generation of revenue from the stadium (Matchday), television broadcasting rights (Broadcasting) and marketing (Commercial), and classifies them on that basis.

Net Revenue is the sum of all revenue sources. The clubs register and publicizes revenues from matchday, broadcasting, commercial, player sales, and other revenues. Table 1 provides a summary of the club's revenue sources.

Table 1
Main revenue sources for soccer clubs

Revenue sources	Description
Matchday	These are the box office revenues, season tickets, partner-fan programs, in short, the revenues generated by stadium activities, especially on match days.
Broadcasting	These are revenues from broadcast rights for TV or other media.
Commercial	Comprises marketing revenues, sponsors, advertising and brand licensing.
Player Sales	These are revenues from the sale of players.
Net Revenue	It is the sum of all revenue generated by the sports club, including matchday, broadcasting, commercial, player sales and other revenue.

Source: Developed by the authors.

The box office revenue, season tickets, and partner-fan programs, that is, the revenue generated by stadium activities, especially on match days, are classified as machday. Szymanski and Kuypers (1999) claim that ticket sales are the most traditional revenue source in soccer. However, with the commercialization of transmission rights and licensed products, their importance has diminished. Despite that, the box office is configured as just one of the ways of revenue generated from the operation of stadiums, including the operation of facilities in activities not related to sport. Studies such as Soriano (2010) and Lima et al. (2018) identified that stadium income has grown in recent years as clubs have invested in improving their facilities and ticket prices have increased, with additional services and amenities.

Revenues from broadcast rights for TV or other media are recorded in the broadcasting revenue. According to Soriano (2010), most soccer clubs won profitable contracts

in the late 1990s, with the advent of cable TV. However, the results were not as profitable as expected. They were relatively good for big clubs, with high audiences, but not so good for medium and small teams. The renegotiation of these contracts in recent years represented only an increase for large clubs. Gomes (2013) explains that the way in which transmission rights are commercialized varies according to the country. In Brazil, until 2010, the clubs sold their broadcasting rights through the Clube dos Treze; in 2011, this changed and started to negotiate individually.

Commercial revenue comprises revenue from marketing, sponsors, advertising and brand licensing (Gomes, 2013). Skymanski and Kuypers (1999) highlight how sports equipment companies compete to sponsor clubs and thus have access to the lucrative market for licensed products, whose replicas of uniforms are their most attractive product. Based on Mayer (2010), there are two main types of sponsors for a soccer club. One of these types is made up of companies that pay a certain amount to expose their brands in game and training uniforms, advertising signs in stadiums and training locations, etc. The other main type of sponsor is made up of companies that supply sports equipment and pay a certain amount to carry out this activity.

Silva, Santos, Souza and Dani (2017) report that soccer clubs have become real companies and are responsible for high revenues, mainly resulting from the sale of players. According to Silva and Filho (2006), player sales has always been a solution for clubs, and in the Brazilian case, it represents a product that depends less on the club-client relationship and more on the technical quality of the player and the team that develops it. In Brazil, the revenue from the sale of players is recorded in the gross revenue for its total amount, differently in Europe, which reports the amount of the gain (revenue less purchases) in other revenue sources and current expenses in the Yearly Statement of Income. Next, the methodological procedures adopted in the work will be presented.

3 METHODOLOGY

The financial variables were obtained from the financial statements of Brazilian soccer clubs from 2013 to 2017. For the analysis, two periods were considered for the variables: from 2013 to 2016 for sports performance and from 2014 to 2017 for economic-financial performance. The study presents this time interval because the format of the championships changed, such as the Copa do Brasil in 2013, which allowed the entry of clubs that competed in the Copa Libertadores in the same year, impacting the analysis of sports performance. Furthermore, Copa Libertadores changed its format in 2017 and went from 138 games to 156 games, adding one phase and altering the measurement of sports performance in knock-out championships.

The choice of teams was made based on the procedures outlined by Barajas et al. (2005) and Bollen (2010). Clubs from the A and B series of the Brazilian championship were included.

Table 2
List of clubs that composed the sample

Club Name		
Esporte Clube Bahia/BA	Botafogo de Futebol e Regatas/RJ	Figueirense Futebol Clube/SC
Esporte Clube Vitória/BA	Club de Regatas Vasco da Gama/RJ	Joinville Esporte Clube/SC
Goiás Esporte Clube/GO	Clube de Regatas do Flamengo/RJ	Associação Atlética Ponte Preta/SP
América Futebol Clube/MG	Fluminense Football Club/RJ	Santos Futebol Clube/SP
Clube Atlético Mineiro/MG	Grêmio Foot-Ball Porto Alegrense/RS	São Paulo Futebol Clube/SP
Cruzeiro Esporte Clube/MG	Sport Club Internacional/RS	Sociedade Esportiva Palmeiras/SP
Club Athletico Paranaense/*PR*	Associação Chapecoense de Futebol/SC	
Coritiba Foot Ball Club/PR	Avaí Futebol Clube/SC	

Source: Developed by the authors.

As shown in Table 2, the final study sample included 22 clubs. Thus, the database has a total of 88 observations since information was collected for four consecutive years for each club. The Corinthians club was excluded from the sample because it did not inform matchday revenues in the financial statements. The other clubs were excluded due to the lack of disclosure of accounting information or the demotion to the C series.

According to the table above, the variable log of the position will be measured considering 22 teams. Thus, LPOS (1) = log 22 corresponds to 1.3424 and LPOS (22) = log 1/22, resulting in -1.3424. Regarding the position in the national championship, the current research adopted the final rank of the season, and the ranking varies between 1 and 22 in a sequential manner. For example, the Palmeiras club was champion of Serie B in 2013, and there were 16 A series teams in the database, so the team assumed p = 17 in that year.

Silva (2013), Nascimento, Nossa, Bernardes and Sousa (2015), Freitas, Farias and Flach (2017) and Ferreira

et al. (2018) used the CBF ranking variable to measure sports performance. In this study, however, we followed the logic of the studies by Barajas et al. (2005), Bollen (2010), Rocha (2016) and Pereira (2018) that examined two dimensions: the position in the national championship and the results considering all the championships disputed by the club.

First, we conducted a general analysis using the net revenue as the dependent variable and then we conducted a more fine-grained analysis using different types of revenues (matchday, broadcasting, commercial and player sales). Prior research also used the gross (or total) revenue. Some examples are: Barajas et al. (2005); Bollen (2010); Nascimento et al. (2015), Rocha (2016), Augusto-Eça et al. (2018), Ferreira et al. (2018), Lima et al. (2018), Pereira (2018), Andrade Junior and Piva (2019).

For all analyses, we used linear panel regressions with fixed effects, with economic-financial performance as the dependent variable and sports performance in the previous year as the independent variable. The decision to use fixed effects models (as opposed to random effects models) was based on the Hausman test. A significant result in this test indicates that the model with fixed effects must be chosen (Greene, 2000). In all regressions conducted in this study, the Hausman test had a p-value <0.01. By using fixed effects, it is possible to control for the unobserved characteristics of the clubs that remain unchanged over time (from 2014 to 2017), which mitigates problems related to omitted variable bias (Greene, 2000). In addition, we controlled for the time trend using dummy variables for each year (2014 being the baseline year). It should be noted that the focus of the present study is to ascertain the impact of sports performance on the revenues in the subsequent year, represented by the net revenue, broadcasting, matchday, commercial and player sales. The equations for testing the effect of sports performance (at time t-1) on the various types of revenues (at time t) are presented below.

$$yi,t = \beta 0i + \beta 1 LPOSi,t-1 + X_{year}\beta + \varepsilon it \quad (1)$$

$$yi,t = \beta 0i + \beta 1 INDi,t-1 + X_{year}\beta + \varepsilon it \quad (2)$$

where:

yi,t = various types of revenue: net revenue, broadcasting, commercial, matchday and player sale.

$\beta 0i$ = intercept for club i;

$\beta 1$ = coefficient (the effect) of LPOS or IND;

LPOSi,t-1 = sports performance proxied by the LPOS index at time t-1.

INDi,t-1 = sports performance proxied by the IND index at time t-1.

$X_{ano}\beta$ = vector of dummy variables for each year to control for time trend (baseline year 2014).

εit = error term.

4 ANALYSIS AND DISCUSSION

This section presents the empirical evidence obtained from the regression models using fixed effects (panel data analysis) using the Stata14 software.

Table 3 shows the descriptive statistics and intercorrelations for all variables in the study. We note that there was no need to remove outliers from the sample used, as the observations were not above or below three standard deviations from the mean of the variable of interest (Fávero, Belfiore, Silva & Chan, 2009).

Table 3
Descriptive Statistics and Intercorrelations

	Variáveis	Mín	Máx	Média	DP	N	1	2	3	4	5	6
1	Net Revenue (log)	7.25	8.81	8.08	0.39	88						
2	Broadcasting (log)	6.58	8.47	7.71	0.41	88	0.93					
3	Commercial (log)	6.21	8.13	7.13	0.46	88	0.89	0.77				
4	Matchday (log)	6.11	8.23	7.39	0.48	88	0.89	0.75	0.84			
5	Player Sales	5.65	8.27	7.10	0.60	88	0.72	0.57	0.59	0.58		
6	LPOS	-1.34	1.34	0	0.66	88	0.64	0.54	0.57	0.63	0.66	
7	IND	86.00	398.00	256.34	77.65	88	0.63	0.54	0.56	0.61	0.64	0.88

Source: Developed by the authors.

Next, in Tables 4 and 5, the results obtained through linear regressions with fixed effects are shown. Separate regressions were run to verify whether the different sports performance measures (LPOS and IND) affect the economic-financial performance in the subsequent year. Separate analyses for each explanatory variable were necessary because the LPOS and IND variables were highly correlated (r = .88). That is, the inclusion of these two variables simultaneously in the model would cause problems of multicollinearity, which would inflate standard errors, thus affecting the results (Lavery et al., 2019).

Table 4

Effects of LPOS $_{(t-1)}$ on Various Forms of Revenue

	Net Revenue		Broadcasting		Commercial		Matchday		Player Sales	
$LPOS_{(t-1)}$		**0.08****		0.01		0.06		**0.09****		**0.31****
		(0.03)		(0.04)		(0.05)		(0.03)		(0.10)
2015	0.10**	0.10**	0.15**	0.15**	-0.01	-0.01	0.05	0.05	0.15	0.15
	(0.03)	(0.03)	(0.05)	(0.05)	(0.05)	(0.05)	(0.04)	(0.04)	(0.12)	(0.12)
2016	0.19***	0.19***	0.34***	0.34***	0.00	0.00	0.04	0.04	0.15	0.15
	(0.03)	(0.03)	(0.05)	(0.05)	(0.05)	(0.05)	(0.04)	(0.04)	(0.12)	(0.12)
2017	0.19***	0.19***	0.24***	0.24***	0.09	0.09	0.08*	0.08*	0.33**	0.33**
	(0.03)	(0.03)	(0.05)	(0.05)	(0.05)	(0.05)	(0.04)	(0.04)	(0.12)	(0.12)
Intercep.	7.96	7.96	7.53	7.53	7.11	7.11	7.35	7.35	6.94	6.94
Sigma_u	0.38	0.38	0.37	0.36	0.44	0.42	0.48	0.45	0.48	0.35
Sigma_e	0.11	0.11	0.16	0.16	0.17	0.17	0.13	0.12	0.41	0.38
Rho	.92	.92	.84	.84	.87	.86	.93	.93	.57	.45
R^2	0.42	0.48	0.46	0.46	0.08	0.10	0.07	0.18	0.10	0.22
ΔR^2	-	**.06****	-	.00	-	.02	-	**.11*****	-	**.12*****

Source: Developed by the authors.

Note: Panel regressions (Fixed Effects). Standard errors in parentheses. * p <0.05 ** p <0.01 *** p <0.001. N = 88.

Table 4 shows the effects of the LPOS variable on the various types of revenue. Initially, we find that the yearly dummy variables positively affect many of the dependent variables, which reveals a tendency for clubs to increase their revenues over time (only for "commercial" this trend was not observed). Figure 2 illustrates this trend. We found that LPOS significantly affects net revenue, matchday and player sales. Broadcasting and commercials were not affected by LPOS. LPOS explains (ΔR^2) 6% of net revenue, 11% of matchday revenue and 12% of player sales revenue in the subsequent year. Therefore, due to the facts exposed, we conclude that the position in the national championship has a significant effect on important revenue sources in the subsequent year.

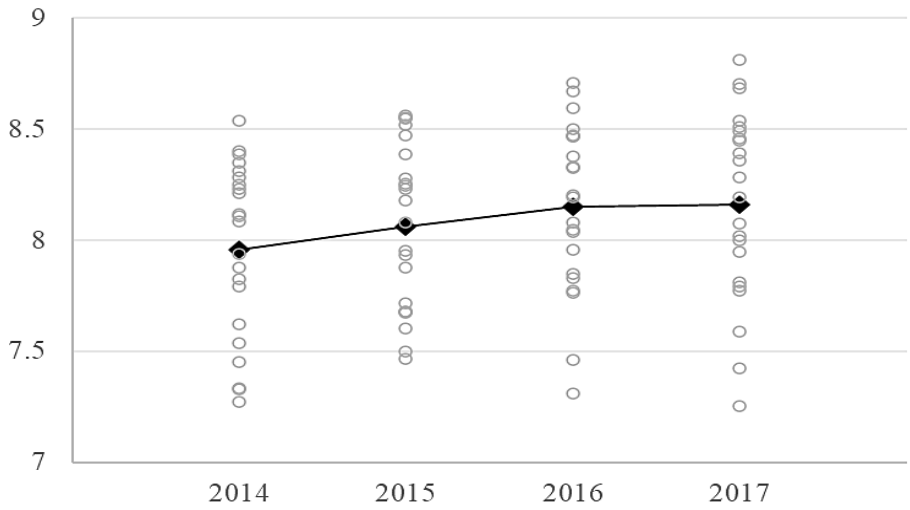

Figure 2. Increase of Net Revenue (log) Over Time.

Source: Developed by the authors.

Note: The gray circles represent the net revenue (log) for each club in the sample. The black diamonds represent the averages for each year.

However, it was found that the effect of IND on the various forms of revenue is less clear (Table 5). Only player sales were affected by IND (IND explained 9% of variation in player sales). That is, the variables net revenue, broadcasting, commercial, and matchday were not affected by IND. When comparing Tables 4 and 5, we find that, in both, revenues from player sales was the one most affected by previous sports performance.

Table 5

Effects of $IND_{(t-1)}$ on Various Forms of Revenue

	Net Revenue		Broadcasting		Commercial		Matchday		Player Sales	
$IND_{(t-1)}$		0.00		0.00		0.00		0.00		**0.002***
		(0.00)		(0.00)		(0.00)		(0.00)		(0.001)
2015	0.10**	0.10**	0.15**	0.14**	-0.01	-0.01	0.05	0.05	0.15	0.19
	(0.03)	(0.03)	(0.05)	(0.05)	(0.05)	(0.05)	(0.04)	(0.04)	(0.12)	(0.12)
2016	0.19***	0.19***	0.34***	0.34***	0.00	0.00	0.04	0.04	0.15	0.18
	(0.03)	(0.03)	(0.05)	(0.05)	(0.05)	(0.05)	(0.04)	(0.04)	(0.12)	(0.12)
2017	0.19***	0.19***	0.24***	0.24***	0.09	0.09	0.08*	0.08*	0.33**	0.35**
	(0.03)	(0.03)	(0.05)	(0.05)	(0.05)	(0.05)	(0.04)	(0.04)	(0.12)	(0.12)
Intercep.	7.96	7.90	7.53	7.57	7.11	7.15	7.35	7.28	6.94	6.32
Sigma_u	0.38	0.36	0.37	0.38	0.44	0.45	0.48	0.47	0.48	0.36
Sigma_e	0.11	0.11	0.16	0.16	0.17	0.17	0.13	0.13	0.41	0.40
Rho	0.92	.92	.84	.85	.87	.87	.93	.93	.57	.45
R^2	0.42	0.42	0.46	0.46	0.08	0.08	0.07	0.08	0.10	0.19
ΔR^2	-	.00	-	.00	-	.00	-	.01	-	**.09****

Source: Developed by the authors.

Note: Panel regressions (Fixed Effects). Standard errors in parentheses. * p <0.05 ** p <0.01 *** p <0.001. N = 88.

The results do not corroborate the research by Barajas et al. (2005) and Bollen (2010), since in their studies the IND variable presented the highest explanatory power. In addition, commercial and broadcasting revenues are significant in Spanish and Dutch soccer, while there is no evidence of their relevance in Brazilian soccer, based on Tables 2 and 3.

The effect on Marketing (commercial) revenue was not statistically significant, diverging from the study by Pinnuck and Potter (2006), who found that sports performance has a positive impact on marketing revenue in Australian soccer.

There is a convergence with the study by Augusto-Eça et al. (2018) regarding the positive relationship between sports and financial performance; however, the authors used a proxy for sports performance (Ranking Pluri de Conquistas) that did not achieve statistical significance.

International studies do not address revenue from player sales because clubs do not account for player sales in gross revenue. They use only the result of the gain or loss with player sales (gross revenue less acquisition cost) in their statements. However, there is a convergence with Ferri et al. (2017), who studied Italian soccer with a variable called player investments (sales revenues less purchases in the period) and found no significant effects between player transfer gains and sports performance.

It is worth mentioning the characteristic of the Brazilian market, considered the “country of soccer”, in being an exporter of soccer players, represented by the high value of international transactions, since if the athlete stands out in tournaments, there is a high probability of being sold abroad. The results regarding the revenues from the sales of players corroborate this pattern (Guedes, 2004; Brasil, 2009; Caetano & Rodrigues, 2009; Franco Júnior, 2013).

An important point for analysis is that international studies indicate that IND has the highest R^2. Our study differs from those by showing that LPOS had the highest explanatory power.

5 CONCLUSIONS

This research sought to examine the relationship between sports performance and economic-financial performance of Brazilian soccer clubs, using different types of revenues. We used panel data from 2013 to 2017. The sample encompassed 22 Brazilian soccer teams, using the period from 2013 to 2016 for sports performance and from 2014 to 2017 for economic-financial performance. Sports performance was proxied by the IND and LPOS indexes. The economic-financial performance was represented by net revenue, broadcasting, matchday, commercial and player sales.

Importantly, the current research did not focus only on teams’ results in national championships. We also included the South American championships in which clubs were competed. We found that sports performance explains in a positive and statistically significant way many important sources of revenue for Brazilian soccer clubs. The variable that reflects the position in the Brazilian Championship, the LPOSt-1, showed the highest explanatory power. We note that the team performance in all competitions, INDt-1, showed statistical significance only for the dependent

variable revenue from player sales. These results contradict the research by Barajas et al. (2005) and Bollen (2010).

The results confirm the export market pattern in Brazil, since the revenue from player sales was the dependent variable most affected by the two types of sports performance used in this study.

Corroborating the research by Ferreira et al. (2018), the results obtained in the present study contribute to the literature, since there is still no full understanding of the relationship between sports and financial performance. Our results are also useful for soccer teams and the general public, as it highlights that revenues from player sales are 12% explained by the rank in the Brazilian championship in the previous year. The overall low explanatory power of our models demonstrates that there are other factors (not related to sports performance) that explain variation in clubs' revenues.

One of the limitations of the present study was the number of observations in the dataset. For future research, we suggest an extension of the period of analysis, including financial statements that will be made public in the coming years. Future research can also use other methodologies to confirm or contest our results.

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CONTEMPORARY JOURNAL OF ECONOMICS AND MANAGEMENT.
ISSN 1678-2089
ISSNe 2178-9258
1. Economics, Administration and Accounting - Journal
2. Federal University of Ceara. Faculty of Economics, Administration, Actuaries and Accounting

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