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The Barcelona Football Club

A DIFFERENT REFEREE BIAS CASE?

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Abstract

This article analyzes the relationship between bribes and competitive success in matches of the First Division of Spain, based on the Negreira Case scandal, which exposed payments from Barcelona FC to Enríquez-Negreira while he was vice president of the Spanish Technical Committee of Referees. Drawing on an extensive self-constructed dataset, covering more than two decades of seasons, and employing various statistical and econometric techniques, this study delves into the potential association between bribery and the likelihood of an organization achieving more victories. The results reveal a significant positive relationship between the payments made by Barcelona FC and its competitive success, even after controlling for quality.

Keywords: corruption, Barcelona, football, LaLiga, referee bias, Negreira.

JEL Codes: Z0, Z2, A1

Resumen

Este artículo analiza la relación entre los sobornos y el éxito competitivo en partidos de la Primera División de España, a partir del escándalo del Caso Negreira, que expuso los pagos del FC Barcelona a Enríquez-Negreira mientras era vicepresidente del Comité Técnico de Árbitros de España. A partir de un amplio conjunto de datos de elaboración propia, que abarca más de dos décadas de temporadas, y empleando diversas técnicas estadísticas y econométricas, este estudio profundiza en la posible asociación entre el soborno y la probabilidad de que una organización consiga más victorias. Los resultados revelan una relación positiva significativa entre los pagos realizados por el FC Barcelona y su éxito competitivo, incluso después de controlar la calidad.

Palabras claves: corrupción, Barcelona, fútbol, LaLiga, sesgo arbitral, Negreira

Códigos JEL: Z0, Z2, A1

Introduction

Referee bias has been examined in many sports, including European football¹ leagues, over the past decade or more. Much of the literature focuses on determining whether there is a home bias in refereeing (Page and Page, 2007;² Dohmen and Sauermann, 2016). Less attention has been given to whether this bias stems from deliberate favoritism. This paper examines the Negreira case, where the Barcelona Football Club (BFC) is alleged to have bribed referees for favorable treatment.

This study investigates the relationship between payments made by BFC to Negreira's entities while he served as vice president of the Spanish Technical Committee of Referees and the goal difference of a team in matches within the Spanish Football Premier Division, even after accounting for team quality. It also aims to uncover the mechanisms, if any, through which these payments may have influenced match outcomes. An econometric analysis of the available data, using goal difference as a proxy for success, reveals that these payments are associated with a positive goal difference for the team. This suggests a potential link to achieving victory.

To validate the robustness of these findings, we also performed an analysis of the probability of a victory, which yielded results consistent with those of the goal

¹ In this paper, we use the terms "soccer" and "football" interchangeably.

² These authors concentrated in the "second leg" home advantage for the European Cup tournaments.

difference analysis. Although the results do not conclusively prove a causal effect of the payments on match outcomes, they represent progress in the specialized literature.

We emphasize the importance of awaiting the findings and results of investigations by the Spanish Prosecutor's Office and Tax Agency to gain a clearer understanding of the nature of BFC's payments to Negreira. At the same time, it highlights the need to investigate whether other teams and seasons should be examined for similar issues using the methodology used here. Considering these potential findings, the article advocates for a comprehensive reform of Spanish football institutions, prioritizing fair play, transparency, and sportsmanship.

The rest of the paper is structured in the following way. Section 2 reviews the literature. Section 3 discusses the descriptive statistics and presents the model. Section 4 discusses the results. Finally, section 5 concludes.

2. LITERATURE REVIEW

Referee bias has long been studied in literature. This phenomenon refers to making biased decisions which in turn may determine competition outcomes. Literature on this issue has concentrated in explaining how referees are influenced by nonmaterial social payoffs that erupt in the decisionmaker's social environment (Dohmen and Sauerman, 2016). This is particularly important for explaining the home referee bias.³

In the football case there are several variables that may affect the outcome⁴ and, most importantly, they may depend on the discretionary judgment of the referees. First, a bias may arise in the allowance for time lost. As known, during the course of the game there exists time lost because of players injuries, VAR reviews, substitutions, among others. Garicano et al (2005), Dohmen (2008), Rickman and Witt (2008), Scopa (2008) have found for different soccer leagues that there is systematic referee bias to add more time when the home team is behind.

Other variables that depend on discretionary decisions include goal difference, penalty kicks, and cards.⁵ Boyko et al (2007) find that the goal difference is statistically

³ Leota et al (2022) and Price and Wolfers (2012) studied this home referee bias for basketball (NBA).

⁴ For a literature review on these variables, see Dohmen and Sauermann (2016).

⁵ Sapp et al (2018) use these variables to measure aggressiveness in European football leagues.

significant for the English Premier League. Others have found disputable penalty kicks as an explanation in the home referee bias (Sutter and Kocher, 2004). Finally, yellow and red cards have also been found to increase the degree of home bias referee (Dawson et al, 2007; Buraimo et al 2010; Buraimo et al, 2012).

The explanation for the home referee bias has also identified social payoffs. In this sense, we may find size of crowd, importance of team, crowd proximity to the field and even subconscious decision making. Some of these inconveniences have been overcome with the use of a video assistant referee (VAR) (see Parsons et al 2001, for the baseball case), which was introduced in Europe in 2016. The first live trial run for VAR took place in a friendly match between PSV and FC Eindhoven in July of that year.

Less studied is the outright favoritism which has been argued diminishes economic efficiency. Distaso et al (2012) explore this for Italian football. Dagaev et al (2024) find that referees from post-communist states favored teams from non-communist states, but there was no evidence of favoritism in the other direction. For the case of other sports, Duggan and Levitt (2002) document match rigging in sumo wrestling. More recently Canappele, Cinaglia and Langois (2021) document 263 cases on alleged corruption between 2016 and 2017 using the Database on Alleged Cases of Corruption in Sports. They show that this behavior happens in many countries and in many sports, including soccer.

Furthermore, they find that match manipulation is the most common feature that shows somehow corruption, especially in the most popular sports. There is also an important number of works that explore doping as a form of corruption. This is out of the scope of this study (for a survey see Ordway, 2021).

In the context of football, determining the factors that influence the probability of a victory is crucial for understanding whether there may be some referee bias. Various papers have explored this issue by estimating the likelihood of winning. To conduct this analysis, researchers have included a range of variables such as goal difference (Distaso et al., 2012), the probability of victory as determined by betting houses (Buraimo, Simmons, and Maciaszczyk, 2012), and other relevant variables.

Our work contributes to the existing literature on referee bias by focusing on potential bias arising from alleged corruption rather than the more commonly studied home bias. While referee decisions in soccer games, even with the presence of VAR,

remain subjective, we specifically examine the case of the Barcelona football team (the so-called Negreira case) to assess whether there was any referee bias in favor of the team.

A similar case of corruption in football occurred in Italy, known as the *Calciopoli* scandal, in which the Juventus and several other clubs unlawfully influenced referees' decisions (see Distaso et al., 2012). This scandal had significant repercussions, including a decline in league attendance for the clubs involved (Buraimo, Migali, and Simmons, 2016).

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3. THE NEGREIRA (BARCELONA) CASE

Barcelona FC has historically been one of the most important clubs in Spain and Europe. From the 1998/99 season to the 2021/22 season, it obtained the European championship cup 11 times in the Spanish First Division, 7 times in the Copa del Rey, 8 times in the Spanish Super Cup, and 4 times in the UEFA Champions League. On average, it won at least one title every year of the period.

However, the legitimacy of many of its domestic titles would be questioned following the information published in February 2023 by the Spanish radio station - Cadena SER. According to this radio network, the Spanish Prosecutor's Office was investigating a company owned by Enríquez Negreira (Negreira, henceforth) that received payments from BFC under the guise of verbal consultancy while he was vice president of the Technical Committee of Referees (CTA, henceforth) (Martí et al., 2023).

This company allegedly received 532,728.02 euros in 2016, 541,752 euros in 2017, and 318,200 euros in 2018. In the same information, Josep María Bartomeu, who was a director of the club between 2003-2005, vice president from 2010-2014, and finally president until 2020, acknowledged the existence of reports on payments dating back to 2003. It would later become public knowledge that the payments began in 2001

(García Bueno & Carranco, 2023). The end of the payments would coincide with the same season in which Negreira ceased to be vice president of the CTA (2017/18). Table 1 shows the payments made each season.

The controversy and significance regarding the destination of the payments do not only fall on the position of the former referee Enríquez-Negreira but also on the functions assigned by the governing body of football in Spain, the Royal Spanish Football Federation (RFEF), to the CTA during the payment period:

3. The Technical Committee of Referees will carry out the following functions: a) establish the levels of referee training; b) technically classify referees and propose their assignment to the corresponding categories; c) propose candidates for international-level referees; d) approve administrative rules regulating refereeing. e) coordinate with autonomous regional federations integrated into the RFEF on training levels; f) appoint referees for non-professional national competitions; and, g) any other functions delegated by the RFEF.

7. The Technical Committee of Referees has disciplinary powers, although limited exclusively to the technical aspects of the referees' performance (Royal Spanish Football Federation, 2011).

Table 1. Annual payments made by BFC to Negreira's Firms (Euros)

Year	Amount Disclosed	Actual President of Barcelona FC
2001	€ 72,924.40	Joan Gaspart
2002	€ 22,463.04	Joan Gaspart
2003	€ 103,175.32	Joan Gaspart until February Comisión Gestora Joan Laporta since June
2004	€ 67,625.92	Joan Laporta
2005	€ 29,629.89	Joan Laporta
2006	€ 230,435.61	Joan Laporta

2007	€ 209,500.67	Joan Laporta
2008	€ 223,555.70	Joan Laporta
2009	€ 331,062.20	Joan Laporta
2010	€ 477,222.19	Joan Laporta until July. Sandro Rosell
2011	€ 622,603.19	Sandro Rosell
2012	€ 679,904.20	Sandro Rosell
2013	€ 696,135.70	Sandro Rosell until January. Josep María Bartomeu
2014	€ 728,952.40	Josep María Bartomeu
2015	€ 728,952.40	Josep María Bartomeu
2016	€ 640,970.98	Josep María Bartomeu
2017	€ 644,600.91	Josep María Bartomeu
2018	€ 655,519.92	Josep María Bartomeu

Note: Amounts paid to the VP of the Technical Committee of Referees via Enríquez-Negreira's firms.

Source: own translation from

<https://www.marca.com/futbol/barcelona/2023/03/23/641c13b5e2704ed5b58b460d.html>

A month after the investigation became public knowledge, the well-known newspaper *La Vanguardia* reported that the Spanish Tax Office warned that the payments might be an indication of covering up other types of illicit services, such as "influencing referee appointments, participating in the manipulation of results, or trading with information accessible only to the arbitration committee" (Muñoz, 2023). This was because the invoices issued by Negreira's companies to BFC lacked documented economic activity. Despite this, at the time of writing this work, investigations by the Spanish tax authorities have not reached a verdict.

It is challenging to conclusively demonstrate whether any illegal behavior occurred, as that will ultimately be determined by the Spanish authorities. Nonetheless, in this work, we explore certain outcomes and variables that may suggest irregularities. To do this, we construct a dataset that can provide insights in this area. Next, we present our analysis.

4. METHODOLOGY

The primary goal in football is to achieve victory. The Negreira case allegedly aimed to influence referees to benefit Barcelona FC by potentially increasing the team's probability of victory. This probability depends on various factors, some of which are significantly influenced by the referee's judgment, while others are independent of it, such as the quality of the team and the coach's strategy for each match.

To conduct our analysis, we use goal difference as a proxy for victory, as some literature has done. Additionally, for robustness, we use a standard limited dependent model to evaluate the probability of winning a match.

We begin by identifying the determinants of goal difference as a proxy for explaining a team's victory. The variables used in our analysis can be grouped into two categories: pre-match factors and in-match factors, following the work of Buraimo, Simmons, and Maciaszczyk (2012). Pre-match information is typically independent of the team's performance during the match and is expected to remain constant throughout the game. One of the key pre-match factors is whether the team is playing at home, as mentioned in the literature review section. Playing at home provides the team with various advantages. To account for this effect, we include a dummy variable indicating whether the team plays at home.

Another important factor is the *expected* number of goals a team might score, which varies depending on the quality disparity between the team and its opponent. If a team is significantly superior to its rival, it is more likely to score more goals. To capture the variation in quality between teams, we use the difference between the teams' odds and the square of the difference to allow for non-linear relationships. The odds effectively represent a team's quality because they account for factors such as the absence of key players due to injuries or sanctions. We treat the odds according to the methodology of Buraimo, Simmons, and Maciaszczyk (2012): since the sum of the three probabilities associated with the outcome of a game exceeds one (reflecting the betting house's profit), we divide the sum by the surplus to adjust the odds to their expected values.

Finally, to measure team quality, we calculate the difference between the probability of the home team winning and the probability of the visiting team winning.

We expect that as the difference in probabilities decreases, the goal difference in the match will increase. This implies that when there is a significant quality difference between teams, a small probability will be assigned to the favorite team relative to its rival. Consequently, a significant quality difference between teams would be expected to result in a proportional goal difference.

To further validate the ability of odds to serve as a good proxy for team quality, we examine the correlation between the market value of a team per season and the number of matches in which the team is favored to win during that season. As indicated in Table 2, there is a significant and positive correlation. Therefore, using odds to assess a team's quality is deemed an appropriate measure.

Table 2. Correlations

Variables	(1)	(2)
(1) Team Market Value	1.000	
(2) The number of matches in which the team is favored to win the game.	0.8140	1.000

Note: Correlation between the market value of each LaLiga team for the seasons 2004/05-2021/22 and the total number of matches in season t for which it is favored to win according to the odds from Interwetten. *Source:* Own elaboration based on Transfermarkt and Football Data UK.

With respect to variables that change during the course of a match, we collected data for each participating team, including the number of goals scored, yellow and red cards received, fouls committed, and penalty kicks awarded. Following the approach of Ferrall and Smith (1999), Duggan and Levitt (2002), and Distaso et al. (2012), we considered each team in a match as a unit of observation, resulting in two observations per match. Consequently, our dataset comprises 18,240 observations from the 380 matches per season across the 24 seasons analyzed.

Our empirical strategy primarily focuses on the period during which Barcelona FC (BFC) allegedly made payments to Negreira's companies. For each season from 1998/99, we determined whether BFC made payments to these companies or not. This information allows us to exploit the comparison of matches in which BFC made payments with those in which they did not, to assess whether making payments is

associated with improvements in aspects that contribute to a team's victory, such as goal difference.

An ideal identification strategy would involve payments occurring randomly among the different teams participating in LaLiga over time. This would allow for a clear determination of the impact of corruption on match variables and the resulting effect on game outcomes. However, given the absence of exogenous variation in the occurrence and timing of payments, our research faces limitations regarding the causal interpretation of our estimates. Therefore, our findings should be understood and interpreted as correlations rather than causal relationships.

To analyze the data, we use a fixed-effects model to estimate how goal difference between teams in a match changes after controlling for game-related variables. The choice of a fixed-effects model is appropriate because it accounts for specific characteristics of each team and variations in LaLiga performance over time. Additionally, using goal difference as an explanatory variable helps us understand the relationship between payments and match outcomes. A positive goal difference indicates that the team scored more goals than its rival and therefore won the match.

The model to be estimated is as follows:

$$GoalDiff_{it} = \alpha + \beta P_{it} + \gamma X_{it} + \theta_i + \lambda_t + \epsilon_{it} \quad (1)$$

where $GoalDiff_{it}$ is the goal difference of each match played by team i in each season t . P_{it} is a dummy variable indicating whether team i made payments to Negreira in season t . X_{it} is a set of control variables related to quality, locality, and other variables that depend on the decisions of a referee, such as yellow and red cards, fouls, and penalty kicks awarded for and against team i in each match of each season t . θ_i represents the unobservable and time-invariant characteristics specific to each team i that affect its performance. The time fixed effects, λ_t , capture time-specific effects that affect all teams uniformly.

By incorporating these covariates, team and time fixed effects, the model aims to provide an estimate of the correlation between payments to Negreira and team

performance. At the same time, the inability to establish a causal relationship is a consequence of the lack of information about the ultimate destination of the payments made. If, for example, they were used to influence the impartiality of certain referees, it would be necessary to control for those who were part of the operation, as done by Distaso et al. (2012). Hence, there is a possibility that the payments variable is correlated with the error term. The outcome of interest is whether the team made payments or not. If significant and positive, it would imply that making payments is associated with a positive goal difference for the team that made payments and, therefore, with its victory.

Considering all those variables we created a panel dataset that allows us to study the potential relationship between the payments made by BCF and the result of a match. Next, we provide the sources of the whole dataset.

5. DATA

The dataset used in this analysis was self-constructed from various sources. We relied on data from different providers to create a comprehensive panel dataset that spans multiple seasons of Spanish LaLiga.

- I. Odds per Match: We sourced odds per match from the Austrian betting company *Interwetten*, where the team favored to win is assigned lower odds compared to its counterpart. This choice was based on the availability of long-term information from *Interwetten*.
- II. Market Value: The market value of each team per season was sourced from *Transfermarkt*. *Transfermarkt* provides data on the market value of LaLiga teams starting from the 2004/05 season, so our analysis of the correlation in table above begins with that season.
- III. Match Data: For variables that change during the course of a match, such as goals scored, yellow and red cards received, fouls committed, and penalty kicks attempted, we collected data from each match in LaLiga from the 1998/99 season to the 2021/22 season. We used various sources for this information:

- For main match statistics such as goals and cards, we utilized data from the football-specialized site *Football Data UK*.
- In the absence of card data before the 2004/05 season and general foul and penalty data, we supplemented our data with information from other football sites including *Football-Lineups*, *FBref.com*, and *Transfermarkt*.
- To collect this data, we used web scraping techniques to extract the necessary information. Specifically, we obtained data on penalty kicks from *Transfermarkt* and fouls conceded per team from *Football-Lineups*.
- Additionally, we used the *worldfootballR* package (Zivkovic, 2023) to extract data from *FBref.com* on the number of cards received by each team.

IV. Match Reports: Since the 2003/04 season, we verified the data against Match Reports issued by the CTA (Comité Técnico de Árbitros) after each match. These reports provide details on events and incidents that occurred during the match. We compiled the information from the Match Reports using again web scraping techniques to create a dataset for comparison and verification of card data.

As a result, we constructed a unique dataset with 18,240 observations, encompassing each participant in each LaLiga match between the seasons 1998/99 and 2021/22. This dataset includes information on the number of goals, fouls, penalty kicks, yellow and red cards, and the probability of winning the match according to *Interwetten* odds. This dataset serves as the basis for our analysis.

6. RESULTS

To start, we present Table 3, which contains the descriptive statistics for all variables to be used in the econometric model. This table includes data from all LaLiga teams and encompasses the full range of observations in our panel dataset. The descriptive statistics are important as they provide a snapshot of the distribution and central

tendencies of each variable, which will be useful for comparison and interpretation of our analysis later in the paper.

In addition to the descriptive statistics, Table 3 also indicates the starting season from which there are observations available for each variable of interest. This information is crucial for understanding the data's scope and the periods covered by our analysis. By reviewing the descriptive statistics, we can gain insights into the general trends and patterns within the dataset, providing context for the econometric analysis that follows.

Table 3. Descriptive Statistics

Variable	Obs	Average	Std Dev.	Initial season with observations
Goal Difference	18,240	0	1.80	1998/99
Fouls Against	12,920	14.968	4.79	2005/06
Fouls in Favor	12,920	14.968	4.79	2005/06
Yellow Card Against	18,240	2.735	1.614	1998/99
Red Card Against	18,240	.16	.407	1998/99
Yellow Card in Favor	18,240	2.735	1.614	1998/99
Red Card in Favor	18,240	.16	.407	1998/99
Penalty Kicks in Favor	18,240	.145	.379	1998/99
Penalty Kicks Against	18,240	.145	.379	1998/99
Odds Difference	16,676	0	.314	2000/01

Source: Own elaboration from the created dataset.

In Table 4, we present the results of a preliminary analysis of mean differences. The first column lists the variable under analysis, while columns 2 and 3 indicate the number of observations for each group. Columns 4 and 5 show the means for each group, and column 6 reports the t-statistic for testing the null hypothesis that the mean difference between the groups is zero. The groups under consideration are Barcelona FC (BFC) and the rest of the LaLiga teams. This initial analysis is conducted for two periods: before and after the alleged payments were made and during them.

In Panel A, which examines the first subset of time, we observe that the means for fouls and yellow cards against are significantly different between BFC and the other LaLiga teams. This suggests that penalty kicks against BFC are lower than for the rest of the LaLiga teams, while the opposite is true for penalty kicks in favor of BFC. In Panel

B, which looks at the second subset of time, we observe differences in how each group is penalized for all considered referee infractions. Again, penalty kicks against BFC are lower than for the rest of the LaLiga teams, while the opposite is true for penalty kicks in favor of BFC.

Table 4. Tests of mean differences between BFC and the rest of the LaLiga teams

<i>Panel A: Before and After payments (1998/99 – 2000/01, 2018/19-2021/22)</i>					
Variable	n		Average		t-statistic
	N ₀	N ₁	A ₀	A ₁	
Goal Difference	5054	266	-0.053	1.015	-1.068***
Fouls Against	2,888	152	13.558	11.053	2.506***
Fouls in Favor	2,888	152	13.388	14.283	-0.895***
Yellow Cards Against	5,054	266	2.662	2.301	0.361***
Yellow Cards in Favor	5,054	266	2.642	2.673	-0.031
Red Cards Against	5,054	266	0.145	0.135	0.009
Red Cards in Favor	5,054	266	0.144	0.15	-0.007
Penalty Kicks Against	5,054	266	0.162	0.128	0.034
Penalty Kicks in Favor	5,054	266	0.16	0.154	0.006

<i>Panel B: During the payments period (2001/02 – 2017/18)</i>					
Variable	n		Average		t-statistic
	N ₀	N ₁	A ₀	A ₁	
Goal Difference	12274	646	-0.082	1.550	-1.631***
Fouls Against	9,386	494	15.617	12.097	3.519***
Fouls in Favor	9,386	494	15.391	16.377	-0.985***
Yellow Cards Against	12,274	646	2.81	2.053	0.757***
Yellow Cards in favor	12,274	646	2.761	2.975	-0.214***
Red Cards Against	12,274	646	0.169	0.116	0.053***
Red Cards in Favor	12,274	646	0.165	0.197	-0.032***
Penalty Kicks Against	12,274	646	0.14	0.104	0.037***
Penalty Kicks in Favor	12,274	646	0.135	0.206	-0.071***

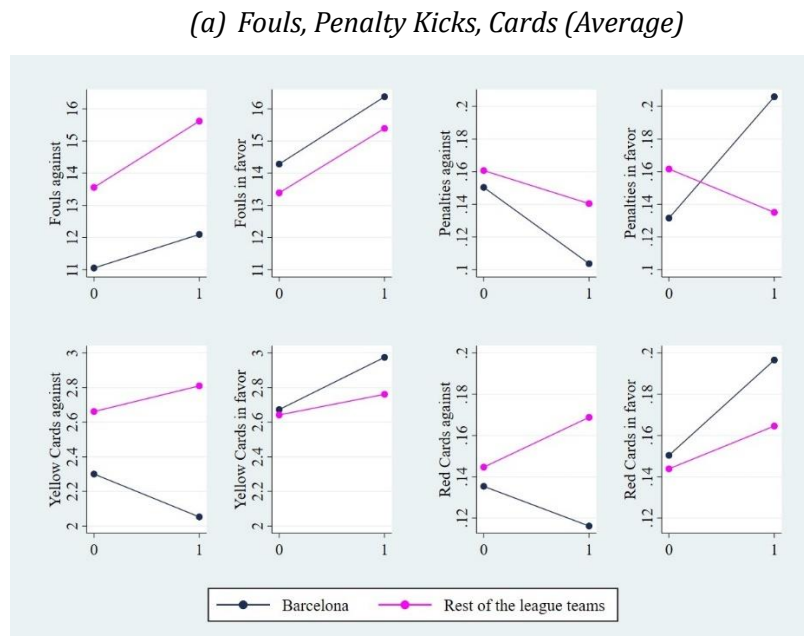
Note: This table presents the results of a t-test analysis to compare the means of referee infractions and goal difference between Barcelona FC and the rest of the LaLiga teams. This test is conducted for two periods distributed in the two panels of the table. Panel A corresponds to before and after payments (1998/99-2000/01, 2018/19-2021/22), while Panel B corresponds to the period in which payments were made (2001/02 – 2017/18). Column 1 indicates the variable used to test the null hypothesis that the mean difference is equal to zero. Columns 2 and 3 indicate the total number of observations for each subset of teams, broken down by whether the team was BFC (column 3) or not (column 2). Columns 4-5 indicate the average value per match for each variable, broken down by whether the team is BFC (column 5) or not (column 4). Finally, column 6 indicates the t-statistic to test the null hypothesis that the difference between the two means is not statistically different. *, **, and *** represent the rejection of the null hypothesis at the 10%, 5%, and 1% levels, respectively. *Source:* Own estimation.

Figure 1 complements Table 4 by visually representing the means for each of the variables used during the two periods for Barcelona FC (BFC) and the other LaLiga teams. The figure effectively highlights the mean differences between the groups for the period before and after the alleged payments were made.

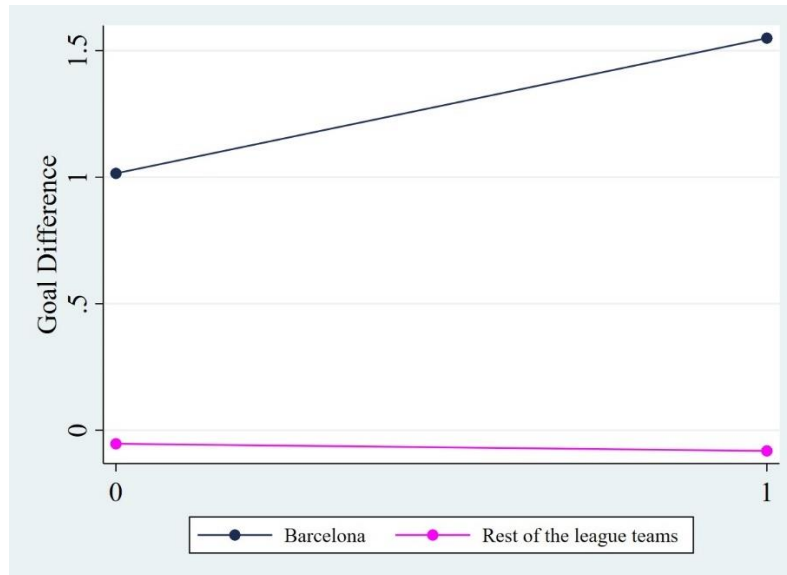
The figure makes it easier to discern the differences in the means for variables such as fouls and yellow cards against, particularly during the period of alleged payments. This visual representation allows for a clearer understanding of how the means diverge between BFC and the other LaLiga teams in these aspects.

Furthermore, the figure also shows the noticeable difference in the mean value for penalty kicks during the payment period. This suggests that BFC experienced a different treatment regarding penalty kicks in favor and against them compared to the other LaLiga teams during the alleged payment period. Overall, the graphical depiction in Figure 1 provides a concise and accessible comparison of the groups across the two time periods.

Figure 1. Average referee infractions and goal difference before and after the payment period, and during the payment period, for BCF and the rest of the LaLiga teams



(b) Goal Difference Average



Note: This Figure shows the average value per match for each statistic, where period 0 corresponds to before/after payments (1998/99-2000/01, 2018/19-2021/22). Period 1 corresponds to the period during payments (2001/02-2017/18). Panel (a) includes fouls, penalty kicks, and cards both in favor and against. Panel (b) includes the goal difference.

Additionally, we conduct a similar exercise to compare whether the mean difference was zero between different periods regarding the alleged payments in Table 5. This analysis is done for both BFC and the rest of the LaLiga teams. Period 1 corresponds to matches played *before* the incident (seasons 1998/99-2000/01); Period 2, to those taking place *during* the event (2001/02-2017/18), and Period 3, to those carried out *after* the episode (2018/19-2021/22). The first column indicates the variable for which the analysis is performed. In this case, variables related to fouls were omitted due to a lack of data for Period 1. Columns 2-4 indicate the number of observations for each period. Columns 5-7 show the averages for each variable in each period. Finally, columns 8-10 present the t-statistic value for each mean test conducted between the three periods. Two aspects of interest from this analysis are whether there are changes in the mean over time, specifically between the subperiods before-during and during-after, and whether such changes are of the same degree or direction among the analyzed groups.

Panel A of Table 5 conducts the analysis for the rest of the LaLiga teams. Note that the mean difference between before and during payments is only significantly different from zero for red cards and yellow cards in favor. Specifically, there is a reduction in the average of cards in favor shown during the payment period compared to that of *before*. Regarding the comparison of means between during and after, it is observed that the mean difference is not significantly equal to zero for variables related to cards and penalty kicks. The results suggest significant changes in the average number of penalty kicks between during and after payments. More specifically, there is a reduction in both cards against and in favor and an increase in penalty kicks in favor and against. No significant changes in goal differences are observed over time.

On the other hand, Panel B of Table 5 conducts the previous analysis exclusively for BFC. The results suggest that cards against decreased during the payment period compared to before payments were made. While between the during and subsequent period, there are indications of a decrease in cards in favor. Regarding goal difference, a change in the mean is observed between the periods considered. Specifically, there is an increase during the payment period and a subsequent reduction. This fact coincides with seasons where the team had a high-quality squad.

Table 5. Means difference test for different periods and for all teams vs Barcelona FC (1998/99-2021/22)

<i>Panel A: LaLiga teams excl. Barcelona FC</i>									
Variable	<i>n</i>			Average			<i>t-statistic</i>		
	<i>N</i> ₁	<i>N</i> ₂	<i>N</i> ₃	<i>A</i> ₁ (1)	<i>A</i> ₂ (2)	<i>A</i> ₃ (3)	(1)-(2)	(2)-(3)	(1)-(3)
Goal Difference	2166	122 74 8	288	-0.042	-0.082	-0.062	0.040	-0.020	0.020
Yellow Card Against	2166	122 74 8	288	2.865	2.810	2.509	0.055	0.301***	0.355***
Yellow Card in Favor	2166	122 74 8	288	2.829	2.761	2.502	0.068*	0.260***	0.327***
Red Card Against	2166	122 74 8	288	0.191	0.169	0.110	0.022**	0.059***	0.081***
Red Card in Favor	2166	122 74 8	288	0.192	0.165	0.108	0.027***	0.057***	0.084***
Penalty Kicks Against	2166	122 74 8	288	0.133	0.140	0.183	-0.007	-0.043***	-0.050***
Penalty Kicks in Favor	2166	122 74 8	288	0.131	0.135	0.183	-0.004	-0.048***	-0.052***

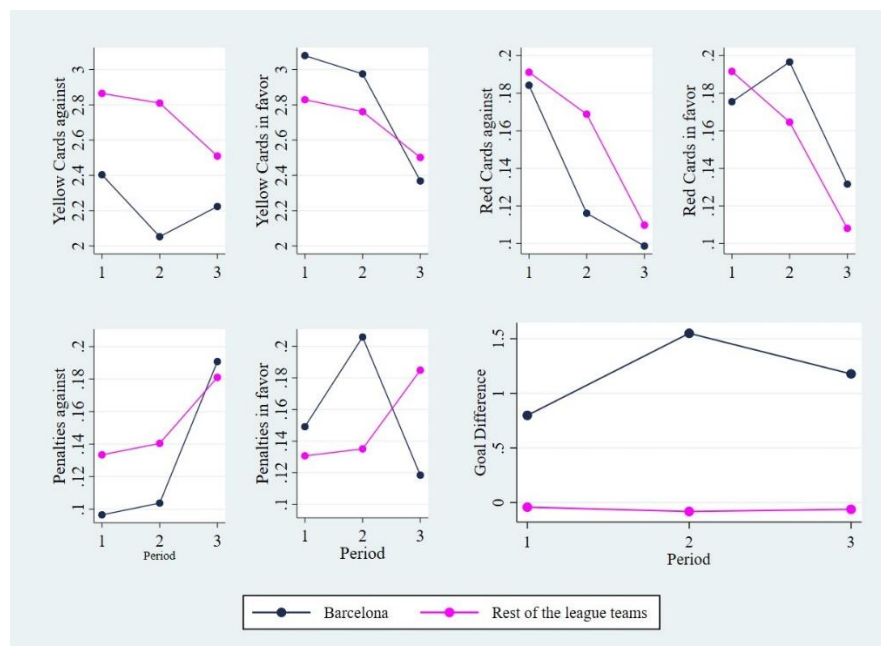
Panel B: Barcelona FC

Variable	<i>n</i>			Average			<i>t</i> -statistic		
	<i>N</i> ₁	<i>N</i> ₂	<i>N</i> ₃	<i>A</i> ₁	<i>A</i> ₂	<i>A</i> ₃	(1)-(2)	(2)-(3)	(1)-(3)
Goal Difference	114	646	152	0.798	1.550	1.178	-0.751***	0.372**	-0.379*
Yellow Card Against	114	646	152	2.404	2.053	2.224	0.351**	-0.171	0.180
Yellow Card in Favor	114	646	152	3.079	2.975	2.368	0.104	0.607***	0.711***
Red Card Against	114	646	152	0.184	0.116	0.099	0.068*	0.017	0.086*
Red Card in Favor	114	646	152	0.175	0.197	0.132	-0.021	0.065*	0.044
Penalty Kicks Against	114	646	152	0.096	0.104	0.151	-0.007	-0.048	-0.055
Penalty Kicks in Favor	114	646	152	0.149	0.206	0.158	-0.057	0.048	-0.009

Note: This table presents the results of a t-test analysis to compare the means of refereeing infractions and goal differences for different time intervals in relation to the payments made by BFC (before, during, and after). This test is conducted for two groups of teams distributed across two panels in the table. Panel A includes all LaLiga teams except for BFC. Panel B includes only the latter. Column 1 indicates the variable used to test the null hypothesis that the difference in means is equal to zero. Columns 2-4 indicate the total number of observations for each analysis subperiod, broken down by subperiod: Before payments (column 2), During (column 3), and After (column 4). Columns 5-7 indicate the average value per match for each variable, broken down by subperiod: Before payments (column 5), During (column 6), and After (column 7). Columns 8-10 indicate the t-statistic to test the null hypothesis that the difference between the means of different subperiods is not statistically different from zero. *, **, and *** represent rejection of the null hypothesis at the 10%, 5%, and 1% levels, respectively.

What is discussed in Table 5 can be better seen in Figure 2, where it is also possible to observe the proportion of the change between periods. The results to be discussed below are only for those mean difference tests where significance was found. For the before-during transition, a drastic reduction in the number of cards against is observed, which happens to a greater extent for BFC. Also, note the difference in direction in the movement of the average value of red cards in favor between the aforementioned periods. For the during-after transition, note the reduction in yellow and red cards in favor, as well as red cards against BFC relative to the rest of the LaLiga teams. Finally, we emphasize the movement of yellow cards against and the goal difference, where a favorable average is observed for BFC during the payment period to subsequently approach the average of the rest of the LaLiga teams. The distance between the goal difference of the two groups is a consequence of evaluating a team that has historically been characterized as high quality and the average of the rest of LaLiga, which considers teams with both high and low quality.

Figure 2. Referee’s average calls and goal difference before and after the alleged corruption event for BFC and rest of LaLiga Teams



Note: This figure displays the average value per match for the three possible analysis subperiods for each refereeing infraction with available information and the goal difference. Period 1 corresponds to the seasons (1998/99-2000/01), which is before the payments were made. Period 2 corresponds to the seasons during which there is evidence of payments by BFC (2001/02-2017/18). Period 3 corresponds to after the payments were made (2018/19-2021/22).

The results shown earlier are merely suggestive but provide an initial indication of how the average number of fouls called against and in favor of teams in the Spanish LaLiga has changed over time. The motivation for these changes over time may be associated with multiple factors, including the evolution of the game or the quality of the teams. In this sense, the next section conducts a more in-depth analysis to consider aspects such as the ones mentioned earlier and additional factors when assessing the association between the payments made by BFC and the outcome of the matches.

- The previous analysis omits important details, such as the quality difference among participating teams. This is highly relevant because the period in which the payments were made coincided with a time when BFC had high-quality players in its squad. Therefore, if we intend to determine the association between payments and match outcomes, it is crucial to take quality into account. At the same time, by doing so, it is possible to make fair comparisons between

teams. We showed earlier that this variable is highly correlated with the total value of the team as obtained from Transfermarkt. In this case, following the methodology of Buraimo, Simmons, and Maciaszczyk (2012), quality is quantified as the difference between the odds of the teams.

- To address this and test whether payments play a role in a team's goal difference, the model in equation (1) is estimated for different specifications. The results are reported in Table 6. Column 1 controls for home advantage, quality, referee infractions, and whether the team paid Negreira's societies while he was vice president of the CTA. This specification omits both fouls in favor and against, as it only has data from the 2005/06 season onwards. This aims to increase the number of years in the analysis and have a year prior to the start of payments in the analysis. Column 2 adds fouls to its specification, so the analysis interval is reduced to start from the 2005/06 season.

Table 6. Goal Difference determinants

VARIABLES	(1)	(2)
	LaLiga (all teams) 00/01-21/22	05/06-21/22
	Goal Difference	
Payments	0.230*	0.296**
	(0.130)	(0.146)
Home game	-0.027	-0.062*
	(0.030)	(0.033)
Difference in Odds	-2.501***	-2.637***
	(0.059)	(0.067)
Square Difference in Odds	-0.377***	-0.529***
	(0.122)	(0.136)
Yellow Cards Against	-0.010	-0.039***
	(0.008)	(0.010)
Yellow Cards in Favor	0.009	0.036***
	(0.008)	(0.010)
Red Cards Against	-0.499***	-0.483***
	(0.032)	(0.036)
Red Cards in Favor	0.500***	0.487***
	(0.032)	(0.036)
Penalty Kicks Against	-0.431***	-0.377***
	(0.032)	(0.035)
Penalty Kicks in Favor	0.430***	0.376***

	(0.032)	(0.035)
Fouls Against		0.028***
		(0.003)
Fouls in Favor		-0.027***
		(0.003)
Constant	0.079	0.016
	(0.068)	(0.103)
<i>n</i>	16,676	12,906
<i>R</i> ²	0.218	0.230

Note: This table shows the estimates of equation (1) where the dependent variable is the goal difference. The control variables include: home advantage, quality, cards, penalty kicks, fouls both for and against, and whether the team paid Negreira or not. Columns 1 and 2 report results for all teams that played in LaLiga between the seasons 2000/01-2021/22. Column 1 omits fouls as a control to extend the analysis period due to data limitations. *, **, and *** represent the level of significance at 10%, 5%, and 1%, respectively.

The results suggest that payments made by BFC to Negreira's societies are positively and significantly associated with the goal difference in a match and therefore with its outcome. However, it is prudent to be cautious about inferring causal relationships from these findings, as the study adopts an observational approach that inherently limits the establishment of causality. The observed correlation raises intriguing questions about possible associations between unethical practices and on-field performance. This positive coefficient suggests that teams involved in payments tend to exhibit a higher average goal difference. While these findings have significant implications, they invite waiting for the findings and judgments of the Spanish Prosecutor's Office and Tax Agency regarding the nature, destination, and use of BFC's payments to Negreira. Based on these, further investigations and analyses can be conducted.⁶

- Regarding pre-game variables, the coefficient for home advantage has a significantly small negative influence on goal difference when considering fouls (Column 2). This result goes against what is found in the literature. The control variables for team quality (the difference in odds and its square) behave largely as expected. It is important to remember that the team favored to win the match

⁶ On January 25, 2024 Negreira was about to testify even after his legal team allegations in the sense that has was mentally ill.

is assigned lower odds. Therefore, as the value of the odds difference decreases, the quality difference between teams increases, and, consequently, the goal difference in the match increases.

- Regarding variables that can change during the game, note that yellow cards lack significance when fouls are omitted as controls. This may be because of the relationship between yellow cards and fouls. As the former ones are a consequence of fouls, including them allows capturing effects on goal difference through free kicks or goals scored from the rebound of a missed penalty.
- Red cards show an increase in goal difference when in favor and a decrease when against. This reflects the advantage that the non-sanctioned team has when having an extra man on the field and the consequences this has on the ease of scoring goals. The opposite happens for red cards against. Concerning penalty kicks, an increase in goal difference is observed when in favor and a decrease when against. This reflects the direct opportunity to score a goal for the sanctioned team. Fouls show an effect opposite to that of cards and penalty kicks. When these are against the team, goal difference increases, while the opposite happens when they are in favor. This reflects how the fouls received by the team limit its game and, therefore, the number of goals it can score.
- In comparison with existing literature, the findings presented in this paper provide a nuanced perspective on the discourse surrounding the relationship between bribes and team performance. In particular, the results in terms of corruption or bribes differ from those of Distaso et al. (2012), whose research indicated a negative or almost nonexistent relationship between playing with colluded referees and team victory. On the contrary, our analysis, covering data from the 2000/01 to 2021/22 seasons, reveals a more pronounced connection between reported bribes and victories among teams. While Distaso et al.'s (2012) work focused on a single league and a limited time period, our study benefits from a broad dataset spanning multiple seasons and teams across a wider spectrum, potentially improving the robustness and generalization of the

findings. Sapp (2018) obtain that cards are favorable to the home team, suggesting a home referee bias.

Additionally, the conclusions drawn in this document complement the results of Boyko et al. (2007) for the variables that affect the goal difference in a match. Their study explored the impact of home advantage, attendance at the match, and the assigned referee on the number of goals. They found a significant and positive relationship between the referee and the goal difference variables. Our findings, which take into account variables dependent on referee decisions, shed light on mechanisms through which refereeing influences the final outcome of the match. By introducing quality data, our analysis provides a more comprehensive understanding of how refereeing could affect not only team performance but also the dynamics of sporting events. In this context, our work goes beyond individualistic correlations to reveal potential mechanisms through which bribery may subtly influence goal difference and the overall success of a team.

Overall, the results suggest that refereeing that unfairly penalizes one of the teams can have a significant impact on the final outcome of the match, through the mechanisms previously outlined. This, consequently, may have economic implications for the involved teams and repercussions in terms of the legitimacy of the competition in question. It is also observed that a club paying Enriques Negreira's societies has a positive association with the final outcome of the match. However, it is imperative to take these findings with caution, considering the highlighted limitations and keeping in mind that the official investigation is still ongoing. Although the statistical significance of the coefficient related to the payment variable provides indications of a correlation, it does not definitively establish the existence of causality. Finally, the results emphasize the need to continue with the official investigation to achieve a comprehensive understanding of the purpose, justification, and destination of the payments made by Fútbol Club Barcelona to entities related to Negreira.

7. ROBUSTNESS

It is also reasonable to estimate the probability of a victory, as a robustness check. For this we run a Probit model where the limited dependent variable takes the value of 1 for victory and 0 otherwise. The model to be estimated is as follows:

$$P(\text{Win})_{it} = \alpha + \beta P_{it} + \gamma X_{it} + \theta_i + \lambda_t + \epsilon_{it} \quad (2)$$

where Win_{it} is the limited dependent variable i in each season t . P_{it} is a dummy variable indicating whether team i made payments to Negreira in season t . X_{it} is a set of control variables related to quality, locality, and other variables that depend on the decisions of a referee, such as yellow and red cards, fouls, and penalty kicks awarded for and against team i in each match of each season t . θ_i represents the unobservable and time-invariant characteristics specific to each team i that affect its performance. The time fixed effects, λ_t , capture time-specific effects that affect all teams uniformly.

Table 7 shows the results. Payments, red cards (both for and against), and penalty kicks (both for and against) positively influence the likelihood of securing a victory. After accounting for payments and market value differences, red cards and penalty kicks in favor are associated with a positive sign, while those against are associated with a negative sign.

In summary, we demonstrated earlier that BCF received more red cards and penalties in favor and fewer against. These variables, as suggested by the probit analysis, play a significant role in determining victory. Therefore, the analysis implies that the Negreira case presents an interesting potential case of corruption.

Table 7. Probit results

VARIABLES	(1)	(2)
	LaLiga (all teams)	
	04/05-21/22	05/06-21/22
	Win	
Payments	0.424*** (0.105)	0.423*** (0.105)
Home Game	0.533*** (0.0239)	0.507*** (0.0246)
Mkt Value Difference	1.63e-09***	1.70e-09***

	(6.15e-11)	(6.26e-11)
Yellow Cards Against	-0.00841 (0.00781)	-0.0261*** (0.00842)
Yellow Cards in Favor	-0.0128* (0.00767)	0.00270 (0.00828)
Red Cards Against	-0.424*** (0.0358)	-0.413*** (0.0369)
Red Cards in Favor	0.390*** (0.0323)	0.383*** (0.0333)
Penalty Kicks in Favor	0.317*** (0.0308)	0.312*** (0.0315)
Penalty Kicks Against	-0.212*** (0.0331)	-0.204*** (0.0337)
Fouls Against		0.0202*** (0.00280)
Fouls in Favor		-0.0166*** (0.00278)
Constant	-0.644*** (0.0382)	-0.675*** (0.0585)
<i>n</i>	13,680	12,920

Note: This table shows the estimates of equation (1) where the dependent variable is the probability to win the match. The control variables include: home advantage, quality, cards, penalty kicks, fouls both for and against, and whether the team paid Negreira or not. Columns 1 and 2 report results for all teams that played in LaLiga between the seasons 2004/05-2021/22. Column 1 omits fouls as a control to extend the analysis period due to data limitations. *, **, and *** represent the level of significance at 10%, 5%, and 1%, respectively.

8. FINAL REMARKS

This study examines the relationship between payments made by BFC to the societies of Negreira while he was vice president of the Spanish Technical Committee of Referees and the goal difference of a team in matches in the Spanish Football Premier Division, even after controlling for quality. Through an econometric analysis of the available data, we have found that the payments are associated with a positive goal difference for the team and therefore with its victory. While the results do not allow for establishing whether the payments had a causal effect on the match outcome, they represent an advancement in the specialized literature. This is because quantitative techniques are adopted to analyze the existence of a correlation between bribes and competitive success.

This work emphasizes the need to await the findings and results of the investigations by the Spanish Prosecutor's Office and Tax Agency to gain a deeper

understanding of the nature of the payments from BFC to Negreira. If applicable, it aims to understand the mechanisms through which they influenced the results. Simultaneously, it underscores the need to investigate whether other teams and years should be considered. Finally, based on this, it advocates for a process of reforming the institutions of Spanish football with the utmost emphasis on fair play, transparency, and sportsmanship.

The findings of this study highlight the importance of having an impartial refereeing body. Otherwise, conditions are created that undermine the fundamental principles of fair play. Consequently, fan trust is eroded, the credibility of the sport is compromised, and the integrity of competitive results is jeopardized. This may lead to teams unjustly winning competitions and, therefore, their economic rewards. It can also lead to other teams facing relegation when it was not warranted, with respective impacts on the club's finances and personnel.

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