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Research article

Scientific method for assessing "Real Madrid DNA": merely a catchy journalistic term or reality?

Adolfo Maza*

Department of Economics, Universidad de Cantabria, Santander, Spain

* **Correspondence:** Email: mazaaj@unican.es.

Abstract: The purpose of this study was to evaluate whether the frequent references to "Real Madrid DNA", when a team comes from behind in the last minutes of a match, could be understood as merely a journalistic surrogate for truth or having simply degenerated into a catchy phrase without much meaning. We took, as a case study, clubs playing in the top division of the Spanish league between the 2010–2011 and 2021-2022 seasons, resulting in an unbalanced panel with 34 clubs that played at least one season in that category. As for the methodology, a variable was created to measure the percentage of times a club comes from behind in the last minutes of a match and explained using a model that included the economic power of the club, other match-specific variables, and fixed effects to assess whether a differentiating effect for Real Madrid (RM) was detected. Concerning empirical findings, it can be asserted that RM's undoubted ability to improve its results in the final stretch of matches comes mainly from money but also from something else hard to explain. Put differently, finding support to RM having something special, which we can refer to as its DNA. RM's fixed effect is not only positive and different from zero but also higher than any other team. Indeed, it differs from the remaining ones from a statistical point of view.

Keywords: Real Madrid DNA; comeback; economic power; mental strength; Spanish league

JEL Codes: C23, J30, L25, L83, Z20

Abbreviations: RM: Real Madrid C.F.; H: Hypothesis.

1. Introduction

The study of sports competitions in general or the performances of certain clubs/teams in particular has been capturing the attention of researchers for several decades, who have adopted a multidisciplinary approach. This undoubtedly relates both to the increasing availability of disaggregated data and to the importance of the sports industry. From an economic perspective, Dimitrov et al. (2006) estimated that the sports industry accounts for 3.7% of the gross domestic product and 5.4% of employment in the European Union.

It goes without saying, however, that not all sports should be put in the same basket. In this regard, there is no doubt that football/soccer is one of the most important, if not the most important sport in the sports industry. From an economic point of view, we assist amazed at the continuous increase in TV rights, far outperforming those of other sports. In a more social perspective, it is sufficient to point out that the television audience for the final of the latest World Cup in Qatar was, according to FIFA, more than 1.5 billion people. Indeed, the relevance of football is such that it has even been used as an indicator of social development by leading researchers (Gásquez and Royuela, 2014; Royuela and Gásquez, 2019).

Against this backdrop, there have been many articles dealing with the success of football clubs and its determinants (see, e.g., Osso and Szymansky, 1991; Szymanski and Smith, 1997; Forrest and Simmons, 2002; Szymanski, 2003; Garcia-del-Barrio and Szymanski, 2009; Carmichael et al., 2011; Fløtnes, 2011; Binder and Findlay, 2012; Frick, 2013; The Economist, 2014; Caruso et al., 2016; Llorca and Teste, 2016; Madsen et al., 2018; Royuela and Gásquez, 2019). These papers, in general, reveal the factors that drive/deter club performance. If a widespread conclusion can be obtained from this branch of literature is that, in the end, everything comes down to money; in other words, the financial capacity of a club to sign the players most valued by the market and to pay high wages is the core factor for success. To some extent related to the above, this paper is, to our knowledge, the first to address a more particular issue; the subject matter is not the general performance of a team but its ability to come back from behind in the last minutes of a match. In other words, we aim to see whether the financial size is the variable that explains the disparate capability of making comebacks or whether there may be something else. The paper is also distinctive, on the other hand, because of the focus on a specific team, Real Madrid C.F. (hereafter RM).[1]

Consequently, this paper attempts to fill a gap in the literature, which has paid no attention to a team's ability to make comebacks. It has a very clear motivation: although RM is universally known for being one of the leading sports organizations in the world (García, 2021), the club with the largest number of European Cups and having been voted the best club of the 20th century, it is also well known for its ability to come back to win, overcoming difficulties. So much so that there is often talk of "white DNA", the spiritual component that a player seems to acquire when they wear the RM white jersey. Our aim in this work is to identify, as far as possible, this unobservable component in order to assess whether it really exists or, as so often happens, whether this ability to prevail over complications is merely caused, once again, by money.[2]

[1] This club, given its importance, has been used as a research laboratory when dealing with different issues, but here it does not act as such since it is actually the case to be studied for the reasons given below.

[2] What we do dismiss from the outset is the argument that RM's comebacks are solely luck. As I myself argue when I hear that puerile reasoning, "Real Madrid are lucky, yes, lucky to have players such as Courtois and Benzema", I mean more than luck it is, at the very least, its financial capacity to have arguably the best goalkeeper in the world and the current Ballon d'Or, among others.

Many news items, facts, and circumstances could be argued to understand the motivation, and we believe the relevance, of this article. For instance, the anthem that was created after the tenth European Cup won by RM says, "History that you made, history to be made, because nobody resists, your desire to win". It is a sign of the ambition that is supposed to be attached to this club. A similar idea had long before been conveyed by Juanito, former RM player and emblem, when in 1986 he coined his famous sentence, much repeated since then, that "90 minutos en el Bernabéu son molto longos/90 minutes at the Bernabéu are very long".[3] Juanito said it after losing 2–0 to Inter Milan in Italy in the first leg of a UEFA Cup tie, warning one of the Inter players of what awaited them in the second leg. And his warning made sense: RM came from behind to win 3–0.

In addition, Gonzalo Higuaín, a former RM player, explained recently to Kun Agüero (a well-known former Manchester City player among others) why RM usually scores in the final minutes when necessary. This piece of news was released after the 2021–2022 Champions League, won by RM, and in which the team found itself on the ropes in several rounds but ended up mounting incredible comebacks with goals in the last minutes of the game as well as in the extra time. In this context, Higuaín talked about RM's mystique, which translates into goals in the dying moments of matches: "When it was my turn to play, they had that phrase that they don't seem to give so much importance to, which is 'Until the end, come on Real' and they make you believe it"; "It's like Kun said once when I was watching him when they drew against Manchester City, he said he saw that something was going to happen and as a player, you feel that. At the Bernabéu, you equalize in the 90th minute, and you feel you can win the match. Real Madrid has a unique DNA".

So, let us test it and see if the data confirm these inklings or leave them as mere lip service. In this paper, we are going to define the variable "Comeback", which will be computed for all clubs belonging to the top division of the Spanish league (known as La Liga) from the 2010–2011 season until the 2021–2022 season.[4] Once this variable has been constructed by reviewing all the matches of each of these seasons, the definition of which will be detailed later on, and provided that RM's greater comeback capacity is effectively supported by data, a model will be specified aiming to explain it. The model, which is estimated for all the clubs in the sample, includes variables that, in theory, could shed some light on a club's comeback capacity. The list of variables comprises, in line with the above, a proxy for the financial capacity of each club together with other potential factors referred to the situation of the match at play. In addition, team fixed effects (and also season ones) are considered in the model, so that they capture the idiosyncrasies of each club that are not explained by those variables. The idea is as follows: if RM's fixed effect is statistically different from the rest, we can say that there is something that differentiates this club—we could say its DNA. However, if there are no differences between RM's and the remaining teams' fixed effects once this set of explanatory variables is included, the results would not support the existence of the "white DNA".

The structure of the paper is as follows. In the second section, somewhat related literature is reviewed; as said, no previous paper explicitly addresses this topic. Subsequently, in the third section data sources are presented, as well as a descriptive analysis mainly focused on the variable "Comeback" that is specifically created for the paper; some information about differences in

[3] Bernabéu, Santiago Bernabéu to be precise, is the name of RM's stadium.

[4] We used data from the Spanish league for the study because it involves many more matches than the Champions League, so the results are more reliable. In the top division of the league there are 20 teams, which means 38 legs with 10 games each.

economic power between clubs is also provided. Additionally, the empirical model is set. The fourth section provides the estimation results as well as some comments. The last section presents the key conclusions of the paper.

2. Related work

As signified in the Introduction, as far as we know, no previous work has analyzed the spirit of comebacks in football, let alone quantitatively. There are, however, two branches of the sports literature that have certain concomitants with this article: on the one hand, the analysis of the success of football teams, as it evidently tends to be positively correlated with our study subject; on the other hand, the study of the ability to turn a match around that has been carried out concerning some individual sports such as tennis. The purpose of this section is to review, very briefly, these fields.

2.1. Study of football clubs' success

Although the literature on this topic is not profuse, the increasing data availability has led to the flourishing of a branch of sports economics that tries to explain the success of football clubs. A very concise summary of this emerging literature, mostly empirical, is shown in Table 1. We include the pioneering work of Osso and Szymanski (1991), which turned its attention to English teams and begins by writing "This article is about success and how to analyze it" (Osso and Szymanski, 1991, p. 113), the excellent article of Szymanski (2003) who, in the study of the design of contests, found a place for football (the four major leagues in Europe) and the nexus between success and resources, and the work of Royuela and Gásquez (2019) which focused, with a worldwide sample, on the effect of signing foreign players on the accomplishment of football clubs.

Before starting, it is worth bearing in mind some particular characteristics of this bunch of papers. First, several of them do not refer exclusively to football but compare it with other sports such as baseball, American football, and/or basketball. Second, some of these studies analyze both clubs and national football teams. Third, it should be noted that several of these papers do not focus on the study of success per se, while others mainly aim to explain the factors behind the level of development of clubs. Whatever the case, we have only extracted from these articles what we are interested in: potential factors explaining the success of football clubs.

Another point to notice before commenting concisely on these works is that the variable measuring success differs between them. Regarding this feature, some articles use the final position, or the percentage of points won by each club in the competition under analysis; in that case, given the high correlation between both variables, we believe the results do not crucially depend on this decision. However, some articles use the Elo rating,[5] which does not fit so well with the two previous ones and, therefore, could lead to different results.

[5] This indicator possesses several advantages over other alternative indicators of success, as explained in Gásquez and Royuela (2016).

Table 1. A review of papers dealing with clubs' success.

Authors	Sample	Period	Approach	Main findings (considering the aim of the present paper)
Osso & Szymanski (1991)	Liverpool in comparison to other English clubs	1970–1971 to 1989–1990	Descriptive statistics and some linear regressions	A positive relationship between team expenditure (player's wages, transfers) and the position of the club. The previous link is stronger than the one with goalscoring performance of players and the weight of home-grown players. Liverpool's success is unique and is due to its club structure
Szymanski & Smith (1997)	Forty-eight clubs in the English league	1974–1975 to 1989–1990	A model with club owners maximizing profits subject to production constraints. Several equations are estimated	A strong pay–performance relationship. Coordination failures that cause the decline of the English League should be corrected in the Premier League
Forrest & Simmons (2002)	Clubs in the Italian, German, and English leagues	1995–1996 (Italy) 1998–1999 and 1999–2000 (Germany) 1977–1978 to 1999–2000 (England)	Regression equations to get estimated elasticities of points ratio with respect to the wage bill	A well-determined team salary–performance relationship, especially in the Italian and English cases
Szymanski (2003)	Clubs in the four leading football leagues in Europe: England, Italy, Germany, and Spain	1974–1975 to 1999–2000 (England) 1988–1989 to 1999–2000 (Italy) 1982–1983 to 1996–1997 (Germany) 1997–1998 to 2002–2003 (Spain)	Simple regression equations between the regular season winning percentage and the wage bill of a team relative to the average of the league	A fairly close correlation between success and relative wage bill, but with important differences between leagues: twice as high in the UK as in Spain
Frick (2005)	Clubs of the German league (Bundesliga)	1981–1982 to 2002–2003	Regression equations including nonlinear terms	Higher relative player salaries raise performance significantly. There is, however, a turning point from which the opposite happens. Besides, firing coaches is not a good decision

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Authors	Sample	Period	Approach	Main findings (considering the aim of the present paper)
Garcia-del-Barrio & Szymanski (2009)	Clubs in the top two divisions of the Spanish and English leagues (La Liga and Premier League, respectively)	1994–1995 to 2003–2004	Revenue equation and performance equation to find evidence in favor of profit maximization or win maximization	A causal effect of wage expenditures on success. As for the goal, win maximization prevails over profit maximization
Kuper & Szymanski (2009)	Clubs in the Premier League	1998–1999 to 2007–2008	Regression analysis	Almost 90% of the variation in the average league position is explained by wage expenditure
Carmichael et al. (2011)	Clubs in the Premier League	1998–1999 to 2004–2005	Empirical model based on the estimation of three behavioral equations	Wage expenditure systematically reflects players' skills and performance and is therefore a key determinant of success. The team's revenue is also directly related to its success. Feedback effects maintain differences between clubs
Fløtnes (2011)	Five clubs of the league Norwegian	2006–2007 to 2010–2011	Correlations and the estimation of several regression equations	The most important factors for the success of clubs are players' salaries and access to financial resources. The most successful clubs tend to be located in the most populated cities
Binder & Findlay (2012)	Clubs of 11 sample countries: Germany, England, Spain, France, Italy, the Netherlands, Scotland, Portugal, Belgium, Sweden, Norway, Denmark, Austria, and Greece	1983–1984 to 2006–2007	Descriptive analysis of competitive equilibrium before and after the Bosman law by means of variances in points won and a league dominance indicator	No significant change in the success of clubs after the Bosman ruling
Frick (2013)	Clubs of the German league (Bundesliga), although the author compares them with other 13 European leagues	2002–2003 to 2010–2011	By using two new datasets that the author compiled, simple correlations and regression equations are used	The relation pay–performance is positively significant. The reform of the German league during the sample period does not affect the result

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Authors	Sample	Period	Approach	Main findings (considering the aim of the present paper)
The Economist (2014)	Thirty-four clubs playing in the Premier League	1996–1997 to 2013–2014	Correlations	A strong link between the amount spent on wages and the points won
Caruso et al. (2016)	Twenty-three clubs in the Italian league (Serie A)	2007–2008 to 2015–2016	Regressions using three measures of diversity and concentration in wage levels as independent variables, apart from others such as relative wages	The only variable that is always significant regardless of the specification of the model is relative wages. Additionally, diversity in payroll is associated with lower club performance
Llorca & Teste (2016)	Thirty-six clubs in the French league (La Ligue 1)	2006–2006 to 2014–2015	Estimation of a model that includes the wage bill as an independent variable, plus some dummy variables	The wage bill is directly related to the success of a club
Madsen et al. (2018)	Forty-four clubs in the Norwegian and Swedish leagues (two top divisions)	2010–2011 to 2014–2015	Correlations	A significant correlation between wage expenditures and sporting success, especially in Sweden. Also, a significant correlation between wage expenditures and spectator attendance
Royuela & Gásquez (2019)	A comprehensive data set of international clubs all over the world. Specifically, 971 clubs from the First Divisions of 71 Leagues	2015–2016	Estimation of a model with, among others, economic resources of the club and portion of foreign players as independent variables	The main variable explaining success is the financial capacity of each club. Having more foreign players has no effect

Having uttered these preliminary remarks, what are the general conclusions we can draw from this review of the literature? In a nutshell, given that Table 1 contains the information of most interest to us, it should be first noted that the studies vary in terms of the club samples used and their time span, although those from the main European leagues indeed predominate. Concerning the methodology employed, however, there is a certain degree of unanimity, as these articles, when it comes to exploring success, tend to estimate regression models (or, in some cases, simple statistical correlations) in which the variable proxying success is explained with respect to a battery of explanatory variables. Finally, as far as the results are concerned, we can state that they all agree on one premise: the success of a team depends to a large extent on the salary of its players. Obviously, this is due to the relationship that exists between player salary and player footballing ability and market value. In fact, the role played

by this variable is so preponderant that it overrides that of others included in some of the works listed in the table, such as age and foreign player transfers.[6]

2.2. Ability to come from behind/resilience

Although the literature on the influence of psychological momentum in development is very vast, it primarily tries to discern whether it is more likely to do well when you are doing well (hence, because of its analogy with basketball, it is also dubbed the "hot hand" effect).[7] As recently indicated by Morgulev (2023, p. 1) in the first sentence of her article, "The term momentum (or hot hand) is widely used by researchers from various disciplines when addressing streakiness". It would not strictly apply, therefore, to our specific topic case which, as indicated before, is quite particular.

Accordingly, the second group of studies that we want to include refers specifically to the analysis of the possibility of a comeback. These works, which are not very abundant, are more directly related to the present paper as they examine the capacity of overcoming a situation when lagging behind. It becomes quickly apparent when delving into this literature that papers are substantially focused on individual sports, especially tennis. The reason is that tennis is a particularly suitable sport for assessing the existence of links between emotional factors and performance; as is often pointed out, what differentiates exceptional players from the rest is their ability to cope with moments of difficulty. This being so, the articles by Ransom and Weinberg (1985), Banko et al. (2016), Cohen-Zada et al. (2017), and De Paola and Scoppa (2017) use data from different tennis tournaments to assess responsiveness to setbacks, paying specific attention to the gender gap. From a methodological point of view, they use regression equations that, for example, evaluate the likelihood of winning the second set after losing the first. More than their results, what is relevant for our paper is the certain analogy between their approach and the one we are going to carry out here, since we will define a "situation of difficulty" (as is the loss of the first set in these works) and evaluate the ability to overcome it (which would be equivalent to winning the second set). Apart from articles using tennis as a sort of laboratory, we would also like to point out that similar approaches have been applied to golf (Rosenqvist, 2019; Baker and McHale, 2022) and even to team sports such as beach volleyball (Sonnabend, 2020) or hockey (Steeger et al. 2021), among others.

Finally, given its relationship with football, we would like to mention a unique paper by Apesteguia and Palacios-Huerta (2010). Peculiarly, they analyze penalty shootouts. They show that being the first to take the kick increases the probability of winning, since taking the second kick makes the situation of being behind more likely and puts players under extra psychological pressure.[8] Our paper, however, looks at matches unfold and tries to explain why RM seems to be more able to pick themselves up when behind/not winning the match.

[6] The relationship between wage bills and the performance of teams does not tend to be so strong for other sports such as baseball and American football. One potential explanation comes from the lack of competitiveness of their markets due to regulations such as salary caps, luxury taxes, and drafts.

[7] A nice example is the work of Morgulev, Azar and Bar-Elia (2019), in which NBA games with overtime are analyzed, and where it is tested if having equalized the game coming from behind acts as a catalyst for momentum.

[8] This result is not, however, unanimous (e.g., Arrondel et al., 2019).

3. Materials and methods

3.1. Data

Prior to presenting the approach this paper is going to follow, there is a crucial point regarding data that has to be solved. The article addresses the capacity of RM, in comparison with the remaining Spanish clubs of the top division, to come from behind as the match nears its end (that aforementioned spirit of "until the end, Real"). Therefore, a variable is needed to capture that capability, not only for RM but for all clubs, and as said we will denote it by "Comeback".

In this respect, the variable we define should meet the following premises: it must capture the competence of a club to score goals in the last minutes of each match, and it has to capture those cases that are significant, i.e., in which as a result of those goals, points are gained with respect to the previous situation. Needless to say, scoring when the game is already over is not in keeping with the purpose of this work; our study tries to go beyond goal-scoring capacity.

Thus, more precisely, the variable "Comeback" is defined as the percentage of occasions in which a club reaches the 75th minute of a match with a draw or trailing by one goal (these represent the possible cases) and finishes the match with some extra points compared to the situation in the 75th minute (favorable cases).[9] Put differently, if you draw and end up winning, and if you lose and end up drawing or winning.[10] There are, however, some clarifications to be made: 1) If the difference was two or more goals, and the club still manages to draw or win, it is included in the computation of the variable; 2) If in the 75th minute the team is winning or drawing, and after the 75th minute the other team scores, but our team ends up equalizing the match or wins it, it is also included; 3) There are even less likely situations, in which, for example, one club is winning by 1–0 in the 75th minute, the other club comes back to 1–2, and the match ends 2–2; in this case, a comeback is scored for both. Although it is clear that all these cases, or comparable ones[11], imply an upward bias in the value of the variable to be explained (since if the comeback did not happen, it would not be included among the possible cases), there is no doubt that they must be incorporated as very representative of what we are seeking to unravel: the ability of a club to get up in the last minutes.[12] All data corresponding to this variable came from Bdfutbol databank, a comprehensive independent website for the compilation of football data and statistics (https://www.bdfutbol.com/es/index.html). As a sign of the reliability of this source, many articles have made use of its information: Calero and del Corral (2014), Marcén (2016), Triguero-Ruiz and Avila-Cano (2018), and Cabras and Tena (2023), to name a few.

Having defined and built the critical variable of the paper, some summary statistics are reported. It is worth starting the number of comeback opportunities that have appeared during the analyzed

[9] Admittedly, where you draw the line on what is considered "final minutes" is an ad-hoc decision. Here, we consider that the injury time, for example, is so short that the number of comebacks would be very small. The 80th minute, however, could have been another option. For that case, the estimates were repeated, and the results were roughly the same.

[10] In quite a few cases, we do not really refer to comebacks as such, since according to our definition (for the sake of not having so little data), it is enough to improve the result. Therefore, we could have called the dependent variable "Improvement", but we have kept the name "Comeback" in a broad sense, i.e., when a team improves the final score in the last minutes of the match.

[11] As can be imagined, the casuistry after analyzing so many matches is very varied.

[12] However, they have been excluded and the results, given their small number, remain largely unchanged.

seasons. In this respect, of the 9120 matches played, 4571 reached the 75th minute with a chance for one of the two teams to win a comeback. The average number of possible cases per team per season ranged from 16.6 in the 2010–2011 season to 22.0 in the 2020–2021 season. The individualized information per team is given in Table 2. Specifically, the total number of comeback opportunities, the average per season, and the number of seasons played in the top division are given. Focusing our comments on RM, it has had 153 occasions over the 12 analyzed seasons, giving it an average of almost 13 comeback chances per season.

Table 2. Summary statistics for Comeback opportunities.

Team	Total	Mean	Number of seasons	Team	Total	Mean	Number of seasons
Alavés	125	20.8	6	Huelva	54	27.0	2
Almería	60	20.0	3	Las Palmas	59	19.7	3
Athletic de	224	18.7	12	Leganés	87	21.8	4
Atlético Madrid	174	14.5	12	Levante	241	21.9	11
Barcelona	141	11.8	12	Mallorca	101	20.2	5
Betis	213	21.3	10	Málaga	156	19.5	8
Cádiz	44	22.0	2	Osasuna	166	20.8	8
Celta	207	20.7	10	Racing	40	20.0	2
Córdoba	20	20.0	1	Rayo Vallecano	121	17.3	7
Deportivo	127	21.2	6	Real Madrid	153	12.8	12
Eibar	149	21.3	7	Real Sociedad	230	19.2	12
Elche	83	20.8	4	Sevilla	205	17.1	12
Español	239	21.7	11	Sporting	82	20.5	4
Getafe	232	21.1	11	Valencia	239	19.9	12
Girona	37	18.5	2	Valladolid	108	21.6	5
Granada	180	20.0	9	Villarreal	200	18.2	11
Hércules	18	18.0	1	Zaragoza	56	18.7	3

If we turn to the value of the Comeback variable as outlined, Figure 1 shows its evolution for all the clubs that have played in the top division of the Spanish league from the 2010–2011 season to the 2021–2022 season. Several results are striking: 1) RM effectively stands out from the rest, to the point that, in several seasons, it manages to improve more than half of the situations in which it reaches the 75th minute with the score level or a goal down (the value of 0.5 has been highlighted in the figure to facilitate comparisons); 2) Although to a lesser extent, F.C. Barcelona also highlights as a club in which the variable takes relatively high values; 3) Whatever the team reviewed, no significant trend can be detected in the data, but rather they are quite volatile; this is to be expected anyway since it reflects the inherent random nature of the variable under scrutiny; 4) Differences between clubs are, in any case, very remarkable.

Focusing now on RM, simple t-tests are performed on the equality of means between this team and the rest (only in cases where the number of degrees of freedom for the computation is at least greater than 3). As suggested graphically in Figure 1, in almost all cases we find a statistically significant difference. The single case where we do not attain a significant difference is in the Real Madrid–Barcelona comparison. This analysis, although simple, gives us some clues about subsequent results, as we will see below.

Figure 1. Comeback variable. Evolution throughout the sample period for all clubs.

As for the rest of the data used in this work, according to its motivation, there is at least one other key variable. As mentioned, we are trying to assess whether RM's distinguished ability to stage comebacks, already verified by Figure 1, is based on some kind of DNA or, ultimately, on money. Therefore, we need a variable capturing, in a single word, the economic power/financial capacity of each club. In this sense, we employ, as in Royuela and Gásquez (2019), the market value as a proxy for the economic power (or salaries, or wealth) of Spanish clubs; specifically, the average market value of players collected from the Transfermarkt data source, so widely used in the literature that, in this case, no evidence of its reliability needs to be provided (https://www.transfermarkt.es/laliga/startseite/wettbewerb/ES1/plus). Furthermore, this variable also captures club skills, since the more expensive the player (especially the superstars), the better their qualities will be, at least in theory (e.g., Pérez, 2021). Another advantage of the market value variable over others, such as Elo ratings, for the model specified below, is that there are no expected problems of endogeneity and no identification issues.

Figure 2 displays the market value variable for each club of the sample (mean of the seasons 2010–2011 to 2021–2022). As can be seen, RM and, even to a greater extent, Barcelona show up as the wealthiest clubs in the league. Atletico de Madrid is, no doubt, the third in the ranking but at a great distance, being Valencia the fourth one. After that, you have a list made up of four clubs (Sevilla, Real Sociedad, Villarreal, and Athletic), and then the remaining ones exhibit no notable differences among them.

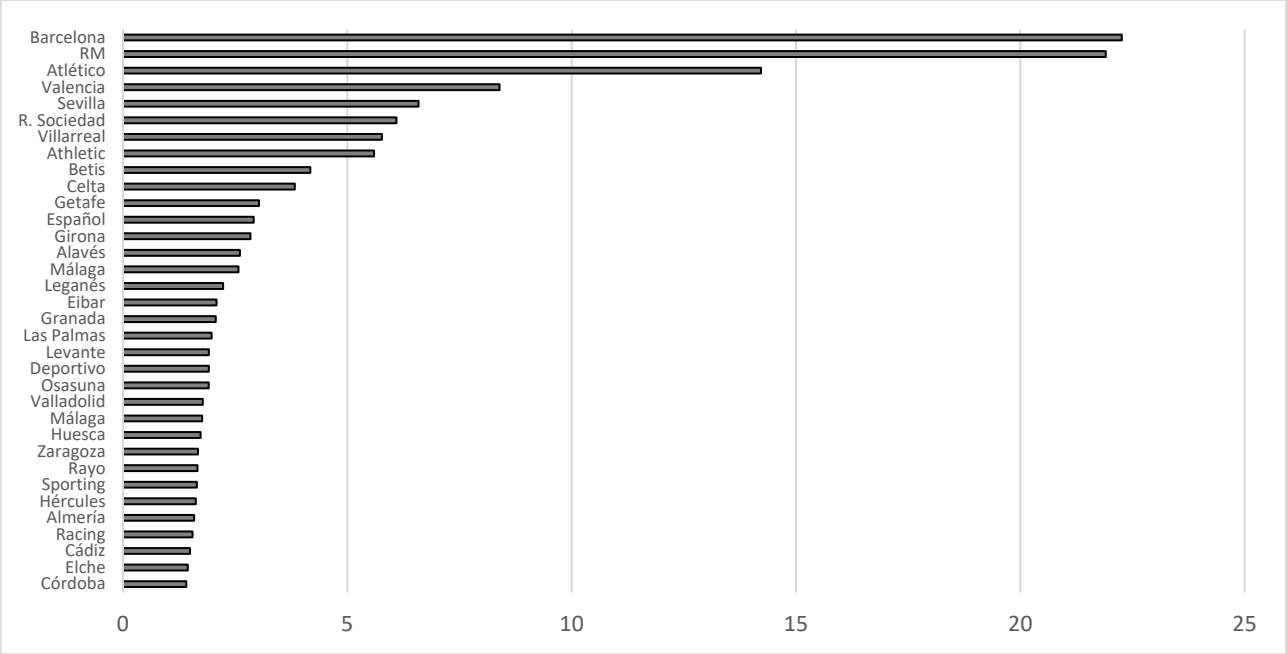

Figure 2. Average market value of players (million euros).

Apart from the two primary variables hitherto mentioned, there are others that, as we will see in the next section, are included in the proposed model. In all cases, data came from the Bdfutbol databank.

3.2. Approach

In this section, we describe the model that is going to be used to try to explain the capacity of making comebacks. Specifically, it is as follows:

$$Comeback_{it} = \beta_1 MV_{it} + \beta_2 A_{it} + \beta_3 H_{it} + \beta_4 NP_{it} + \beta_5 RP_{it} + \beta_6 L_{it} + \beta_7 FP_{it} + \alpha_i + \gamma_t + \varepsilon_{it} \quad (1)$$

where $Comeback_{it}$ refers to the produced dependent variable for club *i* at time *t* explained above. As it is apparent, we produce an unbalanced panel with, in this case, 34 clubs that were part of the top division of the Spanish league in some year(s) (only 7 clubs remained in that division from the 2010–2011 season to the 2021–2022 season). Within this model, we include season fixed effects (γ_t), which try to capture the particularities, if any, of each season, as well as team fixed effects (α_i), which, as noted and discussed in more detail at the end of this section, are the key to this study. Additionally, the independent variables and proposed hypotheses, drawn in some cases from the previous section and in others exclusively linked to the model's dependent variable created ad-hoc, are:

- MV denotes the market value (in logs), also discussed above. In line with previous comments, the hypothesis to be evaluated is:

H1: The higher the market value of a club, the greater the chance of a comeback. So, a positive coefficient β_1 is expected.

- A refers to the mean age of each club's players (in logs). More specifically, as this variable is considered a proxy for physical condition, the mean age is corrected by the number of changes

that each club makes in each match after the 75th minute;[13] it is performed by taking away one year per change. The hypothesis to be explored reads as follows:

H2: The lower the average age of the club's players, the greater the chance of a comeback. So, a negative coefficient β_2 is expected.

- H refers to the location of the match (home or away). It is defined as the percentage of possible situations in which each club is playing at home. Here, as fans' attendance is considered an advantage for the home club (e.g., Martins et al., 2023; Leite and Silva, 2023), we guess the likelihood of a comeback is higher if the club receives the support of its fans. In fact, regarding RM and in line with some previous comments, the sentence "miedo escénico/stage fright" became famous in the eighties and concerns RM's stadium and several incredible comebacks that took place there.[14] Therefore, the hypothesis is:

H3: The higher the portion of situations you have at home, the greater the chance of a comeback. So, a positive coefficient β_3 is expected.

- NP refers to the number of players in comparison with the other club, meaning the computation of sending-offs. Hence, we define this variable as follows: if one (or two) of the other club's player(s) is (are) kicked out after minute 75, the club for which the variable is computed attains a value of 1(2), whereas if the player(s) sent off is from this club it reaches a value of -1(-2), receiving a value of 0 if there are not any red cards.[15] The idea is that with numerical superiority (inferiority) a comeback is more (less) likely, in harmony with the results obtained by Badiella et al. (2023). In this manner, the consequent hypothesis reads:

H4: If the opposing team suffers a sending-off, a club is more likely to come from behind, and vice versa. Therefore, a positive coefficient β_4 is expected.

- RP denotes the ranking position of the rival (in logs). It is strictly defined like the number the rival club had in the standings the leg before the match took place (from 1 to 20). Theoretically, it has to do with the quality of the opponent a club is playing against (see e.g., Bilek and Ulas, 2019). Hence, the hypothesis is:

H5: The worse the opponent's position in the standings, the better the chances of a comeback. So, a positive sign for β_5 is expected.

- L refers to the number of the leg in which the match takes place (in logs). If anything, the idea supporting the inclusion of this variable is that the later the match is played the more important it is in terms of the final result of the league, so the greater the effort players make to come from behind (e.g., Lei and Humphreys, 2013). Luis Aragonés, a legendary Spanish coach, always said: "the important thing is to be in the fight for the last ten legs". Accordingly, the hypothesis is:

H6: The later the leg, the greater the chances of a comeback. So, a positive sign for β_6 is expected.

- FP refers to the percentage of foreign players in the club. There are some papers in the literature

[13] Two clarifications on the inclusion of this variable seem pertinent: 1) If the change is made e.g., at half-time, the physical advantage in the last part of the match would not be very decisive; 2) although a change may lead to a change of playing system, Bucciol et al. (2019) conclude that, especially for top clubs, such changes do not lead to improved results, so we do not want to give it that "meaning" and focus its effect on physical issues.

[14] RM, as indicated by Rodriguez-Pomeda et al. (2017), has designed a business model based on its supporters' emotions, which indeed was key to weathering the Covid-19 crisis far better than most other clubs (Baena, 2023).

[15] Although this is the case where the definition raised the most doubts, most player dismissals occur in the final stretch of the match, and this is when they would have the most effect on the dependent variable of the model.

trying to assess if signing foreign players increases a club's success (e.g., Royuela and Gásquez, 2019). In the same vein, we include this variable, so that the hypothesis to be tested turns out to be:
H7: The higher the portion of foreign players, the greater the chances of a comeback. So, a positive sign for β_7 is expected.

Apart from the inclusion of this battery of independent variables,[16] the instrumental part of our model, due to the purpose of the paper, rests in the estimation of team fixed effects α_i (Equation 1). As briefly indicated in the Introduction, the reasoning is that, once you have explained, to the extent that it is possible, the dependent variable from alternative viewpoints (hypotheses), there is surely something you cannot explain and that is linked to the idiosyncrasies of each club. This unobservable feature is precisely captured by these fixed effects. Therefore, once the estimation is done, we will focus on RM's fixed effect from two different perspectives: on the one hand, by checking if it is positive and statistically different from zero; on the other, by checking if it is statistically different from the others. In the first case, if so, we could state there is something that, for RM, you cannot explain either by money or any other of the factors included in the model. In the second case, if it is different (and higher) than all the others, we could assert it is the only club showing a somewhat distinctive feature that makes it particularly capable of overpowering tough situations. So, the last hypotheses are:
H8a: Real Madrid's fixed effect turns out to be positive and statistically significant.
H8b: Real Madrid's fixed effect is statistically different, one-to-one, from the remaining ones.

4. Results and discussion

The present section tackles the results obtained. It is meaningful, however, to make some comments before coming to the main goal of this section. First, Table 3 reports the correlation matrix of the variables included in the model. As can be observed, correlation coefficients between independent variables are relatively low, so there are no significant problems of multicollinearity. Second, as for serial correlation, we ran the Wooldridge test, and in accordance with the idea conveyed by a simple glance at Figure 1, we can affirm there are no autocorrelation problems. Third, regarding heteroskedasticity, the results of the modified Wald test reveal that variability tends to be different across observations, which could affect the results. Accordingly, we checked the robustness of our results by employing a feasible GLS estimator with heteroskedastic but uncorrelated errors across panels. The most striking feature here is that there are team fixed effects that become significant when the heteroscedasticity problem is addressed (Atletico de Madrid, Celta, Sevilla, Valencia, Betis, Levante, and Malaga on the positive side, Girona on the negative one); in any case, the main results of the paper, referring to the RM DNA, do not vary significantly. Finally, endogeneity was also tested by regressing the residuals to independent variables, without presenting any statistical significance (at a 10% level of significance); therefore, we can state, as expected, that there are no endogeneity problems in the econometric analysis.

[16] No doubt, additional variables could have been included, as the apt comments of the two reviewers pointed out. Due to unavailability of data, variables such as ball positions in the final part of the match (which could provide some information on tactical issues) and injured players in each team at the time of the match are not included. Variables such as having superstars or great coaches, we believe, are captured by the market value of the team. Finally, we checked whether the added time in Real Madrid's matches was higher than the average of the rest, and there is no evidence to support that result which, as one reviewer indicated, could have increased the likelihood of a comeback by RM.

Table 3. Correlation matrix.

	Comeback	*MV*	*A*	*H*	*NP*	*RP*	*L*	*FP*
Comeback	1.0000							
Market value	0.5375	1.0000						
Age	−0.2171	−0.3848	1.0000					
Home	−0.1397	−0.4166	0.0695	1.0000				
Number of players	0.1105	0.1125	−0.1074	0.0517	1.0000			
Rival position	−0.0485	−0.2680	0.1456	0.0448	−0.1103	1.0000		
Leg	−0.0132	0.0442	−0.0002	−0.0418	0.0113	−0.1610	1.0000	
Foreign players	0.2247	0.3142	−0.1431	−0.1545	−0.0207	−0.0383	−0.1278	1.0000

Turning now to the model results, Table 4 shows that the goodness of fit is, especially considering the intrinsic haphazard nature of our dependent variable, satisfactory; around 50% of the observed variability of the dependent variable "Comeback" can be explained by the model. Thus, starting with hypotheses 1–7, referring to the independent variables, the results confirm that market value is a factor behind a club's comeback ability (H1). Put differently, the financial capacity of clubs increases their chances of coming back from behind. This result is somewhat in line with the main finding of the branch of literature addressing the determinants of team success, reviewed above, despite the topic of this paper being quite different. Similarly, evidence supports the idea that playing at home makes it easier to mount a comeback (H3), which could be considered new proof in favor of the existence of home advantage. Besides, evidence suggests that it is even more likely to get back in the match when the opponent is in one of the lowest positions in the standings (H5); in a way, this result could be tentatively explained by a certain arrogance or feeling of superiority of the RM players, in the sense that the worse the position of the rival team is, the less effort they show at the beginning of the match, and only in the final part of the match do they react.

The rest of the hypotheses tested, such as the role of age, situations of numerical difference, how incipient or advanced the league is, and the percentage of foreign players, are not supported by our analysis. Potential as well as tentative reasons behind these results could be that:

1. Age does not actually work as a good proxy for the physical condition of the team and, as a referee correctly pointed out, age also means experience in making comebacks, so the two effects could be balanced out;
2. The number of sending-offs is not representative enough to make a difference;
3. The leg in which the match is played is just as important for the club that wants to come back as it is for the club that is defending the result, so that effect is offset;
4. Foreign players are no longer decisive when it comes to the comeback.

In fact, when dealing with the problems of heteroskedasticity in the data (right-hand side of the table) the results convey the opposite idea: if the club involved had many foreigners, it would be less likely to turn the result of the match around; we could say our findings are in line with the greater love for the team of home-grown players.

Table 4. Estimation results.

	OLS		GLS with heteroskedasticity	
	Coefficient	t-student	Coefficient	t-student
Market value	0.038*	1.66	0.025*	1.77
Age	0.101	0.47	0.056	0.34
Home	0.218***	2.75	0.154**	2.22
Number of players	0.071	1.18	0.067	1.38
Rival position	0.114*	1.80	0.081	1.63
Leg	0.016	0.25	0.030	0.54
Foreign players	−0.131	−1.53	−0.156**	−2.33
Almería	−0.047	−0.67	−0.034	−1.00
Athletic de Bilbao	−0.055	−0.92	−0.053	−1.32
Atlético Madrid	0.094	1.44	0.112**	2.34
Barcelona	0.195***	2.68	0.214***	4.11
Betis	0.069	1.35	0.073*	1.85
Cádiz	−0.012	−0.15	−0.005	−0.13
Celta	0.068	1.33	0.072**	2.07
Córdoba	−0.142	−1.33	(omitted)	
Deportivo Coruña	−0.021	−0.37	−0.019	−0.51
Eibar	−0.033	−0.59	−0.039	−1.06
Elche	−0.004	−0.06	−0.006	−0.15
Español	0.024	0.48	0.021	0.69
Getafe	0.007	0.13	0.009	0.27
Girona	−0.130	−1.63	−0.135***	−4.32
Granada	0.051	0.95	0.056	1.51
Hércules	−0.135	−1.24	(omitted)	
Huelva	−0.059	−0.73	−0.061	−0.89
Las Palmas	−0.025	−0.36	−0.027	−0.82
Leganés	0.044	0.71	0.036	1.11
Levante	0.053	1.05	0.050*	1.69
Mallorca	0.038	0.65	0.032	0.84
Málaga	0.088	1.52	0.096**	2.20
Osasuna	0.014	0.25	0.012	0.27
Racing Santander	0.056	0.70	0.054	0.88
Rayo Vallecano	0.019	0.35	0.019	0.42
Real Madrid	0.250***	3.42	0.274***	5.17
Real Sociedad	0.004	0.06	0.010	0.30
Sevilla	0.062	1.11	0.075*	1.71
Sporting	0.018	0.29	0.016	0.36
Valencia	0.092	1.56	0.106**	2.60
Valladolid	0.030	0.51	0.023	0.74
Villarreal	0.006	0.11	0.010	0.26
Zaragoza	0.035	0.50	0.041	0.53
Observations	240		240	
R^2	0.503		0.485	

Notes: The dependent variable is the one that has been constructed expressly for this work, named $Comeback$; OLS = ordinary least squares; GLS = generalized least squares. $*\rho < 0.1$; $**\rho < 0.05$; $***\rho < 0.01$;

omitted coefficients due to collinearity; the R-squared included for GLS is only an approximation of goodness-of-fit, as it is not necessarily bounded between 0 and 1 and does not represent the total percentage of variation in the dependent variable explained by the model. Season fixed effects are also included, although none are statistically significant.

Moving to the study of fixed effects (bottom part of Table 4), we can respond to the key question of this paper: is there something special about RM? Well, the answer is basically yes. The fixed effect stands out from the rest, being positive and statistically significant (H8a). We must conclude, therefore, that there is something idiosyncratic to only RM that, once the potential factors that can explain the ability of a club to bounce back are included, makes it resilient in the face of difficulties. However, when comparing with the rest of the clubs, we observe that, although RM's fixed effect is the largest of all and differs statistically from almost all the others, there is one exception: FC Barcelona. In other words, there is some doubt about the fulfilment of the last hypothesis (H8b). To this must be added the fact that Barcelona is RM's major competitor in the league and precisely the only club that surpasses it in market value, which may suggest, although it is bold to do so, that economic potential spreads its nets beyond market value. In any event, Barcelona's fixed effect, apart from being lower, does not differ statistically from some others, which, as indicated, is the case with RM.

In summary, there is clear evidence in favor of H8a, while H8b is only partially fulfilled since it seems that the RM's capacity to get over difficult situations in the last minutes of a match is not statistically different from Barcelona's. For that reason, but also because it is always pertinent, we decided to run some additional estimations as a way of testing the robustness of our findings (available upon request). On the one hand, it should be noted that results presented in Table 4 have proven to be very robust when the model was re-estimated with only the clubs that remained in the top division for at least half of the selected seasons (thus reducing the imbalance of the sample). The same happened when only the eight richest Spanish teams were included. In addition, as indicated before, the results are very similar when the reference variable is limited to comebacks after the 80th minute. Finally, and using information summarized in Table 2, the model was also re-estimated by weighted least squares, with the number of games with a chance of a comeback as weights, and again the results were essentially identical.

Alternatively, another robustness test, more focused on the time series rather than on the cross-section, offers different and quite remarkable results. The reason behind it is that, by focusing on RM, a club that should be, at least according to the budget, fighting to win the league, some of the seasons we included in the sample might be unrepresentative. We want to convey the straightforward idea that motivation is the main driver for the comeback and that in these seasons we are referring to, from RM's point of view, there was no motivation at all as the league champion was known beforehand; rather the other way around, there is plenty of evidence to suggest that when this situation happens, RM focuses on the Champions League (in practically every season analyzed, RM reached at least the semi-finals of Europe's top competition), leaving the Spanish league aside.

In this sense, there are in our timeframe four seasons (2012–2013, 2017–2018, 2018–2019, and 2021–2022) in which the difference between the first and second clubs in the final standings was more than 10 points. By way of example, in the 2012–2013 season, RM had no chance of winning the title from almost the outset (5 points behind Barcelona at leg 4, and 18 points behind at the halfway point of the season). Consequently, whether RM lost or won the league, the critical aspect is that in these seasons the champion was clearly known and assumed almost from the beginning, so matches lost

importance (see nice papers related to this issue published by Lei and Humphreys, 2013; Scelles et al., 2013). Therefore, we re-estimated the model without these seasons. The result is startling (Table 5): in this case, the fixed effect for RM is again higher than for Barcelona, but also statistically different (confirming H8b). This finding adds even more evidence about the different behavior of the white team in compromising situations.

Table 5. Estimation results (reduced sample since some seasons are not considered).

	OLS		GLS with heteroskedasticity	
	Coefficient	t-student	Coefficient	t-student
Market value	0.049*	1.78	0.030*	1.77
Age	0.012	0.04	−0.066	−0.34
Home	0.245***	2.64	0.223***	3.13
Number of players	0.090	1.14	0.088	1.46
Rival position	0.064	0.84	0.091*	1.92
Leg	−0.035	−0.46	−0.033	−0.57
Foreign players	−0.234**	−2.18	−0.233***	−3.20
Almería	−0.059	−0.74	−0.063	−1.52
Athletic de Bilbao	−0.104	−1.36	−0.090*	−1.86
Atlético Madrid	0.041	0.49	0.066	1.18
Barcelona	0.119	1.29	0.157**	2.59
Betis	0.010	0.14	0.011	0.23
Cádiz	−0.046	−0.40	(omitted)	
Celta	0.089	1.29	0.090**	2.18
Córdoba	−0.143	−1.26	(omitted)	
Deportivo Coruña	−0.022	−0.29	−0.023	−0.48
Eibar	−0.074	−1.03	−0.078*	−1.92
Elche	−0.045	−0.57	−0.057	−1.20
Español	0.017	0.26	0.011	0.26
Getafe	−0.010	−0.14	−0.014	−0.37
Girona	Not included		Not included	
Granada	0.053	0.76	0.046	1.09
Hércules	−0.143	−1.24	(omitted)	
Huelva	−0.178	−1.61	(omitted)	
Las Palmas	−0.028	−0.32	−0.026	−0.62
Leganés	0.047	0.54	0.042	1.25
Levante	0.022	0.33	0.013	0.36
Mallorca	−0.010	−0.13	−0.027	−0.78
Málaga	0.140*	1.82	0.141***	2.87
Osasuna	0.012	0.18	0.000	−0.01
Racing Santander	0.046	0.52	0.025	0.37
Rayo Vallecano	0.039	0.52	0.026	0.50
Real Madrid	0.280***	3.05	0.316***	5.17
Real Sociedad	−0.030	−0.43	−0.022	−0.52
Sevilla	0.043	0.59	0.055	0.95
Sporting	−0.003	−0.04	−0.012	−0.25
Valencia	0.110	1.46	0.124**	2.57

Continued on next page

	OLS		GLS with heteroskedasticity	
	Coefficient	t-student	Coefficient	t-student
Valladolid	0.005	0.06	−0.008	−0.23
Villarreal	−0.018	−0.25	−0.009	−0.20
Zaragoza	0.113	1.22	0.098	1.17
Observations	160		160	
R^2	0.580		0.537	

Notes: The dependent variable is the one that has been constructed expressly for this work, named $Comeback$; OLS = ordinary least squares; GLS = generalized least squares. $*\rho < 0.1$; $**\rho < 0.05$; $***\rho < 0.01$. Omitted coefficients due to collinearity; the R-squared included for GLS is only an approximation of goodness-of-fit, as it is not necessarily bounded between 0 and 1 and does not represent the total percentage of variation in the dependent variable explained by the model. Season fixed effects are also included, being negative and significant those corresponding to seasons 2015–2016, 2019–2020, and 2020–2021.

As for the remaining hypotheses, the change in the sample seems inappropriate for the reasons we have just explained. During these seasons, the rest of the clubs, apart from RM and Barcelona, were still fighting for their objectives. In any case, with these precautions in mind, when we look at the determinants of the comeback in general terms (topmost part of Table 5), the role performed by market value and playing at home is now also confirmed, while the negative influence of signing many foreign players is reinforced. The main novelty of the results is the positive influence of having some extra players late in the game; in other words, for the first time, we uncover some evidence to support H4.

5. Conclusions

This paper addresses a question that, to our knowledge, had not been previously studied in the literature but has long been present in the football world: RM DNA, myth or reality? Is RM's ability to come from behind in the dying minutes embedded in its DNA or is it simply a matter of money? It is definitely not a straightforward question. We tried to identify something that is accepted as inexplicable. As Manchester City Coach Pep Guardiola said after a comeback to win Premier League (three goals in five minutes against Aston Villa), "I called Real Madrid and gave me good advice (*smiling*)" … "Listen, no explanation for Madrid, no explanation for today. It's momentum". In this sense, it is important to point out that the methodology proposed in this paper (basically the creation of an ad-hoc dependent variable and the proposal of a model with the objective of explaining it as much as possible in order to subsequently evaluate the fixed effects of each club) could be used in many other contexts as long as the idiosyncrasy of a club, the specificities of a club with respect to the rest, can be identified in some way.

As highlighted in the paper, many previous works studied the success of a football team, and others expressly dealt with the resilience or ability to overcome adverse situations in a competition, most of them focused on tennis. This paper gathers some guidelines and conclusions from that literature to assess the determinants of a club's likelihood of a comeback, to finally focus on RM and assess whether there is something enigmatic surrounding this team. To be precise, we compute a specific variable capturing the chances of making a comeback when the match has not gone well for a club (an idea consistent with the literature on resilience) and explain it by estimating a model that includes as explanatory variables, apart from others, the economic potential (a unanimous conclusion of the works on the development of a club). In addition, fixed effects are considered to investigate the

difference between RM and the rest in order to achieve the particular aim of the study. To do so, we train the proposed model on a database containing information on the Spanish top division between the 2010–2011 and 2021–2022 seasons, which gives us an unbalanced panel with 34 clubs that played at least one season in that category.

According to the findings reported in this study, we believe it can be asserted that RM's undoubted ability to improve its results in the final stretch of matches comes mainly from these two sources: money on one side, but also something else hard to explain on the other. It is, in other words, a shared responsibility. Money is indeed relevant in quantifying the probability of a team's comeback, as it allows, for instance, more generous salaries to be paid to the most skilled players. The variable is statistically significant and there is no doubt, therefore, that it partially explains the high values of the dependent variable recorded in RM, together with Barcelona, the richest club in Spain; some other factors also explain the ability to come back but they cannot be ascribed to RM as much as their values are similar in all clubs.

Nevertheless, it is equally accurate that RM must have something special, which we can refer to as its DNA. RM's fixed effect is not only positive and different from zero but also higher than any other one. Indeed, it differs from the remaining ones from a statistical point of view, although in comparison with Barcelona this is not always the case. Regarding the difference between the two strongest clubs in Spain, it is relevant to indicate that, for the whole sample, the difference between RM and Barcelona is not statistically significant. However, if we remove from the analysis seasons in which the fight for the league was unusually weak, with a club (RM or Barcelona in all cases) winning it by a large difference, RM's fixed effect is not only higher but also statistically different from the one for Barcelona. This last result reinforces the general view that there is something special, DNA or whatever, in RM.

Perhaps it is precisely that RM players are taught how to foster momentum, to use Guardiola's words, and this would interfere with the massive literature that attempts to explain psychological momentum (see e.g., nice review papers such as those by Iso-Ahola and Dotson, 2016 and Morgulev, 2023) or even strategic momentum as long as one is able to differentiate it from the psychological one (Meier et al., 2020). Nevertheless, this is beyond the scope of the paper and in line with the use of sports data as "an excellent laboratory to study human behavior in real competitive environments" (Bar-Eli et al., 2020, p. 1). It exceeds the scope since, among other important reasons, the approach should be completely different.[17] Let me just recall what Rocco Mediate, a professional golfer, said once, "As any athlete knows, momentum is the most unstoppable force in sports. The only way to stop it is if you get in your own way, start making stupid mistakes, or stop believing in yourself." Moving on to our topic, conceivably RM's DNA is simply that these players, as well as being among the best, never stop believing in themselves and the emblem they defend, and no matter how much time is left, they fight to the end. Once the existence of DNA seems to some extent supported by reliable evidence, we leave it to other more specialized researchers to confirm or reject this idea.

Use of AI tools declaration

The authors declare they have not used Artificial Intelligence (AI) tools in the creation of this article.

[17] Without in any way intending to advise experts in this area of research, it would be convenient to differentiate something like two stages from a pure emotional point of view: 1) Why Real Madrid players do not usually give up; 2) why the other team should not allow them back into the game, because if they score a goal, the chances of them scoring another one increase.

Data availability

Data for this paper: https://figshare.com/articles/dataset/Football_data/22116884.

Conflict of interest

The author declares no conflicts of interest in this paper.

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