Do financial markets price UEFA Champions League competition events?

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Abstract

Purpose – This paper investigates the stock market reaction to three different events related to the UEFA Champions League – the announcements of draws, odds and match results. The aim of the paper is to test whether these events are informative for stock market operators, i.e. whether they produce abnormal returns.
Design/methodology/approach – Applying the event study methodology, the authors investigate the stock market reaction before (at two events: the draw date and on the release of betting odds) and after the matches of 11 listed soccer teams in the period 2003–2019. The authors also conduct OLS regression analyses in order to disentangle the impact of firm specific variables and match characteristics on cumulative abnormal returns.
Findings – This paper finds that match outcomes affect the stock market performance of listed teams, while the announcements of draws and odds do not. More specifically, the market does not consider match outcomes involving wins and ties as informative events, while it penalizes losing teams. Moreover, investor reactions to events related to the UCL competition depend more on match characteristics than on company specific variables.
Originality/value – The study enriches the ongoing debate about the impact of soccer team results on stock market performance in several ways: using the widest time span ever adopted in this area; focusing on UCL, which is the most important soccer competition played by private clubs; disentangling for the first time the effects of draws, odds release and sporting outcome on stock returns of listed soccer clubs.

Keywords Event study, UEFA, Soccer, Stock returns
Paper type Research paper

1. Introduction

It is well known that individuals have limited information processing abilities (see, e.g. Barberis *et al.*, 1998; Bolak *et al.*, 2013; Bouteska and Regaieg, 2020). Investors' reactions to public news depend on the latter's relative salience: the higher the information salience (i.e. media coverage), the faster the public information is processed by investors and then reflected in share prices. Several articles (e.g. Klibanoff *et al.*, 1998; Chan *et al.*, 2001; Palomino *et al.*, 2009) present empirical evidence regarding asset price reactions to public news consistent with the salience theory. In this field of research, listed soccer teams are interesting objects of study because the teams' performances are greeted with much emotion and media coverage. In addition, as argued by Thaler and Ziemba (1988), sports betting markets provide an ideal laboratory setting for testing the impact of new public information

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on listed soccer teams' share prices. Investors are informed as regards teams and matches firstly through the odds that bookmakers publish, and then shortly afterwards, i.e. when the underlying sporting event has taken place, by the match result.

However, these types of news may influence investors' reactions in different ways. Betting odds represent experts' opinions on match outcomes, while match results represent actual outcomes. Thus, if betting odds do contain valuable information, markets should process this information rapidly, generating a share price reaction. Moreover, these two types of information differ in their levels of salience. Betting odds are publicly available but are only posted on bookmakers' websites and in betting shops. In contrast, match results are available on a wider scale: in all daily newspapers, on radio and television news programs, and in various sports TV programs during prime time. Previous literature suggests that there is a positive relationship between clubs' performance and their profitability (Brown and Hartzell, 2001; Bernile and Lyandres, 2011). Moreover, if market reaction reflects rational expectations on future firm value, investors would price the expected outcome of a match before the match is played. Palomino *et al.* (2009) argue that betting odds are very good predictors of match outcomes, but they conclude that the announcement of betting odds has no impact on the share prices of listed soccer teams.

Based on this existing literature, our research studies the impact of UEFA Champions League (hereafter UCL) competitions on the stock market. The specific features of the UCL make this research particularly innovative. The UCL is in fact the most important European competition: it provides great visibility to football clubs and players and distributes huge amounts of money for participating in and winning the competition. Each UCL match is characterized by a chain of events: the draw, the publication of odds by bookmakers and the football match. This allows us to investigate the stock market reaction, in the period 2003–2019, to three different events (the draw, the release of odds and the sporting outcome) related to the same football match.

Our results confirm previous research by demonstrating that announcements of betting odds have no impact on the stock market performance of listed teams. We contribute to the existing literature by adding that neither do the announcements of draws generate any market price reaction. Moreover, our results corroborate previous studies on the relationship between match outcomes and listed teams' share prices. In fact, we highlight the fact that match results among the large clubs generate less strong reactions in the case of a win than in the case of a lost match. Finally, our research demonstrates that investors' reactions to events related to the UCL competition depend more on match characteristics than on company specific variables.

Thus, our study enriches the ongoing debate about the impact of soccer team results on stock market performance from different points of view. Firstly, to our knowledge this is the first study aiming to disentangle the effects of draws, odds releases and sporting outcomes on the stock returns of listed soccer clubs. Secondly, we specifically focus on UCL matches, i.e. we consider the top soccer clubs in Europe using the longest time-span ever adopted in this field of research. Thirdly, our paper is one of the few studies investigating both the impact of firm specific variables and match characteristics on the stock market performance of football teams.

The paper is organized as follows: the literature review is given in Section 2, while the sample and methodology are described in Section 3. Section 4 discusses our results. Finally, our conclusions are reported in Section 5.

2. Literature review

The relationship between sporting and financial results has been studied in several streams of research. Starting from the seminal work by Scherr *et al.* (1993), which explored Boston

Celtics' performances in the National Basketball League (NBA) and the corresponding value of the club's shares on the stock market, many authors have tried to disentangle the determinants of stock market returns for sport clubs (e.g. Rossi *et al.*, 2013). The literature suggests that there is a positive relation between sports performance and profitability of sporting clubs. Brown and Hartzell (2001) find that the operating performance of US professional basketball, baseball and (American) football clubs is positively associated with teams' sports performance. Given the worldwide diffusion of soccer and the numeric relevance of its followers (Koronios *et al.*, 2020), it is not surprising that the bulk of successive papers gradually switched in focus towards soccer clubs. There is extensive existing literature on the link between match results and financial returns in associated football (e.g. Stadtmann, 2004, 2006; Allouche and Soulez, 2008; Benkraiem *et al.*, 2009; Fotaki *et al.*, 2009; Galoppo and Boido, 2020), and different studies vary greatly in terms of the sample composition, time span considered, competitions analyzed, covariates and econometric methodology employed for the estimations. Table 1 presents some of the previous main findings regarding the relationship between soccer teams' performance and stock market reactions.

Bernile and Lyandres (2011) show that the profitability (measured as the Return on Assets) of European soccer teams increases with better sports performance. This suggests that soccer match results contain value-relevant information. If market reactions reflect rational expectations on future firm value, investors would price the expected outcome of matches before the match is played. Palomino *et al.* (2009) conclude that betting odds are very good predictors of match outcomes, in line with the existing literature on betting markets (Sauer, 1998).

Bearing in mind that stock prices react to match results and, as suggested by the literature, betting odds are good predictors of these results, one would expect that stock prices react to the announcement of betting odds if investors are rational and the odds contain new information (Kalaitzakis *et al.*, 2021). However, Palomino *et al.* (2009) find no statistically significant price reaction to the posting of betting odds. Moreover, Baker and Wurgler (2006) and Edmans *et al.* (2007) argue that match results of smaller clubs should trigger stronger price reactions. In this context, Palomino *et al.* (2009) find that the match results of small clubs generate much stronger market reactions than those of large clubs. Moreover, Berkowitz and Depken (2018) find that football clubs' stock market prices react more strongly and more slowly to bad news (losing) than good news (winning) while Sun and Wu (2015) show that unexpected match results affect the stock market price of the club, generating different kinds of anomalies on the markets (e.g. Rossi and Fattoruso, 2017; Khan *et al.*, 2017).

In formulating our research hypotheses, in addition to previous results, we have to consider that the soccer teams observed in our analysis are the best in Europe. Since they are very strong teams, investors expect victory for each of them, which is therefore taken for granted, while defeat could be unexpected or at least improbable. However, since differences in the UEFA ranking are smaller between UCL contestants than between national championship teams, the outcomes of the matches tend to be less predictable.

Thus, our hypotheses are formulated as follows:

H1. The announcement of the draw has no impact on the price of listed UCL soccer teams.

H2. The announcement of odds is not considered an informative event by UCL football team shareholders.

H3. The UCL football match result is considered an informative event by investors in the case of defeat.

Moreover, to further explore the determinants of market reactions to sporting outcomes, we tested the impact of firm specific variables and match characteristics on cumulative abnormal

Authors	Sample	Years of reference	Main results
Renneboog and Vanbrabant (2000)	19 UK soccer teams	1995–1998	Wins are associated with increases in price on the stock market, while the opposite is true for ties and especially for defeats
Zuber *et al.* (2005)	10 UK clubs	1997–2000	Match importance has a low significance in explaining the stock performances of the examined clubs
Palomino *et al.* (2009)	16 UK clubs	1999–2002	The stock market reacts to news about match results. Game results of small clubs generate much stronger market reactions than those of large clubs. No market reaction is observed after the release of betting information
Bell *et al.* (2012)	19 UK clubs	2000–2008	Several innovative proxies are used to assess the importance of matches, including goal and point surprise and expected degree of rivalry between the clubs involved in a specific match. While the former covariates are found to exert a positive and significant effect on stock market returns, the impact of rivalry appears to be modest
Duque and Ferreira (2005)	2 Portuguese clubs	1998–2003	Wins are usually linked to higher returns while lower returns follow ties and defeats
Demir and Danis (2011)	3 Turkish clubs	2008–2009	Ties/defeats are usually associated with lower stock returns, while a non-significant relationship is found for wins
Saraç and Zeren (2013)	3 Turkish clubs	2005–2012	Soccer performance is positively linked with stock returns
Scholtens and Peenstra (2009)	8 clubs from different European countries	2000–2004	Wins lead to increases in stock returns while the opposite holds (with greater magnitude) for ties and for defeats
Castellani *et al.* (2015)	23 European clubs	2007–2009	A positive relationship is found between sporting results and stock returns: wins lead to higher returns and ties/defeats to lower performance on the stock market. Unexpected results are found to amplify the magnitude of market reaction
Gimet and Montchaud (2016)	24 European teams	2001–2010	Stock returns are more dependent on microeconomic and macroeconomic covariates than on match results
Godinho and Cerqueira (2018)	12 European teams	2001–2013	A link is found between sporting results and stock performance in the case of specific and important matches
Berkowitz and Depken (2018)	17 English football clubs	1992–2008	Club short-term financial performance is negatively impacted by losing but not impacted by winning

Table 1.
Previous main studies regarding the relationship between soccer teams' performance and stock market reaction

returns. In particular, we focused on financial statement items, which are related to international competitions through prizes, sponsorships, increased visibility, player valuation, and the outcome of the matches. On this point, few studies have so far investigated the combined impact of economic and sporting variables on stock market performance. Allouche and Soulez (2008) analyze a sample of 14 English clubs playing national league and cups for the period 1998–2001. Through an event-study analysis, they find that economic events (financial reports, players' transfers, coach replacements) prevail over sporting results in explaining stock returns. The same results are found by

Samagaio *et al.* (2009) and by Gimet and Montchaud (2016) investigating a sample of English football clubs from 1995 to 2007 and a sample of 24 European football clubs from 2001 to 2010, respectively. Galoppo and Boido (2020) considering the football results in the National Championship, National Cup, and Continental Cups in the period between 2003 and 2004 and the 2014–2015 seasons, argue that economic and significant statistical effects on stock market prices occur irrespectively of the results of the matches. Based on this previous literature, we test the following fourth hypothesis:

H4. Investor reaction to events related to the UCL competition depends more on company specific variables than on match characteristics.

3. Sample and methodology

3.1 The sample

In this research we specifically focused on UCL matches. The decision to analyze the UCL was motivated by several factors. First of all, the UCL is the most important soccer competition played by private clubs. Participation in the UCL is one of the main channels by which clubs' revenues are supported and increased: in fact, the UCL is currently the competition with the highest overall jackpot in the world. Moreover, participation in the UCL greatly increases the popularity of the club and of each player at international level: this is likely to improve the value of the team and raise its possibility of obtaining richer sponsorships. Furthermore, UCL matches are usually played on Tuesdays and Wednesdays, while many national league matches are played during the weekend (usually on Friday evenings, Saturdays and Sundays): this allows us to assess the immediate reaction of the market to the sporting result. Additionally, in this competition it is easy to assess match importance, since each stage corresponds to higher (direct and indirect) revenues for the club. Moreover, each match is characterized by a chain of events (the draw, the publication of odds by the bookmakers and the football match), which we investigate separately.

The UCL is a tournament played by 32 teams belonging to national soccer federations that are members of the UEFA (Union of European Football Associations). 26 teams access the group stage directly, where they are joined by the 6 winners of play-off ties. Participants are initially split into 8 groups, each one containing 4 teams, one from each of four seeding. Pot 1 contains the UCL title holder, the Europa League title holder and the champions of the six highest-ranked nations (according to the UEFA ranking system). The other pots are determined by club coefficient rankings: the lower the number of the pot, the lower the ranking. This initial group stage (which takes place from September to December) works like a double round-robin league, where each contending club plays against the others in its group twice, at home and away. The resulting top two teams from each group go on to the following knock-out rounds, thus starting with a round of 16 teams playing home and away matches: in this stage, the winner of a group plays against the second ranked in another group. The knock-out rounds continue through quarter finals and semifinals, and end with the final, played in a single match usually in June. Among the clubs participating in the UCL, we considered only those listed on a stock exchange and, of these, those that reached at least the round of 16 teams. Thus, our sample consisted of 11 listed teams from 7 countries for the period 2003–2019, as shown in Table 2.

Stock market data were extracted from Bloomberg. Match information was obtained from the UEFA official website (www.uefa.com). This source enabled us to collect news related to team rankings, fixed draw dates (which are generally published 10 days before the competition), match dates and sporting outcomes. Team rankings (i.e. UEFA coefficients) are estimated by considering a team's performance in the UCL during the previous 5 years and the ranking attributed to the affiliated national federation.

Table 2.
Sample composition

Team	Country
AFC Ajax	Netherlands
Beşiktaş	Turkey
Borussia Dortmund	Germany
Celtic FC	United Kingdom
FC Porto	Portugal
Fenerbahçe	Turkey
Galatasaray	Turkey
Juventus	Italy
Lazio	Italy
Olympique Lyon	France
Roma	Italy

Historical odds were extracted from the specialized website www.oddsportal.com, which collects betting odds from the most important bookmakers worldwide. Odds are the ratio between the amounts staked by parties to a bet. For example, "odds of 2 to 1" means that the bookmaker stakes twice the amount staked by the betting customer. Hence, the lower the odds, the higher is the probability of the outcome. The availability of fixed odds, which are generally announced 10 days before the sporting event, is fundamental for determining the favorite and underdog teams in a specific match. The oddsportal website reports fixed odds for UCL matches: when more than one bookmaker's data are available, the average odds for wins, ties and defeats are provided. This approach is in line with existing literature (Godinho and Cerqueira, 2018). Unfortunately, detailed odds have been available only since the UCL 2007–2008 season. For this reason, for the period 2003–2007 we computed a simplified version of the odds by comparing the ranking of the opposing teams, as suggested by Page and Page (2007). More specifically, we considered the overall UEFA club coefficients of each team: this ranking is the same as that employed for the pot seeding process for the specific UCL season. Following this approach, the "favorite" team is identified by lower odds or by the highest UEFA coefficient (if data about odds are missing).

Finally, team financial statement items were obtained from the Orbis database.

3.2 Event study methodology

Previous research (e.g. Chen *et al.*, 2019; Führer *et al.*, 2021) on stock price football club reactions apply the event study methodology (MacKinlay, 1997). This methodology permits measurement of stock return changes that result from the announcement of specific events related to UCL matches: records of any returns that significantly differ from the predicted returns of the listed football company involved has been interpreted as an anomaly attributable to the new information made available to the market. As McWilliams and Siegel (1997) claim, the event study technique involves making a number of assumptions, which in this paper will be accepted: the unpredictability of examined events, the lack of associated disturbing effects, and financial market efficiency. The event study methodology therefore enables one to verify if the return obtained on a given day t (when the specific event related to UCL matches is announced) is different from the predicted "normal" return.

Using the same methodology, our study investigates the impact of three different events related to UCL matches on the stock prices of 11 listed soccer teams in the period 2003–2019. We specifically estimated the effect of: (1) the draw announcements, (2) the odds released and (3) the football match result. The event study technique was used to calculate the abnormal returns of football teams, i.e. the difference between their theoretical returns not affected by information about UCL matches (expected returns) and their real returns. This methodology

allowed us to evaluate the stock price effect around the investigated sporting events. Sharpe's (1963) market model was used to calculate expected stock returns (Borenstein and Zimmerman, 1988):

$$\widehat{R}_{i,t} = \alpha_i + \beta_i R_{mkt,\,t} + \varepsilon_{i,t} \tag{1}$$

where $\widehat{\boldsymbol{R}}_{\boldsymbol{i,t}}$ is the stock return of club i on day t; α_i is the intercept of the regression line; β_i is the slope of the regression line; $R_{mkt,t}$ is the national market index return on day t; $\varepsilon_{i,t}$ is the random error.

Each event related to UCL matches was considered as Day 0, and the estimation period ranged from 290 days before Day 0–11 days before it. The α_i and β_i coefficients were therefore estimated by OLS regressions of $\widehat{\boldsymbol{R}}_{\boldsymbol{i,t}}$ on R_{mkt} for a 260-day estimation period prior to the event window. The latter is defined as the time window that takes into account $-\tau_1$ days before and $+\tau_2$ after the date of the announcement, while the date of the announcement itself is defined as day 0. We took various event windows into consideration: windows prior to the communication of the sporting event (so it can be assessed whether the information produced an anomalous effect before the announcement), and subsequent windows, which permit the study of post-announcement market reaction. Limited event windows were taken into consideration as well as rather wide ones (the widest extends from 10 days before the communication of the news to 10 days after its announcement). We take into consideration various event windows as our sample consists of both simple/certain (football match results) and complex/uncertain (draw announcements and odds release) events. Previous literature (Oler *et al.*, 2008) suggests using short event windows for the former events, and wider event windows for the latter. To estimate parameters α_i and β_i the market model chosen had to be able to determine more statistically meaningful coefficients, not only compared to simpler models, such as the constant mean return model (Brown and Warner, 1980), but also for more sophisticated models (such as multifactorial models and models that take into account some financial market anomalies), which often insignificantly improve the goodness of fit of regressions (Brown and Warner, 1985; Campbell *et al.*, 1997).

We estimated the abnormal return ($AR_{i,t}$) due to each event for the listed soccer team i on Day t as follows:

$$AR_{i,t} = R_{i,t} - \left(\widehat{\alpha}_i + \widehat{\beta}_i R_{mkt,\,t}\right) \tag{2}$$

The average abnormal return ($\overline{\boldsymbol{AR}}_{\boldsymbol{t}}$) was calculated as:

$$\overline{AR}_t = \frac{1}{n}\sum_{i=1}^{n} AR_{i,t} \tag{3}$$

Finally, the cumulative abnormal return $\boldsymbol{CAR}_{\boldsymbol{i}}(\boldsymbol{\tau}_1, \boldsymbol{\tau}_2)$ for each stock i was estimated by summing all $AR_{i,t}$ within the event period $[\boldsymbol{\tau}_1, \boldsymbol{\tau}_2]$:

$$CAR_i(\tau_1, \tau_2) = \sum_{t=\tau_1}^{\tau_2} AR_{i,t} \tag{4}$$

while the mean CARs in the different event windows ($\overline{\boldsymbol{CAR}}_{\boldsymbol{i}}(\boldsymbol{\tau}_1, \boldsymbol{\tau}_2)$) were calculated as follows:

$$\overline{CAR}_i(\tau_1, \tau_2) = \frac{1}{n}\sum_{i=1}^{n} CAR_i(\tau_1, \tau_2\ ) \tag{5}$$

To test the significance of the Cumulative Abnormal Returns (CARs) we used two parametric tests (T_1 and T_2) and one non-parametric (T_3) test. T_1 (MacKinlay, 1997; Campbell *et al.*, 1997) first aggregates abnormal returns within the event window for each individual stock, then aggregates across stocks and finally standardizes:

$$\boldsymbol{T}_1 = \frac{\overline{\boldsymbol{CAR}}(\boldsymbol{\tau}_1, \boldsymbol{\tau}_2)}{\left[\widehat{\boldsymbol{\sigma}}^2(\boldsymbol{\tau}_1, \boldsymbol{\tau}_2)\right]^{\frac{1}{2}}} \approx \boldsymbol{N}(0,1) \tag{6}$$

There is some evidence that in short time horizons and during times of high volatility (e.g. the financial crisis of 2007–2008), too many companies tend to show significantly abnormal returns using T_1, which makes it more difficult to determine which returns are truly "abnormal". For this reason, we also estimated a second parametric test (T_2) which is more robust to an event-induced variance increase (Boehmer *et al.*, 1991):

$$T_2 = \sqrt{N}\ \frac{\overline{SCAR}(\tau_1, \tau_2)}{\sqrt{\frac{1}{N-1}\sum\left(SCAR(\tau_1, \tau_2) - \overline{SCAR}(\tau_1, \tau_2)\right)^2}} \approx T\left(0, \frac{g}{g-2}\right) \tag{7}$$

with $g > 2$, where N is the number of stocks and $\boldsymbol{SCAR_i}(\boldsymbol{\tau}_1, \boldsymbol{\tau}_2)$ is the standardized abnormal return on security i at day t. We followed the methodology suggested by Mikkelson and Partch (1988) in order to estimate $\boldsymbol{SCAR_i}(\boldsymbol{\tau}_1, \boldsymbol{\tau}_2)$:

$$SCAR_{i,t} = \frac{CAR_i(\tau_1, \tau_2)}{\widehat{\sigma}_i \sqrt{T_s + \frac{T_s^2}{T} + \frac{\sum_{i=\tau_1}^{\tau_2}\left(R_{m,t} - T_s\overline{R_m}\right)}{\sum_{i=1}^{T}\left(R_{m,t} - \overline{R_m}\right)}}} \tag{8}$$

where τ_1 and τ_2 are respectively the first and last days in the event window, $\boldsymbol{CAR_i}(\boldsymbol{\tau}_1, \boldsymbol{\tau}_2)$ is the cumulative abnormal return of stock i in the event window $(\boldsymbol{\tau}_1, \boldsymbol{\tau}_2)$, $\overline{\boldsymbol{R_m}}$ is the mean return on market index in the estimation period, $\widehat{\boldsymbol{\sigma_i}}$ is the estimated standard deviation of the abnormal return on stock i, T is the number of days in the estimation period and T_s is the number of days in the event window. T_2 shows a T-distribution with T-2 degrees of freedom and converges to a unit normal. Furthermore, to rule out the possibility that our results are dependent on the functional form assumed for our residuals, we performed the nonparametric sign tests suggested by Campbell *et al.* (1997) and MacKinlay (1997):

$$T_3 = \left[\frac{N^{(+/-)}}{N} - 0.5\right]\ \frac{N^{\frac{1}{2}}}{0.5} \approx N(0,1) \tag{9}$$

where N is the number of events and $N(+)/N(-)$ is the number of events with a positive/negative CAR. We considered as statistically significant CARs those that passed all the three tests described above.

3.3 The regression model

In the second stage of our empirical analysis, we ran some OLS regressions with robust standard errors to investigate the CARs determinants. Our models were constructed as follows:

$$y_i = \alpha + \beta_1 X_{i,t} + \beta_2 \Omega_{i,t} + \varepsilon_i \quad i = 1, \ldots, N \tag{10}$$

where subscript i denotes the cross-section dimension, and t the time dimension. We used the statistically significant cumulative abnormal returns observed in the previous event study analysis as a dependent variable. The X vector refers to the football team characteristics in terms of balance sheet ratios, Ω is a vector of match-specific features, and ε is the disturbance term.

With regard to the X vector, we considered the following firm-specific characteristics: (1) size, measured as the natural logarithm of total assets; (2) profitability, expressed by the EBIT margin, calculated as EBIT on operating revenue; (3) capitalization, measured by the ratio of equity to total assets. Moreover, match-specific information included: (1) competition stage, i.e. 4 dummies related to: round of 16, quarterfinals, semifinals and final; (2) favorite team, a dummy built using the methodology described in Section 3.1; (3) difference, a dummy variable taking value 1 if the goal difference is higher than 3, 0 otherwise.

A schematic definition of our variables is shown in Table 3. Descriptive statistics and correlations are presented in Tables 4 and 5, respectively. Our results show no high Pearson correlation among independent variables: this means that they are suitable for further analysis.

We considered three different events related to UCL matches: (1) the announcements of the draw, (2) the release of odds and (3) the football match result. For each event, we tested regression model (10) on the event windows showing statistical significance in the event study analysis.

4. Results

4.1 Event study

Using an event study analysis, we studied the reactions of 11 listed football teams' stock prices to three different events related to UCL matches: (1) the announcements of the draw, (2) the release of odds and (3) the football match result.

Variable	Description
Size	Natural logarithm of total assets
Profitability	(EBIT/operating revenues) * 100
Capitalization	Capital-to-total assets ratio
Round-of-16	Dummy variable: 1 if the match is in a round of 16, 0 otherwise
Quarter-final	Dummy variable: 1 if the match is a quarter-final, 0 otherwise
Semifinal	Dummy variable: 1 if the match is a semi-final, 0 otherwise
Final	Dummy variable: 1 if the match is a final, 0 otherwise
Favorite	Dummy variable: 1 if the team is considered favorite, 0 otherwise
Difference	Dummy variable: 1 if the goal difference is higher than 3, 0 otherwise

Table 3. Variables description

Variable	Obs	Mean	Std. Dev	Min	Max
Size	232	12.23	0.63	10.98	13.65
Profitability	232	−2.32	26.55	−73.15	89.07
Capitalization	232	0.24	0.32	−0.43	0.96
Round-of-16	247	0.18	0.39	0	1
Quarter-final	247	0.08	0.27	0	1
Semifinal	247	0.02	0.14	0	1
Final	247	0.01	0.11	0	1
Favorite	247	0.25	0.43	0	1
Difference	247	0.09	0.29	0	1

Note(s): The table reports the descriptive statistics of firm- and match-specific variables

Table 4. Descriptive statistics

Table 5.
Correlation matrix

	Size	Profitability	Capitalization	Round-of-16	Quarter-final	Semifinal	Final	Favorite	Difference
Size	1								
Profitability	−0.25	1							
Capitalization	−0.31	0.48	1						
Round-of-16	0.12	−0.09	−0.04	1					
Quarter-final	0.16	0.07	−0.08	−0.14	1				
Semifinal	0.09	−0.08	0.06	−0.07	−0.04	1			
Final	0.13	0.05	−0.02	−0.05	−0.03	−0.02	1		
Favorite	0.02	0.08	0.02	−0.03	−0.07	0.05	−0.06	1	
Difference	−0.09	−0.11	−0.05	0.00	0.01	−0.04	−0.03	−0.15	1

Note(s): The table reports the correlation matrix of firm-specific (size, profitability and capitalization) and match-specific (round-of-16, quarter-final, semifinal, final, favorite and difference) variables

The first event we considered was the announcement of the draw, which typically occurs between 20 and 60 days before the event. Table 6 shows the event study results we registered at this date.

Our results show no statistically significant mean CARs in all the investigated event windows, either previous to or after Day 0. As the draw is announced favorite teams do not show positive abnormal returns (Table 6, Panel A)), and underdogs do not experience negative stock returns (Table 6, Panel B)). Thus, our H1 is confirmed and suggests that the draws are not considered an effective predictor of the match result by the stock market. This result is particularly significant, as a draw represents the moment when it is possible to compare the relative strengths of the opposing teams and then begin to formulate an expectation on the outcome of the match. It is therefore the moment in which it is possible to take a position on the share, after formulating an expectation based on objective data (such as the relative strengths of the teams through the UEFA rankings). The absence of any statistical significance of abnormal returns indicates that it is not possible to undertake an effective trading strategy at this stage.

As the market does not anticipate the expected outcome at the draw time using the available information related to the strength of each team, a stock reaction could occur when the odds are released. The second event we considered was therefore the release of the odds, which is usually announced 10 days before the football match. Table 7 shows the event study results we registered around this event.

Our results (Table 7, Panel A) and B)) show no statistically significant mean CARs in the event windows before Day 0, i.e. in the period in which bookmakers communicate their expected outcomes. This result can be interpreted as evidence that the announcement of odds is considered an uninformative event by football team shareholders. For this reason, we confirm H2. Our evidence confirms a previous study by Palomino *et al.* (2009), but does not support the findings of Benkraiem *et al.* (2009), who identified positive stock movement before the wins, thus indicating that the market anticipates a favorable sporting outcome. In our dataset, the odds correctly anticipate the final sporting outcome 55 times out of 100; we may suppose that this performance is not considered adequately informative by market participants. Again, this means that the communication of the odds to the market is not considered a sufficiently informative event for traders to undertake profitable trading strategies in advance of the game.

Finally, as our results show that all previous information is neglected by the market, we expected a potential stock market reaction following the football match (Day 0), as the final outcome is definitely known. Table 7 shows the event study results we registered after Day 0.

As regards winning teams (Table 7, Panel B)), we identify no statistically significant mean CARs either before or after the football match. This means that a win is not rewarded by the stock market, which does not consider it an informative event. This evidence could be attributed to the behavior of stockholder-fans, who see wins as the norm, as suggested by Gimet and Montchaud (2016). Our results confirm previous evidence found by Stadtmann (2004), Benkraiem *et al.* (2009), Bernile and Lyandres (2011), Demir and Danis (2011).

As regards tied matches (Table 7, Panel C)), we identified no statistically significant mean CARs either before or after the football match. This can be interpreted as evidence that a tie is not priced by the stock market, which does not consider it an informative event. Our results confirm previous evidence by Fotaki *et al.* (2009) and Palomino *et al.* (2009), but contrast with the findings reported in most previous literature, which identifies a negative stock market reaction following a tie (Renneboog and Vanbrabant, 2000; Stadtmann, 2004; Duque and Ferreira, 2005; Benkraiem *et al.*, 2009; Palomino *et al.*, 2009; Scholtens and Peenstra, 2009; Demir and Danis, 2011; Castellani *et al.*, 2015). This can be explained by recalling that extant literature mainly focuses on national competitions, while our paper analyzes only UCL matches. The ties have a different significance in the two contexts. In national championships

Table 6.
The announcement of the draw

Event window	Panel A): Favorite teams					Panel B): Underdog teams				
	Number of firms	Mean CAR	T_1	T_2	T_3	Number of firms	Mean CAR	T_1	T_2	T_3
(−10, −1)	71	2.305	2.460	1.199	1.780	81	2.243	2.681	1.111	1.000
(−5, −1)	71	1.485	1.891	1.754	1.068	81	0.446	0.801	−0.231	−0.333
(−3, −1)	72	0.460	0.890	0.370	0.707	81	0.332	0.574	−1.067	0.778
(−1, 0)	72	−0.476	−1.391	0.534	1.414	81	0.258	0.484	−1.162	−2.111
(0, 10)	71	−1.151	−1.364	−1.172	1.780	81	−0.221	−0.206	−1.243	0.778
(0, 5)	72	−1.103	−1.600	−0.702	2.593	81	−0.094	−0.100	−1.517	1.444
(0, 3)	72	−1.360	−2.256	0.027	1.179	81	0.389	0.440	−1.493	−0.778
(0, 1)	72	−0.977	−1.861	0.444	0.943	81	0.778	0.950	0.044	−1.222

Note(s): Table 6 shows the results of event studies carried out on 11 listed football teams participating in the UCL related to the announcement of the draws. We measured the predicted normal bank returns using the market model. The CAR statistical significance is verified using three tests (T_1, T_2 and T_3) reported in Equations (6), (7) and (9)
*, **, *** denote the statistical significance at 10%, 5% and 1%, respectively (one-tailed test)

Table 7.
The odds release and the match result

	Panel A): Lost matches					Panel B): Won matches					Panel C): Tied matches				
Event window	Number of firms	Mean CAR (%)	T_1	T_2	T_3	Number of firms	Mean CAR (%)	T_1	T_2	T_3	Number of firms	Mean CAR (%)	T_1	T_2	T_3
(−10, −1)	243	−0.530	−1.165	−1.525	2.887	246	0.131	0.255	−0.120	−1.275	153	−0.314	−0.595	−1.092	2.183
(−5, −1)	245	−0.116	−0.311	−1.205	1.597	246	0.727	1.855	−1.009	0.510	153	0.430	1.164	−0.698	0.081
(−3, −1)	245	0.016	0.054	−1.178	0.958	246	0.675	2.188	−1.726	1.275	153	0.283	0.897	−0.767	0.081
(−1, 0)	245	−0.243	−0.983	−1.275	1.725	246	0.525	1.800	−0.926	1.148	153	0.648	2.453	1.182	1.051
(0, 10)	245	−2.457***	−4.086	−6.244	5.558	246	0.137	0.231	−1.163	0.128	153	−2.396	−3.060	−3.318	1.050
(0, 5)	245	−2.279*	−4.620	−1.305	5.303	246	0.467	0.889	−1.143	0.383	153	−1.211	−2.271	−1.230	2.506
(0, 3)	245	−2.340*	−5.223	−1.304	6.325	246	0.803	1.801	−0.875	1.785	153	−0.451	−0.951	0.680	1.859
(0, 1)	245	−1.905*	−5.125	−1.323	5.558	246	1.592	3.454	1.116	3.825	153	0.053	0.123	2.203	0.081

Note(s): Table 7 shows the results of event studies carried out on 11 listed football teams participating in the UCL related to the announcement of betting odds and match results. We measured the predicted normal bank returns using the market model. The CAR statistical significance was verified using three tests (T1, T2 and T3) reported in Equations (6), (7) and (9)

*, **, *** denote the statistical significance at 10%, 5% and 1%, respectively (one-tailed test)

there is in fact a high number of matches during the year, and the current reward for wins and ties (3 and 1 points, respectively) renders the latter similar to a defeat. In UCL, this approach is applied only in the initial group stage. As the knock-out phase starts, ties lose their significance, since other matches played by competitors take on the role of deciding the winning team.

Finally, we analyzed stock market reactions to lost matches. Our results (Table 7, Panel A)), show no statistically significant mean CARs before the football match. This means that the event is not priced in advance by the market. On the contrary, we found statistically significant mean CARs after Day 0. More specifically, we estimated mean CARs as being equal to −1.9%, −2.3%, −2.3% and −2.5% in the event windows (0, 1), (0, 3), (0, 5), and (0, 10), respectively. Thus, our H3 is confirmed. This means that news of a lost match is priced by the market after the event, as suggested by most previous literature (Renneboog and Vanbrabant, 2000; Stadtmann, 2004; Duque and Ferreira, 2005; Benkraiem *et al.*, 2009; Palomino *et al.*, 2009; Saraç and Zeren, 2013; Scholtens and Peenstra, 2009; Demir and Danis, 2011; Castellani *et al.*, 2015). These outcomes, jointly considered, are consistent with Kahneman and Tversky's (1979) prospect theory, as the impact of a loss is expected to be stronger than the effect of a win for supporter-investors (Edmans *et al.*, 2007).

4.2 Regression analysis

In order to investigate the determinants of CARs quantified in previous event studies, we ran a cross-sectional regression analysis. This analysis aimed to explain only statistically significant results, i.e. results related to lost matches, using firm- and match-specific variables. We focused on the event window (0, 10), which shows higher statistically significant CARs.

Our results, reported in Table 8, show that the magnitude and the significance of the coefficients is higher for match-than for firm-specific variables.

This means that CARs are affected more by competition characteristics than by team fundamentals. Table 8 in fact shows that size is the only economic variable affecting CARs. The negative sign of size suggests that as match losses occur, larger companies are more penalized by investors than smaller ones. This result can be explained by considering that top teams are usually expected to win. Moreover, since their strength is usually supported by rich sponsorship contracts, each defeat in the UCL reduces the likelihood of wealthier future agreements. In this sense, match losses could generate a reputational price, and, in this context, larger teams seem to pay the higher bill.

The other firm-specific characteristics, profitability and capitalization, show both negative and non-statistically significant coefficients. From an econometric point of view, this evidence can be explained by considering that the volatility of these variables in soccer clubs is very high. Huge reductions and increases in equity capital are in fact quite common in football teams. Moreover, firm profitability can change dramatically as a result of different factors, such as sports prizes, sponsorships, merchandising, ticketing, and the player transfer market.

As regards match-specific features, Table 8 shows that semifinal and final dummies are associated to negative and strongly significant coefficients, especially for finals. This means that investor reaction is stronger in the final and most important competition stages. Two reasons may contribute to explaining this outcome. On the one hand, prizes increase at each step of the competition. Hence, losing a match in the last stages of the UCL can much reduce potential financial income for a team. On the other hand, the reputational aspect should be considered: reaching (and winning) a final can generate a boosting effect on sponsorships, player valuation and merchandising, which is lost in the case of defeats.

Variables	(1)
Size	−3.05*** *(1.059)*
Profitability	−0.02 *(0.021)*
Capitalization	−2.82 *(2.022)*
Round-of-16	−0.53 *(1.383)*
Quarter-final	2.56 *(3.383)*
Semifinal	−14.36** *(6.055)*
Final	−20.49* *(11.368)*
Favorite	−3.06** *(1.477)*
Difference	−0.04 *(1.927)*
Constant	36.92*** *(13.254)*
Observations	230
R-squared	0.19

Note(s): Table 8 shows the results of the regression model run on CARs estimated around the announcement of team defeats in UCL competitions. The dependent variables are CARs quantified in the event windows (0, 10). Independent variables are distinguished between firm-specific and match variables. Firm-specific variables are the following: the natural logarithm of total assets as proxy of firm size, the ratio between EBIT and operating revenues as a proxy of profitability, and capital-to-total assets ratio as a proxy of capitalization. In the second group we have a series of dummies for match-characteristics: round-of-16, quarter-final, semifinal and final assume value 1 if the match belongs to that specific stage of the UCL competition, favorite is equal to 1 if the team is considered favorite for the match, and difference is equal to 1 if the goal difference of the match exceeds 3 goals

*, **, *** denote the statistical significance at 10%, 5% and 1%, respectively. Robust standard errors in brackets

Table 8. OLS regression on CAR 0–10 (lost matches)

Furthermore, being favorite in the competition leads to negative CARs in lost matches. The higher the winning expectation for a team, the stronger the negative investor reaction following defeats. This means that the market penalizes unexpected defeats the most.

Finally, the "difference" variable shows a non-statistically significant coefficient. As the goal difference is not informative, this evidence suggests that the market penalizes the defeat *per se*, thus not considering its magnitude. Overall, our results show that investor reaction to events related to the UCL competition depends more on match characteristics than on company specific variables, thus rejecting hypothesis 4. This evidence seems to be in contrast with previous literature (Allouche and Soulez, 2008; Samagaio *et al.*, 2009; Gimet and Montchaud, 2016) showing that financial team characteristics prevail over match results in explaining stock returns. This can be explained by considering that our study focuses only on UCL matches, which are expected to be the most important ones in a team's sporting year. In effect, as previously described, each stage of this international competition is likely to influence the revenues and overall value of participating clubs: this effect is lower for national championships, where crucial matches are more difficult to identify and are usually positioned in the last part of the season (when the final rank of the competition is about to be decided). Since important matches are usually those which provide a final position that gives access to the UEFA competitions, the previous statements are indirectly confirmed.

4.3 Robustness checks

In order to expand our analysis, we performed some further robustness checks. First, we enriched our baseline equation (10) with country and team fixed effects, respectively (Table 9, column (1) and (2)). Our main results are confirmed by these tests.

Second, we estimated our regression by using alternative variables (Table 9, column (3)). Specifically, we measured profitability as the ratio between net profits before taxes and operating revenues and replaced the dummy difference with a discrete variable indicating the exact goal difference of the match. This analysis also generally confirms our previous results.

Variables	(1)	(2)	(3)
Size	−4.33** *(1.693)*	−3.66* *(2.133)*	−3.06*** *(1.100)*
Profitability	−0.03 *(0.025)*	−0.02 *(0.040)*	
Profit			−0.01 *(0.021)*
Capitalization	−2.30 *(3.101)*	0.08 *(4.650)*	−3.42 *(2.096)*
Round-of-16	−0.86 *(1.399)*	−0.88 *(1.428)*	−0.30 *(1.459)*
Quarter-final	2.35 *(3.452)*	2.47 *(3.442)*	2.48 *(3.454)*
Semifinal	−14.72*** *(5.534)*	−14.86*** *(5.713)*	−13.99** *(5.961)*
Final	−20.16* *(10.977)*	−19.38* *(11.055)*	−20.65* *(11.321)*
Favorite	−3.34** *(1.570)*	−3.45** *(1.633)*	−3.00** *(1.493)*
Difference	−0.10 *(1.925)*	−0.13 *(1.936)*	
Goal-difference			−0.11 *(0.474)*
Constant	50.13** *(20.578)*	41.94* *(24.466)*	37.43*** *(14.011)*
Country dummies	(YES)	(NO)	(NO)
Team dummies	(NO)	(YES)	(NO)
Observations	230	230	227
R-squared	0.21	0.22	0.19

Note(s): Table 9 shows the results of the regression model run on CARs estimated around the announcement of team defeats in UCL competitions. The dependent variables are CARs quantified in the event windows (0, 10). Independent variables are distinguished between firm-specific and match variables. Firm-specific variables are the following: the natural logarithm of total assets as a proxy of firm size, the ratio between EBIT and operating revenues as a proxy of profitability, and capital-to-total assets ratio as a proxy of capitalization. In the second group we have a series of dummies for match-characteristics: round-of-16, quarter-final, semifinal and final assume value 1 if the match belongs to that specific stage of UCL competition, favorite is equal to 1 if the team is considered favorite for the match, and difference is equal to 1 if the goal difference of the match exceeds 3 goals. Columns (1) and (2) show regression results including country dummies and team dummies, respectively. In column (3), profit is calculated as the ratio between profit before taxes and operating revenues, while goal-difference is estimated as the difference between the goals scored by the opposing teams during the match
*, **, *** denote the statistical significance at 10%, 5% and 1%, respectively. Robust standard errors in brackets

Table 9.
Robustness checks: OLS regression on CAR 0–10 (lost matches) using country dummies, team dummies and different covariate specifications

Moreover, we ran our regression model on other statistically significant CARs related to lost matches in the event windows (0, 1), (0, 3) and (0, 5). These robustness checks too, shown in Table 10, confirm previous evidence, although we observed a reduction in the *r*-squared and in the statistical significance of the coefficients associated to semifinals and final matches. Overall, estimation quality decreases as the time-span is reduced. This suggests that the stock market does not react to a defeat with inevitable emotion-induced behavior, which in turn suggests that the impact of team defeats should be observed and quantified not only on the day following the event, but over a greater time period covering the following 10 days. Afterwards, the market succeeds in adjusting soccer team evaluations, making use of new information.

To test whether our results are sensitive to CAR calculation procedure, we compare our CARs, estimated using Sharpe's (1963) market model, to CARs calculated using the Fama–French three-factor model. Daily data for European firms are extracted from the public database made available by French [1]. Overall, market returns using the Fama–French model support the evidence shown in Tables 6 and 7 Specifically, we find no statistically significant mean CARs in case of announcement of the draw, odds release, and match results related to winning teams and tied matches. Moreover, our findings using the Fama–French model show negative and statistically significant mean CARs of −1.7%, −2.0%, −2.1%, and −2.3% in the event windows (0, 1), (0, 3), (0, 5), and (0, 10), respectively. This evidence is similar to that shown in Table 7, Panel A, and confirms that only news of a lost match is priced by the market after the event.

Variables	(1) CAR 0–5	(2) CAR 0–3	(3) CAR 0–1
Size	−2.14*** *(0.808)*	−1.92*** *(0.704)*	−1.16** *(0.572)*
Profitability	−0.02 *(0.019)*	−0.00 *(0.017)*	−0.01 *(0.015)*
Capitalization	−0.65 *(1.371)*	−0.42 *(1.236)*	0.52 *(1.142)*
round-of-16	−0.44 *(1.159)*	−0.25 *(1.050)*	−0.25 *(0.918)*
quarter-final	−0.60 *(2.476)*	−1.74 *(1.923)*	−2.07 *(1.669)*
Semifinal	−11.57** *(5.352)*	−9.55* *(5.585)*	−8.31 *(5.116)*
Final	−19.23 *(13.534)*	−15.74 *(11.896)*	−13.68 *(9.125)*
Favorite	−3.04** *(1.180)*	−2.32** *(1.093)*	−2.38** *(0.991)*
Difference	−0.01 *(1.190)*	0.73 *(0.990)*	0.55 *(0.869)*
Constant	25.51** *(9.887)*	22.48*** *(8.523)*	13.30* *(6.929)*
Observations	230	230	230
R-squared	0.20	0.18	0.18

Note(s): Table 10 shows the results of the regression model run on CARs estimated around the announcement of team defeats in UCL competitions. The dependent variables are CARs quantified in the event windows (0, 5), (0, 3) and (0, 1), shown in columns (1), (2), and (3), respectively. Independent variables are distinguished between firm-specific and match variables. Firm-specific variables are the following: the natural logarithm of total assets as a proxy of firm size, the ratio between EBIT and operating revenues as a proxy of profitability, and capital-to-total assets ratio as a proxy of capitalization. In the second group we have a series of dummies for match-characteristics: round-of-16, quarter-final, semifinal and final assume value 1 if the match belongs to that specific stage of UCL competition, favorite is equal to 1 if the team is considered favorite for the match, and difference is equal to 1 if the goal difference of the match exceeds 3 goals

*, **, *** denote the statistical significance at 10%, 5% and 1%, respectively. Robust standard errors in brackets

Table 10. Robustness checks: OLS regression on different CARs (lost matches)

In further robustness checks we made use of a variable often considered in literature to account for surprising sporting outcomes (the so-called "unexpected points" variable: for the computation of this covariate see Bell *et al.*, 2012). These estimations followed the same set-up employed in Table 10: the unexpected points are included instead of the variable "favorite". However, this new explanatory variable is never statistically significant in any of the regressions. Since we are focusing on lost matches, all the unexpected points are negative and their variability in the sample is low: this makes the econometric outcome predictable. These further tables have not been included in the paper and are available on request.

5. Discussion and conclusions

Our results show that although draws and odds produce expectations about the outcome of a match, their announcements have no impact on the stock performance of listed teams. This means that the financial market does not anticipate the expected outcome at the draw and at the declaration of odds using the available information related to the strength of each team. In our opinion, this situation is justified, considering the high level of the football clubs enrolled in the UCL. In particular, the betting odds concerning UCL soccer teams do not contain any new information that has not already been incorporated in the prices. The same conclusion is valid as regards the draws. As the football teams involved in the UCL are the strongest, investors expect a possible win for each of them. This expectation invalidates the information power of the draws. Moreover, betting odds present low salience levels or high transaction costs. Game results are available on a wider scale: they are presented during radio and television news programs, in all daily newspapers and on several prime-time sports TV programs. On the contrary, betting odds are available only on bookmakers' websites, in specialized publications or in betting offices. Thus, some public information with low media coverage (salience) may not be picked up by investors. The practical implication of our results

is that there may not be effective betting strategies that can yield profits before the occurrence of a match. More specifically, all the information available before the match is not considered effective enough for investors to formulate expectations and take a position on the shares. These outcomes suggest that in competitions such as the UCL where the strength of the contenders is generally homogeneous, predicting a sporting result appears complex and investors react mainly after the match result has been determined.

Furthermore, the financial market does not consider wins as informative events. This evidence could be explained by considering that stockholder-fans expect wins to be the norm with reference to UCL football teams. In addition, tied matches have no impact on team stock returns. This can be explained by recalling that in UCL matches, as the knock-out phase starts ties lose their informative power, since they leave the role of deciding the winning team to other matches played by competitors. However, our analysis shows that the news of a lost match is instead informative and priced by the market after the event.

The study also demonstrates that investor reaction to events related to the UCL competition depends more on match characteristics than on company specific variables. Among firm-specific characteristics, only size contributes to explain the stock market performance of listed teams. As match defeats occur, larger companies are in fact more penalized by investors than smaller ones. On the contrary, different match-specific characteristics play a role in explaining team stock returns. First, investor reaction is stronger in the last and most important competition stages. Second, the market seems to penalize unexpected defeats the most. The importance of match characteristics over company specific variables could be due to our specific focus on the UCL, where, in contrast with national championships, each stage of the competition influences the revenues and the overall value of participating clubs. Given this direct relationship between passing to a next stage and revenues (both direct in terms of prizes and indirect in terms of prestige) received by the winning teams, this outcome appears rational and suggests a logical reaction by the market to the results of the competition.

To conclude, this paper extends previous research from different points of view: its wide time horizon, a specific focus on the UCL (the most important soccer competition played by private clubs), the study of different events (match draws, release of odds and sporting outcome) and stages related to the competition, the analysis of the impact of both firm specific variables and match characteristics on the stock market performance of football teams.

Note

1. https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

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