

You Lose, I Feel Better: Rivalry Between Soccer Teams and the Impact of Schadenfreude on Stock Market

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Abstract

This study considers the game-related performance of two listed soccer clubs in Italy which share the same stadium: Roma and Lazio. We introduce the performance of the archrival in the analysis. The high level of rivalry in sports should lead to a feeling of pleasure at the suffering of another group (known in German as *Schadenfreude*) and we assume to see the satisfaction of investor fans with the defeat of the archrival. Likewise, the win of the archrival can have a negative impact on the mood of investors. This study shows that, when club supporters experience the negative performance of their team, the results of their archrival can affect their investment decisions. It is therefore proven that, at least in this respect, the investors (also widely represented by club supporters) are driven by the sentiments conveyed by rivalry which, considered to be a source of emotion, may be relevant to the market.

Keywords

Schadenfreude, rivalry, soccer, stock return, emotions

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Introduction

Psychology literature has introduced the concept of *Schadenfreude*, which demonstrates that supporter feelings are strongly influenced not only by the favored team but also by the results of the rival (Combs, Powell, Schurtz, & Smith, 2009). The word *Schadenfreude*, borrowed from German (as the English language has no word for it), derives from the combined terms *schaden*, meaning “harm” and *freude*, meaning “joy.” In this study, we examine the economic impact of this notion through the effect of the archrival’s performance on a soccer team’s stock price. Since fan investors can observe the performance of both their favorite team and that of the archrival in a single weekend, their mood and thus their investment decisions could be affected not only by their favorite team’s performance but also by their archrival’s performance. We focus on the rivalry between Lazio and Roma (two listed soccer teams in Italy), which is regarded as one of the most important rivalries of world soccer.

We find that fan investors react positively (negatively) to a win (loss) of their favorite team. There is also supportive evidence for a significant rival effect on stock performance, at least when a loss of the favorite team occurs. A loss combined with an unexpected good result coming from the archrival performance leads to a strong negative market reaction. In contrast, a loss combined with an unexpected bad result of the rival does not create any investor reaction. Therefore, the negative effect of the loss is counterbalanced by the positive surprise (PS) coming from the unexpected bad performance of the archrival. This same effect is not found for the wins, where the positive effect holds regardless of the performance of the archrival. The asymmetric impact of rivalry on wins and losses is consistent with the hedonic framing theory (Thaler, 1999) applied to a preference structure as described by the prospect theory (Kahneman & Tversky, 1979). In the region of gains (i.e., wins), the value function is concave and therefore fan investors would be on average worse off if they were open to other sources of emotions. On the contrary, in the region of losses, the function is convex and they are on average better off being open to the influence of the archrival’s performance. Overall, this study proves that investors are also driven by the emotions conveyed by rivalry which are then relevant to the market.

Our findings contribute to the literature in two ways. First, there is already evidence that emotions stirred up by soccer influence the stock markets (Edmans, Garcia, & Norli, 2007). The researches, both the more general ones on sports events and financial markets and the more specific on club stocks, deal with the performances of the favorite team, either a national team or a club. There are not studies on the effects of a rival team. *Schadenfreude* has been studied by the neuroscience research proving it shares the same neural correlates of physical pleasure (Lieberman & Eisenberger, 2009; Takahashi, Kato, Matsuura, Mobbs, Suhara & Okubo, 2009). It is not simply a secondary and passing emotion, and its impact on decision making and actions may have the same strength of physical pleasure. Although there are studies

documenting that *Schadenfreude* affects the fans' emotions, what is not tested is whether or not those emotions could affect decision making and investment choices. Our result shows that there could be potentially profitable intermarket strategies pursued trading simultaneously on the betting and the stock markets. Such strategies would be available only for private investors (institutional investors can't usually enter in the betting market) and should take into consideration that trading costs, like the profit margin for bookmakers and the bid ask spread on stocks, could offset the benefits. However, since the positions on stocks must be taken after the sport events, which take place at evening and during the weekend, the strategy could be focused on the most profitable cases.

Second, we disentangle the effect of emotions and rational arguments on the stock price of listed soccer clubs by focusing on emotions triggered by the performance of a favorite team and an archrival. The literature provides supportive evidence on the relation between the sports performance of a club and its share price (Boido & Fasano, 2007; Castellani, Pattitoni, & Patuelli, 2015; Demir & Danis, 2011; Scholtens & Peenstra, 2009; Stadtmann, 2006). However, the game results can affect the stock price of clubs for two reasons. Bernile and Lyandres (2011), Panagiotis (2009), and Samagaio, Couto, and Caiado (2009) document the positive relation between the sports performance and the economic performance of soccer clubs. Therefore, the sports performance of teams on stock prices relies on a rational argument, and contrary to listed companies generally issuing quarterly announcements, it can feed investor opinions on a weekly basis through game results. In addition, psychological research provides evidence on the role of the performance of sports clubs, how it affects the mood of the fans (Hirt, Zillman, Erickson, & Kennedy, 1992; Kerr, Wilson, Nakamura, & Sudo, 2005; Sloan, 1979) and how those emotions and feelings of investors could influence their investment decisions (Lucey & Dowling, 2005). Thus, the mood of fan investors following the games may affect the stock price. In sum, game results could affect the performance of stocks for two mutually reinforcing reasons: the emotions and the positive/negative impact of the game result on economic performance. Only Palomino, Renneboog, and Zhang (2009) try to distinguish between these two possible explanations for the market reaction to game results by running a number of tests. They find evidence in favor of both rational arguments and investor sentiment in explaining the market reactions to game outcomes. In this study, we address a particular aspect of this issue by isolating a stream of emotions that is not related to the economic result of the soccer club: the archrival's performance. In this case, the link between emotions and economic performance is weakened or else not relevant at all. For instance, the win of the rival negatively affects the emotions of the supporters without exerting any impact (after considering some control variables) on the economic performance of the favorite club. This study therefore helps to understand the pure impact of emotions on stock performance as stirred up by the rivalry of a soccer club.

The relevance of a study about rivalry goes beyond the boundaries of academic research. The rivalry among clubs in any sport has always been of interest for both

domestic and international fans and the media, and it is considered to be the main source of attractiveness of a league (Mason, 1999). According to Madeiro (2007), the rivalry among competing teams motivates the consumption choices of the fans, the attention of the media and therefore the investments and actions of corporate sponsors. Sponsorship with a particular team can alienate the fans of rival teams and the products of these sponsors are sometimes even regarded negatively by the fans of the rival teams (Theofilou, Ventoura-Neokosmidis, & Neokosmidis, 2008). In order to diminish this negativity and avoid this phenomenon, the communications company NTL sponsored both the Glasgow Rangers and Celtic (Davies, Veloutsou, & Costa, 2006), as the rivalry between those clubs is very intense.

The relevance of the topic may suggest an extended use of our methodology. Schadenfreude is related to envy and arises when misfortune occurs to a team that is self-relevant for the fans (Takahashi et al., 2009): The most prominent rivalries are its clearest example, but Schadenfreude is not necessarily limited to them. Our methodology can be applied to all the teams competing at the same level in the same championships to detect how much self-relevant they are to each other. When it comes out that Schadenfreude may arise the advertising and sponsoring companies should pay a stronger attention in order to design their interventions without annoying the fans.

The rest of the article proceeds as follows: The second section describes the data and the hypotheses. The methodology is given in the third section. The fourth section presents and discusses these findings. The conclusions are in the final section.

Data

The key issue concerning any test of rivalry related hypotheses lies with the definition of the term archrival. Each team competes with many others throughout the season over the years. However, not all these teams are considered “the archrival.” Politics, history, religion, and the fan’s socioeconomic background can all be sources of contention. Even though there is competitiveness between teams that are further apart, the local derbies are the main conflicts. We focus on the rivalry between Lazio and Roma, which is regarded as one of the most important of world soccer according to the Greatest Rivalries list published by Duke (2008) from CNN, Fortune (2009) from Dailymail and Rice (2010) from The Independent. Moreover, both the list of Skysports¹ and the <http://www.footballderbies.com/> website, presenting the list of city derbies and rivalries, consider this rivalry in the top 10. Furthermore, soccer is one of the major expressions of Italian social life and it is a fundamental component of Italian culture. The rivalry between the Roma and Lazio soccer clubs, which share the same stadium, lies at the heart of Italian soccer culture: whereas Roma supporters are famous for being mostly left wing, Lazio fans are known as right-wingers (Scalia, 2009). The derby games are more than a game; they are a battle for city pride and bragging rights (Guschwan, 2007).

Both Lazio and Roma are listed on the Italian Stock Exchange. Given that the Financial Times Stock Exchange (FTSE) Italia All Share index is available from December 31, 2002, the data might cover the period from December 31, 2002, to the end of 2009-2010 season. However, Lazio from 1999 to 2004 experienced six stock splits and reverse stock splits. The finance literature documents the existence of abnormal returns after the announcement of stock splits and after the stock split itself (Chen, Nguyen, & Singal, 2011; Desai & Jain, 1997; Ikenberry, Rankine, & Stice, 1996; Ikenberry & Ramnath, 2002). Thus, we prefer to start the data set for Lazio from the first game of the 2004-2005 season. The stock prices and market index data were collected from Thomson Financial Datastream. The results of soccer games, including league games, national cup games, European Cup games (Intertoto, Champions League, and Union of European Football Association [UEFA] Cup) and the related odds, were collected from www.betexplorer.com.

Hypotheses Development

The Stock Market Reaction to Game Results

First, we must investigate whether the sports performance of the two clubs affects the stock prices in keeping with the previous literature (Bell, Brooks, Matthews, & Sutcliffe, 2009 for clubs in the United Kingdom; Boido & Fasano, 2007, for Italian clubs; Castellani et al., 2015, for all European clubs; Demir & Danis, 2011, for Turkish clubs; Palomino, Renneboog, & Zhang, 2009; Stadtmann, 2006, for Borussia Dortmund from Germany; Zuber, Yiu, Lamb, & Gandar, 2005). Soccer clubs deciding to go public will probably not attract many professional investors, who generally make investment decisions based on calculated economic deliberations (de Ruyter & Wetzels, 2000). Likewise, according to Renneboog and Vanbrabant (2000), the shareholder structure of soccer clubs usually consists of one or several stable controlling shareholders, some institutional investors, and many individual investors, who are also soccer fans. For example, 35,113 people participated in the Initial Public Offering (IPO) of Fenerbahce, a famous soccer club in Turkey, of which 33,935 were small individual investors who demanded a small number of lots. Roma and Lazio are not an exception: Roma 2000 Srl (now NEEP Roma holding) and Tikal own, respectively, 67% and 3.5% of ordinary shares, whereas Lazio Events owns 67% of ordinary shares. The lack of institutional investor interest is also shown by the very poor coverage of financial analysts. From the time of their first listing, only five analysts' reports were issued on each stock: It is worthy to note that they were concentrated between the years 2000 and 2001, just after the IPO. Since then no new report has been issued.² Thus, the impact of the fan investors' mood on stock prices can be observed. In addition, investors should have reactions to sports performance since it directly impacts the future cash flows of the listed clubs (Bernile & Lyandres, 2011; Panagiotis, 2009; Samagaio, Couto, & Caiado, 2009). Therefore, decisions of investor fans are likely to be affected by sports performance.

A win (loss) of a soccer club should influence the price of this club positively (negatively).

The Stock Market Reaction to the Archrival's Performance

Besides the relation between the sports performance of a club and its stock returns, we introduce into the analysis the archrival's performance with reference to human psychology. Although people are expected to feel sympathy when others suffer, this is not always true and sometimes people can experience pleasure when others are in pain (Combs et al., 2009; Leach, Spears, Branscombe, & Doosje, 2003). Psychology literature names this *Schadenfreude*, which derives from the combined terms *schaden*, meaning "harm," and *freude*, meaning "joy" and which is borrowed from German, as the English language has no equivalent. According to Koyama and Reade (2009), supporters do not obtain utility only when their team performs well but also when a rival team has been defeated. Considering the high level of rivalry in sports, it is surprising to note the limited number of studies analyzing the feeling of the fans after the defeat of their archrival. Leach, Spears, Branscombe, and Doosje (2003) show that Dutch soccer fans regard Germany as a rival in soccer. Their main interest is Dutch reaction to the elimination of Germany in the 1998 Fédération Internationale de Football Association World Cup. They document that soccer fans in the Netherlands gained pleasure with the unexpected loss of Germany to Croatia even if Germany was placed in a different grouping of teams and were eliminated from the tournament earlier than the Netherlands. Moreover, the greater the participants' interest in soccer (which was assessed by three statements: "I am interested in soccer," "I enjoy watching soccer on television," "I have regularly watched/listened to the World Cup"), the greater the participants' pleasure at Germany's loss. Therefore, the defeat of a rival may be psychologically more beneficial when there is greater interest in the sport. Cikara, Bruneau, and Saxe (2011) also argue that Red Sox and Yankees fans report feeling pleasure when they watch their rival failing to score against their favored baseball team, as well as against a less competitive team in the same league (i.e., the Orioles). According to Havard (2010), an alumnus of The University of Texas at Austin will experience joy when the rivals face a defeat at the hands of someone other than Texas, such as was the case with the 2009 BCS National Championship game where Florida defeated Oklahoma.

In soccer, club affiliation is assumed to be generally more important than national identity (Boyle & Walter, 2003). Thus, we should expect to see the pleasure of investor fans with the defeat of the archrival. Likewise, the win of the archrival can have a negative impact on the mood of investors. A similar argument is developed by Stadtmann (2006). While analyzing how the performance of Borussia Dortmund affects its stock price, the unexpected number of points gained by Bayern Munich (Borussia Dortmund's rival for the championship) is also considered. It is found that a success by Bayern Munich negatively influences the stock price of Borussia Dortmund. However, this analysis does not take into account the interaction between the two teams.

We assume that the fan investors' mood is not only related to their favorite team's performance but also to the archrival's performance. Thus, the positive mood impact of a win should rise when combined with the loss of the archrival; in contrast, the negative mood effect of a loss should intensify with the win of the archrival.

Hypothesis 1A: The stock price impact of a win combined with the loss of the archrival should be higher than the one of a win combined with a win of the archrival.

Hypothesis 1B: The stock price impact of a loss (in absolute value) combined with the loss of the archrival should be lower than the one of a loss combined with the win of the archrival.

We tested a further and more restrictive development of Hypotheses 1A and 1B by considering the unexpected performance of the archrival according to the odds offered by the bookmakers. We maintain that the unexpected good/bad performance of the archrival should stir up stronger emotions on the team's fans. As we explain more in the next section, we will introduce the notion of negative/PS, defined from the viewpoint of a team considering its archrival. Assume that there is Team X and Team Y. The fans of Team X regard an unexpected negative performance of Team Y as a PS. We therefore infer that the fans should be more interested in the unexpected performance of their archrival.

Hypothesis 2A: The stock price impact of a win combined with an unexpected negative performance of the archrival should be higher than the one of a win combined with an unexpected positive performance of the archrival.

Hypothesis 2B: The stock price impact of a loss (in absolute value) combined with the unexpected negative performance of the archrival should be lower than the one of a loss combined with the unexpected positive performance of the archrival.

Methodology and Research Design

The Stock Market Reaction to Game Results

We use the event study methodology to analyze the impact of sports performance of soccer clubs on their stock prices. Event studies are widely used in finance to analyze the effect of specific events on the stock market. In this case, the event is the game result, namely win, draw, or loss.

The daily stock returns for the teams are calculated as $R_t = \ln(P_t) - \ln(P_{t-1})$, where R_t is the return for day t , P_t and P_{t-1} are the closing prices on day t and day $t - 1$, respectively. *FTSE Italia All Share index* is used in the study since these two Italian soccer clubs are both included in this index. We use the market model to calculate normal returns for each club. The model is defined as follows:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_i, \quad (1)$$

where R_{it} and R_{mt} are the returns of stock i and market index at day t , and β_i is the sensitivity of stock prices to market return. The abnormal returns are calculated for each team separately as:

$$AR_{it} = R_{it} - (\hat{\alpha}_i + \hat{\beta}_i R_{mt}), \quad (2)$$

where AR_{it} is the abnormal return for stock i at time t , $\hat{\alpha}_i$, and $\hat{\beta}_i$ are the estimated values of the parameters of Equation 1. Therefore, the abnormal return is the difference between the actual return and the normal (expected) return. The abnormal returns are calculated for the first trading day following a game day and we use a one-day window as the event period so as to prevent the effect of an overlapping game. In order to estimate the parameters in Equation 1, an estimation period not overlapping with the event period should be used. Since soccer games are played more frequently (at minimum on a weekly basis during the regular season) compared to other events considered in finance, we cannot use pre-event data as an estimation window. Thus, we follow the approach of Brown and Hartzell (2001), Scholtens and Peenstra (2009),³ and Palomino et al. (2009) and include a whole sample period available as the estimation period.

The effect of game results on abnormal returns are analyzed through the regression models by including additional variables. We run the following ordinary least squares (OLS) regressions to verify the consistency with previous literature results:

$$AR_t = \alpha + \beta_1 \text{Win}_t + \beta_2 \text{Loss}_t + \beta_3 \text{Control Variables}_t + \varepsilon_t. \quad (3)$$

$$AR_t = \alpha + \beta_1 \text{Goal difference}_t + \beta_2 \text{Control Variables}_t + \varepsilon_t. \quad (4)$$

where AR_t is the abnormal return the first day following a game, Win_t and Loss_t are dummy variables measuring the outcome of a soccer game: Win_t (Loss_t) variable takes the value of 1 if the team wins (loses) and 0 otherwise. The Goal difference_t variable is the difference between the number of goals scored and number of goals conceded.⁴ A positive (negative) value reflects a win (loss), whereas a value of zero means a draw. Compared to the win/loss dummy variable, the goal difference variable also considers the magnitude of a win or a defeat as investors can react strongly to a win (loss) with a higher positive (negative) goal margin. $\text{Control Variables}_t$ is a vector of the following variables included, consistent with previous studies:

Post-March is a dummy equal to one when games are played after March. It is used because the games toward the end of the season are more important in determining the final position of the club in the championship (Palomino et al., 2009);

Away-Game is a dummy equal to 1 if the game is an away game and 0 for a home game (Zuber et al., 2005);

Two more dummy variables are introduced because the teams compete in different competitions such as domestic league, domestic cup games, and European games. *Serie A* is equal to 1 if the game is a domestic league game and 0 otherwise; *European Cup* dummy is equal to 1 if the game is played in either the UEFA League or the Champions League (Demir & Danis, 2011; Palomino et al., 2009; Zuber et al., 2005);

Finally, *Lazio* is a dummy variable equal to 1 if Lazio is playing and used to separate the impact of the two clubs.

The Stock Market Reaction to the Archrival's Performance

The models in Equations 3 and 4 are in line with the previous literature because they only analyze the impact of a team performance on its stock price, and we used them as a preliminary check to show the consistency of the data with the literature results.

To consider the interaction among the performance of a team and its archrival, we initially create dummy interaction variables, namely *Win-Win*, *Win-Loss*, *Loss-Win*, and *Loss-Loss*. For example, a *Win-Win* (*Loss-Loss*) dummy variable takes the value of 1 if the considered team and its archrival both win (lose) on the weekend in a Serie A game and 0 otherwise.

The reaction of fan investors to the combined effect of their favorite team's performance and of the archrival's performance can also occur due to fundamentals of the team economics. As these two teams get closer to each other in terms of rankings in Serie A, the fan investors could give more weight to the performance of their archrival because the final position of their team will be directly related to their archrival's performance. To control this characteristic, we introduce the ranking difference (*Ranking Difference*) between the two teams in terms of their league positions in the model. Model 1 in the following equation allows us to test the Hypotheses 1A and 1B.

$$AR_t = a + \beta_1 WinWin_t + \beta_2 WinLoss_t + \beta_3 LossWin_t + \beta_4 LossLoss_t + \beta_5 Ranking\ Difference_t + \beta_6 Away\ game_t + \beta_7 PostMarch_t + \beta_8 Lazio_t + \varepsilon_t. \quad (5)$$

To further investigate the interaction between the performance of a team and its archrival, we also include dummy interaction variables by considering the unexpected performance of the archrival. The fans should be more interested in the unexpected performance of their archrival as the mood of fan investors should be more positively (negatively) affected after an unexpected loss (win) of the archrival.

We follow the approach of Zuber, Yiu, Lamb, and Gandar (2005) to determine the unexpected performance of the archrival by using the final odds. In soccer betting, the abbreviation for a home win, a draw, and an away win is 1, *x*, and 2, respectively, and their odds reflect the subjective expectations of the bookmaker. We obtain the Subjective Winning Probabilities (SWP) by taking the inverse of final odds (1/odd) set for Roma and Lazio in each game. If SWP is more than 0.6 (less

Table 1. Positive/Negative Surprise Performance Based on Odds.

Game	Game Date	1	X	2	SWP	Expected Result	Actual Result	Surprise Variables
Roma–Sampdoria	April 25, 2010	1.45	4.07	7.27	0.69	W	L	PS
AC Milan–Roma	May 24, 2009	1.74	3.39	4.69	0.21	L	W	NS
Lazio–Cagliari	January 25, 2009	1.63	3.39	5.73	0.61	W	L	PS
Chievo–Lazio	February 20, 2005	2.26	2.85	3.2	0.31	L	W	NS

Note. 1, X, and 2 represent the odds for home win, draw, and away win, respectively. The subjective winning probability (SWP) equals the inverse of the final odds. When SWP is more than 0.6, a team is expected to win; when it is between 0.4 and 0.6, it is expected to draw; and when it is less than 0.4, it is expected to lose. The surprise variables can be a positive surprise (PS) or a negative surprise (NS). The variable PS is equal to 1 when the actual result of the archrival is worse than the expected one and 0 otherwise. The variable NS is equal to 1 when the actual of the archrival is better than the expected one and 0 otherwise.

than 0.4), a team is expected to win (lose) the game, whereas if SWP is between 0.4 and 0.6, a team is expected to draw. We also test the 0.35–0.65 threshold levels instead of 0.4–0.6, but the results do not change. In accordance with the literature, we prefer to include the latter for the purpose of determining the expectations.

From the viewpoint of a team, a PS occurs when the archrival is expected to win but achieves a draw or a loss; a Negative Surprise (NS) occurs when the archrival is expected to lose but achieves a draw or a win. Table 1 presents examples of obtaining surprise variables by using the odds. For instance, on April 25, 2010, Roma had a home game against Sampdoria. The odds were set as 1.45 for a home win for Roma, 4.07 for draw, and 7.27 for an away win for Sampdoria. A bettor who put 1 euro on Roma (Sampdoria) received 1.45 euro (7.27 euro), which means 45% (627%) of profit. SWP is found to be 0.6897 by taking the inverse of odds set for Roma. As the SWP is above 0.6, Roma was expected to win the game; however, the game ended with the defeat of Roma. For Lazio supporters, this result was defined as a PS since the game ended negatively from what was expected.

In order to achieve the interaction between the performance of a team and the unexpected performance of its archrival, we create four dummy interaction variables for *Win-Positive Surprise of the archrival (WPS)*, *Win-Negative Surprise of the archrival (WNS)*, *Loss-Positive Surprise of the archrival (LPS)*, and *Loss-Negative Surprise of the archrival (LNS)*. More specifically, the *WPS* dummy variable takes the value of 1 if the considered team wins and its archrival has a negative unexpected performance on the weekend in a Serie A game and 0 otherwise. The other variables are set accordingly.

Model 2 in the following equation allows us to test Hypotheses 2A and 2B.

$$AR_t = a + \beta_1 WPS_t + \beta_2 WNS_t + \beta_3 LPS_t + \beta_4 LNS_t + \beta_5 \text{Ranking Difference}_t + \beta_6 \text{Away Game}_t + \beta_7 \text{PostMarch}_t + \beta_8 \text{Lazio}_t + \varepsilon_t \quad (6)$$

Table 2. Market Reactions to Game Results.

	(1) AR	(2) AR	(3) AR	(4) AR	(5) AR	(6) AR
Constant	-0.0064** (0.003)	-0.0045*** (0.002)	-0.0096*** (0.003)	-0.0076*** (0.002)	-0.0157*** (0.006)	-0.013** (0.005)
Win	0.0145*** (0.004)		0.0154*** (0.004)		0.0168*** (0.004)	
Loss	-0.0081* (0.004)		-0.0083** (0.004)		-0.0084** (0.004)	
Goal Difference		0.0062*** (0.001)		0.0065*** (0.001)		0.007*** (0.001)
Away—Game					0.0062** (0.003)	0.0062** (0.003)
Serie A					0.0027 (0.005)	0.0023 (0.005)
European Cup					0.0008 (0.006)	-0.0002 (0.006)
Post-March					0.0012 (0.004)	0.0027 (0.003)
Lazio			0.0071** (0.003)	0.0071** (0.003)	0.0071** (0.003)	0.0071** (0.003)
N	665	665	665	665	665	665
R ²	.06	.07	.07	.08	.07	.08

Note. This table reports the results of regression in Equation 3; columns 1 and 3 and 5, and Equation 4; columns 2, 4, and 6. In Equation 3, we regress the *Abnormal Return (AR)* on two dummy variables. The dummy variables are *Win*, equal to 1 if the team wins, 0 otherwise, and *Loss* equal to 1 if the team loses and 0 otherwise. In Equation 4, we regress the *Abnormal Return* on the variable *Goal Difference*, the difference between the goals scored and the goals conceded. Both equations share the same set of control variables. They are defined as follows: *Away-Game*, equal to 1 if the game is an away game and 0 otherwise; *Serie A*, equal to 1 if the game is a domestic league game and 0 otherwise; *European Cup*, equal to 1 if the game is played in UEFA League or Champions League and 0 otherwise; *Post-March*, equal to 1 when games are played after March and 0 otherwise; *Lazio*, equal to 1 if Lazio is playing and 0 otherwise. Standard errors are given in parentheses.

***Represents statistical significance at 1%. **Represents statistical significance at 5%. *Represents statistical significance at 10%.

Results

The Stock Market Reaction to the Game Results

Table 2 presents the regression results for Roma and Lazio (Equations 3 and 4). The regression in column 5 confirms that there is a statistically significant positive (negative) reaction to a win (loss). As stated in previous literature, investors are sensitive to the performance of teams. As for the regression in column 6, where we replace win/loss variables with the goal difference variable, it is found that the coefficient for goal difference is 0.007 (statistically significant at 1% level). This confirms the importance of high scoring wins/losses for these two clubs.

With regard to the control variables, the coefficient for away games is .0062 (statistically significant at 5% level) in both models. The performance of a team at an away venue matters for the investors. The other control variables are not significant. Although the games after March are important in terms of determining the final position of teams in competitions, the *PostMarch* dummy does not have a significant impact on the market reaction. The investors do not distinguish the importance of games whether they are played before or after March. The teams benefit more from European games through more gate receipts, monetary awards, greater recognition and broadcasting revenues; however, no statistically significant relation is found between European Cup dummy and market reaction.

The Stock Market Reaction to the Archrival's Performance

Table 3 summarizes the estimates of Model 1 (Equation 5) considering Hypotheses 1A and 1B and Model 2 (Equation 6) considering Hypotheses 2A and 2B in the second section. Columns 1 and 3 refer to Model 1, whereas columns 2 and 4 refer to Model 2.

With regard to Model 1, the coefficient estimates for *WinWin* and *WinLoss* are 0.0122 and 0.0097 and they are both statistically significant at 5%. A formal test of equality of coefficients reflects that the coefficient estimates for *WinWin* and *WinLoss* are not statistically different from each other. Therefore, Hypothesis 1A is not confirmed. The coefficient estimates for *LossWin* and *LossLoss* variables are -0.0119 and -0.0171, respectively (both statistically significant at 5% level). Again, a formal test of the equality of coefficients leads to the result that the coefficients for *LossWin* and *LossLoss* are not statistically different from each other. Thus, Hypothesis 1B is also not supported by the findings. These results indicate that although fan investors can observe the performance of both their favorite team and the archrival, the performance of the archrival does not affect the stock market reaction to the performance of the favorite team. We conclude that the emotions stirred up by a win (loss) of the archrival are not sufficient to influence the stock market reaction to the result of the favorite team.

The previously mentioned result may occur as the win and loss variable for the archrival includes both expected and unexpected results, whereas it is reasonable to assume that the unexpected results of the archrival play a more important role in terms of mood effects on the investors. Model 2 (Equation 6) and columns 2 and 4 in Table 3, disentangles these dimensions using the interactions between the team results and the surprise variables, PS and NS. The coefficient estimates for the interaction variables *WPS* and *WNS* are .018 and .0173, statistically significant at 1% and 10% level. The test of equality of coefficients indicates that those two coefficients are not statistically different from each other. Thus, the positive market reaction following the win is not significantly affected by the unexpected (positive or negative) performance of the archrival. The estimates do not support Hypothesis 2A.

Table 3. Market Reactions to the Archrival's Performance.

	(1) AR	(2) AR	(3) AR	(4) AR
Constant	-0.0025 (0.003)	-0.0044* (0.0026)	-0.0032 (0.004)	-0.0058 (0.0036)
WinWin	0.0124** (0.0052)		0.0122** (0.005)	
WinLoss	0.0095** (0.0052)		0.0097** (0.005)	
LossWin	-0.0118** (0.0053)		-0.0119** (0.005)	
LossLoss	-0.0167** (0.0066)		-0.0171** (0.007)	
WPS		0.0186* (0.0100)		0.018* (0.0101)
WNS		0.0168*** (0.0055)		0.0173*** (0.0057)
LPS		-0.0065 (0.0092)		-0.0070 (0.0093)
LNS		-0.0201** (0.0086)		-0.02** (0.0087)
Ranking Difference			0.00001 (0.000)	-0.0000 (0.0003)
Away game			0.0002 (0.004)	0.0010 (0.0037)
Post-March			0.0028 (0.004)	0.0033 (0.0043)
Lazio	0.0033 (0.0035)	0.0035 (0.0036)	0.0032 (0.004)	0.004 (0.0041)
N	485	485	485	485
R ²	0.05	0.04	0.05	0.04

Note. This table reports the results of Model 1 in Equation 5; columns 1 and 3 and Model 2 in Equation 6; columns 2 and 4, testing Hypotheses 1A and 1B and 2A and 2B, respectively. In Equation 5, we regress the *Abnormal Return (AR)* on variables representing the interaction between the team and the archrival performance. They are defined as: *WinWin*, equal to 1 if both the team and the archrival win, 0 otherwise; *WinLoss*, equal to 1 if the team wins and the archrival loses, 0 otherwise; *LossWin*, equal to 1 if the team loses and the archrival wins, 0 otherwise; *LossLoss*, equal to 1 if both the team and the archrival lose, 0 otherwise. In Equation 6, the variables represent the interaction between the team and the archrival unexpected performance and are defined as follows: *WPS*, equal to 1 if the team wins and there is a positive surprise (PS) from the archrival (i.e., it is expected to win but it achieves a draw or a loss), 0 otherwise; *WNS*, equal to 1 if the team wins and there is a negative surprise (NS) from the archrival (i.e., it is expected to lose but it achieves a draw or a win); *LPS*, equal to 1 if the team loses and there is a PS from the archrival, 0 otherwise; *LNS*, equal to 1 if the team loses and there is a NS from the archrival, 0 otherwise. Both equations share the same set of control variables. They are defined as follows: *Ranking difference*, the difference between the positions of the two teams in the league; *Away-Game*, equal to 1 if the game is an away game and 0 otherwise; *Post-March*, equal to 1 when games are played after March and 0 otherwise; *Lazio*, equal to 1 if Lazio is playing and 0 otherwise. Standard errors are given in parentheses. ***Represents statistical significance at 1%. **Represents statistical significance at 5%. *Represents statistical significance at 10%.

As for Hypothesis 2B, the coefficients for *LPS* and *LNS* are $-.0070$ (not statistically significant) and $-.02$ (statistically significant at 5%), respectively. This finding reflects that a loss combined with a PS of the rival does not create any investor reaction, showing that the negative effect of the loss is counterbalanced by the PS coming from the archrival's performance. On the contrary, when the loss is associated with an NS the coefficient of *LNS* is -0.02 , representing the strongest negative market reaction among all the regressions. These findings provide evidence to support Hypothesis 2B which claims the negative stock price impact of a loss combined with an NS must be stronger than the one combined with a PS.

We maintain that the asymmetric behavior implied by the acceptance of Hypothesis 2B and the rejection of Hypothesis 2A is in accordance with the principle of hedonic editing (Thaler, 1999) applied to a preference structure consistent with the prospect theory (Kahneman & Tversky, 1979). The hedonic editing rule assumes that people code the combinations of events to make themselves as happy as possible. When the favorite team wins, the fans are focused on the positive emotions stirred up by the result and are almost impervious to other sources of emotions from the archrival's results. In fact, the advantage from considering other possible good news would be less than the disadvantage from considering bad news, because the value function in the region of gains is concave. In contrast, when a loss occurs, they are prone to negative feelings and they look around to find something to bring them comfort. What is better than the unexpected loss of the archrival? In the region of losses, the value function is convex and good news could have an important effect: This would explain the strength of the archrival's loss effect, which is able to counterbalance the favorite team's defeat. However, the unexpected win of the archrival will turn the negative emotions into a worse mood causing a stronger negative market reaction, compared to Model 1 where the archrival performance is not considered.⁵

These results can be further tested replicating the study to other prominent rivalries and a similar analysis can be performed after the European Cup games to check whether *Schadenfreude* still holds against foreign rivals. Another way to extend the study would consider that *Schadenfreude* is not necessarily limited to the archrivals, but it arises when there are the conditions for envy, as documented by neuroscience (Takahashi et al., 2009). The methodology we applied could be used as a tool to gauge the intensity of *Schadenfreude* among teams competing at the comparable levels in the championships: As for soccer, there are more than one listed clubs in Italy, United Kingdom, Turkey, Portugal, and Denmark. The results of such studies could allow to better fit the marketing investments of sponsors and advertising companies taking into account also the negative interactions among the different teams. Another way to extend the results to teams whose shares are not listed may be resorting to experimental methodology. *Schadenfreude* can be triggered by providing negative news/information about the archrival teams to test how it affects the investment and/or consumption decisions of fans.

Conclusion

In this study, we examine the impact of the archrival's performance on a soccer team's stock price by referring to Schadenfreude. On a weekend, fan investors can observe the performance of their favorite team and also that of the archrival: their mood and thus their investment decisions could be affected not only by their favorite team's performance but also by their archrival's performance. We focus on the rivalry between Lazio and Roma (two of Italy's listed soccer teams), which is regarded as one of the most important rivalries in the world of soccer.

We find that fan investors react positively (negatively) to a win (loss) of their favorite team. There is also supportive evidence for the rival effect on stock performance, at least when we consider unexpected performances of the archrival. We use the odds from soccer betting to determine the unexpected performance. From the team's point of view, a PS occurs when, according to the betting odds, a win from the archrival is more probable but instead they achieve a draw or a loss; a NS occurs when the archrival's loss is more probable, but they achieve a draw or a win.

A loss combined with an NS coming from the archrival performance leads to a strong negative market reaction. On the contrary, a loss combined with a PS of the rival does not create any investor reaction, showing that the negative effect of the loss is counterbalanced by the PS coming from the archrival performance. This asymmetric effect is not found for the wins, where the positive effect holds regardless of the performance of the archrival. We can conclude that, at least in this respect, the investors are driven by the passion conveyed by rivalry, which is a source of emotions that are market relevant.

These findings contribute to the literature in two ways. One, this is the first study that analyzes the impact of Schadenfreude in economic decision making. Although current research documents that Schadenfreude affects the fans' emotions, what is not tested is whether or not these emotions could affect decision making. Two, we disentangle the effect of emotions and rational expectations on the stock price of listed soccer clubs by focusing on emotions triggered by the performance of the archrival team. In such a case, the link between emotions and economic performance is weakened or not relevant at all. For instance, the win of the rival negatively affects the emotions of the supporters without exerting any impact (after considering some control variables) on the economic performance of the club. This study therefore helps to understand the pure impact of emotions on the stock performance of soccer clubs.

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Notes

1. Retrieved from http://www.skysports.com/interactive/top_tens_story/0,25722,15881_4561403,00.html.
2. These data are provided by the Italian Stock Exchange. Financial analysts are obliged by Italian law to send the stock exchange a copy of their reports issued on companies listed on the Italian market.
3. Scholtens and Peenstra (2009) use this approach for the robustness of their findings and this method gives results that are in line with the method which uses an estimation period of 250 trading days to calculate the normal returns.
4. The case for determining the result of two-legged games is rather complicated. For example, although the game ended with the victory of Roma to Middlesbrough by 2-1 on March 16, 2006, due to the loss in the first game by 1-0, by away goals rule Roma was eliminated from UEFA Cup. We prefer not to count this game as a win despite the fact that the official result is a win since it led to elimination. Thus, we count this game as a loss. There are a few cases for each club and these two-legged games situations are controlled one by one.
5. The match result of the archrival does not have any impact on the economic performance of the favorite club if both teams are not competing for the same league position. Otherwise, overtaking the rival may give the other team a significant advantage, like the qualification for the Champions League, which then leads to a rise in future income. In this case, a positive abnormal return is caused by simple economics, not by Schadenfreude. Based on the recommendation of one of the reviewers, as a robustness check we exclude the observations when both teams compete for the same position (when the point difference between teams is small enough to fight for the same ranking in the league) and run the same regressions. The results don't change, providing further support to the existence of *Schadenfreude*.

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