



The beautiful game and abnormal returns: The impact of match outcomes and ex-ante expectations on a football club's stock price

An event study

Peter Frijns

Supervisor: Associate Professor Francisco Santos

Master thesis, Economics and Business Administration

Major: Finance

NORWEGIAN SCHOOL OF ECONOMICS

This thesis was written as a part of the Master of Science in Economics and Business Administration at NHH. Please note that neither the institution nor the examiners are responsible – through the approval of this thesis – for the theories and methods used, or results and conclusions drawn in this work.

Acknowledgements

First and foremost, I would like to thank my supervisor, Associate Professor Francisco Santos, for providing great guidance throughout this semester and for showing genuine interest in the research topic. I would also like to thank my friends who provided me with advice and helped me to collect the necessary data for this study. Lastly, I would like to express my gratitude towards the NHH library staff who kindly assisted me to access information while working remotely.

Abstract

The aim of this study is to examine the stock price reaction of listed football clubs to different types of match outcomes and the ex-ante expectations about the outcomes. Analysing 8472 matches of 22 European football clubs in the period 2007 – 2019, I report that a win results in a positive cumulative abnormal return of 0.61% within the first three trading days after a match. A draw and a loss lead to a negative cumulative abnormal return of -1.07% and -1.92%, respectively. Moreover, for wins and draws I find strong evidence that ex-ante expectations about match outcomes influence the impact on abnormal return. An outcome that constitutes a surprise has a stronger impact on abnormal return than an expected outcome. Highly expected wins are anticipated by investors in advance and do not lead to a significant stock market reaction, while surprise wins result in a big positive cumulative abnormal return of 3.29%. Similarly, the negative effect on cumulative abnormal return of draws is -0.74% for medium expected draws and -1.41% for surprise draws. While the results for losses are not conclusive, there is some weak evidence that suggests that the negative effect on abnormal return of a loss is stronger the more surprising a loss is. Furthermore, I find that domestic match outcomes and European match outcomes do not result in different stock price reactions. Similarly, I report that the effects on abnormal return of wins, draws and losses in the Champions League are not statistically different from the effects of wins, draws and losses in the Europa league, respectively. Lastly, I find that winning a final has no impact on abnormal return, while losing a final leads to a very substantial drop of a football club's stock price.

Table of Contents

Acknowledgements.....	2
Abstract.....	3
Table of Contents.....	4
1. Introduction.....	5
1.1. Background.....	5
1.2. Aim of the study and research approach.....	6
1.3. Findings.....	7
1.4. Existing literature.....	8
1.5. Paper outline.....	10
2. Data and methodology.....	11
2.1. Data collection.....	11
2.2. Methodology.....	13
2.3. Abnormal return calculation.....	14
2.4. Betting odds and probabilities.....	15
2.5. Variables.....	17
3. Empirical analysis.....	18
3.1. The effect of match results.....	19
3.2. The effect of level of surprise.....	21
3.3. The effect of European vs. domestic match results.....	24
3.4. The effect of Champions League and Europa League.....	26
3.5. Match result, level of surprise and Europe vs. domestic.....	27
3.6. The effect of wins and losses in finals.....	28
4. Robustness checks.....	30
4.1. Overlap robustness check.....	30
4.2. Low volume robustness check.....	32
5. Conclusion.....	35
References.....	37
Appendices.....	38

1. Introduction

1.1. Background

Football¹ is the world's most popular sport.² Football is also a business, and money is key. According to the most recent edition of the Deloitte Football Money League the 20 highest earning football clubs in the world generated €9.3 billion of combined revenue in the 2018/2019 season. Not only is this number staggeringly high, the combined revenue of the top 20 football clubs has also been growing rapidly: 3 billion over the last 5 years. The three main sources of revenue for a football club are 1) matchday revenues such as ticket sales; 2) broadcasting rights; and 3) commercial sources such as sponsors and merchandise. In addition, football clubs can generate income through player transfer fees (Deloitte, 2020). Since money plays such a key role in football, some football clubs turn to the stock markets for capital. In 1983 Tottenham Hotspurs³ became the first stock listed football club. Many clubs followed this example, as stock market flotation was especially popular in the 1990s. Various of these clubs have been delisted in the subsequent years after a takeover by wealthy individuals or after poor stock performance (Aglietta, Andreff, & Drut, 2010). Nevertheless, some notable football clubs such as Manchester United, Juventus and Borussia Dortmund are still listed on the stock exchange. The on-field performance of football clubs is expected to impact their market valuation since winning football matches is likely to increase future cash flows in a number of ways. Firstly, the income from TV deals is distributed according to the end of season league position. Secondly, winning domestic games increases a club's chances of qualifying for the lucrative Champions League or Europa League and winning European games increases the chances of progressing further in these lucrative competitions. Thirdly, strong on-field performance increases the income generated through ticket sales, merchandising and sponsorships. Fourthly, it is reasonable to assume that positive match results are accompanied by strong individual performances of a team's football players. This increases their value on the transfer market (Palomino, Renneboog, & Zhang, 2009). For all these reasons, football match

¹ In some parts of the world this sport is called soccer. I will refer to it as football throughout this paper.

² This is a defensible statement. The 2018 FIFA World Cup Final was watched by over 3.5 billion people (FIFA, 2018) and with 4 billion fans worldwide football is the sport with the most fans around the globe (Sawe, 2018).

³ Tottenham Hotspurs is no longer listed on the stock market.

outcomes are considered to be price sensitive information that should have an impact on a club's stock price.

1.2. Aim of the study and research approach

The aim of this study is to investigate the stock market reaction to different types of match outcomes. Given that on-field performance affects the future cash flows of a football club, wins are expected to result in stock price increases, while losses are expected to result in a drop of the stock price. Furthermore, in this study I examine if the ex-ante expectations about the outcome of a match influence the magnitude of the stock price reaction. I expect that the bigger the level of surprise of a match outcome is, the bigger the subsequent stock market reaction. Under the efficient market hypothesis, a club's current stock price should reflect all information available to the investor, including expectations about outcomes of upcoming matches. A highly expected result should therefore only have a minimal effect on the stock price, while a surprise result should lead to a strong market reaction. Moreover, I test if there are any differences between the stock price reaction after a domestic league game and the stock price reaction after a European game (Champions League & Europa League). Because of the lucrative and prestigious nature of the European competitions the results of European matches are expected to have a stronger effect on a football club's stock price than the results of domestic matches. I also examine if the effect on abnormal return following a Champions League game is different from the effect following a Europa League game. Finally, I investigate the stock market reaction after finals. Strong stock market reactions are anticipated following a final given the huge importance of such a match.

To answer these research questions, I conduct an event study to analyse the effect of football match results on the abnormal return of stock listed football clubs. Using betting odds, I calculate implied probabilities to assess the impact of ex-ante expectations. I analyse 8472 matches of 22 European football clubs in the period 2007 – 2019. Unlike the majority of previous research on this topic this study uses a sample that is not limited to clubs from one country but consists of a mix of clubs from 11 different European countries. In addition, this study adds value because the number of matches under analysis is greater than in any existing study and the period of analysis is much more recent. I also

contribute to the literature by introducing a novel way to distinguish highly expected and surprise match outcomes, so that the results of the analysis are consistent with what one would expect to find. Lastly, this study is the first to look at 1) the effect of match outcomes in finals on abnormal return and 2) the difference in effects on abnormal return between Champions League games and Europa League games.

1.3. Findings

I find that a win results in a positive cumulative abnormal return of 0.61% within the first three trading days after a match. A draw and a loss lead to a negative cumulative abnormal return of -1.07% and -1.92%, respectively. Indeed, a win is considered to be good news, while a draw and a loss are considered to be bad news. The negative effects resulting from a draw and a loss are stronger than the positive effect resulting from a win. Also, I find that the effect of a win is incorporated in the stock price quicker than the effects of draws and losses. Regarding the effect of ex-ante expectations about match outcomes the findings provide evidence that the level of surprise of a result amplifies the stock market reaction. Highly expected wins do not lead to a significant stock market reaction, whereas surprise wins result in a positive cumulative abnormal return of 3.29%. Similarly, the negative effect on abnormal return of a draw doubles when the draw is considered a surprise. For losses I find that the effects of the different levels of surprise on abnormal return are not statistically differentiable and thus I cannot conclude that the ex-ante expectations about match outcomes affect the magnitude of the stock market reaction. However, there is some evidence in the results as well as in the robustness check that suggests that highly expected losses have a weaker negative effect on abnormal return than more surprising losses. Moreover, I find that there are no differences between the stock price reaction after a domestic league match outcome and the stock price reaction after a European match outcome. The only exception to this is that a surprise European win results in a higher positive abnormal return than a surprise domestic win. Additionally, wins, draws and losses in the Champions League do not impact abnormal return differently than wins, draws and losses in the Europa League, respectively. Lastly, based on a limited sample of match results in finals, I find that winning a final has no impact on abnormal return, while losing a final leads to a very substantial drop of a football club's stock price.

1.4. Existing literature

The existing literature on this topic is rather limited and the findings of the previous research are contradicting at times. In this section I cover the main findings of the existing literature and compare them to my own findings.

Analysing a sample of 840 matches of English and Scottish listed football clubs over a period of three seasons between 1995 – 1998, Renneboog and Vanbrabant (2000) observe a positive cumulative abnormal return of 1.3% within five days following a win and a negative cumulative abnormal return of -1.7% and -2.5% following a draw and loss, respectively. Although the effects are slightly stronger in both directions than the effects that I find, these results are in line with the findings of this paper. Renneboog and Vanbrabant also find that the effects are consistent across domestic and European matches and that much larger abnormal returns are generated following games that are considered promotion and relegation games.

In contrast, Benkraiem, Louhichi and Marques (2009), using a sample of 745 matches of European clubs during the 2006/2007 season, find that a win does not lead to a positive abnormal return on the days following the match but rather is anticipated prior to the match. They report a statistically significant abnormal return of 0.70% on the last trading day before a win. They attribute this result to the allegiance bias (Edmans, Garcia, & Norli, 2007), stating that a club's supporters, who hold a significant portion of a club's capital, consider a win to be the norm for their team. While the days before a match are not a topic of analysis in this study, my finding of the positive effect on abnormal return after a win contradicts the finding of their research. Benkraiem et al. also report negative abnormal returns on the first trading day after a draw and after a loss of -0.27% and -1.90%, respectively. Additionally, they identify increased trading volumes on the days around matches, which implies that match results are price sensitive information.

Palomino et al. (2009) study 916 football matches of clubs from the United Kingdom in the period 1999 – 2002. They find that the cumulative abnormal returns within the first three days following a match amount to 0.88% for a win and -1.01% for a loss. Their study finds that draws do not have a statistically significant effect on abnormal return, which is different to my results, as I find a statistically significant

negative effect. In line with the findings of this paper, Palomino et al. observe that the effect of a win is incorporated in stock price faster than the effect of a loss. Moreover, they investigate if the ex-ante expectations about a game's outcome influence the stock market reaction. They counterintuitively find that the market reaction to a win is stronger the higher the probability of the win. They do, however, also find that the market reaction to a loss is weaker the higher its ex-ante probability. The contribution of my paper is that, in contrast to the results of Palomino et al., I show that the more expected a win was prior to the game, the weaker the positive effect on abnormal return.

Using a sample of 1274 matches of European clubs between 2000 – 2004, Scholtens and Peenstra (2009) report a positive abnormal return of 0.36% on the first trading day following a win and a negative abnormal return of -1.10% and -1.41% following a draw and loss, respectively. These findings are in line with mine. Furthermore, they analyse if expected and unexpected outcomes result in a different market reaction. They label a win (loss) as expected when the ex-ante most likely outcome of a match is a win (loss) and as unexpected when the ex-ante most likely outcome of a match is a loss (win). I argue that this method is partially flawed. When the ex-ante probabilities of a win and a loss are rather similar, neither result is clearly expected or unexpected. For that reason, I employ a method in this paper that compares the probabilities relative to each other to determine whether a result is a surprise. Scholtens and Peenstra find that unexpected results in European matches result in a stronger stock market response than expected results. For domestic matches, however, they find that expected and unexpected wins do not affect abnormal return differently and, surprisingly, that expected losses have a stronger negative impact on abnormal return than unexpected losses. Lastly, they report that the stock market reacts stronger to results in European matches than to results in domestic matches. I do not observe a difference between European and domestic matches.

Finally, Bell, Brooks, Matthews and Sutcliffe (2012) analyse a sample of 5187 matches of English clubs between 2000 – 2008. They employ a regression model with various variables to examine their impact on the football clubs' stock prices. They find that points surprise, which is the actual amount of points gained from a match minus the ex-ante expected amount of points derived from betting odds, has a

positive influence on stock return. This is consistent with the idea that surprising match results lead to stronger stock market reactions than expected match results.

1.5. Paper outline

The remainder of this paper is organised as follows. First, section 2 covers the data collection, the methodology and the calculations of the abnormal return and the implied probabilities. Then, in section 3 I present the results of the empirical analysis. After that, I test the robustness of the results in section 4. Lastly, in section 5 I present the conclusions of this study.

2. Data and methodology

In this section, I first describe how I collect the data for this study. Next, I shortly explain how the event study methodology is applied in the setting of this study. Then, the calculation of abnormal returns is clarified, followed by a section dedicated to betting odds and match outcome probabilities. Lastly, the variables used in this study are listed.

2.1. Data collection

The first step of the data collection is deciding which football clubs to collect data for. The STOXX Europe Football Index is an index covering listed football clubs in Europe (STOXX, 2020). This study uses the components of the STOXX Europe Football Index as a sample.⁴ In addition, Manchester United, arguably the most well-known listed football club, is added to the sample. Since Manchester United is listed on the New York Stock Exchange in the US the club is not a component of the STOXX Europe Football Index. However, given its size it seems valuable to include the club in the analysis. As a result, the sample of this study consists of 22 football clubs from 11 different countries: Aalborg, Aarhus, Brøndby, FC Copenhagen and Silkeborg from Denmark; Olympique Lyonnais from France; Borussia Dortmund from Germany; AS Roma, Juventus and Lazio Roma from Italy; Ajax from the Netherlands; Ruch Chorzow from Poland; Benfica, FC Porto and Sporting CP from Portugal; AIK Fotboll from Sweden; Besiktas, Fenerbahce, Galatasaray and Trabzonspor from Turkey; Manchester United from England; and Celtic from Scotland.

Information about historical match results and the accompanying betting odds of bookmakers Bet365 and Pinnacle are retrieved from indatabet.com (Indatabet, 2020). These data include the exact score of thousands of football matches and the betting odds of each match outcome (win/draw/loss). For the sample of 22 football clubs, 7972 matches are identified in the period from August 2007 until December 2019. Because a football match where two clubs of the sample play against each other is counted as an event for both clubs, the total number of events increases to 8472. The matches include domestic league games as well as Champions League games, Europa League games and games in the English Football

⁴ FK Teteks, a North Macedonian football club that is a part of the STOXX Europe Football Index, is excluded from the sample, since it is a very small club and I was unable to obtain the club's stock price data.

League Cup (Manchester United). Results and betting odds of national cup games other than the English Football League Cup are not included in the indatabed.com dataset and are consequently not a part of this study. An overview of the amount of wins, draws and losses for each football club can be found in Table 1. The table shows that over half of the matches resulted in a win and only 3 out of 22 football clubs recorded more losses than wins. This is an indication that the clubs in the sample are in general the top performers of their respective leagues.

Table 1
Overview of match results per football club

<i>Football club</i>	<i>Country</i>	<i>Win</i>	<i>Draw</i>	<i>Loss</i>	<i>Total</i>
Aalborg	Denmark	100	68	97	265
Aarhus	Denmark	94	67	98	259
Brøndby	Denmark	137	70	88	295
FC Copenhagen	Denmark	195	85	80	360
Silkeborg	Denmark	86	59	107	252
Olympique Lyonnais	France	261	123	128	512
Borussia Dortmund	Germany	274	123	118	515
AS Roma	Italy	218	101	101	420
Juventus	Italy	299	96	53	448
Lazio Roma	Italy	208	92	124	424
Ajax	Netherlands	336	116	83	535
Ruch Chorzow	Poland	62	50	81	193
Benfica	Portugal	334	87	80	501
FC Porto	Portugal	344	85	63	492
Sporting CP	Portugal	270	104	103	477
AIK Fotboll	Sweden	153	75	62	290
Besiktas	Turkey	189	77	71	337
Fenerbahce	Turkey	169	84	65	318
Galatasaray	Turkey	156	73	74	303
Trabzonspor	Turkey	126	82	96	304
Manchester United	UK (England)	345	118	117	580
Celtic	UK (Scotland)	254	70	68	392
Total		4610	1905	1957	8472

This table shows the number of wins, draws and losses for each football club as well as the country they are from. The matches are games played in the domestic leagues, Champions League, Europa League and English Football League Cup in the time period August 2007 – December 2019.

To get stock price data of the listed football clubs Thomas Reuters Eikon is used. For each club I retrieve the daily adjusted close price and the daily trading volumes. In addition, I retrieve the daily adjusted close prices of the indexes of the markets on which the football clubs are listed. These are: the OMX Copenhagen 25 Index for the Danish clubs, the CAC 40 Index for Olympique Lyonnais, the DAX Index for Borussia Dortmund, the FTSE MIB Index for the Italian clubs, the AEX Index for Ajax, the WIG 20 Index for Ruch Chorzow, the PSI 20 Index for the Portuguese clubs, the OMX Stockholm 30 for AIK Fotboll, the BIST 100 Index for the Turkish clubs, the S&P 500 Index for Manchester United and the FTSE 100 Index for Celtic.

2.2. Methodology

To examine the effects of match results and the expectations about match results on the stock prices of listed football clubs I conduct an event study around the dates of football matches. Event studies are particularly well-suited to investigate stock market reactions to a specific event or type of events (MacKinlay, 1997). In this study, the events of interest are the football matches played by the sample of clubs. The stock price reactions on the three trading days following each match are investigated. The reason I look at the first three trading days following a match is that the effect of a certain match outcome might not be fully incorporated in the stock price immediately on the first trading day after a match, but rather is absorbed over a few days. Extending the amount of days too far, however, would result in numerous overlaps of events, given that football clubs play matches regularly. Additionally, Palomino et al. (2009) also use three days in their study. Adopting the same approach allows for an easy comparison of the results. The potential problem of overlap caused by football clubs playing multiple matches within quick succession certainly exists also when using three days. Therefore, one of the robustness checks in section 4 deals with this issue and tests if the results hold when controlling for overlap.

It is important to properly identify which are the first three trading days following a match. Football matches are often played on the weekend. Games played during weekdays are almost always played in the evening (Champions League, Europa League) and thus outside trading hours. In this study I therefore assume that the last trading day before a match, i.e. the last trading day where the result of the

match is still unknown, is the Friday before a match if the match is played on the weekend and the day itself if the match is played on a trading day. This means that, for example, the first three trading days after a game played on Saturday are the following Monday, Tuesday and Wednesday. The first three trading days after a Europa League game played on Thursday evening are the following Friday, Monday and Tuesday. A possible limitation of this method could be that if a match is played during trading hours on a trading day the result of this match can already affect the stock price on the day itself. It is worth mentioning that Manchester United might be especially prone to this, since the club is listed on the New York Stock Exchange. A Manchester United evening game on a trading day might fall within the trading hours because of the time difference between the US and Europe. However, the effects of this limitation are very minimal given that the number of matches in the dataset that are played during trading hours is very small.

2.3. Abnormal return calculation

To assess the impact of match results on the stock prices of football clubs I examine the abnormal stock returns on the first three trading days following a match. The abnormal return is the difference between the actual return of a stock and the expected or ‘normal’ return of a stock. The expected return is the return of a stock one would expect in the absence of an event. The choice of model for calculating normal returns in event studies has been discussed extensively in the literature. Cable and Holland (1999) find that the market model generally outperforms other models in predicting hypothetical normal returns. However, they also find that the predictive power of all the models is low. The models are at best blunt instruments that cannot be distinguished forensically. For this reason, I use the market adjusted model to determine the expected returns:

$$R_{it} = R_{mt}$$

This model states that the expected return of stock i on day t (R_{it}) is equal to the return of the market on day t (R_{mt}). This model makes quite some bold assumptions, such as the beta of the stock being equal to 1. Most researchers therefore opt to use more advanced methods to calculate expected return, such as the market model or CAPM. But given Cable and Holland’s finding that the more sophisticated

models hardly produce better estimates using this simpler model seems justified. The fact that the findings that are presented later in this paper are largely in line with what one would expect further suggests that using the market adjusted model to determine the expected returns is appropriate. Thus, I calculate the abnormal returns in the following way:

$$AR_{it} = R_{it} - R_{mt}$$

The abnormal return of stock *i* on day *t* (AR_{it}) is equal to the return of stock *i* on day *t* (R_{it}) minus the return of the market on day *t* (R_{mt}). I use the local market index as outlined in section 2.1. as a proxy for the market return for each football club. The abnormal returns on the first, second and third trading day after a football match are labelled AR1, AR2 and AR3, respectively. The cumulative abnormal returns for the first two and first three trading days following a football match are labelled CAR2 and CAR3, respectively, and are calculated by taking the sum of the abnormal returns:

$$CAR_{it} = \sum_{t=1}^{t=T} AR_{it}$$

2.4. Betting odds and probabilities

Palomino et al. (2009) find that betting odds are excellent predictors of game outcomes and thus can be used as an appropriate tool to represent the ex-ante expectations about match outcomes. The betting odds in the dataset are decimal odds for each possible outcome, for example: 1.88 for a win, 3.40 for a draw and 4.39 for a loss. The odds represent the amount, including the original stake, one would receive per betting unit for predicting the correct outcome. Because the dataset contains the betting odds of two different bookmakers, this study uses the average of the two for each outcome. These average odds are used to calculate the implied probability for each outcome, similar to Palomino et al. (2009):

$$probWin = \frac{\frac{100}{oddWin}}{\frac{100}{oddWin} + \frac{100}{oddDraw} + \frac{100}{oddLoss}} * 100\%$$

$$probDraw = \frac{\frac{100}{oddDraw}}{\frac{100}{oddWin} + \frac{100}{oddDraw} + \frac{100}{oddLoss}} * 100\%$$

$$probLoss = \frac{\frac{100}{oddLoss}}{\frac{100}{oddWin} + \frac{100}{oddDraw} + \frac{100}{oddLoss}} * 100\%$$

To calculate the implied probability of a win I first calculate how much one would have to bet in order to receive 100 if the prediction of the win is correct. Using the example betting odds listed above: $100/1.88 = 53.19$. Next, I calculate the required betting amount in order to receive 100 for a draw and for a loss. Again, using the example betting odds listed above: $100/3.40 = 29.41$ and $100/4.39 = 22.78$. The implied probability of a win is then calculated by dividing the amount required to receive 100 for a win by the sum of the amounts required to receive 100 for each outcome: $53.19/(53.19 + 29.41 + 22.78) * 100\% = 50.5\%$. Using the same logic, the implied probabilities for a draw and a loss are 27.9% and 21.6%, respectively.

To test if the stock price reaction depends on the ex-ante expectations about a certain outcome, dummy variables are created. I want to investigate if a result that was highly anticipated in advance yields a different abnormal return than a result that constitutes a big surprise. The implied probabilities are used to construct dummy variables that distinguish between three levels of surprise: highly expected results, medium expected results and big surprise results. Creating these dummy variables allows me to classify each match outcome into one of these categories. A highly likely result is a result with an implied probability prior to the game of over 70%. This percentage is chosen arbitrarily. On the one hand, it needs to be high enough for the result to be truly considered highly likely. On the other hand, the number of observations above the cut-off percentage has to be big enough in order to make statistical inferences. In addition, I seek to set the cut-off percentage in such a way so that the number of highly likely results and the number of big surprise results is roughly equal. Using the 70% cut-off, the dataset contains 1441 matches that are categorised as highly likely results. Given the nature of draws, none of the draws in the dataset are classified as a highly likely result. In fact, the highest probability for a draw in the dataset is 36.5%, far below the cut-off value of 70%. To determine when a result is a big surprise one cannot simply use a cut-off percentage. In a game that could go either way and where the probabilities for each outcome are roughly the same, the probability of the result can be rather low, however this does not necessarily constitute a big surprise. Therefore, I categorise a result as a surprise

result based on its probability relative to the probability of the most likely outcome. A result is counted as a surprise result if its probability is less than half of the probability of the most likely outcome. Using the same example odds as earlier: a win and a draw would not be considered to be surprise results, because 50.5% and 27.9% are greater than $50.5\% * 0.5 = 25.25\%$. A loss, however, would be categorised as a surprise result, since 21.6% is less than $50.5\% * 0.5 = 25.25\%$. This method yields 1587 surprise results in the dataset, leaving 5444 results to be categorised as neither highly likely nor big surprise results. These results are labelled medium expected results.

2.5. Variables

The aim of this study is to analyse the market reaction to different types of match outcomes. Various dummy variables are created to distinguish different types of match outcomes. This enables me to observe the impact each type of event has on abnormal return. A differentiation is made between wins, draws and losses; between the different surprise levels of results; between European and domestic results; between Champions League and Europa League results, between results of finals and non-finals; and between European and domestic results combined with the surprise level. Appendix 1 provides an overview of all the variables and their abbreviations.

3. Empirical analysis

To understand the stock price reaction of football clubs to different types of match results I build several panel data regression models. The regression models in this section all account for football club-specific individual fixed effects. However, they do not account for time fixed effects. Controlling for time fixed effects with numerous time dummies affects the constant term and makes it irrelevant. In my models the interpretation of the constant term is important since it represents a certain type of match result. Additionally, in the previously cited research papers of Renneboog and Vanbrabant (2000), Benkraiem et al. (2009), Palomino et al. (2009), Scholtens and Peenstra (2009) and Bell et al. (2012) time fixed effects are not mentioned. For these reasons I do not control for time fixed effects in the models presented in this section. All the models in the following sections follow a similar structure:

$$Abnormal\ return_{it} = constant + \beta_1 * MatchOutcome1_{it} + \beta_2 * MatchOutcome2_{it} + \dots + \varepsilon_{it}$$

The days under consideration are the first three trading days after a match, other days are not included in the analysis. The models contain dummy variables representing different match outcomes plus a constant term that, similar to the dummy variables, captures the effect of a certain match outcome. All the results for the dummy variables presented in the following sections are calculated by summing the result of the dummy variable and the result of the constant term. This is done so that the numbers presented reflect the total impact of a certain match outcome rather than the impact relative to the baseline (the outcome represented by the constant term).

In the following sections I investigate how different types of match outcomes affect the abnormal return of listed football clubs. First, I simply look at the effects caused by wins, draws and losses. Next, I explore if the level of surprise of a result has an impact on the abnormal return. Then, I examine the effects of European and domestic matches and dive deeper into the effects of Champions League and Europa League games. After that, a model is presented that simultaneously considers match outcome, level of surprise of the result and whether the match is played in a European competition or in the domestic competition. Finally, I look at the effects on abnormal return of winning and losing a final.

3.1. The effect of match results

The first and simplest model examines the effect of a match result on the abnormal return of a football club's stock. The regression uses dummy variables for wins and losses. Consequently, the constant term captures the effect of a draw:

$$(1) \quad \text{Abnormal return}_{it} = \text{constant} + \beta_1 * W_{it} + \beta_2 * L_{it} + \varepsilon_{it}$$

Table 2 summarises the results of model 1. As one would expect, a win is seen as good news and thus results in a positive AR1, CAR2 and CAR3 of 0.56%, 0.55% and 0.61%, respectively. A loss is regarded as bad news and leads to a drop in the AR1, CAR2 and CAR3: -1.49%, -1.71% and -1.92%, respectively. Finally, a draw is also considered to be bad news as it produces a negative AR1, CAR2 and CAR3 of -0.80%, -1.09% and -1.07%, respectively. All of these results are highly statistically significant. These findings contrast the finding of Benkraiem et al. (2009) that wins do not affect abnormal return and the finding of Palomino et al. (2009) that draws do not affect abnormal return. The finding that wins lead to positive abnormal returns and losses lead to negative abnormal returns is rather intuitive. The finding that draws negatively affect abnormal returns could be explained by the fact that the football clubs that make up the sample of this study are mostly the top performers of their respective leagues. A draw is not good enough for these clubs and thus constitutes bad news. A win's positive effect on abnormal return indicates that investors do not blindly expect a win. If this were the case, a win would not represent any news to the investors and the stock price would remain unaffected. The t-tests at the bottom of Table 2 show that the effects of a win, a draw and a loss on cumulative abnormal return are statistically different from each other. This means that although draws and losses both result in negative abnormal returns, the negative effect caused by a loss is stronger. Another finding is that the negative abnormal returns following a draw or a loss are greater in absolute terms than the positive abnormal return following a win, which is in line with Scholtens and Peenstra (2009).s This could be due to investors reacting more strongly to bad news than good news.

The main impact of the different match outcomes on abnormal return appears to happen on the first trading day following a match. To investigate this further I run the same regression as in model 1, but now the dependent variables are the abnormal returns of the second and third trading day following a

match instead of the cumulative abnormal returns on those days. This provides insights into how quickly the stock market incorporates the news of a match outcome in the stock price. The results of these regressions are presented on the right side of Table 2. The positive effect of a win seems to be incorporated in the stock price of a listed football club quickly on the first trading day after a match. The abnormal returns on the second and third trading day after a match are unaffected by a win. A draw has a negative effect on the abnormal return on the first trading day following a match of -0.80% and an additional statistically significant negative effect of -0.28% on the second trading day following a match. Draws do not have an impact on the abnormal return on the third trading day after a match. The negative effect of a loss takes the longest time to be incorporated in the stock price of a listed football club. A loss leads to an AR1, AR2 and AR3 of -1.49%, -0.22% and -0.21%, respectively. For all three types of outcomes the biggest effect is visible on the first trading day after a match. Similar to these results, Palomino et al. (2009) report that the positive effects of good news are incorporated in the stock price faster than the negative effects following bad news.

Table 2
Effects of match results on cumulative abnormal return

	AR1	CAR2	CAR3	AR2	AR3
Win	0.56%*** (0.000)	0.55%*** (0.000)	0.61%*** (0.000)	-0.02% (0.771)	0.07% (0.342)
Draw	-0.80%*** (0.000)	-1.09%*** (0.000)	-1.07%*** (0.000)	-0.28%** (0.002)	0.02% (0.852)
Loss	-1.49%*** (0.000)	-1.71%*** (0.000)	-1.92%*** (0.000)	-0.22%* (0.0134)	-0.21%* (0.049)
<i>t-tests:</i>					
H ₀ : L = D	(0.000)	(0.000)	(0.000)	(0.624)	(0.128)
H ₀ : W = D	(0.000)	(0.000)	(0.000)	(0.014)	(0.718)

Note: p-value in parentheses; * p<0.05, ** p<0.01, *** p<0.001

This table shows the effects of a win, draw or loss on the abnormal return on the first, second and third trading day following a match as well as the cumulative abnormal returns on the first two and first three trading days following a match. It also includes t-tests that test if the effects are equal. Football club-specific fixed effects are controlled for.

3.2. The effect of level of surprise

To investigate if the level of surprise of a match result influences the effect on abnormal returns, I employ a model that incorporates dummy variables for highly expected results, medium expected results and surprise results, and combine them with the outcomes of the matches. The dummy variables distinguishing the different levels of surprise are constructed as described in section 2.4. Highly expected results are results with an ex-ante probability of over 70%. A surprise result is a result with an ex-ante probability of less than half of the probability of the most likely outcome. Finally, all results that are neither highly expected nor surprise results are labelled medium expected results. The dummy variables used in model 2 are created by combining the dummy variables for wins, draws and losses with the dummy variables for levels of surprise. By creating a dummy variable for each outcome depending on the level of surprise I can investigate if the stock market reaction is different for matches with the same outcome but with a different level of surprise. To get a better understanding of how frequently each level of surprise occurs for each type of outcome Table 3 provides an overview of the number of wins, draws and losses by level of surprise.

Table 3
Overview of match outcomes by level of surprise

<i>Level of surprise</i>	<i>Win</i>	<i>Draw</i>	<i>Loss</i>	<i>Total</i>
Highly expected (<i>prob > 70%</i>)	1380	0	61	1441
Medium expected	3139	1000	1305	5444
Surprise (<i>prob < 0.5*prob most likely outcome</i>)	91	905	591	1587
Total	4610	1905	1957	8472

This table provides an overview of the number of wins, draws and losses by level of surprise. A highly expected result is a result with a probability of over 70%. A surprise result is a result with a probability of less than half of the probability of the most likely outcome. Medium expected results are all results that are neither highly expected nor surprise results.

$$(2) \quad \text{Abnormal return}_{it} = \text{constant} + \beta_1 * \text{exp}W_{it} + \beta_2 * \text{medexp}W_{it} + \beta_3 * \text{surp}W_{it} + \beta_4 * \text{surp}D_{it} \\ + \beta_5 * \text{exp}L_{it} + \beta_6 * \text{medexp}L_{it} + \beta_7 * \text{surp}L_{it} + \varepsilon_{it}$$

Since there are no highly expected draws in the dataset no dummy variable is created for this type of event. The constant term represents a medium expected draw. The results of model 2 can be found in Table 4. The cumulative abnormal return following a highly expected win is only marginally positive

for AR1 and CAR3, but the results are not statistically significant. This finding suggests that when a highly expected win occurs this does not constitute any news for the investors. They anticipate a highly expected win beforehand and when the expectation actually materialises the stock price does not change. A medium expected win results in a cumulative abnormal return of 0.79% within the first three trading days following a match. Surprise wins have a big positive effect on a football clubs stock price, resulting in a cumulative abnormal return of 3.29% within the first three trading days following a match. The t-tests at the bottom of Table 4 confirm that the effects of highly expected wins, medium expected wins and surprise wins are statistically different from each other. In conclusion, the results suggest that the impact a win has on the abnormal return depends on the level of surprise of that win. The more unexpected a win is, the bigger the positive abnormal return.

Medium expected draws lead to a statistically significant negative cumulative abnormal return of -0.74% within the first three trading days following a match. The negative effect of a surprise draw is about twice as big as the effect of a medium expected draw. These two effects are statistically different from each other. So, similar to the effect of a win, the effect of a draw on abnormal return is stronger if the result was more unexpected.

A highly expected loss results in a negative AR1, CAR2 and CAR3 of -0.77%, -0.66% and -1.01%, respectively. However, these results, similar to the results of highly expected wins, are not statistically significant. During the first three trading days after a match, a medium expected loss and a surprise loss lead to a cumulative abnormal return of -1.82% and -2.13%, respectively. Interestingly, the effects of highly expected losses, medium expected losses and surprise losses are not statistically different from each other. On the one hand, the increasingly negative effects on abnormal return suggest that the negative impact a loss has on abnormal return increases the more unexpected a loss is. On the other hand, the effects of highly expected losses, medium expected losses and surprise losses are not statistically differentiable and thus one cannot conclude with certainty that the effect a loss has on abnormal return depends on the level of surprise of that loss.

Table 4
Effects on cumulative abnormal return of match results by level of surprise

	AR1	CAR2	CAR3
Highly expected win	0.12% (0.276)	-0.02% (0.915)	0.18% (0.379)
Medium expected win	0.66%*** (0.000)	0.67%*** (0.000)	0.70%*** (0.000)
Surprise win	2.90%*** (0.000)	3.63%*** (0.000)	3.29%*** (0.000)
Medium expected draw (constant)	-0.53%*** (0.000)	-0.75%*** (0.000)	-0.74%*** (0.001)
Surprise draw	-1.09%*** (0.000)	-1.44%*** (0.000)	-1.41%*** (0.000)
Highly expected loss	-0.77% (0.122)	-0.66% (0.328)	-1.01% (0.255)
Medium expected loss	-1.39%*** (0.000)	-1.61%*** (0.000)	-1.82%*** (0.000)
Surprise loss	-1.69%*** (0.000)	-1.93%*** (0.000)	-2.13%*** (0.000)

t-tests:

H ₀ : expW = medexpW	(0.000)	(0.000)	(0.030)
H ₀ : surpW = medexpW	(0.000)	(0.000)	(0.000)
H ₀ : surpD = medexpD	(0.002)	(0.006)	(0.036)
H ₀ : expl = medexpl	(0.230)	(0.176)	(0.368)
H ₀ : surpL = medexpl	(0.119)	(0.223)	(0.388)
H ₀ : expl = surpL	(0.079)	(0.076)	(0.229)

Note: p-value in parentheses; * p<0.05, ** p<0.01, *** p<0.001

This table shows the effects of highly expected, medium expected and surprise wins, draws or losses on the abnormal return on the first trading day following a match and the cumulative abnormal returns on the first two and first three trading days following a match. A highly expected result is a result with a probability of over 70%. A surprise result is a result with a probability of less than half of the probability of the most likely outcome. Medium expected results are all results that are neither highly expected nor surprise results. The table also includes *t*-tests that test if the effects are equal. Football club-specific fixed effects are controlled for.

Summarising the findings above, there is evidence, especially for wins and draws, supporting the idea that the effects of a match outcome on abnormal return are stronger when the outcomes are surprising

and weaker when the outcomes are highly expected. Abnormal returns are even unaffected by highly expected wins. Although the negative effect of losses also appears to become stronger the more unexpected the loss is, the results are not conclusive due to the fact that one cannot statistically distinguish the effects of highly expected losses, medium expected losses and surprise losses. These findings contradict the findings of Palomino et al. (2009). Counterintuitively, they find that the market reaction to a win is stronger the higher the ex-ante probability of the win. However, regarding losses they find evidence that the market reaction is weaker the higher the ex-ante probability of the loss. Another interesting finding of my results is that the additional positive effect of a surprise win over a medium expected win is far greater than the additional negative effect of a surprise loss over a medium expected loss. The additional positive effect on the CAR3 of a surprise win compared to a medium expected win is 2.59 percentage points, whereas the additional negative effect of a surprise loss compared to a medium expected loss is only 0.31 percentage points.

3.3. The effect of European vs. domestic match results

With model 3 I test if the outcome of games played in European competitions (Champions League & Europa League) affects the abnormal return differently than the outcome of domestic games. My sample contains 1502 European games and 6970 domestic games. Dummy variables for European and domestic wins, draws and losses are used. EUW, EUD and EUL represent a European win, a European draw and a European loss, respectively. A domestic win and a domestic loss are represented by domW and domL, respectively. The constant term in this model represents the effect of a domestic draw.

$$(3) \quad \text{Abnormal return}_{it} = \text{constant} + \beta_1 * \text{EUW}_{it} + \beta_2 * \text{EUD}_{it} + \beta_3 * \text{EUL}_{it} + \beta_4 * \text{domW}_{it} + \beta_5 * \text{domL}_{it} + \varepsilon_{it}$$

Table 5 below summarises the results of model 3. Strangely, the results show that cumulative abnormal returns appear to be lower after a European win than after a domestic win. Only the abnormal return on the first trading day following a match is statistically significant for a European win: 0.36%. Domestic wins lead to an abnormal return on the first trading day after a match of 0.59%. This result is rather surprising since the European competitions are generally regarded as more prestigious than domestic competitions. Prize money and media attention for European competitions are high (Cuquerella, 2019),

so one would expect that the positive abnormal return after a win in Europe is higher than after a domestic win. However, the effect of European wins on abnormal return is not statistically different from the effect of domestic wins, so one cannot conclude that European wins lead to lower positive abnormal returns than domestic wins. A European draw results in a negative AR1, CAR2 and CAR3: -0.64%, -1.00% and -1.32%, respectively. Domestic draws have a similar negative effect of -0.84%, -1.11% and -1.00%, respectively. The t-tests at the bottom of Table 5 confirm that the effects of European draws and domestic draws are not statistically different from each other. The same holds true for European losses and domestic losses. Again, the null hypothesis that the effect on abnormal return is the same for European and domestic losses cannot be rejected. In conclusion, I find no evidence that supports the claim that European match outcomes impact the abnormal return differently than domestic match outcomes. These results are in line with the findings of Renneboog and Vanbrabant (2000), but are different to the findings of Scholtens and Peenstra (2009), who report that the stock market reacts stronger to results in European matches than to results in domestic matches.

Table 5
Effects of European and domestic match results on cumulative abnormal return

	AR1	CAR2	CAR3
European win	0.36%* (0.021)	0.23% (0.284)	0.14% (0.612)
European draw	-0.64%** (0.002)	-1.00%*** (0.000)	-1.32%*** (0.000)
European loss	-1.72%*** (0.000)	-1.74%*** (0.000)	-1.69%*** (0.000)
Domestic win	0.59%*** (0.000)	0.60%*** (0.000)	0.69%*** (0.000)
Domestic draw (constant)	-0.84%*** (0.000)	-1.11%*** (0.000)	-1.00%*** (0.000)
Domestic loss	-1.40%*** (0.000)	-1.69%*** (0.000)	-1.99%*** (0.000)

t-tests:

H ₀ : EUW = domW	(0.167)	(0.107)	(0.065)
H ₀ : EUD = domD	(0.374)	(0.722)	(0.429)
H ₀ : EUL = domL	(0.134)	(0.869)	(0.423)

Note: p-value in parentheses; * p<0.05, ** p<0.01, *** p<0.001

This table shows the effects of European and domestic wins, draws and losses on the abnormal return on the first trading day following a match and the cumulative abnormal returns on the first two and first three trading days following a match. European matches are games played in the Champions League and Europa League. Domestic matches are games played in the domestic leagues. The table also includes t-tests that test if the effects are equal. Football club-specific fixed effects are controlled for.

3.4. The effect of Champions League and Europa League

The results above do not indicate that there is a clear difference between the effect of European game outcomes and the effect of domestic game outcomes on abnormal return. To further research this area I build a model that distinguishes between Champions League match results and Europa League match results. My sample contains 749 Champions league matches and 753 Europa League matches. A win, a draw and a loss in the Champions League are represented by CLW, CLD and CLL, respectively.

Similarly, EuleagueW, EuleagueD and EuleagueL represent a win, draw and loss in the Europa League, respectively. Domestic wins and domestic losses are represented by domW and domL.

$$(4) \quad \text{Abnormal return}_{it} = \text{constant} + \beta_1 * \text{CLW}_{it} + \beta_2 * \text{CLD}_{it} + \beta_3 * \text{CLL}_{it} + \beta_4 * \text{EuleagueW}_{it} + \beta_5 * \text{EuleagueD}_{it} + \beta_6 * \text{EuleagueL}_{it} + \beta_7 * \text{domW}_{it} + \beta_8 * \text{domL}_{it} + \varepsilon_{it}$$

The effect of a domestic draw is represented by the constant term. The results of model 4 can be found in appendix 2. The t-tests at the bottom of the table show that there is no statistical difference between the effects of (1) Champions League wins and Europa League wins; (2) Champions League draws and Europa League draws; and (3) Champions League losses and Europa League losses. The negative effect on AR1, CAR2 and CAR3 of a Champions League loss appears to be stronger than the negative effect of a Europa League loss: -1.84%, -2.06% and -2.10% compared to -1.58%, -1.37% and -1.23%, respectively. Given that the Champions League is a more prestigious tournament with more prize money one would indeed expect the effects to be stronger. But as indicated earlier, the differences between the effects of a Champions League loss and a Europa League loss are not statistically significant. Additionally, the negative effect of a Champions League loss appears to be stronger than the negative effect of a domestic loss, however the effects are again not statistically different from each other.

3.5. Match result, level of surprise and Europe vs. domestic

Next, I combine models 2 and 3 to look at the effect on abnormal return depending on match outcome, level of surprise and whether the match is played in Europe or in the domestic league:

$$(5) \quad \text{Abnormal return}_{it} = \text{constant} + \beta_1 * \text{EUexpW}_{it} + \beta_2 * \text{EUmedexpW}_{it} + \beta_3 * \text{EUsurpW}_{it} + \beta_4 * \text{EUsurpD}_{it} + \beta_5 * \text{EUexpL}_{it} + \beta_6 * \text{EUmedexpL}_{it} + \beta_7 * \text{EUsurpL}_{it} + \beta_8 * \text{domexpW}_{it} + \beta_9 * \text{dommedexpW}_{it} + \beta_{10} * \text{domsurpW}_{it} + \beta_{11} * \text{domsurpD}_{it} + \beta_{12} * \text{domexpL}_{it} + \beta_{13} * \text{dommedexpL}_{it} + \beta_{14} * \text{domsurpL}_{it} + \varepsilon_{it}$$

The constant term represents a medium expected domestic draw. Appendix 3 provides an overview of the results of model 5. Surprisingly, a highly expected European win has a negative effect on AR1, CAR2 and CAR3: -0.30%, -0.64% and -0.47%, respectively. Although these results are not statistically significant it is surprising, since one does not expect a win to lead to a negative abnormal return. In

addition, a medium expected European win hardly affects the abnormal return, the results being statistically insignificant and close to zero. A surprise win in Europe on the other hand has a large positive effect on abnormal return. The abnormal return on the first trading day following a match is 4.50% after a surprise European win compared to 1.66% after a surprise domestic win. The difference is statistically significant. This result is in line with the believe that a European win is more important than a domestic win and thus results in a higher positive abnormal return. Another interesting finding is that highly expected European losses appear to have a weaker negative impact on abnormal return than highly expected domestic losses. They result in an AR1, CAR2 and CAR3 of -0.63%, -0.51%, -0.81% and -1.51%, -1.44%, -2.04%, respectively. However, neither the results, nor the differences between the results are statistically significant. Scholtens and Peenstra (2009) find that unexpected results in European matches result in a stronger stock market response than expected results, whereas they do not find evidence for such a relationship for domestic matches. The results of model 5 do not suggest that the findings of model 2 that the impact on abnormal return of wins and draws is stronger the more unexpected an outcome is, differ between European and domestic matches.

3.6. The effect of wins and losses in finals

Finally, I examine if match results of finals have a different impact on abnormal return than match results of non-finals. The expectation is that the positive impact of a win and the negative impact of a loss are stronger for finals than for non-finals, because finals represent important matches where there is a lot at stake. It is important to note that the sample size poses a serious limitation, since there are only 9 finals in my dataset: 3 Champions League finals, 5 Europa League finals and 1 English Football League Cup final. Model 6 makes use of dummy variables for the various types of match outcomes in finals and non-finals:

$$(6) \quad Abnormal\ return_{it} = constant + \beta_1 * FinalW_{it} + \beta_2 * FinalL_{it} + \beta_3 * nonFinalW_{it} + \beta_4 * nonFinalL_{it} + \varepsilon_{it}$$

The constant term represents the effect of a non-final draw. A dummy variable for a draw in a final is purposefully omitted because the result of a final cannot be a draw. The results of model 6 can be found in appendix 4. In contrast to what one would expect, the results show that winning a final has a negative

effect on AR1, CAR2 and CAR3: -0.72%, -2.05% and -1.92%, respectively. However, the results are not statistically significant. Also, the effects are not statistically different from the positive effects of non-final wins. The counterintuitive result is likely caused by the very limited sample size. In order to make a more meaningful claim about the effect of winning a final on abnormal return one would have to collect a bigger sample of final wins. The effects of losing a final, on the other hand, are statistically significant despite the small sample. A loss in a final leads to a massive negative AR1, CAR2 and CAR3 of -7.25%, -10.70% and -13.10%, respectively. The effects are statistically different from the effects of non-final losses. It seems like the stock market harshly punishes a club for losing a final. Again, given the small sample size, the results should be used with caution.

4. Robustness checks

In order to test if the findings in section 3 are robust, I run several robustness checks. The first series of robustness checks involves excluding days that are impacted by the results of two matches due to overlap. Football clubs sometimes have busy schedules and play matches in quick succession. The abnormal return of a football club's stock can therefore be affected by the results of two different matches if these matches are played with only few days between them. For example, when a club plays a match during the weekend and plays a Champions League game the following Tuesday. In this case, Wednesday is both the third trading day following the weekend match as well as the first trading day following the Champions League game. The abnormal return on this day therefore might be affected by both matches. Since the AR1 is used to calculate the CAR2 and CAR3, the CAR2 and CAR3 following the Champions League game on Tuesday are also affected by the match result of the weekend game. The first series of robustness checks thus excludes the abnormal return observations that are subject to overlap. The second series of robustness checks excludes several football clubs from the original sample. One could argue that stocks that are infrequently traded are not a good representation to use in the analysis. In the low volume robustness check I therefore exclude the football clubs that have a daily trading volume of zero on more than 25% of the trading days. This means that the sample is reduced from 22 to 16 football clubs by excluding Silkeborg, Aalborg, Sporting CP, FC Porto, Celtic and Ruch Chorzow.

4.1. Overlap robustness check

In this section I discuss the most interesting results of the overlap robustness check compared to the results presented in section 3. The results of the robustness check when repeating model 1, the model that examines the effect of wins, draws and losses on abnormal return, are mostly in line with the original findings. The only notable difference is that the robustness check finds that wins also affect the abnormal return on the third trading day following a match (0.17%), whereas the original results suggest that wins only affect the abnormal return on the first trading day after a match. This brings into question the finding that the impact of a win is incorporated quicker in the stock price than the impact of a draw or a loss. The original results of model 2 state that highly expected wins do not lead to a stock market

reaction. This suggests that highly expected wins are anticipated by investors and thus do not cause the stock price to jump when they occur. The robustness check shows a statistically significant positive abnormal return of 0.26% on the first trading day following a highly expected win. This provides some evidence that the stock price of a football club goes up slightly after a highly expected win. Table 6 below shows some selected original results and some results of the overlap robustness check regarding the effects of European and domestic match results on abnormal return. Compared to the original results described in section 3, the results of the robustness check show a higher positive AR1, CAR2 and CAR3 after a European win. The cumulative abnormal return over the first two days following a match of 0.68% is even statistically significant and slightly bigger than the effect caused by a domestic win. Similar to the original results, the effects of a European win are not statistically different from the effects of a domestic win. The original results provide some weak evidence that suggests that European wins lead to a lower positive abnormal return than domestic wins. While there are still some signs in the results of the robustness check that support this suggestion, the evidence is further weakened. In addition, when accounting for overlap I find a surprisingly strong negative effect on CAR3 after a European draw: -3.11%. Consequently, the effect of a European draw and the effect of a domestic draw on AR3 are statistically different. In line with the original results, the robustness check does not find any differences between the effects of Champions League results and Europa League results. However, Champions League losses (-2.10%) have a stronger negative impact than domestic losses (-1.34%) on abnormal return on the first trading day after a match. Since this difference is statistically significant this provides evidence that a loss in the Champions League is seen as worse news than a domestic loss. Moreover, the statistically insignificant original results surprisingly suggest that highly expected European wins negatively affect abnormal return. In the findings of the robustness check these effects are positive for AR1 and CAR2, yet insignificant. Finally, the results of the robustness check are in line with the original results regarding the effects of wins and losses in finals.

Table 6
Overlap robustness check: effects of European matches

	Original results			Overlap robustness check		
	AR1	CAR2	CAR3	AR1	CAR2	CAR3
European win	0.36%* (0.021)	0.23% (0.284)	0.14% (0.612)	0.46%** (0.010)	0.68%* (0.031)	0.16% (0.810)
European draw	-0.64%** (0.002)	-1.00%*** (0.000)	-1.32%*** (0.000)	-0.63%** (0.007)	-1.10%** (0.007)	-3.11%*** (0.001)
Domestic win	0.59%*** (0.000)	0.60%*** (0.000)	0.69%*** (0.000)	0.65%*** (0.000)	0.63%*** (0.000)	0.75%*** (0.000)
Domestic draw	-0.84%*** (0.000)	-1.11%*** (0.000)	-1.00%*** (0.000)	-0.70%*** (0.000)	-0.97%*** (0.000)	-0.85%*** (0.000)
H0: EUW = domW	(0.167)	(0.107)	(0.065)	(0.298)	(0.888)	(0.391)
H0: EUD = domD	(0.374)	(0.722)	(0.429)	(0.789)	(0.766)	(0.018)

Note: p-value in parentheses; * p<0.05, ** p<0.01, *** p<0.001

This table shows some selected original results and results of the overlap robustness check regarding the effects of European and domestic match results on the abnormal return on the first trading day following a match and the cumulative abnormal returns on the first two and first three trading days following a match. European matches are games played in the Champions League and Europa League. Domestic matches are games played in the domestic leagues. The table also includes t-tests that test if the effects are equal. Football club-specific fixed effects are controlled for.

4.2. Low volume robustness check

This section compares the most interesting findings of the low volume robustness check with the original findings discussed in section 3. The low volume robustness check finds stronger effects of match results on abnormal return, as can be seen in Table 7 below. Wins lead to more positive abnormal returns, while draws and losses lead to more negative abnormal returns. This result is to be expected since the robustness check excludes the football clubs with low trading volumes. A day with no trading volume means that the stock price stays the same and thus that the daily return equals 0. By excluding the clubs where this happens often the effects of wins, draws and losses are expected to move away from 0.

Table 7
Low volume robustness check: effects of match results

	Original results			Low volume robustness check		
	AR1	CAR2	CAR3	AR1	CAR2	CAR3
Win	0.56%*** (0.000)	0.55%*** (0.000)	0.61%*** (0.000)	0.60%*** (0.000)	0.60%*** (0.000)	0.63%*** (0.000)
Draw	-0.80%*** (0.000)	-1.09%*** (0.000)	-1.07%*** (0.000)	-0.94%*** (0.000)	-1.21%*** (0.000)	-1.19%*** (0.000)
Loss	-1.49%*** (0.000)	-1.71%*** (0.000)	-1.92%*** (0.000)	-1.72%*** (0.000)	-1.97%*** (0.000)	-2.19%*** (0.000)

Note: p-value in parentheses; * p<0.05, ** p<0.01, *** p<0.001

This table shows the original results and the results of the low volume robustness check regarding the effects of match results on the abnormal return on the first trading day following a match and the cumulative abnormal returns on the first two and first three trading days following a match. Football club-specific fixed effects are controlled for.

Further, looking at the effects of losses by the level of surprise of the result, the robustness check finds the effects of a highly expected loss to be closer to 0. Table 8 below covers these findings. The results are not statistically significant in neither the original results nor the robustness check, but the effects as presented by the robustness check provide more evidence for the claim that highly expected losses are anticipated by investors and result in only marginally negative abnormal returns. In addition, the t-tests at the bottom of Table 8 show that the effects on abnormal return of highly expected losses are statistically different from the effects of medium expected losses and surprise losses. This suggests that a more unexpected loss results in a bigger drop of the stock price than a highly expected loss. Moreover, in the original results of model 3 the effect of a European loss could not be distinguished from the effect of a domestic loss. The robustness check finds that the effect on abnormal return on the first trading day following a match of a European loss (-2.07%) is significantly more negative than the effect of a domestic loss (-1.59%). This supports the idea that European matches are more important and consequently losing a match in Europe is considered to be worse news than losing a domestic game. Furthermore, in line with the previously described finding and similar to the results of the overlap robustness check, the low volume robustness check finds the effect on AR1 of Champions League losses to be statistically different from the effect of domestic losses. I.e. Champions League losses have a

stronger negative impact on abnormal return than domestic losses. Lastly, the original results regarding the effects of match outcomes in finals surprisingly suggest that winning a final leads to a negative abnormal return. A disclaimer about the very small sample size is appropriate here. In the results of the robustness check, the abnormal return on the first trading day after winning a final is positive at 1.29%, however the result is still insignificant.

Table 8
Low volume robustness check: effects of losses by level of surprise

	Original results			Low volume robustness check		
	AR1	CAR2	CAR3	AR1	CAR2	CAR3
Highly expected loss	-0.77% (0.122)	-0.66% (0.328)	-1.01% (0.255)	-0.48% (0.398)	-0.26% (0.741)	-0.07% (0.937)
Medium expected loss	-1.39%*** (0.000)	-1.61%*** (0.000)	-1.82%*** (0.000)	-1.67%*** (0.000)	-1.95%*** (0.000)	-2.21%*** (0.000)
Surprise loss	-1.69%*** (0.000)	-1.93%*** (0.000)	-2.13%*** (0.000)	-1.88%*** (0.000)	-2.09%*** (0.000)	-2.30%*** (0.000)
H0: expL = medexpL	(0.230)	(0.176)	(0.368)	(0.039)	(0.039)	(0.026)
H0: surpL = medexpL	(0.119)	(0.223)	(0.388)	(0.310)	(0.628)	(0.809)
H0: expL = surpL	(0.079)	(0.076)	(0.229)	(0.017)	(0.028)	(0.023)

Note: p-value in parentheses; * p<0.05, ** p<0.01, *** p<0.001

This table shows some selected original results and results of the low volume robustness check regarding the effects of highly expected, medium expected and surprise losses on the abnormal return on the first trading day following a match and the cumulative abnormal returns on the first two and first three trading days following a match. A highly expected result is a result with a probability of over 70%. A surprise result is a result with a probability of less than half of the probability of the most likely outcome. Medium expected results are all results that are neither highly expected nor surprise results. The table also includes t-tests that test if the effects are equal. Football club-specific fixed effects are controlled for.

5. Conclusion

The objective of this study is to examine the stock price reaction of listed football clubs to different types of match outcomes. I analyse the abnormal return on the first three trading days following a match to investigate the effects of wins, draws and losses as well as the impact of ex-ante expectations about match outcomes. Furthermore, I test if the effects on abnormal return are different between domestic and European games, between Champions League and Europa League games, and between finals and non-finals. Using a sample of 22 European listed football clubs, I conduct an event study around the dates of football matches to analyse the effects on abnormal return.

I report that a win results in a positive cumulative abnormal return of 0.61% within the first three trading days after a match. A draw and a loss lead to a negative cumulative abnormal return of -1.07% and -1.92%, respectively. Thus, match results are price sensitive information with wins being regarded as good news and draws and losses as bad news. The finding that draws are regarded as bad news could be explained by the fact that the football clubs that make up the sample of this study are mostly the top performers of their respective leagues. Draws are not good enough for these clubs and thus constitute bad news. The negative stock market reaction following a draw or a loss is stronger than the positive stock market reaction following a win. In addition, I find that the stock price absorbs the positive effect of a win faster than the negative effects of draws and losses. Moreover, I find strong evidence for wins and draws, and weaker evidence for losses, that ex-ante expectations about match outcomes influence the impact on abnormal return. Highly expected wins are anticipated by investors in advance and do not lead to a significant stock market reaction, while surprise wins result in a big positive cumulative abnormal return of 3.29%. Similarly, the negative effect on cumulative abnormal return of draws is -0.74% for medium expected draws and -1.41% for surprise draws. While the effects on abnormal return of the different levels of surprise of a loss are not statistically different from each other, the results of the empirical analysis as well as the robustness check suggest that the negative stock market reaction after a loss is amplified by the level of surprise of the loss. This study thus reports results that are consistent with the efficient market hypothesis in that investors use the ex-ante expectations about match outcomes to price a football club's stock and as a result react minimally or not at all when those

expectations are met, but strongly when surprise results occur. Furthermore, I find no evidence that there are differences between the stock price reaction after a domestic match outcome and the stock price reaction after a European match outcome. The idea that European match results should trigger stronger stock market reactions because of the substantial media attention and high prize money is not supported. I only find that a surprise European win results in a higher positive abnormal return than a surprise domestic win. Additionally, I report that the effects on abnormal return of wins, draws and losses in the Champions League are not statistically different from the effects of wins, draws and losses in the Europa league, respectively. Lastly, analysing the limited number of finals in the dataset, I find that winning a final has no impact on abnormal return, while losing a final leads to a very substantial drop of a football club's stock price.

Compared to previous research this study looks at a greater number of matches and a wider mix of European football clubs. I contribute to the existing literature by reporting results regarding the impact of ex-ante expectations about match outcomes that can be explained by the efficient market hypothesis. Furthermore, this study is the first to compare the effects on abnormal return of Champions League games and Europa League games as well as the first to investigate the effect on abnormal return of winning or losing a final. Future research could try to employ a model controlling for time fixed effects. Additionally, future research could examine the impact of winning or losing a final further by looking at a larger sample of finals in order to obtain more meaningful results. Another interesting topic for future research could be to analyse a football club's stock price reaction to other types of events such as player transfers, managerial sackings and takeover announcements.

References

- Aglietta, M., Andreff, W., & Drut, B. (2010). Floating European football clubs. Retrieved from https://economix.fr/pdf/dt/2010/WP_EcoX_2010-24.pdf
- Bell, A. R., Brooks, C., Matthews, D., & Sutcliffe, C. (2012). Over the moon or sick as a parrot? The effects of football results on a club's share price. *Applied Economics*, 44(26), 3435-3452.
- Benkraiem, R., Louhichi, W., & Marques, P. (2009). Market reaction to sporting results: The case of European listed football clubs. *Management Decision*, 47(1), 100-109.
- Cable, J., & Holland, K. (1999). Modelling Normal Returns in Event Studies: A Model-Selection Approach and Pilot Study. *The European Journal of Finance*, 5(4), 331-341.
- Cuquerella, M. (2019). *Winners of 2019/20 Champions League could receive over 80 million euros in prize money*. Retrieved from marca.com: <https://www.marca.com/en/football/international-football/2019/07/11/5d27616646163f138c8b45aa.html>
- Deloitte. (2020). *Deloitte Football Money League 2020*. Deloitte Sports Business Group. Retrieved from <https://www2.deloitte.com/uk/en/pages/sports-business-group/articles/deloitte-football-money-league.html>
- Edmans, A., Garcia, D., & Norli, Ø. (2007). Sports sentiment and stock returns. *The Journal of Finance*, 62(4), 1967-1998.
- FIFA. (2018). *More than half the world watched record-breaking 2018 World Cup*. Retrieved from fifa.com: <https://www.fifa.com/worldcup/news/more-than-half-the-world-watched-record-breaking-2018-world-cup>
- Indatabet. (2020). *Free packages*. Retrieved from indatabet.com: <https://www.indatabet.com/free-packages.html>
- MacKinlay, A. C. (1997). Event Studies in Economics and Finance. *Journal of Economic Literature*, 35(1), 13-39.
- Palomino, F., Renneboog, L., & Zhang, C. (2009). Information salience, investor sentiment, and stock returns: The case of British soccer betting. *Journal of Corporate Finance*, 15(3), 368-387.
- Renneboog, L., & Vanbrabant, P. (2000). Share Price Reactions to Sporty Performances of Soccer Clubs listed on the London Stock Exchange and the AIM. *CentER Discussion Paper, 2000-19*.
- Sawe, B. E. (2018). *The Most Popular Sports in the World*. Retrieved from worldatlas.com: <https://www.worldatlas.com/articles/what-are-the-most-popular-sports-in-the-world.html>
- Scholten, B., & Peenstra, W. (2009). Scoring on the stock exchange? The effect of football matches on stock market returns: an event study. *Applied Economics*, 41(25), 3231-3237.
- STOXX. (2020). *STOXX Europe Football*. Retrieved from stox.com: <https://www.stoxx.com/index-details?symbol=FCTP>

Appendices

Appendix 1

Overview of variables

AR1	Abnormal return on the first day after a match	EuleagueW	Europa League win
AR2	Abnormal return on the second day after a match	EuleagueD	Europa League draw
AR3	Abnormal return on the third day after a match	EuleagueL	Europa League loss
CAR2	Cumulative AR on the first two days after a match	FinalW	Final win
CAR3	Cumulative AR on the first three days after a match	FinalL	Final loss
W	Win	nonFinalW	Non-final win
D	Draw	nonFinalD	Non-final draw
L	Loss	nonFinalL	Non-final loss
expW	Highly expected win	EUexpW	Highly expected European win
medexpW	Medium expected win	EUmedexpW	Medium expected European win
surpW	Surprise win	ESurpW	Surprise European win
medexpD	Medium expected draw	EUmedexpD	Medium expected European draw
surpD	Surprise draw	ESurpD	Surprise European draw
expL	Highly expected loss	EUexpL	Highly expected European loss
medexpL	Medium expected loss	EUmedexpL	Medium expected European loss
surpL	Surprise loss	ESurpL	Surprise European loss
EUW	European win	domexpW	Highly expected domestic win
EUD	European draw	dommedexpW	Medium expected domestic win
EUL	European loss	domsurpW	Surprise domestic win
domW	Domestic win	dommedexpD	Medium expected domestic draw
domD	Domestic draw	domsurpD	Surprise domestic draw
domL	Domestic loss	domexpL	Highly expected domestic loss
CLW	Champions League win	dommedexpL	Medium expected domestic loss
CLD	Champions League draw	domsurpL	Surprise domestic loss
CLL	Champions League loss		

This table gives an overview of all the dependent and independent variables.

Appendix 2

Effects of Champions League and Europa league match results on cumulative abnormal return

	AR1	CAR2	CAR3
Champions league win	0.48%* (0.040)	0.07% (0.828)	0.13% (0.753)
Champions league draw	-0.88%** (0.003)	-1.12%** (0.005)	-1.69%** (0.001)
Champions league loss	-1.84%*** (0.000)	-2.06%*** (0.000)	-2.10%*** (0.000)
Europa league win	0.26% (0.220)	0.36% (0.214)	0.15% (0.697)
Europa league draw	-0.39% (0.175)	-0.88%* (0.027)	-0.97% (0.060)
Europa league loss	-1.58%*** (0.000)	-1.37%*** (0.000)	-1.23%** (0.008)
Domestic win	0.59%*** (0.000)	0.60%*** (0.000)	0.69%*** (0.000)
Domestic draw (constant)	-0.84%*** (0.000)	-1.11%*** (0.000)	-1.00%*** (0.000)
Domestic loss	-1.40%*** (0.000)	-1.69%*** (0.000)	-1.98%*** (0.000)
<i>t</i> -tests:			
H ₀ : CLW = EuleagueW	(0.492)	(0.498)	(0.975)
H ₀ : CLD = EuleagueD	(0.235)	(0.659)	(0.318)
H ₀ : CLL = EuleagueL	(0.469)	(0.153)	(0.171)
H ₀ : CLL = domL	(0.105)	(0.303)	(0.813)

Note: p-value in parentheses; * p<0.05, ** p<0.01, *** p<0.001

This table shows the effects of Champions League, Europa League and domestic wins, draws and losses on the abnormal return on the first trading day following a match and the cumulative abnormal returns on the first two and first three trading days following a match. It also includes t-tests that test if the effects are equal. Football club-specific fixed effects are controlled for.

Appendix 3

Effects on abnormal return of European and domestic match results by level of surprise

	AR1	CAR2	CAR3	
European win	Highly expected European win	-0.30% (0.372)	-0.64% (0.155)	-0.47% (0.429)
	Medium expected European win	0.15% (0.412)	0.04% (0.877)	-0.06% (0.860)
	Surprise European win	4.50%*** (0.000)	4.75%*** (0.000)	3.87%*** (0.000)
European draw	Medium expected European draw	-0.47% (0.081)	-0.66% (0.071)	-1.11%* (0.019)
	Surprise European draw	-0.92%** (0.004)	-1.53%*** (0.000)	-1.68%** (0.003)
European loss	Highly expected European loss	-0.63% (0.249)	-0.51% (0.489)	-0.81% (0.402)
	Medium expected European loss	-1.77%*** (0.000)	-1.83%*** (0.000)	-1.90%*** (0.000)
	Surprise European loss	-2.28%*** (0.000)	-2.25%*** (0.000)	-1.52%* (0.043)
domestic win	Highly expected domestic win	0.16% (0.192)	0.05% (0.783)	0.23% (0.275)
	Medium expected domestic win	0.75%*** (0.000)	0.78%*** (0.000)	0.83%*** (0.000)
	Surprise domestic win	1.66%** (0.002)	2.75%*** (0.000)	2.83%** (0.003)
domestic draw	Medium expected domestic draw (constant)	-0.54%*** (0.000)	-0.77%*** (0.000)	-0.63%* (0.013)
	Surprise domestic draw	-1.12%*** (0.000)	-1.42%*** (0.000)	-1.36%*** (0.000)
domestic loss	Highly expected domestic loss	-1.51% (0.220)	-1.44% (0.391)	-2.04% (0.351)
	Medium expected domestic loss	-1.23%*** (0.000)	-1.51%*** (0.000)	-1.78%*** (0.000)
	Surprise domestic loss	-1.60%*** (0.000)	-1.88%*** (0.000)	-2.23%*** (0.000)
<i>t</i> -tests:				
H ₀ : EU _{surpW} = dom _{surpW}				
	(0.001)	(0.075)	(0.477)	

Note: p-value in parentheses; * p<0.05, ** p<0.01, *** p<0.001

This table shows the effects of highly expected, medium expected and surprise match results in European and domestic competitions on the abnormal return on the first trading day following a match and the cumulative abnormal returns on the first two and first three trading days following a match. A highly expected result is a result with a probability of over 70%. A surprise result is a result with a probability of less than half of the probability of the most likely outcome. Medium expected results are all results that are neither highly expected nor surprise results. European matches are games played in the Champions League and Europa League. Domestic matches are games played in the domestic leagues. The table also includes t-tests that test if the effects are equal. Football club-specific fixed effects are controlled for.

Appendix 4

Effects of match results in finals and non-finals on cumulative abnormal return

	AR1	CAR2	CAR3
Final win	-0.72% (0.751)	-2.05% (0.504)	-1.92% (0.629)
Final loss	-7.25%*** (0.000)	-10.70%*** (0.000)	-13.10%*** (0.000)
Non-final win	0.56%*** (0.000)	0.55%*** (0.000)	0.61%*** (0.000)
Non-final draw (constant)	-0.80%*** (0.000)	-1.08%*** (0.000)	-1.06%*** (0.000)
Non-final loss	-1.47%*** (0.000)	-1.68%*** (0.000)	-1.88%*** (0.000)

t-tests:

H ₀ : FinalW = nonFinalW	(0.571)	(0.398)	(0.525)
H ₀ : FinalL = nonFinalL	(0.000)	(0.000)	(0.000)

Note: p-value in parentheses; * p<0.05, ** p<0.01, *** p<0.001

This table shows the effects of match results in finals and non-finals on the abnormal return on the first trading day following a match and the cumulative abnormal returns on the first two and first three trading days following a match. It also includes t-tests that test if the effects are equal. Football club-specific fixed effects are controlled for.