Nijmegen School of Management
Department of Economics and Business Economics
Master's Thesis Economics (MAN-MTHEC)

Stocks of Football Clubs: Winning or Losing?

By Melvin Navest (s1041126)

Ede, 16 June 2023

Program: Master's Program in Economics
Specialisation: Corporate Finance and Control
Supervisor: Vincent Delabastita

Radboud Universiteit

Abstract

Football stocks are unique regarding their valuation and risks, as football stock prices are strongly dependent on sporting performance. Previous research found that football match results significantly affect football stock returns. However, evidence for other football-related events is lacking. Therefore, this research studies how multiple football-related events affect football stock returns. The stock returns of 21 European football clubs between July 1st, 2011 and June 30th, 2022 are used for the regression analysis. Before analysing how football-related events affect football stock returns, a general examination of football stock returns is provided. Based on both pooled OLS regressions and OLS regressions, football stocks are in general not overvalued and football stock returns are generally not higher during March, April, and May. Furthermore, OLS regressions are conducted for the event studies. Winning a football match has a significant positive effect on football stock returns, while both drawing and losing a football match have a significant negative effect on football stock returns. Besides, purchasing a football player, selling a football player, an injury of a football player, a managerial change, and winning a trophy do not significantly affect football stock returns. Finally, these results are relevant for investors, football clubs, and regulators.

Table of Contents

1 Introduction

Football is considered as the most popular sport in the world (Bell et al., 2012). For example, the 2022 World Cup final between Argentina and France has been watched by nearly 1.5 billion people (Sporza, 2023). Furthermore, the football industry has experienced significant economic growth during the last decade. For instance, based on the Deloitte Football Money League, the total revenue of the 20 clubs with the greatest revenues has increased from "€4.8 billion in 2011/2012" (Bosshardt et al., 2013, p. 2) to ''€9.2 billion in 2021/2022'' (Deloitte, 2023). This can be partly explained by the trend of private club ownership, as privately owned clubs are expected to generate greater revenues on average. Nowadays, private investors have a majority stake in more than 75% of the professional football clubs (Rohde & Breuer, 2017). Besides private limited companies, other common legal forms in professional football are member associations and publicly listed companies (Franck, 2010). Member associations are clubs which are owned by members of the club (Rohde & Breuer, 2017). On the other hand, publicly listed clubs are listed on the stock exchange. Hence, investors could buy shares of the club, thereby acquiring a share of the ownership of the club.

Football stocks are unique with respect to their valuation and risks (Prigge & Tegtmeier, 2022). That is because football stock prices are driven by different types of information compared to, for example, stock prices of industrial and commercial companies (Benkraiem et al., 2009). Therefore, it is essential to study football stocks (Ferreira et al., 2017). Moreover, approximately 25 European football clubs are currently listed on the stock exchange (Prigge & Tegtmeier, 2022). Hence, the number of studies about football stocks is limited (Ferreira et al., 2017; Rohde & Breuer, 2017). As a consequence, it is possible to study unexplored directions regarding football stocks. Previous research has, for instance, studied the influence of an initial public offering (IPO) on sporting and financial performance, whereby IPOs are associated with enhanced sporting performance but not with enhanced financial performance (Aglietta et al., 2010; Rohde & Breuer, 2017). Besides, multiple studies found in different settings a significant asymmetric effect of sporting performance on share returns. Wins led to positive abnormal share returns, while draws and losses led to negative abnormal share returns (Bell et al., 2012; Benkraiem et al., 2009; Berument et al., 2009; Demir & Danis, 2011; Duque & Ferreira, 2005; Ferreira et al., 2017; Floros,

2014; Renneboog & Vanbrabant, 2000; Scholtens & Peenstra, 2009; Stadtmann, 2006). However, most of these studies are already outdated and used the results of football matches as an event, whereas it is likely that football stock returns are also affected by other football-related events (Aglietta et al., 2010; Bell et al., 2012; Floros, 2014). These previous studies showed that football matches have an impact on the stock market (Ashton et al., 2003; Berument & Ceylan, 2012; Edmans et al., 2007). Nevertheless, evidence for other football-related events is currently lacking. Hence, this research uses the results of football matches as an event and also includes other football-related events such as transfers, injuries, managerial turnover, and winning trophies. Therefore, the goals of this research are to study how football-related events affect football stock returns and to provide new insights and explanations for the movements of football stock returns. This leads to the following research question: How do football-related events affect the stock returns of football clubs?

Providing an answer to this question generates new insights which are both scientifically and socially relevant. First, football stocks have an exclusive risk profile as mentioned before. Therefore, the study of multiple football-related events provides insights into the risk preferences of investors who buy football stocks. For example, knowledge is generated with regard to factors that might drive these risk preferences (Schildberg-Hörisch, 2018). Second, trading in football stocks is expected to grow further in the upcoming years and a substantial amount of money is involved in the trading of football stocks (Benkraiem et al., 2009; Prigge & Tegtmeier, 2022; Scholtens & Peenstra, 2009). For instance, Manchester United has nowadays a market capitalization of US$3.39 billion (Google Finance, 2023).[1] Furthermore, the current owners of Manchester United want to sell the club for a price ranging from ''US$7.2 billion to US$9.6 billion'' (Ronald, 2023). Third, football shares are bought by various types of investors (Prigge & Tegtmeier, 2019). An examination of football-related events helps these investors with improved investment decision-making because investors are more able to understand the fluctuations of football stock prices and returns (Floros, 2014). Fourth, publicly listed clubs utilize the stock market to fulfil their financing needs (Benkraiem et al., 2009). Therefore, these clubs need to

[1] The market capitalization of Manchester United on April 28th, 2023.

balance their budgets. This research shows thus to clubs which other elements they need to acknowledge as well for enhanced financial performance of their stocks (Gimet & Montchaud, 2016). Fifth, this research investigates the effect of football-related events on football stock returns before and during the COVID-19 pandemic. Therefore, an exhaustive picture of the behaviour of football stock returns is provided. Finally, concerns of sportswashing have been rising. Sportswashing means that an association with sport is utilized to enhance a damaged moral reputation. For example, the privately owned clubs Newcastle United and Paris Saint-Germain are used for sportswashing (Fruh et al., 2023). Hence, this research could illustrate that publicly listed clubs are a potential solution for sportswashing.

The thesis consists of multiple chapters. First, a theoretical framework is provided. This theoretical framework is about football stocks, football stock returns, and factors affecting football stock returns. Next, the methodology is presented. The stock prices and returns of 21 European football clubs are used as well as specific sporting aspects of these clubs. The panel data are then analysed by using multiple models. After the methodology, the main results of the regression analysis are provided. Finally, the thesis ends with the discussion and conclusion. After the discussion and conclusion, the Bibliography and the Appendix are included as well.

2 Theoretical Framework

This chapter provides a theoretical framework of football stocks, football stock returns, and factors affecting football stock returns. The general characteristics of football stocks are discussed in section 2.1. Besides, the aspects of football stock returns are explained in section 2.2. This theoretical framework leads to multiple hypotheses, which are presented at the end of this chapter.

2.1 Football Stocks

The football stock market has different characteristics compared to the general stock market. Hence, it matters to study football stocks (Ferreira et al., 2017). For example, ‘’signals are very frequent and easy to quantify, occur solely when markets are closed and become publicly available to all agents at the very same time” (Stadtmann, 2006, p. 502) in the football stock

market. Furthermore, a minority of the European football clubs is currently listed on the stock exchange (Prigge & Tegtmeier, 2022). Besides, different types of investors trade in football stocks. Moreover, these various types of investors have different risk preferences (Schildberg-Hörisch, 2018). Prigge & Tegtmeier (2019) distinguish between four types of investors, which are: financial investors, strategic investors, patron investors, and fan investors. Financial investors are only interested in the returns generated by a stock (Leach & Szymanski, 2015). Strategic investors are, for example, companies that sponsor a football club. This means that strategic investors have, besides holding shares of the football club, a business relation with the football club (Prigge & Tegtmeier, 2019). Patron investors are tycoons who buy large stakes in football clubs (Prigge & Tegtmeier, 2019). As a consequence, patron investors have the power to influence the policy of clubs. On the other hand, fan investors do not have the power to influence the policy of clubs. Fan investors buy shares of their favourite club due to their emotional connection with the club (Prigge & Tegtmeier, 2019). Hence, the mood of fan investors has a substantial influence on their trading (Edmans et al., 2007). This might also explain the low stock market turnover of the football stock market (Prigge & Tegtmeier, 2022). A low stock market turnover means that stocks are occasionally traded which could firmly affect stock prices (Aglietta et al., 2010; Ferreira et al., 2017).

Football stocks are also special regarding their prices and risks (Prigge & Tegtmeier, 2022). In efficient markets, financial performances are the major determinants for stock trading (Demir & Danis, 2011). This is in line with the Efficient Market Hypothesis (EMH). According to the EMH, markets are efficient when prices reflect all available information (Prigge & Tegtmeier, 2022). The EMH has three different forms. The first form is the weak form, which means that stock prices reflect past stock prices. The second form is the semi-strong form, which indicates that stock prices reflect all publicly available information. The strong form is the third form, which means that stock prices reflect all information both public information and inside information. Hence, investors respond in efficient markets only to new information (Scholtens & Peenstra, 2009). Besides, efficient markets imply that all investors are rational (Edmans et al., 2007). However, the EMH does not seem to hold with respect to the football stock market. For instance, Prigge & Tegtmeier (2022) found mixed evidence with regard to the European football stock market being

weak form efficient. A possible explanation is the influence of fan investors because these investors trade based on their emotions, thereby affecting stock prices differently than expected based on the EMH (Edmans et al., 2007; Prigge & Tegtmeier, 2019). Moreover, it might be that stock markets cannot be efficient otherwise, no reason exists to find new information (Malkiel, 2003). Stock prices of football clubs depend on various types of information compared to the stock prices of industrial and commercial companies. For example, stock prices of industrial and commercial companies depend mainly on published financial reports (Renneboog & Vanbrabant, 2000). On the contrary, football stock prices are heavily dependent on sporting performance (Benkraiem et al., 2009; Renneboog & Vanbrabant, 2000). Sporting performance is then linked to financial performance, as the sporting performance of a club has a substantial influence on the financial performance of a club (Demir & Danis, 2011).

2.2 Football Stock Returns

Stock returns have been explained by the Capital Asset Pricing Model (CAPM) for plenty of years. According to the CAPM, the expected return of a stock depends on the risk-free rate, the market risk premium, and the beta. Beta is a measure of a stock's systematic risk compared to the market. A higher beta means that a stock has more systematic risk. Hence, higher expected returns are expected for stocks with higher betas. This means that, based on the CAPM, the expected return of a stock is only higher than the risk-free rate when the stock has market risk (Prigge & Tegtmeier, 2019). Prigge & Tegtmeier (2019) applied the CAPM to the share returns of 19 European football clubs and found that the shares of 13 clubs were overvalued by the model, whereby overvaluation implies that the return of a stock is lower than the expected return based on the CAPM. In other words, the stock is overpriced in comparison to the associated return.

The willingness of investors to invest in football stocks decreases when football stocks are overpriced. For instance, Aglietta et al. (2010) found by using the STOXX Europe Football Index that it is unattractive for institutional and financial investors to invest in football stocks. That is because the returns are too low for the associated risks. These risks are significant for football stocks due to the uncertainty about the performance of the stock, which is caused by the uncertainty regarding sporting performance. Furthermore, football stocks have a low

diversification potential (Aglietta et al., 2010). However, this should not have a substantial influence on the risk-return profile. A majority of the football stocks has a beta below 1, which means that general stock market developments have a weak effect on football stock returns (Prigge & Tegtmeier, 2019). In addition to this, Prigge & Tegtmeier (2019) state that unsystematic risk is the primary risk for football stocks. As a consequence, investors could use diversification to eliminate this risk. On the other hand, Gimet & Montchaud (2016) state that football stock returns are mainly dependent on financial elements, such as profit. Hence, football stocks would be vulnerable to systematic risk (Bell et al., 2012). Therefore, conflicting research lines exist, as it is unclear if football stocks are more vulnerable to systematic risk or unsystematic risk.

Football stock returns are driven by different types of information. Hence, previous research generally used event studies to study the response of the stock market to a particular event (Benkraiem et al., 2009). This means that is tested for the existence of abnormal returns before or after the event. Therefore, the CAPM has been used for determining the standard expected returns regarding football stocks otherwise, it is impossible to calculate abnormal returns (Benkraiem et al., 2009; Renneboog & Vanbrabant, 2000). Benkraiem et al. (2009) found abnormal returns around the dates of matches. They also found that the sporting result and the match venue led to fluctuations in football stock prices, whereby draws and defeats led to significant decreases in football stock prices. Scholtens & Peenstra (2009) and Renneboog & Vanbrabant (2000) obtained similar results with different samples. They also found that the stock market responds positively to a win and negatively to a defeat, whereby the response is stronger for a defeat compared to a win. Furthermore, the reaction of the stock market is stronger for European matches than for national league matches (Renneboog & Vanbrabant, 2000; Scholtens & Peenstra, 2009). In addition to this, Floros (2014) studied for four clubs (Ajax, Benfica, Juventus, and FC Porto) how their stock prices are affected by European matches. He found a significant positive effect of draws on the stock returns of Ajax and Benfica, while a significant negative effect was found for draws and defeats regarding the stock returns of Juventus. These contradicting results demonstrate that expectations regarding sporting results matter. Nevertheless, European matches do not always affect stock returns. For example, Demir & Danis (2011) did not find a significant effect of the results of European matches on the abnormal stock returns of three

Turkish clubs (Beşiktaş, Fenerbahçe, and Galatasaray). However, the results of national league matches have a significant effect on the abnormal stock returns of these Turkish clubs. This is in line with previous research because wins resulted in positive abnormal stock returns for Beşiktaş and Fenerbahçe, while these two clubs experienced negative abnormal stock returns after a defeat (Demir & Danis, 2011).

Besides the results of football matches, other factors could affect football stock returns too. For instance, Bell et al. (2012, p. 3441) mention the following factors that could influence football stock prices and returns: ''The share price may be affected by player transfers and contract renewals, a change of manager, sponsorship deals, TV rights deals, a new stadium, take-over bids for the club, football rule changes such as Bosman in 1995, the announcement of the company's earnings, general movements of the stock market and ex-dividend dates.'' The events that are directly related to sporting performance are: transfers, injuries, a change of manager, and winning trophies. First, football players are valuable assets for clubs. Therefore, transfers could have a significant impact on football stock prices (Ferreira et al., 2017). Contradicting evidence exists regarding the influence of transfers on football stock prices. Fotaki et al. (2009) found that the purchase of a player has a negative effect on football stock prices, while the sale of a player has a positive effect on football stock prices. Nevertheless, Gimet & Montchaud (2016) discovered only a significant positive effect for net transfers but not for purchases or sales separately. In addition to this, Stadtmann (2006) did not find a significant effect of transfers on the stock returns of Borussia Dortmund. Second, injuries have a strong influence on sporting performance. For example, Hägglund et al. (2013) found that injuries have a significant negative effect on the sporting performance of football clubs. Nonetheless, the literature regarding injuries and stock prices is limited. Bell et al. (2012) assumed that information obtained during a football match, such as injuries, does not provoke a change in football stock prices. Hence, this would imply that only injuries picked up outside a match matter for football stock prices.

Besides the events related to football players, managerial changes and winning trophies are also crucial for football clubs. For instance, football managers could be valuable assets as well (Ferreira et al., 2017; Fotaki et al., 2009). Dobson et al. (2001) found that a managerial change has a negative effect on the result of the upcoming game, whereas it induces improved

performance in the next season. On the other hand, Audas et al. (2002, p. 647) discovered that clubs that "changed managers within-season subsequently tended to perform worse than those that did not.'' Nevertheless, Fotaki et al. (2009) found that a managerial change does not provoke a change in the stock price of a football club. Winning trophies is also vital for clubs, as it means that they have won a league or a cup. As a consequence, investors are expected to acknowledge this sporting achievement. Duque & Ferreira (2005) studied the stock prices of Sporting Portugal and FC Porto from 1998 until 2002. They found that winning the national league elicits a positive stock return for a club, while not winning the league evokes a negative stock return.

Another important element with respect to football stock returns is the timing of the events. That is because multiple calendar effects are present in the general stock market. For example, the *Halloween effect* means that stock returns are higher ''in November through April than for the rest of the year'' (Haggard & Witte, 2010, p. 379). Haggard & Witte (2010) showed that the *Halloween effect* has been significant for stock returns in the United States from 1954 until 2008. Furthermore, Kling & Gao (2005) discovered a significant calendar effect in the Chinese stock market. They found that stock returns on the Shanghai Stock Exchange have been significantly higher in February and November. Similar calendar effects are also found in the football stock market. For example, the impact of football match results is stronger towards the end of the season (Duque & Ferreira, 2005). That is because end of the season matches are considered to be crucial for the final ranking, as this ranking determines which clubs are allowed to participate in European football and which clubs will relegate (Bell et al., 2012; Ferreira et al., 2017; Renneboog & Vanbrabant, 2000). For example, Renneboog & Vanbrabant (2000) discovered large abnormal stock returns for clubs listed on the London Stock Exchange regarding football matches played between the 15th of February and the end of May. In addition to this, Duque & Ferreira (2005) found for Sporting Portugal and FC Porto a correlation between stock prices and end of the season victories in the national league. However, Bell et al. (2012) found only a small effect for end of the season matches with respect to the stock returns of English clubs.

2.3 Hypotheses

This research has multiple hypotheses. Therefore, the hypotheses are presented in Table 1 for clarity purposes. Before studying how football-related events affect football stock returns, a general examination of football stock returns is provided. Hence, the hypotheses regarding the football-related events are slightly different compared to the hypotheses of previous research. Previous research used an adaptation of the CAPM to determine the expected returns, thereby calculating the abnormal returns based on the differences between the actual returns and expected returns (Renneboog & Vanbrabant, 2000). However, this research uses actual returns instead of abnormal returns. That is because the general examination is conducted to analyse if the CAPM values the stocks of European football clubs fairly. Furthermore, the aforementioned results of Prigge & Tegtmeier (2019) imply that the CAPM is not appropriate for calculating the expected returns. Hence, actual returns are used for the hypotheses regarding the football-related events.

TABLE 1: OVERVIEW OF THE HYPOTHESES

Argument	Hypothesis
A fairly valued stock means that the actual return of a stock is equal to the expected return based on, for instance, the CAPM. Prigge & Tegtmeier (2019) applied the CAPM to the share returns of 19 European football clubs and found that the shares of 13 clubs were overvalued by the model.	H1: The **stocks** of European football clubs are **overvalued**.
In the general stock market, calendar effects such as the *Halloween effect* exist. This means that stock returns are significantly higher during particular months. Multiple studies found that abnormal stock returns are significantly larger in the football stock market during the end of the season (Bell et al., 2012; Duque & Ferreira, 2005; Renneboog & Vanbrabant, 2000).	H2: The **stock returns** of European football clubs are **higher** during the **end of the season**.
Previous research has shown that wins lead to positive abnormal stock returns (Bell et al., 2012; Benkraiem et al., 2009; Berument et al., 2009; Demir & Danis, 2011; Duque & Ferreira, 2005; Ferreira et al., 2017; Floros, 2014; Renneboog & Vanbrabant, 2000; Scholtens & Peenstra, 2009; Stadtmann, 2006).	H3a: A **win** has a **positive effect** on the **stock returns** of European football clubs.
Previous research has shown that draws provoke negative abnormal stock returns (Bell et al., 2012; Benkraiem et al., 2009; Berument et al., 2009; Demir & Danis, 2011; Duque & Ferreira, 2005; Ferreira et al.,	H3b: A **draw** has a **negative effect** on the **stock returns** of European football clubs.

2017; Floros, 2014; Renneboog & Vanbrabant, 2000; Scholtens & Peenstra, 2009; Stadtmann, 2006).	
Previous research found that losses induce negative abnormal stock returns (Bell et al., 2012; Benkraiem et al., 2009; Berument et al., 2009; Demir & Danis, 2011; Duque & Ferreira, 2005; Ferreira et al., 2017; Floros, 2014; Renneboog & Vanbrabant, 2000; Scholtens & Peenstra, 2009; Stadtmann, 2006).	H3c: A **loss** has a **negative effect** on the **stock returns** of European football clubs.
Fotaki et al. (2009) found that the purchase of a player has a negative effect on football stock prices.	H4a: The **purchase of a player** has a **negative effect** on the **stock returns** of European football clubs.
Fotaki et al. (2009) discovered that the sale of a player has a positive effect on football stock prices.	H4b: The **sale of a player** has a **positive effect** on the **stock returns** of European football clubs.
Injuries have a strong negative effect on the sporting performance of a club (Hägglund et al., 2013).	H4c: A **player getting injured** has a **negative effect** on the **stock returns** of European football clubs.
Dobson et al. (2001) found that a managerial change has a negative effect on the result of the upcoming game. Furthermore, Audas et al. (2002, p. 647) found that clubs that "changed managers within-season subsequently tended to perform worse than those that did not.''	H5a: A **managerial change** has a **negative effect** on the **stock returns** of European football clubs.
Duque & Ferreira (2005) state that winning the national league leads to a positive stock return for a club.	H5b: **Winning a trophy** has a **positive effect** on the **stock returns** of European football clubs.

3 Methodology

This chapter explains the methods used for testing the hypotheses. Hence, the sample selection and data collection, variables, and models for the regression analysis are explained.

3.1 Sample Selection and Data Collection

The sample consists of listed football clubs. The common stock index for listed football clubs is the DJ StoXX Football Index, which is also known as the STOXX Europe Football Index (Aglietta et al., 2010; Prigge & Tegtmeier, 2019). This index contained 23 football clubs in 2010 (Aglietta et al., 2010). However, the last closing price of the STOXX Europe Football Index was in 2020 and no clear overview can be found of clubs that belong to this index (De Tijd, 2020). As a consequence, the sample is manually selected. First, the top 25 European countries, whose clubs performed on average better in UEFA club competitions (UEFA Champions League, UEFA Europa League, and UEFA Conference League) over the last five years, is taken from the UEFA country coefficient ranking (UEFA.com, 2023). Second, for each of these 25 countries it is checked if a club in the

country's highest national league is listed on the stock exchange. This is done by searching manually in the Refinitiv Workspace. Third, it is checked if stock prices are available for the listed clubs. As a consequence, the sample consists of 21 European football clubs.[2] Therefore, the sample contains one English club, one German club, three Italian clubs, one French club, one Dutch club, four Portuguese clubs, one Scottish club, four Turkish clubs, four Danish clubs and finally one Swedish club.

Panel data are needed to perform the analyses. First, the stock prices of the 21 football clubs have been collected via the Refinitiv Workspace. Stock prices denominated in euros have been gathered from the beginning of the 2011/2012 season until the end of the 2021/2022 season. Football seasons begin in most European countries, except a few Scandinavian countries, on July 1st and end on June 30th. Therefore, monthly stock prices have been obtained from July 2011 up to and including June 2022. In addition to this, daily stock prices have been collected from July 1st, 2011 up to and including June 30th, 2022. This period was chosen for multiple reasons. First, Financial Fair Play (FFP) has been implemented in the 2011/2012 season. FFP means that clubs are not able to spend more than their revenues over a few seasons (Goal.com, 2018; Voetbal International, 2018). Hence, FFP has had a massive impact on the sporting and financial performance of clubs (Rohde & Breuer, 2017). Furthermore, the introduction of FFP regulation has created a more equal playing field, as all European football clubs are obliged to stick to the same accounting principles (Goal.com, 2018). Therefore, the decision was made to neglect the period before the introduction of FFP. Second, the 2021/2022 season is the last season for which all information is available because the 2022/2023 season has not finished yet. Third, this period covers the seasons before the COVID-19 pandemic as well as the seasons during the COVID-19 pandemic. Hence, a comprehensive picture of football stocks is provided.

The stock prices are used to obtain data with respect to the actual returns. These actual returns are calculated similarly as in previous research, namely by using continuously compounded returns (Demir & Danis, 2011; Duque & Ferreira, 2005). Football clubs almost do not pay dividends (Stadtmann, 2006). Hence, dividends are ignored with regard to the

[2] An overview of these football clubs is provided in Appendix 7.1.

computation of the actual returns. Therefore, the actual returns are calculated as in Demir & Danis (2011) and Duque & Ferreira (2005). A continuously compounded return is computed by using the current stock price and the previous stock price. First, the current stock price is divided by the previous stock price. Second, the continuously compounded return is obtained by taking the natural logarithm of this division. This is also shown by Equation 1, which is used for calculating monthly continuously compounded returns and daily continuously compounded returns. Hence, $S_{i,t}$ is the stock price of football club *i* at time *t*, whereby *t* is either in months or in days depending on which unit of time is used.

EQUATION 1

$$(1)\ \text{Return}_{i,t} = \ln(S_{i,t} / S_{i,t-1})$$

In addition to the actual returns, more data are needed to apply the CAPM. Hence, data regarding the risk-free rate and market return are collected. Monthly data are used to analyse if football stocks are overvalued. That is because monthly returns are more normally distributed and are less affected by outliers compared to daily returns (Renneboog & Vanbrabant, 2000). Hence, 1-month EURIBOR rates are used as risk-free rates and are obtained from the European Central Bank – Statistical Data Warehouse website (European Central Bank, 2023). Next, the monthly return of the STOXX Europe 600 is used as a proxy for the monthly market return. That is because this index replicates ''almost 90% of the underlying investable market'' (Qontigo, 2023) regarding European stocks. Therefore, monthly prices of the STOXX Europe 600 are acquired through the Refinitiv Workspace. The monthly market return is then computed by using Equation 1. As a consequence, the data for the general examination of football stock returns are gathered.

Data are also required for the event studies regarding football-related events. The daily stock prices and daily returns have already been obtained. Furthermore, the daily continuously compounded return of the STOXX Europe 600 is used as a proxy for the daily market return. Besides, the data with respect to the football-related events are gathered for each club. This is done via *Transfermarkt*.[3] This website contains detailed historical information regarding match

[3] This hyperlink provides the website of *Transfermarkt*: https://www.transfermarkt.com/

results, transfers, injuries, managerial turnover, and winning trophies. This information has been collected for 13,698 football-related events and data regarding these events have been coded manually. Therefore, the data collection process has been time-consuming.

Manchester United is used as an example to explain the acquisition of these data for each club. First, the results of official matches have been collected from the beginning of the 2011/2012 season until the end of the 2021/2022 season. This is done for each season by obtaining all match results (win, draw, or loss) in a particular season.[4] It is necessary to know the dates for the event studies. Hence, the match dates are also collected. Second, data regarding transfers have been gathered from the beginning of the 2011/2012 season until the end of the 2021/2022 season as well. Data are only collected with respect to transfers for which a transfer fee is paid.[5] Therefore, free transfers and loan deals are ignored.[6] All transfers are examined for each season by using both the transfer page of the club and the personal pages of the players involved. For example, Manchester United purchased Jadon Sancho for a fee of €85 million in the 2021/2022 season.[7] In addition to this, the transfer date is acquired via the personal page of Jadon Sancho.[8] Third, data with respect to injuries are for each club only obtained for the 2021/2022 season. That is because it is time-consuming to investigate manually all injuries for 21 football clubs and their players over a period of 11 seasons. All injuries are checked through the squad overview page of a club for the 2021/2022 season.[9] Besides, the personal pages of the players that belonged to this squad during this season are used as well. However, some players made a direct transfer or a loan transfer during the season. Therefore, for these players only injuries picked up when they were part of the club's squad are noted. This is investigated by using the

[4] The following hyperlink can be used to obtain in chronological order the results of Manchester United in the 2021/2022 season: https://www.transfermarkt.com/manchester-united/spielplandatum/verein/985/plus/0?saison_id=2021&wettbewerb_id=&day=&heim_gast=&punkte=&datum_von=-&datum_bis=-
Besides, it is possible to obtain data for the other seasons by clicking on 'Season'.

[5] This article provides additional information regarding football transfers: https://www.goal.com/en/news/how-does-a-football-transfer-work/130og8e76770l1dcqbne3jntx7

[6] This article explains shortly anything related to loan deals: https://www.90min.com/posts/football-loan-transfer-rules-premier-league-guidelines-limits-full-details

[7] An overview of the transfers of Manchester United in the 2021/2022 season: https://www.transfermarkt.com/manchester-united/transfers/verein/985/plus/?saison_id=2021&pos=&detailpos=&w_s=
Furthermore, this can also be seen for other seasons by changing the 'Filter by season'.

[8] The personal page of Jadon Sancho shows his transfer history: https://www.transfermarkt.com/jadon-sancho/profil/spieler/401173

[9] The injuries 'Rest' and 'Quarantine' were ignored because they are not considered as real injuries.

personal player page. For instance, Harry Maguire was part of Manchester United's 2021/2022 squad.[10] His personal page shows that he had three injuries between July 1st, 2021 and June 30th, 2022.[11]

After obtaining the data with respect to the players, data regarding managerial changes and winning trophies are gathered. The data related to managerial changes are collected from the start of the 2011/2012 season until the end of the 2021/2022 season. Data are acquired when a manager has been fired, has resigned, or a new manager has been appointed. To obtain these data, the staff page of a club is used and is filtered on the role of manager. For example, the staff page of Manchester United shows all managers of the club between 1903 and 2023.[12] The last football-related event of this research is winning trophies. Data regarding winning trophies are also obtained from the beginning of the 2011/2012 season until the end of the 2021/2022 season. For instance, the victories page of Manchester United shows all official leagues and cups won by the club.[13] Although this page shows in which season a club won a league or a cup, the dates are not directly available. Hence, these dates are obtained indirectly. Several newspapers and websites, such as *The Guardian*, *Algemeen Dagblad, Voetbal International*, and *Voetbalzone*, have been used to acquire the dates when clubs became champions. For example, the last time Manchester United won the Premier League was on April 22nd, 2013.[14] Furthermore, the page that contains all match results of a club in a particular season is used for winning cups. The date of the final is then obtained from this overview.

3.2 Variables

The variables are created after the data collection and an overview of the variables is provided by Table 2. First, the variables for the application of the CAPM are made (Prigge &

[10] The squad of Manchester United in the 2021/2022 season: https://www.transfermarkt.com/manchester-united/startseite/verein/985?saison_id=2021

[11] The injury history of Harry Maguire: https://www.transfermarkt.com/harry-maguire/verletzungen/spieler/177907. It is also possible to look up the injury history of a player via 'STATS' and then clicking on 'Injury history'.

[12] All current and former managers of Manchester United: https://www.transfermarkt.com/manchester-united/mitarbeiterhistorie/verein/985

[13] This page shows all trophies won by Manchester United: https://www.transfermarkt.com/manchester-united/erfolge/verein/985

[14] This article is about Manchester United's last Premier League title: https://www.nu.nl/sport/3404147/van-persie-schiet-manchester-united-titel.html

Tegtmeier, 2019). Therefore, the variables *Risk_Free_Rate* and *Market_Return* are generated. Furthermore, the variable *Monthly_Return* is created for each football club. This variable contains the monthly stock returns of a particular football club during the chosen time period. Second, the variable for the calendar effect analysis is added (Haggard & Witte, 2010). Hence, the dummy variable *End_Of_Season* is constructed. March, April, and May are chosen as the end of the season months because clubs usually play their last matches of the season in these months (Renneboog & Vanbrabant, 2000). The 2019/2020 season is the only exception because this season ended in August due to the COVID-19 pandemic (NOS, 2020). Hence, June, July, and August are the end of the season months for the 2019/2020 season.

Next, the variables for the analysis of the football-related events are created. Hence, for each football club a variable is generated with respect to its daily stock returns. The variable *Daily_Return* contains all daily stock returns of a particular football club during the chosen time period. Moreover, the variable *Daily_Market_Return* is created as well. For football matches, a one-day window is used ''as the event period to prevent the effect of an overlapping game.'' (Demir & Danis, 2011, p. 61) Occasionally, two games were played between two trading days. If this happened, only the most recent game of these two has been included. Furthermore, football matches are played during the weekends or during the night (Stadtmann, 2006). Hence, football matches are played when the stock market is closed. As a consequence, the effect of a match result on football stock prices and returns materializes on the next trading day (Demir & Danis, 2011; Renneboog & Vanbrabant, 2000). Therefore, this is considered when the dummy variables *Win*, *Draw*, and *Loss* are created (Demir & Danis, 2011; Duque & Ferreira, 2005).

National league matches and group stage matches of European club competitions are coded similarly, namely by using the results of these matches. However, national cup matches and knockout matches of European club competitions are coded differently. If these national cup matches and knockout matches consist of a single leg, progression to the next round is coded as a win. On the other hand, not progressing to the next round is coded as a loss. Furthermore, cup matches and knockout matches consisting of two legs are also coded differently. The first leg is coded as a national league match, which implies that the coding depends on the result. The second leg is coded in another way. Progression to the next round is always coded as a win.

Winning the second leg without progression to the next round is coded as a loss. That is because the assumption is made that being eliminated is more important than winning the second leg. Moreover, other results that lead to elimination are coded as a draw or a loss depending on the result of the match. That is because these results are different but are both expected to provoke a negative stock market response. After the creation of the variables *Win*, *Draw*, and *Loss*, the variables for the other football-related events are constructed. Therefore, the dummy variables *Player_Purchase*, *Player_Sale*, *Injury*, *Managerial_Change*, and *Winning_Trophy* are created. A one-day window is used for these events as well. Besides, it is also assumed that the effects of these events materialize on the next trading day.

TABLE 2: OVERVIEW OF THE VARIABLES

Variable	Coding
Risk_Free_Rate	1-month EURIBOR rates
Market_Return	The monthly returns of the STOXX Europe 600.
Monthly_Return	The monthly stock returns of a particular football club.
End_Of_Season[15]	This variable is equal to 0 for the monthly stock returns of all months, except the monthly stock returns of March, April, and May. Furthermore, *End_Of_Season* is equal to 1 for the monthly stock returns of March, April, and May.
Daily_Return	The daily stock returns of a particular football club.
Daily_Market_Return	The daily returns of the STOXX Europe 600.
Win	*Win* is equal to 0 on all trading days which are not the first trading day after the club has won an official match. Besides, *Win* is equal to 1 on the first trading day after the club has won an official match.
Draw	*Draw* is equal to 0 on all trading days which are not the first trading day after the club has drawn an official match. Hence, *Draw* is equal to 1 on the first trading day after the club has drawn an official match.
Loss	*Loss* is equal to 0 on all trading days which are not the first trading day after the club has lost an official match. Therefore, *Loss* is equal to 1 on the first trading day after the club has lost an official match.
Player_Purchase	This variable is equal to 0 on all trading days which are not the first trading day after the club bought a player and is equal to 1 on the first trading day after the club bought a player.
Player_Sale	*Player_Sale* is equal to 0 on all trading days which are not the first trading day after the club sold a player

[15] For the 2019/2020 season, *End_Of_Season* is equal to 0 for the monthly stock returns of all months, except the monthly stock returns of June, July, and August. Hence, it is equal to 1 for the monthly stock returns of June, July, and August.

	and is equal to 1 on the first trading day after the club sold a player.
Injury	This variable is equal to 0 on all trading days which are not the first trading day after a first team player got injured and is equal to 1 on the first trading day after a first team player got injured.
Managerial_Change	*Managerial_Change* is equal to 0 on all trading days which are not the first trading day after a managerial change and is equal to 1 on the first trading day after a managerial change.
Winning_Trophy	This variable is equal to 0 on all trading days which are not the first trading day after winning a trophy and is equal to 1 on the first trading day after winning a trophy.

3.3 Models

Two models are used for the general examination, while one model is used for the event studies. These models are used for the regression analysis. Different regression types are used to perform the regression analysis due to the usage of panel data. First, pooled regressions are used (Bell et al., 2012).[16] A pooled regression means that an OLS regression is performed on the pooled data (Hiestand, 2005; Wooldridge, 2013). Therefore, it is possible to draw a general conclusion regarding football stocks. However, the standard errors are likely to be serially correlated due to the clustered data (Wooldridge, 2013).[17] Hence, clustered standard errors are used for the pooled regressions to avoid incorrect standard errors and coefficients (Abadie et al., 2023; Wooldridge, 2013). Second, OLS regressions are performed. These OLS regressions are conducted separately for each club (Demir & Danis, 2011; Prigge & Tegtmeier, 2019). That is because football clubs use ''different structures when transferring their revenues and expenses to their listed companies" (Demir & Danis, 2011, p. 59). Hence, a pooled regression could lead to biased results (Demir & Danis, 2011). Therefore, separate OLS regressions are conducted to draw conclusions for each individual football stock as well.

[16] A pooled regression is the most appropriate regression model in the context of this research. This was also confirmed by both pFtests and Breusch-Pagan Lagrange Multiplier tests.

[17] This was later confirmed by Breusch-Godfrey tests.

The first model is a model of Prigge & Tegtmeier (2019, p. 152). This model is a modified CAPM and is used to test the first hypothesis. However, the CAPM has several limitations. First, it relies on unrealistic assumptions. For example, the CAPM assumes rational investors, no transaction costs, risk-free borrowing and lending, risk-free borrowing and lending at the same rates, and no restrictions regarding the short selling of assets (Rossi, 2016). Second, the CAPM is a single-factor model (Prigge & Tegtmeier, 2019). Hence, the Fama and French three-factor model is more used nowadays. The Fama and French three-factor model is an extension of the CAPM because it adds firm size and book-to-market factors to the CAPM (Fama & French, 1993). Nevertheless, the Fama and French factors are denominated in US dollar and also include dividends (French, 2023). Therefore, the Fama and French three-factor model is not appropriate for this research. For instance, this research uses stock prices denominated in euros. Furthermore, football clubs almost do not pay dividends (Stadtmann, 2006). Hence, the CAPM is used instead of the Fama and French three-factor model.

The modified CAPM of this study contains exactly the same variables as the modified CAPM of Prigge & Tegtmeier (2019). They used as dependent variable the monthly excess return of a football stock. As a consequence, a new variable needs to be created for every club. Hence, the variable *Monthly_Excess_Return* is made by subtracting the values of *Risk_Free_Rate* from the *Monthly_Return* values. The independent variable is the market risk premium, which is the market return in excess of the risk-free rate (Prigge & Tegtmeier, 2019). Therefore, the variable *Market_Risk_Premium* is created by subtracting the values of *Risk_Free_Rate* from the values of *Market_Return*. Besides, the coefficient of *Market_Risk_Premium* (β1) can be regarded as the beta. Furthermore, β0 “indicates whether the stock is correctly priced.” (Prigge & Tegtmeier, 2019, p. 153) The focus is on a negative β0 because a negative β0 implies that a stock is overvalued. This means that the return is lower than the expected return based on the CAPM (Prigge & Tegtmeier, 2019). First, a pooled regression is conducted. This pooled regression is shown by Equation 2. This leads to a single β0 for all football clubs. Hence, a conclusion can be drawn regarding the valuation of football stocks in general. Second, the separate OLS regressions lead to a β0 for each football club, thereby making it possible to test for each football club if its

stock is overvalued (Prigge & Tegtmeier, 2019). The model for the OLS regressions is shown by Equation 3. Finally, one-sided t-tests are performed to test if a β0 is significantly less than 0.

EQUATION 2

$$(2)\ Monthly\_Excess\_Return_{it} = \beta 0 + \beta 1 * Market\_Risk\_Premium_t + \varepsilon_{it}$$

EQUATION 3

$$(3)\ Monthly\_Excess\_Return_{it} = \beta 0_i + \beta 1_i * Market\_Risk\_Premium_t + \varepsilon_t$$

The second model is used to analyse if football stock returns are higher during end of the season months. The model is based on the model of Haggard & Witte (2010, p. 380) but is slightly adjusted. Haggard & Witte (2010, p. 380) used their model for an OLS regression analysis. Hence, both a pooled regression and OLS regressions are used again. The pooled regression is shown by Equation 4 and is used to test if a calendar effect exists in the football stock market. In addition to this, the model for the OLS regressions is shown by Equation 5. This means that for each football club is checked if a calendar effect is present regarding its stock returns. Hence, *Monthly_Return* is used as dependent variable. The independent variables are *Market_Return* and *End_Of_Season* (Haggard & Witte, 2010). *Market_Return* is included as independent variable to control for the monthly returns of the stock market. Besides, the inclusion of *End_Of_Season* is necessary for testing if football stock returns are higher during the end of the season. Therefore, the focus is on a positive β2 as a positive β2 means that football stock returns have been higher during end of the season months (Haggard & Witte, 2010). Hence, one-sided t-tests are performed to test if a β2 is significantly greater than 0.

EQUATION 4

$$(4)\ Monthly\_Return_{it} = \beta 0 + \beta 1 * Market\_Return_t + \beta 2 * End\_Of\_Season_t + \varepsilon_{it}$$

EQUATION 5

$$(5)\ Monthly\_Return_{it} = \beta 0_i + \beta 1_i * Market\_Return_t + \beta 2_i * End\_Of\_Season_t + \varepsilon_t$$

A third model is used for the event studies. That is because similar regressions are conducted as in Demir & Danis (2011, p. 62) and Renneboog & Vanbrabant (2000, p. 21). Another reason is that the daily data of the involved football clubs differ excessively to conduct a pooled regression. Therefore, several assumptions related to the pooled regression are not valid anymore (Wooldridge, 2013). Hence, only OLS regressions are performed for each club (Demir & Danis, 2011). The used OLS regression is shown by Equation 6. In contrast to previous research, daily returns are used as dependent variable instead of daily abnormal returns based on the aforementioned reasons in section 2.3 (Benkraiem et al., 2009; Demir & Danis, 2011; Renneboog & Vanbrabant, 2000). Therefore, the dependent variable is the variable *Daily_Return*. Besides, *Daily_*Market*_Return* is included as independent variable to control for the daily returns of the stock market. Furthermore, the other independent variables are the football-related event variables. First, the dummy variables *Win*, *Draw*, and *Loss* are included (Demir & Danis, 2011; Renneboog & Vanbrabant, 2000). A dummy trap is avoided, as these dummy variables are equal to 0 on all trading days which are not the first trading day after a match (Duque & Ferreira, 2005). Second, the dummy variables *Player_Purchase*, *Player_Sale*, *Injury*, *Managerial_Change*, and *Winning_Trophy* are all included too, as these events are not correlated for any club.[18] The hypotheses are then tested by checking if the coefficient of a particular variable differs significantly from 0. This is done by using one-sided t-tests.

EQUATION 6

$$(6)\ Daily\_Return_{it} = \beta 0_i + \beta 1_i * Daily\_Market\_Return_t + \beta 2_i * Win_t + \beta 3_i * Draw_t + \beta 4_i * Loss_t + \beta 5_i * Player\_Purchase_t + \beta 6_i * Player\_Sale_t + \beta 7_i * Injury_t + \beta 8_i * Managerial\_Change_t + \beta 9_i * Winning\_Trophy_t + \varepsilon_t$$

[18] This is based on the Variance Inflation Factors.

4 Results

This chapter provides the results of the regression analysis. First, the descriptive statistics are provided. Second, the results of the general examination of football stock returns are presented. Third, the results of the event studies regarding the football-related events are presented. Finally, the results of several robustness checks are briefly discussed as well. All tables are included in the Appendix because they are quite extensive. Besides, a thorough discussion of the results regarding the robustness checks is provided in Appendix 7.6.

4.1 Descriptive Statistics

Descriptive statistics are provided for the key variables with respect to the analysis. Therefore, data about the number of observations, mean, standard deviation, minimum, and maximum are shown. Table 3 presents the descriptive statistics of the key variables regarding the general examination after pooling the data of all football clubs. For example, *Monthly_Return* and *Monthly_Excess_Return* have less observations compared to *Risk_Free_Rate*. Multiple explanations exist for these differences in the number of observations. An explanation is that the Refinitiv Workspace contained Manchester United stock prices since August 2012. That is because Manchester United is relisted since August 10th, 2012 (Manchester United, 2023; Smith, 2012). Hence, Manchester United returns have been calculated since September 2012. Besides, SC Braga stock prices were missing for multiple months during the chosen time period. As a consequence, it was impossible to calculate returns for all months. Furthermore, *Market_Return* and *Market_Risk_Premium* are missing for July 2011 because prices of the STOXX Europe 600 were collected since July 2011. Therefore, these variables contain a missing observation for each football club, except Manchester United. Finally, *End_Of_Season* has less observations as well. First, Manchester United was not listed during the 2011/2012 season. Therefore, stock price data did not exist for the club during some end of the season months. Second, data were not collected for AIK regarding *End_Of_Season* because AIK is excluded from the calendar effect analysis. AIK is a Swedish football club and football seasons do not end on June 30th in Sweden. Hence, AIK is the only club in the sample for which March, April, and May are not end of the season months.

That is why the decision was made to exclude AIK from the calendar effect analysis. Furthermore, Table 4 shows the descriptive statistics of *Monthly_Return* and *Monthly_Excess_Return* per football club, as these variables differ for each club.

Descriptive statistics are also provided for the key variables of the event studies. These descriptive statistics are shown by Table 5 and are presented per football club. Multiple reasons exist for the differences regarding these descriptive statistics. First, the football clubs are listed on various stock exchanges. Hence, these stock exchanges were open and closed on different days. Second, daily stock prices were not always available for each football club. For example, some stocks have been temporarily suspended. Therefore, it was sometimes not possible to calculate the daily returns. Third, the number of observations of the football-related events differ for each football club as well. Hence, Table 6 is provided. This table shows per football club the number of observations regarding each football-related event.

4.2 General Examination

The general examination of football stock returns consisted of two parts.[19] First, it was tested if European football stocks are overvalued by the CAPM. The results of these regressions are presented in Table 7. European football stocks are generally overvalued by the CAPM based on the results of the pooled regression. That is because β0 is -0.003 (p = 0.0979), which means that football stocks are on average overvalued by 0.3%. Furthermore, β0 is significant at the 10% level after dividing the p-value by 2 based on using a one-sided t-test (Studenmund, 2017). Besides, the coefficient of *Market_Risk_Premium* is 0.821 (p = 0.0000) and significant at the 1% level. Hence, football stocks usually have a beta of less than 1. As a consequence, football stocks are less affected by general stock market developments. In addition to the pooled regression, the OLS regressions led to similar results. For instance, the stocks of 15 football clubs are overvalued by the CAPM. However, this is only significant at the 5% level for Galatasaray (p = 0.0372). Besides, the stocks of the six other football clubs are undervalued by the CAPM. Nevertheless, this unexpected result is only significant at the 10% level for Silkeborg IF (p = 0.0990). Furthermore,

[19] All variables and residuals were stationary based on the outcomes of the Augmented Dickey-Fuller test.

the coefficient of *Market_Risk_Premium* is for 15 football clubs less than 1 and is significant at different levels for 11 football clubs. Hence, these football clubs have a beta of less than 1. On the other hand, 6 football clubs have a beta greater than 1 and this is significant at the 1% level for 5 football clubs. Based on the pooled regression, the null hypothesis of H1 would be rejected, as β0 is negative and differs significantly from 0. However, the null hypothesis of H1 would not be rejected based on the OLS regressions. Although β0 is negative for 15 of the 21 football clubs, it is only significantly negative for Galatasaray. Furthermore, the R^2 is less than 0.2 for each regression. Therefore, *Market_Risk_Premium* does not explain much of the variance of *Monthly_Excess_Return*.

Second, it was analysed if stock returns of European football clubs are higher during the end of the season. The results of these regressions are shown by Table 8. A calendar effect is, based on the results of the pooled regression, not present in the football stock market. The coefficient of *End_Of_Season* is namely -0.0001 (-0.01%), whereas a positive coefficient was expected. Furthermore, the p-value of *End_Of_Season* is 0.4968 after being divided by 2. This indicates that the monthly stock returns of football clubs are not significantly higher during the end of the season months. Besides, the coefficient of *Market_Return* is 0.826 (p = 0.0000) and significant at the 1% level. Hence, monthly market returns have a substantial influence on the monthly football stock returns.

The OLS regressions resulted in an expected positive *End_Of_Season* coefficient for 12 of the 20 football clubs. These positive coefficients range from 0.0002 (0.02%) to 0.069 (6.9%). However, after dividing the p-values by 2, only the monthly stock returns of Ajax (p = 0.0578), FC Copenhagen (p = 0.0970), and Silkeborg IF (p = 0.0111) are significantly higher during end of the season months at respectively the 10% level and the 5% level. Furthermore, an unexpected negative *End_Of_Season* coefficient was obtained for 8 of the 20 football clubs. These negative coefficients range from -0.071 (-7.1%) to -0.003 (-0.3%). However, a negative *End_Of_Season* coefficient is after dividing the p-values by 2 only significant at the 10% level for Sporting Portugal (p = 0.0690) and Trabzonspor (p = 0.0745), while it is significant for Beşiktaş (p = 0.0239) at the 5% level. Therefore, the monthly stock returns of Sporting Portugal, Beşiktaş, and Trabzonspor are significantly lower during the end of the season months. Besides, the *Market_Return*

coefficient is positive for all football clubs and is for 15 of the 20 football clubs significant at the 5% level or the 1% level. Based on these results of the calendar effect analysis, the null hypothesis of H2 cannot be rejected. That is because the pooled regression resulted in an insignificant negative coefficient for *End_Of_Season*, while the OLS regressions led to mixed results. Hence, football stock returns are in general not higher during end of the season months. Moreover, the adjusted R^2 is less than 0.2 for each regression. Therefore, *Market_Return* and *End_Of_Season* do not explain much of the variance of *Monthly_Return*.

4.3 Event Studies

The event studies were conducted after the general examination.[20] The event studies were carried out for all football clubs, except SC Braga. That is because many daily returns were missing for SC Braga. The event studies have been used to test hypothesis 3a up to and including hypothesis 5b. As all hypotheses with respect to the event studies are one-sided, all p-values regarding the coefficients of the event variables were divided by two. The results of these regressions are presented in Table 9. The adjusted R^2 is less than 0.25 for each regression. This was expected because this research did not include all potential factors that could affect football stock returns.

The first events are the results of football matches. First, it was tested if a win leads to a higher stock return on the next trading day. The coefficient of *Win* is, as expected, positive for 19 of the 20 football clubs. Furthermore, *W*in is significantly positive at the 10% level, the 5% level, or the 1% level for 10 clubs. On the contrary, a negative *Win* coefficient was only found for Fenerbahçe. However, this negative coefficient is not significant based on the p-value of 0.2692. Second, it was examined if a draw leads to a lower stock return on the next trading day. A draw led indeed to lower stock returns for 18 of the 20 football clubs. Besides, *Draw* is significantly negative at the 10% level, the 5% level, or the 1% level for 14 of these 18 clubs. On the other hand, the coefficient of *Draw* is positive for both Celtic and Silkeborg IF. Nevertheless, this surprising result is only significant for Celtic ($p = 0.0364$) at the 5% level. Third, it was studied if a

[20] All variables and residuals were stationary based on the outcomes of the Augmented Dickey-Fuller test.

loss evokes a lower stock return on the next trading day as well. The coefficient of *Loss* is indeed negative for 19 of the 20 football clubs and is significant for 17 clubs at the 10% level, the 5% level, or the 1% level. A loss has only a positive effect on the stock returns of Silkeborg IF. Nonetheless, this positive *Loss* coefficient is not significant based on the p-value of 0.3377. Based on the results of the regressions, the null hypotheses of H3a up to and including H3c can be rejected. For example, a win has a significant positive effect on football stock returns for 50% of the clubs. Furthermore, a draw has a significant negative effect on football stock returns regarding 70% of the clubs. Lastly, a loss has a significant negative effect on football stock returns for 85% of the clubs.

The next events are the events related to football players. First, it was checked if the purchase of a player results in a lower stock return on the next trading day. This is the case for 9 of the 20 football clubs. However, *Player_Purchase* is for none of the clubs significantly negative. On the contrary, the coefficient of *Player_Purchase* is unexpectedly positive for the other 11 clubs. Furthermore, this positive *Player_Purchase* coefficient is significant at the 5% level for Olympique Lyon ($p = 0.0392$) and AIK ($p = 0.0370$). Second, it was studied if the sale of a player provokes a higher stock return on the next trading day. *Player_Sale* has an expected positive effect on the stock returns of 12 of the 20 football clubs. This positive effect is significant for Benfica ($p = 0.0967$), Fenerbahçe ($p = 0.0616$), and Beşiktaş ($p = 0.0660$) at the 10% level, while it is significant for Galatasaray ($p = 0.0480$) at the 5% level. On the other hand, *Player_Sale* has only a significant negative effect on the stock returns of AIK ($p = 0.0533$). Third, it was analysed if an injured football player generates a lower stock return on the next trading day. Information regarding injuries was not available for Aalborg BK and AIK. Hence, the variable *Injury* has been part of 18 OLS regressions. The coefficient of *Injury* is negative for 9 of the 18 football clubs. However, it is not significant for any of these clubs. On the other hand, *Injury* has an unexpected significant positive effect on the stock returns of FC Porto ($p = 0.0935$), Fenerbahçe ($p = 0.0536$), and Trabzonspor ($p = 0.0860$), as *Injury* is significant at the 10% level for these clubs. Based on the results of the regressions, the null hypotheses of H4a up to and including H4c cannot be rejected because the stock market reacts inconclusive to these events. Furthermore, significant negative

results were not obtained regarding *Player_Purchase* and *Injury*, while significant positive results were limited regarding *Player_Sale*.

The last events are managerial changes and winning trophies. First, it was examined if a managerial change induces a lower stock return on the next trading day. A managerial change has a negative effect on the stock returns of 11 of the 20 football clubs. However, this negative effect is only significant for Juventus (p = 0.0891) at the 10% level, whereas it is significant for Lazio Roma (p = 0.0465) and Silkeborg IF (p = 0.0395) at the 5% level. On the contrary, a managerial change has only a significant positive effect on the stock returns of AGF Aarhus (p = 0.0206). Second, it was tested if winning a trophy elicits a higher stock return on the next trading day. The variable *Winning_Trophy* has been included in 19 OLS regressions because AGF Aarhus did not win a trophy during the chosen time period. The coefficient of *Winning_Trophy* is positive for 7 of the 19 football clubs. Furthermore, winning a trophy has only a significant positive effect on the stock returns of Lazio Roma (p = 0.0642) and Ajax (p = 0.0176). Nevertheless, *Winning_Trophy* has a surprising negative impact on the stock returns of 12 football clubs. Moreover, this negative effect is significant for Olympique Lyon (p = 0.0186), Galatasaray (p = 0.0130), Fenerbahçe (p = 0.0469), and AIK (p = 0.0364) at the 5% level. In addition to this, this negative effect is significant for Juventus (p = 0.0001), Benfica (p = 0.0001), Beşiktaş (p = 0.0001), and Aalborg BK (p = 0.0042) at the 1% level as well. Based on the results of the regressions, the null hypotheses of H5a and H5b cannot be rejected. A managerial change has a negative effect on football stock returns for a majority of the clubs. However, this negative effect is only significant for Lazio Roma, Juventus, and Silkeborg IF. Moreover, winning a trophy results in a higher stock return for approximately one third of the football clubs. Besides, this positive effect is only significant for Lazio Roma and Ajax. On the other hand, winning a trophy has a significant negative effect on the stock returns of 8 of the 19 football clubs. Therefore, winning a trophy has probably an unexpected significant negative effect on football stock returns.

4.4 Robustness Checks

Two robustness checks are performed for each analysis. The first robustness check is a different measure of returns because absolute returns are used. Therefore, returns are not

continuously compounded anymore but are calculated as the percentage change in the stock price. This is shown by Equation 7. The second robustness check is the usage of a different time period. The COVID-19 pandemic had a major negative impact on the stock market (Baker et al., 2020; Contessi & De Pace, 2021; Mazur et al., 2021). Hence, previous results might be biased. As a consequence, the 2019/2020 season up to and including the 2021/2022 season are removed from the sample.

EQUATION 7

$$(7)\ \text{Return}_{i,t} = (S_{i,t} - S_{i,t-1}) / S_{i,t-1}$$

The results of the first robustness check regarding the valuation of football stocks are shown by Table 10, while the results of the second robustness check are presented in Table 11. The first robustness check led to different results. For example, the β0 of the pooled regression is now 0.007 (p = 0.0047) and is significant at the 1% level, while it was significantly negative at the 10% level when continuously compounded returns were used. The OLS regressions generated different results as well. For instance, the stocks of five football clubs are currently overvalued by the CAPM and β0 is not significantly negative for any of these clubs. On the other hand, the results of the second robustness check are more aligned with the results of the original analysis. For example, the β0 of the pooled regression is -0.003 (p = 0.1980) but is not significant anymore. Furthermore, equivalent results were obtained with the OLS regressions. For instance, the stocks of 11 football clubs are overvalued by the CAPM based on the second robustness check. Besides, this result is again only significant for a few clubs.

Next, the robustness checks were conducted for the calendar effect analysis. The results of the first robustness check are shown by Table 12. The *End_Of_Season* coefficient is now positive for the pooled regression because it is 0.001 (p = 0.1075). Nonetheless, *End_Of_Season* is still insignificant. The OLS regressions generated similar results compared to the original OLS regressions. A positive *End_Of_Season* coefficient was obtained for 11 of the 20 football clubs. Nevertheless, *End_Of_Season* has only a significant positive effect on the monthly stock returns of three clubs. Furthermore, the results of the original OLS regressions are confirmed as significant effects were found for the same clubs. The results of the second robustness check are

presented in Table 13. The coefficient of *End_Of_Season* is -0.001 (p = 0.4667) for the pooled regression and is insignificant. Furthermore, the OLS regressions of the second robustness check induced similar results compared to the results of the first robustness check OLS regressions. For example, a positive *End_Of_Season* coefficient was again obtained for 11 of the 20 football clubs. Besides, *End_Of_Season* still has a significant positive effect on the stock returns of two clubs.

The robustness checks were also done for the event studies. The OLS regressions of the first robustness check include all event variables. The results of this robustness check are shown by Table 14. This robustness check generated equivalent results for *Win*, *Draw*, and *Loss* compared to the original analysis. The results of the first robustness check also did not differ substantially for *Player_Purchase*, *Player_Sale*, *Injury*, *Managerial_Change*, and *Winning_Trophy*. The results of the second robustness check are presented in Table 15. Data were not collected regarding injuries during the time period used for this robustness check. Hence, the variable *Injury* is removed from this analysis. Besides, *Winning_Trophy* was included in 17 OLS regressions because AS Roma, Trabzonspor, and AGF Aarhus did not win a trophy between July 1st, 2011 and July 1st, 2019. The results of the second robustness check are slightly different compared to the results of the first robustness check. For example, the sign of several coefficients changed for a few clubs. However, the impact of the events on football stock returns did not change generously.

5 Discussion and Conclusion

This research consisted of two parts, namely a general examination of football stock returns and event studies regarding football stock returns. The general examination was conducted to provide information about football stocks before studying how football-related events affect football stock returns. The first part of the general examination led to similar results as the study of Prigge & Tegtmeier (2019). That is because it was found that football stocks are in general significantly overvalued by the CAPM after pooling the data. Furthermore, 15 of the 21 football stocks were overvalued by the CAPM. Nevertheless, this was only significant for Galatasaray. Besides, these results were quite similar when the period of the COVID-19 pandemic was excluded. However, the results were contrasting when absolute returns were used instead of continuously compounded returns. Therefore, the evidence is not definite to state that European

football stocks are overvalued. The second part of the general examination did not provide evidence for a general calendar effect in the European football stock market. That is because stock returns were not significantly higher during end of the season months. This was also confirmed by the robustness checks. Hence, this result corresponds with the result of Bell et al. (2012), as they also found that the end of the season has not a substantial impact on the stock returns of football clubs. However, either positive end of season effects or negative end of season effects were found for a handful of clubs. This is in line with the findings of Renneboog & Vanbrabant (2000) because they found large abnormal stock returns for clubs regarding end of the season matches. A possible explanation is that end of the season matches have been more important for some clubs than for other clubs with regard to the final ranking (Bell et al., 2012; Renneboog & Vanbrabant, 2000). As a consequence, end of season effects are only present for a handful of clubs.

The results of the event studies are crucial for answering the research question. First, winning a match has a significant positive effect on stock returns for a majority of the football clubs. Second, drawing a match has a significant negative effect on stock returns for a majority of the football clubs. Third, losing a match also has a significant negative effect on the stock returns of almost all football clubs. These results are confirmed by the robustness checks. Hence, these results support the results of previous research. Previous research found similar effects of match results on abnormal football stock returns (Bell et al., 2012; Benkraiem et al., 2009; Berument et al., 2009; Demir & Danis, 2011; Duque & Ferreira, 2005; Ferreira et al., 2017; Floros, 2014; Renneboog & Vanbrabant, 2000; Scholtens & Peenstra, 2009; Stadtmann, 2006). An explanation for these results is the dependence of football stock returns on sporting performance, as the sporting performance of a club has a substantial influence on the financial performance of a club (Bell et al., 2012; Benkraiem et al., 2009; Demir & Danis, 2011; Renneboog & Vanbrabant, 2000). However, it is fundamental to consider that the effect of these events is still less than the effect of general stock market movements.

In contrast to the match results, the events related to football players did not generally have a significant effect on football stock returns. For example, the purchase of a football player induced mixed results. The purchase of a football player did not have a significant effect on the

stock returns of many football clubs. This finding is equivalent to the findings of previous research (Bell et al., 2012; Gimet & Montchaud, 2016; Stadtmann, 2006). However, for a handful of clubs the purchase of a football player has a significant positive effect on their stock returns. Nevertheless, this does not provide evidence for the finding of Fotaki et al. (2009), as they found that the purchase of a football player has a negative effect on football stock prices and returns. Furthermore, the sale of a football player generated mixed effects as well. Besides, these effects were not significant for a majority of the football clubs. Hence, this finding is again equivalent to the findings of previous research (Bell et al., 2012; Gimet & Montchaud, 2016; Stadtmann, 2006). Nonetheless, the sale of a football player had a significant positive effect on the stock returns of a handful of football clubs. This provides limited evidence for the result of Fotaki et al. (2009) because they found that the sale of a football player has a positive effect on football stock prices and returns. These mixed results can be explained by heterogeneous player qualities of the transferred players. Moreover, injuries of football players also have different effects on football stock returns. Injuries were expected to have a negative effect on sporting performance and thereby also financial performance (Hägglund et al., 2013). However, only a few significant positive effects were found regarding injuries and football stock returns. Therefore, it is likely that injuries do not have an effect on football stock returns (Bell et al., 2012).

The last events were managerial changes and winning trophies. A managerial change also led to mixed results. For a handful of football clubs, a managerial change has either a significant positive effect or a significant negative effect on their stock returns. Nevertheless, most of the results regarding a managerial change were insignificant. Therefore, this is equivalent to the finding of Fotaki et al. (2009). Winning a trophy had various effects as well. Winning a trophy had a positive effect on the stock returns of a few football clubs. On the other hand, winning a trophy had an unexpected significant negative effect on the stock returns of almost 50% of the football clubs. Hence, this finding contradicts the finding of Duque & Ferreira (2005), as they found that winning the national league generates a positive stock return.

This research had the following research question: How do football-related events affect the stock returns of football clubs? Multiple answers can be provided to this question. First, winning a football match has a positive effect on the stock returns of football clubs. Second,

drawing a football match has a negative effect on the stock returns of football clubs. Third, losing a football match also has a negative effect on the stock returns of football clubs. Fourth, the purchase of a football player, the sale of a football player, an injury of a football player, a managerial change, and winning a trophy do not affect football stock returns. Nevertheless, it is important to note that these football-related events might significantly affect the stock returns of a single football club.

This study had a couple of limitations. Hence, these limitations could generate alternative explanations why certain events did not have an expected effect on football stock returns. First, a one-day event window was used for all events. This is appropriate for football matches, as they are played when the stock market is closed (Stadtmann, 2006). However, football transfers, injuries, and managerial changes can also occur when the stock market is open. Hence, a one-day event window might not capture the entire effect of these events. Furthermore, it could be possible that the stock market does not respond directly to certain events. This would also mean that a one-day event window is insufficient for capturing the entire effect of these events. Second, rumours about transfers, injuries, and managerial changes were ignored in this study. Rumours precede the official announcements of football clubs regarding these events. Hence, it is likely that the stock market has already responded to these events. This would mean that a one-day event window is inadequate. Third, the expectations of investors were neglected as well. This applies in particular to match results and winning trophies. For example, it is halfway through the season likely which club is going to win the league. Hence, it can be expected again that investors have already responded to these events. Fourth, this research did not include financial elements that could affect football stock returns. For instance, the market capitalization and financial statements of these football clubs are substantially different. Besides, finance-related events such as the publication of financial reports can affect football stock returns as well (Gimet & Montchaud, 2016). Finally, other external factors have been ignored too. For example, football clubs from different countries were included in the sample. Nevertheless, this research did not control for this in the regression analysis. Moreover, several football clubs have been involved in scandals. For example, Beşiktaş, Fenerbahçe, and Juventus have been involved in several scandals (Goal.com, 2021; Yilmaz et al., 2019). These scandals could affect football stock prices, as

Mazanov et al. (2012) found that scandals have a positive effect on football stock prices and returns.

This research provides, partly based on the limitations, multiple recommendations for further research. First, further research could use a multi-day event window. Hence, a possible effect of a particular event can be studied better. Second, further research could use newspapers and websites to obtain information regarding rumours about particular events. Hence, this information can be used to study the response of the stock market instead of only using information of official announcements. Third, further research could account for the expectations of investors. Therefore, experiments, interviews, or betting odds can be used to elicit the expectations of the different types of investors (Demir & Danis, 2011; Prigge & Tegtmeier, 2019). Fourth, several financial elements and other external factors can be included in further research. For example, the market capitalization and data of the financial statements can be added to the analysis. Besides, transfer fees could be added to the analysis because varying transfer fees could have different effects on stock returns. As a consequence, transfer fees control for heterogeneous player qualities. Furthermore, it can be studied how the football stock market responds to financial events of football clubs, such as the publication of a financial report. Hence, an analysis that includes both financial events and sporting events can better explain the movements of football stock returns. Fifth, further research could control for particular country effects. This can be done by adding country dummy variables to the analysis. Finally, further research could also use fixed effects regressions instead of pooled regressions, thereby taking into account that some characteristics of football clubs do not change.

Policy recommendations are provided as well. First, listed football clubs use the stock market to satisfy their financing needs (Benkraiem et al., 2009). However, football clubs “choose different structures when transferring their revenues and expenses to their listed companies” (Demir & Danis, 2011, p. 59). Therefore, the UEFA could introduce a regulation which states that all football clubs should have an identical structure for transferring their revenues and expenses to their listed companies. Second, multiple privately owned clubs are used for sportswashing. Hence, the UEFA could introduce a regulation to eliminate sportswashing. For example, the UEFA

could require that all football clubs are publicly listed. All in all, this research provides multiple suggestions for the future.

6 Bibliography

REFERENCES

Abadie, A., Athey, S., Imbens, G. W., & Wooldridge, J. M. (2023). When Should You Adjust Standard Errors for Clustering?*. *The Quarterly Journal of Economics*, *138*(1), 1–35. https://doi.org/10.1093/qje/qjac038

Aglietta, M., Andreff, W., & Drut, B. (2010). Floating European football clubs in the stock market. *EconomiX Working Papers*, Art. 2010–24. https://ideas.repec.org//p/drm/wpaper/2010-24.html

Ashton, J. K., Gerrard, B., & Hudson, R. (2003). Economic impact of national sporting success: Evidence from the London stock exchange. *Applied Economics Letters*, *10*(12), 783–785. https://doi.org/10.1080/1350485032000126712

Audas, R., Dobson, S., & Goddard, J. (2002). The impact of managerial change on team performance in professional sports. *Journal of Economics and Business*, *54*(6), 633–650. https://doi.org/10.1016/S0148-6195(02)00120-0

Baker, S. R., Bloom, N., Davis, S. J., Kost, K., Sammon, M., & Viratyosin, T. (2020). The Unprecedented Stock Market Reaction to COVID-19. *The Review of Asset Pricing Studies*, *10*(4), 742–758. https://doi.org/10.1093/rapstu/raaa008

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. https://doi.org/10.1080/00036846.2011.577017

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. https://doi.org/10.1108/00251740910929722

Berument, M. H., & Ceylan, N. B. (2012). Effects of soccer on stock markets: The return–volatility relationship. *The Social Science Journal*, *49*(3), 368–374. https://doi.org/10.1016/j.soscij.2012.03.003

Berument, M. H., Ceylan, N. B., & Ogut-Eker, G. (2009). Soccer, stock returns and fanaticism: Evidence from Turkey. *The Social Science Journal*, *46*(3), 594–600. https://doi.org/10.1016/j.soscij.2009.06.001

Bosshardt, A., Bridge, T., Hanson, C., Shaffer, A., Stenson, C., & Thorpe, A. (2013). *Captains of industry Football Money League*. https://www2.deloitte.com/content/dam/Deloitte/uk/Documents/sports-business-group/deloitte-uk-deloitte-football-money-league-2013.pdf

Contessi, S., & De Pace, P. (2021). The international spread of COVID-19 stock market collapses. *Finance Research Letters*, *42*, 101894. https://doi.org/10.1016/j.frl.2020.101894

De Tijd. (2020, August 28). *STOXX Europe Football-Net Return EUR*. De Tijd. https://www.tijd.be/markten-live/aandelen/stoxxeuropefootbal.150036707.html

Deloitte. (2023). *Deloitte Football Money League 2023*. Deloitte United Kingdom. https://www2.deloitte.com/uk/en/pages/sports-business-group/articles/deloitte-football-money-league.html

Demir, E., & Danis, H. (2011). The Effect of Performance of Soccer Clubs on Their Stock Prices: Evidence from Turkey. *Emerging Markets Finance and Trade*, *47*(sup4), 58–70. https://doi.org/10.2753/REE1540-496X4705S404

Dobson, S., & Goddard, J. A. (2001). *The economics of football* (Vol. 10). Cambridge University Press Cambridge.

Duque, J., & Ferreira, N. A. (2005). *Explaining Share Price Performance of Football Clubs Listed on the Euronext Lisbon* [SSRN Scholarly Paper]. https://doi.org/10.2139/ssrn.675633

Edmans, A., García, D., & Norli, Ø. (2007). Sports Sentiment and Stock Returns. *The Journal of Finance*, *62*(4), 1967–1998. https://doi.org/10.1111/j.1540-6261.2007.01262.x

European Central Bank. (2023). *Euro area (changing composition)—Money Market—Euribor 1-month—Historical close, average of observations through period—Euro, provided by Refinitiv—Quick View—ECB Statistical Data Warehouse*. https://sdw.ecb.europa.eu/quickview.do?SERIES_KEY=143.FM.M.U2.EUR.RT.MM.EURIBOR1MD_.HSTA

Fama, E. F., & French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics*, *33*(1), 3–56. https://doi.org/10.1016/0304-405X(93)90023-5

Ferreira, P., Loures, L., Nunes, J. R., & Dionísio, A. (2017). The behaviour of share returns of football clubs: An econophysics approach. *Physica A: Statistical Mechanics and Its Applications*, *472*, 136–144. https://doi.org/10.1016/j.physa.2017.01.022

Floros, C. (2014). Football and Stock Returns: New Evidence. *Procedia Economics and Finance*, *14*, 201–209. https://doi.org/10.1016/S2212-5671(14)00703-5

Fotaki, M., Markellos, R. N., & Mania, M. (2009). Human Resources Turnover as an Asset Acquisition, Accumulation and Divesture Process. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.1325645

Franck, E. (2010). Private Firm, Public Corporation or Member's Association Governance Structures in European Football. *International Journal of Sport Finance*, *5*(2), 108–127.

French, K. R. (2023, May). *Kenneth R. French—Description of Fama/French Factors*. http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/f-f_3developed.html

Fruh, K., Archer, A., & Wojtowicz, J. (2023). Sportswashing: Complicity and Corruption. *Sport, Ethics and Philosophy*, *17*(1), 101–118. https://doi.org/10.1080/17511321.2022.2107697

Gimet, C., & Montchaud, S. (2016). What Drives European Football Clubs' Stock Returns and Volatility? *International Journal of the Economics of Business*, *23*(3), 351–390. https://doi.org/10.1080/13571516.2016.1204686

Goal.com. (2018, November 17). *What is Financial Fair Play and how does it work? FFP rules explained | Goal.com*. https://www.goal.com/en/news/what-is-financial-fair-play-and-how-does-it-work-ffp-rules-explained/1ihlynh8s59i319l6nxx1z6kg5

Goal.com. (2021, December 6). *From the Pjanic-Arthur transfer to questions over Ronaldo's sale: Could Juventus be relegated again? | Goal.com*. https://www.goal.com/en/news/pjanic-arthur-transfer-secret-ronaldo-payments-juventus-relegated-again/blt8b27b040ed8aeced

Google Finance. (2023, April 28). *Manchester United PLC (MANU): Aandelenkoers en nieuws - Google Finance*. https://www.google.com/finance/quote/MANU:NYSE

Haggard, K. S., & Witte, H. D. (2010). The Halloween effect: Trick or treat? *International Review of Financial Analysis*, *19*(5), 379–387. https://doi.org/10.1016/j.irfa.2010.10.001

Hägglund, M., Waldén, M., Hedevik, H., Kristenson, K., Bengtsson, H., & Ekstrand, J. (2013). Injuries affect team performance negatively in professional football: An 11-year follow-up of the UEFA Champions League injury study. *British Journal of Sports Medicine*, *47*. https://doi.org/10.1136/bjsports-2013-092215

Hiestand, T. (2005). Using Pooled Model, Random Model And Fixed Model Multiple Regression To Measure Foreign Direct Investment In Taiwan. *International Business & Economics Research Journal (IBER)*, *4*(12). https://doi.org/10.19030/iber.v4i12.3642

Kling, G., & Gao, L. (2005). Calendar effects in Chinese stock market. *Annals of Economics and Finance*, *6*(1), Art. 1.

Leach, S., & Szymanski, S. (2015). Making Money Out of Football. *Scottish Journal of Political Economy*, *62*(1), 25–50. https://doi.org/10.1111/sjpe.12065

Malkiel, B. G. (2003). The Efficient Market Hypothesis and Its Critics. *Journal of Economic Perspectives*, *17*(1), 59–82. https://doi.org/10.1257/089533003321164958

Manchester United. (2023). *Investor FAQs*. https://ir.manutd.com/investor-faqs.aspx

Mazanov, J., Lo Tenero, G., Connor, J., & Sharpe, K. (2012). Scandal+football=a better share price. *Sport, Business and Management: An International Journal*, *2*(2), 92–114. https://doi.org/10.1108/20426781211244006

Mazur, M., Dang, M., & Vega, M. (2021). COVID-19 and the march 2020 stock market crash. Evidence from S&P1500. *Finance Research Letters*, *38*, 101690. https://doi.org/10.1016/j.frl.2020.101690

NOS. (2020, August 7). *Champions League gaat verder na vijf maanden: Hoe zit het ook alweer?* https://nos.nl/artikel/2343165-champions-league-gaat-verder-na-vijf-maanden-hoe-zit-het-ook-alweer

Prigge, S., & Tegtmeier, L. (2019). Market valuation and risk profile of listed European football clubs. *Sport, Business and Management: An International Journal*, *9*(2), 146–163. https://doi.org/10.1108/SBM-04-2018-0033

Prigge, S., & Tegtmeier, L. (2022). Efficiency in the market for listed European football clubs. *Managerial Finance*, *48*(11), 1561–1578. https://doi.org/10.1108/MF-05-2021-0196

Qontigo. (2023). *1-STOXX® Europe 600 (SXXP) (EU0009658202)*. Qontigo. https://qontigo.com/index/sxxp/

Renneboog, L. D. R., & Vanbrabant, P. (2000). Share Price Reactions to Sporty Performances of Soccer Clubs listed on the London Stock Exchange and the AIM. *Share Price Reactions to*

Sporty Performances of Soccer Clubs Listed on the London Stock Exchange and the AIM, 2000–19. https://research.tilburguniversity.edu/files/534671/19.pdf

Rohde, M., & Breuer, C. (2017). The market for football club investors: A review of theory and empirical evidence from professional European football. *European Sport Management Quarterly*, *17*(3), 265–289. https://doi.org/10.1080/16184742.2017.1279203

Ronald, I. (2023, March 20). *Manchester United is for sale, who could buy the world-famous club?* CNN. https://www.cnn.com/2023/03/20/football/manchester-united-sale-explainer-spt-intl/index.html

Rossi, M. (2016). The capital asset pricing model: A critical literature review. *Global Business and Economics Review*, *18*(5), 604–617. https://doi.org/10.1504/GBER.2016.078682

Schildberg-Hörisch, H. (2018). Are Risk Preferences Stable? *Journal of Economic Perspectives*, *32*(2), 135–154. https://doi.org/10.1257/jep.32.2.135

Scholtens, 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. https://doi.org/10.1080/00036840701721406

Smith, C. (2012, August 10). *Manchester United IPO: History Says Don't Buy*. Forbes. https://www.forbes.com/sites/chrissmith/2012/08/10/manchester-united-ipo-history-says-dont-buy/

Sporza. (2023, January 18). *Bijna anderhalf miljard tv-kijkers zagen Argentinië de wereldtitel veroveren | WK voetbal 2022 | sporza*. https://sporza.be/nl/2023/01/18/bijna-anderhalf-miljard-tv-kijkers-zagen-argentinie-de-wereldtitel-veroveren~1674068643104/

Stadtmann, G. (2006). Frequent News and Pure Signals: The Case of a Publicly Traded Football Club. *Scottish Journal of Political Economy*, *53*(4), 485–504. https://doi.org/10.1111/j.1467-9485.2006.00391.x

Studenmund, A. H. (2017). *Using Econometrics: A Practical Guide* (Seventh). Pearson Education, Limited. https://www.pearson.com/en-us/subject-catalog/p/using-econometrics-a-practical-guide/P200000006422/9780137506323

UEFA.com. (2023, April 3). *Country coefficients | UEFA Coefficients*. UEFA.Com. https://www.uefa.com/nationalassociations/uefarankings/country/

Voetbal International. (2018, September 10). *Europese clubs gezonder dan ooit: Unicum na invoering Financial Fair Play*. Voetbal International. https://www.vi.nl/nieuws/europese-clubs-gezonder-dan-ooit-unicum-na-invoering-financial-fair-play

Wooldridge, J. M. (2013). *Introductory econometrics: A modern approach* (5th ed., international ed). South Western, Cengage Learning.

Yilmaz, S., Manoli, A. E., & Antonopoulos, G. A. (2019). An anatomy of Turkish football match-fixing. *Trends in Organized Crime*, *22*(4), 375–393. https://doi.org/10.1007/s12117-018-9345-8

7 Appendix

7.1 Sample

Overview of football clubs that belong to the sample:

- Manchester United FC (ENG)
- Borussia Dortmund (GER)
- SS Lazio Roma (ITA)
- Juventus FC (ITA)
- AS Roma (ITA)
- Olympique Lyonnais (FRA)
- AFC Ajax (NED)
- SL Benfica (POR)
- FC Porto (POR)
- SC Braga (POR)
- Sporting Clube de Portugal (POR)
- Celtic FC (SCO)
- Galatasaray SK (TUR)
- Fenerbahçe SK (TUR)
- Beşiktaş JK (TUR)
- Trabzonspor (TUR)
- FC Copenhagen (DEN)
- AGF Aarhus (DEN)
- Silkeborg IF (DEN)
- Aalborg BK (DEN)
- AIK Fotboll (SWE)

7.2 Descriptive Statistics

TABLE 3: DESCRIPTIVE STATISTICS GENERAL EXAMINATION

Variable	N	Mean	St.dev	Min	Max

Monthly_Return	2688	0	0.144	-1.299	1.05
Risk_Free_Rate	2759	-0.002	0.004	-0.006	0.014
Monthly_Excess_Return	2688	0.001	0.145	-1.3	1.048
Market_Return	2739	0.003	0.04	-0.16	0.129
Market_Risk_Premium	2739	0.005	0.04	-0.155	0.134
End_Of_Season	2627	0.25	0.433	0	1

N shows the number of observations for each variable. Mean, St.dev, Min, and Max are provided in numbers, which means that corresponding percentages can be obtained by multiplying these numbers with 100.

TABLE 4: DESCRIPTIVE STATISTICS GENERAL EXAMINATION PER FOOTBALL CLUB

Manchester United	N	Mean	St.dev	Min	Max
Monthly_Return	118	0	0.081	-0.171	0.275
Monthly_Excess_Return	118	0.003	0.081	-0.166	0.28
Borussia Dortmund	N	Mean	St.dev	Min	Max
Monthly_Return	131	0.003	0.098	-0.345	0.303
Monthly_Excess_Return	131	0.004	0.098	-0.341	0.309
Lazio Roma	N	Mean	St.dev	Min	Max
Monthly_Return	131	0.005	0.134	-0.666	0.411
Monthly_Excess_Return	131	0.007	0.134	-0.662	0.415
Juventus	N	Mean	St.dev	Min	Max
Monthly_Return	131	0.003	0.149	-0.693	0.567
Monthly_Excess_Return	131	0.004	0.149	-0.701	0.571
AS Roma	N	Mean	St.dev	Min	Max
Monthly_Return	131	0.001	0.182	-0.724	1.05
Monthly_Excess_Return	131	0.002	0.182	-0.719	1.048
Olympique Lyon	N	Mean	St.dev	Min	Max
Monthly_Return	131	0	0.094	-0.365	0.383
Monthly_Excess_Return	131	0.002	0.095	-0.364	0.383
Ajax	N	Mean	St.dev	Min	Max
Monthly_Return	131	0.004	0.056	-0.196	0.145
Monthly_Excess_Return	131	0.006	0.056	-0.192	0.149
Benfica	N	Mean	St.dev	Min	Max
Monthly_Return	131	0.008	0.167	-0.476	0.693
Monthly_Excess_Return	131	0.01	0.168	-0.478	0.691
FC Porto	N	Mean	St.dev	Min	Max
Monthly_Return	131	0.001	0.129	-0.552	0.616
Monthly_Excess_Return	131	0.003	0.129	-0.547	0.62
SC Braga	N	Mean	St.dev	Min	Max
Monthly_Return	81	0.044	0.332	-1.299	0.827
Monthly_Excess_Return	81	0.046	0.332	-1.3	0.815
Sporting Portugal	N	Mean	St.dev	Min	Max
Monthly_Return	131	0.002	0.133	-0.316	0.457
Monthly_Excess_Return	131	0.003	0.133	-0.32	0.455
Celtic	N	Mean	St.dev	Min	Max
Monthly_Return	131	0.009	0.076	-0.387	0.333
Monthly_Excess_Return	131	0.01	0.076	-0.382	0.339
Galatasaray	N	Mean	St.dev	Min	Max
Monthly_Return	131	-0.021	0.173	-0.585	0.511
Monthly_Excess_Return	131	-0.019	0.174	-0.58	0.515

Fenerbahçe	N	Mean	St.dev	Min	Max
Monthly_Return	131	-0.009	0.151	-0.439	0.58
Monthly_Excess_Return	131	-0.008	0.151	-0.435	0.585
Beşiktaş	N	Mean	St.dev	Min	Max
Monthly_Return	131	-0.012	0.183	-0.569	0.663
Monthly_Excess_Return	131	-0.011	0.183	-0.565	0.668
Trabzonspor	N	Mean	St.dev	Min	Max
Monthly_Return	131	-0.013	0.19	-0.704	0.747
Monthly_Excess_Return	131	-0.011	0.19	-0.699	0.751
FC Copenhagen	N	Mean	St.dev	Min	Max
Monthly_Return	131	-0.001	0.071	-0.241	0.24
Monthly_Excess_Return	131	0	0.071	-0.236	0.239
AGF Aarhus	N	Mean	St.dev	Min	Max
Monthly_Return	131	-0.008	0.121	-0.283	0.455
Monthly_Excess_Return	131	-0.006	0.122	-0.278	0.453
Silkeborg IF	N	Mean	St.dev	Min	Max
Monthly_Return	131	0.009	0.094	-0.431	0.48
Monthly_Excess_Return	131	0.011	0.094	-0.432	0.478
Aalborg BK	N	Mean	St.dev	Min	Max
Monthly_Return	131	-0.013	0.175	-0.832	0.941
Monthly_Excess_Return	131	-0.012	0.175	-0.833	0.94
AIK	N	Mean	St.dev	Min	Max
Monthly_Return	131	-0.003	0.1	-0.301	0.549
Monthly_Excess_Return	131	-0.001	0.1	-0.302	0.553

N shows the number of observations for each variable. Mean, St.dev, Min, and Max are provided in numbers, which means that corresponding percentages can be obtained by multiplying these numbers with 100.

TABLE 5: DESCRIPTIVE STATISTICS EVENT STUDIES PER FOOTBALL CLUB

Manchester United	N	Mean	St.dev	Min	Max
Daily_Return	2487	0	0.02	-0.143	0.108
Win	2488	0.124	0.329	0	1
Draw	2488	0.046	0.209	0	1
Loss	2488	0.052	0.222	0	1
Player_Purchase	2488	0.013	0.113	0	1
Player_Sale	2488	0.011	0.106	0	1
Injury	2488	0.016	0.126	0	1
Managerial_Change	2488	0.006	0.075	0	1
Winning_Trophy	2488	0.002	0.049	0	1
Borussia Dortmund	N	Mean	St.dev	Min	Max
Daily_Return	2786	0	0.021	-0.178	0.117
Win	2787	0.116	0.32	0	1
Draw	2787	0.032	0.177	0	1
Loss	2787	0.046	0.21	0	1
Player_Purchase	2787	0.012	0.108	0	1
Player_Sale	2787	0.017	0.129	0	1
Injury	2787	0.022	0.146	0	1
Managerial_Change	2787	0.003	0.057	0	1
Winning_Trophy	2787	0.003	0.05	0	1
Lazio Roma	N	Mean	St.dev	Min	Max
Daily_Return	2791	0	0.029	-0.316	0.261

Win	2792	0.097	0.296	0	1
Draw	2792	0.042	0.2	0	1
Loss	2792	0.056	0.23	0	1
Player_Purchase	2792	0.018	0.133	0	1
Player_Sale	2792	0.011	0.103	0	1
Injury	2792	0.013	0.111	0	1
Managerial_Change	2792	0.004	0.065	0	1
Winning_Trophy	2792	0.001	0.038	0	1
Juventus	N	Mean	St.dev	Min	Max
Daily_Return	2791	0	0.028	-0.278	0.251
Win	2792	0.14	0.347	0	1
Draw	2792	0.035	0.185	0	1
Loss	2792	0.031	0.173	0	1
Player_Purchase	2792	0.023	0.151	0	1
Player_Sale	2792	0.025	0.157	0	1
Injury	2792	0.024	0.152	0	1
Managerial_Change	2792	0.004	0.06	0	1
Winning_Trophy	2792	0.007	0.082	0	1
AS Roma	N	Mean	St.dev	Min	Max
Daily_Return	2791	0	0.034	-0.382	0.404
Win	2792	0.101	0.302	0	1
Draw	2792	0.041	0.198	0	1
Loss	2792	0.048	0.215	0	1
Player_Purchase	2792	0.021	0.145	0	1
Player_Sale	2792	0.025	0.156	0	1
Injury	2792	0.014	0.119	0	1
Managerial_Change	2792	0.006	0.075	0	1
Winning_Trophy	2792	0	0.019	0	1
Olympique Lyon	N	Mean	St.dev	Min	Max
Daily_Return	2812	0	0.021	-0.157	0.245
Win	2816	0.105	0.306	0	1
Draw	2816	0.042	0.2	0	1
Loss	2816	0.052	0.222	0	1
Player_Purchase	2816	0.014	0.118	0	1
Player_Sale	2816	0.016	0.127	0	1
Injury	2816	0.004	0.062	0	1
Managerial_Change	2816	0.004	0.059	0	1
Winning_Trophy	2816	0.001	0.027	0	1
Ajax	N	Mean	St.dev	Min	Max
Daily_Return	2754	0	0.019	-0.223	0.128
Win	2816	0.124	0.33	0	1
Draw	2816	0.034	0.181	0	1
Loss	2816	0.031	0.173	0	1
Player_Purchase	2816	0.013	0.115	0	1
Player_Sale	2816	0.018	0.135	0	1
Injury	2816	0.013	0.115	0	1
Managerial_Change	2816	0.001	0.038	0	1
Winning_Trophy	2816	0.004	0.059	0	1
Benfica	N	Mean	St.dev	Min	Max
Daily_Return	2779	0	0.045	-0.474	0.532
Win	2816	0.144	0.351	0	1
Draw	2816	0.032	0.176	0	1

Loss	2816	0.032	0.177	0	1
Player_Purchase	2816	0.018	0.135	0	1
Player_Sale	2816	0.021	0.144	0	1
Injury	2816	0.011	0.106	0	1
Managerial_Change	2816	0.003	0.053	0	1
Winning_Trophy	2816	0.005	0.073	0	1
FC Porto	N	Mean	St.dev	Min	Max
Daily_Return	1692	0	0.054	-0.293	0.314
Win	2795	0.139	0.346	0	1
Draw	2795	0.033	0.178	0	1
Loss	2795	0.032	0.176	0	1
Player_Purchase	2795	0.018	0.134	0	1
Player_Sale	2795	0.018	0.133	0	1
Injury	2795	0.009	0.094	0	1
Managerial_Change	2795	0.005	0.071	0	1
Winning_Trophy	2795	0.004	0.065	0	1
SC Braga	N	Mean	St.dev	Min	Max
Daily_Return	63	0.016	0.055	-0.115	0.201
Win	2773	0.108	0.31	0	1
Draw	2773	0.033	0.179	0	1
Loss	2773	0.053	0.223	0	1
Player_Purchase	2773	0.013	0.112	0	1
Player_Sale	2773	0.013	0.113	0	1
Injury	2773	0.007	0.085	0	1
Managerial_Change	2773	0.009	0.096	0	1
Winning_Trophy	2773	0.001	0.038	0	1
Sporting Portugal	N	Mean	St.dev	Min	Max
Daily_Return	1830	0.001	0.057	-0.294	0.427
Win	2791	0.12	0.325	0	1
Draw	2791	0.033	0.18	0	1
Loss	2791	0.04	0.195	0	1
Player_Purchase	2791	0.017	0.129	0	1
Player_Sale	2791	0.021	0.144	0	1
Injury	2791	0.01	0.1	0	1
Managerial_Change	2791	0.01	0.1	0	1
Winning_Trophy	2791	0.003	0.057	0	1
Celtic	N	Mean	St.dev	Min	Max
Daily_Return	2765	0	0.012	-0.1	0.141
Win	2800	0.155	0.362	0	1
Draw	2800	0.034	0.18	0	1
Loss	2800	0.037	0.189	0	1
Player_Purchase	2800	0.018	0.134	0	1
Player_Sale	2800	0.01	0.101	0	1
Injury	2800	0.005	0.071	0	1
Managerial_Change	2800	0.003	0.053	0	1
Winning_Trophy	2800	0.007	0.086	0	1
Galatasaray	N	Mean	St.dev	Min	Max
Daily_Return	2761	-0.001	0.037	-0.234	0.198
Win	2762	0.106	0.308	0	1
Draw	2762	0.043	0.202	0	1
Loss	2762	0.046	0.209	0	1
Player_Purchase	2762	0.022	0.148	0	1

Player_Sale	2762	0.009	0.097	0	1
Injury	2762	0.017	0.128	0	1
Managerial_Change	2762	0.007	0.083	0	1
Winning_Trophy	2762	0.005	0.071	0	1
Fenerbahçe	N	Mean	St.dev	Min	Max
Daily_Return	2761	-0.001	0.035	-0.229	0.198
Win	2762	0.112	0.315	0	1
Draw	2762	0.044	0.205	0	1
Loss	2762	0.04	0.196	0	1
Player_Purchase	2762	0.018	0.132	0	1
Player_Sale	2762	0.009	0.095	0	1
Injury	2762	0.023	0.149	0	1
Managerial_Change	2762	0.009	0.093	0	1
Winning_Trophy	2762	0.001	0.038	0	1
Beşiktaş	N	Mean	St.dev	Min	Max
Daily_Return	2761	-0.001	0.037	-0.241	0.196
Win	2762	0.101	0.301	0	1
Draw	2762	0.041	0.197	0	1
Loss	2762	0.047	0.211	0	1
Player_Purchase	2762	0.017	0.131	0	1
Player_Sale	2762	0.009	0.097	0	1
Injury	2762	0.02	0.138	0	1
Managerial_Change	2762	0.005	0.071	0	1
Winning_Trophy	2762	0.002	0.043	0	1
Trabzonspor	N	Mean	St.dev	Min	Max
Daily_Return	2761	-0.001	0.039	-0.233	0.227
Win	2762	0.087	0.281	0	1
Draw	2762	0.049	0.216	0	1
Loss	2762	0.048	0.214	0	1
Player_Purchase	2762	0.022	0.148	0	1
Player_Sale	2762	0.013	0.115	0	1
Injury	2762	0.024	0.153	0	1
Managerial_Change	2762	0.009	0.093	0	1
Winning_Trophy	2762	0.001	0.033	0	1
FC Copenhagen	N	Mean	St.dev	Min	Max
Daily_Return	2745	0	0.019	-0.139	0.194
Win	2746	0.109	0.312	0	1
Draw	2746	0.041	0.198	0	1
Loss	2746	0.04	0.196	0	1
Player_Purchase	2746	0.015	0.121	0	1
Player_Sale	2746	0.015	0.12	0	1
Injury	2746	0.005	0.069	0	1
Managerial_Change	2746	0.003	0.057	0	1
Winning_Trophy	2746	0.003	0.057	0	1
AGF Aarhus	N	Mean	St.dev	Min	Max
Daily_Return	2737	0	0.033	-0.295	0.244
Win	2746	0.06	0.237	0	1
Draw	2746	0.039	0.194	0	1
Loss	2746	0.052	0.222	0	1
Player_Purchase	2746	0.004	0.063	0	1
Player_Sale	2746	0.004	0.066	0	1
Injury	2746	0.001	0.033	0	1

Managerial_Change	2746	0.002	0.043	0	1
Winning_Trophy	2746	0	0	0	0
Silkeborg IF	N	Mean	St.dev	Min	Max
Daily_Return	1714	0.001	0.049	-0.326	0.29
Win	2746	0.058	0.234	0	1
Draw	2746	0.031	0.172	0	1
Loss	2746	0.054	0.225	0	1
Player_Purchase	2746	0.001	0.033	0	1
Player_Sale	2746	0.003	0.05	0	1
Injury	2746	0.002	0.047	0	1
Managerial_Change	2746	0.004	0.066	0	1
Winning_Trophy	2746	0	0.019	0	1
Aalborg BK	N	Mean	St.dev	Min	Max
Daily_Return	2510	-0.001	0.049	-0.764	1.239
Win	2746	0.063	0.244	0	1
Draw	2746	0.035	0.183	0	1
Loss	2746	0.055	0.228	0	1
Player_Purchase	2746	0.005	0.069	0	1
Player_Sale	2746	0.006	0.078	0	1
Injury	2746	0	0	0	0
Managerial_Change	2746	0.004	0.06	0	1
Winning_Trophy	2746	0.001	0.027	0	1
AIK	N	Mean	St.dev	Min	Max
Daily_Return	2450	0.001	0.046	-0.32	0.359
Win	2756	0.084	0.278	0	1
Draw	2756	0.034	0.182	0	1
Loss	2756	0.034	0.182	0	1
Player_Purchase	2756	0.003	0.054	0	1
Player_Sale	2756	0.007	0.083	0	1
Injury	2756	0	0	0	0
Managerial_Change	2756	0.001	0.033	0	1
Winning_Trophy	2756	0	0.019	0	1

N shows the number of observations for each variable. Mean, St.dev, Min, and Max are provided in numbers.

TABLE 6: OVERVIEW OF FOOTBALL-RELATED EVENTS PER FOOTBALL CLUB

Club	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*
Manchester United	308	114	129	32	28	40	14	6
	Win	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*
Borussia Dortmund	322	90	129	33	47	61	9	7
	Win	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*
Lazio Roma	270	117	156	50	30	35	12	4
	Win	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*
Juventus	392	99	86	65	71	66	10	19
	Win	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*
AS Roma	283	114	135	60	70	40	16	1
	Win	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*
Olympique Lyon	295	118	147	40	46	11	10	2
	Win	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*
Ajax	349	96	87	38	52	38	4	10
	Win	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*

Benfica	405	90	91	52	60	32	8	15
	Win	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*
FC Porto	388	91	89	51	50	25	14	12
	Win	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*
SC Braga	299	92	146	35	36	20	26	4
	Win	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*
Sporting Portugal	336	93	111	47	59	28	28	9
	Win	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*
Celtic	434	94	104	51	29	14	8	21
	Win	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*
Galatasaray	292	118	126	62	26	46	19	14
	Win	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*
Fenerbahçe	309	121	111	49	25	63	24	4
	Win	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*
Beşiktaş	279	112	129	48	26	54	14	5
	Win	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*
Trabzonspor	239	135	133	62	37	66	24	3
	Win	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*
FC Copenhagen	300	112	110	41	40	13	9	9
	Win	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*
AGF Aarhus	164	108	143	11	12	3	5	0
	Win	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*
Silkeborg IF	160	84	147	3	7	6	12	1
	Win	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*
Aalborg BK	174	95	151	13	17	0	10	2
	Win	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*
AIK	232	94	94	8	19	0	3	1

P_P: *Player_Purchase, P_S*: *Player_Sale, M_C*: *Managerial_Change*, *W_T*: *Winning_Trophy*.

7.3 Results of General Examination

TABLE 7: VALUATION OF FOOTBALL STOCKS

Monthly_Excess_Return	β0	*Market_Risk_Premium*	R^2
Pooled OLS	-0.003*	0.821***	0.051
	(0.002)	(0.080)	
Manchester United	-0.001	0.584***	0.078
	(0.007)	(0.187)	
Borussia Dortmund	-0.001	1.076***	0.197
	(0.008)	(0.192)	
Lazio Roma	0.0004	1.350***	0.164
	(0.011)	(0.269)	
Juventus	-0.0003	0.948***	0.066
	(0.013)	(0.315)	
AS Roma	-0.005	1.505***	0.111
	(0.015)	(0.376)	
Olympique Lyon	-0.002	0.755***	0.103

	(0.008)	(0.196)	
Ajax	0.004 (0.005)	0.453*** (0.115)	0.107
Benfica	0.005 (0.014)	0.958*** (0.358)	0.053
FC Porto	-0.002 (0.011)	0.959*** (0.270)	0.089
SC Braga	0.031 (0.038)	1.430 (1.012)	0.025
Sporting Portugal	-0.0003 (0.011)	0.710** (0.284)	0.046
Celtic	0.007 (0.006)	0.663*** (0.156)	0.123
Galatasaray	-0.026** (0.014)	1.411*** (0.359)	0.107
Fenerbahçe	-0.012 (0.013)	0.945*** (0.319)	0.064
Beşiktaş	-0.016 (0.016)	1.175*** (0.387)	0.067
Trabzonspor	-0.015 (0.017)	0.664 (0.413)	0.020
FC Copenhagen	-0.003 (0.006)	0.739*** (0.142)	0.173
AGF Aarhus	-0.008 (0.011)	0.469* (0.264)	0.024
Silkeborg IF	0.011* (0.008)	0.050 (0.206)	0.0005
Aalborg BK	-0.013 (0.015)	0.278 (0.383)	0.004
AIK	-0.003 (0.009)	0.287 (0.218)	0.013

Dependent variable: *Monthly_Excess_Return*. Independent variable: *Market_Risk_Premium*. * Significant at the 10% level based on a one-sided t-test. ** Significant at the 5% level based on a one-sided t-test. *** Significant at the 1% level based on a one-sided t-test. * Significant at the 10% level based on a two-sided t-test. ** Significant at the 5% level based on a two-sided t-test. *** Significant at the 1% level based on a two-sided t-test. Standard errors are presented in parentheses.

TABLE 8: CALENDAR EFFECT ANALYSIS FOOTBALL STOCKS

Monthly_Return	β0	*Market_Return*	*End_Of_Season*	Adjusted R^2
Pooled OLS	-0.003 (0.002)	0.826*** (0.089)	-0.0001 (0.007)	0.050
Manchester United	0.001 (0.008)	0.606*** (0.188)	-0.011 (0.017)	0.068
Borussia Dortmund	0.001 (0.009)	1.087*** (0.193)	-0.008 (0.018)	0.186
Lazio Roma	0.003	1.352***	-0.006	0.149

	(0.013)	(0.272)	(0.025)	
Juventus	-0.008	0.907***	0.032	0.055
	(0.015)	(0.317)	(0.029)	
AS Roma	-0.005	1.501***	0.003	0.095
	(0.018)	(0.380)	(0.035)	
Olympique Lyon	-0.004	0.721***	0.007	0.082
	(0.009)	(0.198)	(0.018)	
Ajax	-0.001	0.445***	0.017*	0.108
	(0.005)	(0.116)	(0.011)	
Benfica	0.011	0.927**	-0.025	0.037
	(0.017)	(0.361)	(0.033)	
FC Porto	-0.002	0.930***	0.0002	0.069
	(0.013)	(0.273)	(0.025)	
SC Braga	0.019	1.216	0.069	0.003
	(0.042)	(1.006)	(0.089)	
Sporting Portugal	0.009	0.694**	-0.039*	0.044
	(0.013)	(0.285)	(0.026)	
Celtic	0.006	0.662***	0.002	0.108
	(0.007)	(0.157)	(0.014)	
Galatasaray	-0.025	1.373***	-0.003	0.086
	(0.017)	(0.363)	(0.033)	
Fenerbahçe	-0.018	0.946***	0.021	0.053
	(0.015)	(0.322)	(0.030)	
Beşiktaş	0.001	1.206***	-0.071**	0.080
	(0.018)	(0.385)	(0.035)	
Trabzonspor	-0.001	0.645	-0.055*	0.018
	(0.019)	(0.413)	(0.038)	
FC Copenhagen	-0.008	0.700***	0.017*	0.158
	(0.007)	(0.142)	(0.013)	
AGF Aarhus	-0.011	0.394	0.009	0.003
	(0.012)	(0.266)	(0.024)	
Silkeborg IF	-0.002	0.020	0.043**	0.025
	(0.009)	(0.204)	(0.019)	
Aalborg BK	-0.021	0.244	0.029	-0.007
	(0.018)	(0.386)	(0.035)	

Dependent variable: *Monthly_Return*. Independent variables: *Market_Return* and *End_Of_Season*. * Significant at the 10% level based on a one-sided t-test. ** Significant at the 5% level based on a one-sided t-test. *** Significant at the 1% level based on a one-sided t-test. ⋆ Significant at the 10% level based on a two-sided t-test. ⋆⋆ Significant at the 5% level based on a two-sided t-test. ⋆⋆⋆ Significant at the 1% level based on a two-sided t-test. Standard errors are presented in parentheses.

7.4 Results of Event Studies

TABLE 9: EVENT STUDIES FOOTBALL STOCKS

Daily_Return	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Manchester United	0.00002	0.635***	0.001	-0.002	-0.003**	-0.003	-0.002	0.002	-0.002	0.008	0.113
	(0.0004)	(0.036)	(0.001)	(0.002)	(0.002)	(0.003)	(0.004)	(0.003)	(0.005)	(0.008)	

	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Borussia Dortmund	0.0004	0.820***	0.006***	-0.008***	-0.018***	0.0001	0.002	-0.003	0.002	0.008	0.239
	(0.0004)	(0.031)	(0.001)	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.006)	(0.007)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Lazio Roma	0.001**	0.664***	0.008***	-0.015***	-0.023***	-0.003	0.002	-0.0001	-0.013**	0.021*	0.110
	(0.001)	(0.048)	(0.002)	(0.003)	(0.002)	(0.004)	(0.005)	(0.005)	(0.008)	(0.014)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Juventus	0.001	0.767***	0.001	-0.009***	-0.018***	0.001	0.002	-0.002	-0.012*	-0.020***	0.105
	(0.001)	(0.047)	(0.001)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.009)	(0.006)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
AS Roma	0.001*	0.614***	0.002	-0.012***	-0.022***	-0.003	0.001	-0.004	-0.003	-0.004	0.061
	(0.001)	(0.057)	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)	(0.005)	(0.008)	(0.033)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Olympique Lyon	-0.00002	0.356***	0.006***	-0.001	-0.011***	0.006**	-0.002	-0.005	0.0003	-0.031**	0.054
	(0.0004)	(0.036)	(0.001)	(0.002)	(0.002)	(0.003)	(0.003)	(0.006)	(0.007)	(0.015)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Ajax	0.001	0.194***	0.001	-0.005***	-0.011***	0.002	-0.003	-0.002	0.001	0.013**	0.024
	(0.0004)	(0.034)	(0.001)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.010)	(0.006)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Benfica	0.002	0.323***	0.002	-0.011**	-0.029***	-0.0005	0.008*	-0.003	-0.005	-0.043***	0.024
	(0.001)	(0.078)	(0.002)	(0.005)	(0.005)	(0.006)	(0.006)	(0.008)	(0.016)	(0.012)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
FC Porto	-0.0002	0.357***	0.005	-0.0002	-0.010*	-0.001	-0.001	0.015*	-0.005	0.008	0.003
	(0.001)	(0.128)	(0.004)	(0.007)	(0.007)	(0.010)	(0.011)	(0.012)	(0.016)	(0.022)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Sporting Portugal	0.001	-0.102	0.005	-0.010*	-0.002	-0.014	0.004	-0.011	-0.001	0.006	-0.001
	(0.002)	(0.133)	(0.004)	(0.007)	(0.007)	(0.012)	(0.009)	(0.012)	(0.014)	(0.024)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Celtic	0.0001	0.179***	0.001**	0.002**	-0.001	-0.001	0.003	0.0002	0.005	-0.002	0.028
	(0.0003)	(0.020)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.003)	(0.004)	(0.003)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Galatasaray	-0.0004	0.695***	0.004*	-0.014***	-0.015***	0.006	0.012**	0.005	0.005	-0.022**	0.055
	(0.001)	(0.064)	(0.002)	(0.003)	(0.003)	(0.005)	(0.007)	(0.005)	(0.009)	(0.010)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Fenerbahçe	0.001	0.617***	-0.001	-0.019***	-0.027***	-0.005	0.010*	0.007*	0.009	-0.028**	0.073
	(0.001)	(0.059)	(0.002)	(0.003)	(0.003)	(0.005)	(0.007)	(0.004)	(0.007)	(0.017)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Beşiktaş	0.0002	0.683***	0.005**	-0.015***	-0.020***	0.004	0.011*	0.004	-0.003	-0.061***	0.066
	(0.001)	(0.063)	(0.002)	(0.004)	(0.003)	(0.005)	(0.007)	(0.005)	(0.010)	(0.016)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Trabzonspor	0.001	0.637***	0.001	-0.013***	-0.023***	0.001	-0.007	0.007*	0.008	-0.021	0.054
	(0.001)	(0.067)	(0.003)	(0.003)	(0.003)	(0.005)	(0.006)	(0.005)	(0.008)	(0.022)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
FC Copenhagen	-0.00001	0.441***	0.006***	-0.006***	-0.013***	-0.002	0.003	0.004	-0.0002	-0.006	0.098
	(0.0004)	(0.032)	(0.001)	(0.002)	(0.002)	(0.003)	(0.003)	(0.005)	(0.006)	(0.006)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
AGF Aarhus	0.001	0.272***	0.010***	-0.016***	-0.024***	0.009	0.001	-0.021	0.029**	-	0.050
	(0.001)	(0.056)	(0.003)	(0.003)	(0.003)	(0.010)	(0.009)	(0.019)	(0.014)	-	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2

Silkeborg IF	0.001	0.332***	0.002	0.0002	0.002	0.010	-0.009	0.002	-0.030**	0.007	0.002
	(0.001)	(0.110)	(0.005)	(0.007)	(0.005)	(0.054)	(0.022)	(0.022)	(0.017)	(0.049)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Aalborg BK	0.00000	0.312***	0.022***	-0.013***	-0.024***	0.0004	-0.003	-	-0.003	-0.090***	0.033
	(0.001)	(0.087)	(0.004)	(0.005)	(0.004)	(0.013)	(0.012)	-	(0.016)	(0.034)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
AIK	0.0004	0.483***	0.009***	-0.002	-0.018***	0.029**	-0.017*	-	0.023	-0.081**	0.022
	(0.001)	(0.084)	(0.003)	(0.005)	(0.005)	(0.016)	(0.010)	-	(0.026)	(0.045)	

Dependent variable: *Daily_Return*. Independent variables: *Daily_Market_Return (D_M_R)*, *Win*, *Draw*, *Loss*, *Player_Purchase (P_P)*, *Player_Sale (P_S)*, *Injury*, *Managerial_Change (M_C)*, and *Winning_Trophy (W_T)*. * Significant at the 10% level based on a one-sided t-test. ** Significant at the 5% level based on a one-sided t-test. *** Significant at the 1% level based on a one-sided t-test. ⋆ Significant at the 10% level based on a two-sided t-test. ⋆⋆ Significant at the 5% level based on a two-sided t-test. ⋆⋆⋆ Significant at the 1% level based on a two-sided t-test. Standard errors are presented in parentheses.

7.5 Results of Robustness Checks

TABLE 10: FIRST ROBUSTNESS CHECK VALUATION OF FOOTBALL STOCKS

Monthly_Excess_Return	β0	*Market_Risk_Premium*	R^2
Pooled OLS	0.007***	0.809⋆⋆⋆	0.042
	(0.003)	(0.100)	
Manchester United	0.002	0.578⋆⋆⋆	0.071
	(0.007)	(0.194)	
Borussia Dortmund	0.003	1.064⋆⋆⋆	0.186
	(0.008)	(0.196)	
Lazio Roma	0.009	1.252⋆⋆⋆	0.135
	(0.011)	(0.279)	
Juventus	0.010	0.948⋆⋆⋆	0.061
	(0.013)	(0.326)	
AS Roma	0.011	1.911⋆⋆⋆	0.098
	(0.020)	(0.509)	
Olympique Lyon	0.002	0.759⋆⋆⋆	0.095
	(0.008)	(0.206)	
Ajax	0.005	0.430⋆⋆⋆	0.093
	(0.005)	(0.118)	
Benfica	0.019	1.056⋆⋆⋆	0.047
	(0.017)	(0.420)	
FC Porto	0.006	0.930⋆⋆⋆	0.073
	(0.012)	(0.292)	
SC Braga	0.077**	1.463	0.026
	(0.038)	(1.011)	
Sporting Portugal	0.008	0.708⋆⋆	0.040
	(0.012)	(0.307)	
Celtic	0.010*	0.607⋆⋆⋆	0.094
	(0.007)	(0.166)	
Galatasaray	-0.011	1.217⋆⋆⋆	0.075

	(0.015)	(0.376)	
Fenerbahçe	-0.001 (0.013)	0.890*** (0.335)	0.052
Beşiktaş	-0.001 (0.017)	1.261*** (0.426)	0.064
Trabzonspor	0.005 (0.018)	0.422 (0.447)	0.007
FC Copenhagen	-0.001 (0.006)	0.708*** (0.145)	0.155
AGF Aarhus	-0.001 (0.011)	0.398 (0.285)	0.015
Silkeborg IF	0.015** (0.009)	0.043 (0.215)	0.0003
Aalborg BK	0.004 (0.019)	0.207 (0.469)	0.002
AIK	0.002 (0.010)	0.270 (0.239)	0.010

Dependent variable: *Monthly_Excess_Return*. Independent variable: *Market_Risk_Premium*. * Significant at the 10% level based on a one-sided t-test. ** Significant at the 5% level based on a one-sided t-test. *** Significant at the 1% level based on a one-sided t-test. ⋆ Significant at the 10% level based on a two-sided t-test. ⋆⋆ Significant at the 5% level based on a two-sided t-test. ⋆⋆⋆ Significant at the 1% level based on a two-sided t-test. Standard errors are presented in parentheses.

TABLE 11: SECOND ROBUSTNESS CHECK VALUATION OF FOOTBALL STOCKS

Monthly_Excess_Return	β0	*Market_Risk_Premium*	R^2
Pooled OLS	-0.003 (0.003)	0.614*** (0.092)	0.024
Manchester United	0.004 (0.008)	0.496⋆⋆ (0.233)	0.053
Borussia Dortmund	0.010 (0.009)	0.604⋆⋆ (0.249)	0.059
Lazio Roma	0.006 (0.012)	0.838⋆⋆ (0.335)	0.063
Juventus	0.011 (0.017)	0.998⋆⋆ (0.453)	0.050
AS Roma	-0.0001 (0.015)	0.776⋆ (0.442)	0.035
Olympique Lyon	-0.001 (0.010)	0.884⋆⋆⋆ (0.270)	0.103
Ajax	0.009** (0.005)	0.290⋆ (0.149)	0.039
Benfica	0.006 (0.018)	1.121⋆⋆ (0.492)	0.053
FC Porto	-0.003 (0.011)	0.480 (0.305)	0.026
SC Braga	0.018	2.275	0.032

	(0.050)	(1.695)	
Sporting Portugal	-0.001 (0.015)	0.639 (0.404)	0.026
Celtic	0.014** (0.006)	0.291⋆ (0.160)	0.034
Galatasaray	-0.034** (0.016)	1.489⋆⋆⋆ (0.449)	0.106
Fenerbahçe	-0.023** (0.013)	0.632⋆ (0.356)	0.033
Beşiktaş	-0.020 (0.017)	0.737 (0.471)	0.026
Trabzonspor	-0.028** (0.015)	-0.094 (0.401)	0.001
FC Copenhagen	-0.001 (0.007)	0.687⋆⋆⋆ (0.182)	0.132
AGF Aarhus	-0.019* (0.013)	0.494 (0.349)	0.021
Silkeborg IF	0.011 (0.011)	-0.058 (0.300)	0.0004
Aalborg BK	-0.015 (0.020)	0.115 (0.551)	0.0005
AIK	0.0002 (0.011)	0.122 (0.312)	0.002

Dependent variable: *Monthly_Excess_Return*. Independent variable: *Market_Risk_Premium*. * Significant at the 10% level based on a one-sided t-test. ** Significant at the 5% level based on a one-sided t-test. *** Significant at the 1% level based on a one-sided t-test. ⋆ Significant at the 10% level based on a two-sided t-test. ⋆⋆ Significant at the 5% level based on a two-sided t-test. ⋆⋆⋆ Significant at the 1% level based on a two-sided t-test. Standard errors are presented in parentheses.

TABLE 12: FIRST ROBUSTNESS CHECK CALENDAR EFFECT ANALYSIS FOOTBALL STOCKS

Monthly_Return	β0	*Market_Return*	*End_Of_Season*	Adjusted R^2
Pooled OLS	0.007⋆ (0.003)	0.817⋆⋆⋆ (0.103)	0.001 (0.006)	0.040
Manchester United	0.003 (0.009)	0.596⋆⋆⋆ (0.194)	-0.010 (0.017)	0.060
Borussia Dortmund	0.006 (0.009)	1.074⋆⋆⋆ (0.198)	-0.011 (0.018)	0.176
Lazio Roma	0.012 (0.013)	1.254⋆⋆⋆ (0.282)	-0.011 (0.026)	0.121
Juventus	0.001 (0.015)	0.916⋆⋆⋆ (0.328)	0.034 (0.030)	0.053
AS Roma	0.014 (0.024)	1.911⋆⋆⋆ (0.515)	-0.006 (0.047)	0.083
Olympique Lyon	-0.001 (0.009)	0.725⋆⋆⋆ (0.208)	0.012 (0.019)	0.076
Ajax	-0.0003	0.422⋆⋆⋆	0.018*	0.096

	(0.005)	(0.118)	(0.011)	
Benfica	0.022	1.033**	-0.012	0.030
	(0.019)	(0.424)	(0.039)	
FC Porto	0.007	0.897***	-0.005	0.053
	(0.014)	(0.295)	(0.027)	
SC Braga	0.065	1.355	0.063	0.006
	(0.043)	(1.005)	(0.089)	
Sporting Portugal	0.018	0.697**	-0.042*	0.038
	(0.014)	(0.307)	(0.028)	
Celtic	0.008	0.601***	0.002	0.078
	(0.008)	(0.167)	(0.015)	
Galatasaray	-0.012	1.167***	0.007	0.055
	(0.017)	(0.380)	(0.035)	
Fenerbahçe	-0.008	0.882**	0.026	0.042
	(0.015)	(0.338)	(0.031)	
Beşiktaş	0.013	1.267***	-0.053*	0.061
	(0.020)	(0.427)	(0.039)	
Trabzonspor	0.018	0.380	-0.057*	0.005
	(0.020)	(0.447)	(0.041)	
FC Copenhagen	-0.006	0.669***	0.018*	0.142
	(0.007)	(0.145)	(0.013)	
AGF Aarhus	-0.004	0.328	0.009	-0.004
	(0.013)	(0.287)	(0.026)	
Silkeborg IF	0.002	0.019	0.048***	0.031
	(0.010)	(0.213)	(0.019)	
Aalborg BK	-0.005	0.200	0.029	-0.011
	(0.022)	(0.473)	(0.043)	

Dependent variable: *Monthly_Return*. Independent variables: *Market_Return* and *End_Of_Season*. * Significant at the 10% level based on a one-sided t-test. ** Significant at the 5% level based on a one-sided t-test. *** Significant at the 1% level based on a one-sided t-test. ⋆ Significant at the 10% level based on a two-sided t-test. ⋆⋆ Significant at the 5% level based on a two-sided t-test. ⋆⋆⋆ Significant at the 1% level based on a two-sided t-test. Standard errors are presented in parentheses.

TABLE 13: SECOND ROBUSTNESS CHECK CALENDAR EFFECT ANALYSIS FOOTBALL STOCKS

Monthly_Return	β0	*Market_Return*	*End_Of_Season*	Adjusted R^2
Pooled OLS	-0.003	0.599***	-0.001	0.021
	(0.003)	(0.088)	(0.008)	
Manchester United	0.001	0.496**	0.005	0.032
	(0.009)	(0.234)	(0.018)	
Borussia Dortmund	0.014	0.568**	-0.015	0.038
	(0.010)	(0.252)	(0.021)	
Lazio Roma	0.008	0.809**	-0.005	0.038
	(0.014)	(0.340)	(0.028)	
Juventus	0.003	0.910⋆	0.034	0.028
	(0.019)	(0.458)	(0.038)	
AS Roma	0.006	0.743⋆	-0.023	0.016

	(0.018)	(0.427)	(0.035)	
Olympique Lyon	-0.001	0.830***	0.001	0.071
	(0.011)	(0.274)	(0.023)	
Ajax	0.006	0.267*	0.014	0.026
	(0.006)	(0.149)	(0.012)	
Benfica	0.018	1.039**	-0.046	0.038
	(0.021)	(0.497)	(0.041)	
FC Porto	-0.004	0.430	0.003	-0.001
	(0.013)	(0.309)	(0.025)	
SC Braga	-0.010	1.892	0.134	0.016
	(0.056)	(1.644)	(0.109)	
Sporting Portugal	0.008	0.579	-0.036	0.013
	(0.017)	(0.407)	(0.034)	
Celtic	0.016**	0.260	-0.011	0.014
	(0.007)	(0.161)	(0.013)	
Galatasaray	-0.042**	1.453***	0.031	0.085
	(0.019)	(0.455)	(0.038)	
Fenerbahçe	-0.019	0.676*	-0.018	0.020
	(0.015)	(0.361)	(0.030)	
Beşiktaş	0.007	0.726	-0.108***	0.086
	(0.019)	(0.459)	(0.038)	
Trabzonspor	-0.024	-0.131	-0.018	-0.018
	(0.017)	(0.406)	(0.033)	
FC Copenhagen	-0.008	0.631***	0.027**	0.124
	(0.008)	(0.181)	(0.015)	
AGF Aarhus	-0.023	0.408	0.020	-0.002
	(0.015)	(0.352)	(0.029)	
Silkeborg IF	0.002	-0.075	0.038*	0.005
	(0.013)	(0.301)	(0.025)	
Aalborg BK	-0.019	0.085	0.015	-0.020
	(0.023)	(0.559)	(0.046)	

Dependent variable: *Monthly_Return*. Independent variables: *Market_Return* and *End_Of_Season*. * Significant at the 10% level based on a one-sided t-test. ** Significant at the 5% level based on a one-sided t-test. *** Significant at the 1% level based on a one-sided t-test. * Significant at the 10% level based on a two-sided t-test. ** Significant at the 5% level based on a two-sided t-test. *** Significant at the 1% level based on a two-sided t-test. Standard errors are presented in parentheses.

TABLE 14: FIRST ROBUSTNESS CHECK EVENT STUDIES FOOTBALL STOCKS

Daily_Return	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Manchester United	0.0002	0.631***	0.001	-0.002	-0.003**	-0.003	-0.002	0.002	-0.002	0.008	0.110
	(0.0004)	(0.036)	(0.001)	(0.002)	(0.002)	(0.003)	(0.004)	(0.003)	(0.005)	(0.008)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Borussia Dortmund	0.001	0.815***	0.006***	-0.008***	-0.018***	0.0001	0.002	-0.002	0.002	0.008	0.236
	(0.0004)	(0.031)	(0.001)	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.006)	(0.007)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Lazio Roma	0.002***	0.647***	0.008***	-0.015***	-0.023***	-0.004	0.002	-0.0004	-0.014**	0.021*	0.103
	(0.001)	(0.049)	(0.002)	(0.003)	(0.002)	(0.004)	(0.005)	(0.005)	(0.008)	(0.014)	

	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Juventus	0.001**	0.760***	0.001	-0.009***	-0.017***	0.001	0.002	-0.002	-0.012*	-0.020***	0.100
	(0.001)	(0.048)	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)	(0.003)	(0.009)	(0.006)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
AS Roma	0.002**	0.615***	0.003*	-0.011***	-0.022***	-0.003	0.0003	-0.005	-0.003	-0.005	0.058
	(0.001)	(0.059)	(0.002)	(0.003)	(0.003)	(0.005)	(0.004)	(0.005)	(0.008)	(0.034)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Olympique Lyon	0.0002	0.351***	0.006***	-0.001	-0.011***	0.006**	-0.003	-0.005	0.0001	-0.031**	0.052
	(0.0005)	(0.037)	(0.001)	(0.002)	(0.002)	(0.004)	(0.003)	(0.006)	(0.007)	(0.015)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Ajax	0.001*	0.186***	0.001	-0.005***	-0.011***	0.002	-0.003	-0.002	0.001	0.013**	0.022
	(0.0004)	(0.034)	(0.001)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.010)	(0.006)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Benfica	0.002**	0.309***	0.002	-0.011**	-0.029***	-0.0003	0.008*	-0.003	-0.006	-0.042***	0.021
	(0.001)	(0.081)	(0.003)	(0.005)	(0.005)	(0.007)	(0.006)	(0.008)	(0.016)	(0.012)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
FC Porto	0.001	0.360***	0.005	-0.00001	-0.010*	-0.001	-0.001	0.016*	-0.006	0.008	0.004
	(0.002)	(0.129)	(0.004)	(0.007)	(0.007)	(0.010)	(0.011)	(0.012)	(0.016)	(0.022)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Sporting Portugal	0.003*	-0.106	0.005	-0.010*	-0.001	-0.013	0.004	-0.012	-0.002	0.005	-0.001
	(0.002)	(0.135)	(0.004)	(0.008)	(0.007)	(0.012)	(0.010)	(0.012)	(0.014)	(0.024)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Celtic	0.0002	0.176***	0.001**	0.002**	-0.001	-0.001	0.003	0.0002	0.005	-0.003	0.026
	(0.0003)	(0.021)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.003)	(0.004)	(0.003)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Galatasaray	0.0002	0.676***	0.004**	-0.014***	-0.015***	0.006	0.012*	0.005	0.004	-0.020**	0.051
	(0.001)	(0.065)	(0.002)	(0.003)	(0.003)	(0.005)	(0.007)	(0.005)	(0.009)	(0.010)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Fenerbahçe	0.002**	0.604***	-0.001	-0.019***	-0.026***	-0.005	0.011*	0.007*	0.009*	-0.028*	0.070
	(0.001)	(0.060)	(0.002)	(0.003)	(0.003)	(0.005)	(0.007)	(0.004)	(0.007)	(0.017)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Beşiktaş	0.001	0.669***	0.005**	-0.015***	-0.020***	0.004	0.011*	0.004	-0.003	-0.059***	0.063
	(0.001)	(0.064)	(0.002)	(0.004)	(0.003)	(0.005)	(0.007)	(0.005)	(0.010)	(0.016)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Trabzonspor	0.002*	0.618***	0.002	-0.013***	-0.023***	0.001	-0.007	0.007*	0.008	-0.021	0.051
	(0.001)	(0.068)	(0.003)	(0.003)	(0.003)	(0.005)	(0.006)	(0.005)	(0.008)	(0.022)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
FC Copenhagen	0.0001	0.433***	0.006***	-0.006***	-0.013***	-0.002	0.003	0.004	-0.0003	-0.006	0.093
	(0.0004)	(0.032)	(0.001)	(0.002)	(0.002)	(0.003)	(0.003)	(0.005)	(0.006)	(0.006)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
AGF Aarhus	0.001*	0.262***	0.010***	-0.016***	-0.024***	0.009	0.001	-0.021	0.030**	-	0.048
	(0.001)	(0.057)	(0.003)	(0.003)	(0.003)	(0.010)	(0.009)	(0.019)	(0.014)	-	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Silkeborg IF	0.002*	0.319***	0.002	0.002	0.003	0.010	-0.010	0.001	-0.030**	0.006	0.002
	(0.001)	(0.113)	(0.005)	(0.007)	(0.005)	(0.054)	(0.022)	(0.022)	(0.018)	(0.050)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Aalborg BK	0.001	0.298**	0.022***	-0.013**	-0.024***	-0.001	-0.004	-	-0.005	-0.086**	0.018
	(0.001)	(0.116)	(0.005)	(0.007)	(0.005)	(0.018)	(0.016)	-	(0.021)	(0.045)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2

AIK	0.001	0.486***	0.009***	-0.002	-0.018***	0.028**	-0.017*	-	0.022	-0.079**	0.022
	(0.001)	(0.086)	(0.003)	(0.005)	(0.005)	(0.016)	(0.011)	-	(0.026)	(0.046)	

Dependent variable: *Daily_Return*. Independent variables: *Daily_Market_Return (D_M_R)*, *Win*, *Draw*, *Loss*, *Player_Purchase (P_P)*, *Player_Sale (P_S)*, *Injury*, *Managerial_Change (M_C)*, and *Winning_Trophy (W_T)*. * Significant at the 10% level based on a one-sided t-test. ** Significant at the 5% level based on a one-sided t-test. *** Significant at the 1% level based on a one-sided t-test. ⋆ Significant at the 10% level based on a two-sided t-test. ⋆⋆ Significant at the 5% level based on a two-sided t-test. ⋆⋆⋆ Significant at the 1% level based on a two-sided t-test. Standard errors are presented in parentheses.

TABLE 15: SECOND ROBUSTNESS CHECK EVENT STUDIES FOOTBALL STOCKS

Daily_Return	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Manchester United	0.0004	0.514***	-0.0002	-0.003*	-0.003*	-0.003	-0.003	-	-0.003	0.009*	0.068
	(0.0005)	(0.046)	(0.001)	(0.002)	(0.002)	(0.004)	(0.004)	-	(0.005)	(0.007)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Borussia Dortmund	0.001**	0.612***	0.007***	-0.008***	-0.020***	0.001	0.001	-	0.002	-0.007	0.183
	(0.0004)	(0.037)	(0.001)	(0.002)	(0.002)	(0.004)	(0.003)	-	(0.009)	(0.008)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Lazio Roma	0.002***	0.469***	0.007***	-0.016***	-0.026***	-0.004	0.003	-	-0.014*	0.020	0.079
	(0.001)	(0.064)	(0.002)	(0.003)	(0.003)	(0.005)	(0.006)	-	(0.009)	(0.017)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Juventus	0.001	0.618***	0.003*	-0.010***	-0.021***	0.002	0.002	-	-0.012	-0.021***	0.066
	(0.001)	(0.063)	(0.002)	(0.003)	(0.004)	(0.004)	(0.004)	-	(0.012)	(0.007)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
AS Roma	0.001⋆	0.435***	0.003*	-0.017***	-0.023***	-0.0004	0.002	-	-0.004	-	0.053
	(0.001)	(0.067)	(0.002)	(0.003)	(0.003)	(0.005)	(0.004)	-	(0.009)	-	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Olympique Lyon	-0.0001	0.381***	0.007***	-0.001	-0.012***	0.007*	-0.003	-	0.0005	-0.032**	0.057
	(0.001)	(0.048)	(0.002)	(0.002)	(0.002)	(0.004)	(0.004)	-	(0.011)	(0.015)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Ajax	0.001	0.138***	0.002*	-0.005**	-0.008***	0.003	-0.004	-	0.002	0.027***	0.015
	(0.001)	(0.046)	(0.001)	(0.002)	(0.003)	(0.004)	(0.004)	-	(0.010)	(0.008)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Benfica	0.002	0.338***	0.004*	-0.018***	-0.038***	-0.001	0.009	-	-0.006	-0.048***	0.031
	(0.001)	(0.106)	(0.003)	(0.006)	(0.006)	(0.008)	(0.008)	-	(0.024)	(0.013)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
FC Porto	0.001	0.441***	0.004	-0.007	-0.016**	-0.001	0.002	-	-0.007	0.003	0.005
	(0.002)	(0.161)	(0.005)	(0.009)	(0.008)	(0.012)	(0.014)	-	(0.016)	(0.031)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Sporting Portugal	0.001	-0.215	0.001	-0.011	0.012	-0.011	0.005	-	0.004	-0.002	-0.002
	(0.002)	(0.177)	(0.006)	(0.009)	(0.009)	(0.016)	(0.013)	-	(0.017)	(0.037)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Celtic	0.001**	0.131***	0.001**	0.001	-0.002*	-0.002	0.002	-	-0.001	-0.004*	0.017
	(0.0003)	(0.022)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	-	(0.004)	(0.003)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Galatasaray	-0.001	0.660***	0.003	-0.009***	-0.009***	0.006*	0.010*	-	0.005	-0.021**	0.042
	(0.001)	(0.077)	(0.002)	(0.004)	(0.004)	(0.005)	(0.007)	-	(0.009)	(0.010)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Fenerbahçe	0.0004	0.490***	-0.002	-0.016***	-0.019***	-0.008*	0.016**	-	-0.004	-0.029**	0.053
	(0.001)	(0.067)	(0.002)	(0.003)	(0.004)	(0.006)	(0.007)	-	(0.008)	(0.015)	

	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Beşiktaş	0.00003	0.624***	0.002	-0.013***	-0.021***	0.006	0.011*	-	-0.006	-0.070***	0.066
	(0.001)	(0.071)	(0.002)	(0.004)	(0.004)	(0.005)	(0.006)	-	(0.011)	(0.022)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Trabzonspor	0.0004	0.611***	-0.001	-0.010***	-0.021***	-0.002	-0.006	-	0.012*	-	0.059
	(0.001)	(0.072)	(0.003)	(0.003)	(0.003)	(0.005)	(0.006)	-	(0.008)	-	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
FC Copenhagen	0.00004	0.348***	0.005***	-0.004**	-0.011***	-0.001	0.001	-	0.002	-0.005	0.060
	(0.0004)	(0.039)	(0.001)	(0.002)	(0.002)	(0.004)	(0.004)	-	(0.007)	(0.006)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
AGF Aarhus	0.001	0.251***	0.007**	-0.016***	-0.024***	0.011	-0.0001	-	0.031**	-	0.041
	(0.001)	(0.075)	(0.003)	(0.004)	(0.003)	(0.015)	(0.014)	-	(0.015)	-	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Silkeborg IF	0.001	0.042	0.002	-0.0002	0.003	0.001	-0.002	-	-0.036*	0.008	-0.005
	(0.002)	(0.175)	(0.007)	(0.009)	(0.007)	(0.078)	(0.055)	-	(0.023)	(0.056)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
Aalborg BK	-0.00001	0.313**	0.025***	-0.015***	-0.027***	-0.001	-0.004	-	-0.003	-0.090***	0.033
	(0.001)	(0.124)	(0.005)	(0.006)	(0.005)	(0.020)	(0.018)	-	(0.024)	(0.038)	
	β0	*D_M_R*	*Win*	*Draw*	*Loss*	*P_P*	*P_S*	*Injury*	*M_C*	*W_T*	Adj.R^2
AIK	0.001	0.267**	0.009**	-0.006	-0.017***	0.007	-0.021*	-	0.010	-0.084**	0.010
	(0.001)	(0.115)	(0.004)	(0.006)	(0.006)	(0.021)	(0.013)	-	(0.046)	(0.046)	

Dependent variable: *Daily_Return*. Independent variables: *Daily_Market_Return (D_M_R)*, *Win*, *Draw*, *Loss*, *Player_Purchase (P_P)*, *Player_Sale (P_S)*, *Injury*, *Managerial_Change (M_C)*, and *Winning_Trophy (W_T)*. * Significant at the 10% level based on a one-sided t-test. ** Significant at the 5% level based on a one-sided t-test. *** Significant at the 1% level based on a one-sided t-test. ⋆ Significant at the 10% level based on a two-sided t-test. ⋆⋆ Significant at the 5% level based on a two-sided t-test. ⋆⋆⋆ Significant at the 1% level based on a two-sided t-test. Standard errors are presented in parentheses.

7.6 Discussion of Results Robustness Checks

The results of the first robustness check regarding the valuation of football stocks are shown by Table 10. This robustness check led to different results. For example, the β0 of the pooled regression is now 0.007 (p = 0.0047) and is significant at the 1% level, while it was significantly negative at the 10% level when continuously compounded returns were used. This β0 of 0.007 would mean that football stocks are on average undervalued by 0.7% based on the CAPM. Besides, the coefficient of *Market_Risk_Premium* changed to 0.809 (p = 0.0000) but is still significant at the 1% level. This confirms that football stocks usually have a beta of less than 1. The OLS regressions led to different results as well. For example, the stocks of five football clubs are currently overvalued by the CAPM and β0 is not significantly negative for any of these clubs. As a consequence, the stocks of 16 football clubs are undervalued. This unexpected result is only significant for Celtic (p = 0.0744) at the 10% level and for SC Braga (p = 0.0236) and Silkeborg IF

(p = 0.0397) at the 5% level. Moreover, the coefficient of *Market_Risk_Premium* did not change significantly for most of the football clubs. *Market_Risk_Premium* is for 14 football clubs less than 1 and is significant at different levels for 9 football clubs. This confirms for most of these football stocks that they have a beta of less than 1. On the other hand, 7 football clubs have a beta greater than 1 and this is significant at the 1% level for 6 football clubs. Hence, these stocks are more volatile than the overall stock market.

The results of the second robustness check are presented in Table 11. The results of this robustness check are more aligned with the results of the original analysis. For example, the β0 of the pooled regression is -0.003 (p = 0.1980) but is not significant anymore. Moreover, the coefficient of *Market_Risk_Premium* changed to 0.614 (p = 0.0000) and is still significant at the 1% level. Furthermore, equivalent results were obtained with the OLS regressions. For instance, the stocks of 11 football clubs are overvalued by the CAPM based on the second robustness check. Furthermore, this result is significant for AGF Aarhus (p = 0.0730) at the 10% level and for the Turkish clubs Galatasaray (p = 0.0198), Fenerbahçe (p = 0.0380), and Trabzonspor (p = 0.0289) at the 5% level. On the other hand, the stocks of the other football clubs are undervalued. This surprising result is only significant for Ajax (p = 0.0451) and Celtic (p = 0.0112) at the 5% level. Moreover, the coefficient of *Market_Risk_Premium* is less than 1 for 18 of the 21 football clubs and is thereby significant at different levels for 10 football clubs. On the contrary, the coefficient of *Market_Risk_Premium* is for Benfica, SC Braga, and Galatasaray greater than 1 and is significant for Benfica (p = 0.0250) and Galatasaray (p = 0.0013).

Based on the results of these robustness checks, the null hypothesis of H1 would not be rejected. That is because β0 is significantly positive for the pooled regression of the first robustness check, while it is not significantly negative for the pooled regression of the second robustness check. Furthermore, the OLS regressions of the first robustness check led to a positive β0 for 16 of the 21 football clubs whereby β0 is significant for 3 clubs. On the other hand, β0 is not significantly negative for any football club. In addition to this, mixed results were obtained with the second robustness check. A negative β0 was obtained for 11 of the 21 football clubs and this result was only significant for 4 clubs. However, it is important to note that the R^2 of each

robustness check regression, except the SC Braga robustness check regressions, is less than the R^2 of the original regressions.

Next, the robustness checks were conducted for the calendar effect analysis. The results of the first robustness check are shown by Table 12. The *End_Of_Season* coefficient is now positive for the pooled regression, as it is 0.001 (0.1%). Nonetheless, *End_Of_Season* is still insignificant based on a p-value of 0.1075. Besides, the coefficient of *Market_Return* changed slightly but is still significant at the 1% level. The OLS regressions generated similar results as the original OLS regressions. The first robustness check resulted in a positive *End_Of_Season* coefficient for 11 of the 20 football clubs. These positive coefficients range from 0.002 (0.2%) to 0.063 (6.3%). Nevertheless, *End_Of_Season* has only a significant positive effect on the monthly stock returns of Ajax (p = 0.0504), FC Copenhagen (p = 0.0835), and Silkeborg IF (p = 0.0075). On the contrary, a negative *End_Of_Season* coefficient was obtained for 9 of the 20 football clubs. These negative *End_Of_Season* coefficients range from -0.057 (-5.7%) to -0.005 (-0.5%). However, the negative coefficients are only significant at the 10% level for Sporting Portugal (p = 0.0695), Beşiktaş (p = 0.0876), and Trabzonspor (p = 0.0835). Therefore, the results of the original OLS regressions are confirmed, as significant effects were also found for these six clubs regarding the original calendar effect analysis. In addition to this, the coefficient of *Market_Return* is still positive for all football clubs and is again for 15 of the 20 football clubs significant at the 5% level or the 1% level.

The results of the second robustness check are presented in Table 13. The coefficient of *End_Of_Season* is -0.001 (-0.1%) for the pooled regression. Although this result is similar to the result of the original analysis, the result of this robustness check is also not significant based on a p-value of 0.4667. The coefficient of *Market_Return* decreased to 0.599 (p = 0.0000) but is still significant at the 1% level. Furthermore, the OLS regressions of the second robustness check led to similar results compared to the results of the first robustness check OLS regressions. For example, a positive *End_Of_Season* coefficient was again obtained for 11 of the 20 football clubs. Hence, this means that nine negative *End_Of_Season* coefficients were obtained as well. Nevertheless, *End_Of_Season* has only a significant positive effect on the stock returns of FC Copenhagen (p = 0.0351) and Silkeborg IF (p = 0.0625). In addition to this, a significant negative effect of *End_Of_Season* is only found for Beşiktaş (p = 0.0026). Moreover, the coefficient of

Market_Return is still positive for all football clubs, except Trabzonspor and Silkeborg IF. However, *Market_Return* coefficients are only significantly positive at the 10% level, the 5% level or the 1% level for 11 football clubs.

Based on the results of these robustness checks regarding the calendar effect analysis, the null hypothesis of H2 cannot be rejected. First, the pooled regression of the first robustness check resulted in a positive *End_Of_Season* coefficient. Nevertheless, this result was insignificant. Second, mixed results were obtained with the OLS regressions of the first robustness check. For example, a significant positive end of season effect was found for three clubs, whereas for three other clubs a significant negative end of season effect was found. Third, the pooled regression of the second robustness check resulted in an insignificant negative *End_Of_Season* coefficient. Fourth, the OLS regressions of the second robustness check led only to a significant positive *End_Of_Season* coefficient for FC Copenhagen and Silkeborg IF, while *End_Of_Season* was significantly negative for Beşiktaş. Hence, the results of the robustness checks confirm the results of the original calendar effect analysis. However, it is important to consider that the adjusted R^2 of almost all robustness check regressions is less than the adjusted R^2 of the original regressions.

The robustness checks were also conducted for the event studies. The OLS regressions of the first robustness check include all event variables. The results of this robustness check are shown by Table 14. This robustness check led to equivalent results for *Win*, *Draw*, and *Loss* compared to the original analysis. For instance, winning a match still has a positive effect on the stock returns of 19 of the 20 football clubs. Moreover, *W*in is significantly positive at the 10% level, the 5% level, or the 1% level for 11 clubs. On the other hand, *Win* has again a negative effect on the daily stock returns of Fenerbahçe. Nevertheless, this unexpected effect is still insignificant based on a p-value of 0.2717. Furthermore, the coefficient of *Draw* is still negative for 18 of the 20 football clubs. Besides, a significant negative effect is found for the same number of clubs compared to the original analysis. On the contrary, the coefficient of *Draw* is still positive for both Celtic and Silkeborg IF and is again only significant for Celtic ($p = 0.0361$) at the 5% level. The coefficient of *Loss* is again negative for 19 of the 20 football clubs and is still significant for 17 clubs at the 10% level, the 5% level, or the 1% level. In contrast to this, an unexpected result is

obtained for Silkeborg IF once more. However, *Loss* (p = 0.2850) has not a significant positive effect on the daily stock returns of Silkeborg IF.

The first robustness check also did not lead to different results for the other events. For example, *Player_Purchase* has a negative effect on the daily stock returns of 10 football clubs, which means that *Player_Purchase* has a positive effect regarding the other 10 football clubs. However, the negative effect is not significant for any club. Furthermore, *Player_Purchase* still has only a significant positive effect on the stock returns of Olympique Lyon (p = 0.0422) and AIK (p = 0.0396). In addition to this, a positive *Player_Sale* coefficient is again obtained for 12 of the 20 football clubs. This positive *Player_Sale* coefficient is still significant for Benfica (p = 0.0994), Galatasaray (p = 0.0523), Fenerbahçe (p = 0.0560), and Beşiktaş (p = 0.0637) at the 10% level. In contrast to this, a significant negative effect of *Player_Sale* is again only found for AIK (p = 0.0543). Moreover, the coefficient of *Injury* is once more negative for 9 of the 18 football clubs. However, injuries do not have a significant negative effect on football stock returns. On the other hand, unexpected significant positive effects of *Injury* are found for the stock returns of FC Porto (p = 0.0769), Fenerbahçe (p = 0.0555), and Trabzonspor (p = 0.0637). Furthermore, *Managerial_Change* has a negative coefficient for 11 of the 20 football clubs. This negative effect is again significant for the same clubs, namely Lazio Roma (p = 0.0465), Juventus (p = 0.0920), and Silkeborg IF (p = 0.0443). On the contrary, a significant positive effect of *Managerial_Change* is found for Fenerbahçe (p = 0.0975) and AGF Aarhus (p = 0.0182). Moreover, the results regarding *Winning_Trophy* did not differ much compared to the original analysis. The coefficient of *Winning_Trophy* is positive as expected for 7 of the 19 football clubs. Again, this result is only significant for both Lazio Roma (p = 0.0639) and Ajax (p = 0.0150). Furthermore, unexpected significant negative effects of *Winning_Trophy* are also found once more. For example, these negative effects are significant at different levels regarding the stock returns of Juventus (p = 0.0001), Olympique Lyon (p = 0.0202), Benfica (p = 0.0002), Galatasaray (p = 0.0214), Fenerbahçe (p = 0.0504), Beşiktaş (p = 0.0001), Aalborg BK (p = 0.0276), and AIK (p = 0.0415).

The results of the second robustness check are presented in Table 15. The variable *Injury* is removed from this analysis because data were not collected regarding injuries during the time period used for this robustness check. The results of the second robustness check are slightly

different compared to the results of the first robustness check. For example, the coefficient of *Win* is now only positive for 17 of the 20 football clubs. Furthermore, this positive effect is significant at different levels for 12 clubs. On the other hand, the negative *Win* coefficients of Manchester United (p = 0.4495), Fenerbahçe (p = 0.1781), and Trabzonspor (p = 0.3903) are insignificant. Besides, the *Draw* coefficient is negative for each football club, except Celtic. A draw has again a significant negative effect on the stock returns of 14 football clubs, whereas the positive *D*raw coefficient of Celtic (p = 0.3269) is insignificant. Moreover, negative *Loss* coefficients are obtained for all football clubs, except Sporting Portugal and Silkeborg IF. These negative *Loss* coefficients are significant for all clubs at the 10% level, the 5% level, or the 1% level, while the positive effect of *Loss* is insignificant for both Sporting Portugal (p = 0.1005) and Silkeborg IF (p = 0.3405).

The impact of the other events on football stock returns did not change significantly as well. For instance, *Player_Purchase* has a negative effect on the stock returns of 11 of the 20 football clubs. However, this negative effect is now only significant for Fenerbahçe (p = 0.0652). In contrast to this, the purchase of a player has a significant positive effect on the stock returns of Olympique Lyon (p = 0.0658) and Galatasaray (p = 0.0864). Moreover, a positive *Player_Sale* coefficient is again obtained for 12 of the 20 football clubs. This positive effect of selling a player is only significant for the Turkish clubs Galatasaray (p = 0.0869), Fenerbahçe (p = 0.0134), and Beşiktaş (p = 0.0503). On the contrary, a significant negative effect of selling a player is only found for AIK (p = 0.0521). Furthermore, a negative *Managerial_Change* coefficient is again obtained for 11 of the 20 football clubs. This negative effect of *Managerial_Change* is now only significant for Lazio Roma (p = 0.0638) and Silkeborg IF (p = 0.0570). However, a significant positive *Managerial_Change* effect is found for Trabzonspor (p = 0.0571) and AGF Aarhus (p = 0.0200). Lastly, *Winning_Trophy* was included in 17 OLS regressions because AS Roma, Trabzonspor, and AGF Aarhus did not win a trophy between July 1st, 2011 and July 1st, 2019. A positive effect of winning a trophy was obtained for 5 of the 17 football clubs. Furthermore, this positive effect is only significant for Manchester United (p = 0.1000) and Ajax (p = 0.0005). On the other hand, winning a trophy has a significant negative effect on the stock returns of Juventus (p = 0.0021),

Olympique Lyon (p = 0.0183), Benfica (p = 0.0001), Celtic (p = 0.0899), Galatasaray (p = 0.0150), Fenerbahçe (p = 0.0278), Beşiktaş (p = 0.0001), Aalborg BK (p = 0.0087), and AIK (p = 0.0348).

The results of these robustness checks have several implications with respect to the hypotheses. Based on the results of these robustness checks, the null hypotheses of H3a up to and including H3c can be rejected. For example, a win has again a significant positive effect on football stock returns for more than 50% of the clubs. Moreover, a draw still has a significant negative effect on football stock returns for 70% of the clubs. Furthermore, a loss has a significant negative effect on football stock returns for at least 85% of the clubs. On the other hand, the null hypotheses of H4a up to and including H4c cannot be rejected based on these robustness checks. A significant negative effect of purchasing a player is only found for Fenerbahçe, while purchasing a player has a significant positive effect on the stock returns of a few clubs. Furthermore, a positive effect of selling a player is found for a handful of clubs. However, this is not enough evidence. Besides, injuries have again not a significant negative impact on football stock returns. Finally, the null hypotheses of H5a and H5b cannot be rejected as well based on the robustness checks. That is because a significant negative effect of a managerial change is only obtained for a handful of clubs, while a managerial change has a significant positive effect for some other clubs. Furthermore, both robustness checks led only to a significant positive winning trophy effect for two clubs. However, significant negative winning trophy effects were found for almost 50% of the clubs. Nevertheless, it is fundamental to consider that the adjusted R^2 of almost all robustness check regressions is less than the adjusted R^2 of the original regressions.