

Does Surprising Sports News
Affect Stock Prices of
Soccer Clubs?

by

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Abstract

I investigate the effect of unexpected game results and gaps in players' market values and transfer fees on the stock prices of publicly listed soccer clubs. I study three teams specifically from June 2015 to June 2020: Juventus F.C. from Serie A, Manchester United from the Premier League, and Borussia Dortmund from the Bundesliga, all of which participated in both the UEFA Champions League games and the top domestic soccer league in their respective countries. Taking advantage of the betting odds provided by the gambling companies Bet 365, I quantify people's expectations and measure the price gap using data collected from the Transfermarkt database. The difference between expected points and actual points and that between the actual paid transfer fees and players' market values reflect the extent to which the realizations deviate from people's expectations. I also uniquely study the different effects of unexpected game results in the UEFA Champions League on Juventus stock returns and the other two teams. I estimate the effect of unexpected sports news on the stock returns via Ordinary Least Squares regression. Winning a domestic league game unexpectedly leads to an increase in the stock returns for Dortmund and Manchester United, and winning a UEFA Champions League game unexpectedly leads to an increase in the stock returns of Juventus.

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1 Introduction

Stock prices may react to news. For example, Cutler et al. (1988) showed that stock returns react to macroeconomic news. Hardouvelis (1987), Waud (1987), and Urich and Wachtel (1981) argued that stock prices responded primarily to monetary news. Schwert (1981) examined that the stock prices reacted to monthly CPI inflation rate announcement. Those researches mainly focus on macroeconomic announcements such as changes in money supply and discount rate. The market news is directly related to the market and targeting the specific market. Thus it is very insightful to investigate the effect of market news on stock returns. However, to my knowledge, there is not much research concentrating on the market news in the soccer market. Therefore, by contrast, this research will investigate whether market-specific news affects stock prices in a rapidly growing market – the soccer market.

The two major types of sports news are game results and player transfers. The player transfers generally happen during the summer and winter transfer window, and the games are usually played between August and May in the following year, with a frequency of once or twice per week. Intuitively, the game results show whether the competition strategy of the team is effective and whether the players can help the team to get the points efficiently, which influence fans' satisfaction with the team performance. Moreover, among the investment in soccer markets, player transfers are a large part of capital flow. Especially in the past five years, many player transfer fees have reached an amount of more than a hundred million Euros. Such huge cash inflows and outflows will have an effect on the clubs' income and even capital structures - many clubs have leveraged debt to pay for the player transfer fees and salaries. Therefore, game results and player transfers may affect the team's stock returns.

According to the efficient markets hypothesis, security prices should only respond to the surprises as the expected events should be embedded in the stock prices already. Pearce and Roley (1985) proposed that the measure of the market's expectation must be obtained to form the unanticipated components of the announcements. Therefore more specifically, I want to investigate the effect of unexpected game results and the overpaid or underpaid amount of player

transfers by the club on stock prices. Winning a game unexpectedly means the team is stronger than what people expected and it can attract more fans and supporters in the future. This unexpected fan base increase leads to the team's stronger ability to generate revenues, such as more advertisements, more TV broadcast deals, and more ticket sales. Thus intuitively, if a team wins a game expected to lose, its stock price may increase. On the other hand, if a team loses a game that it was expected to win, the stock price may fall. The underpaid or overpaid amount of player transfers by the club plays a similar role here. When the team conducts purchases or sales of players, the transaction fee it pays is usually different from the player's market value. If the club overpays in a deal, it shows that the club has relatively less bargaining power. The player transferred in may not perform as well as the club would have hoped. Conversely, if the club underpays, the payback of this transaction can be higher than expected. Therefore, the stock price may increase in case of underpaying and decrease in case of overpaying. The paper will be testing the hypothesis that winning a game unexpectedly and underpaying for a player transfer will lead to an increase in stock price.

My empirical analysis is based on the data of three soccer clubs with the highest market capitalizations: Juventus F.C. from Serie A, Manchester United from the Premier League, and Borussia Dortmund from the Bundesliga from June 2015 to June 2020. I first investigate the relationship between the unexpected domestic league game results and the stock returns, and the relationship between the price gaps of player transfers and the stock returns. I quantify the unexpected game results by using the betting odds provided by gambling companies. This allows me to accurately measure the difference between realizations and expectations. As another significant part of the soccer season, the UEFA Champions game results should not be mixed with the regular league games. Therefore, I then take UEFA Champions League games results separately. By including the dummy variable Euro into regression and produce an interactive term between the Euro dummy variable and the unexpected points the team gets from a game, I am able to capture how much effect an unexpected point got from the UEFA Champions League has on the stock return.

I next consider the price gap between transaction fees and the players' market prices using the absolute Euro value. However, my result does not show any significant relationship. To align units of the left-hand side and right-hand side of the regression equation, I next use transaction fees as a percentage of the teams' market capitalization instead of using dollar amount directly. Therefore, I use the percentage variable in my third and fourth model. However, my result still shows no significant relationship between the transaction fees and the players' market prices.

I then explore whether winning or losing an important game unexpectedly will have a larger effect on the stock price. I include both unexpected points and an interactive term between unexpected points and important dummy variables as explanatory variables. The coefficient on the interactive term tells me whether unexpectedly winning an important game has a larger effect on returns than winning a regular game.

Overall, my findings show that the surprising sports news does have an effect on stock prices. However, depending on the specific team, the UEFA Champions games and the regular games have a different amount of effects on the stock returns. In the Conclusion and Further Research section, I discuss the potential implication of my findings: this may provide some hints for the publicly listed soccer club managers, board members, and investors to better understand the mechanism of the stock price change so they can make wiser investment decisions. I also discuss the possible directions and questions that need to be answered in future research in the last section.

2 the Soccer Market

In this section, I introduce the basic information of the soccer market, especially the Bundesliga, the Serie A, the Premier League, and the UEFA Champions League. I describe the competition structures of the leagues, key competitors in the leagues, and the performance records of the teams I study from 2015 to 2020, which explain the intuition behind my hypothesis about the effect of unexpected game results on their stock returns. I also introduce some important player transfers and describe the situation in the transfer market in recent years, and this explain the intuition behind my hypothesis about the effect of the price gap in player transfers on the teams' stock returns.

The soccer market is a rapidly developing market that attracts much attention from investors. The profitability of famous soccer clubs has been increasing for many years: the top 20 highest revenue-generating football clubs for the 2018/19 season have combined revenue of 9.3 billion Euros, growing 11% from last season (Deloitte, 2020). Among the investment in soccer markets, player transfers are a large part of capital flow. For example, the transfers of Dembélé (from Dortmund to Barcelona), Cristiano Ronaldo (from Real Madrid to Juventus), and Pogba (from Juventus to Manchester United) all cost more than a hundred million Euros individually.

Team Name	League	Market Listed	Market Capitalization
Manchester United	the Premier League	NYSE	\$2.4B
Juventus	Lega Serie A	BIT	€1.2B
Borussia Dortmund	the Bundesliga	DB	€525M
Ajax	The Eredivisie	AEX	€281M
AS Roma	Lega Serie A	BIT	€210M
Celtic	the Scottish Premiership	AIM	£112M
Lazio	Lega Serie A	BIT	€93M
Benfica	LS	the Primeira Liga	€64M
Sporting CP	LS	the Primeira Liga	€51M
Bali United	IDX	the Liga 1	IDR984B

Table 1: Table of top ten publicly listed soccer clubs with a highest market capitalization

Rank	Player Name	Clubs	Year	Fee
1	Neymar	Barcelona - PSG	2017	222
2	Kylian Mbappe	Monaco - PSG	2017	145
3	Joao Felix	Benfica - Atletico Madrid	2019	126
4	Philippe Coutinho	Liverpool - Barcelona	2018	120
5	Antoine Griezmann	Atletico Madrid - Barcelona	2019	120
6	Ousmane Dembele	Borussia Dortmund - Barcelona	2017	105
7	Paul Pogba	Juventus - Manchester United	2016	105
8	Cristiano Ronaldo	Real Madrid - Juventus	2018	100
9	Eden Hazard	Chelsea - Real Madrid	2019	100
10	Gonzalo Higuain	Napoli - Juventus	2016	90

Table 2: Top 10 transfers in the soccer market from 2015 to 2020
All transfer fees are in a million Euros.

	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
Dortmund	Round of 16	NA	Quarter-finals	Group Stage	Round of 16	Round of 16
Juventus	Final	Round of 16	Final	Quarter-finals	Quarter-finals	Round of 16
Man United	NA	Group Stage	NA	Round of 16	Quarter-finals	NA

Table 3: Performance of Dortmund, Juventus, and Manchester United in the UEFA Champions League from 2015 to 2020
NA denotes that the team did not make it to the official stage.

	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
Dortmund	7 th (-5) 1 st	2 nd (+5) 1 st	3 rd (-1) 1 st	4 th (-1) 1 st	2 nd (+2) 1 st	2 nd (0) 1 st
Juventus	(0) 4 th	(0) 5 th	(0) 6 th	(0) 2 nd	(0) 6 th	(0) 3 rd
Man United	(+3)	(-1)	(-1)	(+4)	(-4)	(+3)

Table 4: Performance of Dortmund, Juventus, and Manchester United in their domestic leagues from 2015 to 2020
Changes in the rankings from the last season are presented in parentheses. A positive sign denotes that the ranking is higher, and a negative sign denotes that the ranking is lower compared to that of the last season.

2.1 Overview of the Italian Soccer Market and Serie A

Serie A is regarded as one of the best football leagues in the world and it is often depicted as the most tactical and defensively sound national league (IFFHS, 2020). Serie A is also one of the most storied football leagues in the world, and is crowded with many superstars. Among the 100 greatest footballers in history chosen by FourFourTwo magazine in 2017, 42 players have played in Serie A, more than any other league in the world (Reid, 2017).

In each season 20 teams play in Serie A, the highest level soccer league in Italy. Compared to the Premier League, Serie A has a much more stable position in the championship: From 2001, there were only three teams that got the championships - A.C. Milan won two times, Inter Milan won five times and Juventus ranked the first in the remaining years. Although the main competitor of Juventus has changed from AC Milan and Inter Milan to Roma and Napoli in the past decade, it does not change the fact that Juventus can always defend its top position. As presented in table 4, while the rankings of Dortmund and Manchester United in their domestic leagues varied each year up to five positions from 2015 to 2020, Juventus managed to keep the highest rank nine years in a row. They successfully secured a place in the UEFA Champions League in the past decade with their excellent performance in Serie A. As a consequence, their fans and investors generally believe that Juventus will continue this amazing trend and perform well in their domestic league in the future.

2.2 Overview of the German Soccer Market and the Bundesliga

At the top of the German soccer league system with 18 teams in the league per season, the Bundesliga is the highest level soccer competition in Germany. It is the most-watched soccer league: the Bundesliga is the number one football league in the world in terms of average attendance in 2010 (Cutler, 2010). Moreover, it is broadcast on television in over 200 countries (Bundesliga, 2013).

Similar to Serie A, there is one team that dominated the league in the past decade and managed to get first place eight years in a row: Bayern Munich. However, compared to the first

decade of the 21st century, Dortmund significantly improved their competition ability from 2010 to 2020. Dortmund is the team that brought the dominant Bayern Munich the most challenges in the past decade: Dortmund got the runner ups five times (season 2012/13, 2013/14, 2015/16, 2018/19, and 2019/20), and championed twice in season 2010/11 and 2011/12. Each year after 2012, the fans were excited to see if Dortmund can successfully break the current situation and rank the first again. Despite the unsatisfactory performance in season 2014/15, Dortmund is still the strongest opponent for Bayern Munich in the five seasons I study. However, the terrible performance prevented Dortmund from participating in the UEFA Champions League in season 2015/16. Not surprisingly, more attention of the Dortmund team has been put on the domestic league, where they have continuously moved towards its goal of the championship.

2.3 Overview of the British Soccer Market and the Premier League

With its fast pace, fierce competition, and numerous strong teams, the highest level soccer league in the United Kingdom - the Premier League is not only one of the most successful leagues in the world, but also the most commercial one: it is the highest-paid and most-watched league in the world. According to Hughes (2013) and Dubber and Donaldson (2015), the Premier League is the most-watched sports league in the world, broadcast in 212 territories to 643 million homes with a potential TV audience of 4.7 billion people.

Consisting of 20 teams, the Premier League has a long-lasting reputation of being competitive. Since the Premier League restructuring in 1992/93, a total of seven teams have won the Premier League championship. Manchester United has a significantly more brilliant record with 13 champions, twice as much as Chelsea in the second place, who got 5 champions. Compared to years before 2010 when Manchester United had a compelling advantage in the league, the competition structure of Premier League has changed, and Manchester United faced much more challenges in the past decade. They did not rank first since 2015. While the championship competition of other major soccer leagues was limited to only one to three teams in the past ten years, the competition in the Premier League involved a significantly higher number of

teams, including Liverpool, Chelsea, Manchester City, Leicester City, and Manchester United. In the five seasons that I study, there were four different champions, among which are Leicester City and Liverpool, who got their first championship in the Premier League in season 2015/16 and season 2019/20 respectively. Moreover, the competition for the UEFA Champions League qualification was also intense, resulting in Manchester United is the only team that missed the UEFA Champions League in the past five years three times among the three teams I study. As a consequence, Manchester United has to pay more effort focusing on their domestic league, and such uncertainty has attracted more attention from fans, investors, and media than the UEFA Champions League do. After all, if you cannot rank top 4 in the domestic league, there is no way to play in the UEFA Champions League.

2.4 Overview of the UEFA Champions League

The UEFA Champions League is an annual club football competition organized by the Union of European Football Associations (UEFA) and contested by top-division European clubs. The UEFA Champions League runs from July to May in the following year, and there are 32 teams in the group stage, all of which are national league champions or runners-up of their national associations.

As the UEFA Champions League is the only league that allows the top teams in their respective leagues to compete together, it is regarded as one of the most prestigious soccer tournaments in the world and the most prestigious soccer club competition in Europe. Starting from 2015, the most successful team in the UEFA Champions League is no doubt Real Madrid, with three champions in a row from season 2015/16 to 2017/18. Except that, there is a lot of uncertainty in the league and big reversal happens occasionally. For example, F.C. Barcelona was knocked out in the second round for two consecutive years, with a more than three goals advantage in the first round. But they also managed to fight until the last second and win the game by 6 - 1 in the second round against PSG and got promoted to the next round. Obviously, the UEFA Champions League is more exciting with higher uncertainty than the domestic leagues.

Among the three teams I study, Juventus is the strongest candidate in the UEFA Champions League. In season 2014/15 and 2016/17, Juventus was the first runner-up in the UEFA Champions League. Even though they were defeated by F.C. Barcelona and Real Madrid in the respective years, their performance was satisfactory. On the contrary, Dortmund usually stopped at the stage of the round of 16, and Manchester United even couldn't get into the Champions League in three years. As a result, people expect Juventus to maintain the great performance, and even go further, while paying relatively less attention to the performance of Dortmund and Manchester United in the UEFA Champions League than their domestic leagues.

3 Empirical Analysis

In this section, I estimate the change of stock returns of three soccer teams caused by each explanatory variable respectively: the unexpected game results and the price gaps in player transfers. Moreover, I specifically stress the concern of whether unexpected UEFA Champions league results and unexpected results in relatively important games would lead to a larger effect on stock returns.

The methodology used for this research is regression analysis. After obtaining the variables, I investigate the effect of explanatory variables on stock return following two steps: Firstly, I run a simple Ordinary Least Squares regression on the weekly average stock return against unexpected points and underpaid or overpaid amount, controlling for the respective market index. Then, for robustness check, I include dummy variables such as important games and the Champions League games, which may enlarge the effect of unexpected game results.

3.1 the Domestic League Game Results and Player Transfers

The first explanatory variable is unexpected game result. Soccer games have a natural resource to reflect people's belief of a game result - betting odds. Spann and Skiera (2009) concluded that prediction markets and betting odds perform equally well in terms of forecasting accuracy, but both methods strongly outperform tipsters. So the betting odds are a good source of people's belief and expectation towards the future games. Therefore, unlike Pearce and Roley (1985) who used survey data on market participants' expectations of certain economic announcements to measure the unexpected parts of the news, I quantify people's expectation and calculate the gap between people by using the betting odds provided by gambling company Bet 365. The odds for games on weekend are collected on Fridays afternoons generally before 17:00 British Standard Time. Odds for midweek games are collected on Tuesdays before 13:00 British Standard Time. Following the formula proposed by Stadtmann (2006), I sum up the inverse of each quote (home win, draw or home lose)¹ to yield the mark-up of the betting

¹Here I refer the team I study as the home team. If it is an away game for the team I study, all "home win" and "home lose" reverse.

company:

$$\text{mark up} = \frac{1}{\text{quote of home win}} + \frac{1}{\text{quote of draw}} + \frac{1}{\text{quote of home lose}}$$

Then I compute the probability implied by the betting odds for a home win, draw and home loss respectively:

$$\text{win probability} = \frac{1}{\text{mark up} \times \text{quote of home win}}$$

$$\text{draw probability} = \frac{1}{\text{mark up} \times \text{quote of draw}}$$

$$\text{loss probability} = \frac{1}{\text{mark up} \times \text{quote of home lose}}$$

Finally, I calculate the points the team expected to get in this game:

$$\text{expected points} = \text{win probability} \times 3 + \text{draw probability} \times 1 + \text{loss probability} \times 0$$

Subtracting the expected points from the actual points the team gets, I obtain the unexpected points as the first independent variable²:

$$\text{unexpected points} = \text{actual points} - \text{expected points}$$

The second independent variable in the model is the overpaid or underpaid amount (price gap) in a transaction. Using a measuring unit of one thousand Euros, I subtract the actual transaction fees from players' market values at the time of transfer³ according to the transfer records in Transfermarkt database to get the club's underpaid or overpaid amount:

$$\text{price gap} = \text{market value} - \text{transaction fees}$$

²To make sure that the coefficients are meaningfully reported with three significance digits, I re-scale the Unexpected variable by multiplying the unexpected points with 100 before regression analysis.

³If a player transfers out, the signs of both market value and transaction fee are negative. If a player transfer in, both signs are positive.

I calculate the overpaid/underpaid amount both as euro amount and as a percentage of the clubs' market capitalizations (*pre_cap*) using the balance sheet as of June 30 each year⁴ and use the two variables in different models:

$$pre_cap = \frac{price\ gap}{market\ capitalization}$$

If the team overpays, the signs of both variables are negative; if the team underpays, the signs of them are positive. When there are multiple games or player transfers in a week, I calculate the average unexpected points and the aggregate gap between transaction fees and players' market values to serve as the explanatory variables.

In all regressions, I control for the weekly return of the market index where the firm is listed, i.e. index DAX for Dortmund, index FTSE MIB for Juventus, and index NYSE for Manchester United. The stock returns of each team co-move strongly with its index respectively. In this way, I am able to remove some noise in weekly return differences that are driven by random noise.

The control variable that represents whether the game is an important one is a dummy variable, which is set to 1 if the game is considered important and 0 otherwise:

$$Important = \mathbb{1} \{ \text{The game is an important one} \}$$

To decide which games are important, I take competitive factors into account: if both teams in a game were ranked top 3 in the league last season, I regard the game as important.

The three models used in the following regressions are as follows: To estimate the effect of unexpected game results and price gaps in player transfers on the clubs' stock returns, controlling for weekly returns of the market index, model (1) is used:

⁴Source of annual reports: Capital IQ. In some years the cut-off of data vary from June 30.

$$R_t = \gamma_0 + \beta_1 \text{Unexpected} + \beta_2 \text{Price_gap} + \gamma_1 \text{Index} + \gamma_2 \text{Transfer_miss} + \gamma_3 \text{Game_miss} + \mu_t \quad (1)$$

The β_1 coefficients capture the effect of 100 extra unexpected points get from the game on the stock returns. The β_2 coefficients capture the effect of underpaying one Euro on the stock returns.

Using euro values and a percentage of the teams' market capitalizations as a measure of price gaps, controlling for weekly returns of market index and important games, model (2) and (3) are used respectively:

$$R_t = \gamma_0 + \beta_1 \text{Unexpected} + \beta_2 \text{Price_gap} + \beta_3 \text{Unexpected : Important} + \gamma_1 \text{Index} \\ + \gamma_2 \text{Transfer_miss} + \gamma_3 \text{Game_miss} + \mu_t \quad (2)$$

$$R_t = \gamma_0 + \beta_1 \text{Unexpected} + \beta_2 \text{Pre_cap} + \beta_3 \text{Unexpected : Important} + \gamma_1 \text{Index} \\ + \gamma_2 \text{Transfer_miss} + \gamma_3 \text{Game_miss} + \mu_t \quad (3)$$

The β_2 coefficients capture the effect of underpaying one Euro and underpaying 100% of the clubs' market capitalization on the stock returns respectively in the model (2) and model (3). The β_3 coefficients indicate whether unexpectedly winning a relatively important game has a larger effect on the stock returns than winning an ordinary game.

3.1.1 Summary Statistics and Regression Results of the Juventus Database

Due to the schedule of soccer games, there are many weeks during which no game is played. Also, the transfers always happen during the winter and summer transfer windows. So the independent variables in the data set are sparse in nature. Adopting the method of dealing with missing variables from Giglio et al. (2015) and Dickens and Katz (1987), for each characteristic X I assign a variable X_{mis} that is equal to 1 for all observations for which X is not observed, and 0 otherwise. I set $X = 0$ when $X_{mis} = 1$. Estimating regressions including both X and the

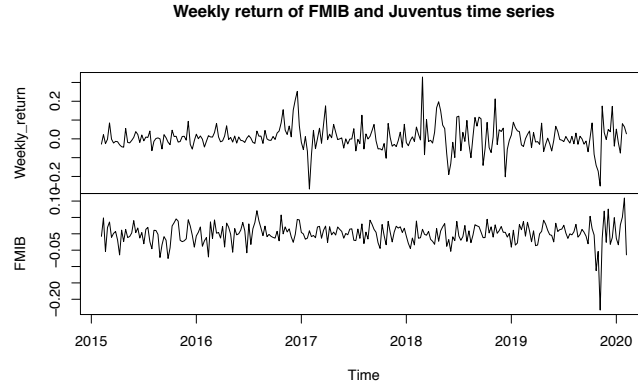


Figure 1: Time series plots of weekly return of Juventus’ stock price and FTSE MIB

Variable	Max	Min	Mean	Std	# of Observations
Weekly return of stock price	0.3290	-0.2670	0.00765	0.069	261
Weekly return of market index	0.1094	-0.2330	0.0002	0.0253	261
Unexpected points	200	-239.3	012.7	80.98	163
Transfers price gap as euros (k€)	35000	-25000	-1042	4401.6	41
Price gap as a percentage of market capitalization in transfers	141.7	-101.2	-4.5	15.4	41

Table 5: Summary Statistics for Juventus

dummy X_{mis} allows me to keep the observations with one missing characteristic for X in the estimation. In that way, I can estimate the coefficients on the control variables with more data (including the observations that have missing characteristics as well).⁵

Table 6 shows the regression results for Juventus. In column (1), the model is meant to capture the effect of unexpected game results and price gap in player transfers as Euro values on the stock returns. As shown in the table, there is no significant relationship between either explanatory variables, controlling the market index FTSE. In column (2), I include the dummy variable of important games and still use the price gaps in player transfers in Euro values. However, there is still no significant relationship between dependent and independent variables. In column (3), I further change the price gap variable to the percentage of market capitalization. There is no significant relationship between dependent and independent variables as well.

⁵When generating the statistics summary of the sparse data, I ignore the weeks in which that variable is not observed, that is, the observations with $X_{mis} = 1$. The Mean and Standard Deviation are based on the number of observations listed in the table. This is also the case for Dortmund and Manchester United.

	(1)	(2)	(3)
Constant	0.011 (0.013)	0.007 (0.013)	0.011 (0.013)
Unexpected	0.013 (0.543)	0.132 (0.596)	0.141 (0.596)
Price_gap	-0.067 (1.082)	-0.057 (1.087)	
Pre_cap			-98.569 (191.949)
FTSE MIB	0.772***	0.777***	0.780***
Unexpected:Important		-1.060 (1.217)	-1.050 (1.227)
Transfer_miss	✓	✓	✓
Game_miss	✓	✓	✓
R^2	0.1618	0.1635	0.1641
Adjusted R^2	0.1416	0.1391	0.1397

Table 6: Regression output summary of Juventus
Heteroskedasticity standard errors are presented in parentheses.
Significance levels: *p <.1; **p <.05; ***p <.01

3.1.2 Summary Statistics and Regression Results of the Dortmund Database

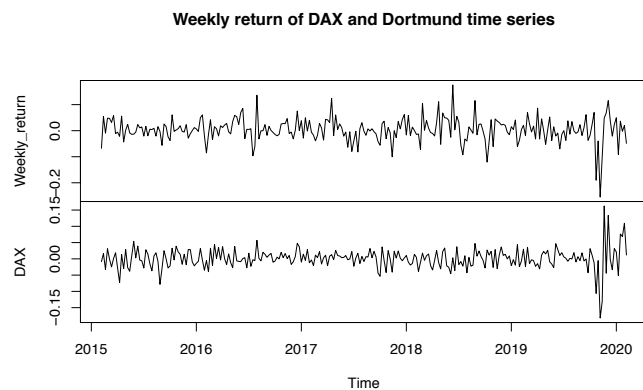


Figure 2: Time series plots of weekly return of Dortmund's stock price and DAX

Table 8 shows the regression results for Dortmund. In column (1), the model is meant to capture the effect of unexpected game results and price gap in player transfers as Euro values on the stock returns. As shown in the table, 100 extra points got unexpectedly from domestic league games lead to an increase of approximately 1.04 on the stock returns controlling the market index DAX. This effect of the unexpected game result variable is quite significant. The

Variable	Max	Min	Mean	Std	# of Observations
Weekly return of stock price	0.1754	-0.2547	0.0034	0.0461	261
Weekly return of market index	0.1625	-0.1819	0.0001	0.0317	261
Unexpected points	189.3	-238.6	1.62	87.21	157
Transfers price gap as euros (k€)	90000	-22000	260	6653.4	27
Price gap as a percentage of market capitalization in transfers	129.4	-28.3	0.4	9.7	27

Table 7: Summary Statistics for Dortmund

	(1)	(2)	(3)
Constant	-0.013 (0.010)	-0.013 (0.010)	-0.014 (0.010)
Unexpected	1.040** (0.330)	1.057** (0.367)	1.053** (0.004)
Price_gap	-0.283 (0.304)	-0.284 (0.305)	
Pre_cap			-144.780 (0.218)
DAX	0.586***	0.586***	0.586***
Unexpected:Important		-0.065 (0.858)	-0.001 (0.008)
Transfer_miss	✓	✓	✓
Game_miss	✓	✓	✓
R^2	0.2153	0.2153	0.2146
Adjusted R^2	0.1983	0.1948	0.1940

Table 8: Regression output summary of Dortmund
Heteroskedasticity standard errors are presented in parentheses.
Significance levels: *p < .1; **p < .05; ***p < .01

price gap variable, similar to the Juventus regression, has no significant effect on stock returns. In column (2), I include the dummy variable of important games and still use the price gaps in player transfers in Euro values. There is a no larger effect of winning important games unexpectedly on the stock returns. In column (3), I also change the price gap variable to the percentage of market capitalization. There is no significant relationship between price gaps in player transfers and stock returns as well.

3.1.3 Summary Statistics and Regression Results of the Man United Database

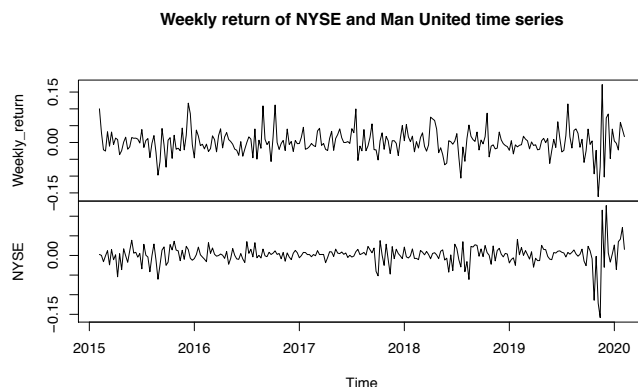


Figure 3: Time series plots of weekly return of Manchester United's stock price and NYSE

Variable	Max	Min	Mean	Std	# of Observations
Weekly return of stock price	0.1723	-0.161	0.0012	0.038	261
Weekly return of market index	0.1271	-0.1584	0.001	0.0253	261
Unexpected points	268.83	-204.45	35.17	113.83	160
Transfers price gap as euros (k€)	15000	-52000	-1414.9	6432.9	37
Price gap as a percentage of market capitalization in transfers	7.2	-4.4	-0.6	2.8	37

Table 9: Summary Statistics for Manchester United

Table 10 shows the regression results for Manchester United. In column (1), the model is meant to capture the effect of unexpected game results and price gap in player transfers as Euro values on the stock returns. As shown in the table, there is no significant relationship between the unexpected game results and the stock returns, controlling the market index NYSE. The price gap variable, consistent with the Juventus and Dortmund regression, has no significant effect on stock returns. In column (2), I include the dummy variable of important games and still use the price gaps in player transfers in Euro values. An interesting change is that the unexpected variable is shown as significant: getting 100 extra points unexpectedly in domestic games leads to an increase of approximately 0.662 in stock returns of Manchester United. However, there is a quite counter-intuitive result that winning 100 points in important domestic games unexpectedly would lead to a decrease of 0.918 on the stock returns. In column (3), I also change the price gap variable to the percentage of market capitalization. There is no

	(1)	(2)	(3)
Constant	-0.005 (0.005)	-0.005 (0.005)	-0.005 (0.005)
Unexpected	0.451 (0.231)	0.662* (0.270)	0.662* (0.170)
Price_gap	-0.129 (0.220)	-0.137 (0.225)	
Pre_cap			-244.580 (507.910)
NYSE	0.836***	0.828***	0.829***
Unexpected:Important		-0.918* (0.425)	-0.918* (0.426)
Transfer_miss	✓	✓	✓
Game_miss	✓	✓	✓
R^2	0.3133	0.3273	0.3271
Adjusted R^2	0.2984	0.3097	0.3096

Table 10: Regression output summary of Manchester United Heteroskedasticity standard errors are presented in parentheses. Significance levels: *p <.1; **p <.05; ***p <.01

significant relationship between price gaps in player transfers and stock returns as well.

3.2 the UEFA Champion Games Results Regression Analysis

The control variable that represents whether the game is a Champions Leagues game is a dummy variable, which is set to 1 if the game is a Champions League game and 0 otherwise:

$$\text{Euro} = \mathbb{1} \{ \text{The game is a UEFA Champions League game} \}$$

Model 4 is used to estimate whether winning a UEFA Champions game unexpectedly will affect the stock returns. In addition to the same coefficients as the other three models, the β_4 coefficients capture the effect of 100 extra unexpected points get from the UEFA Champions game on the stock returns:

$$R_t = \gamma_0 + \beta_1 \text{Unexpected} + \beta_2 \text{Pre_cap} + \beta_3 \text{Unexpected : Important} + \beta_4 \text{Unexpected : Euro} \\ + \gamma_1 \text{Index} + \gamma_2 \text{Transfer_miss} + \gamma_3 \text{Game_miss} + \mu_t \quad (4)$$

	Juventus	Dortmund	Manchester United
Constant	0.006 (0.012)	-0.015 (0.010)	-0.005 (0.005)
Unexpected	0.256 (0.595)	1.080** (0.004)	0.675* (0.266)
Pre_cap	-118.483 (0.192)	-148.290 (0.218)	-275.182 (0.512)
Index	0.823***	0.652***	0.779***
Unexpected:Important	-0.831 (1.114)	-0.091 (0.789)	-1.047 (0.436)
Unexpected:Euro	5.039** (1.678)	-0.912 (1.232)	-1.263 (0.897)
Transfer_miss	✓	✓	✓
Game_miss	✓	✓	✓
R^2	0.2247	0.2514	0.2945
Adjusted R^2	0.2032	0.2307	0.2750

Table 11: Regression output summary of Juventus, Dortmund, and Manchester United in the UEFA Champions League games

Heteroskedasticity standard errors are presented in parentheses.

Significance levels: *p <.1; **p <.05; ***p <.01

Table 11 shows the regression results of Juventus, Dortmund, and Manchester United including the Euro dummy variable. For Juventus, there is a significant positive relationship between the Unexpected: Euro interactive term with the stock returns. Getting 100 extra points unexpectedly in a UEFA Champions League game leads to an increase of approximately 5.039 in Juventus' stock return. By contrast, I do not detect a significant relationship between winning a European Championship game and the stock returns for Dortmund and Manchester United. The unexpected variable itself is significant with a positive value in both regressions. On average, winning 100 extra points unexpectedly leads to an increase of 1.080 in Dortmund's stock returns, and winning 100 extra points unexpectedly leads to an increase of 0.675 in Manchester United's stock returns. Similarly, the price gap variables are not shown as significant.

4 Discussion and Interpretation

The unexpected points get from a game do have a positive effect on the club's stock price. However, the effect should be divided into two categories: from models (1) - (3) in regressions of Dortmund and Manchester United where the coefficients of variables Unexpected itself are significant, I notice that getting 100 extra unexpected points will lead to an increase of 0.6 to 1 in stock return. Demir and Danis (2014) argued that the effect of a European Cup win (loss) will be larger in magnitude compared to a win (loss) in a national league. Differently, my results in model (4) support my hypothesis that the effect of the UEFA Champions League is indeed larger for Juventus on the stock returns, but not being significant in the scenarios of the other two teams. On average, 100 extra unexpected points of Juventus getting from the UEFA Champions League games will lead to an increase of 5.039 in the team's stock returns, which is much more significant and in a larger magnitude than the effect of the domestic league games.

This is consistent with my reasoning: since there is no real threat for Juventus in the domestic league, shareholders believe that they can keep the good performance and rank the first as before. One or two unexpected victories or failures may not change people's beliefs. On the contrary, the UEFA Champions League is much more competitive and Juventus' competitors in Champions League are significantly stronger, so Juventus faces much more challenges. If Juventus loses unexpectedly in a UEFA Champions League game, it is very likely that they will not proceed to the next round. Therefore, the shareholders will change their beliefs due to one or two unexpected game results. This effect is almost immediately reflected on the stock returns. For Dortmund and Manchester United, they face many domestic challenges. The fans and investors expect Dortmund to challenge Bayern Munich and get championship again. One or two unexpected failure may lead people to rethink about their perception of the team's real competition level. Therefore, they may adjust their investments accordingly and the adjustments lead to a change in the stock returns. The fans and investors of Manchester United will focus more on their domestic league game results because on the one hand, the position of Manchester United in domestic league varied each year and winning or losing a game unexpectedly contributes to the fluctuation of the ranking. On the other hand, performing well in the domestic

league is the premise of competing in the Champions League. If Manchester United do not manage to rank top 4 in the Premier League, they don't even get the opportunity to participate the UEFA Champions League.

I use the euro amount variable of price gap in player transfers and the percentage variable of price gap as a percentage of the team's market capitalization in two regression models respectively. Both variables do not show significance. According to Bell et al. (2012), the market may need several days to react to the surprising news. This may lead to an insignificant coefficient of the underpaid/overpaid amount of the player transfers. However, I don't find the idea of a several-day delay in the pricing of information plausible, in particular with the fact that I find unexpected game results being priced within the same week. Thus, the most likely interpretation for this result is that the sale and sale prices were already known to market participants, and thus the surprising news is already priced in. From many news sources, generally, the price from rumors before a transaction does not vary much from the final transaction fee. Therefore, the market has incorporate the surprising news before the final transaction date.

The important dummy variable, however, is behaving differently from my assumption in all regressions. My results show that winning an important game unexpectedly will not lead to a bigger effect on the stock returns on Juventus and Dortmund, and will even lead to a decrease of the Manchester United stock returns. In next section, I will discuss the potential reason behind this counter-intuitive result and suggest a possible improvement to further explore the role of this variable.

5 Conclusion and Further Research

I explore the effect of surprising sports news on the stock returns of three publicly listed soccer clubs: Juventus, Dortmund, and Manchester United. For Dortmund and Manchester United, getting 100 extra points from games unexpectedly leads to an increase of 1 and 0.56 respectively in the stock return. There is no difference between unexpected regular league results and unexpected UEFA Champions League results. That is to say, winning or losing a UEFA Champions game will not affect the stock returns more or less compared to winning or losing a regular league game unexpectedly. For Juventus, however, the unexpected UEFA Champions League results play a very significant role in changing the stock returns. On average, winning 100 extra points in the UEFA Champions league unexpectedly leads to an increase of 5.039 in Juventus' stock returns. By contrast, winning 100 extra points generally will not have such a significant influence on the stock returns for Juventus. On the other hand, I also explore the role of price gaps in player transfers play in changing the stock returns. For all three teams, the price gaps are not shown as significant in any regressions.

My results are informative for club managers who make competition strategies, board members who make investment decisions, and investors. Apparently, for sports clubs like Juventus, who face little or even no real competition in their domestic leagues, they should devote more effort to the UEFA Champions League. For example, due to players' physical ability constrain, if they have to make a trade-off between a regular league game and a UEFA Champions League game, winning the UEFA Champions League game should be their first priority. Meanwhile, for most clubs who still face much domestic competition like Dortmund and Manchester United, they should focus more on the domestic league as their fans and investors may not have much expectation on the UEFA Champions game, but would rather pay more attention to the domestic league. The results are also informative to investors who trade the stock: the fundamental of the soccer teams - their on-court performance - does have an influence on the stock returns. The investors should pay an effort to better understand the real competition level of the team and try to produce a more accurate forecast of the game results. If there is a huge gap between their forecasts and the realizations frequently, their investments are very likely to yield

negative returns.

My results can potentially contribute to future research on the stock returns study. There are three potential perspectives for further research. Firstly, as the important game variable is not shown as significant in all regressions, which is quite counter-intuitive, it may be an interesting question to explore whether the shareholders and other investors are paying attention to different aspects of a game and thus have different criteria for “important games”. My criteria for important games are based on the competition level of two opposing teams. In that case, if a game in which the team’s opponent ranked the top 3 in last season, it will be labeled as important. However, the shareholders may focus on the commercial values of a game, such as the TV broadcast deals or the stories behind the game. Therefore, we can use attendance, broadcast deals, and advertisement deals to re-categorize the important games in future research.

Another improvement would be the variable “price gap” - the gap between transaction fees and players’ market values, both as euro values and as a percentage of the club’s market capitalization. As a team’s yearly budget is limited, the variables within one year may be correlated with each other - if the team overpays a lot in one transaction, it won’t have money to overpay much in the following deals - and the investors know this information well. This may have an influence on the relationship between the price gap variable and the stock returns as well.

Finally, it may be an interesting question to explore the role outliers of price gaps play in the analysis. Unlike the unexpected points, whose standard deviation is relatively small, the price gap varies a lot due to some “super transactions” - one club overpays significantly to get a player. Exploring this phenomenon requires a comprehensive understanding of the sub-effect of transactions on commercial values including the advertisements and the “star effect”, which need to be considered case by case. Why was one team willing to overpay so much for a player? What were the stories behind the deal? It is worthy to separate those outliers and study how they influence the stock returns individually.

References

- A. Bell, C. Brooks, D. Matthews, and C. Sutcliffe. 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, 2012.
- Bundesliga. Tv broadcasters worldwide. *Bundesliga Official Website*. Available: <http://www.bundesliga.com/en/watch/broadcasters/>, 2013.
- D. Cutler, J. Poterba, and L. Summers. What moves stock prices. *Journal of Portfolio Management*, 15(4):157–172, 1988.
- M. Cutler. Bundesliga attendance reigns supreme despite decrease. *Sport Business*. Available: <https://www.sportbusiness.com/news/bundesliga-attendance-reigns-supreme-despite-decrease/>, 2010.
- Deloitte. *Deloitte Football Money League 2020*. Deloitte, 2020.
- E. Demir and H. Danis. The effect of performance of soccer clubs on their stock prices: Evidence from turkey. *Emerging Markets Finance and Trade*, 47(4):58–70, 2014.
- W. T. Dickens and L. F. Katz. Interindustry wage differences and industry characteristics. *NBER Working Paper: Unemployment and the Structure of Labor Markets*, pages 48–89, 1987.
- J. Dubber and A. Donaldson. Playing the game: The soft power of sport. *British Council*. Available: <https://www.britishcouncil.org/research-policy-insight/insight-articles/playing-game-soft-power-sport>, 2015.
- S. Giglio, M. Maggiori, and J. Stroebel. Very long-run discount rates. *The Quarterly Journal of Economics*, 130(1):1–53, 2015.
- G. Hardouvelis. Macroeconomic information and stock prices. *Journal of Economics and Business*, 39(2):131–140, 1987.

- G. Hughes. History and time are key to power of football, says premier league chief. *The Times*. Available: <https://www.thetimes.co.uk/article/history-and-time-are-key-to-power-of-football-says-premier-league-chief-3d3zf5kb35m>, 2013.
- IFFHS. Iffhs world's best national league in the world 2020. *International Federation of Football History Statistics*. Available: <https://www.iffhs.de/index.php/posts/911>, 2020.
- D. K. Pearce and V. V. Roley. Stock prices and economic news. *The Journal of Business*, 58(1): 49–67, 1985.
- A. Reid. Fourfourtwo's 100 greatest footballers ever. *FourFourTwo*. Available: <https://www.fourfourtwo.com/features/fourfourtwos-100-greatest-footballers-ever>, 2017.
- G. W. Schwert. The adjustment of stock prices to information about inflation. *The Journal of Finance*, 36(1):15–29, 1981.
- M. Spann and B. Skiera. Sports forecasting: A comparison of the forecast accuracy of prediction markets, betting odds and tipsters. *Journal of Forecasting*, 28(1):55–72, 2009.
- G. Stadtmann. Frequent news and pure signals: The case of a publicly traded football club. *Scottish Journal of Political Economy*, 53(4):485–504, 2006.
- T. Urich and P. Wachtel. Market response to the weekly money supply announcements in the 1970s. *The Journal of Finance*, 36(5):1063–1072, 1981.
- R. N. Waud. Public interpretation of federal reserve discount rate changes: Evidence on the "announcement effect". *Econometrica*, 38(2):231–250, 1987.