Frequent News and Pure Signals
The Case of a Publicly Traded Football Club

Georg Stadtmann*

September 2005

Abstract

We use stock market data for Borussia Dortmund GmbH & Co. KGaA – one of the leading German football clubs – for an application of the news model. Due to the specific characteristics of the news generating process, the case of a publicly traded sport club is a very appropriate candidate for testing this model. By applying a *traditional* as well as a *reversed* news model we elaborate whether new information can explain subsequent changes in the stock price of Borussia Dortmund. We find that *sport* as well as *corporate governance* related variables are important drivers of the stock price.

Keywords: News Model, Football Industry, Betting Odds, Stock Market

JEL classification: G14

* Department of Economics, WHU Koblenz, Burgplatz 2, 56179 Vallendar, Germany and Institute for Development Strategies, Indiana University, Bloomington, USA

Tel.: +49-261-6509-273, Fax: +49-261-6509-279
E-mail address: stadtman@whu.edu

We would like to thank for helpful comments the participants of the European Economic Association Meeting 2004 in Madrid and the participants of the E.A.R.I.E. conference 2004 in Berlin. We also would like to thank two anonymous referees for their helpful comments, but we remain responsible for any errors.

1 Introduction

A central assumption of the news model is that agents collect every piece of publicly available information and incorporate this information set in their asset price expectation. This leads to a scenario where asset prices are efficient in a semi-strong form as defined by Fama (1970). As a consequence, changes in asset prices are the outcome of the appearance of new, non-expected information that was not considered in asset prices so far. Frequently, this information is labeled as a *signal* with respect to the fundamental value of an asset. When testing the news model, it would be ideal to have signals at hand that occur very frequent, are easy to quantify, occur solely when financial markets are closed, become publicly available to all agents at the same point in time, and have ex-ante observable expectations.

Regularly, signals such as earnings announcements are used to test the news model. A disadvantage of using earnings announcements is that such information occurs only infrequently, since such an analysis is based on quarterly reports. Furthermore, some agents have access to this information in advance which can lead to substantial problems due to insider trading. Additionally, information regarding quarterly reports is already expected to some extent, and is therefore, at least partially reflected in market prices. All characteristics mentioned above lead to a scenario, where earnings announcements can not be regarded as pure signals so that the news content is not easy to quantify (Brown/Hartzell 2001).

A stock market segment where signals come close to fulfilling the above mentioned criteria is the sports industry with publicly traded sports clubs, like football teams. Football teams participate in different competitions like the national championship, the national cup competition, as well as international competitions such as, on an European level, the Champions League, UEFA, and UI-Cup. Therefore, financial agents receive information on the strength of a team regularly and frequently. Another feature is that matches normally take place on weekends or at night, so that the outcome of the games materialize when financial markets are closed. Additionally,

the outcome of the games becomes public knowledge at the very same time and it can thus be excluded that financial agents act on inside information. A very important aspect is also the fact that betting odds are available for all matches. These betting odds can be used to extract market expectations and ex-ante winning/losing probabilities. Therefore, one can control for the ex-ante expected match outcome. Given these industry characteristics, it becomes clear that publicly traded sport clubs can be regarded as a very appropriate candidate for an application of the news model.[1]

The study of Brown/Hartzell (2001) provides the most comprehensive analysis of the impact of sporting results on share prices. Their focus is on the performance of the Boston Celtics in the NBA competition and subsequent stock price reactions. To control for the role of expectations they use betting market point spreads. As a result they find that match performance significantly affect share prices, trading volume, and volatility. Furthermore, they find asymmetric price reactions to wins and losses and that playoffs have a larger impact on returns compared to regular season games.

However, until now, empirical evidence with respect to the link between sporting success and subsequent stock performance of publicly listed *football* companies is limited. Lehmann/Weigand (1998), Renneboog/Vanbrabant (2000), Dobson/Goddard (2001), as well as Palomino/Renneboog/Zhang (2005) analyze the performance of the British football clubs. Ashton/Gerrard/Hudson (2003) analyze the economic impact of national sport events on the stock market by applying the event study methodology. However, their focus is not on the impact of match outcome on clubs' stock market prices but on the impact of England's national football team results

[1]Nevertheless, one may argue that the football industry may also have some disadvantages. Football fans are often regarded to act irrationally and one can not rule out that football fans also engage in stock market trading. However, some institutional investors hold major stakes in Borussia Dortmund GmbH & Co. KGaA. For example, in 2000/2001 the Deutsche Bank was holding a stake of 10 % and an international investment fund was holding a 5 % in the company (Borussia Dortmund 2001, p. 9). Largest single shareholder is still the Ballspielverein Borussia 09 e.V. Dortmund which holds a stake of more than 25 % (Borussia Dortmund 2002, p. 30). Furthermore, the Deutsche Bank was the main underwriter during the IPO process.

on the FTSE100 index. Results show that stock market return is indeed positive after wins and negative after losses. Dahlke/Rott (2001) who focus on Borussia Dortmund do not use econometric methods to examine the stock performance but concentrate on corporate governance related issues.

The remainder of the paper is organized as follows. In Section 2, we focus on the football industry. We develop a theoretical framework that highlights the link between the sporting success and the economic success. Equipped with this theoretical framework, we derive the main hypotheses which are tested in the empirical part of this paper. In Section 3, we present the results of our empirical analysis. In particular, we focus on the role of the expectation formation process by using betting odds information to control for the ex-ante expected fundamentals. In Section 4, we apply the so called reversed news model to test the robustness of our findings. The last section concludes.

2 The Professional Football Industry

2.1 The Structure of the German and European Football Competitions

The top football division in Germany is the *Bundesliga*, which was founded in 1963. It has 18 teams that play each other for the German championship in home and away matches, alternating between their home and their opponent's stadiums. Thus, each team must play 34 Bundesliga matches per season. In addition to the Bundesliga matches, a competition is held each year for the *DFB Cup*. Under the current rules, 64 teams take part in the first round of the cup competition. In addition to all teams from the 1^{st} and 2^{nd} Bundesliga, clubs from the two regional leagues and amateur teams that may reach the main draw of the DFB Cup competition via qualification matches, participate in the main round. The DFB Cup competition is played using a knockout system, i.e., only the winning side in a given match qualifies for the next round. The pairings are drawn by lot (Borussia Dortmund 2000, pp. 21 – 22).

Since the beginning of the 1999/2000 season, 32 European top teams have

been participating in the *Champions League* (CL), a championship organized by the UEFA.[2] In addition to the competition's sporting dimension, the significant financial value of participation is of great importance to football clubs. Under the current rules, the first two teams in the Bundesliga automatically qualify to play in the CL. The third ranked team may also qualify for the CL via a qualifying round.[3] The competition initially begins with two rounds of matches where the teams in each group play each other. The best eight teams then qualify for the quarterfinals. Thereafter, the competition is continued under a knockout system with home and away matches. The final is held at a neutral stadium.

Since the 1999/2000 season and the abolition of the European Cup Winners' Cup competition, the only competition on an European level other than the CL is the *UEFA Cup*. The competition is conducted using a knockout system with home and away matches. In the third round, eight teams that were knocked out following the first round of group matches in the CL are added to the UEFA Cup competition. The fourth to sixth placed teams from the Bundesliga qualify for the UEFA Cup, as well the DFB Cup winner.[4] Two other Bundesliga teams may qualify to participate in the competition via a further qualification round, the so-called *UEFA Intertoto Cup ("UI-Cup")*.

– Insert Table 1 here –

Table 1 gives an overview of the sporting success of Borussia Dortmund for the time span under consideration (11/2000 – 09/2004). In the Bundesliga,

[2]The Union des Associations Europeennes de Football ("UEFA"), an association formed under the law of Switzerland, was founded in 1954. It is the umbrella organization of the European football associations, and today has 51 members. In addition to the European Championship, which is held every four years, UEFA organizes club championships such as the CL and the UEFA Cup.

[3]In the 2000/2001 and 2001/2002 season even the fourth placed team had the chance to qualify for the CL. Those teams that fail to qualify for the CL via qualification matches are automatically qualified for the UEFA Cup competition (Kicker 2000, p. 3 and 2001, p. 3).

[4]Should the winner of the DFB Cup competition be qualified for the CL, the loser of the DFB Cup final is qualified for the UEFA Cup. The number of starting places per national football association depends upon the clubs' rating in the UEFA Five Year Evaluation, depending on the results of the respective national club teams during the preceding five years.

Borussia Dortmund was quite successful with a 3^{rd} place at the end of the 2000/2001 season and winning the national championship at the end of the following season. Taking all observations for this competition together, one can analyze the influence of the outcome of 130 matches, 64 of them were won while 28 games were lost. Table 1 also highlights that Bayern Munich has to be regarded as the main competitor in the German Bundesliga.

The good performance in the national competition allowed Dortmund to qualify two times for the CL. Although they dropped out after the first round in the CL in 2001/2002, they took the chance to compete in the UEFA Cup competition subsequently and made it to the final. Therefore, we observe 37 signals of the international competitiveness of Borussia Dortmund.

While being highly successful in the two competitions mentioned before, Dortmund failed early in the DFB Cup competition against 'underdogs' of the second or third league. Hence, we only have a limited number of observations for this competition.

2.2 The Link Between the Sporting Success, Revenues, and Profits

There is a close link between the success in the national and international competitions and the revenues generated by a football club (see Lehmann/Weigand, 1997). This is true due to the following linkages:

- If a team is successful and has a good position in the overall national ranking, the club has the chance to qualify for an European competition like the CL, UEFA, or UI-Cup. With a qualification for a European competition, the club can generate additional funds from selling the broadcasting rights of this competition.[5]

[5]While the broadcasting rights of the CL are centrally marketed by the UEFA, every participant in the UEFA Cup competition markets the broadcasting rights of its home games individually (see Elter 2002, p. 86). See Kruse/Quitzau (2002) and Parlasca/Szymanski (2002) for a critical analysis of the central marketing of television rights to football matches.

- Furthermore, successful teams also have a higher gate attendance leading to higher ticket and merchandising revenues. Gärtner/Pommerehne (1978), Lehmann/Weigand (1997) as well as Czarnitzki/Stadtmann (2002) analyze the link between sporting success and attendance figures for the German football industry. All studies find a significant positive link between the two variables.[6]

- A successful team is able to generate higher advertising and sponsoring revenues, because most sponsoring agreements provide for graduated revenues based on the team's performance. Especially, a participation in European competitions can generate additional funds (Borussia Dortmund 2000, p. 29 and 2001, p. 15).

– Insert Table 2 here –

Table 2 focuses on the revenue structure of Borussia Dortmund. The figures of the profit & loss statement highlight the importance of those revenues that can be generated through selling broadcasting rights and advertising/sponsoring. Furthermore, this table also shows the immense decrease of revenues during the 2000/2001 season, when Dortmund did not qualify for an European competition. When controlling for those revenues stemming from transfer operations, revenues decreased by more than 30 % during fiscal year 2000/2001 compared to the fiscal year 1999/2000.[7] Despite the immense sporting success, overall profits can be regarded as relatively low. This statement especially holds, because other operating income contributed significantly to the group net income. So far, Borussia Dortmund has not paid any dividends even after winning the German championship.

[6]See Peel/Thomas (1988) and Forrest/Simmons/Feehan (2002) for empirical evidence for the British leagues. See also Baimbridge/Cameron/Dawson (1996) who analyze the relationship between gate attendance and live TV-broadcasting. To meet excess demand in the future, Borussia Dortmund increased the stadium capacity. Since the beginning of the 2003/2004 season, the enlarged arena has a capacity for more than 80,000 spectators in Bundesliga matches (Borussia Dortmund 2002, p. 42).

[7]The high amount of transfer revenues stem mainly from selling the transfer rights of player *Evanilson* to AC Parma. Nevertheless, Evanilson is still in the team of Dortmund due to a licensing agreement (see Borussia Dortmund 2001, p. 16).

However, higher revenues should also increase the profitability[8] of the club which should also lead to higher (expected) dividend payments. Higher expected dividend payments will – according to the standard theory of finance – lead to higher stock prices. Hence, if all relations hold as supposed in our framework, the outcome of a game should influence stock prices. Hence, we test the following hypotheses:

- H1: A won match should influence stock returns positively.
- H2: A lost match should influence stock returns negatively.

As stressed above when analyzing the revenue structure of Borussia Dortmund, the high amounts of money that can be earned in the European competitions should be considered. Hence, the third hypothesis is:

- H3: A won/lost game in a European competition will influence stock returns to a larger extent than a win/defeat in the national competition.

3 The Empirical Analysis

3.1 Controlling for Expectations

The main idea of the news model is that only the difference between the realized fundamentals and the expected fundamentals has to be regarded as the news component. Putting it differently, only the *expectation error* should influence stock prices. Therefore, if a home win was already anticipated to a large extent (there always remains some kind of uncertainty), stock prices should not react that much. One method to control for the expected match outcome is to use betting odds information. The betting odds used in this analysis were kindly provided by *gamebookers.com*, an online bookmaker. Using the conventional abbreviation for a home win (1), a draw (0), and an away win (2), Table 3 highlights the background of the *'news proxy'* used in the following analysis.

[8] Szymanksi/Smith (1997, p. 136) find in an empirical analysis of the English football industry that the function between profit and position in the league has a negative slope. This negative slope indicates that increased spending on players is – on average – not self financing through higher performance and higher revenues.

– Insert Table 3 here –

For example, on May 19^{th}, 2001, Dortmund played at home against 1. FC Koeln. The quotes prior to the game were 1.35 for a home win of Dortmund, 4.25 for a draw, and 6.90 for an away win of 1. FC Koeln. This means a bettor who put 1 Euro on a draw received 4.25 Euro. Comparing the different quotes for this match already highlights that Dortmund was regarded as the favorite in this match. Summing up the inverse of the quotes (1/1.35 + 1/4.25 + 1/6.90), yields the mark-up of the betting company. The higher this mark-up, the higher the price for the bet. As becomes evident in Table 3, the mark-up is around 12 % for this betting company. By controlling for this mark-up, one can compute the probability implicit in the betting odds for a home win which amounts to 66 % $[1/(1.35 * 1.12)]$, for a draw which is equal to 21 % $[1/(4.25 * 1.12)]$, and the away win of 13 % $[1/(6.10 * 1.12)]$, respectively. These implicit probabilities show that Dortmund was indeed regarded as the favorite.

Having these probabilities at hand, it is possible to control for the expectations of the financial agents. Because the winning team receives 3 points and a draw will lead to 1 point, the expected number of points for Dortmund in the match against Koeln is equal to 2.19 $(3 * 0.66 + 1 * 0.21)$. Since Dortmund drew in this match, the outcome has to be interpreted as a *negative* information and the expectation error amounts to a negative 1.19 (1 – 2.19). Only this expectation error has to be regarded as the new information which has to be priced in on Monday morning. Due to the fact that Dortmund underperformed in this match, stock prices should decrease. In a second example, the expected number of points in the away match where Dortmund plays in Munich is equal to 1 (1*0.28+3*0.24).[9] Hence, the outcome of the match was in line with the prior expectations and should therefore, have *no* impact on stock prices.

[9]The team which plays at home always has a home field advantage. See Schwartz/Barsky (1977) and Vergin/Sosik (1999). However, this does not mean, that the home team is always expected to win. As can be seen in Table 3, Hansa Rostock was regarded as the underdog when playing at home against Dortmund.

3.2 Description of the Data Set

In addition to the match outcome variables described in the previous paragraph, we also consider ad-hoc announcements of Borussia Dortmund as a signal which could influence stock prices. We considered whether a player renews his contract, a new player is hired, or a player is sold to another club. However, no coefficient turned out to be significantly different from zero. Hence, we dropped these variables from our final specification.[10]

– Insert Figure 1 here –

Daily stock data of closing prices as well as the development of the SDAX are taken from Datastream. Figure 1 highlights the development of the stock price of Borussia Dortmund after going public at the end of October 2000. Since the IPO, market capitalization decreased by more than 75 %. While the development of the stock price was in line with the overall stock market development until the end of 2002, the stock of Borussia Dortmund significantly under-performed afterwards.

3.3 Regression Results

We estimate the following Model 1

$$\Delta DORT_t = \beta_0 + \beta_1 \Delta SDAX_t + \epsilon_t, \tag{1}$$

where $\Delta DORT$ denotes the percentage change in stock prices and $\Delta SDAX$ the percentage change in the relevant stock market index.[11] Model 1 serves as a control specification. As a consequence, we are able to separate which part of the variance in the change in stock prices is explained by changes in

[10] On the one hand, this result could be interpreted in a way that this information does not influence the fundamental value of the asset. On the other hand, since it is possible that these events were anticipated by the public, we can not rule out that the signal was already reflected in market prices when it became public knowledge. We checked for this by extending the coverage of the dummy variable, but did not find any effects.

[11] Since financial time series like stock prices or stock indices are often non-stationary, we tested for stationarity by using the Augmented Dickey Fuller Test. It turned out that the log of the time series of the share prices and the index series are not stationary. Hence, we tested whether the first difference of the logged time series are stationary, which turned out to be the case. The test results are available from the authors upon request.

overall market conditions and match outcome variables, respectively.

Estimates are presented in Table 4. Specification 1a is estimated over the full range of trading days (1,010 observations). The estimated slope coefficient takes the value of $\beta_1 = 0.3999$, meaning that a 1 % change of the SDAX only leads to an under-proportional change in the stock price (0.4 %). When we condition on the fact that a match took place on the day before, we are left with 175 observations. Specification 1b shows that the slope coefficient is not significantly different from zero anymore. This is a hint that company specific, match related variables may be more important compared to the overall market conditions on trading days following a match day.

– Insert Tables 4 and 5 here –

The news model states that only the *unexpected part* of an information drives stock market prices. We already described in Section 3.1 our method to disentangle the *expected* from the *unexpected* part by using betting odd information. Before presenting the results of our empirical analysis, we would like to briefly explain our testing procedure which is in line with Dobson/Goddard (2001, p. 388):

In a first step, we include variables that measure the *actual* match outcome (numbers of points gained) in each competition (Bundesliga/EU matches). In a second step, we include *additionally* a variable that measures the *expected* match outcome in each competition. In case that only the unexpected part of the match outcome has an impact on share prices, the coefficient on the actual performance should be the negative of the coefficient on expected performance. If this condition is met, it is justified to combine the information of actual performance and expected performance in a single measure *'unexpected performance'*.

In line with the procedure described above, we estimate the following model specification 2:

$$\begin{aligned} \Delta DORT &= \beta_0 + \beta_1 \Delta SDAX + \beta_2 BUND\_act \\ &\quad + \beta_5 EU\_act + \beta_8 DFB\_Win + \beta_9 DFB\_Lost + \epsilon_t, \end{aligned} \tag{2}$$

where $BUND\_act$ is a variable measuring the number of points gained in the matches in the German Bundesliga competition and the EU variable measures the performance in European matches, respectively. Since the DFB Cup is played in a knock-out modus, we just control for won and lost games for this competition. Furthermore, one should keep in mind that we have only a very limited number of observations for the DFB Cup competition (7 matches). As a consequence, one should not stress the interpretation of the estimation results with respect to this competition too far.

The estimated coefficients measuring the effect of the number of points gained in a Bundesliga match as well as in a European match are positive and significantly different from zero. Hence, these results can be regarded as a *'confirmation'* of hypotheses H1 and H2. In contrast to this, a comparison of the size of the $Bund\_act$ coefficient and the EU_act coefficient leads to the insight that both coefficients are not significantly different from each other. This finding is in sharp contrast to hypothesis H3.

With respect to the goodness-of-fit of the model, the adjusted R^2 takes a value of 0.1606, which has to be regarded as exceptionally high for stock market studies. By comparison of the goodness-of-fit of Model 1b and 2, one gets the impression that sport related variables are of high importance to explain variations in stock prices – compared to overall market conditions.

Since we are interested whether only the unexpected part of an information drives stock prices, we add two variables that control for the expected performance.

$$\begin{aligned} \Delta DORT_t &= \beta_0 + \beta_1 \Delta SDAX_t + \beta_2 BUND\_act + \beta_3 BUND\_exp \\ &\quad + \beta_5 EU\_act + \beta_6 EU\_exp \\ &\quad + \beta_8 DFB\_Win + \beta_9 DFB\_Lost + \epsilon_t \end{aligned} \tag{3}$$

The regression results are also presented in Table 4 (Model 3). The estimated $Bund\_act$ coefficient takes a value of $\hat{\beta}_2 = 0.0105$ while the estimated $Bund\_exp$ coefficient takes a value of $\hat{\beta}_3 = -0.0015$. A formal test of the

hypothesis that $\hat{\beta}_2 = -\hat{\beta}_3$ comes to the result that the H0 hypothesis can not be rejected on a 90 % confidence level. The same result applies to the estimated coefficients for the EU matches ($\hat{\beta}_5 = -\hat{\beta}_6$). As a consequence, it is justified to combine the information of the actual match outcome and the expected match outcome in a single variable unexpected match outcome. Therefore, we perform this regression as Model 4:

$$\begin{aligned} \Delta DORT_t &= \beta_0 + \beta_1 \Delta SDAX_t + \beta_4 BUND\_unexp \\ &\quad + \beta_7 EU\_unexp + \beta_8 DFB\_Win + \beta_9 DFB\_Lost + \epsilon_t \end{aligned} \tag{4}$$

The coefficients of interest $\hat{\beta}_4$ and $\hat{\beta}_7$ have the expected positive sign and are significantly different from zero. Compared to Model 3, Model 4 is a more parsimonious specification. All further robustness checks will depart from this benchmark.

One may argue that the variable that measures the outcome of the European matches is a combination of games that are played in the CL and games that are played in the UEFA Cup competition. Hence, it may bring further insights to separate the outcomes of the two competitions (β_{7a} and β_{7b}). Therefore, regression equation of Model 5 reads as follows:

$$\begin{aligned} \Delta DORT &= \beta_0 + \beta_1 \Delta SDAX + \beta_4 BUND\_unexp \\ &\quad + \beta_{7a} UEFA\_unexp + \beta_{7b} CL\_unexp \\ &\quad + \beta_8 DFB\_Win + \beta_9 DFB\_Lost + \epsilon_t \end{aligned} \tag{5}$$

The estimated coefficient for the CL variable is positive and somewhat larger than the coefficient estimated for UEFA Cup or Bundesliga matches (Table 5, Model 5). This finding supports the hypothesis that the CL can be regarded as a *cash-cow* for football clubs. However, in statistical terms, the difference between the $Bund\_unexp$ coefficient and the CL_unexp coefficient is still *not* significant. All other coefficients lie in the same range as in Model 4.

Until now, we only considered the match outcome of Borussia Dortmund as an explanatory variable. Therefore, one may criticize that we have neglected an important competition factor: The overall ranking in, for example, the Bundesliga is *not only* influenced by the sporting success of Borussia Dortmund *but also* by the sporting success of its major competitors. As can be seen from the last column of Table 1, Bayern Munich has to be regarded as the main competitor for the national championship. Hence, we augment Model 5 by a variable that measures the unexpected number of points gained by Bayern Munich. Therefore, we estimate Model 6

$$\begin{aligned} \Delta DORT &= \beta_0 + \beta_1 \Delta SDAX + \beta_4 BUND\_unexp \\ &\quad + \beta_{7a} UEFA\_unexp + \beta_{7b} CL\_unexp \\ &\quad + \beta_8 DFB\_Win + \beta_9 DFB\_Lost + \beta_{10} Bayern\_unexp + \epsilon_t \end{aligned} \tag{6}$$

The coefficient β_{10} has the expected negative sign and is significantly different from zero. This implies, that a success of Bayern Munich influence the stock price of Borussia Dortmund negatively. Furthermore, a comparison of $\hat{\beta}_4$ and $\hat{\beta}_{10}$ leads to the insight that the *direct effect* of Borussia Dortmund is larger than the *indirect effect* of Bayern Munich.

– Insert Table 6 here –

The regression results presented so far are based on a data set that incorporates trading days following days for which we were able to observe the outcome of a match (175 observations). Another interesting question is, whether the stock market adjusts to new information during the trading day or whether there is a measurable impact of match outcome for more than one trading day. To address this point, we also include the lagged independent variables of the match outcome variables as additional variables. To be in a position to perform this test, we include all trading days irrespectively of whether a game took place the day before or not. In a first step, we present regression results for Model 6a over the full range of trading days. All match related coefficients are in the same range as in Model 6. In a second step, we lag all match related variables and also include these measures as

explanatory variables.

The estimated coefficients are presented in Table 6 as Model 7a. The coefficients of the lagged variables for Bundesliga as well as DFB Cup matches are not significantly different from zero. This means, that with respect to these signals, information is priced in within the trading day following the day of the match. However, the lagged variable for the UEFA Cup is significantly positive, meaning that these events influenced stock prices for more than one day. Furthermore, the lagged CL variable is significant, but has a negative sign meaning that there exists some kind of overshooting behavior on the first trading day following the match day. However, since the number of observations for the EU competitions is very limited, one should not drive this interpretation too far. The results of Model 7a show that information is *regularly* priced in on the subsequent trading day. Nevertheless, some *extraordinary* events may also have an impact on the subsequent trading days, but it is not clear cut whether the adjustment on the first trading day is too slow (UEFA Cup) or too extreme (CL).

4 The Reversed News Model

4.1 Comparison of the Approaches

Empirical studies which test the news model of asset price determination traditionally apply the following approach: In a first step, a theoretical model is derived that identifies the different news categories which are assumed to drive asset prices. In a second step, the influence of the different news categories on the asset price is quantified empirically. This is also the approach we applied so far: On the basis of the industry model we hypothesized that match outcome is a key value driver for Borussia Dortmund. Subsequently, we quantified the influence of match outcome on stock prices empirically.

An alternative approach is the so called *reversed news model* (see Ellison/Mullin 2001). Key to this approach is that it is not estimated how new information influence stock prices. In contrast to the traditional approach,

we identify *at first* large stock price reactions which can not be explained by overall stock market conditions. In a second step, we check whether we can identify company specific information that can explain the stock price reactions.

The reversed news model was already applied by Gerrad/Lossius (2004) for eleven English listed football teams. Gerrard/Lossius argue that the reversed news model is a proper method to circumvent some pitfalls of traditional event studies, such as the problem of choosing the appropriate length of the event window. Over the time period July 1997 – June 2003, about 100 days with abnormal stock price reactions are identified. About half of these extreme stock price reactions can be related to match results and about 40 % to company specific financial news.

– Insert Table 7 here –

4.2 Empirical Analysis

To control for the overall stock market reaction, we regress the relative change of Borussia Dortmunds' stock price on a constant and the relative change of the SDAX [time span: season 2003/2004]. We sort all *absolute* error terms according to their size. In Table 7 we present the 15 largest error terms. We tried to identify for each date company specific news that may have caused the unexplained reaction in stock prices. Table 7 highlights that

- the speculation about the issuing of a 100 mill. Euro bond,
- the non-qualification to the CL as well as
- the investment decision of a large blockholder (Norman Rentrop)

influenced Borussia Dortmund's stock market prices. Therefore, we were able to proof by applying the reversed news model that *not only* match outcome *but also* corporate governance related information are important drivers of stock market price. Hence, we would like to give some more details to the different news that we identified by the reversed news model.

4.3 Three Important Events

Non-Qualification to the CL (8/28/2003)

One event which must be considered as a new information for all market participants was the non-qualification of Borussia Dortmund for the CL in the 2003/2004 season. In the night of 8/27/2003, Dortmund lost a dramatic penalty shootout against FC Brügge. As a consequence Dortmund was not allowed to play in the lucrative CL, but would play in the UEFA Cup competition. Since public interest for this competition is only minor, the financial attractiveness of the UEFA Cup competition is also reduced, compared to the CL. On the subsequent trading day stock prices dropped from 3.60 Euro to 3.30 Euro (-8.3 %). If one considers 19.5 mill. shares outstanding, market capitalization was reduced by 19.5*0.30 = 5.85 mill. Euro.

How can one explain the *size* of decline in market capitalization? Firstly, one has to consider that the information about the drop out did not hit the market unexpectedly. As betting odds indicated, the chance prior to the game to qualify for the main round of the CL amounted only to 50 %. Secondly, one has to know that a team which qualifies to the first main round of the CL gets about 15 mill. Euro TV-revenues, guaranteed by the UEFA (Schnell 2003). This is the case, because TV-rights for the CL are centrally marketed by the UEFA. Since the odds were 50:50 prior to the game, about 7.5 mill. Euro were already priced in by the market. Thirdly, one has to consider that Dortmund would play *at least* one home game in the UEFA Cup competition which would also generate some income through gate attendance and TV-revenues. Hence, the drop of the market capitalization should be somewhat lower than 7.5 mill. Euro. This example is also a strong hint for the efficient market hypothesis.

The Blockholder Norman Rentrop (10/16/2003)

On 10/16/2003 the public was informed about the fact that an individual investor (Normal Rentrop) bought a 14.4 % share of Borussia Dortmund from the Deutsche Bank. After this information hit the market, share prices increased by 5.1 %. To explain this stock price reaction, two different kind of

arguments can be given. Firstly, one has to consider that the Deutsche Bank took over a 24.9 % block of Borussia Dortmund during or in the aftermath of the IPO which took place in October 2000. Over the subsequent three years, Deutsche Bank sold a substantial amount of their position over the secondary market. During the whole time period Borussia Dortmund was listed, the Deutsche Bank reduced its position, thereby putting downward pressure on stock prices. This downward pressure was eliminated by selling the remaining blocks of shares to one single shareholder. This line of argumentation was frequently found in the financial press and could serve as one explanation for the increase in the stock price of Borussia Dortmund on 10/16/2003.

A second line of argumentation is more corporate governance related: A single large blockholder who is interested in the company, may be able to put pressure on the management to follow the interest of shareholders and increase the shareholder value. This second argument could also serve as an explanation for the positive stock price reaction to the new information.

Our finding that large investors have an impact on share prices of publicly traded football clubs is in line with the finding of Gerrrad/Lossius (2004). For example, they show that the takeover bid of BSkyB in September 1998 caused an abnormal return of Manchester United share prices of about 30 %. Furthermore, takeover bids and rumors about takeover bids also had a major impact on the stock price of other publicly traded football teams such as Newcastle United or Southampton Leisure Holding.

The 100.000.000 Euro Bond (12/22/2003)

Another news which resulted in an extreme reaction of the stock price of Borussia Dortmund was a newspaper story published in the sports-magazine *Kicker* (Hennecke 2003) and the daily newspaper *Süddeutsche-Zeitung* (Röckenhaus 2003) on 12/22/2003. The story line was as follows: The non-qualification to the CL as well as the early knock-out in the subsequent UEFA Cup competition would reduce revenues dramatically and would also lead to a substantial loss at the end of the fiscal year as well as to a serious liquidity problem. Furthermore, it was reported that the management of

Borussia Dortmund would plan to issue a 100 mill. Euro bond secured by future gate attendance revenues.

The management of Borussia Dortmund reacted immediately in a press conference and denied the stories published in the press. However, the management confirmed the negotiations with respect to issuing a bond but also stated that the face value will definitely be lower. Additionally, the management announced that it will lawsuit the journalists and publishing houses for misleading the public.

During the subsequent days, new information was published with respect to the liquidity and profitability status of Borussia Dortmund. From this discussion an *'objective'* observer must have got the impression that Borussia Dortmund is not the most transparent company. As can be seen from Table 7 as well as Figure 1 this discussion had a major influence on the stock price. Volatility was sky-rocking and a downward trend emerged.

5 Conclusion

We have applied the news model to the football industry to analyze, whether new information regarding the sporting success can explain subsequent changes in the stock price of Borussia Dortmund. The football industry proves a very appropriate candidate for applying this model due to specific characteristics: Signals are very frequent and easy to quantify, occur solely when the markets are closed, become publicly available to all agents at the very same time, and have observable expectations due to the existence of betting odds.

According to the news model, only the unexpected part of an information should influence stock prices. Hence, we use betting odds information to control for the ex-ante expected match outcome. We show that there exists a close link between the sporting success and subsequent changes in the stock market. Therefore, the main hypotheses H1 and H2 derived from a theoretical model can not be rejected. Hypothesis H3, predicting that the outcome of European matches should have a higher impact on

the stock price than the outcome of Bundesliga matches, is not supported. Although the estimated coefficient on CL matches is larger compared to the coefficients on Bundesliga or UEFA Cup matches this difference is not significant in statistical terms.

As a robustness check, we applied the reversed news model to identify those events that had a major impact on the stock price of Borussia Dortmund. We find that – besides the match outcome – several corporate governance related news also played an important role.[12] A comparison of the traditional approach and the reversed news model gains the following insights:

- One advantage of the news model is that this method is an appropriate way to identify *'forgotten'* news categories which were not identified in the theoretical model. As a consequence, an omitted variable bias can be circumvented.

- One disadvantage of the reversed news model can be seen in the fact that this model is not able to detect news categories that have a significant, but only small impact on stock prices.

Therefore, a reversed news model should not be estimated in isolation. However its seems to be an appropriate robustness check when testing the traditional news model.

[12]See also Lehmann/Weigand (2002) for a discussion of corporate governance and professional football in Germany.

References

Ashton, J.K., B. Gerrard, R. Hudson (2003): Economic impact of national sporting success: evidence from the London stock exchange, Applied Economics Letters, Vol. 10, pp. 783 – 785.

Baimbridge, Mark; Cameron, Samuel; Dawson, Peter; (1996): Satellite Television and the Demand for Football: A Whole New Ball Game?; Scottish Journal of Political Economy, Vol. 43(3), pp. 317 – 333.

Borussia Dortmund (2000): Offering Circular, 28.10.2000.

Borussia Dortmund (2001): Annual Report, July 2000 – June 2001.

Borussia Dortmund (2002): Annual Report, July 2001 – June 2002.

Brown, Gregory W. and Hartzell, Jay C. (2001): Market reaction to public information: The atypical case of the Boston Celtics, in: Journal of Financial Economics, Vol. 60, pp. 333 – 370.

Czarnitzki, Dirk and Stadtmann, Georg (2002): Uncertainty of Outcome versus Reputation: Some Empirical Evidence for the German Premier-League Football, *Empirical Economics,* Vol. 27(1), pp. 101 – 112.

Dahlke, Mirko; Rott, Armin (2001): Fußballaktionäre in der Abseitsfalle? Erste Erfahrungen mit dem BVB-Papier, Dortmunder Diskussionsbeiträge zur Wirtschaftspolitik, Nr. 106, Januar 2001.

Dobson, Stephen and Goddard, John (2001): The Economics of Football, Cambridge University Press.

Ellison, Sara Fisher; Mullin, Wallace P. (2001): Gradual Incorporation of Information: Pharmaceutical Stocks and the Evolution of President Clinton's Health Care Reform; in: Journal of Law and Economics, Vol. 44(1), pp. 89 – 129.

Elter, Vera-Carina (2002): Vermarktung medialer Rechte im Fußball, in: FC Euro AG, Analyse der börsennotierten europäischen Fußballunternehmen – Entwicklung und Chancen des deutschen Fußballmarktes, WGZ-Bank, 3. Edition, pp. 75 – 91.

Fama, E.F. (1970): Efficient Capital Markets: A Review of Theory and Empirical Work, in: The Journal of Finance, Vol. 25, pp. 383 – 417.

Forrest, David; Simmons, Robert; Feehan, Patrick (2002): A Spatial Cross-Sectional Analysis of the Elasticity of Demand for Soccer; Scottish Journal of Political Economy, Vol. 49(3), pp. 336 – 355.

Gärtner M. and Pommerehne W.W. (1978): Der Fußballzuschauer – ein homo oeconomicus? Eine theoretische und empirische Analyse, *Jahrbuch für Sozialwissenschaften* Vol. 29, pp. 1089 – 1095.

Gerrard, Bill and Eric Lossius (2004): Playing the Stock Market: The Relationship between News and Equity Prices in Professional Team Sports, Working Paper presented at the North American Society of Sport Management (NASSM) Conference in Atlanta, Georgia.

Hennecke, Thomas (2003): Borussia Dortmund bemüht sich um eine Riesen-Anleihe, in: Kicker, Nr. 104 vom 22. Dezember 2003, S. 17.

HypoVereinsbank (2003): Fußball – Aktionäre in der Abseitsfalle, HVB Equity Research August 2003.

Kicker (2000): Sonderheft Finale 1999/2000.

Kicker (2001): Sonderheft Finale 2000/2001.

Kicker (2002): Sonderheft Finale 2001/2002.

Kicker (2003): Kicker Homepage [http://www.kicker.de].

Kruse, Jörn and Quitzau, Jörn (2002): Zentralvermarktung der Fernsehrechte an der Fußball-Bundesliga, *Zeitschrift für Betriebswirtschaft,* Special Edition 4/2002, pp. 63 – 82.

Lehmann, Erik and Weigand, Jürgen (1997): Money Makes the Ball Go Round – Fußball als ökonomisches Phänomen, in: ifo Studien – Zeitschrift für empirische Wirtschaftsforschung, Vol. 43(3), pp. 381 – 409.

Lehmann, Erik and Weigand, Jürgen (1998): Wieviel Phantasie braucht die Fußballaktie?, in: Zeitschrift für Betriebswirtschaft, Ergänzungsheft 2/1998, pp. 101 – 120.

Lehmann, Erik and Jürgen Weigand (2002): Mitsprache und Kontrolle im professionellen Fußball: Überlegungen zu einer Corporate Governance, in: Zeitschrift für Betriebswirtschaft, Ergänzungsheft 4/2002, pp. 43 – 61.

Parlasca, Susanne and Szymanski, Stefan (2002): When the whole is less than the sum of the parts: The negative effects of central marketing of football television rights on fans, media concentration and small clubs, *Zeitschrift für Betriebswirtschaft,* Special Edition 4/2002, pp. 83 – 103.

Palomino, Frederic, Luc Renneboog, Chendi Zhang (2005): Stock Price Reactions to Short-Lived Public Information: The Case of Betting Odds, European Corporate Governance Institute (ecgi) Finance Working Paper No 81/2005.

Peel, David A.; Thomas, Dennis A. (1988): Outcome Uncertainty and the Demand for Football: An Analysis of Match Attendances in the English Football League; Scottish Journal of Political Economy, Vol. 35(3), pp. 242 – 249.

Renneboog, Luc and Vanbrabant, Peter (2000): Share Price Reactions to Sporty Performances of Soccer Clubs Listed on the London Stock Exchange and the AIM Center for Economic Research Working Paper No. 2000-19.

Röckenhaus, Freddie (2003): Horrorschulden und Bilanztricks: Borussia Dortmund vor dem Finanzcrash, Süddeutsche Zeitung online 22.12.2003.

Schnell, Christian (2003): Borussia Dortmund verliert auch an der Börse, Handelsblatt Freitag, den 29. August 2003.

Schwartz, Barry and Barsky, Stephen F. (1977): The Home Advantage, *Social Forces,* Vol. 55(3), pp. 641 – 661.

Szymanski, Stefan; Smith, Ron (1997): The English Football Industry: profit, performance and industrial structure, in: International Review of Applied Economics, Vol. 11(1), pp. 135 – 153.

Vergin, Roger C. and Sosik, John J. (1999): No Place like Home: An Examination of the Home Field Advantage in Gambling Strategies in NFL Football, *Journal of Economics and Business*, Vol. 51, pp. 21 – 31.

Table 1: Overview of the Different Competitions

	Borussia Dortmund			Bayern Munich
Season	German Bundesliga	European Competitions	German Cup Competition "DFB-Pokal"	German Bundesliga
2000/2001	· 3^{rd} rank at the end of season	· Not qualified, since Dortmund was only on $11th$ rank at the end of 1999/2000 season	· Out in 3^{rd} round against Schalke 04 (11/29/2000)	· 1^{st} rank at the end of season · Winning of the National Championship (5/19/2001)
2001/2002	· 1^{st} rank at the end of season · Winning of the National Championship (5/4/2002)	· Winner of the qualification games to the CL against Donezk (8/7/2001 and 8/22/2001) · Out after 1^{st} round in the CL · Switch to 3^{rd} round of the UEFA Cup competition · Loosing of the UEFA Cup final against Feyenoord Rotterdam (5/8/2002)	· Out in 1^{st} round against Wolfsburg Amateure (8/25/2001)	· 3^{rd} rank at the end of season
2002/2003	· 3^{rd} rank at the end of season	· 2^{nd} rank in the first phase of CL, qualification to 2^{nd} phase, · Out in CL after 3^{rd} rank at the end of 2^{nd} phase	· Out in 2^{nd} round against SC Freiburg (5/11/2002)	· 1^{st} rank at the end of season · Winning of the National Championship (5/24/2003)
2003/2004	· 6^{th} rank at the end of season	· Looser of CL qualification against Brügge (8/13/2003 and 8/27/2003) · Switch to UEFA Cup · Out in 2^{nd} round against FC Sochaux (11/27/2003)	· Out in 2^{nd} round against Borussia Mönchengladbach (10/29/2003)	· 2^{nd} rank at the end of season
2004/2005	· currently 11^{th} rank, after four games played	· Out in 1^{st} round of UEFA Intertoto Cup against RC Genk	· still in the competition (2^{nd} round)	· currently 5^{th} rank, after four games played
Summary	130 Matches: 64 Win, 38 Draw, 28 Lost	37 Matches: 17 Win, 8 Draw, 12 Lost	7 Matches:[a)] 3 Win, 4 Lost	130 Matches: 78 Win, 28 Draw, 24 Lost

Note: [a)] The first two matches of the DFB Cup in the 2000/2001 season took place before November 2000 – the starting point of our empirical study – and are therefore, not considered in this analysis.

Table 2: Consolidated Profit and Loss Statement of Borussia Dortmund

	2002/2003	2001/2002	2000/2001	1999/2000
Match Operations	17,898	19,619.6	14,972.4	17,959.2
Advertising	44,260	30,782.1	16,258.8	26,672.9
Radio, TV	49,919	45,975.7	19,339.1	35,020.5
Transfer Revenues	316	1,235.5	25,259.6	3,047.4
Merchandising	15,692	12,672.7	7,512.6	9,795.7
Renting	97	532.3	212.4	12.3
Other Revenues	931	2,161.1	1,290	136.3
Total Revenues	129,113	112,979.0	84,844.9	92,644.3
Other Operating Income	33,143	37,406.6	29,720.5	2,534.1
Group Net Income	3,256.9	755.4	-10,920.7	42.4

Source: Borussia Dortmund (Annual Report, various issues). The figures of the year 2001/2002 are not adjusted due to a change of the *basis of consolidation* compared to 2002/2003. Figures are in thousand Euro.

Table 3: Betting Odds and Implicit Probabilities for the Match Outcome

Date	Teams	Result	Betting Odds			Mark-up	Implicit Probability		
			1	0	2				
05/19/2001	Dortmund vs. 1. FC Koeln	3:3	1.35	4.25	6.90	1.12	66 %	21 %	13 %
08/18/2001	Hansa Rostock vs. Dortmund	0:2	3.60	3.30	1.87	1.12	25 %	27 %	48 %
02/09/2002	Bayern Muenchen vs. Dortmund	1:1	1.85	3.25	3.72	1.12	48 %	28 %	24 %

Teams	Actual points	Expected points	Unexpected points
Dortmund vs. 1. FC Koeln	1	2.19	-1.19
Hansa Rostock vs. Dortmund	3	1.71	1.29
Bayern Muenchen vs. Dortmund	1	1.00	0.00

Table 4: Regression Results I

		Model 1a	Model 1b	Model 2	Model 3	Model 4
β_0	Constant	-0.0014 (-1.52)	-0.0095*** (-3.55)	-0.0290*** (-6.20)	-0.0228** (-2.26)	-0.0097*** (-3.82)
β_1	SDAX	0.3999*** (2.61)	0.2794 (0.80)	0.3002 (0.88)	0.2790 (0.83)	0.3341 (0.98)
β_2	Bund_actual	–	–	0.0118*** (5.53)	0.0105*** (4.36)	–
β_3	Bund_expected	–	–	–	-0.0015 (-0.24)	–
β_4	Bund_unexpected	–	–	–	–	0.011*** (4.57)
β_5	EU_actual	–	–	0.0108*** (2.99)	0.0173*** (3.88)	–
β_6	EU_expected	–	–	–	-0.0137 (1.74)	–
β_7	EU_unexpeced	–	–	–	–	0.0175*** (3.63)
β_8	DFB_Win	–	–	0.0296*** (3.15)	0.0233* (1.80)	0.0102 (1.20)
β_9	DFB_Lost	–	–	-0.0039 (-0.26)	-0.0103 (-0.58)	-0.0232 (-1.55)
	Obs.	1,010	175	175	175	175
	R^2	0.0094	0.0045	0.1847	0.2033	0.1839
	Adj. R^2	0.0084	-0.0013	0.1606	0.1699	0.1598
	Prob. F-Test	F(1, 1,008)= 0.0093	F(1, 173)= 0.4240	F(5, 169)= 0.0000	F(7, 167)= 0.0000	F(5, 169)= 0.0000

Note : * (**, ***) denotes significance at the 10 (5, 1) %-level. t-values (in parenthesis) are based on heteroskedastic standard errors.

Table 5: Regression Results II

		Model 5	Model 6
β_0	Constant	-0.0098***	-0.0094***
		(-3.82)	(-3.77)
β_1	SDAX	0.3240	0.3430
		(0.95)	(1.02)
β_4	BUND_unexpected	0.0110***	0.0104***
		(4.56)	(4.41)
β_{7a}	UEFA_unexpected	0.0135**	0.0135**
		(2.17)	(2.17)
β_{7b}	CL_unexpected	0.0204***	0.0204***
		(2.92)	(2.90)
β_8	DFB_Win	0.0103	0.0100
		(1.20)	(1.16)
β_9	DFB_Lost	-0.0232	-0.0234
		(-1.55)	(-1.56)
β_{10}	Bayern_unexpected	–	-0.0038*
			(-1.85)
	Obs.	175	175
	R^2	0.1867	0.1985
	Adj. R^2	0.1577	0.1649
	Prob. F-Test	F(6,168) = 0.0000	F(7,167) = 0.000

Note : * (**, ***) denotes significance at the 10 (5, 1) %-level. t-values (in parenthesis) are based on heteroskedastic standard errors.

Table 6: Regression Results III

		Model 1a	Model 6a	Model 7a
β_0	Constant	-0.0014 (-1.52)	-0.0013 (-1.46)	-0.0013 (-1.40)
β_1	SDAX	0.3999*** (2.61)	0.4152*** (2.76)	0.4036*** (2.69)
β_4	Bund_unexpected	–	0.0099*** (4.37)	0.0094*** (4.11)
β_{4*}	Bund_unexpected_lag	–	–	0.0012 (0.57)
β_{7a}	UEFA_unexpeced	–	0.0136** (2.01)	0.0136** (2.00)
β_{7a*}	UEFA_unexpeced_lag	–	–	0.0103** (2.16)
β_{7b}	CL_unexpeced	–	0.0202*** (2.65)	0.0203*** (2.65)
β_{7b*}	CL_unexpeced_lag	–	–	-0.0098* (-1.77)
β_8	DFB_Win	–	0.0018 (0.22)	0.0017 (0.21)
β_{8*}	DFB_Win_lag	–	–	-0.0002 (-0.01)
β_9	DFB_Lost	–	-0.0314** (-2.14)	-0.0314** (-2.14)
β_{9*}	DFB_Lost_lag	–	–	-0.0047 (-0.47)
β_{10}	Bayern_unexpected	–	-0.0044** (-2.10)	-0.0042** (-1.99)
β_{10*}	Bayern_unexpected_lag	–	–	-0.0034 (-1.54)
	Obs.	1,010	1,010	1,010
	R^2	0.0094	0.0603	0.0696
	Adj. R^2	0.0084	0.0538	0.0575
	Prob. F-Test	F(1, 1,008)= 0.0093	F(7, 1,002)= 0.0000	F(13, 996)= 0.0000

Note : * (**, ***) denotes significance at the 10 (5, 1) %-level. t-values (in parenthesis) are based on heteroskedastic standard errors.

Table 7: Results of the Reversed News Model

No.	Date	Price reaction*	Event	Category
1	12/22/2003	-9.59 %	100 mill. Euro bond	CG
2	10/16/2003	8.92 %	Norman Rentrop	CG
3	8/28/2003	-8.75 %	Non-qualification to CL	MO
4	12/30/2003	-7.45 %	Transparency discussion	CG
5	1/2/2004	6.81 %	Transparency discussion	CG
6	1/7/2004	-6.16 %	Transparency discussion	CG
7	6/3/2004	-5.51 %	n.a.	
8	5/6/2004	5.23 %	n.a.	
9	7/22/2003	-5.01 %	n.a.	
10	5/4/2004	-4.81 %	n.a.	
11	3/1/2004	-4.39 %	Bayern München – VfL Wolfsburg 2:0 Werder Bremen – Bor. Dortmund 2:0	MO
12	7/8/2003	-4.39 %	n.a.	
13	3/17/2004	-4.21 %	n.a.	
14	7/14/2003	4.20 %	n.a.	
15	12/15/2003	-4.10 %	Bayern München – VfB Stuttgart 1:0 Bor. M'gladbach – Bor. Dortmund 2:1	MO

Note: CG: Corporate Governance related news. MO: Match Outcome related news. *Price reaction of Borussia Dortmund stocks, not explained by overall market reaction. n.a.: no news identified.

Figure 1: Performance of Borussia Dortmund Compared to the Benchmark SDAX