The News Model of Asset Price Determination

– An Empirical Examination of the Danish Football Club

Brøndby IF

by

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Abstract

According to the news model of asset price determination, only the unexpected component of an information should drive the stock price. We use the Danish publicly listed football club *Brøndby IF* to analyze how match outcome impacts the stock price. To disentangle gross news from net news, betting odd information is used to control for the expected match outcome.

Keywords: News Model, Football Industry, Betting Odds, Stock Market, Market Efficiency, Event Study

JEL classification: G14, L83, G32

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According to the news model of asset price determination, only the unexpected component of an information should drive the stock price. We use the Danish publicly listed football club *Brøndby IF* to analyze how match outcome impacts the stock price. To disentangle gross news from net news, betting odd information is used to control for the expected match outcome.

1 Introduction

The news model states that financial agents collect every piece of publicly available information and consider this information in their asset price expectations. As a consequence markets are efficient in a semi-strong form as defined by Fama (1970).

Changes in asset prices are caused by the appearance of new, non-expected information that was not reflected in asset prices so far. We use the Danish publicly listed football club *Brøndby IF* to analyze, how the match outcome impacts the stock price. To disentangle gross news from net news, betting odd information is used to control for the expected match outcome (see also Dobson/Goddard 2001, Brown/Hartzell 2001, Ashton/Gerrard/Hudson 2003).

The remainder of the paper is organized as follows. Section 2 describes the data set. We present the regression methodology and results in Section 3. The last section concludes.

2 The data set

The analysis is perform on the Danish football club *Brøndby IF*, during the period 2nd of March 2009 – 6th of November 2011. Match results and odds for calculating expectations were kindly provided by *Danske Spil*,[1] while stock market data for *Brøndby IF B* and the *OMXC smallcap index* were collected from *Euroinvestor*.[2]

– Insert Table 1 here –

Table 1 highlights that *Brøndby IF* performed quite well in the Danish national league, with three 3rd places in the last three seasons. However, currently the team is underperforming and ranked 10th. Through their top three finishes, *Brøndby IF* played qualification matches for *UEFA Europa League*, but failed to qualify in each and every season.

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[1]www.Danskespil.dk
[2]www.Euroinvestor.dk

Additionally, the team performed relatively poorly in the Danish Cup competition. Thus, we only have a few observations for this competition. All in all, we have 119 observations, 50 of these are wins, 31 draws, and 38 losses.

The expectations for each match outcome are calculated using the odds given by *Danske Spil*. Since *Danske Spil* continuously adjusts their odds, we choose those odds given just before game started, since these represent the true expectations given injuries, change in line-up's etc. For each observation we calculated the percentage change in the *Brøndby IF B* stock price, on the following trading day, as well as the percentage change in the *OMCX Smallcap stock index*.

3   Hypotheses and empirical results

We test the following hypotheses:

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

- H2: A won game in the European competition will influence stock returns to a larger extend than a game won in the national competition.

- H3: An unexpected win should affect stock returns stronger than an expected win.

To test these hypotheses we set up four different models. Model 1 is given by:

$$\Delta BIF_t = \beta_0 + \beta_1 \Delta Scap_t + \varepsilon_t, \tag{1}$$

where ΔBIF_t denotes the percentage change in the stock price of *Brøndby IF* and $\Delta Scap_t$ denotes the percentage change in the *OMCX Smallcap index*. $\Delta Scap$ is used to control for changes in the stock price due to market wide trends.

The news model states that only the *unexpected part* of an information drives stock market prices. We used betting odd information to disentangle

the *expected* from the *unexpected* part (see Stadtmann 2006 for a detailed description of the methodology applied). Our testing procedure 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 match for every competition. In a second step, we include *additionally* a variable that measures the *expected* match outcome. 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'.

Model 2 tests whether the actual match outcome has a significant effect on the stock price. $Superpoint_t$ and $Europoint_t$ is given as the actual number of points acquired in a match, hence a win gives a value of 3, a draw gives a value of 1 and a loss is equivalent of the value of 0. $Pokalwin_t$ is a dummy, which obtains the value 1, whenever the match played was in the Danish Cup competition and the outcome was a Brøndby win.

$$
\begin{aligned}
\Delta BIF_t \;=\;& \beta_0 + \beta_1 \Delta Scap_t + \beta_2 Superpoint_t \\
& + \beta_5 Europoint_t + \beta_8 Pokalwin_t + \varepsilon_t
\end{aligned}
\tag{2}
$$

Model 3 introduces the variables $Superexpected_t$ and $Euroexpected_t$ which represent the expected number of points acquired in a match. Hence, this model tests how unexpected information drives stock prices.

$$
\begin{aligned}
\Delta BIF_t \;=\;& \beta_0 + \beta_1 \Delta Scap_t + \beta_2 Superpoint_t \\
& + \beta_3 Superexpected_t + \beta_5 Europoint_t \\
& + \beta_6 Euroexpected_t + \beta_8 Pokalwin_t + \varepsilon_t
\end{aligned}
\tag{3}
$$

In Model 4 we introduce the expectation error variables.

$$
\begin{aligned}
\Delta BIF_t \;=\;& \beta_0 + \beta_1 \Delta Scap_t + \beta_4 Supererror_t \\
& + \beta_7 Euroerror_t + \beta_8 Pokalwin_t + \varepsilon_t
\end{aligned}
\tag{4}
$$

The results from the four regressions are summarized in Table 2.

– Insert Table 2 here –

Model 1 shows that there exists a positive relation between the percentage change in the stock index and the percentage change in the stock price of *Brøndby IF*. A one percentage increase in the *OMCX Smallcap index* increases the *Brøndby IF* stock price by 1.15 percent.

Model 2 reveals positive coefficients on all of the independent variables which imply that hypothesis H1 can not be rejected. However, Model 2 also shows that there is no significant difference between national and European matches, which contradicts hypothesis H2.[3] The coefficient related to the *Danish cup competition* is insignificant, which might be due to the small number of tournament observations. Model 2 explains 16.69% of the variation in the stock price of *Brøndby IF B*. The strong increase of the adjusted R^2 compared to Model 1 reveals, that company specific information is the main driver of the stock price. The goodness-of-fit is in line with such kind of stock market studies (Stadtmann, 2006, p. 496).

Model 3 is used to examine whether the variables actual number of points scored *(point)* and the expected number of points scored *(expected)* can be aggregated in a variable that measures the expectation error. The estimated β_2 and β_5-coefficients remain positive. The coefficients (β_3 and β_6) of the variables, *Superexpected* and *Euroexpected* in contrast are negative. A test on the hypothesis that $\hat{\beta}_2 = -\hat{\beta}_3$ reveals that there is no significant difference between these two coefficients. A similar result is obtained when

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[3]Test of beta coefficients:

$$H_0 : \hat{\beta}_2 = \hat{\beta}_5$$
$$H_a : \hat{\beta}_2 \neq \hat{\beta}_5$$
$$Probability\ F\text{-}test : (1, 114) = 0.6710$$

testing the hypothesis that $\hat{\beta}_5 = -\hat{\beta}_6$.[4]

As a consequence, it is justified to construct expectation error variables as the difference between the actual number of points scored and the expected number of points. Model 4 supports the hypotheses H2 and H3. Both coefficients of the error variables are positive and significant. This implies that an unexpected point gained will result in a positive percentage change in the stock price of *Brøndby*, which is in line with hypothesis H3. In addition, we find that an unexpected point gained in a *UEFA Europa League* cup game increases the stock price of *Brøndby IF* approximately twice as much as an unexpected point gained in the national league, which supports hypothesis H2. However, this difference is not significant in statistical terms.

4 Conclusion

We test the news model of asset price determination and find strong evidence, that new – company specific – information is the main driver of the stock price. By using bedding odd information, we are able to disentangle the expected from the unexpected part of an information. We are able to show, that only the unexpected part drives the stock price. The overall results support the hypothesis of market efficiency in its semi-strong form.

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[4]Results of hypothesis tests:

$H_0 : \hat{\beta}_2 = -\hat{\beta}_3$ $\qquad\qquad$ $H_0 : \hat{\beta}_5 = -\hat{\beta}_6$

$H_a : \hat{\beta}_2 \neq -\hat{\beta}_3$ $\qquad\qquad$ $H_a : \hat{\beta}_5 \neq -\hat{\beta}_6$

Probability F-test $: (1, 112) = 0.2605$ $\qquad$ *Probability F-test* $: (1, 112) = 0.5238$

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Tables

Table 1: *Overview of Brøndby IF's performance during the period 2009 – 2011*

Season	Danish national league "Superligaen"	UEFA Europa league	Danish Cup competition "DBU-Pokalen"
2008/2009*	Ranked 3rd at the end of season	Knocked out in the 4th round of qualification.	Knocked out in the semi-final against AaB.
2009/2010	Ranked 3rd at the end of season	Knocked out in the 3rd round of qualification against Hertha Berlin.	Knocked out in the 1/8 final against Vejle BK.
2010/2011	Ranked 3rd at the end of season	Knocked out in the 3rd round of qualification against Sporting CP.	Knocked out in their first game against Varde IF (Third round).
2011/2012	Currently ranked 10th	Knocked out in the 1st round of qualification against SV Reid.	Knocked out in the 1/8 final against F.C. København.
Summary	98 Matches: 41 Wins, 26 Draws, 31 Losses	14 Matches: 7 Wins, 3 Draws, 4 Losses	7 Matches: 2 Wins, 2 Draws, 3 Losses

*The data only includes matches from 2nd of March 2009 – This excludes all *UEFA Europa League* matches in this season, and the first three matches in *DBU-Pokalen*. These matches are therefore not considered in the analysis.

Table 2: *Regression results*

		Model 1	Model 2	Model 3	Model 4
β_0	Constant	-0.004	-0.0181***	-0.0134	-0.0029
		(-1.19)	(-3.79)	(-1.33)	(-0.90)
β_1	Scap	1.1521**	1.1534***	1.1645***	1.1612***
		(2.51)	(2.60)	(2.64)	(2.65)
β_2	Superpoint	–	0.0091***	0.0087***	–
			(3.67)	(3.11)	
β_3	Superexpected	–	–	-0.0019***	–
				(-0.29)	
β_4	Supererror	–	–	–	0.0086***
					(3.10)
β_5	Europoint	–	0.0111***	0.0198***	–
			(2.42)	(2.80)	
β_6	Euroexpected	–	–	-0.0152	–
				(-1.60)	
β_7	Euroerror	–	–	–	0.0194***
					(2.78)
β_8	Pokalwin	–	0.0251	0.0205	0.0099
			(1.00)	(0.77)	(0.40)
	Observations	119	119	119	119
	R^2	0.0511	0.1669	0.1870	0.1775
	Adjusted R^2	0.0430	0.1377	0.1435	0.1484
	Probability F-test	F(1,117)	F(4,114)	F(6,112)	F(4,114)
		=0.0134	=0.0003	=0.0006	=0.0002

*Significant at 10% level, **Significant at 5% level, ***Significant at 1% level. t-values in parantheses.