The Influence of Media Coverage on Short Selling Decisions – Evidence from the Netherlands

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This research paper investigates whether the sentiment conveyed in the media, i.e. media optimism and media pessimism, is predictive of the amount of net short positions. The relationship is investigated on a daily basis using the Dutch stock market as an example. It was expected that short selling decisions are sentiment based and that a relationship between the sentiment conveyed in the media and the amount of net short positions is found. The results of this research paper suggest that media pessimism has the most influence on the amount of net short positions, but at the same time also call for further research on the topic.

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1. INTRODUCTION

In the past numerous studies investigated the role of the media in the stock market concluding that the media plays a crucial role in it (Fang & Peress, 2009) (Tetlock, 2007) (Tetlock, Saar-Tsechansky, & Macskassy, 2008). While Tetlock et al. observe that 'linguistic media content captures otherwise hard-to-quantify aspects of firms' fundamentals, which investors quickly incorporate into stock prices' (Tetlock, Saar-Tsechansky, & Macskassy, 2008, p. 1437) Fang and Peress report that because of its wide reach the media plays a crucial role in the stock market. According to Fang and Peress media coverage shows an effect on the pricing of the securities in question even if the disseminated information is no genuine news (Fang & Peress, 2009). Furthermore, Tetlock reports 'that high media pessimism predicts downward pressure on market prices' (Tetlock, 2007, p. 1139). Besides that, it is expected that media sentiment does not only affect market prices but also has an influence on investors' trading strategies (Nofsinger, 2005). Therefore, it will be interesting to see to what extent short selling decisions are sentiment based and how the sentiment conveyed in the media, i.e. media optimism and media pessimism, influences investors' short selling decisions.

Short selling or going short is defined as selling a security (e.g. a share of company x) a seller does not own in anticipation of a downward movement of that underlying security. The seller then hopes to buy back the underlying security at a lower price to close the position. By that the seller 'extinguish[es] the initial loan of the stock' (Dechow, Hutton, Meulbroek, & Sloan, 2001, p. 79) and profits from the decline in the market price of the underlying security. Sellers that want to go short on a security borrow the underlying security from either a broker or an institutional investor.

Over the years short selling activity has become an increasingly important activity on the financial markets. This can be seen in the increase of short trade activity on the financial markets as well as in the increasing demand for short selling data. According to Brent et al. the portion of short trades on the NYSE amounted to nine percent in 1984 (Brent, Morse, & Stice, 1990). Years later, it had been reported that the portion of short trades of the total trading volume on the financial markets had at least doubled (Asquith, Pathak, & Ritter, 2005) (Boehmer, Jones, & Zhang, 2008). By 2009 Diether et al. reported that the portion of short trades on the NASDAQ amounted to 32 percent (Diether, Lee, & Werner, 2009). Next to that, the Netherlands Authority for the Financial Markets (short: AFM) reported an increase in notifications of net short positions in the years 2014 and 2015: 'if a comparison is made between the first half of 2013 and the first half of 2015, the figure[s] show[s] an increase of 1088 notifications' (AFM, 2015, p. 7). The figure of appendix 3 shows the increase in the amount of quarterly notifications since the short sell regulation came into place on 1 November 2012. 'Due to a change in the European regulation with regard to short selling […] European market authorities [such as the AFM] are now obligated to publish notifications of net short positions when reaching 0.5% of the total outstanding share capital of a firm' (Kersbergen, 2015, p. 2). In their report the AFM also disclosed that since the short sell regulation came into place the website via which the short selling data is made publicly available accumulated about 192.494 page views: 'on average, the register (in excel format) is downloaded 80 times per day, with a record of 814 downloads on a single day' (AFM, 2015, p. 8).

This research paper aims to investigate whether it is possible to predict the amount of net short positions from the sentiment conveyed in the media at the example of the Netherlands. Consequently, the central research question of this research paper is:

What is the influence of the sentiment conveyed in the media on the amount of net short positions in the Netherlands?

Investigating the relationship between media sentiment and the amount of net short positions also allows examining what role emotions play in the decision making processes of professional traders involving short sales and whether professional traders who sell short are influenced by the sentiment in the media even though they are to behave rationally. Big net short positions such as the ones publicized by the AFM are usually held by professional traders who, according to Lo and Repin, are 'likely to be among the most rational decision makers in the general population, hence, ideal subjects for examining the role of emotion in rational decision making processes' (Lo & Repin, 2002, p. 324). Additionally, is researching the influence of media coverage on short selling decisions an interesting opportunity to add to the existing literature on short selling; especially to the one that is investigating the Netherlands. So far, only a small portion of the scientific literature focuses on short selling in the Netherlands.

The rest of this research paper is structured as follows: the next section will introduce different views on the financial markets. In chapter 3 the hypothesis to be tested is developed. Following that, the methodology is described. Chapter 5 of this paper elaborates on the data collected. Chapter 6 reports the empirical findings. Section 7 discusses the limitations and the implications of the study and chapter 8 concludes the paper.

2. LITERATURE REVIEW

In the past two views on financial markets established that look at the financial markets from two different angles and by that created 'a longstanding controversy in economics and finance' (Lo & Repin, 2002, p. 323). While advocates of the 'Efficient Markets Hypothesis' argue that financial markets are driven by rational responses, advocates of 'Behavioural Economics' or 'Behavioural Finance' argue that financial markets are driven by emotional responses. Other researchers argue that the two views on financial markets are not contradictory but that emotional and rational responses are complementary (Lo & Repin, 2002).

2.1 Efficient Markets Hypothesis

The Efficient Markets Hypothesis (short: EMH) states that all available information are fully incorporated into market prices to such an extent that the profits generated by acting on certain information do not excel the costs of acquiring those information (Fama, 1991). An underlying assumption of the EMH is that investors are always behaving rationally and in their own self-interest (Lo, 2005).

According to the EMH is the development of market prices greatly influenced by new information and not so much by historical or present market prices which is what makes the development of market prices unpredictable (Qian & Rasheed, 2007). Furthermore, Qian and Rasheed state that market prices can only be predicted with up to 50 percent accuracy since market prices are following a random walk pattern (Qian & Rasheed, 2007). Lo and Repin support the unpredictability of market prices: '[market] prices are determined by the competitive trading of many self-interested investors, and such trading eliminates any informational advantages that might exist among any members of the investment community' (Lo & Repin, 2002, p. 323). They argue that, therefore, market prices cannot be predicted (Lo & Repin, 2002).

Scientifically there is a lot of support for the EMH. According to Michael Jensen there is no other hypothesis in the field of economics with more empirical evidence to it (Jensen, 1978). In another review Fama expressed himself similar to Jensen: 'support of the efficient markets model is extensive, and (somewhat uniquely in economics) contradictory evidence is sparse' (Fama, 1970, p. 416). At the same time it has to be mentioned that the EMH cannot be tested on its own (Fama, 1991).

2.2 Behavioural Economics/Finance

Critics of the EMH are using the terms Behavioural Economics and Behavioural Finance to distinguish their view on the financial markets from the one of the advocates of the EMH (Lo & Repin, 2002). They argue that investors often display irrational behaviour due to emotional responses: 'the sources of these irrationalities are often attributed to psychological factors – fear, greed, and other emotional responses to price fluctuations and dramatic changes in an investor's wealth' (Lo & Repin, 2002, p. 323).

Several research studies confirmed that investors often display irrationalities due to emotionally biased behaviour (Barber & Odean, 2001) (Bell, 1983) (De Bondt & Thaler, 1985) (Odean, 1998) (Huberman & Regev, 2001) (Shefrin & Statman, 1985) (Tversky & Kahneman, 1981). Barber and Odean, for example, found that excessive trading due to the display of overconfidence is reducing investors' net returns. Therefore, they compared the trading volumes and net returns of men and women under the assumption that men are more confident than women when it comes to financial matters (Barber & Odean, 2001). Other such biases are e.g. a feeling of regret due to possibly not having made the best decisions (Bell, 1983), overreacting to certain events (De Bondt & Thaler, 1985), being reluctant to the admission of losses (Odean, 1998) (Shefrin & Statman, 1985), herding behaviour (Huberman & Regev, 2001) or shifting psychological principles. Tversky and Kahneman found out that the preference of an option is influenced by how the decision is framed and that preferences shift, especially when money is involved (Tversky & Kahneman, 1981).

According to Lo & Repin supports the development of the NASDAQ Composite Index between March 10, 2000 and October 17, 2001 the claim of the critics of the EMH: 'either the earlier run-up in the technology sector was driven by unbridled greed and optimism, or [that] the precipitous drop in value of such a significant portion of the U.S. economy must be due to irrational fears and pessimism' (Lo & Repin, 2002, p. 323). In that time the NASDAQ Composite Index lost 61.4 percent of its value. The NASDAQ Composite Index declined from a historical high of 5048.62 on March 10, 2000 to 1646.34 on October 17, 2001 (Lo & Repin, 2002). The findings of Nofsinger and the findings of Tetlock, 'that high media pessimism predicts downward pressure on market prices' (Tetlock, 2007, p. 1139) and that 'if social mood rises too high […] the extreme overconfidence and euphoria can cause a stock market bubble and corporate overinvestment' (Nofsinger, 2005, p. 145) give credence to that claim.

With regard to short selling this means that the sentiment conveyed in the media (i.e. media optimism or media pessimism) can have an influence on investors short selling decisions. Even if the media does not disseminate information the sentiment does have an influence on market prices. Especially high media pessimism which is predictive of a 'downward pressure on market prices' (Tetlock, 2007, p. 1139) could induce short selling activity on the financial markets (Fang & Peress, 2009) (Nofsinger, 2005) (Tetlock, 2007).

2.3 A Fuller View on Financial Markets

Other research studies, however, suggest a connection between emotional and rational responses in decision making processes. Indicating that financial markets are neither driven by emotional nor by rational responses alone, but that emotional and rational responses are complementary (Ackert, Church, & Deaves, 2003) (Bollen, Mao, & Zeng, 2011) (Elster, 1998) (Lo, 1999) (Lo & Repin, 2002) (Loewenstein, 2000) (Peters & Slovic, 2000). Ackert et al. state that emotional responses are more basic than rational responses, occur very early on in the decision making process and can help in making optimal decisions (Ackert, Church, & Deaves, 2003). According to Ackert et al. 'emotion allows people to transcend the details, prioritize, and focus on the decision to be made' (Ackert, Church, & Deaves, 2003, p. 33).

Examining the importance of emotions in rational decision making processes Lo and Repin found out that 'intuitive judgments require not only cognitive but also emotional mechanisms' (Lo & Repin, 2002, p. 332). To that end Lo and Repin measured professional traders' physiological characteristics during regular trading sessions. Furthermore, their findings imply that even for highly experienced professional traders emotional responses play a significant role in processing financial risk in real time. At the same time their results also suggest that experienced professional traders are less sensitive to sudden changes in financial markets than their less experienced colleagues (Lo & Repin, 2002). Moreover, Bollen et al. state that 'although news most certainly influences [stock] market prices, public mood states or sentiment may play an equally important role' (Bollen, Mao, & Zeng, 2011, p. 1).

3. HYPOTHESIS

It is assumed that the sentiment conveyed in the media has an influence on investors short selling decisions because even if the media does not disseminate information the sentiment does have an influence on market prices. It is expected that especially high media pessimism which is predictive of a 'downward pressure on market prices' (Tetlock, 2007, p. 1139) induces short selling activity on the financial markets (Fang & Peress, 2009) (Nofsinger, 2005) (Tetlock, 2007). Hence, the following hypothesis about the influence of media coverage on the amount of net short positions in the Netherlands can be made:

H1 – There is a relationship between the sentiment conveyed in the media and the amount of net short positions in the Netherlands.

The sentiment conveyed in the media should, thus, affect professional traders' short selling decisions and short selling be sentiment based.

4. METHODOLGY

To test the developed hypothesis this research study partly replicates the methodological approach used in an earlier study conducted by Bollen et al. who investigated whether Twitter mood is predictive of the stock market (Bollen, Mao, & Zeng, 2011).

The relationship between the independent variable 'Media Coverage' and the dependent variable 'Short Positions' is examined investigating the daily changes in the amounts of net short positions and the daily changes in the sentiment conveyed in the media on a company basis. The changes in the amounts of net short positions and the changes in the sentiment conveyed in the media are examined, so that conclusions about the impact of the media sentiment on short selling decisions can

be drawn. Moreover, is the relationship between the variables investigated on a daily basis because media coverage is quickly incorporated into market prices (Tetlock, Saar-Tsechansky, & Macskassy, 2008). This is done in three different phases. In the first phase are the records of the AFM used to calculate the daily changes in the amounts of net short positions on the Dutch stock market over a randomly selected time series of 30 consecutive days. Besides that, is media coverage featuring the, during that time series identified companies collected. To account for the independent variable 'Media Coverage' preceding the dependent variable 'Short Positions' media coverage from five days prior to the start of the daily short selling time series on is collected. Short sellers generally hold their short positions on a short-term basis. On average a short position is hold for three to five days (Boehmer & Wu, 2012). In the second phase is the collected media coverage subjected to the Python NLTK Text Classification tool measuring negative vs. positive sentiment from text content. Based on those results a negative vs. positive media sentiment ratio is calculated for each company i on day t because media pessimism (negative sentiment) is predictive of 'downward pressure on market prices' (Tetlock, 2007, p. 1139), suggesting an increase in the amount of net short positions. In the reverse case it is assumed that media optimism (positive sentiment) is predictive of upward pressure on market prices and, thus, suggesting a decrease in the amount of net short positions. By calculating a negative vs. positive sentiment ratio a negative change represents an increase in positive sentiment while a positive change represents an increase in negative sentiment in the corresponding media coverage. If a relationship between the independent variable 'Media Coverage' and the dependent variable 'Short Positions' is found this would imply that an increase in the negative vs. positive media sentiment ratio (positive change) would lead to an increase in the amount of net short positions and vice versa (Bollen, Mao, & Zeng, 2011).

In the third phase the hypothesis that there is a relationship between the sentiment conveyed in the media and the amount of net short positions in the Netherlands is examined. Therefore, a Granger causality analysis correlating the daily changes in the amounts of net short position to the daily changes in media sentiment is used. 'Granger causality analysis rests on the assumption that if a variable X causes Y then changes in X will systematically occur before changes in Y' (Bollen, Mao, & Zeng, 2011, p. 4), which controls for the independent variable 'Media Coverage' preceding the dependent variable 'Short Positions'. The regression model looks as follows:

$$SP_{it} = a_0 + b_1 * MC_{it} + b_2 * MC_{it-1} + \cdots + b_n * MC_{it-n} + \in_{it}$$

SP_{it} represents the change in the amount of net short positions for company i on day t, a_0 represents the constant regression coefficient, b represents the regression slope coefficients, MC_{it} stands for the change in media sentiment for company i on day t, and $\in_{it}$ terms the regression error. Since the 'Media Coverage' data is expected to be lagged MC_{it-1} until MC_{it-n} (n=5) stand for the changes in media sentiment for company i on days t-1 (data lagging one day) until t-n (data lagging n days). In a second step the change in the size of company i on day t will be introduced as a control variable to validate the results. Company size indicates whether 'a constant supply of stocks is given which is important in order to be able to borrow shares which are then shorted' (Schindler, 2015).

As a consequence the regression model has to be adjusted. The regression model now looks as follows:

$$SP_{it} = a_0 + b_1 * MC_{it} + b_2 * MC_{it-1} + \cdots + b_n * MC_{it-n} + SIZE_{it} + \in_{it}$$

Next, the results will be tested for robustness. The independent variable with the most predictive quality (excluding the control variable) of the dependent variable 'Short Positions' will be recoded into three different dummy variables. In a first instance will the independent variable be recoded into a dummy variable testing against no change in media sentiment. Days with no change in media sentiment are now equal to a value of one while changes in the daily media sentiment are now equal to zero. Thereafter, will the independent variable be recoded into a dummy variable testing against positive changes in the daily media sentiment. Every decrease in media sentiment (positive change) is now equal to a value of one while every other change in the daily media sentiment (negative or none) is equal to zero. The same is done for the third dummy variable testing against negative sentiment change. Every increase in the daily media sentiment (negative change) is now equal to a value of one while every other change in the daily media sentiment (positive or none) is equal to zero.

4.1 Variables

Short Positions: the daily changes in the amounts of net short positions on company basis. A net short position is defined as the difference between any short positions and any long positons hold by market participants (AFM, 2015).

Media Coverage: refers to the daily changes in the sentiment conveyed in the media on a company basis. News items that feature the companies shorted during the investigated time series are systematically collected from the LexisNexis database. To obtain only relevant news items, only news items with relevance scores equal to or higher than 90 percent are collected (Fang & Peress, 2009). The relevance score is used 'to measure the quality of the match between an article and a company' (Fang & Peress, 2009, p. 2028) based on the frequency, weight and location of the company name in an article.

Size: the change in the size of company i on day t. The market capitalization at the end of each day t is used as a measure of company size.

5. DATA COLLECTION

The data set contains records over a randomly chosen time series of 30 consecutive days for the daily changes in the amounts of net short positions. The short selling times series lasts from the 6th of April 2016 until the 5th of May 2016. The data collected for the daily changes in the media sentiment contains records over a 35 days daily time series starting on the 1st of April to account for the dependent variable 'Media Coverage' preceding the independent variable 'Short Positions'. Besides that, the data set also contains records of companies' market capitalization over the duration of the short selling time series.

The data set collected for the short selling time series is based on 94 notifications of net short positions of 19 companies listed on the Dutch stock market. Those records were then used to compute the daily changes in the amounts of net short positions over the investigated time series. The daily changes are given as a percentage of the companies' outstanding share capital. Net

short positions data were collected from the publicly available short selling register of the AFM.

To compute the daily changes in the companies' market capitalization data about companies' outstanding share capital and share prices at the end of day t were collected from Google Finance. The market capitalization of company i on day t is computed by multiplying the share price of company i at the end of day t with the number of the company's outstanding shares. The daily changes in the companies' market capitalization are given as a percentage of the companies' market capitalization at the end of day t-1.

The data set for the media sentiment time series contains 214 different news items. The data set includes newspaper articles from (financial) newspapers, websites and industry specific magazines to ensure that the news items collected are news items from sources frequently visited by financial market participants, especially professional traders. No news items were identified for five of the 19 companies identified during the short selling time series. Neutral news items, news items showing equal portions of negative and positive sentiment as well as days without any media coverage were assigned a value of one, to ensure that the daily changes in the negative vs. positive sentiment ratio would accurately represent the daily changes in the sentiment conveyed in the media covering company i on day t.

6. EMPIRICAL FINDINGS

This section reports the empirical findings of the conducted analyses. It includes a preliminary analysis of the previously introduced variables for their regression suitability.

6.1 Preliminary Analysis

First of all were the descriptive statistics of the previously introduced variables examined. Those can be found in table 1 below. As part of the preliminary analysis the variables' normality assumption as well as the variables' linearity assumption were investigated after that.

Table 1. Descriptive Statistics

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
SP_Change (in %)	551	-5,27	2,87	-0,014	0,493	-2,068	29,794
MC_Change	551	-1,33	1,33	0,000	0,097	0,269	132,252
MC_Change (1 lag)	551	-1,33	1,33	-0,001	0,100	0,033	120,960
MC_Change (2 lags)	551	-1,33	1,33	0,000	0,102	0,233	111,076
MC_Change (3 lags)	551	-1,33	1,33	0,000	0,102	0,233	111,076
MC_Change (4 lags)	551	-1,33	1,33	0,000	0,102	0,233	111,076
MC_Change (5 lags)	551	-1,33	1,33	0,000	0,102	0,233	111,076
Size_Change (in %)	551	-16,77	11,49	-0,040	2,047	-0,366	13,216
Valid N (listwise)	551						

The data set includes 551 records of 19 companies listed on the Dutch stock market. As the descriptive statistics table shows is the biggest decrease in the daily amounts of net short positions equal to 5.27 percent of a company's outstanding share capital and the biggest increase equal to a value of 2.87 percent of a company's outstanding share capital. As the mean for the dependent variable SP_Change (in %) shows decreased the daily amounts of net short positions by 0.014 percent on average over the investigated time series.

The minima for independent variables MC_Change show that the investigated Media Coverage is at most 1.33 times more positive than negative based on the results of the NLTK Text Classification tool. The maxima for the independent variables, on the other hand, show that the investigated Media Coverage is also at most 1.33 times more negative than positive. The mean for almost all independent variables is equal to zero meaning that on average no change in media sentiment had been recorded over the investigated time series. Besides that, are the minimum, the maximum and the mean value almost all the same for all 'Media Coverage' variables. This is due to the fact that in the five days prior to the investigated short selling time series almost no changes in the sentiment conveyed in the media had been recorded either.

For the control variable Size_Change (in %) the biggest decrease in a company's market capitalization is equal to a value of 16.77 percent and the biggest increase in a company's market capitalization equal to a value of 11.49 percent over the investigated daily time series. On average the companies' market capitalization decreased by -0.040 percent during that time.

While the dependent variable SP_Change (in %) is the only variable which is skewed (i.e. to the left) all variables show high levels of kurtosis beyond the suggested cut-offs of -1 or +1 (Schindler, 2015). For that reason, the data set was checked against outliers. De Veaux et al. defined extreme outliers as 'data values farther than 3 IQRs from the quartiles' (De Veaux, Velleman, & Bock, 2014, p. 91). According to that definition extreme outliers are observations that lie more than three times the interquartile range (short: IQR) either below the first or above the third quartile (De Veaux, Velleman, & Bock, 2014).

Except for the control variable Size_Change (in %) the upper and lower boundaries for extreme outliers were all equal to zero. This was to be expected since changes in the amounts of net short positions were only recorded in about 13 percent of all observations and changes in the media sentiment only recorded in about three percent of all observations. This is in line with the high levels of kurtosis displayed by the different variables. For that reason have all changes in the amounts of net short positions as well as all changes in the sentiment conveyed in the media to be regarded as influential cases.

For the control variable Size_Change (in %) the lower boundary for extreme outliers was equal to -3.80 and the upper boundary for extreme outliers equal to 3.48 following the definition of De Veaux et al. After the outliers for the control variable Size_Change (in %) were excluded from the sample the new data set for the control variable Size_Change (in %) includes 512 records. The initial sample included 39 extreme outliers. As a result the control variable's levels of skewness and kurtosis improved. The new levels are -0,093 and 1,292 respectively. This means that the control variable now shows a lesser level of kurtosis which is close to the suggested cut-offs between -1 and +1.

To check the variables' normality assumption histograms of the variables were looked at. As already expected after examining the descriptive statistics, all of the introduced variables violate the normality assumption slightly. The variables' linearity assumption assuming that the relationship between the dependent and independent variables is linear was examined at hand of scatterplots of the dependent and independent variables. Furthermore, were the Pearson correlation coefficients examined to investigate the relationship between the dependent variable (SP_Change (in %)) and the independent variables (see table 2).

All Pearson correlation coefficients lie in between a range of -0.5 and +0.5. Therefore, one can conclude that the variables do not display any signs of multicollinearity; another assumption of linear regression (Field, Miles, & Field, 2009). Moreover, the Pearson Correlation Matrix shows that there is no independent variable that is statistically significantly correlated with the dependent variable.

Table 2. Pearson Correlation Matrix

Pearson Correlation Matrix

	SP_Change (in %)	MC_Change	MC_Change (1 lag)	MC_Change (2 lags)	MC_Change (3 lags)	MC_Change (4 lags)	MC_Change (5 lags)	Size_Change (in %)
SP_Change (in %)								
MC_Change	-0,048							
MC_Change (1 lag)	0,029	0,453**						
MC_Change (2 lags)	-0,020	-0,034	-0,478**					
MC_Change (3 lags)	0,029	0,170**	-0,034	-0,467**				
MC_Change (4 lags)	-0,039	-0,175**	0,166**	-0,033	-0,467**			
MC_Change (5 lags)	0,020	-0,159**	-0,171**	0,162**	-0,033	-0,467**		
Size_Change (in %)	0,045	-0,030	-0,019	0,041	-0,071	0,007	0,039	

** Correlation significant at the 0,01 level

Examining the scatterplots of the dependent and independent variables showed that all of the variables violate the linearity assumption. The results of the preliminary analysis, thus, yield that the collected data are not suitable for regression analyses as previously suggested and that an alternative method of analysing the relationship between the amounts of net short positions and the sentiment conveyed in the media has to be found.

6.2 Alternative Analyses

Another possibility analysing the relationship between the amounts of net short positions and the sentiment conveyed in the media are bivariate analyses. At hand of bivariate analyses changes in the daily amounts of net short positions can be compared to positive changes in media sentiment, no changes in media sentiment and negative changes in media sentiment for example. Therefore, the initial sample is divided into three subsamples. Consequently, each 'Media Coverage' data set is divided into three subsequent data sets resulting in different data sets that allow to compare short selling changes to positive changes in media sentiment, no changes in media sentiment and negative changes in media sentiment on days t, t-1, t-2 and so on. In total 36 new variables are created (18 dependent variables and their 18 corresponding, independent variables).

The mean statistic for all positive changes in media sentiment = -0.017, the mean statistic for no changes in media sentiment = -0,013 and the mean statistic for all negative changes = -0,034.

To measure the strength of association between the changes in the amounts of net short positions and the changes in media sentiment i.e. positive, none or negative the Kendall's tau-b correlation coefficient and the Spearman's correlation coefficient are used. First the strength of association between the new dependent variables 'SP Change (in %)' and the new independent variables 'Positive MC Change', 'No MC Change', and 'Negative MC Change' is measured using Kendall's tau-b. After that these results are validated using Spearman's rho to measure the strength of association between the dependent and the independent variables. The bivariate analyses are performed using SPSS. The results (see table 3) show no statistically significant correlations.

Looking at the descriptive statistics of the newly created variables in more detail (see appendix 1), though, shows that on average there are only eight valid cases where there was a positive change in the sentiment conveyed in the media recorded. Also, on average, there were only seven valid cases where there was a negative change conveyed in the sentiment in the media recorded. All other cases are associated with no change in media sentiment. As a consequence of the lack of valid cases associated with positive and negative changes in the sentiment conveyed in the media the results of the bivariate analyses have no statistical validity.

In lieu of that, the mean statistics of the newly created variables are interpreted. As the mean statistics of the newly created variables indicate declined the amounts of net short positions by a marginally 0,013 percent of a company's outstanding share capital when no change in media sentiment was recorded.

Besides that, the mean statistics for the daily changes in the amounts of net short positions are indicative of a specific pattern when the mean statistics for the daily changes in the amounts of net short positions are compared for positive and negative changes in the sentiment conveyed in the media. The amounts of net short positions associated with an increase in negative media sentiment seem to increase on days five, three and one after a negative change in media sentiment was recorded (+0,099% overall). On days four and two after a negative change in the media sentiment was recorded, as well as on the day itself, the amounts of net short positions seem to decrease, on the other hand (-0,167% overall). The opposite seems to be the case for the amounts of net short positions associated with an increase in positive media sentiment. On days five, three and one after a positive change in media sentiment was recorded the amounts of net short positions seem to decrease (-0,116% overall), while on days four and two after a positive change in the media sentiment was recorded, as well as on the day itself, the amounts of net short positions seem to increase (+0,082% overall). Further research on the topic shall determine whether this is a significant, emerging pattern in the relationship between the amounts of net short positions and the sentiment conveyed in the media.

Interestingly to note is also that the largest decrease in the mean statistics of the daily changes in the amounts of net short positions was recorded four days after an increase in negative media sentiment (-0,267%) and that the largest increase in the amounts of net short positions was recorded the day thereafter (+0,1086%). Based on those results one can conclude that a negative change in the sentiment conveyed in the media has the most influence on the amounts of net short positions; negatively as well as positively. However, due to the limited number of valid cases associated with positive and negative changes in media sentiment have the results of this study only limited, suggestive meaningfulness.

When looking into the different valid cases associated with a positive or a negative change in media sentiment in more detail it becomes apparent that only three of the 19 companies in the sample (i.e. ArcelorMittal SA, Galapagos NV and TomTom NV) are associated with those changes in media sentiment. While ArcelorMittal SA and TomTom NV are amongst the top three of the companies with the most media coverage, Galapagos NV is a company with below average media coverage. On average eleven news items were identified for the 19 companies in the sample over the investigated time period. In case of Galapagos NV only six different new items were identified.

Table 3. Results Bivariate Analyses

Correlations Bivariate Analyses

	Model 1 (no lag)		Model 2 (1 lag)		Model 3 (2 lags)		Model 4 (3 lags)		Model 5 (4 lags)		Model 6 (5 lags)	
	Kendall's tau-b	Spearman's rho	Kendall's tau-b	Spearman's rho	Kendall's tau-b	Spearman's rho	Kendall's tau-b	Spearman's rho	Kendall's tau-b	Spearman's rho	Kendall's tau-b	Spearman's rho
Positive MC Change	-0,422	-0,450	0,484	0,535	-0,330	-0,354	0,605	0,644	-0,051	-0,102	-0,242	-0,268
	(0,270)	(0,310)	(0,158)	(0,172)	(0,349)	(0,390)	(0,077)	(0,085)	(0,877)	(0,809)	(0,480)	(0,522)
No MC Change	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-
Negative MC Change	-0,481	-0,575	0,129	0,139	0,000	0,083	-0,250	-0,341	0,146	0,187	-0,396	-0,428
	(0,230)	(0,233)	(0,756)	(0,793)	(1,000)	(0,860)	(0,481)	(0,455)	(0,690)	(0,689)	(0,295)	(0,338)
No. of Obs.	551	551	551	551	551	551	551	551	551	551	551	551

* Dependent Variable SP Change (in %)

While the frequency of media coverage seems to be linked to the number of valid cases where either a positive or a negative change in media sentiment was recorded, the size of a company seems to not be linked to it. With a market capitalization of about €13.56 billion ArcelorMittal SA is the third biggest company in the sample. Galapagos NV (market capitalization ≈ €1.63 billion) and TomTom NV (market capitalization ≈ €1.76 billion), on the other hand, were amongst the smaller companies in the sample at the time of observation.

When looking into which kinds of news items had an influence on the sentiment in the media coverage featuring those three companies no specific type of news items was detected. The topics covered by those news items differed from business opportunities and current business developments to share price developments and earnings announcements.

7. DISCUSSION

This section elaborates on the limitations and the implications of this research paper. Moreover, are directions for further research studies given.

7.1 Limitations and Implications

Here, different limitations to this research study have to be noted. First of all, that the introduced variables are not suited for any kinds of regression analyses. If the data would allow for regression analyses, different regression analyses such as in the appendix of this research paper would have been performed (see appendix 2). Also, from a statistical point of view is any change in the daily amounts of net short positions and any change in the daily media sentiment in this study's data set rather an exception.

Next to that, shows the collected data set a lack of variation. In other studies such as the one conducted by Fang and Peress who investigated the relationship between media coverage and stock returns media coverage was either examined on a monthly or a yearly basis (Fang & Peress, 2009). Their data does not show any of the abnormalities as shown by the data collected for this research study. This can be explained by the fact that if media coverage is examined on a monthly or a yearly basis more media coverage is aggregated for one timely observation than when media coverage is examined on a daily basis. This most certainly resulted in the increased variation in the examined data sets.

Neither is this study's data set comparable to any of the data sets used in studies investigating e.g. the role of the media or the role of language in the stock market on a daily basis (Tetlock, 2007) (Tetlock, Saar-Tsechansky, & Macskassy, 2008). While those studies indeed investigate media coverage on a daily basis as well, those studies only investigate the influence of the fraction of negative words in the media coverage on the stock market. This can explain why the different data sets are not comparable either. This study's data set contains data on negative and positive sentiment in media coverage.

Very often negative and positive media sentiment cancelled each other out and the corresponding news item was classified as neutral leading to only a very few changes in media sentiment on a daily basis in this study's data set.

The lack of variation in the data implies that neither the results of the bivariate analyses nor the interpretations of the mean statistics of the newly created dependent and independent variables have any statistical meaningfulness; and that the mean statistics have to be interpreted with caution.

7.2 Directions for Further Research

Further research shall take the above mentioned limitations and implications into account. Further research studies could investigate the relationship between the amount of net short positions and media sentiment on a weekly or monthly basis to ensure that changes in the amounts of net short positions or changes in the sentiment conveyed in the media are rather the norm than the exception. Here, it has to be noted that media coverage is quickly incorporated into market prices though (Tetlock, Saar-Tsechansky, & Macskassy, 2008). Therefore, investigating the relationship between the variables on a weekly or monthly basis might distort the actual relationship between the variables. Moreover, are short sales usually a short-term event with an average duration of three to five days (Boehmer & Wu, 2012). These are also the reasons why in this research paper it had been chosen to investigate the relationship between the amounts of net short positions and the sentiment conveyed in the media on a daily basis.

Another possibility for further research to investigate the relationship between the introduced variables is by requesting access to the complete records of the AFM. This way one would not only have access to the records made publicly available, which according to the AFM only contain about 20 percent of all notifications of net short positions recorded by the AFM (AFM, 2015). Instead one would gain access to all of the notifications of net short positions recorded by the AFM. Another possibility would also be to investigate the relationship between the dependent variable and the independent variables at the example of a country other than the Netherlands where there is more shorting activity taking place.

8. CONCLUSION

The aim of this research paper was to investigate whether it is possible to predict the amount of net short positions from the sentiment conveyed in the media. Based on the results of this research paper there is no statistically significant evidence to either reject or not to reject the hypothesis formulated in the beginning of this research paper. Because of that, it cannot be stated with certainty whether or not short sales made by professional traders are sentiment based and whether or not emotions play a role in the decision making processes of professional traders involving short sales. The mean statistics of the newly created dependent and independent variables, though, suggest that especially negative changes in the sentiment conveyed in the media have an impact on the amounts of net

short positions. Also, the mean statistics suggest that the relationship between the sentiment conveyed in the media and the amounts of net short positions is lagged. It would, therefore, be advisable to conduct further, more extensive research on the relationship between the amounts of net short positions on the financial markets and the sentiment conveyed in the media.

Research on the effect of short selling activity on the financial markets is a highly debated topic and so far research has been inconclusive. The most common view on the effect of short selling activity on the financial markets is that short selling activity negatively affects the financial markets by fostering downward movements in market prices (Henry & Koski, 2010) (Shkilko, Van Ness, & Van Ness, 2012). Assuming that this is indeed true and that further research is able to predict the amount of net short positons from the sentiment conveyed in the media professional traders could use this information to exploit the relationships to their advantage i.e. to maximize their returns.

On the other hand could financial market authorities such as the AFM use such a model to predict the overall level of short selling activity on the financial markets too. By that financial market authorities who according to European regulations with regard to short selling are supposed to intervene in the case of certain developments on the financial markets may be able to take preventive measures: 'in case of adverse events or developments which constitute a serious threat to financial stability or to market confidence in a Member State or in case of a significant fall in price of a financial instrument, individual competent authorities have various emergency powers of intervention available to them. These powers inter alia include to impose notification or disclosure requirements concerning short positions in financial instruments other than shares, sovereign debt and sovereign credit default swaps and to prohibit or impose conditions on entering into a short sale or equivalent transaction. In exceptional circumstances, ESMA can also decide to intervene directly' (AFM, 2015).

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11. APPENDIX

Appendix 1. Descriptive Statistics of the Newly Created Variables

Descriptive Statistics

Model	Variable	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
1 (no lag)	SP Change (in %)	7	0,00	0,61	0,087	0,231	2,646	1,587
	Positive MC Change	7	-1,33	-0,24	-0,486	0,381	-2,414	1,587
	SP Change (in %)	538	-5,27	2,87	-0,013	0,497	-2,067	0,210
	No MC Change	538	0,00	0,00	0,000	0,000	-	-
	SP Change (in %)	6	-0,54	0,00	-0,177	0,274	-0,971	1,741
	Negative MC Change	6	0,33	1,33	0,567	0,388	2,074	1,741
2 (1 lag)	SP Change (in %)	8	-0,61	0,00	-0,115	0,228	-1,934	1,481
	Positive MC Change	8	-1,33	-0,24	-0,489	0,353	-2,446	1,481
	SP Change (in %)	537	-5,27	2,87	-0,013	0,498	-2,062	0,210
	No MC Change	537	0,00	0,00	0,000	0,000	0,000	-
	SP Change (in %)	6	0,00	0,61	0,102	0,249	2,449	1,741
	Negative MC Change	6	0,33	1,33	0,567	0,388	2,074	1,741
3 (2 lags)	SP Change (in %)	8	0,00	0,74	0,093	0,262	2,828	1,481
	Positive MC Change	8	-1,33	-0,24	-0,489	0,353	-2,446	1,481
	SP Change (in %)	536	-5,27	2,87	-0,015	0,497	-2,069	0,211
	No MC Change	536	0,00	0,00	0,000	0,000	-	-
	SP Change (in %)	7	-0,61	0,52	-0,057	0,345	0,044	1,587
	Negative MC Change	7	0,33	1,33	0,559	0,355	2,204	1,587
4 (3 lags)	SP Change (in %)	8	-1,33	0,52	-0,101	0,529	-2,073	1,481
	Positive MC Change	8	-1,33	-0,24	-0,489	0,353	-2,446	1,481
	SP Change (in %)	536	-5,27	2,87	-0,014	0,494	-2,088	0,211
	No MC Change	536	0,00	0,00	0,000	0,000	-	-
	SP Change (in %)	7	-0,52	0,74	0,109	0,414	0,259	1,587
	Negative MC Change	7	0,33	1,33	0,559	0,355	2,204	1,587
5 (4 lags)	SP Change (in %)	8	-0,52	0,54	0,068	0,337	-0,031	1,481
	Positive MC Change	8	-1,33	-0,24	-0,489	0,353	-2,446	1,481
	SP Change (in %)	536	-5,27	2,87	-0,012	0,494	-2,085	0,211
	No MC Change	536	0,00	0,00	0,000	0,000	-	-
	SP Change (in %)	7	-1,33	0,00	-0,267	0,510	-1,979	1,587
	Negative MC Change	7	0,33	1,33	0,559	0,355	2,204	1,587
6 (5 lags)	SP Change (in %)	8	-0,54	0,00	-0,133	0,245	-1,442	1,481
	Positive MC Change	8	-1,33	-0,24	-0,489	0,353	-2,446	1,481
	SP Change (in %)	536	-5,27	2,87	-0,013	0,498	-2,063	0,211
	No MC Change	536	0,00	0,00	0,000	0,000	-	-
	SP Change (in %)	7	0,00	0,61	0,087	0,231	2,646	1,587
	Negative MC Change	7	0,33	1,33	0,559	0,355	2,204	1,587
Valid N (listwise)		6						

Appendix 2. Regression Analyses

If the regression analyses are to confirm that there is a relationship between the net amount of short positions and the sentiment conveyed in the media it is expected that the regression analyses find statistically significant correlations between the dependent and at least one of the independent variables. The regression analyses are performed using SPSS.

In a first step, the variables of the regression model were checked for heteroscedasticity and the independence of standardized residuals. The results show no evidence of either heteroscedasticity or homoscedasticity, but the residuals are normally distributed. The P-P-Plots though show deviations between the suggested lines and the observed residuals confirming that the variables are indeed not suited for regression analyses. Moreover, the results of the multiple regressions (including the control variable Size_Change (in %)) show a negative autocorrelation in the residuals. The mean Durbin-Watson statistic = 2.570. In a second step, the test of the models using ANOVA was performed. This resulted in statistically insignificant F-values ranging from 0.557 to 0.952. The respective p-values range from 0.387 to 0.573. The mean F-value = 0.791 and the mean p-value = 0.459. The unstandardized beta weights show the strongest correlation of the dependent variable with the independent variable MC_Change (3 lags) = 0.231. Nevertheless, is also that correlation not statistically significant (p-value = 0.354). All in all, the models have no predictive qualities. The adjusted R-square statistics range from -0.002 to 0.000; with a mean adjusted R-square statistic of -0.001. The results of all regression analyses can be found in the Coefficients table (see table 1 below).

According to the results of the multiple regression analyses the hypothesis formulated in the beginning of this research paper, that there is a relationship between the amount of net short positions and the sentiment conveyed in the media is, thus, to be rejected. There is no statistically significant evidence that there is a relationship between the dependent variable and any of the independent variables.

To validate the previous results another multiple regression analysis including all independent variables as well as the control variable Size Change (in %) was performed. The results remain statistically insignificant even though the predictability of the model improved (adjusted R-Square = 0.005; Durbin-Watson = 2.565; ANOVA = 0.624 with a p-value of 0.736). Interestingly, the inclusion of all independent variables into the model led to noticeable increases in the unstandardized beta weights of the independent variables MC_Change and MC_Change (4 lags). The unstandardized beta weight of MC_Change increased from -0.193 to -0.381 and the unstandardized beta weight of MC_Change (4 lags) increased from -0.214 to -0.387. At the same time decreased the unstandardized beta weight of the independent variable MC_Change (3 lags) from 0.213 to 0.110. From the two independent variables MC_Change and MC_Change (4 lags), MC_Change is the better predictor variable. Although MC_Change shows a lower unstandardized beta weight of -0.381 it shows a lower standard error (0.291 vs. 0.365) and a more narrow 95 percent confidence interval of its beta weight (-0.952 – 0.190 vs. -1.105 – 0.331) in comparison to the independent variable MC_Change (4 lags).

In a last step were the results tested for their robustness using the three dummy variables: (1) No Sentiment Change (2) Positive Sentiment Change and (3) Negative Sentiment Change. Based on those results it can be concluded that the previous test results are indeed robust. The results remain statistically insignificant. This confirms that there is no relationship between the sentiment conveyed in the media and the amount of net short positions in the Netherlands and that the hypothesis formulated in the beginning of this research paper is to be rejected.

Table 1. Coefficients Regression Analyses

Coefficients

	Multiple Regression Analyses							Tests for Robustness		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Dummy 1	Dummy 2	Dummy 3
MC_Change	-0,193 (0,382)						-0,381 (0,191)			
MC_Change (1 lag)		0,096 (0,657)					-0,121 (0,721)			
MC_Change (2 lags)			-0,169 (0,415)				-0,164 (0,637)			
MC_Change (3 lags)				0,231 (0,354)			0,110 (0,756)			
MC_Change (4 lags)					-0,214 (0,409)		-0,387 (0,290)			
MC_Change (5 lags)						0,058 (0,786)	-0,158 (0,593)			
Size_Change (in %)	0,018 (0,321)	0,019 (0,304)	0,019 (0,292)	0,020 (0,279)	0,018 (0,305)	0,018 (0,313)	0,019 (0,292)			
No MC Change										
Positive MC Change								0,100 (0,593)		
Negative MC Change								-0,164 (0,419)	-0,264 (0,337)	
Adj. R^2	0,000	-0,001	-0,001	0,000	-0,001	-0,002	0,005	0,002	0,002	0,002
No. Of Obs.	512	512	512	512	512	512	512	551	551	551

* Dependent Variabel SP_Change (in %)

Appendix 3. Amounts of Quarterly Short Sell Notifications since Q4 2012