How do corporate earnings announcements influence short selling in the Netherlands?

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ABSTRACT

This paper researches the relationship between short selling prior to corporate earnings announcements and stock returns after the corporate earnings announcements in the Netherlands. The dataset consists of 3419 observations of short sell transactions distributed over 31 companies, with in total 366 corporate earnings announcements in the years 2013, 2014 and 2015. The results show that short sellers tend to decrease their short position abnormally in the fifteen days prior to the corporate earnings announcement. The article, however, fails to support the assumption that short sellers are informed, as short selling prior to the corporate earnings announcement is not able to explain the return after the corporate earnings announcement. The article, however, was able to find a significant influence of the return five days prior to the earnings announcement and the availability of put options on the level of abnormal short selling. At last, the aggregated net short position is found to have a significant negative influence on the return after the corporate earnings announcement.

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Keywords

Short selling, Investment, Informed short selling, Uninformed short selling, Corporate earnings announcement, Investor behaviour, Net short position, The Netherlands, Stock market

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1. INTRODUCTION

Short selling is known as a controversial investment product. The last decade it gained an increasing amount of attention due to the believed impact it had during the economic crisis that started in 2008. Recently it came back in the news when the movie, The Big Short, was nominated for an Oscar. The movie, based on a true story, is focused on the time period right before the start of the economic crisis of 2008, where a few investors made a bet against the housing market of the United States. The investors shorted on the housing market based on an analysis of subprime loans. Short sellers are often perceived to be unethical, because they profit from the losses of others, such as from families that could not pay their rent and lost their homes, as in the case of The Big Short. Short selling is motivated by the belief that a security's price is overvalued and, therefore, the price will decline.

Another reason for short selling to be a controversial investment product is its relationship to abnormal returns. Empirical studies suggest that short sellers are believed to be able to earn abnormal returns over their trades due to an information advantage (Desai et al. 2002; Boehmer, Jones, and Zhang 2008; Diether, Lee, and Werner 2008). These authors documented that the informed short sellers have value-relevant information that leads them to believe that a certain security is overpriced. By selling short on the over-valued security, short sellers help to correct overvaluation and increase the market efficiency. An informed short seller, however, can only benefit from its information advantage as long as it traded before the information is publicly known. After the information is known publicly, the information asymmetry is resolved and the security will reflect its true value again. The opposite, an uninformed short seller, does not have information that gives them to believe that a certain security is overvalued. Uninformed short selling can be, therefore, speculative, but there are also other reasons such as hedging, arbitrage or tax reasons.

A limited amount of research is done on the effect of news events, such as corporate earnings announcements, on short selling. The corporate earnings announcements of companies are encircled on many investors' calendars, as it is an interesting period to focus on. An earnings announcement is 'an official statement that gives details of a company's profit or loss for a particular period' (Cambridge Dictionaries Online, 2016). The earnings result of a company ultimately drives the value of the security. The corporate earnings announcement often results in a reaction in the stock's price as the information contained in the announcement becomes impounded into the stock price. The period before the earnings statement is, therefore, a moment for short sellers to reconsider their short positions by increasing or decreasing them, depending on whether the statement is believed to have a negative or positive price reaction. In such a scenario, informed investors can benefit from their information advantage as their investment can earn an abnormal return right after the corporate earnings announcement.

The focus of this research is the short selling activity prior to corporate earnings announcements and the price impact of short selling prior to corporate earnings announcement. The trading pattern around corporate earnings announcements will be compared with the trading pattern in times when no announcement is imminent. Researching the price impact of short selling in relation to corporate earnings announcement enables us to test the informativeness of short sellers.

A lack of research on the effects of short selling in relation to corporate earnings announcements, as well as the small amount of researchers including the Netherlands in their dataset could turn this research a valuable addition to previous work. Thence the research questions of the paper; *'How do corporate earnings announcements influence short selling in the Netherlands?'*

The rest of this paper is structured in the following way. In section 2 the existing literature will be reviewed and based on the current literature the hypotheses will be drawn. Section 3 will discuss the research methods in place to examine the proposed hypotheses. Section 4 will elaborate on the data retrieved to be implemented in the research models. Section 5 reviews the computed results of the research models. Finally, in section 6, the conclusions of this research will be discussed and complemented with the limitations of this research as well as the recommendations for further research and practice.

2. LITERATURE REVIEW & HYPOTHESIS

This section systematically reviews the existing literature on short selling, with in particular the literature focused on short selling around news events. Based on this literature review the hypotheses will be developed to test the research question.

2.1 Literature review

The considerable amount of research done on the topic of short selling raised some contradicting and controversial findings on the investment product and its investors. One of the controversial topics in short selling is the claim whether short sellers' trades are informed or uninformed. Several researchers investigated this issue in order to find evidence to prove the other side wrong. To name a few, Christophe et. al (2009) investigated the trading pattern of short sellers before downgrades, whereas Blau & Wade (2011) investigated the trading pattern around both downgrades and upgrades. Other researchers, such as Boehmer & Wu (2013) investigated the influence of short selling on the price discovery process. Diamond & Verrechia (1987), Aitken et al. (1998) and Desai et al. (2002) performed tests on the ability of short sellers to gain an abnormal return on their trade. Researches related to the topic of this paper are from Daske, Richardson & Tuna (2005) and Ferri et al. (2004), who both analyse the trading pattern of short sellers around significant news events. In the coming sections the literature on informed and uninformed short selling will be further elaborated on.

2.1.1 *Informed short selling*

The theory of informed short selling assumes that investors take a short position because they have value-relevant information that leads them to believe that a certain stock is overpriced. The value-relevant information could be gained in several ways. To begin with, Blau and Wade (2012) believed that investors are tipped. Another source, proposed by Engelberg (2010), is that informed investors gain their information advantage through superior processing of information provided by news events. For these reasons, the trades of short sellers are believed to be informative. For that reason, an unexpected increase in the amount of short positions could indicate that certain information is not incorporated in the stock price and, therefore, would lead to a decrease in the stock's return. The reason that short sellers are assumed to be informed was due to the associated costs and trading model of short selling, which made short selling not suitable as an investment product for liquidity traders. (Diamond and Verrechia, 1987). The fact that informed short sellers have value-relevant private information, makes them more willing to bear the costs associated with short selling.

2.1.1.1 *The price impact of short selling*

Several researchers examined the relationship between short positions and stock returns. The results of Desai et al. (2002), who performed empirical tests on stocks of the Nasdaq market, showed that the negative returns increase with the level of short selling. Aitken et al. (1998), in their research to the Australian market, find that short sales are negatively associated with stock returns, with in particular short sales near information events and

short sales made through market orders are associated with a larger stock price reaction. Senchack and Starks (1993) found that a more negative price reaction to short selling occurs when the change in unexpected short selling is larger.

Aitken et al. (1988) found that a trade-by-trade disclosure of short selling improves the market efficiency as short positions are rapidly incorporated into the stock price. The market desires transparency on short sales to increase price efficiency and to be able to impound relevant information into the stock prices. Boehmer and Wu (2013) show that short selling leads to more accurate prices and, therefore, short selling should not be restricted. At last, Beber and Pagano's (2013) research to the effects of the temporary bans of short selling in 30 countries, including the Netherlands, found that bans on short selling had a negative effect for liquidity and the price discovery process. These findings are in line with Marsh and Payne (2012), who describe the market quality with variables as trading activity, liquidity, efficiency and price discovery.

In contrast with previous researchers, Hsu and Ziff (2011) state that the public disclosure of individual net positions lead to negative effects of herding behaviour on the market, such as the decrease of market efficiency and a higher risk of disorderly markets. Evidence of herding in the stock market was found in the research of Choi and Sias (2009), who showed that herding of institutional investors on an industry level impacts the price of a stock, meaning that the most heavily purchased industries outperform other industries. This leads us to the stealth-trading hypothesis, developed by Barclay and Warner's (1993), suggesting that informed investors use medium-size trades in order not to alarm other investors and authorities. The hypothesis is similar to the idea of Kyle (1985), who state that investors rather makes a number of relative smaller trades than a single large trade in order to disguise the fact that a trader is informed.

2.1.1.2 *Short selling around news events*

Some researchers also examined the short selling activity around news events. For instance, Christophe and Hsieh (2010) analysed the short selling activity prior to analyst downgrades. The research showed that short selling activity is abnormal high prior to analyst downgrades. This could be the result of private information that investors got by being tipped by analysts. Blau (2014) included in its research also short selling activity prior to analyst upgrades. If short sellers are informed, it would be expected to find an abnormal low short selling activity prior to upgrades. The research, however, showed a significantly increase in short selling prior to analyst downgrades, as well as analyst upgrades. For that reason, Blau (2014) noted that short selling is more likely to be speculative than informed.

Engelberg (2010) states that there is little evidence to support the claim that the information advantage of short sellers comes from trading before information is released, although short sellers have been shown to trade before the release of certain types of public information. The result of the research, which combines a database of short sellers' trading patterns with a database of news releases, shows that short sellers' trading advantage comes from their ability to analyse publicly available information. This is in contrast with a number of papers argue that news reduces the information asymmetry between informed and uninformed traders and, therefore, are less profitable trades than before a news event. However, Miller (1977) introduced the concept of divergence of opinion in the market. The divergence of opinion states that not all investors will make the same estimate of the risk, return and consequently the price of a stock that they are willing to pay for. Public news events, therefore, are profitable trading moments as it can lead to differential interpretations by traders based on the traders' skill.

Previous research in stock return predictability from financial statement analysis suggest that returns are concentrated around subsequent earnings announcements (Skinner and Sloan, 2002). For that reason, it is assumed that informed short sellers time their trading activity to coincide with earnings announcements. If short sellers are informed traders, an increase in short positions should occur before a negative earnings surprise and a decrease in short should occur before a positive earnings surprise. If investors are uninformed, trading activity should be uniformly dispersed across positive, neutral and negative earnings surprises. Christophe et al. (2004) examines short-sales transactions in the five days prior to earnings announcements. The results provide evidence of informed trading, as they show that abnormal pre-announcement short selling is significantly linked to post-announcement stock returns. In addition to that, the test indicates that short sellers are more active in stocks with low-to-market valuations or low standardized unexpected earnings (SUE). On the opposite, the research of Daske et al. (2005) finds an increase around the time of significant news events, but does not find evidence that short sale activity is concentrated around bad news events and, therefore, is rejecting the assumption that short sellers are informed.

2.1.2. Uninformed short selling

The theory of uninformed short selling assumes that investors do not have specific information that gives them a reason to believe that the price of a certain stock will drop. Uninformed short selling could be purely speculative, as an investor guesses that a certain stock price will drop. The literature of short selling, however, discusses several other reasons for investors to consider a short position on a company. For instance, short selling is often used for hedging to lower the risk of the total investment of an investor. The availability of derivatives is an important indicator in the degree of informed or uninformed short selling. In addition to that, short selling is also used to make an arbitrage profit and to delay taxes to the next financial year. The research of Diamond and Verrechia (1987) showed that there is a positive relationship between the costs of short selling and the amount of informed trades. The result indicates that the lower the costs of short selling are, the more uninformed short selling will be.

Derivatives are financial instruments that derive value from an underlying asset. The availability of several derivatives, such as options, futures or forward, can be used as alternatives for short positions. Diamond and Verrechia (1987) identify options as a way to reduce short selling costs. Figlewski and Webb (1993) show that the availability of options reduces the impact of short sales on excess stock returns. In addition to that, the research also shows that the availability of options increases the information efficiency of the market in terms of bad news. Aitken et al. (1998) show that short trades in optioned stock are often not informed, as it is used for hedging or arbitraging purposes. At last, Christophe et. al (2004) note that the availability of put options provides investors with a direct alternative to short selling and, therefore, short-selling around corporate earnings announcements is expected be lower for firms with put options available. The potential losses for short selling are unlimited, where a put option is less risky as the potential loss of a put option is limited to the premium paid for the put option. Short selling, however, is more profitable and therefore believed to be preferred by informed short sellers, where put options is a less risky alternative believed to be used by uninformed short sellers.

A second reason for considering uninformed short selling is to make an arbitrage profit. An arbitrageur using short selling in a certain security is not trading on private information, but uses it to exploit price inconsistencies. For that reason, Senchack and Stark (1993) assume that short selling part of arbitrage trading

will not cause a price reaction of the security, as it is believed to be uninformed. At last, tax-related short selling can be considered to be used in order to delay the recognition of a capital gain or a loss to the following year (Brent, Morse and Stice, 1990). Furthermore, the results identify that shareholders are more likely to use tax-related short selling when it is invested in a security which is more volatile and, therefore, poses more risk to the investor. However, there is only a weak tendency to go short with the purpose of delaying taxes to the next accounting year. Conrad (1994) shows that there is a smaller price reaction of short selling at the end of the financial years.

2.2 Hypotheses

As described in the literature review, there are two views on short selling: informed and uninformed short selling. In the research of Christophe et. al (2004) it is assumed that, if short-sellers engage in informed trading, investors will use the corporate earnings announcement to earn abnormal returns. The information advantage of informed short sellers can disappear due to the information disclosed in the corporate earnings announcements. Hence, it is expected that investors trade before the corporate earnings announcement. The following hypotheses will be formulated to examine the trading pattern of shorting positions in relation with corporate earnings announcements. The first hypothesis is established in order to show that there is an actual difference between the trading pattern before corporate earnings announcements and the trading pattern in times when no announcement is imminent. This should show that short sellers make use of corporate earnings announcements to trade on.

H_1: In the Netherlands, there is a higher trading activity of short selling in the time period before the corporate earnings announcements than in the time period of non-announcement.

If short sellers are informed investors, we would expect to see a significant relationship between the stock price reaction after a corporate earnings announcement and the amount of short positions increased/decreased before a corporate earnings announcement. We would expect short sellers to have no short position or decreased their short position on that certain stock before the positive corporate earnings announcement. On the opposite, after a negative earnings surprise the stock price will decline and, therefore, we would expect short sellers to increase their short position on that certain stock in order to earn an abnormal return. The second hypothesis focuses on the short selling behaviour in relation to the stock price reaction caused by the corporate earnings announcements.

H_2: In the Netherlands, there is a negative relationship between the change in the short level interest in the time prior to the corporate earnings announcement and the stock price reaction after the corporate earnings announcement.

The third hypothesis is related to the informativeness of short sellers. The third hypothesis focuses on the ability of the short sellers to forecast a negative or positive earnings surprise. If short sellers are informed, we would expect the change in short positions days prior to the corporate earnings announcement to have a negative relationship with the stock price reaction in the period after the corporate earnings announcements. In this case scenario, the increase of short positions in the days prior to the corporate earnings announcement are believed to result in a negative earnings surprise. The third hypothesis, therefore, researches the aggregated level of net short position prior to the corporate earnings announcement and the stock price reaction after the corporate earnings announcement.

H_3: In the Netherlands, there is a negative relationship between the stock price reaction after a corporate earnings announcement and the change of the aggregated short interest level in the days prior to the corporate earnings announcement.

3. RESEARCH METHOD

In this section, the model used in this research method will be developed. The second part of this section consists of an elaboration of the variables used in the model.

3.1 Research Model

In order to test the hypotheses, regression models similar to those developed by Christophe et. al (2004) are used to examine the relationship between short selling and corporate earnings announcements. The first model examines whether short sellers specifically target corporate earnings announcements and engage in an unusual amount of short selling. The first hypothesis examines the trading activity of short sellers prior to the corporate earnings announcement, with an interval of -5 trading days to 0, the day of the announcement. A positive outcome above the value of 1 means that short sellers increased their short position abnormally, whereas a negative value below -1 means that short sellers decreased their abnormally.

$$ABSS(-5,0)_i = \frac{SS(-5,0)_i}{AVESS(-5)_i}$$

In this analysis, abnormal short selling is defined as the ratio between (1) the average short selling of the five days before the corporate earnings announcement, $SS(-5,0)_i$, and (2) the average amount of daily short selling in the period of non-announcement, $AVESS(-5)i$. The dependent variable, $ABSS(-5,0)_i$ is the average of stock *i*'s amount of daily abnormal net short selling during the five days prior the corporate earnings announcement. The variable $SS(-5,0)_i$ represents the daily average amount of short selling of stock *i* during the five days prior to the earnings announcement, and $AVESS(-5)_i$ is the average amount of shares sold of change in the firm's short interest during the non-announcement period. The time period of non-announcement is defined as the period of days between the first corporate earnings announcement in the dataset of stock *i* and the last corporate earnings announcement of the dataset of stock *i*, excluding the time period before the corporate earnings announcement. This is assumed to give a fair representation of a firm's typical daily level of short selling.

The second model is developed to test whether the stock price return after the corporate earnings announcement is related to abnormal short selling prior to the corporate earnings announcement.

$$ABSS(-5,0)_i = \alpha 0 + \beta 1 RET(0,1)_i + \beta 2 RET(-5,0)_i + \beta 3 PUTOPTION_i + \varepsilon_i$$

In this model $ABSS(-5,0)_i$ is the average abnormal net short selling of stock *i* during the five days prior to the corporate earnings announcement, as registered in the Short Selling Register of the Authority for Financial Markets in the Netherlands. The variable $RET(0,1)_i$ is the return on stock *i* from the closing price of the day before the corporate earnings announcement to the opening price after the corporate earnings announcement. $RET(0,1)_i$ serves as a proxy for the earnings surprise, positive or negative, contained in the corporate earnings announcement. The variable $RET(-5,0)_i$ is the return on stock *i* from the opening prices of day -5 to 0, which is the closing price of stock *i* before the corporate earnings announcement. $RET(-5,0)_i$ represents the movement of the stock price during the five days prior to the announcement and serves as a control variable for the possibility that upward or downward changes in the stock price might affect the level of short-selling in the days leading up to the announcement. The difference between this model and the model of Christophe et. al (2004) is the addition of the variable

PUTOPTION$_i$, which is added to the model as a control variable to control for the effect of existence of put options for stock *i*, as put options provide investors with a direct alternative (Christophe et. al, 2004).

The intercept is α0, β1 is the coefficient of the variable *RET(0,1)*$_i$, β2 is the coefficient of the variable *RET(-5,0)*$_i$, β3 is the coefficient of the variable *PUTOPTION*$_i$ and ε represents the model errors. The coefficient of variable *RET(0,1)*$_i$ will be expected to take on a negative value, as it is assumed that the lower the earnings surprise is, the higher the abnormal net short selling is during the five days prior to the corporate earnings announcement. In order to test the hypothesis, a statistically significant and negative β1 would mean that short-selling regularly rises prior to a disappointing earnings reports and falls before announcements that lift the prices of the stock. A nonnegative β1 would fail to affirm the hypothesis of informed trading. The variable *RET(-5,0)*$_i$ might affect the level of short selling in the days leading up to the announcement. A pre-announcement increase in stock price, for example, might affect short-selling by inducing some investors to short the now 'over-valued' stock. The variable *PUTOPTION*$_i$ will be expected to have a negative value, as the availability of put options provides investors with a direct alternative to short selling and, therefore, short-selling around corporate earnings announcements might be lower for firms with put options available.

A third model is developed to test the informativeness of short sellers. The third model is developed to test whether the aggregated level of short interest in stock *i* and the changes in short interest in stock *i* in the days prior to the corporate earnings announcement is related to the stock return of stock *i* of the day after the corporate earnings announcement. This model is a combination of the model proposed of Aitken et al. (1998) to measure abnormal return and the model proposed by Christophe et al. (2004) to measure the impact of short selling on corporate earnings announcement.

$$RET(0,1)_i = \alpha 0 + \beta 1 ABSS(-5,0)_i + \beta 2(SHORT)_i + \beta 3 RET(-5,0)_i + \beta 4(PUTOPTION)_i + \varepsilon_i$$

One new variable is added to this research. The variable SHORT*i*, with the coefficient β2, measures the aggregated level of short interest at the moment of the earnings announcement and serves as a control variable. The variable is believed to have a negative relationship with the dependent variable, as the higher the aggregated level of short interest, the more pessimistic view short sellers will have of the stock and, therefore, the lower the return will be after the corporate earnings announcement.

The coefficient of variable ABSS(-5,0)$_i$, is believed to have a negative relationship with the dependent variable RET(0,1)$_i$, as an increase in short positions in the days prior to a corporate earnings announcement can be perceived as a bearish signal about the upcoming corporate earnings announcement. The variable RET(-5,0)$_i$ serves as a control variable, that controls for the impact of the price movement prior to the corporate earnings announcements and the general view of the expectations of the investors about upcoming results. The second control variable, PUTOPTION$_i$, controls for the impact of options, as it is believed that the availability of put options reduces the effect of the variable ABSS(-5,0)$_i$ on the independent variable RET(0,1)$_i$.

3.2 Variables

3.2.1 *Dependent variables*

The dependent variable is the variable being tested during this research. The dependent variable in model 1 is ABSS(-5,0)$_i$, which expresses the short selling activity, and in model 2 RET(0,1)$_i$, which expresses the return of the stock the moment after the corporate after the corporate earnings announcement.

3.2.1.1 *Abnormal short Selling*

The variable, abnormal short selling, is expressed as a ratio of short selling activity in the five days prior to the corporate earnings announcement. The short selling activity is expressed in changes in net short positions, which are short positions expressed as a percentage of the total issued share capital of a particular company. The measure is similar to that of Christophe et. al (2004), who divide the short selling activity of the five days prior to the corporate earnings announcement by the average short selling activity outside this period.

The difference between the researches is that Christophe et. al (2004) uses daily short trading data, whereas this research uses daily changes in net short positions provided by the Authority for Financial Markets in the Netherlands. In addition, the research of Christophe et. al (2004) focuses on firms listed on the Nasdaq, whereas this research focuses on firms listed on the Euronext Amsterdam, as it is related to the Dutch short selling behaviour.

3.2.1.2 *Return corporate earnings announcement*

The variable *RET(0,1)*$_i$ shows the reaction of the market on the corporate earnings announcement. A negative *RET(0,1)*$_i$ means that the market viewed the corporate earnings announcement as unfavourable, whereas a positive return on *RET(0,1)*$_i$ viewed the corporate earnings announcement as favourable. The return of corporate earnings announcement is a continuous variable, that can take any value in percentages. The historical stock price of t=0 is the closing price before the earnings announcement, whereas t=1 is the opening price after the corporate earnings announcement. The difference between these stock prices is expressed in percentages. The return is adjusted for dividend.

3.2.1.3 *Alternative measures of abnormal short selling*

The period adopted in the research model takes into account, as suggested by Christophe et. al (2004), a period of 5 days of short selling prior to the corporate earnings announcement. It is also interesting to check for several other periods, considering the stealth-trade hypothesis of Barclay and Warner(2013). For instance, short sellers might take a short position sooner than 5 days prior to the corporate earnings announcement. Hence, a period of fifteen days prior to the corporate earnings announcement is added to the analysis(-15,0). the period of non-announcement, AVESS(-15)$_i$, decreased due to including more days in the variable SS. This period is derived from the research of Aitken et. al (1998) and Senchack and Starks (1993).

$$ABSS(-15,0)_i = \frac{SS(-15,0)_i}{AVESS(-15)_i}$$

The variable *RET(0,1)*$_i$ might be a bit short to calculate the return of a short sell prior to the corporate earnings announcement, since the market might take some more time for the market to impound the information provided in the corporate earnings announcement in a stock price reflecting the true value. Thence, the period (0,5) is used as an alternative to measure the relationship between short selling prior to the corporate earnings announcement and the return of stock *i* in the period (0,5).

3.2.2 *Independent variable*

The independent variable determines the dependent variable. In the models two independent variables appear. The first one, RET(0,1)$_i$, measures the return of stock *i* after the corporate earnings announcement and the second, ABSS(-5,0)$_i$, measures the abnormal short selling in the five days prior to the corporate earnings announcement.

3.2.2.1 *Return of corporate earnings announcement*

This variable is the same as the dependent variable, but should be interpreted differently. In this case, the variable of *RET(0,1)*$_i$ identifies whether short sale transactions precede earnings surprises contained in the corporate earnings announcement.

An alternative to measure the judgement of the achieved results of a company is to focus on the wording of the earnings report. However, this is not seen as an accurate method to measure the judgement of the investors. Earnings results can be bad, but still can be perceived as a positive earnings surprise if the losses are less than previously expected. An analysis based on wording cannot take this into account. In addition, companies will benefit from a high stock price and choose their wording very careful to palliate their results and is, therefore, not a reliable source.

3.2.2.2 *Abnormal short selling*

The variable, ABSS(-5,0)$_i$, represents the change in short positions in the five days prior to the corporate earnings announcement. in stock *i*. The changes in short positions are derived from the Short Selling Register of the Authority of Financial Markets of the Netherlands. The variable will take on a negative value when investors decrease their short positions in the period(-5,0)$_i$ and a positive value when investors increase their short positions in the period(-5,0)$_i$. The variable is believed to have a negative relationship with the dependent variable RET(0,1)$_i$. An increase in short positions in the five days prior to the corporate earnings announcement could mean that the investor believes the earnings will not reflect the true value of the share and a price correction will appear after the results are made public. The investor, in this case, believes there will be a negative earnings surprise. On the opposite, a decrease of short positions in the five days prior to the corporate earnings announcement could mean that the short seller believes that the company will have good news contained in the corporate earnings announcement and, therefore, the price of the stock will rise.

3.2.3 *Control variable*

In addition to the dependent and independent variables, three control variables are added based on prior literature. The first control variable relates to the return of stock *i* prior to the corporate earnings announcement, the second controls whether put options are available and the third controls for the impact of the aggregated level of short interest.

3.2.3.1 *Return prior to corporate earnings announcement*

The first control variable is RET(-5,0)$_i$ and represents the movement of the stock price during the five days prior to the announcement. The variable controls for the possibility that a stock price movement of stock *i* might affect the level of short selling in the days leading up to the corporate earnings announcement. For instance, a pre-announcement increase in stock price might induce some investors to take a short position on the now 'over-valued' stock. With the control variable in place, the model does not wrongly attribute pre-announcement short-selling to expectations regarding the earnings release.

3.2.3.2 *Put Option*

The second control variable is the availability of put options. A put option is an option contract that gives the owner the right to sell a specified amount of an underlying stock at a specified price within a specified time. Christophe et. al (2004) noted that short-selling around corporate earnings announcements might be lower for firms with put options available than for the others. Due to the associated costs, it is assumed that taking a short position on a stock with put options available is more likely to be informed. (Diamond & Verecchia, 1987).

3.2.3.3 *Aggregated level of Short Interest*

At last, the aggregated level of short interest is the last control variable. The aggregated level of short interest is derived from the Short Sell Register from the Authority of Financial Markets of the Netherlands. The aggregated level of short interest is the aggregated amount of short positions of all investors in stock *i*, which results a number between 0% and 100%.

4. DATA

This first section includes an elaboration on the process of the collection and preparation of the data. In addition, the second section provides descriptive statistics of the dataset.

4.1 Sample

The focus of this study on the Netherlands is realised by an analysis of the Dutch listed firms on the Euronext Amsterdam. The study investigates the short selling activity around the corporate earnings announcements of the corporate years 2013, 2014 and 2015. The short selling activity is measured by the changes of the net short positions registered by the Authority of Financial Markets (AFM). AFM is responsible for the publication of the net short positions through the Short Selling Register. The net short position is expressed as a percentage of the total issued share capital of a particular company. The net short selling position covers the shares that an investor holds short in a company subtracted by the shares which the same investor holds long in that company.

From November 2012 onward, European regulation obligates parties (natural and legal persons) to report any significant short position in Dutch stock market (Regulation (EU) Nr. 236/2012, Article 6). The regulation requires mandatory reporting of net short positions to the authorities when the position equal 0.2% of the company issued share capital, and the positions are published when they reach the threshold of 0.5%. The short sellers need to report any change in their net short positions of 0,1% or more. If the net short position falls below the publication threshold, the net short position of the short sellers will not be longer reported until it reaches the threshold again.

The dataset contains 3419 short selling transactions and 366 corporate earnings announcements distributed over 31 companies. The dataset contains a few adaptions. The foreign companies listed on the Euronext Amsterdam are removed from the dataset to remain the focus on the Netherlands. In addition, the dataset contains companies with at least 5 short position announcements. Corio N.V. is removed from the dataset, as it was taken over by Klépierre S.A. in July 2014. SNS Reaal N.V. is removed as it is nationalised in February 2013. Data not contained in the short sell register of the Authority of Financial Markets, such as corporate earnings announcement dates and stock prices, is retrieved from Yahoo! Finance.

4.2 Descriptive Statistics

Table 1, 2 and 3 provide the descriptive statistics for the proposed dependent, independent and the control variables. Table 1 includes all 366 corporate earnings announcements. Table 2 presents the data after excluding outliers and all events with no short selling activity in the five days prior to the corporate earnings announcement. A total of 291 events have a value of 0 in SS(-5,0), meaning that 75 events remain in table 2. some short selling activity takes place. Table 3 presents the data after excluding all events where no short selling activity was observed in the fifteen days prior to the corporate earnings announcement. This table consists of a total of 122 events. The descriptive statistics seems to take on logical values. Based on this information it cannot be stated that short sellers make particularly use of corporate earnings announcements, it rather seems that short sellers are very selective in their trading.

The mean of ABSS takes on a negative value, meaning that short sellers tend to decrease their short positions prior to a corporate earnings announcement. The mean and median of RET(0,1) is positive in table 1, meaning that in general there tend to be more positive earnings surprises. In contrast, table 2 takes on a negative mean, whereas it has a positive median. Meaning that the dataset contains more positive earnings surprises, but due to

the large negative earnings surprises the mean is negative. This could mean, for instance, that negative abnormal short selling in the five days prior to the earnings corporate earnings announcement causes considerable negative returns. Table 3, however, shows a positive mean again. This could mean that short selling in the period of fifteen days before the corporate earnings announcement have a smaller influence on the return in the period (0,1). The variable RET(0,5) takes on negative values in all tables, meaning that on average stock tend to decline in price the period of 5 days after a corporate earnings announcement. At last, the variables AVESS takes a significantly bigger value in table 2 and 3 compared to table 1, meaning that short-selling around corporate earnings announcements mainly takes place at stocks with overall high short selling activity rather than stock with only a few short positions announcements.

Table 1 has, as expected, bigger standard deviations for the variables related to short positions and short selling, as in table 2 and 3 the exclusion of outliers reduced the standard deviations. The variables concerning the return, prior and after the corporate earnings announcement, also seem to suffer from bigger standard deviations. It could be that the short selling activity around the corporate earnings announcements causes a more volatile stock price movement.

Put options were available in 80,3% of the total amount of corporate earnings announcements. The amount of optioned stock shows a similar value as that of Aitken (1998) and Christophe (2004), who found a value of respectively 76% and 73% of the stocks in the sample have options available. Tables 2 & 3, however, show a value of 88% and 89,8%, which is remarkable as it would be expected that there is less short selling in stocks with put options available as an alternative derivative.

5. RESULTS

This section discusses the results of the regression models. The results should be able to tell us more about the economic and statistical significance of the models. A regression analysis will be complemented with a measure of model fitness, model significance and the parameter significance. The results consist of two subchapters, each for one of the hypothesis. The first discusses the results of the regression models explaining the variable ABSS and, the second, discusses the results of the regression models explaining the variable RET.

5.1 Abnormal short selling

This section discusses the results of the tables 4, 5 and 6 of the regression models concerning abnormal short selling for the period (-5,0) and the period (-15,0). The subchapter discusses the short selling prior to the corporate earnings announcement, the regression model computed with the dataset including all events and, at last, the regression model using the dataset that is checked for outliers and only include events with short selling activity

5.1.1 *Short selling prior to the corporate earnings announcement*

The results of table 3 show that short sellers do not tend to increase their short positions abnormally prior to the corporate earnings announcement. The one-tail t-test shows a value of 0.285, in the case of ABSS(-5,0), and 0.114, in the case of ABSS(-15), meaning that the value is not significantly, at the 0.05 level, different from the average amount of short selling in the non-announcement period.

The results of table 4, however, show that short sellers do tend to decrease their short positions fifteen days prior to the corporate earnings announcement. The one-tail t-test of the variable ABSS(-15) is statistically significant with a value of 0.000, meaning that short sellers decrease in the period ABSS(-15). The variable ABSS(-5) has a value of 0.058, meaning that it is not statistically significant at the 0.05 level. But as you can see, it is rather close to being statistically significant.

5.1.2 *All events*

This section discusses the results of the regression models associated to the dependent variable, abnormal short selling, for the periods (-5,0) and (-15,0) including all events.

5.1.2.1 *ABSS (-5,0)*

The coefficients of the independent variable RET are expected to have a negative relationship with the variable ABSS. The coefficients, however, produce non-significant values and even in an unexpected direction, namely positive values. RET(0,1), takes on a positive value of 0.790 in the period (-5,0) of ABSS, meaning that an increase of one percentage point in the return leads to an increase of 0.790 of ABSS, which has a mean of -8.85. The variable RET(0,5) takes on an expected negative value of -0.075.

The variable RET(-5,0) takes on a statistically significant negative value. The coefficients predict that an increase of one percentage point in return in RET(-5,0) would lead to a decrease of, respectively, 7.356 and 7.335 in ABSS(-5,0), which has a mean of -8.85. Both values are statistically significant at the 0,01 level. This observation is in contrast with the theory, as the theory suggests that an increase in return could trigger investors to sell short on the 'now' over-valued stock. At last, the variable $PUTOPTION_i$ also takes on an unexpected value. The availability of put options offers short sellers a direct investment alternative and, therefore, we would expect less short selling if put options are available. The coefficients, however, take on positive values of respectively, 32.375 and 32.269, meaning that the availability of put options would lead to an increase of abnormal short selling of 32.375 in case of RET(0,1) and an increase of 32.269 in case of RET(0,5). The results even give a statistically significant positive value to the 0.05 level.

5.1.2.2 *ABSS (-15,0)*

The variable RET(0,1) takes on a statistically significant value at the 0.05 level in the period (-15,0). However, this value is in the unexpected direction. With a value of 1.323, the model predicts that an increase of one percentage point in return in the period (0,1) would lead to an increase of 1.323 in ABSS(-15,0), which has a mean of -7.67. The variable RET(0,5) takes on a negative value, -0.014, in relation to the dependent variable ABSS(-15,0), as in ABSS(-5,0), but is far from statistically significant. The control variable RET(-5,0), of 1.640, in the case of RET(0,1) and 1.561, in the case of RET(0,5), take on similar significant levels as in ABSS(-5,0). The values of the variable $PUTOPTION_i$ are in contrast to the period (-5,0), not statistically significant.

5.1.3 *Events excluded*

This section discusses the results of the regression models associated to the dependent variable abnormal short selling for the periods (-5,0) and (-15,0) excluding the indicated events.

5.1.3.1 *ABSS (-5,0)*

The variable RET would have been expected to produce a significant result in the dataset with the excluded events. However, the model fails to produce significant coefficients for the variable RET(0,1) and RET(0,5), as it takes on the values of 0,859 and -0.121. These values are contradicting, as the first would suggest that an increase of one percentage point in the return in the period (0,1) would lead to an increase in abnormal short selling, whereas the latter suggests that an increase of one percentage point in return in the period (0,15) would lead to a decrease of 0.121 in abnormal short selling.

Table 1. Descriptive statistics including all events

Descriptive statistics of all relevant variables, with the variables in the rows and the descriptive statistics in the columns of 31 firms with 366 corporate earnings announcements.

Variables	N	#	Mean	Median	Std. Deviation	Maximum	Minimum
ABSS(-5)	31	366	-8.85	0.00	101.63	104.46	-1871.17
ABSS(-15)	31	366	-7.67	0.00	48.82	263.17	-462.22
AVESS(-5) in %	31	366	0.01062	0.00343	0.01750	0.10525	0.00040
AVESS(-15) in %	31	366	0.01087	0.00352	0.01914	0.11659	0.00034
Option	31	366	0.803	1	-	1	0
Return(-5,0) in %	31	366	0.373	0.242	4.127	23.929	-10.634
Return(0,1) in %	31	366	0.354	0.460	4.020	17.554	-17.266
Return(0,5) in %	31	366	-0.217	-0.261	9.338	40.087	-47.609
Net short position in %	31	366	0.96	0.000	1.76	10.02	0.00

Table 2. Descriptive Statistics, after excluding outliers and all events with no short selling activity in the period (-5,0) prior to the corporate earnings announcement.

Descriptive statistics of all relevant variables, with the variables in the rows and the descriptive statistics in the columns. After excluding events according to previously indicated requirements, 26 firms with in total 75 events remain in the dataset.

Variables	N	#	Mean	Median	Std. Deviation	Maximum	Minimum
ABSS(-5)	26	75	-18.26	-4.3236	60.70	104.46	-426.79
AVESS(-5) in %	26	75	0.02284	0.01671	0.02634	0.10525	0.00040
Option	26	75	0.880	1	-	1	0
Return(-5,0) in %	26	75	0.448	-0.169	5.364	19.561	-10.477
Return(0,1) in %	26	75	-0.261	0.223	4.163	10.454	-13.479
Return(0,5) in %	26	75	-0.463	-1.415	11.301	28.775	-47.609
Net short position in %	26	75	2.837	1.960	2.342	10.020	0.000

Table 3. Descriptive Statistics, after excluding outliers and all events with no short selling activity in the period (-15,0) prior to the corporate earnings announcement.

Descriptive statistics of all relevant variables, with the variables in the rows and the descriptive statistics in the columns. After excluding events according to previously indicated requirements, 30 firms with in total 118 events remain in the dataset.

Variables	N	#	Mean	Median	Std. Deviation	Maximum	Minimum
ABSS(-15)	30	118	-13.98	-5.25	48.38	145.50	-203.23
AVESS(-15) in %	30	118	0.02155	0.01225	0.02956	0.11659	0.00045
Option	30	118	0.898	1	-	1	0
Return(-5,0) in %	30	118	0.340	0.000	4.902	19.561	-10.577
Return(0,1) in %	30	118	0.029	0.024	4.287	14.241	-13.479
Return(0,5) in %	30	118	-0.180	-0.775	11.224	40.087	-47.609
Net short position in %	30	118	2.35	1.69	2.16	10.02	0.00

Table 4. One-sample t-test

A one-sample t-test with the test value of 1 is conducted in order to test the hypothesis that short sellers increase their short positions abnormally prior to a corporate earnings announcement. The t-test consists of 314 events, in the case of ABSS(-5), and 385 events, in the case of ABSS(-15). The dataset contains all events with a value of 0 or more.

	Test Value = **1**						
						90% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	**Sig. (1-tail)**	Mean Difference	Lower	Upper
ABSS(-5)	-.569	313	.570	.285	-.20624	-.8047	.3922
ABSS(-15)	-1.064	284	.228	.114	-.41357	-1.0552	.2281

Table 5. One-sample t-test

A one-sample t-test with the test value of -1 is conducted in order to test the hypothesis that short sellers decrease their short positions abnormally prior to a corporate earnings announcement. The t-test consists of 342 events, in the case of ABSS(-5), and 324 events, in the case of ABSS(-15). The dataset contains all events with a value of 0 or less.

	Test Value = **-1**						
						90% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	**Sig. (1-tail)**	Mean Difference	Lower	Upper
ABSS(-5)	-1.623	341	.105	.058	-9.20466	-18.5575	.1482
ABSS(-15)	-4.385	323	.000	.000	-11.39433	-15.6807	-7.1080

Table 6. Results for the dependent variable ABSS*i*

The table consists the results for the regression models explaining the values for ABSS*i* for the period (-5,0) and the period (-15,0). The table is divided in two parts, the first one for the regression models including all events, and the second part for the regression models including the sample where outliers and events with no short selling activities are excluded. The periods are represented in the columns and the rows show the values of each of the variables in the model. The first number in each cell indicates the coefficient in the regression model, while the values between brackets represents the results of the t-test. At the bottom, the R^2 value, the adjusted R^2 value and the F-statistic is provided for each model. The dataset contains of 31 companies, with in total 366 events.

	All events				**Events Excluded**			
	ABSS (-5,0)	ABSS (-15,0)	ABSS (-5,0)	ABSS (-15,0)	ABSS (-5,0)	ABSS (-15,0)	ABSS (-5,0)	ABSS (-15,0)
RET(0,1)	0.79	1.323**	-	-	0.859	0.223	-	-
	(0.627)	(2.101)	-	-	(0.514)	(0.211)	-	-
RET(0,5)	-	-	-0.075	-0.014	-	-	-0.121	0.053
	-	-	(-0.138)	(-0.051)	-	-	(-0.196)	(0.130)
RET(-5,0)	-7.356***	-1.64***	-7.335***	-1.561**	-0.995	-0.780	-0.990	-0.739
	(-5.997)	(-2.675)	(-5.976)	(-2.531)	(-0.767)	(-0.839)	(-0.76)	(-0.792)
PUTOPTION	32.375**	3.467	32.269**	3.680	56.521***	1.759	54.35**	1.827
	(2.549)	(0.546)	(2.536)	(0.576)	(2.648)	(0.117)	(2.553)	(0.122)
R^2	0.104	0.030	0.104	0.018	0.092	0.006	0.088	0.006
Adjusted R^2	0.097	0.022	0.096	0.01	0.054	-0.020	0.049	-0.021
F-Statistic	14.066***	3.764**	13.931***	2.235*	2.396*	0.242	2.259*	0.219
No. of Obs.	366	366	366	366	75	75	118	188

***** Significant at the 0.10 level
****** Significant at the 0.05 level
******* Significant at the 0.01 level

Table 7. Results for the dependent variable RET*i*

The results for the regression models explaining the values for RET*i* for the period (0,1) and the period (0,5). The table is divided in two parts, the first one for the regression models including all events, and the second part for the regression models including the sample where outliers and events with no short selling activities are excluded. The periods are represented in the columns and the rows show the values of each of the variables in the model. The first number in each cell indicates the coefficient in the regression model, while the values between brackets represent the results of the t-test. At the bottom, the R^2 value, the adjusted R^2 value and the F-statistic is provided for each model. The dataset contains of 31 companies, with in total 366 events.

	All events				**Events Excluded**			
	RET (0,1)	RET (0,5)	RET (0,1)	RET (0,5)	RET (0,1)	RET (0,5)	RET (0,1)	RET (0,5)
ABSS(-5)	0.001	-0.001	-	-	0.004	-0.001	-	-
	0.626)	(-0.140)	-	-	(0.519)	(-0.170)	-	-
ABSS(-15)	-	-	0.009**	-0.001	-	-	0.002	0.006
	-	-	(2.053)	(-0.084)	-	-	(0.280)	(0.269)
SHORT	- 0.215*	-0.300	-0.208*	-0.301	-0.021	-0.802	-0.129	-0.675
	(-1.798)	(-1.074)	(-1.746)	(-1.076)	(-0.097)	(-1.414)	(-0.689)	(-1.382)
RET(-5,0)	0.058	-0.026	0.062	-0.022	0.086	-0.211	0.065	-0.133
	(1.085)	(-0.208)	(1.212)	(-0.183)	(0.933)	(-0.852)	(0.789)	(-0.616)
PUTOPTION	0.076	-0.034	0.088	-0.054	-1.492	-0.893	-0.726	-0.363
	(0.886)	(-0.027)	(0.167)	(-0.044)	(-0.123)	(-0.214)	(-0.546)	(-0.105)
R^2	0.013	0.003	0.023	0.003	0.029	0.039	0.012	0.020
Adjusted R^2	0.002	-0.008	0.012	-0.008	-0.026	-0.016	-0.023	-0.015
F-Statistic	1.170	0.299	2.138*	0.296	0.528	0.708	0.347	0.568
No. of Obs.	366	366	366	366	75	75	118	188

***** Significant at the 0.10 level
****** Significant at the 0.05 level
******* Significant at the 0.01 level

The variable RET(-5,0), although still negative, has weaker coefficients compared to the dataset in which all events are included. The values of -0.995, in the case of RET(0,1), and -0.990, in the case of RET(0,5) are not statistically significant. The availability of put options, however, has statistically significant coefficients compared to the sample in which all events are included. The statistically significant values, meaning that the availability of put options would lead to an increase of 56.521, in the case of RET(0,1), and 54.350, in the case of RET(0,5), in ABSS(-5,0).

5.1.3.2 *ABSS (-15,0)*

The variable RET(0,1) and the variable RET(0,5) takes on a slightly positive value, meaning that the increase of one percentage point in the return in the period (0,1) and (0,5) would lead to an increase in abnormal short selling of 0.223 and 0.053. The return of the period (-5,0) produced non-significant negative values of -0.780 in the case of RET(0,1) and -0.739 in the case of RET(0,5). The variable PUTOPTION produced non-significant values of 1.759 and 1.827.

5.2 Return

This section discusses the results of table 7 of the regression models concerning the return after the corporate earnings announcement for the periods (0,1) and (0,5) will be discussed. This subchapter discusses the regression model computed with the dataset including all events and regression model computed with the dataset excluding outliers and events with no short sell activity prior to the corporate earnings announcement.

5.2.1 *All events*

This section discusses the results of the regression models associated to the dependent variable, the return after the corporate earnings announcement, for the period (-5,0) and the period (-15,0) with all events included in the dataset.

5.2.1.1 *RET (0,1)*

Two variables are particularly interesting to test whether they are able to explain the variable RET(0,1): The level of abnormal short selling prior to the corporate earnings announcement and, the second, the aggregated net short position at the day of the corporate earnings announcement. The variable, ABSS, would be expected to take on a negative value. However, ABSS(-15,0) takes on a statistically significant positive value at the 0,05 level, meaning that an increase of one percentage point in the variable ABSS(-15,0) would lead to an increase of 0,009 in RET(0,1), which as a mean of 0.354. The second variable, SHORT, takes on, as expected, negative values, meaning that an increase of one percentage point in the net short position would lead to a decrease of, respectively, 0,215, in the case of ABSS(-5), and 0,208, in the case of ABSS(-15,0), in RET(0,1), which has a mean of 0.009. Both coefficients are significant at the 0,10 level and, therefore, in line with the theory.

The control variables, RET(-5,0) and PUTOPTION, do not seem to have a significant impact on the dependent variable, RET(0,1). RET(-5,0) takes on slightly positive values, 0.058 in the case of ABSS(-5,0) and 0.062 in the case of ABSS(-15,0. The variable PUTOPTION takes on non-significant values of 0.076 and 0.088, meaning there is no reason to suggest that the availability of put options would lead to an increase in RET(0,1).

5.2.1.2 *RET (0,5)*

The independent variable ABSS is in line with the theory, as it takes on values of -0.001, in the case of ABSS(-5,0), and -0.001, in the case of ABSS(-15,0), meaning that an increase of one percentage point of ABSS(-5,0) and (-15,0) would lead to a decrease of 0.001 in the RET(0,5), which has a mean of -0.217. The second variable, the net short position, takes on expected negative values of -0.300 in the case of ABSS(-5,0) and -0.301 in the case of ABSS(-15,0). However, none of the values are statistically significant.

The control variables take on non-significant negative values. The variable RET(-5,0) takes on the values of -0.026, in the case of ABSS(-5,0), and -0.022, in the case of ABSS(-15,0). The variable PUTOPTION takes on negative values of -0.034, in the case of ABSS(-5,0), and -0.054, in the case of ABSS(-15,0).

5.2.2 *Events excluded*

In this section results of the regression models associated to dependent variable, return after the corporate earnings announcement, for the period (-5,0) and the period (-15,0) with excluded from the dataset will be discussed.

5.2.2.1 *RET (0,1)*

The values of 0.004 and 0.002, although not significant, suggests that the increase of abnormal short selling would lead to an increase in the return. The net short position shows negative values of -0.021, in the case of ABSS(-5,0), and -0,129, in the case of ABSS(-15,0), meaning that an increase of one percentage point in the net short position would lead to a decrease of 0.021 and 0.129 in the RET(0,1).

The control variable RET(-5,0) takes on positive values of 0.933, in the case of ABSS(-5,0), and 0.789, in the case of ABSS(-15,0), meaning that the return in period (-5,0) has a positive relationship with the return in the period (0,1). The variable PUTOPTION takes on the values -1.492, in the case of ABSS(-5,0), and -0.726, in the case of ABSS(-15,0), meaning that the availability of put options would lead to a decrease in return in the period (0,1).

5.2.2.2 *RET (0,5)*

The values of ABSS, -0.001 in the period(-5,0) and 0.006 in the period (-15,0) are close to zero and, therefore, by far not significant. The net short position takes on values of -0.802, in the case of ABSS(-5,0), and -0,675, in the case of ABSS(-15,0), meaning that an increase of one percentage point in the net short position would lead to a decrease of 0.802 and 0.675 in RET(0,5). These coefficients, although having a bigger value than in the period (0,1), are not significant.

The control variable RET(-5,0) takes on negative values of 0.933, in the case of ABSS(-5,0), and 0.789, in the case of ABSS(-15,0), which is in contrast with the coefficients of the dependent variable RET(0,1). The positive values mean that an increase of one percentage point in the return in period(-5,0) would lead to a decrease of the return in the period (0,5) of, respectively, 0.933 in ABSS(-5,0) and 0.789 in ABSS(-15,0). The variable PUTOPTION takes on the non-significant negative values of -0.893, in the case of ABSS(-5,0), and -0.363, in the case of ABSS(-15,0), meaning that the availability of put options would lead to a decrease in return in the period (0,1).

6. CONCLUSIONS

In this final section, the conclusions of the paper will be discussed. In addition, encountered limitations will be discussed and recommendations will be made for further research.

6.1 Conclusions

This paper focuses on the short selling behaviour in relation to corporate earnings announcement in the Netherlands. News events, such as corporate earnings announcements, are often not involved in the research of the practice short selling. The Netherlands was also not often included in research due to a lack of data. However, since new laws have been introduced by the Authority of Financial Markets regarding the publication of net short positions in 2012, the Netherlands is able to provide valuable data for research practices.

Corporate earnings announcements are identified as opportunities to earn a quick abnormal return, as ultimately the results of a company drive the value of the stock. Short sellers are assumed to be informed and, therefore, are expected to make use of their information advantage by earning abnormal returns at corporate earnings announcements. The data, however, shows that of the 291 corporate earnings announcement in only 75 events there was short selling activity in the period (-5,0) and 122 in the period (-15,0). The results show that short sellers tend to decrease their short positions abnormally in the period (-15,0). It could be that these were events in which the company would have published good results, but another explanation could be that short sellers tend to decrease their risk, as the information enclosed in the corporate earnings announcement is unknown.

This research follows a similar model of Christophe et. al (2004), who developed a multiple regression model to explain the level of abnormal short selling in the period (-5,0) or (-15,0) before the corporate earnings announcement. The dependent variable, ABSS, is measured by the independent variable RET(0,1) or RET(0,5), which is the return of the corporate earnings announcement after a certain period, and two control variables RET(-5,0), which represents the return five days prior to the corporate earnings announcement, and PUTOPTION, which states whether or not put options are available as alternative derivatives. A second model is introduced in order to measure the informativeness of investors. The theory suggests that short sellers have an information advantage and, therefore, are able to earn abnormal returns. The second regression model measures the dependent variable RET, which is the return of the period (0,1) and the period (0,5) after the corporate earnings announcement, by the independent variables ABSS, the independent variable SHORT, which is the net short position the moment before the corporate earnings announcement, and the control variables RET(-5,0) and PUTOPTION.

The results fail to support the assumption that the level of abnormal short selling can be explained by the return in the period(0,1). The model is able to generate one statistically significant value of 1.323 for the variable RET(0,1) to explain ABSS(-15,0) in the sample where all events are included. However, this is a positive value, meaning that an increase of one percentage point of the return in period(0,1) would lead to an increase in abnormal short selling in the period(-15,0). There are two possible explanations for this remarkable statistic. The first one could be that short sellers are uninformed and, therefore, the hypotheses would fail. The second possible explanation could be that short sellers tend to focus on the long term and, therefore, selling short the days prior to the corporate earnings is not done with the intention of benefitting from the information disclosed in the corporate earnings announcement.

Both control variables seem to take on significant values. The variable RET(-5,0) takes on statistically significant negative values, meaning that investors tend to decrease their short positions significantly if the stock price increases in the period (-5,0). This is in contrast with the theory suggesting that short sellers could sell short on the 'now' over-valued stock if the stock price increases. A reasonable explanation could be that short sellers tend to secure their profits or minimize their losses, since an increase of the stock price in the days running up to the corporate earnings announcement often means that companies were able to get better results than previously expected. The other control variable, PUTOPTION, generated remarkable values, since it produced significant positive values, while the theory suggests that put options offers investors a direct alternative to sell short and, therefore, should reduce abnormal short selling. Since there is no logical explanation, this remarkable result should be further investigated.

The second regression model measures whether the dependent variable RET could be explained by the independent variable ABSS and the variable SHORT. The variable ABSS produced one statistically significant positive value, meaning that an increase in abnormal short selling prior to the corporate earnings announcement would lead to an increase in the return after the corporate earnings announcement. Due to a positive value we are not able to reject the null hypothesis, meaning that short sellers seem not be informed or, as an alternative explanation, short sellers does not seem to focus on the corporate earnings announcement and anticipate on a long-term profit.

The second interesting independent variable, SHORT, generates negative values, of which two values are statistically significant, meaning that an increase in the aggregated net short position would lead to a decrease of the return after the corporate earnings announcement. The other control variables, RET(-5,0) and PUTOPTION, are in contrast with the previous regression model, not able to create any significant values.

Based on the results it does not seems that short selling activity days prior to the corporate earnings results is able to explain information about a possible negative or positive earnings surprise. This is in contrast with the findings in the article of Christophe et al. (2004), but in line with the paper of Daske et al. (2005). Based on the results of the data on the firms in the Netherlands, it does not seems that short sellers should be assumed to be informed.

6.2 Limitations

The data sample solely covers firms listed on the Euronext Amsterdam and, therefore, the results cannot be generalised and applied to other countries. The data provided by the Authority of Financial Markets of the Netherlands consists of net short positions, which has it upsides and downsides. The laws of the Authority of Financial Markets of the Netherlands demands net short positions to be published from 0.5% or higher. The net short positions are useful to control for hedging, but the regulations reduces the information on short selling. The law limits our data to investments that consists of millions of euros, whereas short sell transactions of smaller numbers are interesting as well to research. In addition to that, Kyle (1985) argues that 'informed traders have an incentive to disguise their private information by engaging in a number of relatively smaller trades than a single large trade' and, therefore, we could expect short sellers with an information advantage to keep its net short position under 0,5% and stay of the radar. At last, the data sample consisted only of 75 events with registered short selling activity in the period (-5,0) and 122 events in the period (-15,0). Due to a relatively small dataset, the value of AVESS of some companies suffered from low values and, therefore, ABSS suffered from a high standard deviation and outliers. The dataset should be increased to be able to make significant statements about the short selling behaviour in the Netherlands.

6.3 Recommendations

The limitations of this paper provide room for recommendations for further research. Further research should focus on the rationale behind short selling in order to explain, for instance, the timing of the investment in relation to upcoming news events, the time period of the investment or the information (advantage) of the investor. In addition, further research should obtain a bigger data set that is not limited to net short positions from 0,5% or above. At last, the model of Christophe et al. (2004) did not seem to generate statistically significant results, meaning that it could be recommended to use a different model and different variables to measure the relation between abnormal short selling and the return after corporate earnings announcements.

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8. APPENDIX

8.1 Companies

An overview of the companies included in the research.

Company	Frequency	Percentage	Corporate earnings announcements	Percentage
AMG Advanced Metallurgical Group N.V.	39	1,141%	12	3,279%
Aperam S.A.	172	5,031%	12	3,279%
Arcadis N.V.	29	0,848%	12	3,279%
Arcellormittal S.A.	179	5,235%	12	3,279%
BE Semiconductor Industries N.V.	51	1,492%	12	3,279%
BinckBank N.V.	45	1,316%	12	3,279%
Brunel International N.V.	15	0,439%	12	3,279%
Corbion	21	0,614%	12	3,279%
Core Laboratories N.V.	157	4,592%	12	3,279%
Delta Lloyd N.V.	148	4,329%	12	3,279%
Eurocommerical Properties N.V.	11	0,322%	12	3,279%
Fugro N.V.	330	9,652%	12	3,279%
Galapagos N.V.	44	1,287%	9	2,459%
Gemalto N.V.	205	5,996%	12	3,279%
Heijmans N.V.	98	2,866%	12	3,279%
Koninklijke BAM Group N.V.	177	5,177%	12	3,279%
Koninklijke Boskalis Westminster	31	0,907%	12	3,279%
Koninklijke KPN N.V.	80	2,340%	12	3,279%
Koninklijke Ten Cate	8	0,234%	12	3,279%
Koninklijke Vopak N.V.	22	0,643%	12	3,279%
NSI N.V.	15	0,439%	12	3,279%
PostNL N.V.	177	5,177%	12	3,279%
Royal Imtech N.V.	487	14,244%	9	2,459%
SBM Offshore N.V.	359	10,500%	12	3,279%
TNT Express N.V.	67	1,960%	12	3,279%
TomTom N.V.	232	6,786%	12	3,279%
Unibail-Rodamco SE	10	0,292%	12	3,279%
USG People N.V.	86	2,515%	12	3,279%
Vastned Retail N.V.	10	0,292%	12	3,279%
Wereldhave N.V.	74	2,164%	12	3,279%
Wolters Kluwer N.V.	40	1,170%	12	3,279%
Total	3419	100%	366	100%

8.2 Correlations

This section of the appendix contains four tables providing an overview of the Pearson correlations. The first two table contains the correlations of the Period (-5,0) and (-15,0) including all events in the dataset. The third and fourth model, for the period (-5,0) and (-15,0), contains the correlations for the dataset that excluded outliers and events with no short selling activity.

Table 1. Pearson correlations for the period (-5,0) including all event

		ABSS(-5)	AVESS(-5)	RET(-5,0)	RET(0,1)	RET(0,5)	Option	SHORT
ABSS(-5)	Pearson Correlation	1	,043	-,296***	,016	-,005	,123**	,014
	Sig. (2-tailed)		,416	,000	,765	,918	,019	,785
AVESS(-5)	Pearson Correlation	-	1	,067	-,081	-,030	,149***	,580**
	Sig. (2-tailed)	-		,202	,121	,572	,004	,000
RET(-5,0)	Pearson Correlation	-	-	1	,052	-,007	,012	-,039
	Sig. (2-tailed)	-	-		,324	,894	,814	,463
RET(0,1)	Pearson Correlation	-	-	-	1	,619***	,008	-,096*
	Sig. (2-tailed)	-	-	-		,000	,882	,067
RET(0,5)	Pearson Correlation	-	-	-	-	1	-,005	-,056
	Sig. (2-tailed)	-	-	-	-		,928	,283
Option	Pearson Correlation	-	-	-	-	-	1	,038
	Sig. (2-tailed)	-	-	-	-	-		,463
SHORT	Pearson Correlation	-	-	-	-	-	-	1
	Sig. (2-tailed)	-	-	-	-	-	-	

***. Correlation is significant at the 0.01 level (2-tailed).

**. Correlation is significant at the 0.05 level (2-tailed).

*. Correlation is significant at the 0.10 level (2-tailed).

c. Listwise N=365

Table 2. Pearson correlations for the period (-15,0) including all events

		ABSS(-15)	AVESS(-15)	RET(-5,0)	RET(0,1)	RET(0,5)	Option	SHORT
ABSS(-15)	Pearson Correlation	1	,052	-,132*	,104*	-,002	,028	-,024
	Sig. (2-tailed)		,324	,012	,048	,971	,589	,652
AVESS(-15)	Pearson Correlation	-	1	,077	-,083	-,034	,151**	,555**
	Sig. (2-tailed)	-		,142	,113	,521	,004	,000
RET(-5,0)	Pearson Correlation	-	-	1	,052	-,007	,012	-,039
	Sig. (2-tailed)	-	-		,324	,894	,814	,463
RET(0,1)	Pearson Correlation	-	-	-	1	,619**	,008	-,096
	Sig. (2-tailed)	-	-	-		,000	,882	,067
RET(0,5)	Pearson Correlation	-	-	-	-	1	-,005	-,056
	Sig. (2-tailed)	-	-	-	-		,928	,283
Option	Pearson Correlation	-	-	-	-	-	1	,038
	Sig. (2-tailed)	-	-	-	-	-		,463
SHORT	Pearson Correlation	-	-	-	-	-	-	1
	Sig. (2-tailed)	-	-	-	-	-	-	

***. Correlation is significant at the 0.01 level (2-tailed).-

**. Correlation is significant at the 0.05 level (2-tailed).

*. Correlation is significant at the 0.10 level (2-tailed).

c. Listwise N=365

Table 3. Pearson correlations for the period (-5,0) excluding the events according to the conditions

		ABSS(-5)	AVESS(-5)	RET(-5,0)	RET(0,1)	RET(0,5)	Option	SHORT
ABSS(-5)	Pearson Correlation	1	,156	-,447***	,002	-,014	,359***	,182
	Sig. (2-tailed)		,182	,000	,983	,903	,002	,119
AVESS(-5)	Pearson Correlation	-	1	,082	-,200*	-,236**	,126	,499***
	Sig. (2-tailed)	-		,484	,085	,042	,283	,000
RET(-5,0)	Pearson Correlation	-	-	1	,075	-,086	-,027	-,093
	Sig. (2-tailed)	-	-		,525	,465	,820	,426
RET(0,1)	Pearson Correlation	-	-	-	1	,518***	-,120	,002
	Sig. (2-tailed)	-	-	-		,000	,305	,990
RET(0,5)	Pearson Correlation	-	-	-	-	1	-,044	-,164
	Sig. (2-tailed)	-	-	-	-		,706	,159
Option	Pearson Correlation	-	-	-	-	-	1	,067
	Sig. (2-tailed)	-	-	-	-	-		,569
SHORT	Pearson Correlation	-	-	-	-	-	-	1
	Sig. (2-tailed)	-	-	-	-	-	-	

***. Correlation is significant at the 0.01 level (2-tailed).
**. Correlation is significant at the 0.05 level (2-tailed).
*. Correlation is significant at the 0.10 level (2-tailed).
c. Listwise N=75

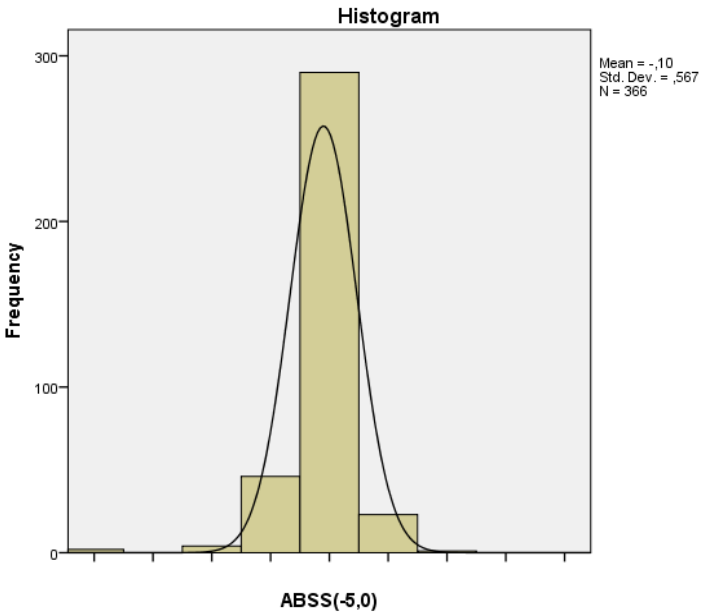
Table 4. Pearson correlations for the period (-15,0) excluding the events according to the conditions

		ABSS(-15)	AVESS(-15)	RET(-5,0)	RET(0,1)	RET(0,5)	Option	SHORT
ABSS(-15)	Pearson Correlation	1	,155*	-,172	,134	,000	,123	,138
	Sig. (2-tailed)		,089	,058*	,142	,997	,176	,128
AVESS(-15)	Pearson Correlation	-	1	,113	-,101	-,050	,116	,505***
	Sig. (2-tailed)	-		,214	,267	,585	,203	,000
Return(-5,0)	Pearson Correlation	-	-	1	,058	-,054	-,036	-,097
	Sig. (2-tailed)	-	-		,524	,557	,694	,290
Return(0,1)	Pearson Correlation	-	-	-	1	,554***	-,052	-,024
	Sig. (2-tailed)	-	-	-		,000	,572	,793
Return(0,5)	Pearson Correlation	-	-	-	-	1	-,006	-,103
	Sig. (2-tailed)	-	-	-	-		,945	,259
Option	Pearson Correlation	-	-	-	-	-	1	,057
	Sig. (2-tailed)	-	-	-	-	-		,533
SHORT	Pearson Correlation	-	-	-	-	-	-	1
	Sig. (2-tailed)	-	-	-	-	-	-	

***. Correlation is significant at the 0.01 level (2-tailed).
**. Correlation is significant at the 0.05 level (2-tailed).
*. Correlation is significant at the 0.10 level (2-tailed).
c. Listwise N=122

8.3 Distribution of the values of ABSS

This section of the appendix contains two histogram and two tables providing an overview of the distribution of the values of ABSS (-5,0) and ABSS(-15,0). The first histogram and the table represent the distribution of the variable ABSS(-5,0). The second histogram and table represent the distribution of the variable ABSS(-15,0).



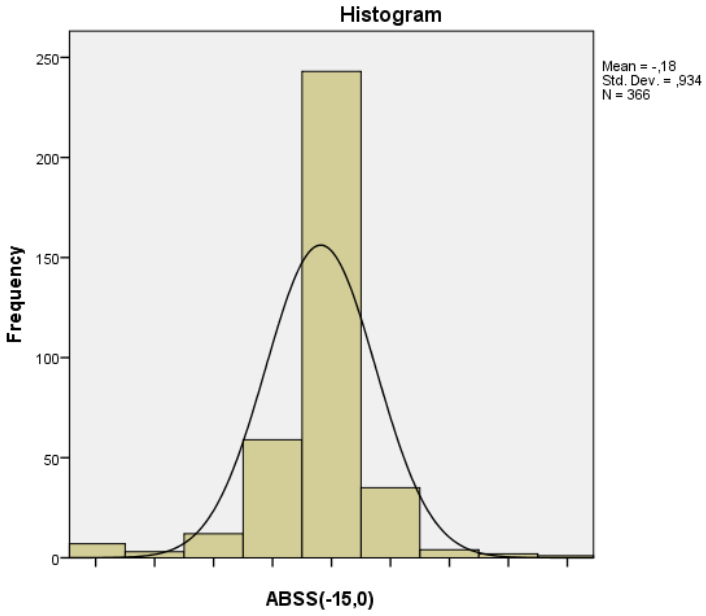


Table 1. Distribution of the values of ABSS(-5)

Standard deviations from ABSS(-5) = 0	Frequency	Percentage	Cumulative Percentage
Less than -3.0	2	.5	.5
-3.00	0	.0	.5
-2.00	4	1.1	1.6
-1.00	46	12.6	14.2
.00	290	79.2	93.4
1.00	23	6.3	99.7
2.00	1	.3	100.0
3.00	0	.0	100.0
More than 3.0	0	.0	100.0
Total	366	100,0	

Table 2. Distribution of the values of ABBS(-15)

Standard deviations from ABSS(-15) = 0	Frequency	Percentage	Cumulative Percentage
Less than -3.0	7	1.9	1.9
-3,00	3	.8	2.7
-2,00	12	3.3	6.0
-1,00	59	16.1	22.1
,00	243	66.4	88.5
1,00	35	9.6	98.1
2,00	4	1.1	99.2
3,00	2	.5	99.7
More than 3.0	1	.3	100.0
Total	366	100.0	