Bachelor Thesis

Stock Price Reactions to Negative Profit Warnings

An Event Study

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Abstract

The aim of this study is to investigate if individuals react rational to the announcement of negative profit warnings in the Swedish stock market. This is done by using an event study approach, investigating the corresponding abnormal returns and cumulative abnormal returns before, during, and after the announcement. Tests is also made to see whether qualitative and quantitative profit warnings and firm size has any impact on the cumulative abnormal returns. The sample consists of 176 profit warnings from 2008 to 2018. On the announcement day, the average abnormal return at day zero was -6.99 % and the average cumulative abnormal returns at day zero and one was -9.06 %. The results found also that smaller firms generate lower abnormal returns on the announcement date, but that there is no difference between qualitative and quantitative profit warnings. With small and insignificant cumulative abnormal returns before and after the announcement, the reached conclusion is that the market is efficient on aggregate level during the event of negative profit warnings.

Keywords
Profit warning, Efficient Market Hypothesis, Behavioural Finance, Event Study

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Contents

1 Introduction .................................................................................................................. 1
  1.1 Purpose .................................................................................................................. 2
  1.2 Hypothesis .............................................................................................................. 3
  1.3 Structure of Paper ................................................................................................. 5

2 Background Information .............................................................................................. 6
  2.1 Profit Warnings ..................................................................................................... 6
  2.2 Regulations of Profit Warnings ............................................................................. 6
  2.3 Market Efficiency ................................................................................................. 7
  2.4 Behavioural Finance ........................................................................................... 9

3 Literature Review ......................................................................................................... 11
  3.1 Market Response to New Information .................................................................. 11
  3.2 Pre-Announcement Drift ..................................................................................... 12
  3.3 Post-Announcement Drift .................................................................................... 13
  3.4 Impact of the Information Content on Profit Warnings ....................................... 14
  3.5 Impact of Firm Size on Profit Warnings .............................................................. 15

4 Methodology ................................................................................................................ 16
  4.1 Event Study .......................................................................................................... 16
  4.2 Definition of Event .............................................................................................. 16
  4.3 Data and Selection Criteria .................................................................................. 17
  4.4 Estimation Window .............................................................................................. 18
  4.5 Normal Returns ................................................................................................... 19
  4.6 Abnormal Returns ............................................................................................... 20
  4.7 Aggregation of Abnormal Returns ...................................................................... 21
  4.8 The Regression Approach of the Event Study ..................................................... 22
  4.9 Significance test .................................................................................................... 22

5 Empirical Results and Analysis ................................................................................... 24
  5.1 The reaction to profit warnings ........................................................................... 24
  5.2 Hypothesis One ..................................................................................................... 25
  5.3 Hypothesis Two .................................................................................................... 26
  5.4 Hypothesis Three .................................................................................................. 26
1 Introduction

In the end it is the future stream of cash flow and the riskiness in those cash flow, which the investors obtain, that should determine the value of the equity. In that sense the stock price should always reflect the present value of those cash flow. Important to note is that no one can forecast the future, but what can be done is to gather available information today in order to try to predict the future. With that being said, a market is efficient when the stock prices always “fully reflect” available information (Malkiel and Fama, 1970). If we believe in this, share prices must react to all new information that change the view about the future stream of cash flow or the riskiness in those. Further, the reaction must be totally unbiased, and the information must be immediately reflected in the stock price. This means no money can be made acting on new information, but still investors and traders exists.

Obviously, some of these traders make money, otherwise they would not exist. Thus, on the opposite side of those who advocates the Efficient Market Hypothesis (EMH), the advocates of behavioral finance appear. They believe that the human being is seldom totally rational, rather they believe the human being is driven by emotions and therefore biases occurs when decision is being made on the market. In this sense, trading opportunities can arise when important corporate news is released, given that the market may over- or underreact to the announcement due to different psychology traps. If an overreaction appears then the stock price will revert back to equilibrium, and an underreaction will cause the stock price to move in the same direction as the event appeared in. In either case the market response is not unbiased and could not be said to be efficient. Numerous of studies have been made testing market efficiency together with different announcements, such as earnings announcements, dividends announcements, and takeovers announcements.

A much less studied area is the stock price reaction to profit warnings. Given that profit warnings are, more or less, unpredictable it becomes more suitable to test the EMH in contrast to earnings announcement and dividends announcement where the market already knows when the announcement will occur. Thus, the element of surprise with a profit warning is the key factor. At the same time, this study will only look at the negative profit warning. In accordance with the prospect theory, individuals put more
weight to losses in wealth compared to an equal amount of gain in wealth (Kahneman, 1979). Therefore, negative announcement could be more appropriate to test EMH than positive announcement, to really see if the market participants acts rational. In our sample the companies are forced to release information when the market’s expectation deviates too much from the underlying business (Nasdaq, 2018) and when they do so these press releases often get much attention in the newspaper with the statement that the company has made a profit warning. In that sense a profit warning is a pure information event, telling that the consensus view is wrong about the future. Given this, profit warnings are furthermore suitable testing EMH in contrast to quarterly earnings announcement where lots of other information is released at the same time. Sometimes the reaction to profit warnings becomes large, in our research movements down to -46% was found. This means that the market has revalued the equity to almost half of the value compared to the day before, the question is if these reactions are rational or some psychology bias is involved.

1.1 Purpose

This study will examine negative profit warnings disclosed by companies listed on the Nasdaq Stockholm Stock Exchange and First North Stock Exchange from January 2008 to March 2018 and see if the market reacts rational to these announcements. The method used is an event study approach, testing for the average abnormal returns (AAR) and the cumulative average abnormal returns (CAAR) prior the announcement, at the announcement, and after the announcement. With this approach we would like to answer our research question:

“Does the Swedish stock market react rational to the announcement of negative profit warnings?”

As previously mentioned, profit warnings are a relative unexplored area of research, and as far as we know no previously research have been done focusing only on the Swedish stock market. One study though has researched the Nordic market, but the sample of Swedish profit warnings was limited to only 62 events and contained both positive and negative warnings, at the same time normal t-test was used in this study (Spohr, 2014). Thus, we will contribute with new and more data to a relative unexplored event. At the
same time more reliable test statistic will be used, in that sense that the t-test will be based on robust standard errors. In this way, the conclusion about market rationality during profit warnings will be more reliable in this study, compared to Spohr (2014), and therefore it will provide useful information about the stock market rationality in Sweden.

1.2 Hypothesis

In order to answer our research question and see if the market participants react in accordance with the efficient market hypothesis three main hypothesis, H1 to H3, will be set up testing for the AAR and CAAR. It is important to test both the days prior the announcement and after the announcement, in the view that this will give important information of how the market actually reacted to the announcement. Beside the main hypothesis two other hypothesis will be set up, H4 to H5, that works as controls factors.

**H1: It exists abnormal returns on the announcement day**

If the market is rational, then it should react instantly and unbiased when news is released that change the view about the value of a company (Malkiel and Fama, 1970). This have for a long time been documented in the EMH literature (Fama, 1991), and news about profit warnings is no exception, as will be seen in the literature review. Given that a negative profit warning is a statement that the market has to high expectation about the future cash flow, the announcement of it will create a negative AAR. If rejection cannot be made of the first hypothesis that indicates that the market is efficient.

**H2: It exists negative abnormal returns prior the announcement day**

If negative AAR and CAAR exists prior the announcement, then the market may already have anticipated the announcement. This could occur because of a general economic or industry specific condition (Jackson and Madura, 2003a), as Malkiel and Fama (1970) put it regarding stock splits, that the drift of AAR before the announcement is more a sign of that firms tends to do stocks splits in abormally good times. At the same time it could also occur because some form of information leakage to institutional investors or analysts (Jackson and Madura, 2003a). Given mixed results in the profit warning litterature it becomes hard to expect any results, but it is important to conclude
any sign of AAR and CAAR before the announcement from the perspective that a drift will affect the magnitude of the reaction on the announcement day. A rejection of the second hypothesis indicates that the market has not anticipated the announcement.

**H3: It exists abnormal returns after the announcement day**
If abnormal returns, positive or negative, occurs the days following the announcement then the market can predict returns, this means that the market either have over- or underreacted to the announcement and this is something the market will exploit. If an underreaction occurs, then the speed of adjustment is not fast enough and this is not an unbiased reaction. Further, if an overreaction instead appears then this reaction is neither unbiased. Any sign of these two reaction indicates that the market is not efficient in the semi strong form (Malkiel and Fama, 1970). If a rejection cannot be made of the third hypothesis that indicates a post-announcement-drift and therefore confirms an inefficient market.

**H4: The abnormal returns for qualitative profit warnings is different compared to Quantitative**
What type of information that is conveyed in the profit warning should affect how investors react to the news of profit warnings. Quantitative warnings that give more and exact information in the profit warning should have different abnormal returns than qualitative warnings that give very limited new information. This is of particular interest given that with less information it should become harder for investors to make rational decision, and the possibility of underreaction becomes larger (Bulkley and Herrerias, 2005). If a rejection can be made of the fourth hypothesis that indicates that with less information it becomes harder to act rational.

**H5: Profit warnings made by larger firms is more anticipated than for small firms.**
Bigger firms should be more closely monitored, both in terms of the number of analyst following the company and the number of active investors, and this was confirmed by Collett (2004). Therefore, a profit warning should be more anticipated for larger firms than for small. If a rejection can be made of the fifth hypothesis that confirms that firm size matters in anticipating profit warnings.
1.3 Structure of Paper

This paper is divided into a total of six main chapters together with corresponding subchapters. The second chapter covers relevant information regarding what a profit warning is and the regulation behind it, EMH together with its different forms, and behavioural finance with a focus on what can cause over- or underreactions. After that, in chapter three, the literature review will be presented. This part is divided into five subchapters, where the first three will focus on how the AAR and CAAR is developed through time and on the announcement date. In order to get a deeper knowledge how the stock market react to particular news and announcement, other important studies will be covered that don’t analyse profit warnings, but still use the event study methodology. The two remaining subchapters deals with how the firm size and the information content in the profit warnings affect the AAR and CAAR. In chapter four the method will be presented together with the data collection procedure. To start with, the foundation of the event study method will be presented and the corresponding calculation of the abnormal returns (AR) and cumulative abnormal returns (CAR). In the end, the regression model will be presented and the significance tests. Chapter five will present our empirical results, and therefore investigate if any rejection can be made on our hypothesis. This chapter will also incorporate our analysis. Chapter six concludes.
2 Background Information

In order to get an understanding of how the market may react to profit warning the following chapter will first give a brief introduction to the regulation of profit warnings and what it entails. After that, the foundation of the EMH will be presented and the general problem to actually reach an exact answer to the EMH together with concepts in behavioral finance that can results in over- or underreaction. This will give a solid knowledge to make conclusion about the results on the hypothesis stated above.

2.1 Profit Warnings

As mentioned in the introduction, a profit warning is press release made by a company telling that the underlying business deviate to much from the market’s current expectation. Pukthuanthong (2010) defines a profit warning as,” any earnings preannouncement in which a company reports that revenues or earnings will be below analysts’ estimates.” The companies are forced to do this, and when they do this the press release is defined by the media as a profit warning. At the same time the amount of information can differ between profit warnings, and one can particular make a clear distinction between what is called quantitative and qualitative profit warnings. Bulkley and Herreras (2005) define these as, “Quantitative warnings are those warnings that include a forecast for the scheduled earnings announcement to which they refer. Qualitative warnings are defined to be those that only offer the guidance that earnings will be below current expectations”. Detailed examples of quantitative and qualitative profit warnings can be explored in Appendix 1.

2.2 Regulations of Profit Warnings

In order to analyze the impact of profit warning one has to know if any drift has occurred before the announcement. A drift is simply if CAAR exist before or after the event, which means that the AAR tends to go in a certain direction. If a drift before the announcement occur, this could be a sign of information leakage. Therefore, it is important to have the knowledge of how the regulation is in the specific country, because stricter regulation have been shown to decrease the pre-announcement-drift (Jackson and Madura 2007). In Sweden the security market is regulated by Law
(2007:528) on securities trading, Marknadsmisbruksförordningen (Mar), and is also controlled by the financial supervisory authority. In terms of publishing insider information, the Nasdaq Stockholm and Nasdaq First North are regulated identically. If financial development departs from earlier published information the issuer should publish this information as soon as possible, this means that there is certain tolerance for that a publication can take some time to administrate. Mar was implemented by the European Union 3 July 2016 and can be seen as an updated version of Marknadsmisbruksdirektivet, and according to Nasdaq it does not entail any major changes in practice but imposes higher requirements on the issuer to expand and systemize their documentation of information especially regarding postponed releases (Nasdaq, 2016)

2.3 Market Efficiency

The Efficient Market Hypothesis (EMH) deem that the financial markets are efficient and can be described as, prices of securities are reflected by all available and relevant information (Malkiel and Fama, 1970). Prices of securities will therefore always adjust when new information is released, indicating that investors are rational. Information has to be unpredictable and if not, the prediction is said to be part of today’s information. The price change of the stock also has to be unpredicted, independent of each other and random. This is the basic aspect of the argument that a stock price should follow a random walk (Bodie et al., 2018).

EMH advocates that the financial markets are efficient, which means that it is not possible to make arbitrage profits on the market. This leads to the widely spread debate between EMH promoters and those that don’t promote for example institutional investors. But the question is if this debate ever will be solved given the three issues that exist. First, the selection bias issue brings up the problem that if someone discover an investment scheme then he/she can publish it in order to get honoured, or he/she can keep it and earn money, thus we can’t really tell if and how much money that is made on the market. Second, the lucky event issue tells that given all the market participants it will always be someone who end up as a winner, generating abnormal returns. This could be described using the analogy of coin flipping contest, there will always be a winner, but is it skill or luck? Third, the magnitude issue claims that portfolio managers
with access to large amount of capital can earn on negligible deviations on the market (Bodie et al., 2018).

There are three different forms of EMH, the weak form, the semi-strong form and the strong form. The weak form claims that all trading data are reflected in the securities prices, telling that trend or other technical analysis is ineffective, given that all participants have immediately access to trading data. The semi-strong form, which is of particular interest in this study, claims that all publicly available information about the company are already reflected in the stock price. It generally concerns the speed of adjustment to other obviously public available information (Malkiel and Fama, 1970). The common method testing the semi strong form is to use event studies, to see how the market react to a specific event. Figure 1 shows how the stock price should change and not change to an event according to the EMH. If the market overreacts to the event the stock prices will revert back as the dotted line shows, and if the market underreacts the speed of adjustment to the news is not instantly and therefore a momentum in the stock prices will occur, as the dashed line shows. Such price movements could be explained by the human psychology, suggesting that the market is inefficient, but if overreaction appears as many times as underreaction then the market still can be said to be efficient (Fama, 1998) and most of the literature concerning the semi strong form of EMH using event studies confirms that the market is efficient (Fama, 1991). The strong form claims that stock prices reflect all relevant information about the firm including insider information, in that sense no trading profits can be gained using insider information (Malkiel and Fama, 1970).

Figure 1: Price reaction to an announcement, over- and underreaction. Source: Based on (Damodaran, 2012) page 131 figure 6.5.
2.4 Behavioural Finance

In EMH the assumption is made that the human being is rational. This is a strong assumption, at least for those who advocates behavioural finance, which is a subtopic to behavioural economics. The proponents of behavioural economics and finance then argue that predictions in economics and finance must be modified for people’s behavior in economic situation, and therefore they further state that the human being is seldom rational during decision that concerns wealth. This means further that when deviations from EMH is found, such as the over- and underreaction in, it could be explained by psychology biases from the human being (Burton and Shah, 2013). Thus, an event study that results in patterns such as the dashed and dotted line in Figure 1 is due to irrational behavior according to the behavioral finance and therefore it will provide useful information for hypothesis one and three. Given that the literature in behavioral finance is extensive only the most import aspects that could create some form of biases and that will result in over- or underreaction will be presented in this study, and those are conservatism, representativeness, anchoring and following the herd.

*Conservatism* is an information process bias, and errors in the information process can lead to that the estimates of the true probabilities of possible events or the corresponding rate of returns becomes wrong. The conservatism bias means that investors are too passive in updating their expectations when new information is released. If this happens, the speed of adjustment to the event will not be fast enough and therefore the market will underreact and consequently a momentum will arise in the stock price (Bodie et al., 2018).

*Representativeness* is another information process bias that come from that individuals makes to fast decision based on what they have seen before in similar situations. To be more specific, it means that they consider that a part of the sample serves as the complete sample and therefore they infer a pattern too quickly. This explains to some extent how such behavior can lead to correction anomalies and overreaction on the market (Bodie et al., 2018).

*Anchoring* means that individuals tends to use some form of reference point when dealing with uncertainty, that reference point tends to be previously expectation for
active market participants. Major deviations from the average expectations will often cause large stock prices movement, however, research shows that these movements tend to be too small compared to what they should be if investors are rational. A reason for that is the previously expectation get too much importance compared to the new expectation (Fromlet, 2001).

_Herd behavior_ is when investors tends to follow the mass in accordance to certain investing behavior. Thus, individuals do not use their own judgement when making decisions, rather they do what the others are doing and think it will continue. This will create a feedback loop where the individuals choice of acting will support the herd behavior and this will attract more and more investors making the herd behavior stronger (Fromlet, 2001). For example, when a profit warning announcement is made and if the stock price reacts negative, investors tend to follow the herd and sell their stocks, which can cause an overreaction in the stock price.
3 Literature Review

The following section will focus on the most important studies and empirical findings regarding profit warnings, but besides that other relevant papers that use event studies together with corporate announcement will also be covered in order to get a broader view and understanding into the subject. Further this will give a deeper knowledge of what to expect of the hypothesis, where each of the following subchapter corresponds to the hypothesis stated on page 3 and 4.

3.1 Market Response to New Information

Ball and Brown (1968) did one of the first studies that found that accounting earnings did contain useful information for investors, using an event study approach on unexpected earnings announcement. With a sample of 261 US firms and a time period from 1957 to 1965 they found cumulative abnormal returns in the month of the announcement for the firms that either had unexpected positive or negative earnings. After this paper, many event studies have been made in the accounting literature. Kothari (2001) provides a great review of the accounting literature from the 20th century, including the many event studies that have been made after Ball and Browns paper. He generally concludes that most of the announcements is consistent with market efficiency, that the markets react instantly and unbiased to new information, even though he also finds evidence against this. Khanal and Mishra (2017) provide a more updated study on market reaction on dividends announcement using an event study. With a sample of 460 dividends-announcement from the U.S market and ranging from 2006 to 2012 they found statistical significant abnormal returns on the announcement day of 0.39% and the day following 0.76%. Al-Thaqeb (2018) had a more international and broader perspective, investigating the impact of major local events on the U.S a market from 1999 to 2013, such as the 9/11 attack and the mortgage crisis 2008, and how this affected the worlds equity markets. Depending on the event investigated, he gets different results, for example he gets mixed results on the CAAR for the Hurricane Katrina 2005 and U.S Government shutdown 2013, whereas the mortgage crisis 2008 gets uniformly and negative results. In the end he can conclude that the international markets underreact to positive events and overreact to negative events, particular to unanticipated crisis, but he finds no evidence that the results could be explained by individual economic factors for the included countries. The general conclusion of what
mentioned above is that the market reacts to important announcements, and as will be seen the profit warning literature is no exception.

The market response on the announcement day to negative profit warnings shows a lot of variety in previous research, in terms of abnormal returns is ranges from -2.81% (Jackson and Madura, 2007) to -15.1% (Collett, 2004). Dave Jackson and Jeff Madura have contributed with a total of four studies in the area of profit warnings. In their study “Profit Warnings and Timing” they use a sample of 245 profit warnings from the US market between the years 1998 to 2000 and found significant two day (-1, 0) CAAR of -14.72%, with AAR of -10.75% at day zero, and thus confirmed that profit warnings are associated with negative revaluation of firms (Jackson and Madura, 2003a). They found similar results in their other studies as well: with focus on American Depositary Receipts (Jackson and Madura, 2003b), with focus on banks (Jackson and Madura, 2004), with focus on new regulations (Jackson and Madura, 2007).

Bulkley and Herrerias (2005) also looked at the US market in the period 1998 to 2000 with a total sample of 2013 profit warnings and found an AAR of -8.50%. Collett (2004) that found AAR of -15.1% had a sample of 756 profit warnings from the UK market, he also investigated the trading volume and could conclude that this was abnormally high on the day of the announcement and the day after, thus the market responded rapidly to the information contained in the trading statements. Spohr (2014) made a study on the Nordic market ranging from 2005 to 2011 focusing on both negative and positive profit warnings. With a sample of 356 positive warnings and 118 negative warnings he found a significant AAR of -6.095% for the negative profit warnings during the event day.

3.2 Pre-Announcement Drift

If a drift before the announcement is found, then this could mean that the market has anticipated the announcement. This could be evidence that information leakage has occurred, but it could also depend on the general economic or industry condition and therefore investors have anticipated higher production costs or a weaker demand (Jackson and Madura, 2003a). With that being said, one has to be careful drawing conclusion on the pre-announcement drift. However, Hao (2016) showed that by
studying 2000 share repurchasing announcements in the US between 1996-2012 that repurchase announcements on the options market have a positive relationship with pre-announcement volatility. He concluded that some market actors have information on upcoming announcements.

The results regarding profit warnings and pre-announcement drift are mixed. Jackson and Madura (2003a) finds some evidence of drift. With a negative CAAR of -3.53% and significant at 0.1% level the nine days prior the announcement, and significant AAR at 0.1% level at the events day (t -3) and (t -2). Bulkley and Herrerias (2005) finds also evidence of drift before the announcement, with negative and statistically significant, at 1% level, AAR from five days prior the announcement to one day prior the announcement. Church and Donker (2010) finds CAAR from 20 days prior the announcement of -1.89% that it significant at 10% level, but concludes that most of the information is absorbed at the announcement date. Collett (2004) conclude that their results suggest no pre-announcement drift, and so do Spohr (2014).

3.3 Post-Announcement Drift

If one can predict the abnormal returns after an announcement, then this is called post-announcement drift. If the abnormal return drift after the announcement and with the same sign as the announcement occur in, then this means the market have underreacted to the announcement as Figure 1 shows. In the earnings announcement literature (Ball and Brown 1968) was the first one to find evidence of this and after that several other studies have documented the same pattern in more detail. Studies have found drift up to a year that is statistically and economically significant for extreme bad and good portfolios. Thus, this is evidence that the market does not react instantly to earnings announcement (Kothari, 2001). The drift has been widely documented, Dargenidou et al. (2018) had a focus on insider trading and the effect on the post announcement drift, using data from all listed non-financial companies in UK from 1995-2013 which contained 19 804 observations. The authors showed that after an earnings announcement, trades that are made by insiders drive the post earnings announcement drift which are consistent with earlier research.
In the profit warning literature, the evidence of drifts is mixed. Jackson and Madura (2003a) find statistically significant CAAR of -4.58% for the first five days preceding the announcement. Bulkley and Herrerias (2005) found evidence of abnormal returns up to three months after the profit warning. Collett (2004) finds only evidence of drift the day after the announcement, but that this did only hold for smaller firms. Spohr (2014) finds statistically significant abnormal returns up to four days after the announcement. Church and Donker (2010) on the other hand finds that almost all information of the event is incorporated around the announcement. That is the day before, the day of the announcement, and the day after. Thus, no post event drift occurred.

3.4 Impact of the Information Content on Profit Warnings

Bulkley and Herrerias (2005) main focus was to look at the underreaction when a profit warning was released and see if there is any difference between qualitative profit warnings and quantitative profit warnings. They found that over their eleven days event window that qualitative warnings are significantly more negative than the reaction to quantitative warnings. They further showed that over the next three months after the announcement that qualitative profit warnings resulted in negative abnormal returns of -9.6%, this is in contrast to quantitative profit warnings that showed abnormal returns of -2.2% the following three months. Thus, the underreaction was larger for qualitative profit warnings. Jackson and Madura (2003a) tested three hypotheses regarding the information content of profit warnings. They argued if the reason for the profit warning was caused by poor revenues then the market should have anticipated this to a greater extent, given that this is often driven by the general economic condition. First, they expected that the negative revaluation in the prewarning period is more pronounced when revenue is the consequence of the profit warning. Second, they expected therefore also that the revaluation effect on the announcement day is less pronounced when the revenue is the consequence, given that the market has already anticipated the event to some extent when revenue was the consequence. No statistical evidence was found regarding these two hypotheses. Finally, they tested whether it occurred any lagged affects when firms don’t pinpoint the reason for the profit warning, but no statistical evidence was found here neither. Even though not researched in this study it could be worth to mention the difference between negative and positive profit warnings. Collett
(2004) and Spohr (2014) investigated this and both finds that positive warnings exhibit smaller reactions.

3.5 Impact of Firm Size on Profit Warnings

The number one control variable in many researches is firm size. Jackson and Madura (2003a) use total assets as a proxy for firm size and finds that the pre-announcement period CAR is not conditional of the size of the firm, but on the other hand they find that on the announcement day and the five days following the announcement is conditional on the size. They conclude that smaller firms experience more negative pronounced effects to profit warnings, therefore they also conclude that the market anticipate announcement better for bigger firms. Bulkley and Herrerias (2005) finds also that smaller firms are to a greater extent impacted of a profit warning. Church and Donker (2010) reach also the conclusion that firm size matters, with firm size measured as total market value they find through their OLS regression that the CAR from 20 days prior the announcement to 20 days after the announcement is statistically different from zero. Collett (2004) found that smaller firms have higher AR and is more statistical significant on the announcement day compared to bigger firms, though in this statistic the AR where measured on negative trading statements from firms and not only profit warnings. Finally, Cox et al. (2017) also reached the same conclusion in their OLS regression model, but in contrast to the other studies a Fama-French three-factor model was used to calculate the AR.
4 Methodology

In order to fulfil the purpose of this study the quantitative method event study will be used. This is in order to analyse the stock market rationality by measuring the corresponding AAR and CAAR. By using the AAR and CAAR hypothesis one to three can be answered. Thus, in the following chapter the methodology of event study will be presented. First the standard way of calculating the AAR and CAAR will be shown and in the end the regression approach will be presented as well as significance tests. In this way conclusion about any pre- and post-announcement drift could be made, as well as the magnitude of the reaction on the announcement day. Further, test will be made on whether firm size and the information in profit warning have any impact on CAR, and in this way results for hypothesis four and five can be found.

4.1 Event Study

Event studies measure how economic, or other relevant, events affect the value of a firm using financial market data where you compare the total return to the normal return. With the assumption that the market is rational, then new information should be immediately reflected in the stock prices and therefore the event study a useful tool measuring the value effect of new information (Mackinlay, 1997). In that sense, over a short time horizon event studies will provide an increased understanding of the information content of different announcement. As stated above event studies is useful given market rationality, but that also indicate what results we should expected if the market is efficient, and therefore event studies will also test market efficiency (Kothari and Warner, 2004). Given the ease of use and the long history, perhaps the first published study was made by James Dolley 1993 where he studied the stock price effect of stock splits, the method has been applied in many research areas, stretching from legal liability cases to macro announcements (Mackinlay, 1997), and therefore the amount of papers using event studies is enormous.

4.2 Definition of Event

The first step when conducting an event study is to define the event of interest and the length of the event window. The event window is the day of the announcement, but it is
usually expanded to two days in order to capture the effects when the announcement comes after the stock market have closed. It is also often expanded several days prior and after the announcement in order to answer other research questions of interest (Campbell et al., 1997), such as information leakage and post-price drift. As already noted, our event is negative profit warnings on the Swedish stock market from January 2008 to March 2018, using daily stock price data. The event day will be the day the firm release the press release stating that the market’s expectation deviates too much from the underlying business, plus one day to capture the effect when the press release was announced after the market have closed, in this way results will be given in order to answer hypothesis one. In order to answer all of the other hypothesis the event window will also be expanded from minus ten days to plus ten days. In Figure 2 below a time line for a whole event study is shown where the event window corresponds to the time period T₁ to T₃, and T₂ is the announcement date. Thus, with CAAR from T₁ to T₂ hypothesis two can be answered, and with CAAR from T₂ to T₃ hypothesis three can be answered. There is no general rule for the length of the event window in the case of profit warnings. Some use ± 5 days, for example (Spohr, 2014) and (Collett, 2004), others use ± 10 days or longer, for example (Jackson and Madura, 2003a) and (Church and Donker, 2010). What is important to note is that expanding the event window will cause the CAAR to reflect other information besides the information in the profit warning.

4.3 Data and Selection Criteria

In order to collect the data of profit warnings from the Swedish stock market, between January 2008 to March 2018, Retrievers media archive have been used. With “vinstvarnar”¹ and “vinstvarning” as search words we have been able to identify when the media reports that a firm have announced a profit warning. At this stage 215 profit warnings were found, then all corresponding press releases was collected either through the firm’s web site, Cision News, or Nasdaq OMX Nordic. The press releases have been used in order identify the profit warning was of qualitative or quantitative nature, but it also work as a control check to see if there actually was a profit warning. A total of five companies was removed because no press release was found. Further, any profit

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¹ “Profit warning”
warning that was released together with other major news from the company in question is removed, such as quarterly reports, dividends announcement, acquisitions and further. In line with Jackson and Madura (2003a) this is in order to remove the possibility that our measurement will reflect other information beyond the profit warning. After this was done the final sample included a total of 176 profit warnings, table 1 shows the final sample distributed through time. Given that the sample is collected from 2008 to 2018 it will eliminate the possibility that our results will reflect a specific market condition, for example it could be seen that 2008 was the year when most profit warnings was released, and this was during the market downturn after the financial crisis. On the other hand, when expanding the time period, it increases the possibility that structural shift may occur. One such possibility in our case could be the new regulations that was implemented in July 2016. As seen from table one, it appears that the number of profit warnings increase during and after 2016 compared to the year before, but as have been mention before Nasdaq claims this updated regulation should not have any impact on the listed firms. After all profit warnings have been collected, the stock prices, the index prices, and the market capitalization was collected through DataStream.

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Table 1: Profit warnings sorted by year and type. 2018 only contains January, February, and March.

4.4 Estimation Window

In this study the market model is used to determine the normal return. In order to estimate the parameters of the market model a subset of data is needed, this is what is called estimation window. In Figure 2, the period from \( T_0 \) to \( T_1 \) corresponds to the estimation window. The estimation window could be 120 days prior the event. At the same time it is important that the estimation window do not overlap the event window in order to avoid the event from influencing the parameters of the model (Campbell et al., 1997). A post-event window could also be included in the estimation window, from \( T_3 \) to \( T_4 \) in Figure 2, in order to increase the robustness of the market model parameters,
if any gradually changes will occur (Mackinlay, 1997). In line with this, we use 120 trading days prior the event window (-131, -11) and a post-event window of 22 days after the event window (+11, +33)

Figure 2: Time Line for an Event Study. Source: Based on (Mackinlay, 1997) page 20. Figure 1

4.5 Normal Returns

In order to answer our hypothesis both the AAR and CAAR is needed, and in order to reach this the stocks normal returns are first needed. The normal return is defined as the expected return without conditioning on the event taking place, and the first decision that has to be made doing this, is to decide what benchmark model to use. What is important to emphasize at this point is that an event study is a joint test. That is, it tests whether the abnormal returns are zero and whether the chosen model of normal returns is correct. On the other hand, the test statistic specification has shown to not to be highly sensitive to the chosen benchmark model of the normal returns, when short term event studies in conducted. This seems reasonable as long as the parameters in the benchmark model do not change dramatically (Kothari and Warner, 2004).

With that being said, the benchmark model is categorized in two broad categories, statistical and economical. The two most common economic models used in event studies is Capital Asset Pricing Model (CAPM) and Arbitrage Pricing Theory (APT). CAPM was popular in the 1970s, but later when deviations of CAPM was found it introduced the possibility that the results may be sensitive to the specific CAPM restriction, therefore the use of CAPM is very rare in event studies. Different APT models have also been used, but it most cases is seems it adds little explanatory power (Mackinlay, 1997). The three statistical models that could be used is either the constant
mean return model, the market model\(^2\), or other different factor models. The market model has the gain over the constant mean return model given that it removes the variation in the return connected to the market’s return and in that way reduce the variance of the abnormal returns. The motivation for other factor models is that they would reduce the variance even further than the market model. Factors models that could be considered are models formed by industry, size, or multi factor model, such as the Fama French three- and four factor models. But generally, there is little gains from using multifactor models given the empirical fact that the extra explanatory variables seem not to reduce the variance that much compared to the market model (Mackinlay, 1997). Given what stated above and the purpose of this study it seems most reasonable to use the market model, and this is what will be used.

The assumption that is made using the market model is that the returns are jointly multivariate normal and independently and identical distributed. The market portfolio used in the market model should be a broad-based stock index (Mackinlay, 1997). Therefore, the index used in this research will be the OMXSPI, and for any stock the market model is:

\[ R_{it} = \alpha_i + \beta_i R_{mt} + \epsilon_{it} \]  
\( (1) \)

Where:
\( R_{it} \) = Actual return for stock \( i \) at time \( t \)
\( R_{mt} \) = Return for the market portfolio at time \( t \)
\( \alpha_i \) = Unsystematic risk for stock \( i \)
\( \beta_i \) = Systematic risk for stock \( i \)
\( \epsilon_{it} \) = Error term

4.6 Abnormal Returns

Using the estimated parameters from the market model in equation 1 makes it possible to calculate the expected return, which is the normal return, for each stock and therefore the abnormal returns as well. The abnormal return is the difference between the return conditional on the event and the normal return in the event window. This simply means

\(^2\) Also known as the single-index-model
that the abnormal return is the error term of the regression in equation 1 (Mackinlay, 1997).

\[ AR_{it} = R_{it} - \hat{\alpha}_i - \hat{\beta}R_{mt} \]  \hspace{1cm} (2)

Where:
- \( AR_{it} \) = Abnormal return for stock i at time t
- \( R_{it} \) = Return on market portfolio at time t
- \( \hat{\alpha}_i \) = Estimated unsystematic risk for stock i
- \( \hat{\beta} \) = Estimated Unsystematic risk for stock i

4.7 Aggregation of Abnormal Returns

Before making any inferences about the event, the abnormal returns must be aggregated through time and across securities. In this way answers to hypothesizes one to three can be answered and at the same time regression on the CAR can be done to answer hypothesis four and five. The cumulative abnormal return for each stock over time is expressed as (Mackinlay, 1997):

\[ CAR_i(t_1, t_2) = \sum_{t=t_1}^{t_2} AR_{it} \]  \hspace{1cm} (3)

When aggregating the abnormal returns across securities, one has to make sure that no clustering exists. Clustering is when the event window across the events overlaps each other, and if this exists it could bias the result, given the assumption that the AR’s and CAR’s covariance across the events must be zero. This topic will be covered later. If this problem doesn’t exist, one can start aggregate the abnormal returns from each event. The aggregation is simply the average of the abnormal returns across the events and is expressed as (Mackinlay, 1997):

\[ AAR_t = \frac{1}{N} \sum_{i=1}^{N} AR_{it} \]  \hspace{1cm} (4)

Where:
- \( AAR_t \) = average abnormal return across securities at time t
- \( N \) = number of events
Using the same approach as used when calculating the cumulative abnormal returns for each stock, one can aggregate the average cumulative returns over the event window for any time interval (Mackinlay, 1997).

\[
CAAR(t_1, t_2) = \sum_{t=t_1}^{t_2} AAR_t
\]  

(5)

4.8 The Regression Approach of the Event Study

In this study a regression approach will be conducted in order to reach the abnormal returns. This is done by adding dummy variables for each day in the event window to the right of the market model. The dummy variable will assign a value of one for the corresponding days in the event window and zero otherwise, the coefficient of the dummy variables (gamma) will then capture the AAR (Karafiath, 1988). In order to reach the CAAR one simply to add the coefficients of the dummy variables. Using this approach, the results will be reached in one step in contrast to two steps and test that take into account heteroscedasticity and autocorrelation can easily be done. The following regression will be set up for each event:

\[
R_{it} = \alpha_i + \beta_i R_{mt} + \gamma_{11} D_{t-10} + \gamma_{21} D_{t-9} + \cdots + \gamma_{21} D_{t+10}
\]  

(6)

4.9 Significance test

In order to test the hypothesis about the AAR and the CAAR some form of significance test has to be made. If the assumption is made that the AAR are independent and identically distributed, then a standard t-test of the cross-sectional estimate can be done, setting the hypothesis that the AAR is equal to zero. If we further assume that the AAR is independent over time a t-test can be conducted on CAAR (Binder, J, 1998). Indeed, this are very strong assumptions, thus any statistical inference based on the t-test is questionable and therefore the standard t-test will not be used in this study. Several version of the standard t-test have been developed together with non-parametric test in order to solve the problem associated with the t-test, a discussion of the corresponding test would be out of scope for this study. Maybe the most common problem in event studies is clustering, if clustering exists a downward bias appear in the standards error
and therefore the test statistic will be biased upwards (Kothari and Warner, 2004). Therefore, a test for heteroscedasticity will first be performed in order to see if this is a problem. The test used will be a modified Wald test for group wise heteroscedasticity, in contrast with the standard Wald test the modified version is workable when the assumption of normality is violated. A rejection of the hypothesis in the test confirms presence of heteroscedasticity (Greene, 2012), the test can be found in the Appendix 2. In order to deal with the problem of heteroscedasticity and any potential problems with autocorrelation a robust standard error will be used on our regression. If the coefficients to the dummy variables is significant, then the conclusion can be made that AAR exists on the specific day in question. Also, test will be made on the CAAR in order to investigate further any potential drift prior and after the announcement, in order to answer hypothesis one to three, where the chosen time periods are (-10, -1), (-5, -1), (0, +1), (+2, +5), (+2, +10).

A regression will also be conducted on the CAR for the different time periods to test if the information in profit warning, hypothesis four, and if the firm size, hypothesis five, has any impact on the magnitude of the CAR. The firm size is expressed in the logarithm form to make it more normal distributed, and as a proxy for firm size the market capitalization will be used. To remove the possibility that the event itself will affect the market capitalization, the used time period will be the day before the event window (-11). A dummy variable will be used to test if qualitative profit war warning has any impact on the CAR. The regression is expressed as:

\[
CAR_i(t_1, t_2) = \beta_0 + \beta_1 \log(Mcap) + \beta_3 D(\text{Qualitative}) + \epsilon_i
\]

Where
\[
\beta_0=\text{intercept}
\]
\[
\beta_1 \log(Mcap)= \text{the coefficient that will capture the effect of the company size, expressed as the natural logarithm of market capitalization.}
\]
\[
\beta_3 D(\text{Qualitative})= \text{The dummy variable will assign a value of one if qualitative and zero if quantitative.}
\]
5 Empirical Results and Analysis

In the following chapter the empirical results will be presented and if any rejection can be made of the hypothesis. Further, the analysis will be presented about the statistical results.

5.1 The reaction to profit warnings

Figure 3 shows how the CAAR is developing through the event window. It is clear that the market reacts to the announcement of a profit warning, given the abnormal return at the day of the announcement. In Table 2 the CAAR for the different time period during the event window is presented, the total CAAR for the entire period was -9.06%. The AAR seems to drift slightly two days before the announcement and during the announcement the stock prices falls heavily. If one compare Figure 3 and Figure 1 it appears a small reversion in AAR after the announcement. This could be a sign of overreaction and therefore also a market that is not always totally rational. In Appendix 3 the results for all AAR is shown.

![Figure 3: CAAR (-10, +10); The cumulative average abnormal returns over the event window, where time 0 represent the day of the announcement, and time -10 and 10 represent ten days before and after the announcement respectively.](image-url)
Table 2: CAAR before, during, and after the announcement of a negative profit warning

| CAAR   | Coef.   | Std. Err. | t     | P>|t| |
|--------|---------|-----------|-------|-----|
| CAAR (-10, -1) | -0.00806 | 0.007543 | -1.07 | 0.287 |
| CAAR (-5, -1)   | -0.00466 | 0.005704 | -0.82 | 0.415 |
| CAAR (0, +1)    | -0.08996 | 0.007614 | -11.82 | 0.000 |
| CAAR (+2, +5)   | 0.002327 | 0.00678  | 0.34  | 0.732 |
| CAAR (+2, +10)  | 0.007444 | 0.007804 | 0.95  | 0.341 |

5.2 Hypothesis One

In Table 2 our results from the CAAR is presented for the different time intervals. With an CAAR at (0, +1) of -9.00% and that is highly statistical significant, it could be confirmed that the market reacts to the news of a profit warning. Most of the reaction happens at day (0) with an AAR of -6.99% and a t-test based on robust standard error of -10.57, the corresponding measures at day (+1) is 2.03% and -5.32. Thus, we can conclude that abnormal returns exist at the day of the announcement and therefore hypothesis one is not rejected.

These results are very similar to what Spohr (2014) found, with an AAR of -6.095% and -1.00%, at day (0) and (+1) respectively. Even though he studied the whole Nordic market his sample was heavily skewed to Finland, which represented 343 of 475 profit warnings in his sample. Given that the time period is quite similar one could conclude that the Swedish and Finnish market is quite similar in the reaction to profit warnings.

On the other hand, the results are far from what Collett (2004) found with AAR of -15.10%, Jackson and Madura (2003a) with an AAR of -10.75% and Cox et al. (2017) -13.38%. One explanation for this is that all of these studies mostly covered the pre-period of the it-bubble and only one year after, with exception for Cox et al. (2017) that looked specific how the business cycle affect the magnitude of profit warnings during the whole business cycle. As noted by Cox et al. (2017), the reaction to profit warnings is asymmetric during the business cycle, where the level of surprise to negative profit warning is higher during the boom phase, indeed the boom phase was large during the it-bubble, and therefore the reaction should also become larger. Further, given the
positive CAAR after the announcement, it appears that the reaction is not fully rational rather it could suggest some overreaction, more on this later.

5.3 Hypothesis Two

It appears to be a slightly drift before the announcement, where it is only four days out of ten that provides a small positive return. On the other hand, the negative returns are also small, the day before the announcement provides the lowest pre-period return of -0.55% and a robust t-test at -2.51. Looking at the cumulative returns gives a similar picture, with CAAR (-10, -1) of -0.81% and CAAR (-5, -1) of -0.46%, and neither is statistical significant. Hypothesis two could therefore be rejected, the market has not anticipated the announcement.

These results are also similar to Spohr (2014), that found no evidence of a pre-announcement drift. As mentioned before, most of Spohr’s sample is from Finland, therefore one could say that the regulation regarding profit warnings is similar to Finland’s. In contrast, Jackson and Madura (2003a) founds evidence of pre-announcement drift. One explanation for this is the difference in the regulation, in that sense that Sweden may have a more stricter regulation that force companies to release the information faster, and thereby the possibility of information leakage is smaller. This explanation would be consistent to what Jackson and Madura (2007) discovered, that the pre-announcement drift in the U.S decreased from a CAAR (-11,-1) of -4.02% to -2.55% after a new and stricter regulation was implemented. At the same time, given that our sample is collected almost through a whole business cycle removes the possibility that our results would be affected of a specific time period and a specific market condition. In the end our first argument seems most reasonable, that Sweden would have stricter regulation and therefore the possibility of information leakage is smaller.

5.4 Hypothesis Three

The speed of adjustment to a profit warning seems to be instant, with only a small negative AAR at the days (+2; +4; +6) and no statistical significant results. In contrast, the CAAR is positive with 0.23% and 0.74%, for the periods (+2, +5) and (+2, +10)
respectively. Even though no statistical significance was found, the results suggest more that the market have overreacted to the announcement of a profit warning rather than underreacted. Thus, a drift occurs but in opposite sign of the announcement. Still, the results are not statistical significant, it exists no abnormal returns after the announcement of a profit warning. Therefore, we can reject hypothesis three.

The fact that the AAR seems to revert back mostly contradicts previous research. It is only Church and Donker (2010) that finds a positive CAAR of 0.06% (+1, +20), and the CAAR that they display shows similar patterns as Figure 3. Even though similar results, their sample period was only from November 2002 to December 2002 and in that sense our results give more support that the market seems to overreact, given that our sample cover a whole business cycle. Jackson and Madura (2003a) founds in their sample that CAAR (+1, +20) is -4.58%. This is a large drift, but one can argue that their method of including the day after the announcement in their CAAR calculation is flawed, given that they do not express that they control for announcements that have occurred after the stock market have closed. Thus, the drift of -4.58% is probably smaller. At the same time, one need to remember that the technology has increased a lot since their study. Thus, one possibility that our study shows results that is in contrast with Jackson and Madura (2003a) is that the information flow is much faster in our study’s sample period. Given this, it removes the possibility that a negative drift occurs because investors get the news to late and that this effect the reaction after the announcement. On the other hand, Spohr (2014) and Cox et al., (2017) found also a negative drift, but the magnitude of these drifts was much smaller. At the same time, even though Spohr’s post-announcement drift is significant a normal t-test is used, and this could overstate the significance level. This means further that the t-test in his study is questionable and therefore also his conclusion about it.

The question arise why our results contradict the previously literature, in that sense AAR seems to revert back in our study. In the language of behavioral finance this would be a sign of emotional bias, and to be more specific, an emotional bias that creates an overreaction. In that sense the biases that creates underreactions are not relevant for our results. Instead the representativeness could explain this bias, based on that people perhaps have tried to predict the stock return based on what they have seen before. Another bias could be that the individuals follows the herd, where they sell off
their securities too quickly based on what the others are doing, and this creates a too large reaction in the stock price. In order to see if the market really overreacted, further test have been made to see if the CAR (0, +1) could explain the magnitude of CAR (+2, +5; 2+, +10). The tests are shown in the Appendix 4 and there were no statistical significant results found. Thus, it appears on aggregate level that the market does not overreact and that the market seems to be efficient. However, this does not have to imply that behavioral finance is useless. Studying the events individually could give useful information. For example, if no new information is released that relates to the company and still a drift occurs, this is in our opinion some form of evidence of emotional bias.

5.5 Hypothesis Four and Five

Table 3 displays the results from the regression presented in equation 7, that test whether the size of the company and whether the type of profit warning can explain the variation in CAR for the time intervals in question. Studying the period before the announcement date there is no statistical significant result that indicate that the size of the company and what type of profit warning have significant effect on the CAR. Further we can see that in those cases where the profit warning was qualitative has no statistical significant impact on CAR in any time interval, thus we cannot reject hypothesis four that qualitative profit warnings give different CAR than quantitative. These results contradicts Bulkley and Herrerias (2005) results that finds that qualitative warnings will result in more negative AAR and CAAR and that are statistical significant, but on the other hand our coefficient is still positive which is in line with Bulkley and Herrerias (2005).

The fact that our results is insignificant give at the same time support for EMH, in that sense that even if the information is less precise it does not seem that any under- or overreaction becomes larger, which was one of Bulkley and Herrerias argument. The one coefficient that is statistical significant is the size of the company during the announcement period, that is CAR (0, +1), telling that a smaller firm releasing a profit warning will result in larger negative AR compared to bigger firms. This is in line with previous studies (Bulkley and Herrerias, 2005; Collett, 2004; Cox et al., 2017). This could be a sign that when a smaller firm release a profit warning it comes with more
surprise compared to larger firms, and this was what Jackson and Madura (2003a) concluded. But given the results for the CAR (-10, -1) and CAR (-5, -1) this do not seem to be the answer. The reason is that coefficient is positive for the pre-period, telling that the pre-announcement drift is larger for smaller firms. This tells further that the profit warnings made by smaller firms is more anticipated than for larger firms, but on the other hand these results are not statistical significant. A rejection cannot be made on hypothesis five, telling that profit warning is not more anticipated for larger firms. Thus, the result that smaller firms have more negative CAR (0, +1) is probably due to some other factor, given that the regression yielded an adjusted R-square of 0.0582. Plausible explanations could be that smaller firms have larger risk and, or, that smaller stocks tend to be more illiquid. In this sense Jackson and Madura (2003a) conclusion falls short, given that they only base their conclusion on the AAR on the announcement date and do not take into account the period before.

| Dependent Variable | Independent Variables | Coef. | Robust Std. Err. | t    | P>|t| |
|-------------------|-----------------------|-------|------------------|------|-----|
| CAR (-10, -1)     | lnMcap                | 0.0051927 | 0.0048408 | 1.07 | 0.285 |
|                   | qualitative           | 0.0281487 | 0.0256060 | -1.10 | 0.273 |
| CAR (-5, -1)      | lnMcap                | 0.0030403 | 0.0030377 | 1.00 | 0.318 |
|                   | qualitative           | 0.0075923 | 0.0177357 | -0.43 | 0.669 |
| CAR (0, +1)       | lnMcap                | 0.0119684 | 0.0042864 | 2.79 | 0.006 |
|                   | qualitative           | 0.0192894 | 0.0281067 | -0.69 | 0.493 |
| CAR (+2, +5)      | lnMcap                | 0.0022244 | 0.0048970 | -0.45 | 0.650 |
|                   | qualitative           | 0.0080262 | 0.0280822 | -0.29 | 0.775 |
| CAR (+2, +10)     | lnMcap                | 0.0049396 | 0.0055530 | -0.89 | 0.375 |
|                   | qualitative           | 0.0033908 | 0.0319337 | -0.11 | 0.916 |

Table 3: Regression on CAR where the independent variables is the logarithm of the Market Capitalization and a dummy variable for qualitative profit warnings.
6 Conclusion

In this paper an event study has been conducted on negative profit warnings that have been released on the Swedish stock market from January 2008 to March 2018. Thus, the purpose of this study was to investigate how the market react to these profit warnings and if these reactions where rational and in accordance with EMH. Therefore, the purpose was also to investigate the stock market reaction before the announcement and after the announcement. This in order to see if the market had anticipated the announcement and if any drift occurs after. Tests was also conducted on how the firm size and the source of the profit warning impacted the reactions.

This study found that the speed of adjustment to profit warnings on the Swedish stock market is fast, given that no underreaction occurred, and this is mostly in line with previously studies. At the same time only, a small drift before the announcement could be found and the CAAR (-10, -1) and (-5, -1) was not significant. It was only the AAR the day before announcement that was significant, but at the same time the reaction was small. Therefore, the conclusion is made that the market does not have anticipated the event in that magnitude it will affect the AAR at the announcement day in any significant way. The interesting findings in this study was how the AAR developed after the profit warnings. Even though no significance was found, the CAAR after the announcement is positive and suggest that the market may overreact to profit warnings. This is mostly in contrast to previously studies where only Church and Donker (2010) finds a positive CAAR. Further, this suggest that the market do not react rational all the time, rather some emotional bias seems to explain this pattern. The cross-sectional regression analysis on the CAR give some evidence that smaller firms generate lower CAR on the announcement date compared to bigger firms, this is in line with previously studies. On the other hand, the R-square is still low suggesting some other variable also affect the magnitude of the CAR. No evidence was found that firm size has any effect in the pre- and after-period CAR. The regression analysis further suggests that whether the profit warnings was qualitative or quantitative do not have any impact on the CAR, this shows that the amount of precision in the news do not affect how rationale the investors are in their decisions, this is contrast to Bulkley and Herrerias (2005) that conclude that the market under reacts more when qualitative warnings is released.
In summary, our results suggest that the market is efficient on aggregated level. With small and insignificant pre-announcement drift the market have not anticipated the event. A drift occurs after the announcement, even though insignificant statistics it shows that the market rather overreacts than underreact to profit warnings, which could give some evidence of emotional bias in individual cases.

The implications that should be noted in this study is first that our sample is to a certain degree small compared to some of the other studies, specially the subsample of qualitative profit warnings. Second, sometimes a few companies release profit warnings at similar dates each year which could suggest that this is something that the market already knows and therefore this may not yield a reaction in the stock prices. However, these two implications are not of that degree that the results would change dramatically and therefore the conclusion would not change neither. In the end our study exhibits high credibility in that sense that the data is collected from reliable sources such Retriever’s media archive and DataStream. At the same time the event study have been used for a long time and according to Kothari and Warner (2004) short term event studies like those in this paper is almost free from trouble. Thus, this method is clearly in line with our purpose and will give results in order to answer if market participants act rational to profit warnings. At the same time those profit warnings that is released together with other important announcement is removed, this will further increase the validity of this study.

Throughout this study several interesting questions have been raised that requires further research. To start with, the amount of time individuals has to react to profit warnings should have an impact on how rational their decision is. Therefore, to study the amount of time from that a profit warning is released to when the market opens is of interest. For example, if the profit warning is released on Friday after the market have closed plenty of time is available for decision making, in contrast to when a profit warning is released when the market is opened. If the results imply that the individuals make less rational decision when less time is available, then those that stipulates the regulation may consider implementing that profit warnings should only be released when the market have closed. Of course, a drawback follows with this and that is when the time increase to the profit warning is released the risk for information leakage increase.
Another research area that needs to be more developed in the future is the predictability of returns regarding profit warnings. Even though tests are made in this study, further and more sophisticated test are needed, especially regarding overreactions and predictability.

Last, more studies have to be made regarding the difference between positive and negative profit warning, any difference in the reaction will provide useful information in the field of behavioral finance.
References

Articles:


**Literature:**


Electronic Sources:

Appendices

Appendix 1. An Example of Qualitative and Quantitative Profit Warning

Quantitative profit warning:

SSABs resultat negativt i fjärde kvartalet 2015

I kvartalsrapporten för perioden januari–september 2015, från den 22 oktober, gavs följande prognos:

"I Nordamerika förväntas efterfrågan på grovpål vara fortsatt avvaktande under fjärde kvartalet och lagervärket fortsätter hos distributörer även under fjärde kvartalet. Den underliggande efterfrågan hos slutkunder bedöms vara relativt stabil, men upptäcker viss säsongsmässig avmattning mot slutet av kvartalet.

I Europa förväntas en viss lagerminskning hos distributörer och kunder ske initialt i fjärde kvartalet, men sett över hela kvartalet väntas inga större lagerförändringar. Efterfrågan bedöms vara stabil, men med en säsongsmässig avmattning mot slutet av kvartalet. För höghållbara stål förväntas efterfrågan vara oförändrad under det fjärde kvartalet. Sammantaget bedöms SSABs leveransvolymen under fjärde kvartalet bli något högre än under tredje kvartalet. Under november kommer ett underhållsstop att genomföras i produktionen i Oxelösund vilket kommer att belasta resultatet i fjärde kvartalet med cirka 100 Mkr."

Drygt två månader in i fjärde kvartalet har pris och volymutvecklingen varit väsentligt svagare än de bedömningar som gjordes i samband med publiceringen av rapporten för tredje kvartalet.

- Volymerna för fjärde kvartalet 2015 bedöms bli i lägre än under det tredje kvartalet 2015 och betydligt lägre jämfört med fjärde kvartalet 2014. Kunder både i Europa och USA har haft en avvaktande hållning på grund av fallande priser och valt att minska sina lager.
- Marknadspriserna på tunnplåt och grovpål har gått ner kraftigt under fjärde kvartalet vilket ger en negativ inverkan på resultatet inom framförallt SSAB Europe och SSAB Americas.
- Volymer och priser i Europa och Nordamerika har under 2015 påverkats starkt negativt av höga importvolymer från Asien och från Östeuropa utanför EU. Den preliminära resultatbedömningen för fjärde kvartalet 2015 är att EBITDA (exklusiv täm fjämförelsestörande poster) kommer att uppgå till mellan 50 Mkr och 250 Mkr och att rörelseresultatet (exklusiv täm fjämförelsestörande poster) kommer att uppgå till mellan -900 Mkr och -700 Mkr.

Det operativa kassaflödet och nettokassaflödet bedöms vara fortsatt positivt under fjärde kvartalet.

Utsikter för första kvartalet 2016:

I Nordamerika väntas efterfrågan öka under det första kvartalet som en konsekvens av låga lager hos distributörerna. SSAB Americas har nyligen annonserat prishöjningar på grovpål. Kostnaderna för metallskrot förväntas fortsatt vara låga.

I Europa väntas efterfrågan öka under det första kvartalet med viss lagerpåfyllnad hos distributörer och slutkunder. Marknadspriserna för järnmalm har sjunkit väsentligt under fjärde kvartalet och kommer att påverka resultatet positivt under första kvartalet 2016.


Figure 4: Source: SSAB (2015). SSABs resultat negativt i fjärde kvartalet 2015.  
Qualitative profit warning:


Appendix 2. Modified Wald Test

Modified Wald test for groupwise heteroskedasticity in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (176) = 27232.12
Prob>chi2 = 0.0000

Table 4: STATA output; Modified Wald test
Appendix 3. Results of Average Abnormal Returns

|                      | D_minus10 | D_minus9  | D_minus8  | D_minus7  | D_minus6  | D_minus5  | D_minus4  | D_minus3  | D_minus2  | D_minus1  | D_0       | D_1       | D_2       | D_3       | D_4       | D_5       | D_6       | D_7       | D_8       | D_9       | D_10      | cons       |
|----------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                      | -8.93e-06 | .0023208  | -0.00     | 0.997     | -.0045893 | .0045714  |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
|                      | -.0028131 | .0017838  | -1.58     | 0.117     | -.0063337 | .0007075  |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
|                      | -.0020126 | .0018318  | -1.10     | 0.273     | -.0056278 | .0016027  |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
|                      | -.0007639 | .0015058  | -0.51     | 0.613     | -.0037358 | .0022079  |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
|                      | .0022044  | .0017407  | 1.27      | 0.207     | -.0012311 | .0056398  |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
|                      | .0015313  | .0024683  | 0.62      | 0.536     | -.0033401 | .0064027  |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
|                      | .0004373  | .0029786  | 0.15      | 0.883     | -.0054414 | .0063159  |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
|                      | .0015702  | .0028599  | 0.55      | 0.584     | -.0040742 | .0072147  |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
|                      | -.002685  | .0020232  | -1.33     | 0.186     | -.006678  | .0013081  |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
|                      | -.0055183 | .0021945  | -2.51     | 0.013     | -.0098493 | .0011872  |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
|                      | -.098508  | .0066073  | -10.57    | 0.000     | -.0828909 | -.0568106 |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
|                      | -.0201104 | .0038331  | -5.25     | 0.000     | -.0276754 | -.0125453 |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
|                      | -.0048781 | .0023197  | -2.10     | 0.037     | -.0094563 | -.0002998 |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
|                      | .0027865  | .0020735  | 1.34      | 0.181     | -.0013057 | .0068788  |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
|                      | -.0013925 | .0031002  | -0.45     | 0.654     | -.0075112 | .0047262  |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
|                      | .0058111  | .0036274  | 1.60      | 0.111     | -.001348  | .01297    |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
|                      | -.0012228 | .0017316  | -0.71     | 0.481     | -.0046403 | .0021946  |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
|                      | .0003496  | .0023161  | 0.15      | 0.880     | -.0042215 | .0049207  |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
|                      | .0025692  | .0022445  | 1.14      | 0.254     | -.0018605 | .0069989  |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
|                      | .0010873  | .001873   | 0.58      | 0.562     | -.0026093 | .0047838  |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
|                      | .0023341  | .0021439  | 1.09      | 0.278     | -.0018971 | .0065652  |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
|                      | -.0006536 | .0000751  | -8.70     | 0.000     | -.0008019 | -.0005053 |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |

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<tr>
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Table 5: STATA output; Results of AAR, the fourth column represent the t-test based on robust standard errors, and the fifth column represent the p-value

Appendix 4. Predictability of Returns

<table>
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<tr>
<th>Linear regression</th>
<th>Number of obs</th>
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<td>Prob &gt; F</td>
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<tr>
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<td>R-squared</td>
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<tr>
<td></td>
<td>Root MSE</td>
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<table>
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<tr>
<th>CAARp2p5</th>
<th>Robust</th>
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<th>[95% Conf. Interval]</th>
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<tr>
<td>_cons</td>
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<td>.0120131</td>
<td>-1.40</td>
<td>-.0405192 &amp; .0069011</td>
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Table 6: STATA output; Regression where the CAAR (0, +1) is the independent variable and CAAR (+2, +5) is the dependent variable.
**Linear regression**

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<th>Prob &gt; F</th>
<th>R-squared</th>
<th>Root MSE</th>
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**Table 7: STATA output; Regression where CAAR (0, +1) is the independent variable and CAAR (+2, +10) is the dependent variable.**

| CAARp2p10 | Robust Coef. | Std. Err. | t     | P>|t|  | [95% Conf. Interval] |
|-----------|--------------|-----------|-------|-----|-------------------------|
| CAAR0p1   | -.1621456    | .1730603  | -0.94 | 0.350 | -.5037132               | .179422 |
| _cons     | -.0072338    | .0136259  | -0.53 | 0.596| -.0341271               | .0196595 |