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Profit Warnings and Stock Price Development

The Swedish stock market's reaction to profit warnings over the years 2004 and 2014

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Abstract:

When a firm's estimate of its financial result deviate significantly from that of the market, the firm is obliged to issue a profit warning. Over the years 2004-2014, only 100 profit warnings were issued on Nasdaq OMX Stockholm Stock Exchange. The low number of profit warnings indicates a reluctance by firms to warn. This study was aimed at investigating whether or not this reluctance was motivated, by analysing stock price development following profit warnings**.** 2,404 quarterly observations for 198 firms, out of which 27 issued one or more profit warnings, were studied through a linear regression. The findings show that there is a clear difference in quarterly cumulative abnormal returns (CAR) between warning and non-warning firms, in line with reports from the American market. The Swedish stock market punishes the issuance of a profit warning by an 11.2% decline in CAR. This seems to hold true regardless of the magnitude of the deviation of firm net income from analyst estimates. It was found that, in cases of too optimistic estimates, the market provides a premium for convergence of analyst estimates towards actual outcome, which can be seen as reward for openness. However, this was heavily outweighed by the punishment for mere issuance of a profit warning.

Key Words: Profit Warning, Earnings Announcement, Earnings Deviation
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1. Introduction

Is openness towards the stock market rewarded or punished? This must be considered by the management of publicly listed firms when deciding on what information to convey to the market. In many cases there is no such choice; the information must be shared or else the firm will face legal consequences. Yet, there is no unanimous clear-cut definition as to if and when crucial information should be conveyed to the market. One example concerns the question of whether or not to issue a profit warning when the firm's financial performance deviates from the expected. The regulations controlling profit warnings do not provide quantitative guidelines on information disclosure. Thus, there is a grey area where management's own assessment will determine whether or not to issue a profit warning.

Below see an extract from a profit warning issued by Micronic Mydata AB in December 2006 before the release of the fourth quarter results:

"The Board of Micronic has decided to revise its expectations for the full year sales. The Board's earlier assessment was that sales for the full year would be in the range of SEK 1,300 to SEK 1,500 million. The Board's current assessment is that sales for the full year will amount to approximately SEK 1,200 million. The change in the Board's assessment is due to the present market situation."

Comparing the statement above with that from an article in the economic journal Dagens Industri regarding ABB Ltd's first quarter results in 2014 raises some questions:

"ABB reported operating income of $855 million for the first quarter. Analyst expectations indicated a profit of $1,107 billion. Orders continued to decline and new CEO Ulrich Spiesshofer was disappointed with the result /.../ the share dropped 6.6 percent."

What made management at Micronic Mydata to issue a profit warning? Why did management at ABB not warn the market of the upcoming earnings surprise despite a larger deviation from expectation, percentage wise, compared to Micronic Mydata? Management's primary task in all

profit-driven organizations is to maximize value for shareholders. Therefore, it can be assumed that the decision in this matter is influenced by the expected effect on stock price.

This thesis was an attempt to bring more clarity about the effect of profit warnings on stock price development in Sweden. This was studied through a model regressing quarterly cumulative abnormal returns (CAR), for warning and non-warning firms, as the dependent variable**.** The study focused on the *Swedish* stock market response to profit warnings. Previous studies have mainly been conducted on the American market (Jackson & Madura, 2003; Kasznik & Lev, 1995; Skinner, 1994; Tucker, 2007). Every country's stock exchange market is subject to a unique regulatory system surveying also the application of profit warnings. Therefore, it cannot be assumed that the results obtained in studies of the American market are valid also for the Swedish market.

Using data from 198 firms listed on Nasdaq OMX Stockholm Stock Exchange between the years 2004-2014, out of which 27 firms have issued a total of 44 profit warnings, the findings of this study suggested that there indeed is a difference in quarterly cumulative abnormal returns (CAR) between warning and non-warning firms. The Swedish stock market punished the issuance of a profit warning by an 11.2% decline in CAR. This appeared to hold true regardless of the magnitude of the deviation of firm net income from analyst estimates. The study also indicates that the market provides a premium for convergence of analyst estimates towards actual outcome in cases of too optimistic estimates. The convergence-process can be facilitated by firms releasing information on current financial status. The premium for convergence can therefore be seen as a reward for openness. Such a reward for openness, however, is heavily outweighed by the punishment for issuing a profit warning.

Beyond the Introduction above (Section 1), this thesis was organized as follows. Section 1 contains a survey of previous studies and theories related to profit warnings. Swedish regulations on profit warnings, and the definition of these as applied in this study, are also presented. In Section 2, the terminology and hypothesis of the study are outlined. Section 3 describes data and method. The results and subsequent analysis are discussed in Section 4, followed by an assessment of their validity. In Section 5 the main conclusions are summarized and suggestions for further research are provided.

1.1 Previous Research

Despite a number of studies on the topic, there is still controversy about the impact of profit warnings on stock price development of publicly listed firms. Kasznik & Lev (1995) found that warning firms, on average, experienced significantly lower returns than non-warning firms when facing a negative earning surprise (-4.2% and -2.0% respectively). The authors suggested the reason for the difference being analysts' interpretation of a profit warning as a permanent earning disappointment. By considering the analysts' revised forecast for subsequent annual earnings, Kasznik & Lev were able to quantify the permanence of the disappointment. It was found that warning firms experienced a mean forecast revision by -6.7% (median -3.3%), while the corresponding number for the non-warning firms was -2.7% (median -1.2%). As the revision-variable was not incorporated in their multi-response logit analysis, the explanatory value remains to be determined.

The negative effect of profit warnings on stock price development was further confirmed by Jackson & Madura (2003). In the study "Profit warnings and Timing", the authors reported that average CAR around profit warnings was-17.1%, assessed over a period starting five days before the warnings were published and ending the day after publication. The stock price continued to decline by 4.58% the following five days, suggesting an initial analyst underreaction, as no evidence of a later reversal was noted. Furthermore, Jackson & Madura showed that the isolated drop in stock price, measured over the day of the warning and the following day, was 32 times greater than that of the subsequent earnings announcement for the warning firms. During a two-day period surrounding the issuance of a warning, average CAR was -14.72%, as compared to the average of 0.46% over the day of the quarterly earnings announcement and the following day.

A study contradicting a difference in returns between warning and non-warning firms was published by Tucker (2007). In the study "Is Openness Penalized? Stock Returns around Earnings Warnings", it was indeed found that the return for non-warning firms, on average, was 10.1% higher than for warning firms. The findings seemed to hold true in the short and long term, starting the last month of the event-quarter and ending five days and three months, respectively, after the event-quarter earnings announcement. However, Tucker argued that

managers with a multitude of "other bad news" are more likely to issue a warning than those with fewer bad news, which creates a self-selection bias. The firms that warn should therefore experience lower returns. After controlling for this, the difference in return remained in the short term (-6.4%), but no difference was found in the long term.

Church & Donker (2010), in their study "Profit Warnings: will openness be rewarded?" proposed a way for firms to reduce the negative valuation effect of a profit warning. The authors provided evidence that a greater degree of disclosure had a positive effect on abnormal returns for firms conveying multiple successive profit warnings. However, the reward for releasing more specific information in the warning did not outweigh the initial negative market reaction.

Previous research seems to conclude that there is a difference in stock price development between firms issuing profit warnings compared to those not. Yet, the occurrence of disparate theories regarding the reason for this difference seems to reflect the complexity of stock price development following a profit warning.

1.2 Theoretical Framework

1.2.1 Information Asymmetry

One reason for firms to issue profit warnings is to close the expectation gap between analyst estimates and firm expectations regarding future performance. The expectation gap should be attributed to firms knowing something the analysts do not know. This is an example of information asymmetry, and occurs when one party possesses more or better information than the other (Pindyck & Rubinfeldt, 2009). This is a well-known phenomenon, and is particularly prevalent on public stock markets, where often there is a large distance between the management of a company and the owners. Church & Donker (2010) related their findings to information asymmetry and suggested that firms can offset the negative effect of a profit warning on their stock price by publishing detailed information in the warning.

1.2.2 Market Signalling

A concept related to information asymmetry is that of market signalling. Market signalling occurs in the case of information asymmetry when the one party that possesses more or better information send signals to the other conveying information about product quality (Pindyck & Rubinfeldt, 2009). Teoh & Hwang (1991) found that higher-quality firms are more inclined to voluntarily disclose bad news than lower-quality firms. The authors suggested that firms can signal high quality by the issuance of profit warnings. Furthermore, the findings in Skinner's study "Why Firms Voluntarily Disclose Bad News" (1994) supported the idea that firms can improve their reputation by voluntary disclosure of bad news. Skinner suggested this reasoning as an explanation as to why firms issue profit warnings despite empirical evidence of stock price decline after a warning. On the other hand, Kasznik & Lev (1995), as previously mentioned, suggested the issuance of a profit warning to be perceived by the market as a signal of a permanent earnings decline. The divers interpretations of what profit warnings signal obviously leave several questions open about market reaction to a warning.

1.2.3 Swedish Regulations

In Sweden, disclosure of information on stock exchanges, and thus also profit warnings, are primarily controlled by the Securities Market Act (Lag om värdepappersmarknaden) (2007:528). Also, the Swedish Financial Supervisory Authority (SFSA) (Finansinspektionen) has issued "Regulations governing operations on marketplaces (FFFS 2007:17)" as a complement to the Securities Market Act that further controls how the information should be conveyed to the market. Moreover, all firms listed on Nasdaq OMX Stockholm Stock Exchange (Nasdaq OMXS) are also subject to the rules of the stock exchange. Nasdaq OMXS Rule book for Issuers (2014) refers to Chapter 15 section 6 in the Securities Market Act regarding the issuer's obligation to disclose information and states:

"*...the issuer of transferable securities must /.../ continuously inform the Exchange about its operations and otherwise provide the Exchange with information required in order to fulfil its obligations. Furthermore, the issuer must also publish such information regarding its operations and securities which is of significance for assessment of the price of the Securities*".

Continuing, the Nasdaq OMXS Rule book for Issuers further states:

"In the event that the financial result or position of the company deviates in a significant way from what could reasonably be expected based on financial information previously disclosed by the company, the company shall disclose information about the change if it is considered price sensitive."

The phrase "deviates in a significant way from what could reasonably be expected" lacks quantitative measures. This makes an interpretation of what is "significant" dependent of a variety of firm specific circumstances. Moreover, information that is "price sensitive" differs from case to case and is therefore hard to assess. The Rule book for Issuers does however provide some, albeit not quantitative guidelines.

In conclusion, neither the law nor SFSA or Nasdaq OMXS provide quantitative criterias to define a profit warning or requirements as to when and how this should be issued. The identification of important information and the following assessment of its effect on share price is a complex consideration for management. In the absence of distinct guidelines, the issuance of profit warning remains a subjective decision.

2. Terminology and Hypothesis

2.1 Terminology

2.1.1 Profit Warning

In this study, a public firm announcement is considered to be a profit warning if it contains *management disclosure of information on future performance not in line with previous expectations*. This definition was derived from that of the Nasdaq OMXS Rule book for Issuers and the Securities Market Act. It was also taken into account that a warning had to indicate a clear effect on the future financial performanceof the company. A statement is regarded to disclose future performance if it includes information on revised sales and/or earnings outlook. Growth, market share and price development are examples of sales performance indicators,

while write-offs, impairment and restructuring costs are examples of earning performance indicators, that may be included in a profit warning. “Expectations” is defined in line with Nasdaq OMXS Rule book for Issuers (2014): “expectations based on the company’s formerly released information”. Consequently, there are expectations on all firms listed on Nasdaq OMXS. They are obliged, according to the rule book, to publish financial reports on a quarterly basis. These reports form the basis for market expectations. In addition, many publicly listed firms are monitored by analysts, who release earnings estimates, which may be assumed to affect market expectations. The consensus of analyst estimates could be seen as indicators of market expectations. In the present study the *consensus* of analyst estimates was hereafter referred to as “analyst estimates” and used to represent market expectations. Finally, some firms disclose their own prognoses, which presumably affect both analyst estimates and market expectations. Altogether, several actors contribute to market expectations but regardless of the underlying sources and forces, a significant deviation from them should result in a profit warning.

The effect of a profit warning on stock price development was studied using a linear regression controlling for analyst revision, earnings surprise, market capitalization and market-to-book value. Definitions of the variables were presented below and the methodology was further outlined in section 3.

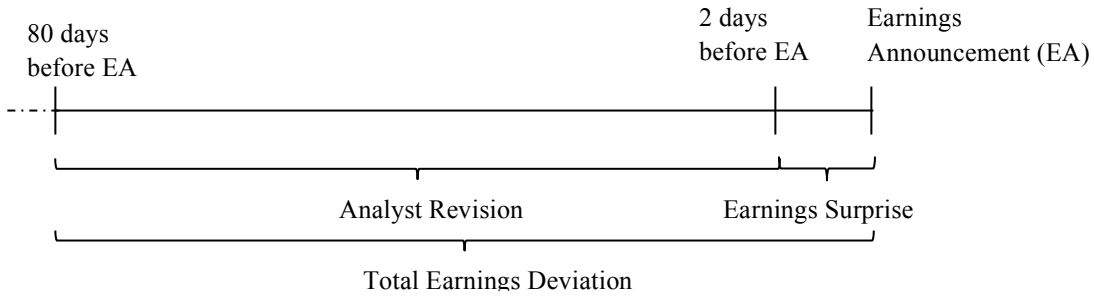
2.1.2 Analyst Revision

The variable “analyst revision” (REV) was the difference between the latest and earliest analyst estimates of net income for the quarter, 80 and 2 calendar days before the release of the quarterly reports including earnings announcements (hereafter solely referred to as earnings announcements). See Graph 1 for demonstration. Presumably the reason why firms issue profit warnings is to align market expectations with the firm’s own estimates in cases of an apparent discrepancy. Therefore, there will most likely be a downward revision between the earliest and latest analyst estimates for profit-warning firms, resulting in a negative sign of the variable REV. Obviously, no expectations can be made about the sign of REV for non-warning firms, as it depends on firm performance in relation to analyst estimates.

2.1.3 Earnings Surprise

The variable ”earnings surprise” (SURP) was the difference between actual net income and latest analyst estimate of net income for the quarter, 2 days before earnings announcement (see Graph 1). The sign and magnitude of the earnings surprise depend on the firm’s performance, which can be in line, above or below analyst estimates. By issuing a profit warning, firms have a chance to align market expectations with a revised projection of net income. Despite a warning, SURP can still assume both positive and negative values depending on how well the information in the warning describes actual outcome and how well the market adjusts its expectations to the information. Nonetheless, SURP should reasonably be smaller for warning firms than for non-warning firms. The former have made an attempt to close the expectation gap through an issuance of a warning.

Graph 1



2.1.4 Market Capitalization and Market-to-Book Value

The variable “market capitalization” (MCAP) was measured as the market capitalization in the beginning of the year for the firm. In the present study, market capitalization was controlled for as it is believed that larger firms are under closer observation by analysts (Kasznik & Lev, 1995; Jackson & Madura; 2003, Tucker, 2007; Church & Donker, 2010; among others). Skinner (1994) showed that firms can improve their reputation by voluntarily disclose bad news as investors generally dislike earning surprises. With more analysts observing a firm, stronger expectations are being created. Hence, it can be expected to be more crucial for larger firms to issue profit warnings when deviating from expectations than for smaller.

The variable “market-to-book value” (MBV) was used as a measure of firm valuation levels. Firms with high market-to-book values have high valuation levels and their stock price is

commonly believed to be more volatile (S&P Capital IQ). As these firms can be expected to experience a stronger reaction to profit warnings and earnings deviations, this is controlled for in the regression.

2.2 Hypothesis

Profit warnings are commonly perceived as something negative. Previous research confirms a negative market reaction to profit warnings. Yet, these conclusions are almost exclusively derived from American data. The lack of conclusive data from the Swedish market leaves the suggested difference in stock price development for warning and non-warning firms still to be determined.

A profit warning reduces the information asymmetry. This could be expected to be rewarded mitigating the reaction to the initial earnings deviation, which is in line with findings by Church & Donker (2010). Moreover, a warning might signal honesty, transparency and firm willingness to facilitate investor assessments. It could also signal high firm quality (Teoh & Hwang, 1991). Such signals associated with a warning may also be expected to be rewarded by the market.

Conversely, the issuance of a warning might cause analysts to interpret more into the warning than justified by the actual earnings deviation, even beyond the quarter (Kasznik & Lev, 1995). The warning might also cause investors to suspect other bad news than those disclosed in the warning (Tucker, 2007). These interpretations could lead to further alterations of future expected cash flow by investors. As the value of future expected cash flow is the definition of stock price, a downward alteration of such will have a negative impact on stock returns.

On the whole, there seems to be some controversy between research and theory. Although, considerable empirical data indicates a negative market response to profit warnings, some counterbalancing effects have been suggested. Nonetheless, it remains unknown to what extent these mechanisms operate on the Swedish market, which prompted the following hypothesis:

H_0 = Warning firms do not experience different quarterly cumulative abnormal returns compared to non-warning firms

H_1= Warning firms do experience different quarterly cumulative abnormal returns compared to non-warning firms

3. Method

3.1 Data

3.1.1 Delimitations

3.1.1.1 Firm

The study was limited to firms on Nasdaq OMX Stockholm Stock Exchange, as publicly listed firms have an obligation to continually inform shareholders about their financial performance. This also implies an obligation to issue profit warnings. Moreover, profit warnings should be issued when a firm's financial result or position deviates from what could previously be expected. As mentioned earlier, analyst estimates could be viewed as a reflection of market expectations. Therefore analyst estimates were used to measure deviations from market expectations in the present study. Hence, another limitation concerns the inclusion of only firms monitored by analysts.

3.1.1.2 Time

Cumulative abnormal returns were measured over quarterly periods, as firms are obliged to publish quarterly earnings announcements making a quantification of deviations between actual outcome and expectations possible within this time period. It is rare for firms to issue more than one profit warning within a quarter, which makes such a period suitable for research on CAR caused by profit warnings[1].

[1] The sample used in this study included no observation where more than one profit warning was issued during a quarter

3.1.1.3 Profit Warning

In the present study, profit warnings have been excluded if issued in conjunction with the earnings announcement. This is done because of the inability of separating the stock price reaction caused by the warning, and that arising from the earnings announcement. Notably, the latter entails both earnings data and other firm information. Further, only profit warnings including information on sales and/or earnings outlook were considered since these aspects are unequivocal indicators of firm financial performance corresponding to the definition of profit warning used in this study.

3.1.2 Sources

The data was collected from the databases FactSet Financial Information and Bloomberg Professional, in addition to Nasdaq OMX Nordic. Analyst estimates and net income of the firms studied were gathered from FactSet Financial Information. This database was also used to identify firms having issued profit warnings and the corresponding dates[2]. Data on firms' yearly betas, market capitalization and market-to-book value was collected through Bloomberg Professional. Daily prices between 2004 and 2014 for the firms were collected from Nasdaq OMX Nordic together with the OMX Stockholm All Share Index for the same period. The Nasdaq OMX Nordic website was also used to analyse the profit warning press releases in detail. Randomised double-checking was applied to all data through examination of quarterly reports and firm announcements.

3.1.3 Sample

The initial data sample covered all firms on the Small, Mid and Large Cap listed on the Nasdaq OMX Stockholm Stock Exchange as of February 2014. Data was collected over a period as long as a decade, i.e. 2004-2014, to obtain a sufficient number of profit warnings permitting statistical analysis. Altogether, data on 251 firms and 66 profit warnings and a total of 5,647 observations were included. Notably, 66 profit warnings according to the limitations made in the present

[2] FactSet defined a profit warning as follows: *"Companies typically issue a profit warning when the consensus of analysts' forecast becomes overoptimistic. These public calls to order /... / consist of company forecasts for changing circumstances. A profit warning is an event liable to trigger the calculations of a post-event consensus."* This definition was not applied in the present study since it would include warnings where, in our opinion, no clear effect on future financial performance or position of the company could be identified.

study, 100 profit warnings as defined by FactSet. Eliminations from the initial sample were made by excluding observations where calculation of CAR were not possible due to missing beta values. Furthermore, observations stretching over a shorter time period than the event-window (see 3.2 Operationalization of Dependent Variable below) and those lacking one or more of the control variables were also excluded. Firms belonging to the GICS level 1 industry "Financials" were also eliminated, due to the unique nature of their balance sheets. Also, firms with negative equity values, and hence negative market-to-book values, were eliminated from the sample as this could skew the results (Wilson & Wang, 2010). The final sample consisted of 198 firms, 2,404 earnings announcements and 44 profit warnings from 27 different firms. No eliminations were made based on the sign or size of the total earnings deviation from actual net income. However, only profit warnings regarding negative earnings deviations were included[3].

3.2 Operationalization of Dependent Variable

Using a similar methodology as Church & Donker (2010), an event study approach was used to measure CAR over a quarter. The data sample was assumed to be normally distributed according to the central limit theorem as the number of observations exceeds 30 (Newbold, 2010). An ordinary least square (OLS) regression was used to assess the difference in CAR between warning and non-warning firms. Throughout the study, an assumption was made regarding the chain of causality. The econometric method was built to test the hypothesis that profit warnings bring new information to the market and affect the magnitude of cumulative abnormal returns. Abnormal returns were computed as the delta between the stock's daily return and the stock's expected return:

$$AR_{i,j} = R_{i,j} - ER_{i,j}$$

$AR_{i,j}$= Abnormal return for firm *i* on day *j*

$R_{i,j}$ = Stock return for firm *i* on day *j*

$ER_{i,j}$ = Expected stock return for firm *i* on day *j*

[3] Over the ten year period being studied, only one positive profit warning was found. However, this was issued in conjunction with an earnings announcement and thereby not considered in the sample.

The expected return was calculated using the Capital Asset Pricing Model (Berk & DeMarzo, 2011):

$$ER_{i,j} = r_{f,j} + \beta_{i,j} * (r_{m,j} - r_{f,j})$$

$r_{f,j}$ = risk-free rates based on ten-year government bonds on day *j* (Swedish Central Bank)

$\beta_{i,j}$ = two years weekly betas for each firm *i* on day *j* (Bloomberg Professional)

$r_{m,j}$ = return of the value-weighted Stockholm All Share Index on day *j* (Nasdaq OMX Nordic)

The event was defined as the release of the earnings announcement (day 0). CAR was computed for two event-windows, stretching from 80 calendar days before the release of the earnings announcement, to two and ten trading days after the release. The longer event-window was used to capture a potentially lagged market response to the earnings announcement[4].

$$CAR_{i,Q} = \sum AR_{i,j} \text{ for day } j = (-80, 2) \text{ and } j = (-80, 10)$$

3.3 Operationalization of Independent Variables

3.3.1 Operationalization of Test Variable

3.3.1.1 Profit Warning

A dummy variable (DPW) was used to separate firms into "warning" and "non-warning", depending on whether the firm had issued a profit warning during the quarter or not.

$$DPW_{i,Q} = \begin{cases} 1 \text{ warning} \\ 0 \text{ non} - \text{warning} \end{cases}$$

[4] Day -80 was used instead of day -90 (which may be thought of as a natural event-start when measuring returns over a quarter) in order to obtain as many profit warnings as possible and to avoid including the same returns in two event-windows when there was less than three months between two subsequent earnings announcements. In the initial sample, the number of days between releases of two consecutive quarterly reports ranged from 52 to 125.

3.3.2 Operationalization of Control Variables

3.3.2.1 Analyst Revision

The analyst revision (REV) was the difference between the latest and earliest analyst estimates of net income for the quarter, divided by earliest analyst estimate[5].

$$REV_{i,Q} = \frac{E_{i,L} - E_{i,E}}{|E_{i,E}|}$$

3.3.2.2 Earnings Surprise

The earnings surprise (SURP) was the difference between actual net income and latest analyst estimate of net income for the quarter, divided by the latest estimate.

$$SURP_{i,Q} = \frac{NI_{i,Q} - E_{i,L}}{|E_{i,L}|}$$

3.3.2.3 Market Capitalization

This variable (MCAP) was created by scaling the firm's market capitalization in the beginning of the year to 1:1,000,000,000 in order to achieve somewhat similar magnitude of the control variables.

$$MCAP_{i,t} = \frac{MCAP_{i,t-1}}{1{,}000{,}000{,}000}$$

3.3.2.4 Market-to-Book Value

The variable (MBV) was created by assessing the firm's market capitalization in the beginning of the year, divided by the firm's opening balance of total assets.

$$MBV_{i,t} = \frac{MBV_{i,t-1}}{Total\ Assets_{i,t-1}}$$[6]

[5] The earliest and latest analyst estimates were issued 80 and 2 calendar days respectively before the earnings announcement.

[6] This is not the correct definition of market-to-book value. However, this was realized late in the study why the variable has not been redefined.

3.4 The Model

A modification of the regression by Bartov et al. (2002) was used in this study. CAR was regressed on DPW, REV, SURP, MCAP and MBV to estimate the causal relationship between DPW and CAR:

$$CAR_{i,Q} = \beta_0 + \beta_1 DPW_{i,Q} + \beta_2 REV_{i,Q} + \beta_3 SURP_{i,Q} + \beta_4 MCAP_{i,Q} + \beta_5 MBV_{i,Q} + e_{i,Q}$$

Test variable:

$DPW_{i,Q}$ = dummy variable for profit warning for firm *i* within quarter *Q*

Control variables:

$REV_{i,Q}$ = revised analyst estimates for firm *i* and quarter *Q*

$SURP_{i,Q}$ = earnings surprise for firm *i* and quarter *Q*

$MCAP_{i,Q}$ = yearly scaled market capitalization for firm *i* and quarter *Q*

$MBV_{i,Q}$ = yearly market-to-book value for firm *i* and quarter *Q*

$e_{i,Q}$ = error term for firm *i* and quarter *Q*

Previous studies have not made a distinction between deviations from early and late analyst estimates but instead measured the deviations from a single, or average, estimate (Kasznik & Lev, 1995; Jackson & Madura, 2003; Tucker, 2007; Church & Donker, 2010; among others). Using a similar methodology as Bartov et al. (2002), this study made this distinction, the reason being that, for warning firms, there will commonly be a downward revision of analyst estimates. The profit warning effect on analyst estimates over time would not be captured using one single measure.

4. Result and Analysis

4.1 Results

The findings are presented in Table 1[7]. In OLS (1, 2), the coefficients of the DPW showed that there is a negative and significant correlation between the issuance of profit warnings and cumulative abnormal returns. The null Hypothesis "Warning firms do not experience different quarterly cumulative abnormal returns compared to non-warning firms" can therefore be rejected at 1% significance level. Below, see an in-depth analysis of the results from the regression.

Results of OLS (1) and OLS (2)

$$CAR_{i,Q} = \beta_0 + \beta_1 DPW_{j,Q} + \beta_2 REV_{j,Q} + \beta_3 SURP_{j,Q} + \beta_4 MCAP_{j,Q} + \beta_5 MBV_{j,Q} + e_{i,Q}$$

Table 1. Ordinary Least Squares (1, 2)

Period	N	β_0	β_1	β_2	β_3	β_4	β_5	R^2 (%)
CAR2 (-80, 2)	2404	0.001	-0.116***	0.013***	0.011***	-0.000	0.013***	6.6%
OLS (1)		(0.005)	(0.025)	(0.003)	(0.001)	(0.000)	(0.003)	
CAR10 (-80, 10)	2404	-0.001	-0.112***	0.012***	0.011***	-0.000	0.016***	6.2%
OLS (2)		(0.005)	(0.027)	(0.003)	(0.001)	(0.000)	(0.003)	

Significance level of *p<10%, **p<5%, ***p<1%

Extreme values were winsorized at 1% level. Robust standard-errors are shown in parenthesis

$CAR_{2,i,Q}$ = cumulative abnormal return over the quarter beginning 80 days before the release of earnings announcement and ending 2 trading days after the earnings announcement
$CAR_{10,i,Q}$ = the cumulative abnormal return over the quarter beginning 80 days before the release of earnings announcement and ending 10 trading days after the earnings announcement
$DPW_{i,Q}$ = a dummy variable that takes on the value of 1 if the quarter contains a profit warning and 0 otherwise
$REV_{i,Q}$ = difference between the latest and earliest analysts' estimates of net income for the quarter
$SURP_{i,Q}$ = difference between actual net income and latest analyst estimate of net income for the quarter
$MCAP_{i,Q}$ = a firm's market capitalization in the beginning of the year divided by 1,000,000,000
$MBV_{i,Q}$ = market capitalization in the beginning of the year relative to book value of total assets in the beginning of the year

[7] The results presented in this section were considered after winsorizing at the 1% level to improve estimation of the OLS regression. The reason for using winsorizing to control for extreme values was that the majority of the extreme values represent observations containing profit warnings. Therefore, trimming would not be a suitable method. It would result in a smaller number of the already few profit warnings in the final sample. Also, since 1% was winsorized in both tails, this should not cause any redistribution of the data.

Table 2. Descriptive Statistics

Variable	N	Mean	Median	Std.
CAR (-80, 2)	2404	0.006	0.013	0.168
CAR (-80, 10)	2404	0.008	0.012	0.180
REV	2404	-0.251	-0.072	1.171
SURP	2404	-0.417	-0.023	2.535
MCAP	2404	35.074	4.841	78.419
MBV	2404	1.285	0.924	1.266

Table 3. Analyst Revision and Earnings Surprise

	Profit Warning			No Profit Warning & Neg. Tot. Earnings Deviation		
Variable	Mean	Median	Std.	Mean	Median	Std.
REV	-1.363	-0.500	3.318	-0.758	-0.166	4.913
SURP	-7.009	-0.167	32.578	-1.140	-0.162	8.224

Data were assumed to be normally distributed, therefore the following analysis was based on mean values. However, due to skewness of the data, the median may sometimes have been more representative. The median values were represented in parenthesis to facilitate understanding of the results (see Appendix 7.2.1 for statistics on skewness of the data).

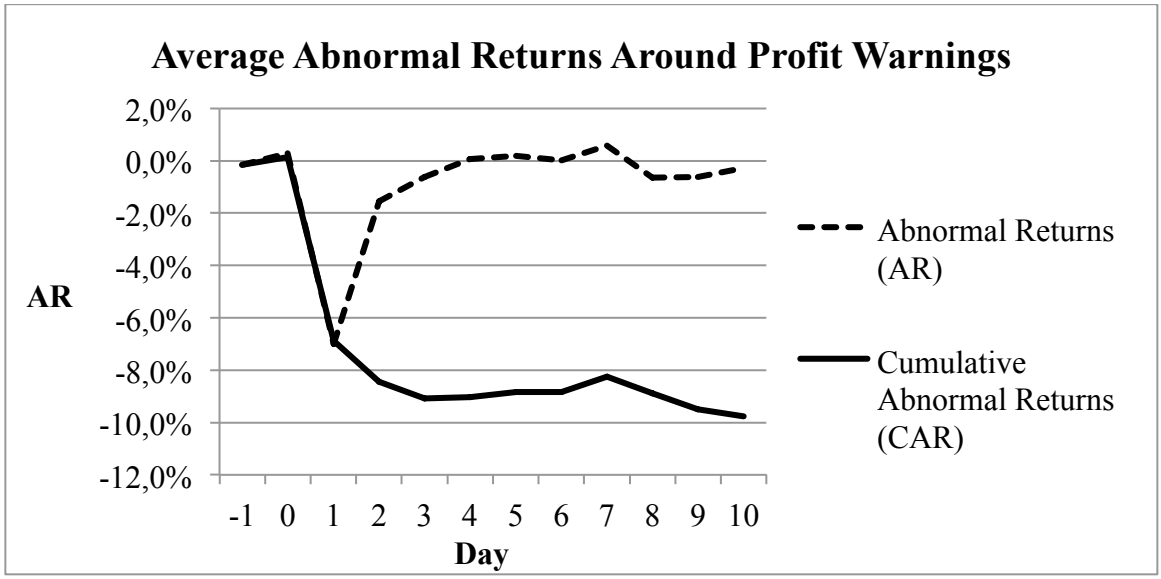
4.2 Analysis

4.2.1 Profit Warning

The results in Table 1 showed that the dummy profit warning (DPW) was significantly and negatively correlated (-0.112) with CAR. After controlling for the magnitude of total earnings deviation, firm size and firm valuation warning firms, on average, experienced 11.2% lower CAR over a quarter than non-warning firms. This punishment for issuance of profit warnings is indeed of decisive economical importance given that the average CAR for the total sample was 0.8%.

4.2.1.1 Investor Behaviour Around Profit Warnings

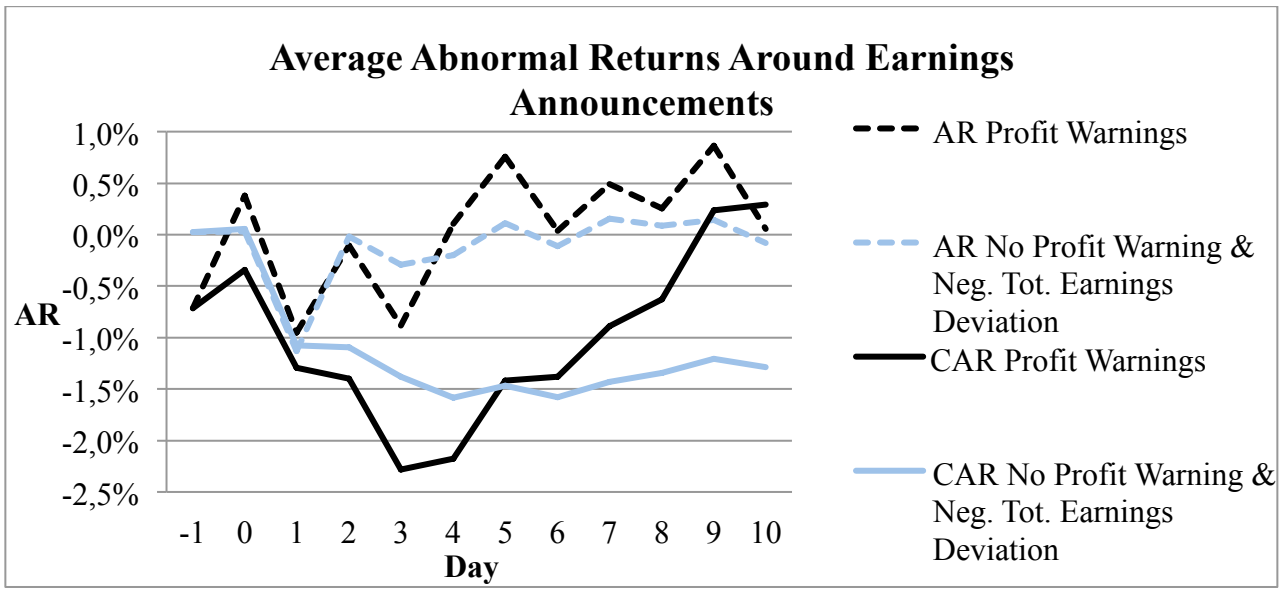
Graph 2



In Graph 2, average abnormal and cumulative abnormal returns around profit warnings are shown, stretching from one day before the profit warning to ten days after the warning. A strong negative market reaction of 7.0% could be observed the day following the warning. (-7.0% in AR and -6.6% in CAR). The stock returns experienced a continued negative development until the fourth day after the warning, whereupon they seemed to stabilize. Extending the period to ten days after the warning resulted in an average CAR of -9.8%. The negative reaction implies that profit warnings bring new information to the market that alters investor expectations. As the value of future expected cash flow is the definition of stock price, a downgrading of expected future cash flow will have a negative impact on stock returns. The lagged market response to new information conveyed through profit warnings could be evidence of an initial analyst underreaction. The finding also indicated that information disclosed in warnings is firm specific. If the information instead would have been applied to the whole industry, it would most likely have been known by investors and therefore not caused a pronounced reaction.

4.2.1.2 Investor Behaviour Around Earnings Announcement

Graph 3



In Graph 3, a difference in market reaction around earnings announcements between warning and non-warning firms can be seen as determined by analysis of average abnormal returns and CAR. Comparison of average abnormal returns between warning and non-warning firms is solely of interest if both groups experience negative earnings deviations. Therefore, "non-warning firms" were referred to those experiencing negative earnings deviation in the following section.

Both warning and non-warning firms experienced an initial decline in abnormal returns on the day following the earnings announcement. However, for non-warning firms, average abnormal returns stabilized between -0.3% and 0.2% from day two until ten days after the earnings announcement. Firms having issued profit warnings experienced a more fluctuating course with average abnormal returns ranging from -0.9% to 0.9%. By analysing CAR from one day before the announcement to one day after, it was observed that both types of firms exhibited similar abnormal returns (-1.3% for warning firms and -1.1% for non-warning). Extending this period to ten days following the earnings announcement, a reversal effect was found for the firms having issued profit warnings (from -1.3% to 0.3%) whereas the non-warning firms continued to exhibit CAR on low negative levels (from -1.1% to -1.3%). Regardless of the issuance of profit

warnings, it can be concluded that earnings announcements bring new information to the market to which it responds within a few days. Notably, firms having issued profit warnings exhibit a more volatile stock price development following the earnings announcement.

4.2.1.3 Early Earnings Announcement

One could assume that information disclosed in a profit warning would serve as an early earnings announcement. For firms having issued a warning, the ensuing earnings announcement would not bring any new information to the market, given no additional earning deviations, and thus not cause any abnormal returns. However this was not the case. Either firms do not warn enough or new circumstances have meanwhile occurred on the market that are disclosed in the earning announcement leading to negative reactions. This can not be determined by solely observing abnormal returns. Of interest is also the reversal effect for observations including a warning, occurring after the earning announcement. One could argue that the positive CAR for the longer period is due to analysts taking into account new, positive information disclosed in the earnings announcement. However, the seemingly contradictory negative initial reactions remain unexplained. The magnitude of the earnings deviations was not controlled for in these analyses. No conclusions can therefore be drawn about the adequacy of the reaction in quantitative terms, but at least the general behaviour pattern can be discerned.

4.2.1.4 Rewards and Punishments

Although the magnitude of the total earnings deviations was not controlled for when measuring CAR around profit warnings and earnings announcements, it was controlled for in the regressions through the variables REV and SURP. Hence, CAR resulting from the mere issuance of profit warnings was captured by DPW. The negative coefficient of DPW indicates that the potential reward for closing the expectation gap, as suggested by Church & Donker (2010), was outweighed by the punishment for issuance of a profit warning. This is in line with results by Libby & Tan (1999) presented in the paper "Analysts' Reaction to Warnings of Negative Earnings Surprises". The severe punishment might be at least partly explained by the low frequency of profit warnings. Each warning is therefore at increased risk of receiving greater attention and thereby negatively affecting the expectations of a larger number of investors.

The pronounced negative reaction to warnings could also be related to the regulations of profit warnings. Given that there are no clear guidelines as to when and if to issue a warning, this may cause market uncertainty about the underlying reason for the warning. Investors may interpret more into the warning than the current quarter earnings deviations actually reflect, and thereby downgrade future cash flow expectations. The information given in the warning might also imply, or clearly state, weaker outlook for firm performance also beyond the current quarter, resulting in a justified downgrade of future cash flow expectations in the long run. Since the long-term future performance deviations, communicated in a small number of warnings, were not controlled for in the present study, its explanatory value remains undetermined. The long term difficulties disclosed in some warnings could potentially skew the results and be an explanation for the heavy, and maybe also justified, market punishment found in this study.

From this study, one can only speculate about the reason for the lower expectations on future cash flow beyond the quarter (when not communicated in the warning) but previous research has given valuable insights. Two possible explanations are analyst suspicions and interpretations. A study taking into account analyst suspicions of firms having "other bad news" than those disclosed in the warning was presented by Tucker (2007), suggesting that there may exist a self-selection bias among both warning and non-warning firms. After controlling for this self-selection, Tucker found no difference in returns in the long run. Since "other bad news" is not controlled for in the regressions applied in this study, the potential effect of these on stock price development around profit warnings on the Swedish market was not considered. This may have lead to an exaggerated magnitude of the DPW coefficient. Furthermore, Kasznik & Lev (1995) suggested that analyst interpreting permanent earning disappointments beyond the current quarter into the profit warning could be the reason for the severe punishment of warning firms. This was not controlled for in the multi-response logit analysis by Kasznik & Lev, nor in the model used in this study. Thus, its explanatory value remains to be determined.

4.2.1.5 National Features

Several studies conducted on the American market between the years 1996-2003 reported a decline in CAR ranging from 4.2 to 14.2% caused by profit warnings. The findings in the present study on the Swedish market showed a decline in CAR by 11.2%. The regulations regarding

issuance of profit warnings are commonly national and stock exchange specific. Comparisons of different market reactions are therefore difficult to make. Moreover, different studies employ different econometric models. The model used in this study, to our knowledge, has not been used before. Nonetheless, some conclusions may be drawn when comparing the reaction to warnings on the Nasdaq OMX Stockholm and Nasdaq (USA) as the rules are quite similar. Not surprisingly, a negative market reaction to profit warnings occurs on both markets. Apart from similarities in regulations, also similar firm and investor cultures may play a role. Even if firms in Sweden and USA were governed by different regulations, one could expect the firms to behave similarly. The New York Stock Exchange and Nasdaq (USA) are the two largest in the world. The firms listed may be assumed to serve as role models on how to act on the stock market. Firms listed on Nasdaq OMX Stockholm do not only attract Swedish investors, but also international. To facilitate investments, the firms are prone to adapt to the "global" American practice to the extent the national regulations allow. As investors seldom are confined to one single market, one may expect the response on a specific market to be similar to that on another. Investors are always searching arbitrage opportunities. If markets reacted differently to the same information, this would quickly be taken advantage of by investors. The differences and hence also the arbitrage opportunities would then disappear.

4.2.2 Lagged Market Response

In the present study, CAR was computed over two time periods; two and ten trading days following the earnings announcement. The average CAR was 0.6% over the shorter period and 0.8% over the longer, which indicated a, small but still noticeable, overall lagged market response to earnings announcements. Moreover, the DPW coefficients assumed different values depending on event-window (long window -11.2%, short window -11.6%) at unaltered significance levels. This is in line with the findings displayed in Graph 2, suggesting a positive market reaction reversal within ten days after the earnings announcement following a warning. The reversal effect in combination with the change of the DPW coefficient suggest the results from the long-term window to be more "representative" of the market reaction. The following analysis was therefore conducted on the regression based on CAR over the longer period.

4.2.3 Analyst Revision

Analyst revision (REV) and CAR were positively correlated (0.012) at the 1% significance level. This could be seen as an indication of investor confidence in analyst estimates. The average analyst revision for the total sample was -25.1% (median of -7.2%) with a standard deviation of 1.171 (Table 2)[8]. The 25.1% average downward revision can be seen as evidence of an initial optimism in analyst estimates, followed by a later downward revision. This is consistent with the findings of Bartov et al. (2002) on the American market.

4.2.3.1 Analyst Estimates' Effect on CAR

Standard deviation is a measure of a variable's average fluctuations around the mean. The standard deviation of REV was 1.171, and was used to illustrate the effect of changes in analyst revision on CAR. One standard deviation in upward revision results in a 1.4 percentage point increment of CAR (1.171*0.012). The increase in CAR may be assumed to be of economical significance as the average CAR of the sample was 0.8%. The impact of analyst estimates on CAR could be a reason for firms' reluctance to issue profit warnings. The consequence of a warning is commonly a downward revision, which according to the coefficient of REV leads to lower CAR. The sample entailed both positive and negative earning deviations, while the profit warnings pertained exclusively to negative deviations from expectations. Thus, the ensuing analysis comparing warning firms and non-warning firms was solely based on firms experiencing total negative earnings deviations. Statistics showed an average revision by -136.3% (-50.0%) for warning firms as compared to -75.8% (-16.6%) for non-warning firms. The magnitude of the downward revision can be seen as a distinct analyst reaction to profit warnings. It may be concluded that the information given in the warnings was new and relevant to analysts, thereby causing the strong reaction. However, by solely studying the mean value of analyst revisions, no conclusions can be drawn about the revision being justified or not.

4.2.4 Earnings Surprise

The earnings surprise variable was assigned a coefficient of 0.011, significant at the 1% level. This is evidence of the market responding positively to positive earnings surprises and vice

[8] As earnings were measured in net income which can exhibit pronounced fluctuations over periods, e.g. due to non-recurring items, the large standard deviations should not be considered abnormal

versa. The variable showed large fluctuations with a mean of -41.7% (-2.3%) and standard deviation 2.535. To examine the economic significance also of this variable, its effect on CAR may be calculated using one standard deviation: an increase in earnings surprise by one standard deviation results in a 2.8 percentage point increase in CAR (2.535*0.011). Relating this increase to the average 0.8% CAR for the sample, indicated that the variable was not only of statistical significance, but also of economical.

4.2.4.1 Analyst Optimism

Despite the positive correlation between SURP and CAR, the average negative earnings surprise indicated that the general analyst optimism mentioned above holds true also for the latest analyst estimates. This observation contradicts findings in previous research by Bartov et al. (2002) on the American market, claiming that the analyst optimism turns into pessimism (underestimation of earnings) at the end of the reporting period. There seems to be a more cautious estimation path on the Swedish market compared to the American. The reason for this more consistent optimism in Sweden is not clear, but a possible explanation is a desire by analysts to make the stocks/market more attractive to encourage transactions, i.e. generate courtage fees. Another explanation could be a fear to revise estimates too much and thereby risking to lower recommendations for a stock that turns out to beat expectations. It might be easier for analysts to blame the firm for underperformance than themselves for underestimation, and thereby risking to miss a potential reward. A third explanation could be as simple as a willingness to be on good terms with firms and therefore make biased positive valuations. In the profit warnings cases, however, the suggested analyst optimism could also reflect insufficient information in the warning, and/or insufficient downward revision communicated by the firm, causing appropriate estimates hard to make.

4.2.4.2 Insufficient Closing of Expectation Gap

Presumably, profit warnings are attempts to align market expectations with that of the firm. The larger downward revision for warning firms should reasonably lead to smaller earnings surprises for warning firms compared to non-warning. However, warning firms exhibited more negative earnings surprises -700.9% (-16.7%) compared to non-warning firms experiencing negative total earnings deviations with an average earnings surprise of -114.0% (-16.2%). It is evident that

warning firms' attempts to align market expectations with their own resulted in some convergence but far from closing of the gap.

4.2.4.3 Comparing Market Reaction to Analyst Revision and Earnings Surprise

Bartov et al. (2002) reported that firms that meet or beat analyst expectations (MBE) enjoy higher returns than firms with similar earnings deviations that fail to do so. It was not the aim of this study to investigate whether this holds true also for the Swedish market. Nonetheless, some conclusions regarding expectations management can probably be drawn by studying the correlation coefficients between CAR on one hand and analyst revision (β_2) and earnings surprise (β_3) on the other. Expectations management occurs when management intentionally lower analyst estimates in order to produce a positive earnings surprise, or to avoid a negative, upon the earnings announcement (Bartov et al, 2002). The lowering of expectations by management is therefore not necessarily prompted by actual earnings deviation, but is aimed at an "expectation detour" to maximize stock price. The greater magnitude of the coefficient, i.e. the higher weight assigned by investors to analyst revision (0.012) compared to earnings surprises (0.011), indicated that there was no reward for expectations management. The penalty for lowering expectations (through a negative revision) in order to surprise the market was greater than the reward for the resulting positive earnings surprises (-0.012 + 0.011 = -0.001).

Assuming no expectations management took place, i.e. in cases of actual earnings deviations and not "expectation detours", some conclusions about different market reactions to analyst revision and earnings surprises, can also be drawn by studying the coefficients of REV (β_2) and SURP (β_3). The weight assigned by investors (indicated by the magnitude of the coefficient) to analyst revision, must be compared to the weight assigned to earnings surprises and the course of expectations caused by a revision or lack thereof. A revision in analyst estimates will influence the size of the earnings surprise and thus create a certain expectation course. If estimates are revised to come closer to the actual outcome, the earnings surprise will be smaller in absolute terms. If estimates are revised in the wrong direction, i.e. to come further apart from the actual outcome, the earnings surprise will be larger in absolute terms. The degree of convergence between analyst estimates and actual outcome achieved by analyst revision is reflected by a "lessened" earnings surprise of the same magnitude as the convergence. A one unit revision in

analyst estimates in the right direction will result in a one unit absolute decrease in earnings surprise. However, the effect on CAR of a one unit change in REV and SURP is determined by their coefficients; e.g. convergence by a one unit upward change in REV is equalled to (1* ($+\beta_2$)) and a one unit absolute decrease in SURP is equalled to (-1 *($+\beta_3$)). Furthermore, given that an upward revision is correct, the net effect of the analyst revision and its corresponding change in earnings surprise ($\beta_2 - \beta_3$) should in turn be compared to the effect of solely surprising the market without a revision (β_3):

$$\text{Net effect of analyst revision } = (1 * (+\beta_2) + \big(-1 * (+\beta_3)\big) \rightarrow \big(1 * (+\beta_2 - \beta_3)\big)$$
$$\rightarrow (\beta_2 - \beta_3)$$

$$\text{Effect from solely surprising the market without earlier revision} = (1 * (+\beta_3))$$
$$\rightarrow (+\beta_3)$$

$$\text{Difference between the two possible expecations paths} = (\beta_2 - \beta_3) - (+\beta_3)$$
$$\rightarrow \beta_2 - \beta_3 - \beta_3$$
$$\rightarrow \beta_2 - 2\beta_3$$

Consequently, assuming convergence by *upward* revision, there is a premium for revising analyst expectations instead of solely surprising the market as long as analyst revision according to its β_2 amounts to *more* than twice the weight of earnings surprise, β_3. Correspondingly, there is a reward for convergence by a *downward* analyst revision as long as the magnitude of the weight assigned by investors to analyst revision is *less* than twice the weight assigned to earnings surprises -1*($+\beta_2$ - $2\beta_3$) = ($-\beta_2$ + $2\beta_3$). This was the case in this study where $-\beta_2 + 2\beta_3$ equalled -0.012 + 2*0.011 = 0.01. The net effect, i.e. 1 percentage point increase in CAR, can therefore be seen as a market reward for convergence between analyst estimates and actual outcome in cases of too optimistic estimates, which have been observed in this study. Such a convergence is primarily facilitated by firms disclosing information on current financial status. Hence, the reward for convergence can be seen as a reward for openness as it reduces the information asymmetry. Skinner (1994) states that investors generally dislike earnings surprises and that there are costs related to management withholding information from the market. Well-known examples are litigation and reputational damage, in addition to the costs associated with investors

choosing not to hold the stock. Evidently, and in line with Skinner's theories, it is more advantageous for firms on the Swedish market to disclose information negatively affecting expectations, than to keep silent and later surprise the market. The reward assigned convergence between analyst estimates and actual outcome, through negative revisions, rhymes well with issuance of profit warnings. However, the market punishment of 11.2% caused by the mere issuance of a profit warning clearly outweighs the small reward for disclosure of upcoming earning deviations through a warning, compared to keeping silent and surprising the market.

4.2.5 Market Capitalization and Market-to-Book Value

Market capitalization correlated with CAR by a negative, non-significant coefficient of -0.000. This negative correlation between firm size and CAR is in line with the findings by (Banz, 1981; Amihud & Mendelson, 1989; among others). It has proven difficult to find a significant correlation between CAR and firm size based on quarterly returns, so also in this study (Dongcheol, 1997).

Market-to-book value and CAR correlated positively by a coefficient of 0.016, significant at the 1% level. This indicates that firms with higher valuations experience higher abnormal returns. The positive relationship is in line with findings by Dhatt et al. (1999). By comparing the original regression (OLS (2)) with one excluding the control variables market capitalization and market-to-book value (see Appendix 7.1) the coefficients were similar at unaltered significance levels. However, all coefficients (profit warning, analyst revision and earnings surprise) assumed higher absolute values. Hence, firms with high market-to-book values experience a stronger reaction to profit warnings and earnings deviations.

4.3 Validity of Results

4.3.1 Data Sample

The final data sample for analysis after the eliminations made may entail a risk of not being fully randomized. Observations lacking one or more control variables were not considered. As many as 3,228 observations were excluded due to missing values for two variables, i.e. analyst revision and earnings surprise (either early and/or late analyst estimates). Another 18 observations were

discarded because of missing values for market capitalization and market-to-book-value (out of a initial total sample of 8,875). The relatively large number of omitted observations on analyst estimates could lead to a bias towards inclusion of large firms and those listed on the stock exchange for a long period. Larger firms are likely to be under closer observation than smaller, thereby being subject to continuous analyst estimates. In addition, firms listed for a longer period constituted a larger part of the sample than those listed for a shorter period. The firm size was controlled for in the regression since it was believed to affect profit warnings, but not the listing time. Despite a considerably large number of observations excluded because of missing values on REV and SURP, analyst estimates were crucial in this study necessitating the eliminations made.

Another problem was encountered when calculating CAR for consecutive quarters. As a lagged market response to earning announcements was tested for, ten consecutive trading days following an earning announcement were included when assessing quarterly CARs for the long-term window. For some observations i.e. less than 5.0%, one or more of these ten days were accounted for twice as they belonged to two successive event-windows[9]. However, these overlapping periods were controlled for so as not to include any profit warnings that could have skewed the CAR calculations.

The reason for choosing the time period studied (years 2004-2014) was to obtain a sufficient number of profit warnings permitting statistical analysis. It may be argued that the data sample was biased towards a recession, given the inclusion of years of the financial crisis, when profit warnings can be expected to be more frequent. Although the higher frequency turned out to be the case, the average drop around profit warnings over the years of recessions and booms showed no clear differences (see Appendix 7.2.2). Furthermore, after studying GDP over the 2004-2014 period, it could be concluded that both periods of recessions and booms are considered (Ekonomifakta). Hence, the sample was probably neither biased towards any specific economic cycle, nor the results.

[9] Observations with less than (80+10) 90 between two earnings announcements

4.3.2 Statistics

4.3.2.1 Multicollinearity

Multicollinearity exists when two or more independent variables in a multiple regression are highly correlated (Wooldridge 2009). The presence of multicollinearity does not alter the underlying assumptions of OLS models nor undermine the validity of the model as a whole. Nevertheless, high correlations might invalidate the results. The VIF-test (Variance-Inflation Factor-test) can be used to determine whether the multicollinearity is severe or not. Wooldridge criticized this method and claimed that there is no upper limit for multicollinearity. The VIF-test (see Appendix 7.4.1) showed no obvious multicollinearity. Due to the criticism mentioned above, Pearson's Bivariate Correlation Matrix (see Appendix 7.4.2) was also used to assess multicollinearity (Wooldridge 2009). Low correlations were found according also to this method.

4.3.3 Robustness Tests

In order to examine the findings dependency on assumptions made and methodology used in this study, six robustness tests were made. Test 1 focused on the analysis of regressions on the two different time-periods. The original regression (OLS (2)) was compared to the regression on CAR over the shorter event-window (OLS (1)). The regressions exhibited similar coefficients with unaltered significance levels. Thus, the choice of event-window did not affect the results and the null hypothesis could be rejected for both event-windows.

In the original regression, CAR and the continuous independent variables i.e. analyst revision, earnings surprise, market capitalization and market-to-book value, were winsorised by 1% in both tails. Out of 2,715 observations, 52-55 observations were winsorised for cumulative abnormal returns, analyst revision and earnings surprise. 50 observations were winsorised for market capitalization and 74 for market-to-book value. Test 2, 3 and 4 examined the results dependence of the treatment of extreme values. These tests are important as the observations including profit warning for obvious reasons assumed abnormal values compared to the majority of the observations, 44 warning compared to 2,360 non-warning observations (see Appendix 7.5 for distribution of data sample).

In test 2, the results' sensitivity to the treatment of outliers was explored by comparing the original regression with a regression on data not excluding extreme values (OLS (3)). The two regressions showed similar coefficients with unaltered significance levels at 1% for the profit warning dummy and market-to-book value variable. The coefficients of analyst revision and earnings surprise exhibited altered significance levels, each from 1% to 5%. Nevertheless, the null hypothesis was still rejected also in OLS (3).

Test 3 compared the original regression with a regression on data excluding outliers through trimming of the sample by 3 standard deviations from the mean (OLS (4)), resulting in 2,201 observations. Similar results for coefficients and significance levels at 1% were obtained, apart from the coefficient of the analyst revision variable, which altered down to a significance level of 5%, and the coefficient of market capitalization reaching a 10 % significance level. The null hypothesis remained rejected.

Test 4 was the last test concerning the treatment of outliers. The original regression was compared with a regression on data excluding observations of REV and SURP with absolute values larger than 100 (OLS (5)). After excluding four extreme values the remaining observations were winsorised at 1% level. Similar results for coefficients and significance levels at 1% were obtained for all variables. Therefore, the null hypothesis remained rejected also in this test. The results of this study were not found to be sensitive to the treatment of extreme values.

In test 5, the original regression was compared to a regression on data excluding the control variables market capitalization and market-to-book value (OLS (6)). Unaltered significance levels and similar values of the coefficients were noted. The null hypothesis remained rejected, indicating that the results were independent of the control for market capitalization and market-to-book value.

For OLS estimations of the linear regressions to be justified, homoskedacity is required (Wooldridge 2009). Homoskedacity is at hand when the variance of the unobservable error, u, conditional on the control variables, is constant. Homoskedacity fails whenever the variance of

the error term is not constant, leading to so-called heteroskedacity. In the original regression this was controlled for by heteroskedacity-robust standard errors[10]. In test 6 the original regression was compared to a regression carried out without this particular control (OLS (7)), nonetheless showing the same significance levels. Thus, the findings were not affected by adjustment for heteroskedacity.

4.4 Limitations

It must be emphasized that the R^2 values of the regressions presented in this study were rather low. Thus, the variables used did not capture CAR very well. This obviously was a flaw of the regression, as much of CAR remains unexplained. However, regressions on CAR seldom reach R^2 values above 10%.

Other limitations pertained to the inability of subgrouping firms according to specific industry because of the limited number of observations of profit warnings in this study. Previous research suggests that there are varying attitudes to profit warnings among different industries. According to O'Brien & Hodges (1991) high technology firms are more exposed to shareholder lawsuits and thereby more inclined to issue profit warnings. Therefore, Kasznik & Lev (1995) analysed the effect of profit warnings within specific types of industries. If this could have been done in the present study, the statistics may have yielded a higher explanatory value.

Profit warnings were seldom issued before the late 1990s (Jackson & Madura, 2003). With increasing practice of such a measure, the effect of warnings on stock price may be assumed to alter. This study explored a relatively long time period and did not make a distinction between different years. Hence, changes and trends in market response were not assessed. It can therefore not be ascertained that the findings reflected current market reactions. Given that only 100 profit warnings were issued over the ten years studied no drastic change in attitudes had probably occurred.

[10] "Heteroskedacity-Robust Standard Error: A standard error that is (asymptotically) robust to heteroskedacity of unknown form" (Wooldridge 2009)

5. Conclusions & Future Research

5.1 Conclusion

The heavy damage on stock price caused by profit warnings found in the present study of the Swedish stock market suggests that firm management should be cautious to issue warnings unless there is a litigation risk associated with the withholding of information. The findings are similar to those reported from the American market. Although evidence was found that the market provides a premium for convergence of analyst estimates towards actual outcome in cases of too optimistic estimates, which indeed was observed in the present study. This can be seen as reward for openness. However, it was heavily outweighed by the punishment for the mere issuance of a profit warning. The reaction to a profit warning by the market could be counter-productive as it probably makes firms more reluctant to disclose information. This could lead to a downward spiral where the market punishes the few firms issuing profit warnings. Firms may become less and less inclined to disclose information. Without altered attitudes by either part i.e. firms and market, a solution could be a change in regulations. The main reason for the powerful market reaction is analysts interpreting more into a warning than disclosed by the firm, as suggested by previous studied. Quantitative guidelines in the regulations could potentially reduce investor uncertainty about the true underlying reasons for profit warnings. Presumably, this could mitigate an otherwise unjustified harsh market response.

5.2 Future Research

The scope of this study was to explore the stock price development following a profit warning, but not the underlying reasons for the market reaction observed. Future research should focus on identification of pertinent factors governing the mechanisms of firm and market behaviour. Furthermore, there is a need of new tools to analyse complex multifactorial forces determining the course and level of stock price. Future research might consider the introduction of an instrumental variable controlling for reverse causality. A non-linear model, due to the skewness of the data, might also be more suitable for research in this field.

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7. Appendix

7.1 Results of Regressions

Results of Regression:

$CAR_{i,Q} = \beta_0 + \beta_1 DPW_{i,Q} + \beta_2 REV_{i,Q} + \beta_3 SURP_{i,Q} + \beta_4 MCAP_{i,Q} + \beta_5 MBV_{i,Q} + e_{i,Q}$

Ordinary Least Squares: Robustness Tests

Regression	Obs.	β_0	β_1	β_2	β_3	β_4	β_5	R^2 (%)
OLS (1)	2404	-0.001	-0.112***	0.012***	0.011***	-0.001	0.016***	6.2%
		(0.006)	(0.028)	(0.004)	(0.002)	(0.001)	(0.003)	
OLS (2)	2404	-0.001	-0.112***	0.012***	0.011***	-0.001	0.016***	6.2%
		(0.006)	(0.028)	(0.004)	(0.002)	(0.001)	(0.003)	
OLS (3)	2404	-0.009	-0.117***	0.003**	0.002**	0.000	0.016***	3.3%
		(0.007)	(0.030)	(0.001)	(0.001)	(0.001)	(0.003)	
OLS (4)	2201	-0.012*	-0.126***	0.007**	0.009***	0.002*	0.022***	4.5%
		(0.007)	(0.031)	(0.003)	(0.002)	(0.001)	(0.005)	
OLS (5)	2400	-0.001	-0.116***	0.012***	0.013***	-0.000	0.016***	6.3%
		(0.006)	(0.028)	(0.004)	(0.002)	(0.000)	(0.003)	
OLS (6)	2404	0.018***	-0.122***	0.013***	0.012***			5.0%
		(0.003)	(0.027)	(0.004)	(0.002)			
OLS (7)	2404	-0.001	-0.112***	0.012***	0.011***	-0.001	0.016***	6.2%

Significance level of *p<10%, **p<5%, ***p<1%
Robust standard-errors are shown in parenthesis

OLS (1) CAR(-80, 2). Extreme values winsorized at 1% level. Controlled for robust standard-errors
OLS (2) CAR(-80, 10). Extreme values winsorized at 1% level. Controlled for robust standard-errors
OLS (3) CAR(-80, 10). Extreme values not winsorized. Controlled for robust standard-errors
OLS (4) CAR(-80, 10). Extreme values were trimmed 3 std. from the mean. Controlled for robust standard-errors
OLS (5) CAR(-80, 10). Extreme values > |100| excluded for analyst revision and earnings surprise. Remaining observations winsorised at 1% level. Controlled for robust standard-errors.
OLS (6) CAR(-80, 10). Excluding control variables Market Capitalization and Market-to-Book Value. Extreme values winsorized at 1% level. Controlled for robust standard-errors
OLS (7) CAR(-80, 10). Extreme values winsorized at 1% level. Not controlled for robust standard-errors

$CAR_{2,i,Q}$ = cumulative abnormal return over the quarter beginning 80 days before the release of earnings announcement and ending 2 trading days after the earnings announcement
$CAR_{10,i,Q}$ = cumulative abnormal return over the quarter beginning 80 days before the release of earnings announcement and ending 10 trading days after the earnings announcement
$DPW_{i,Q}$ = dummy variable that takes on the value of 1 if the quarter contains a profit warning and 0 otherwise
$REV_{i,Q}$ = difference between the latest and earliest analysts' estimates of net income for the quarter
$SURP_{i,Q}$ = difference between actual net income and latest analyst estimate of net income for the quarter
$MCAP_{i,Q}$ = a firm's market capitalization in the beginning of the year divided by 1,000,000,000
$MBV_{i,Q}$ = market capitalization in the beginning of the year relative to book value of total assets in the beginning of the year

7.2 Descriptive Statistics

7.2.1 Descriptive Statistics on Dependent and Independent Variables

Descriptive Statistics

Variable	N	Mean	Median	Std.	Max	Min	Skewness	Kurtosis
CAR (-80, 2)	2404	0.006	0.013	0.168	0.517	-0.562	-0.166	4.740
CAR (-80, 10)	2404	0.008	0.012	0.180	0.541	-0.555	-0.137	4.392
REV	2404	-0.251	-0.072	1.171	4.037	-7.691	-3.08	23.509
SURP	2404	-0.417	-0.023	2.535	4.926	-18.999	-5.220	36.506
MCAP	2404	35.074	4.841	78.419	431.678	0.120	3.398	14.777
MBV	2404	1.285	0.924	1.266	7.912	0.104	2.900	13.326

7.2.2 Descriptive Statistics on Profit Warnings

Profit Warning Characteristics

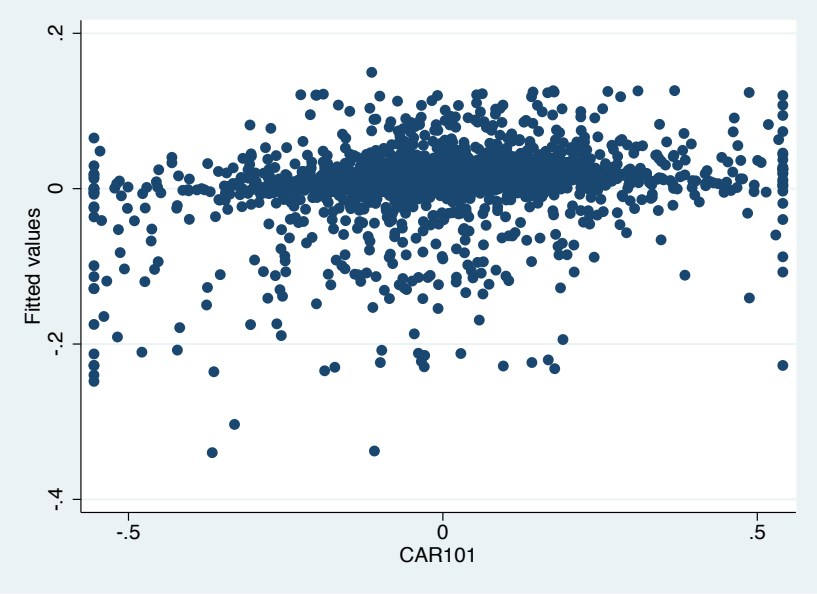
Characteristic	N
Sample Segmented by Warning Quarter	
Q1	6
Q2	9
Q3	12
Q4	17
Sample Segmented by Source of Warning	
Revenue	28
Non-revenue	16
Sample Segmented by Timing of Warning	
Earlier than -40 days before EA	17
Later than -40 days before EA	27
Total	44

Profit Warning Characteristics

Sample Segmented by Year of Warning			
Year	N	Mean Drop (-1, 1)	Mean Drop (-1, 10)
2004	0		
2005	0		
2006	2	-4.2%	-6.9%
2007	9	-8.9%	-9.7%
2008	13	-6.1%	-11.4%
2009	10	-2.0%	-2.6%
2010	0		
2011	5	-12.2%	-16.8%
2012	4	-10.0%	-15.1%
2013	1	-13.4%	-12.5%
2014	0		

7.3 Heteroskedacity

7.3.1 Plotted Error Terms



7.3.2 White's Test for Heteroskedacity

White's Test for Heteroskedacity

Source	chi^2	df	p
Heteroskedacity	183.01	19	0.0000
Skewness	7.42	5	0.1911
Kurtosis	54.99	1	0.0000
Total	245.42	25	0.0000

7.4 Multicollinearity

7.4.1 VIF-test

The table shows the results from a Variance-Inflation-test that examines the potential existence of multicollinearity between the independent variables. There is a pronounced existence of multicollinearity if VIF is higher than 10 or if the inverse of VIF is close to 0. Hence, the VIF-factor shows no pronounced existence.

VIF-test

Variable	VIF	1/VIF
PW	1.03	0.973071
REV	1.03	0.975388
SURP	1.02	0.983231
MCAP	1.03	0.966311
MBV	1.03	0.970538
Mean VIF	1.03	

7.4.2 Pearson's Bivariate Correlation Matrix

Pearson's Bivariate Correlation Matrix

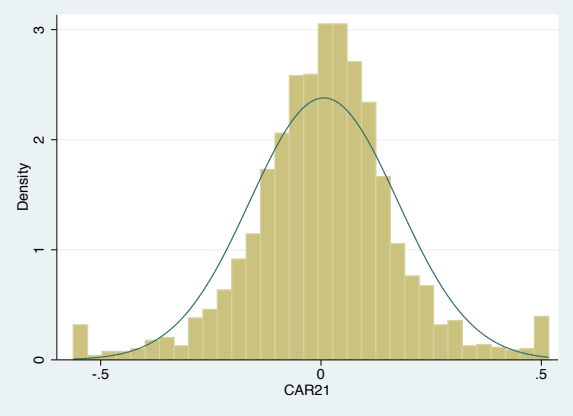
	PW	REV	SURP	MCAP	MBV
PW	1,000				
REV	-0.093***	1,000			
SURP	-0.067***	0.094***	1,000		
MCAP	0.092***	0.068***	0.046**	1,000	
MBV	-0.066***	0.076***	0.065***	0.133***	1,000

Significance level of *p<10%, **p<5%, ***p<1%

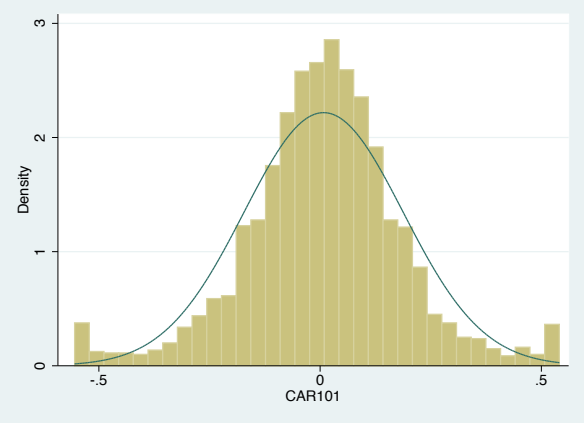
7.5 Descriptive of Data Distribution

7.5.1 Density of Variables

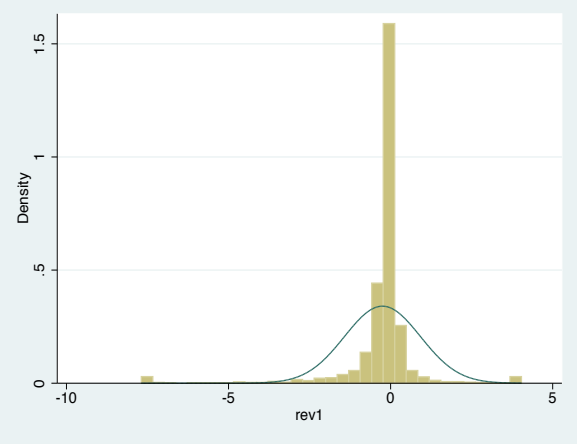
CAR (-80, 2)



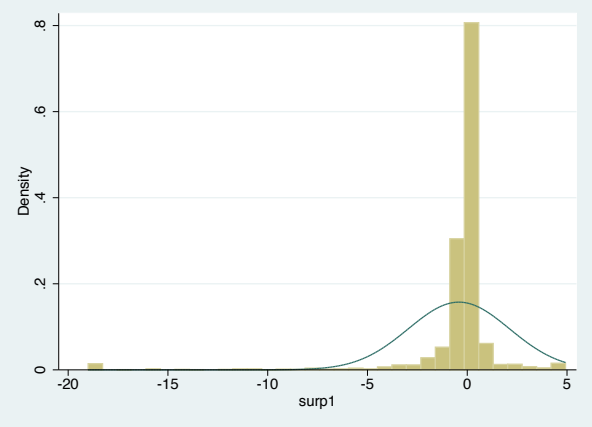
CAR (-80, 10)



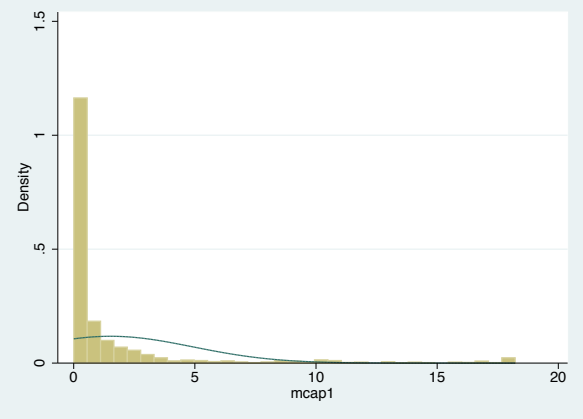
REV



SURP



MCAP



MBV