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The Convertible Bond Announcement Effect

An event study on the Nordic markets

Master thesis

Department of Economics

Lund University School of Economics and Management

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Authors: Carl Hemmingson and Robert Ydenius

Supervisor: Jens Forssbaeck

Abstract

The announcement effect of convertible bonds is a well-researched topic. However, there is no clear consensus whether the announcements of convertible bond issuance affect the stock price positively or negatively. Previous research shows that this effect differs between markets. As no previous research has been examining the Nordic markets, we find this to be of interest. The aim of this thesis is to examine if there is an announcement effect of convertible bond issues on the Nordic markets. To find if there is an announcement effect, we conduct an event study on 53 observations to obtain abnormal returns for several different event windows. Furthermore, we examine if the firm-specific variables; size of the issuing firm, leverage, market-to-book and the relative issue size are significantly affecting the abnormal returns. Based on the findings of the abnormal returns we find a negative significant announcement effect. The result is also in line with what the majority of studies finds in other European markets. Furthermore, we find leverage to have a positive effect and the relative issue size to have a negative effect on the abnormal returns.

Key words: Nordic countries, announcement effect, convertible bonds, event study, abnormal returns.

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1. Introduction

Firms have several possibilities when deciding on new sources of financing, for example issuing shares or issuing debt in the form of a straight bond. Furthermore, the use of hybrid securities is another possibility as a source of financing. One of the most well-known hybrid securities is convertible bonds which offer the investor the option to convert the bonds into common stock of the issuing company within a certain period. Convertible bonds consequently have features of both debt and equity (Brennan and Schwartz, 1980). From the firm's perspective, convertible bonds offer an interest rate that is lower than straight bonds and this might be a cheaper way of financing its operations or investments. On the other hand, a potential downside compared to a straight bond is if the bondholders choose to convert its bonds into equity against the firm's will. From the investor's point of view, the downside with lower interest rate is compensated by the upside of having the opportunity to convert the bonds into shares in the company (Zhang, 2016). Nokia, the Finnish telecommunications company, issued a convertible bond in 2012 with a maturity of five years. These bonds carry a coupon of 5,00 % paid semi-annually where the investors have the option to convert their holdings into shares in the company at EUR 2,61 per share until maturity. If the convertible bond is not converted, the nominal value will be disbursed in cash at the maturity date (Nokia, 2012).

The announcement effect due to security offerings is a well-researched subject. The empirical evidence for equity issuance suggests that these offerings have a negative effect on the issuing firm's stock price (Asquith and Mullins, 1986; Masulis and Korwar, 1986). Similar studies on straight debt generally find zero or a small negative effect on the stock price from the announcement of issuance (Dann and Mikkelson, 1984; Eckbo, 1986; Mikkelson and Partch, 1986).

The announcement effect of convertible bonds refers to the degree of influence and the direction of the stock price of a listed company due to an announcement of convertible bond issuance by the same company (Zhang, 2016). Several studies have examined this effect. The majority of the studies were conducted in the 80's and 90's, and many of them focus on the U.S. or the Japanese market since these historically have been the two largest markets for issuing convertible bonds (Dutordoir et al., 2016). Studies have also examined the announcement effect on other Western markets, for example, the UK, Swiss and the German market. The general pattern of these studies on Western markets is that the announcement of issuing convertible debt is associated with negative stock price effects (Abhyankar and Dunning, 1999; Ammann et al., 2006). This effect is on average less negative for European markets compared to the U.S. market. In contrast with results in the U.S., studies on the Japanese market show contradictive results, and there is a lack of unanimity regarding the sign of the announcement effect (Dutordoir et al., 2016). Furthermore, research conducted on emerging markets has shown that the announcement of issuing convertible bonds have a positive effect on stock prices

(Zhang, 2016). Although, the overall results imply that the announcement effect is negative, the effect varies depending on the country of interest.

Dutordoir and Van de Gucht (2007) explain that the Western European bond market differs in several aspects compared to the U.S. market. While convertible bonds have been common for a long time in the U.S., the convertible bond market in the Western Europe gained momentum first in the 1990s and has exhibited a high growth since then. Furthermore, there are differences regarding the firms issuing convertible bonds and the size of the issues between the markets. European firms usually have a larger debt component in the convertible issues than the U.S. firms. According to Lewis et al. (2003) U.S. convertible bond issuers tend to be small firms with high risk and high growth. Whereas Dutordoir and Van de Gucht (2004) propose that European issuers, on the other hand, tend to be large, mature and financially wealthy companies.

Even within Europe the convertible bond markets differ. Bancel et al. (2009) explain that there exist country-specific factors in Europe which have an impact on the likelihood of convertible bond issuance as well as the characteristics of the convertible bonds. As an example, compared to the European average, the percentage of convertibles which includes a call option[1] is substantially lower in the Nordic countries. Furthermore, the ratio of the number of public issues in relation to private issues is noticeably smaller on the Finnish and Swedish markets than the European average (Bancel et al., 2009). No research has examined the announcement effect of convertible bonds in the Nordic markets. Since the announcement effect of convertible bonds is ambiguous and there are country-specific characteristics present in the Nordic countries, hence it makes it an interesting market to investigate the announcement effect of on.

The aim of this study is to examine if there is an announcement effect of convertible bond announcements in the Nordic markets. The study will be carried out by investigating if the convertible bond announcements are associated with abnormal returns on the underlying firms' stocks. Furthermore, we will examine if firm-specific factors affect the possible abnormal returns associated with the announcements. Our intention with this study is to increase the knowledge of the announcement effect of convertible bonds in the Nordic markets.

In order to carry out the purpose, we conduct an event study on a data sample of convertible bonds with a time span from May 1992 to October 2016. The sample includes 53 observations, distributed to 22 observations in Sweden, 21 observations in Norway and ten observations in Finland. Due to data limitations, we exclude Denmark and Iceland in our study. From the event study we obtain the

[1] A call option gives the issuing firm the right to repurchase the convertible bond from the holder at a specified price (Bodie et al., 2014).

associated abnormal returns. The announcement effect is then identified by examining the abnormal returns associated with the announcements of these convertible bonds. In order to identify which firm-specific factors that potentially affect the cumulative abnormal returns, we use underlying theory regarding security issuance as well as previous research regarding the subject. We conduct cross-sectional regressions to examine if firm size, firm leverage, market-to-book ratio and the relative issue size are affecting the cumulative abnormal returns. We find that the announcement of convertible bond issuance is associated with negative significant cumulative abnormal returns for the sample. Thus, we find a negative announcement effect in the investigated Nordic countries. Furthermore, we find that leverage of the issuing firms and the relative size of the issues to be significantly affecting the abnormal returns.

In the following section, we present a theoretical background of the subject based on information asymmetry and signaling theory. In the same section previous research is reviewed, both for the announcement effect of equity and debt issuance as well as convertible debt issuance. Based on this we formulate our hypotheses. Section 3 presents the data collection process and the methodology used in this study. Furthermore, the section introduces our chosen selection criteria and the data sample that is used in this study. The results of the study are exhibited in section 4. In section 5, the analysis of the results is presented, and lastly, in section 6, we provide a summary and conclusion of the study and suggestions for future research.

2. Literature Review and Hypotheses Development

2.1. Review of Theoretical Foundation

Modigliani and Miller (1958) argue that a firm's capital structure is irrelevant for the value of the firm. The authors states that the way a firm finances its investments given certain assumptions does not matter for the market value of the firm. According to this theory, under the assumptions of perfect capital markets, it is irrelevant for the firm value whether the firm chooses to issue debt, equity, a convertible bond or any other kind of securities. Regarding the issuance of convertible bonds, common theories in previous studies include the asymmetric information theory and the signaling theory, which both violates the assumptions set up by Modigliani and Miller (Eckbo, 1986).

Information asymmetry is a commonly used theory for security issuance. Information asymmetry between the investors and the management of the firm ascends since the management has more information regarding the firm's value than its investors. Thus, the management of the firm will have information regarding the net present value (NPV) of an investment opportunity and the value without this investment opportunity, while it is unknown for investors. This situation arises and is accepted by the investors since if the information is released to the market, the competitors of the firm would also get ahold of this information which could harm the firm and thus the investors (Myers and Majluf, 1984).

Myers and Majluf (1984) explain that corporate managers act in the best interest of existing shareholders. Hence, the managers do not want to issue new shares when the firm is undervalued since the cost to existing shareholders may be larger than the investment's NPV. Therefore, the authors argue that the choice to issue new shares communicates to the investors that the management of the firm considers the firm to be overvalued. In the opposite case when the management considers the firm to be undervalued they prefer to issue debt for investments instead, finance the investments with internal sources of funds or omit the investments. The authors propose a pecking order hypothesis which states that the firms, due to adverse selection cost, prefer internal to external financing. When outside financing is necessary, firms may prefer debt issuance over equity issuance due to the lower information cost associated with debt financing.

Myers and Majluf (1984) additionally states that a firm's choice of issuing securities depends on the expectations the managers have regarding the value of the projects initiated. The authors propose that the firms are expected to issue stocks when they think that a "bad state" is likely to occur. If they expect that a "good state" is most likely to occur, they are more prone to issue debt. Assuming that the management acts in the interest of existing shareholders, they will not want to share the profits of a positive NPV-project with outside investors. For that reason, they are more likely to want to finance the project with internal sources or debt. Conversely, if the management believes that the project might increase the firm's risk and decrease the firm's value, they are more likely to want to share the downside risk with outside investors and thus issue equity. For investors who are aware of this, the decision to not issue equity signals good news and conversely the decision to issue equity signals bad news.

2.2. Previous Research of Equity and Debt Announcement Effects

There is a great deal of evidence that changes in firm's capital structure convey information to investors, and thus also affects the stock prices. The announcement effect of issuing equity is a well-researched area. A study by Asquith and Mullins (1986) investigates the effect on stock prices due to equity offerings. They examine a total of 531 common stock offerings between 1963 and 1981. The authors find a clear negative announcement effect of the offerings and the average two-day abnormal return amounted to -2,7 %. Masulis and Korwar (1986) examine the announcement effect of equity offerings on the U.S. market between the years 1963 and 1980. By investigating the announcement effect of these offerings, they found that they led to negative abnormal returns. The consensus for equity offerings is that they induce a negative announcement effect, both throughout the U.S. as well as the European market (Armitage, 1998).

Dann and Mikkelson (1984) examine the announcement effect on corporate debt offerings in the U.S. By using a sample of 150 offerings of straight debt, they find the announcement effect to be marginally negative. Eckbo (1986) analyze the announcement effect of corporate debt offerings on the U.S. market and receive similar results. Using a sample of 459 straight debt offerings between 1964 and 1981, the author find that these offerings are on average associated with zero or negative stock price reactions. Mikkelson and Partch (1986) also obtain similar results as they find straight debt offerings to be associated with small negative returns.

2.3. Previous Research of Convertible Bond Announcement Effect

As mentioned earlier, several studies examine the announcement effect of convertible bond issues. Since convertible bonds have features of both debt and equity these effects can go different ways and the announcement effect of convertible debt can be related to which of the effects of debt or equity that has the largest impact (Eckbo, 1986).

Dann and Mikkelson (1984), also examine the announcement effect of convertible bonds as well as the issue effect of these. The issue effect is the effect on the actual issue date of the convertible bond, i.e. the first day of trading of the convertible bonds. The authors implement the following selection criteria for convertible bond sample; the stock market data is identifiable in The Wall Street Journal, no other securities are offered in conjunction with the convertible bond, and no other major firm-specific news are released at the same time. These criteria narrow down the initial sample of convertible bond announcements from 537 to a final sample of 132 announcements between 1970 and 1979. The authors measure the stock price response to the announcement of new convertible debt over a two-day event window. They find that the two-day cumulative average abnormal return (CAAR) was –2,31 % and statistically significant. The authors propose different potential explanations for their findings. However, no satisfactory explanation of the results is found, but the authors laid a basis for future research regarding the announcement effect of convertible bond issues.

Eckbo (1986) also investigates the announcement effect of straight debt as well as convertible debt in the U.S. between 1964 and 1981. 75 convertible bond issues are selected by using similar criteria as Dann and Mikkelson (1984). The two-day CAAR relative to the announcement of the convertible bond offerings amount to -1,25 %. The author explain his findings based on theory of asymmetric information and the announcement should lead to a negative effect since the news of external financing will lead unformed investors to demand a discount as a hedge if the firm is overvalued. The author concludes that due the evidence of the negative announcement effect of equity, the negative effect of convertible bond announcements is likely to reflect the equity feature of convertible bonds.

A more recent study regarding the announcement effect of convertible bond issues in the U.S. was conducted by Arshanapalli et al. (2004). Their final sample consists of 85 convertible bonds issued between 1993 and 2001. In their study, both the announcement effect and the issue effect are examined. The authors use the announcement date as the first date when the issue appears on Bloomberg. The estimation period stretches from (-290, -40) and they use nine different event windows to obtain the abnormal returns. Five of these different event windows yields significant average abnormal returns (AAR) at a 0,1 % significance level, which is in line with the previous studies conducted on the U.S. market. To identify the determinants of the abnormal returns, the authors perform a cross-sectional regression where they include the size of the company (given by market value), a dummy for hot markets, the firm's market-to-book ratio and the outstanding amount of the issue as the independent variables. They perform the regression on the cumulative abnormal returns (CAR) for two different event windows; (-1, 0) and (-2, +2). For the event window (-1, 0), the authors find the coefficients for the outstanding amount of the issue, the market-to-book ratio and the size to be negatively significant.

Kang and Stulz (1996) investigate whether the Japanese stock market reacts differently to the announcement of the issuance of convertible bonds compared to the U.S. They use a sample of 561 convertible bonds between 1985 and 1991. The announcement is defined as when the initial public announcement is available in the press. The estimation window they use is (-220, -20) and the event window is three days surrounding the announcement. The authors find a significant positive average cumulative abnormal return (CAAR) of 1,05 %. As an explanation for the significant positive results, the authors propose that the Japanese managers decide to issue shares based on different considerations compared to the U.S. managers. Whereas the U.S. managers' aim is to maximize the shareholder wealth, the Japanese managers' aim is to maximize the market share. Thus the issuance of convertible bonds does not convey information that the stock is overpriced. Other potential explanations according to the authors are that the institutional setting for security issues differs in Japan compared to the U.S. and that the Japanese stock market exhibited deregulations and "bubble economy effects."

On the other hand, Cheng et al. (2005) find a negative announcement effect of convertible bonds in Japan using a sample of 172 convertibles issued during the period 1996 to 2002. The announcement date is defined as the first day of which the announcement appeared in the Bloomberg database. The event window is three days, (-1, +1), and the estimation window is (-240, -31). The authors find a CAAR of -1,24 %. They suggest that one of the reasons to why their result contradicts the results of Kang and Stulz (1996) is related to the study's different time span. The stock market index in Japan increased from approximately 250 in 1985 to a peak of 780 in 1990, which indicated a large optimism regarding the equity market. During the period 1996 to 2002, the market performance was fluctuating a lot with a slight downward trend, indicating a decreased optimism concerning the market.

Fenech (2008) examine the announcement effect on the Australian market by using a sample of 126 convertible bonds. To mitigate for confounding events, issues offered in conjunction with another offer and offerings for merger and acquisitions deals are removed. Furthermore, issues, when there was one offering within one year prior by the same company, are removed as well as when the announcement date could not be identified. The author bases the theoretical foundation on agency and information asymmetry hypothesis, financial distress hypothesis and the tax-benefit hypothesis. Based on these hypotheses, three regressions are conducted. The author employ the estimation window (-180, -20) and uses several different event windows. The author finds a slightly negative abnormal return on the event date, but overall the announcement of convertible bond leads to a significant positive stock price response which contradicts the stated information asymmetry hypothesis. The author conducts three different regressions to determine which variables affect the announcement effect. The author find the market-to-book ratio, the debt to market value of equity, the relative underwriting cost and a variable capturing the value of the tax shield to have positive effects on the CARs.

One of the earliest studies on the European market, conducted by de Roon and Veld (1998), examines the announcement effect of offerings of convertible bonds on the Dutch market. One reason why the authors find the Dutch market to be of interest is that the corporate governance structure differs from the U.S. The period stretches from 1976 to 1996. During that time 62 convertible bonds are issued. 14 of these are eliminated since the announcements are in conjunction with other type securities issuance. Their final sample consists of 47 convertible bonds. Among the sample, only 14 of the bonds are so-called clean. The rest of the bonds were announced together with the companies' annual reports or other major firm-specific news. The announcement date is defined as when the announcement appears in the Dutch daily financial news press. The estimation window ranges from (-110, -10) and the event window from (-1, +1). The CAAR for the convertible bonds amounts to 0,23 %; however, it is not significant. When only looking at the clean sample, the CAAR is still positive and insignificant. Furthermore, the authors are unable to show that the results differ from the U.S. due to differences in corporate governance structure.

The year after, the announcement effect of convertible securities in the UK market was examined by Abhyankar and Dunning (1999). In their sample selection, the authors exclude non-sterling issues and issues where the underlying company is not listed at the London Stock Exchange at the issue date. Furthermore, issues by financial companies, issues in conjunction with other types of securities and cases where the issuing company has made more than one issue within five years after the first one are excluded. Their final sample consists of 129 of convertible bonds whereas 73 of them are clean. The announcement date is defined as when the information was released to the so-called Company Announcements Office. They use the estimation window (-160, -60) and the cumulative abnormal returns are calculated using a variety of event windows. When employing the window (-1, 0) the estimated CAAR for the total sample is -1,21 % which is statistically different from zero.

The authors conduct a cross-sectional regression on the two-day cumulative abnormal return based on firm value, debt ratio, the relative size of the convertible bond, the market-to-book ratio, and the issue maturity. The firm size is used as a proxy for the degree of information asymmetry, and since larger firms have less information asymmetry, their hypothesis is that firm size ought to have a positive effect on the abnormal returns. Bankruptcy and financial distress costs could be related to business risk and a higher level of debt. Firm leverage is used as a proxy for this risk and it expected to have a positive effect. The market-to-book ratio is used to capture growth opportunities, and according to the authors, it should be positive. Lastly, the issue maturity is assumed to be negative. According to their regression, all variables are in line with their expectations except issue maturity. However, only issue maturity is found to be significant.

Ammann et al. (2006) investigate the announcement and issue effect of convertible bonds and exchangeable bonds on the Swiss and German markets. Between 1996 and 2006 a total sample of 203 convertible and exchangeable bonds is first identified, but 120 are eliminated. They remove issues according to the following criteria: announcement date cannot be identified, conversion stock is not listed, securities have a volume smaller than $10 million, data is not available, and the announcements are accompanied by other large firm-specific news two days before or after the announcement. The estimation window is ranging between (-200, -21) and they use several event windows. Similar to previous studies in the U.S., the authors find a negative announcement effect. The CAAR for the event window (0, +1) for the German and Swiss convertibles is -2,43 % and -1,03 % respectively. The authors suggest that a potential reason for the larger negative returns on the German market is related to institutional aspects.

2.4. Hypotheses Development

The key common factor in the previous research is that the announcement effect of convertible bonds issues in general is associated with significant abnormal returns. However, there is no absolute consensus regarding the sign of the announcement effect of convertible bonds, and the effect differs across markets. When considering an overall view, the majority of the research in the Western world finds a negative announcement effect associated with convertible bonds. Thus we formulate our first hypothesis:

Hypothesis 1: The stock price reacts negatively to the announcement of convertible bond issuance in the Nordic markets

Stein (1992) suggests that companies may issue convertible bonds as a backdoor way of issuing equity in situations where information asymmetry makes conventional equity issues unattractive. Abhyankar & Dunning (1999) propose that, based on the findings of Stein (1992), the firm size may be considered as a proxy of the degree of information asymmetry, where information asymmetry is inversely related to size. A motivation for this is that larger firms are more likely to have substantial analyst coverage and face more scrutiny by institutional investors (O'Brien and Bhushan, 1990). Abhyankar and Dunning (1999) test Stein's prediction that the size of the firm should have a positive influence on the announcement effect of the convertible bond issuance. The authors find a positive insignificant coefficient for the firm size variable. Arshanapalli et al. (2004) also test size with a similar reasoning as Abhyankar and Dunning. They find a significant positive coefficient for the firm size, revealing that larger firms experience less negative abnormal returns in general, all else unchanged. Based on the discussion above, we expect a positive coefficient for the size of the firm in the cross-sectional regressions, indicating that firm size should have a positive effect on the abnormal returns. Therefore we formulate the second hypothesis the following:

Hypothesis 2: The size of the firm should have a positive effect on the stock price reaction of the announcement of convertible bond issuance

Furthermore, Stein (1992) finds that convertible bonds are more commonly issued by firms that are highly levered. The author emphasizes the importance of financial distress which can be caused by having excess debt. Stein reasons that if the stock price falls, the company will no longer be able to force a conversion of the convertible bond into equity. The consequence of this leads to a larger debt burden than expected. Due to the potentially high financial distress cost for highly levered firms they will only choose to issue convertible bonds if the managements are optimistic about the prospect of the share prices and the firms' future financial performances. Therefore when a highly levered firm chooses to issue convertible debt, it could be seen as a credible signal of improved performance in the future. Stein predicts that the leverage ratio of the issuing firm should have a positive impact on the announcement effect of convertible bonds. Hypotheses regarding leverage are commonly examined in the previous research. The studies by Abhyankar and Dunning (1999) and Cheng et al. (2005) investigates the effect of leverage and both finds leverage to have an insignificant positive coefficient. Furthermore, Fenech (2008) discovers a significant positive effect of leverage which gives support to Stein's predictions. Based on the discussion above, we expect a positive coefficient for the leverage of the firm in the cross-sectional regressions, meaning that leverage has a positive impact on the abnormal returns connected to the announcement of convertible bond issuance. Based on this discussion, we formulate the third hypothesis the following:

Hypothesis 3: The leverage of a firm should have a positive effect on the stock price reaction of the announcement of convertible bond issuance

Additionally, Stein (1992) proposes that firms with higher growth opportunities are more vulnerable to financial distress cost and asymmetric information problems. The greater the potential for financial distress cost is, the more credible the convertible issuance is as a signal of optimism since these firms have the most to lose if they are unable to force conversion. Hence, these high growth firms will only issue convertibles if they are optimistic of the future stock price. Therefore, Stein predicts that the firm's growth opportunity should have a positive effect on the abnormal returns. As a proxy for growth opportunities, the market-to-book-ratio is commonly used in previous research including Fenech (2008) who propose that firms with low growth opportunities (low market-to-book-ratio) have a more negative stock reaction to the convertible debt announcement. The author found a positive effect of the market-to-book-ratio on the abnormal returns. Based on the discussion above, we expect a positive coefficient for the market-to-book in the cross-sectional regressions, meaning that market-to-book ratio should have a positive effect on the abnormal returns. We formulate the fourth hypothesis the following:

Hypothesis 4: The market-to-book of a firm should have a positive effect on the stock price reaction of the announcement of convertible bond issuance

Myers and Majluf (1984) states that the size of an issue may be interpreted as a proxy for the amount of unfavorable information that is released to the market. The potential implication of this reasoning could be that larger issues convey more negative information to the market. Based on this, a larger size of the issue should lead to a larger negative stock price reaction all else equal. The impact of the issue size has also been tested in previous studies, often as the relative size of the issue (proceeds from the issue divided by the market value of equity) with ambiguous results. For example, both Arshanapalli et al. (2004) and Ammann et al. (2006) find a negative but insignificant effect of relative issue size on the abnormal returns. On the contrary, Fenech (2008) and Abhyankar and Dunning (1999) find a positive but insignificant effect on the relative size of the issues. Since no clear pattern is found regarding the effect of the relative issue size in previous studies, we lean towards the theoretical explanation and expect a negative coefficient for the relative size of the issue in the cross-sectional regressions. The relative issue size should therefore have a negative effect on the abnormal returns. We formulate the last hypothesis the following:

Hypothesis 5: The relative issue size of the firm should have a negative effect on the stock price reaction of the announcement of convertible bond issuance

The goal of these hypotheses is to be able to identify the relationship between the Nordic stock market reaction and the announcement of convertible bonds, as well as to detect if the firm-specific characteristics have an effect on the stock market reaction.

3. Data and Methodology

3.1. Data Sample Collection

The sample data of convertible bonds for the Nordic countries; Sweden, Norway, Denmark, Finland and Iceland, are collected from three different databases; Bloomberg, Capital IQ and Thomson Reuters Eikon. We use three different databases to get the sample as large as possible and to be sure to include as many relevant convertible bonds as possible. We use the Bloomberg data as our primary database, and the convertible bonds from Capital IQ and Eikon are added if they are not available in Bloomberg. Thus duplicates are excluded. By doing so, we obtain 316 convertible bonds with a specified issue date from the different countries.

It is common that firms release information about the issuing of convertible bonds in several steps. The firms sometimes release information only that they plan to issue a convertible bond. Using this as the announcement date is problematic since we only have data on real events; thus we will miss events where the company does not fulfill their plan of issuing a convertible bond. Furthermore, if only the plan of issuing a convertible bond is released without further specification, the investors may have a hard time of assessing the effect of the potential issue. The investors can more easily analyze and thus react accordingly to the convertible bond issuance when more information is released.

The firms usually release the full terms of the convertible bond containing all relevant information close to the issue date. The full terms include, for example, the subscription price, the conversion ratio, the total issue size as well as the coupon rate and the maturity of the bond. In most cases, some of the information has already been released in previous press releases before the full terms of the convertible bond is announced. The advantage of using this date as the announcement date is that it offers a broader range of possible explanatory variables in the cross-sectional regression such as the maturity length and change in equity, which is commonly used in previous research. The downside is that if the full terms contain little new information, the investors are more likely to have already reacted to the actual announcement of the convertible bond. So the possible reaction to the full terms might have more to do with the investors' expectations regarding the issue, not the actual effect of issuing a convertible bond.

We have therefore chosen to define the announcement date as the first date where the amount of the convertible bond issue is released to market. If the amount of the issue is given, it is more likely that investors can assess this information and react accordingly.

In order to find the announcement date, we at first hand use the firm's web pages to find the press release connected to the issue. If we cannot obtain the announcement date from their archives we use newsweb.no (a news page for listed companies on Oslo Börs) for the Norwegian companies, CisionWire (a news service for listed Swedish companies) for the Swedish firms and NASDAQ's news archive for Danish, Finnish and Icelandic companies. For many of the older convertibles we were not able to find the announcement dates in these news archives. We therefore use the service Retriever Research which covers the majority of the news released by newspapers in the Nordic countries.

To examine the announcement effect of the issuance of convertible bonds, several selection criteria are set up. From the initial 316 convertible bonds found in the different databases, 53 bonds are used in our final sample. Firstly, we only include non-financial firms in our sample. Therefore we exclude all banks and financial firms (87 issues) since these are subject to regulation restrictions regarding their minimal capital requirement (Bank for International Settlements, 2016). The exclusion of financial firms is in line with previous research including Abhyankar & Dunning (1999) and Fenech (2008), where the latter argues that financial firms raise securities to satisfy their minimal capital requirement. Furthermore, we exclude those issues where the underlying firm that issued the bond is not listed or listed outside the area of interest (21 firms). If the announcement date of convertible bonds cannot be identified, we exclude them from our sample (34 issues).

Convertible bonds issued to the employees of the issuing firm are also excluded (10 firms) since the motive of these offerings usually is not because of financial reasons (Sörensson, 1993). Sometimes firms issue another type of security in conjunction with the issuance of convertible bond, as an example both a convertible bond issue and seasoned equity offer. In these cases, we cannot isolate the announcement effect of the convertible bond. For that reason, we choose to exclude this kind of issues from our sample (26 issues). Additionally, when a firm issue a convertible bond for a merger and acquisition transaction we cannot distinguish the announcement effect related to the convertible bond announcement. Therefore we exclude them from our sample (12 issues). We also exclude so-called exchangeable bonds[2] from our sample (3 issues). For some the convertible bonds, stock return data of the underlying firm is missing in Datastream and is therefore excluded from our sample (11 issues).

[2] An exchangeable bond is a hybrid debt security that can be converted into shares in another company than the issuing company (Bodie et al., 2014).

Moreover, when two or more convertibles in the original sample are announced at the same date by the same firm, we count this as one issue in our sample (5 issues). Following the approach of Fenech (2008) we choose to omit the issues where a firm had made more than one issue within one year prior to the offering (21 issues). After the selection criteria mentioned above is applied, only one convertible bond in Iceland and three in Denmark are left. Since this is too few observations to draw any conclusions regarding the announcement effect in these countries, we exclude these four observations from Iceland and Denmark, and focus on the remaining countries; Finland, Norway and Sweden.

Lastly, it is common for this kind of research to focus on "clean" announcement dates[3]. A clean announcement implies that it is not contaminated by other substantial firm-specific news that could affect the stock price. We chose to follow the same approach as Ammann et al. (2006) where we remove the convertible bonds where firm-specific news regarding forecasted or actual earnings or dividends, as well as similar large news were announced in a period two trading days prior or after the convertible bond announcement (29 issues).

The final sample of convertible bonds consists of 53 observations which met the selection criteria mentioned above. In these kinds of event studies, it is rather common that you lose a majority of your initial sample after applying relevant selection criteria to isolate the effect you are keen on investigating. As an example of this, Abhyankar and Dunning (1999) initially had a sample of 898 convertible issues whereas 261 of these were included in their final sample after their selection criteria were applied. De Roon and Veld (1998) had an even larger loss of observations, where their sample consisted of 14 clean convertible bond announcement compared to the initial sample of 62 convertible bonds. Thus, by comparing our loss of observations with previous studies in this subject, it is not unreasonably large.

There is no absolute consensus of what selection criteria to apply, and it differs in the previous research, where some are less strict, and some are stricter than in this study. A common selection criterion used in previous research is that the securities must have a minimum nominal issuing volume to be included in the sample. For example, Ammann et al. (2006) and Arshanapalli et al. (2004) applied this, and the limits were set to \$10 million and \$100 million respectively. We choose not to include a minimum issue size as it would decrease the total sample size further. One potential problem of this is that our sample might suffer from a bias towards smaller firms; however, we consider it more important to get a larger sample in this case.

[3] See for example Roon and de Veld (1998) and Ammann et al. (2006)

After applying the selection criteria, the data sample's time span reaches from May 1992 to October 2016 where the majority (45 issues) of the convertible bonds are issued in the 21st century. Roughly half of the sample (26 issues) consists of convertible bonds issued from 2010 and onwards. Overall, the data sample includes 22 convertible bonds issued by Swedish companies, 21 convertible bonds from the Norwegian market, and the rest of the ten convertible bond observations are from the Finnish market. As the Nordic market is a relatively small stock market, this affects the sample size, and the effect of it can be seen on the Danish and Icelandic convertible bonds passing our selection criteria. As we only analyze the announcement effect in Finland, Norway and Sweden, our findings might not be applicable for the all the Nordic markets. The underlying firms of the convertible bonds, as well as each respective announcement date, are given in Appendix A.

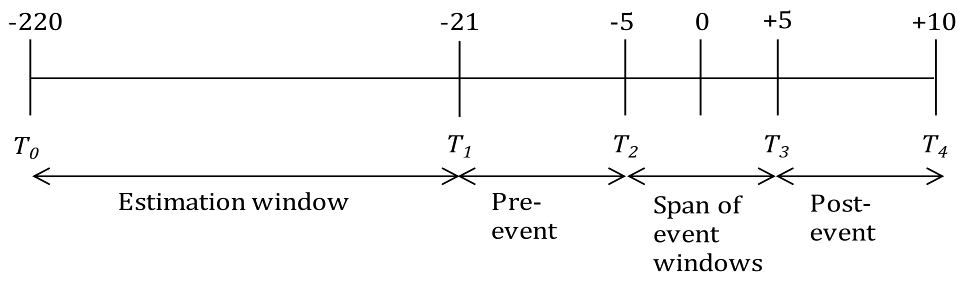
3.2. Event Study

To be able to capture the market reaction to convertible bond announcements, we use an event study methodology which is useful when measuring the effect of a certain economic event on the value of a firm (MacKinlay, 1997). Throughout this section, we choose to follow the general procedure for a short-term event study presented by MacKinlay (1997).

3.2.1. Event Definition

In order to measure the expected normal performance of the stocks, we first divide a time horizon into an estimation window, event window and a post-event window. The time $t = 0$ is defined as the event day, which is the announcement date. The time $t = T_2$ to $t = T_3$ represents the event window, and $t = T_1$ to $t = T_2$ represents the estimation window. Furthermore, the length of the estimation window and the event window is given by $L_1 = T_1 - T_0$ and $L_2 = T_3 - T_2$ respectively. The post-event window has a length of $L_3 = T_4 - T_3$. The figure below illustrates the timeline:

Figure 3.1: Timeline of the event study



This paper's estimation window is chosen based on previous research[4] to stretch from 200 days until 21 days before the announcement, i.e. (-200, -21). Thus the estimation window, L_1, includes a total of

[4] See for example Ammann et al. (2006) and Fenech (2008).

180 days. This is a commonly used length for the estimation window in previous research; however, there is no clear consensus of the length of it and the length differs between studies.

We use several different event windows in our study. The chosen windows are (-5, +5), (-2, +2), (-1, +1), (-1, 0) and (0, +1). By using event windows that are larger than just the event day we capture the potential effects surrounding the announcement date, and we can also capture the potential leakage of the information before the announcement date. We base the chosen event windows on what previous research has used[5].

3.2.2. Normal and Abnormal Returns

The normal return is defined as the expected return if the event did not occur (MacKinlay, 1997). In line with previous research, we use the single factor market model as our estimation of the expected normal return[6]. The market model relates the return of any given security to the return of the market portfolio (MacKinlay, 1997). As the market portfolio, we choose to use country specific stock market indices from The Financial Times Stock Exchange (FTSE), one for each country of interest. Thus for the Swedish firms, we use FTSE Sweden, for the Norwegian firms FTSE Norway and for the Finnish firms, we use FTSE Finland. We download this data from Thomson Reuters Datastream. The stock market data of the firms and the indices is downloaded as "total return" from the start of the estimation window until the post-event window. The "total return" in Datastream reinvests any cash distributions, such as dividends, back into the stock, which displays a more accurate representation of the stock's performance and makes it easier to compare the firms. We download the indices and the stock market data directly as one-day returns.

The market model is linear in its specification and for any firm *i*, the market model is defined as:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \qquad E[\varepsilon_{it}] = 0 \qquad Var[\varepsilon_{it}] = \sigma_{\varepsilon i}^2 , \tag{1}$$

where R_{it} is the return of firm *i* on day t, R_{mt} is the return of the market on day *t* and ε_{it} is the error term. β_i measures the sensitivity of R_{it} to the market, $R_{mt,}$ and α_i is the intercept (MacKinlay, 1997).

The expected normal return is defined as $E\{R_{it}^* | \Omega_{it}\} = \hat{\alpha}_i + \hat{\beta}_i R_{mt}^*$ where Ω_{it} is the conditional information of the market model (MacKinlay, 1997). We obtain the parameters $\hat{\alpha}_i$ and $\hat{\beta}_i$ by applying ordinary least squares (OLS) in Microsoft Excel on each firm's daily returns and the respective country's FTSE return in the estimation window. For the firm *i* the OLS estimators from the estimation window are calculated using the formulas:

$$\hat{\beta}_i = \frac{\sum_{t=T_0+1}^{T_1} (R_{it} - \hat{\mu}_i)(R_{mt} - \hat{\mu}_m)}{\sum_{t=T_0+1}^{T_1} (R_{mt} - \hat{\mu}_i)^2} \quad \hat{\alpha}_i = \hat{\mu}_i - \hat{\beta}_i \hat{\mu}_m \quad \hat{\mu}_i = \frac{1}{L_1} \sum_{t=T_0+1}^{T_1} R_{it} \quad \hat{\mu}_m = \frac{1}{L_1} \sum_{t=T_0+1}^{T_1} R_{mt} , \tag{2}$$

[5] Example, Arshanapalli et al. (2004) and Ammann et al. (2006) both use several event windows stretching from (-5, +5).

[6] See for example Ammann et al. (2006), Arshanapalli et al. (2004) and Fenech (2008).

where $\hat{\mu}_i$ is the mean of the returns for firm i in the estimation window and $\hat{\mu}_m$ is the mean of the market returns for the same period (MacKinlay, 1997).

The abnormal return over the event window is used as a measure for the impact the event has on the firm's value. At day *t*, the abnormal return is defined as the actual return for a stock subtracted with the expected normal return (MacKinlay, 1997):

$$\widehat{AR}_{it} = R_{it} - (\hat{\propto}_i + \hat{\beta}_i R^*_{mt}) \tag{3}$$

By using the obtained estimates from the OLS regressions, we calculate the abnormal returns in Microsoft Excel for all of the 53 firms for the estimation window.
These obtained values are aggregated for all of the 53 observations and is then divided by the number of events to calculate the average abnormal returns (AAR) given by (MacKinlay, 1997):

$$AAR_t = \frac{1}{N} \sum_{i=1}^{N} \widehat{AR}_{it} \tag{4}$$

We obtain the average abnormal returns for the event windows for the total sample as well as the three different subsamples divided according to country.

3.2.3. Testing Procedure

To ascertain the significance of the AAR for each day in the event window period, we use a t-statistics which is calculated based on the following equation:

$$t_{AAR} = \frac{AAR_t}{\sigma_{AAR}/\sqrt{N}}, \tag{5}$$

where t_{AAR} is the t-statistic, AAR_t is the average abnormal returns at time t, σ_{AAR} is the standard deviation of abnormal returns at time t given and N is the sample size (Brooks, 2014).

To be able to draw overall inferences of the event study, we follow MacKinlay's (1997) approach and aggregate the abnormal returns across time and securities. From the start of the event windows, t_1, to the end of the windows, t_2, we calculate the cumulative abnormal returns for all of the firms in our sample. The formula is the following:

$$\widehat{CAR}_i(t_1, t_2) = \sum_{t=t_1}^{t_2} \widehat{AR}_{it} \tag{6}$$

These values are then aggregated for the total sample as well as for the country subsamples. By doing this we can obtain the average cumulative abnormal return (CAAR) which is given by the sum of all cumulative abnormal return divided by the number of observed observations:

$$CAAR(t_1, t_2) = \frac{1}{N} \sum_{i=1}^{N} \widehat{CAR}_i(t_1, t_2) \tag{7}$$

We have no overlapping event windows in our sample. Thus the variance of the cumulative abnormal returns exhibits no clustering and hence the cumulative abnormal returns will be independent across securities. MacKinlay (1997) proposes that the estimate of the variance will be consistent when the abnormal returns are uncorrelated in the cross-section. The cross-sectional variance is given by:

$$var(CAAR(t_1,t_2) = \frac{1}{N^2}\sum_{i=1}^{N}((\widehat{CAR}_i(t_1,t_2) - CAAR(t_1,t_2))^2 \quad (8)$$

The standard deviations of the CAARs are calculated taking the square root of equation (8) and these will be used to determine the significance of the CAAR for the different event windows. We use the following calculation of the t-statistic for the total sample as well as the three subsamples:

$$t_{CAAR} = \frac{CAAR_t}{\sigma_{CAAR}/\sqrt{N}}, \quad (9)$$

where t_{CAAR} is the CAAR t-statistic, $CAAR_t$ is the cumulative average abnormal return at time *t* and σ_{CAAR} is the cross-sectional standard deviation of the cumulative abnormal returns at time *t* for the sample size given by N (Brooks, 2014). This is a parametric test which requires the observations to be drawn from a normally distributed population. However, evidence shows that daily abnormal returns are fat-tailed compared to the normal distribution. On the other hand, if the abnormal returns are independent and identically distributed drawings from finite variance distributions, the Central Limit Theorem states that the distribution of the sample will converge to normality as the number of securities increases (Brown & Warner, 1985). Thus, this kind of test in general performs more accurate when the sample size is larger. Since our subsamples are quite small we also include a non-parametric test to provide a check for the robustness of the conclusion that will be based on the parametric tests. A non-parametric test is free from specific assumptions concerning the distribution of the abnormal returns (MacKinlay, 1997). We choose to perform the non-parametric Wilcoxon Signed Rank test on the total sample and the subsamples. This will test whether the medians instead of the averages of the CARs in the sample are significantly different to zero (Rey & Neuhäuser, 2014). This test is performed in Eviews.

3.3. Data Collection of Variables

Given the obtained values of the cumulative abnormal returns, we conduct cross-sectional regressions with the aim to determine what firm-specific factors affect the cumulative abnormal returns.

The second hypothesis states that the stock price reaction to the announcement of convertible bonds should be positively affected by leverage. We define leverage as the book value of debt divided by the market value of equity. To get the values of the book value of debt, we obtain "Total debt" from Datastream. "Total debt" is defined as "all interest bearing and capitalized lease obligations." It is the sum of long and short term debt measured in local currency. The "Total debt" is only updated once a year in Datastream and is only available in yearly data. As the market value of equity, the "Market Value (Capital)" on Datastream is used, defined as "the share price multiplied by the number of ordinary shares in issue."

Following the approach of Cheng et al. (2005) who also acquire these variables from Datastream, we use the corresponding values on the last day of the year before the announcement date. This date is also used by Fenech (2008) and Abhyankar & Dunning (1999) when they compute leverage. The critique of using this is that the market value of equity may deviate a lot from the end of the year until the announcement date. However, we consider the pros of being able to use this variable to be larger than the potential cons. For two of the firms in our sample, "total debt" is missing in Datastream, and therefore we cannot compute leverage. Hence these firms become excluded in our cross-sectional regressions.

The third hypothesis states that the stock price reaction to the announcements of convertible bonds should be positively affected by the size of the firm. De Roon & Veld (1998) use the average market value of equity between 15 days and ten days before the announcement as the market value of equity in their regression. Following this approach, we take the average market value of equity between 20 days and six days before the announcement date, i.e. the pre-event window. This data is downloaded as "Market value (Capital)" in Datastream as well. Since we have three different countries with different currencies, we download all the market capitalizations directly in Euro to make all of the firms more comparable to each other. For the same reason, the natural logarithm of the obtained values is used which is customary to do in these kinds of studies[7].

The fourth hypothesis states that the stock price reaction to the announcement of convertible bonds should be positively affected by the market-to-book ratio. To obtain the book values we use "total assets" from Datastream. "Total assets" represents "the sum of total current assets, long term receivables, investment in unconsolidated subsidiaries, other investments, net property plant and equipment and other assets." The "total assets" is only updated once every year in Datastream. Following the same reason as for leverage, we use the last day of the year prior to the announcement for both the market value of equity and book value. The market-to-book ratio is given by dividing the market value of equity by the book value. In this case, we use the local currency for both the book value of assets and the market value.

The fifth hypothesis states that the stock price reaction to the announcements of convertible debt should be negatively associated with the relative size of the issue. The absolute size of the issue is obtained from the same source where we identified the announcement date of each separate issue. We get the relative size of the issue by dividing the issue size by the market value of equity given in the same currency as the issue. The market value of equity we use for this ratio is the average between day -20 and -6.

[7] See for example Ammann et al. (2006), Cheng et al. (2005) and Arshanapalli et al. (2004).

3.4. Cross-sectional Regressions

Based on the previous review of the hypotheses we estimate two different regression models to examine the association between the cumulative abnormal returns for the announcements and our variables of choice. The first regression model looks as follows:

$$CAR_i = \alpha + \beta_{i1}\ln(Size)_i + \beta_{i2}\text{Leverage}_i + \beta_{i3}Market\ to\ Book_i + \beta_{i4}Relative\ issue\ size_i + \varepsilon_i$$

We include country dummy variables in our second regression model to be able to examine country specific effects. The model looks the following:

$$CAR_i = \alpha + \beta_{i1}\ln(Size)_{i1} + \beta_{i2}\text{Leverage}_{i2} + \beta_{i3}Market\ to\ Book_{i3} + \beta_{i4}Relative\ issue\ size_{i4} + \beta_{i5}D\ Finland_{i4} + \beta_{i4}D\ Norway_{i4} + \varepsilon_i$$

"D Finland" is a dummy taking on the value of 1 for all Finnish firms and 0 otherwise and "D Norway" is a dummy taking on the value of 1 for all Norwegian firms and 0 otherwise. α will capture the effect of the firm being Swedish in this case.

4. Results

4.1. Event Study Results

The average abnormal returns for the different event windows reaching from -5 and +5 are presented in the table below. The table shows the AARs for the total sample as well for the three subsamples; Sweden, Norway and Finland. By following previous research, we use two-tailed t-test to determine the significance of the variables[8]

Table 4.1: Average Abnormal Returns (AAR)

The table shows the overview of the average abnormal returns for the total event window span reaching from -5 days until +5 days after the event date. For each date, the AAR is presented as well as the associated t-statistics. There are 53 observations in the total sample distributed accordingly: Sweden includes 22 observations, Norway 21 observations and Finland 10 observations.

Date (t)	Total sample	Sweden	Norway	Finland
-5	0,83% (1,12)	1,43% (1,55)	-0,69% (-0,71)	2,68% (1,05)
-4	0,35% (0,80)	0,92% (2,11)**	-0,65% (-0,99)	1,18% (0,76)
-3	0,15% (0,34)	0,91% (0,86)	0,24% (0,50)	-1,75% (-1,36)
-2	-0,35% (-0,95)	-0,95% (-1,45)	0,03% (0,05)	0,20% (0,36)
-1	-0,15% (-0,45)	0,20% (0,47)	-0,58% (-0,84)	-0,02% (-0,03)
0	-1,11% (-2,59)**	-0,47% (-0,68)	-1,57% (-2,32)**	-1,54% (-1,75)
1	-0,53% (-1,15)	-0,97% (-1,24)	-0,44% (-0,67)	0,23% (0,21)
2	0,14% (0,79)	-0,63% (-0,90)	1,08% (1,07)	-0,15% (-0,17)
3	-0,74% (-2,19)**	-0,64% (-0,98)	-0,93% (-2,13)**	-0,55% (-0,89)
4	0,02% (0,06)	0,03% (0,05)	-0,52% (-0,87)	1,16% (1,13)
5	0,02% (0,04)	0,85% (1,26)	-0,82% (-1,14)	-0,06% (-0,08)

***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively, using a 2-tail test.

As seen in the table, the AAR for the total sample at the announcement date, i.e. the event date, t = 0, is -1,11 % which is statistically significant from zero at a 5 % level. The negative AARs are quite concentrated around t = 0, with the exception that AAR is negatively statistically significant at t = 3. Overall, by splitting the sample according to the countries, the results are fairly similar.

In the Swedish subsample, there is a negative AAR of -0,47 % at the event date, which is lower than for the total sample and it is not statistically significant. What also can be noted is that for t = 1 to t = 3, the AARs are negative and larger in absolute terms, but they are insignificantly different from zero as well. In this subsample, only the AAR for t = -4 is significant with a p-value below 5 %.

[8] See for example Abhyankar and Dunning (1999), Ammann et al. (2006) and Cheng et al. (2005)

The AAR at the event date of the Norwegian sample amount to -1,57 %, which is larger than for the overall sample and it is significant at a 5 % level. The negative announcement effect is relatively clustered at t = 0 since even though AAR at t = -1 and t = 1 are negative, they are not significant. However, AAR at t = 3 is significant and negative.

The Finnish sample also yields a larger negative AAR at t = 0, -1,54 %, than the total sample. The magnitude of the AAR at the event day is similar to the Norwegian subsample, but in this case, it is not significant. The sample for Finland is however rather small with a total of ten observations.

As mentioned, we employ several different event windows to examine the cumulative effect of the stock market reaction. The CAARs of the different event windows for the total sample and the subsamples are reported in the table below. By using a Wilcoxon Signed Rank test in Eviews we investigate whether the median CARs for the event windows are significantly different from zero or not. The second table shows the output of the Wilcoxon Signed Rank test.

Table 4.2: Cumulative Average Abnormal Return (CAAR)

Overview of the cumulative average abnormal returns. The table presents the results for the five different event windows employed in this study, both for the total sample and the subsamples. For each window, the CAAR and its associated t-statistic are shown.

Event Window	Total sample	Sweden	Norway	Finland
(-5, +5)	-1,38% (-1,02)	0,67% (0,27)	-4,85%(-3,14)***	1,38% (0,47)
(-2, +2)	-2,00% (-2,24)**	-2,83% (-1,67)	-1,48% (-1,08)	-1,27% (-1,47)
(-1, +1)	-1,79% (-2,72)***	-1,24% (-1,64)	-2,59% (-2,45)**	-1,33% (-1,47)
(-1, 0)	-1,26% (-2,32)**	-0,28% (-0,37)	-2,15% (-2,09)**	-1,57% (-1,73)
(0, +1)	-1,64% (-3,13)***	-1,44% (-1,46)	-2,01% (-2,64)**	-1,31% (-1,57)

***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively, using a 2-tail test.

Table 4.3: Median Cumulative Abnormal Return

Overview of the mean cumulative abnormal returns. The table presents the results for the event windows both for the total sample and the subsamples. For each window, the median CAR and its associated Z-statistic are given.

Event Window	Total sample	Sweden	Norway	Finland
(-5, +5)	-0,73% (1,27)	0,52% (0,35)	-3,68% (2,47)**	-0,67% (0,10)
(-2, +2)	-2,29% (3,05)***	-2,58% (2,05)**	-1,10% (1,60)	-2,31% (1,02)
(-1, +1)	-2,06% (2,80)***	-1,96% (1,07)	-2,61% (2,33)**	-2,08% (1,53)
(-1, 0)	-1,40% (2,14)**	-0,27% (0,36)	-2,75% (1,88)*	-1,44% (1,73)*
(0, +1)	-1,41% (3,27)***	-0,85% (1,72)*	-1,77% (2,26)**	-1,80% (1,73)*

***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively, using a 2-tail test.

As seen in Table 4.2, the total sample of each of the event windows shows negative CAARs and all of these are significant except for the longest event window (-5, +5). Among the event windows the CAAR for (-1, +1) and (0, +1) are both significant at a 1 % level, while the event window, (-2, +2) gives largest negative CAAR. Examining the second table which exhibits the median CARs it can be seen that the same event windows are significant.

The results that are obtained by splitting the sample into the three subsamples are not as clear. As seen in Table 4.2 the Swedish sample does not exhibit any significant CAARs for the different event windows. In general, it can be seen that the Swedish sample has smaller CAARs (except for the event window (-2, +2)), when looking at the absolute values than the total sample. On the other hand, the median CARs of the event windows (-2, +2) and (0, +1) both are significant at a 5 % and 10 % respectively.

The Norwegian sample in general yields larger CAARs (in absolute terms) than the other countries. The CAARs for the different event windows are significant, except for the (-2, +2) event window. What also can be noted is that the Norwegian subsample differs from the other samples as the CAAR for the event window (-5, +5) is significant at a 1 % level, while neither the total sample nor the other countries have yielded significant negative CAARs at that event window. By comparing these results to the other table, it is seen that the same event windows are significant.

For the Finnish firms, all event windows except the (-5, +5) window have negative CAARs. However, none of the different event windows yield a significant CAAR. The Finnish sample, on the other hand, shows significant median CARs for the windows (-1, 0) and (0, +1) where both of these are significant at a 10 % level.

To test the robustness of the results and to be more certain that it is the announcement of convertible bonds that is driving the results, we also compute similar calculations for other windows. In these windows, the actual event date is left out, and therefore we should not see any significant abnormal returns. We compute the AAR and CAAR calculations for a pre-event window reaching from (-10, -1) and for a post-event window (+1, +10). A table of these calculations can be found in the Appendix B. All AARs are insignificant except the AAR at t = 3 which previously has been stated. By examining the CAAR for the different windows they are insignificant.

4.2. Cross-sectional Regressions Results

We conduct two regressions based on each of the mentioned models in the methodology on two different CARs as the dependent variables, summing up to a total of four regressions. As we find the largest significance in the event window (0, +1) we choose to include this in two of our regressions. In order to capture potential effects that can be surrounding the announcements we also choose to test a longer event window that exhibits both significant CAAR and median CAR. Therefore we choose

CAR(-2, +2) to be the independent variable in the two other regressions. We perform these regressions in Eviews. To investigate if the OLS estimator is consistent, we test the regressions with a White test for heteroscedasticity, a correlation table for multicollinearity, a Jarque-Bera test for normality and a Ramsey RESET test for linearity (Brooks, 2014). Due to signs of heteroscedasticity in the first regression we employ White robust standard errors on that regression. Otherwise, no additional changes are made. The performed tests and the interpretation of these can be found in Appendix C to F.

Table 4.4: Regression results

The table shows the regression results for the four different regressions performed in this study. In the regressions, 51 out of 53 convertible bonds are included since we lack variable data for two of the observations.

	Regression 1	**Regression 2**	**Regression 3**	**Regression 4**
Dependent variable	CAR(0,+1)	CAR(0,+1)	CAR(-2,+2)	CAR(-2,+2)
Variable	Coefficient (t-stat)	Coefficient (t-stat)	Coefficient (t-stat)	Coefficient (t-stat)
C	1,290 (0,449)	1,414 (0,561)	0,365 (0,081)	0,224 (0,047)
LN(SIZE)	-0,416 (-1,062)	-0,276 (-0,789)	-0,395 (-0,639)	-0,376 (-0,570)
LEVERAGE	0,013 (3,442)***	0,015 (3,577)***	0,016 (2,141)**	0,016 (1,990)*
MARKET-TO-BOOK	0,001 (0,946)	0,001 (0,878)	0,004 (1,470)	0,004 (1,427)
RELATIVE ISSUE SIZE	-0,075 (-2,465)**	-0,079 (-2,831)***	-0,092 (-1,821)*	-0,091 (-1,728)*
FINLAND_DUMMY	-	-1,256 (-0,887)	-	0,236 (0,088)
NORWAY_DUMMY	-	-2,103 (-1,803)*	-	-0,104 (-0,047)
R-squared	0,242	0,295	0,152	0,152
Adjusted R-squared	0,176	0,199	0,078	0,037
F-statistic	3,675	3,064	2,061	1,317
Prob(F-statistic)	0,011**	0,014**	0,101	0,270
Prob(Wald F-statistic)	0,001****	-	-	-

***, ** and * denote statistical significance at the 1%, 5% and 10% levels respectively

Table 4.5**:** Descriptive statistics for variables included in regressions

The table presents descriptive statistic for all the variables included in the regressions.

	CAR(0,1)	CAR(-2,2)	LN(SIZE)	LEVERAGE	MARKET-TO-BOOK	RELATIVE ISSUE SIZE
Mean	-1,55%	-2,02%	5,64	101,32%	2,19	26,41%
Median	-1,27%	-2,29%	5,78	40,33%	1,32	15,73%
Maximum	9,53%	19,27%	8,95	610,27%	9,50	106,65%
Minimum	-13,88%	-21,95%	1,61	0,00%	-1,22	1,52%
Standard deviation	3,85%	6,63%	2,04	129,45%	2,34	23,63%

As seen from Table 4.4, two of the variables in regression 1 are significant. The positive coefficient of leverage is significant at a 1 % level. It would imply that a one percentage point increase in leverage would lead to a 0,013 percentage point increase in CAR all else unchanged. As seen in the table 4.5, the average leverage level is 101 %. A one percentage point increase is therefore small in relative terms. A more intuitive way to grasp the effect of the variable is to examine an increase of one standard deviation. A one standard deviation increase in leverage would lead to an increase of 0,43 standard deviations in CAR which would entail a gain of 1,66 percentage points. Furthermore, the coefficient of relative issue size is significantly negative at a 5 % level. Using the same approach as for leverage, an increase of one percentage point in the relative issue size would be associated with a decrease in CAR with -0,075 percentage points. If there is an increase of one standard deviation in the relative issue size, the matching decrease in CAR would be -0,46 standard deviations which are equal to -1,78 percentage points. The size variable has a negative coefficient, but it is not significant. Moreover, we find that the coefficient of the constant and the coefficient for the market-to-book ratio are not significant.
The F-test for a regression examines whether the coefficients are jointly zero (Brooks, 2014), and in this case, the F-statistic is significant at a 5 % level indicating that the null hypothesis is rejected. The adjusted R-squared is 0,176 which means that the regression explains 17,6% of the variance in the cumulative abnormal returns.

The second regression is based on the first one, but it also includes dummy variables for Finland and Norway to examine potential country specific effects. Among the two dummy variables, the Norwegian dummy is significant at a 10 % level, and it has a coefficient value of approximately -2,1 %. This means that if the company is Norwegian, the associated effect on CAR is that is decreased by -2,1 % if everything else is constant. The dummy variable for Finland is also negative, but the same implication cannot be said as it is not significant. The coefficient of the constant is positive, indicating that if the company is Swedish, the CAR is 1,41 % higher. However, it is not significant either. Besides the dummy variables, the same variables as in the first regression are significant. In this regression, however, both leverage and relative issue size are significant at a 1% level. The coefficients are rather similar in size (except the constant), and thus the effect of an increase in these variables will have similar effects in size as in the previous regression. By including the dummy variables the adjusted R-squared increases by roughly two percentage points indicating that this model explains the dependent variable better.

The third regression is similar to the first except that the dependent variable is changed to the CAR for a longer event window, (-2, +2). The signs of the coefficients still show the same pattern as the previous regressions, but for leverage, market-to-book and relative issue size the absolute magnitudes of the coefficients have increased compared to regression 1. The t-statistic compared to the first regression is lower for all variables except for market-to-book. The same variables are significant as in previous regressions, but not to the same extent anymore whereas relative issue size is now significant at a 10 % level and leverage at a 5 % level. The effect of the lower t-statistics is also seen in the F-statistic since now it is not significant anymore as for the previous regressions. Thus the coefficients in the regressions are not jointly significantly jointly from zero. The adjusted R-squared is also lower, and the regression is describing 7,8 % of the variance of the dependent variable. As the adjusted R-squared is lower in this case, the model is not as well-suited for explaining CAR(-2, +2) as it is for explaining CAR(0, +1).

The fourth regression is based on the third but also includes the country dummy variables. The included dummy variables do not increase the model's performance since all the t-statistics are lowered as well as the adjusted R-squared which is less than half of the adjusted R-squared of regression 3. However, the magnitudes of the coefficients are similar to the previous regression except for the constant. Both leverage and relative issue size are still significant, but both at a 10 % level. None of the added dummy variables are significant in this case, and their associated coefficients are now lower than in the second regression. By adding the dummy variables the F-statistic is reduced thus inflating the p-value, and the coefficients are not jointly significant.

5. Analysis

By examining the AARs of the convertible bond announcements for the total sample, we find that the largest effect occurs on the actual day of the event. This implies that the influence of the convertible bond announcement is primarily occurring on that date and the effect amounts to -1,11 %. That the effect is at its strongest at the actual event day is in line with the overall pattern of previous research[9]. This effect was expected since the market ought to take any current information into consideration. The effect is at its largest at the event date for the Norwegian and Finnish sample, whereas the first yields a significant AAR at the event date. It cannot be seen in the Swedish sample where the AARs are larger the three following dates after the event.

When examining how the market reacts to the announcement of convertible bonds we see that our total sample exhibits significant CAARs for all event windows except for the longest, (-5, +5). The Norwegian sample on the other hand exhibit significant negative CAAR for that event window. Since we only examined for confounding events two days prior and two days after the announcements it could be the case that other firm-specific news contaminates it. Another possible explanation is that information may have leaked to the market before the announcements we are investigating.

[9] See for example Cheng et al. (2005) and Ammann et al. (2006)

The strongest finding in the sense of significance is the CAAR(0, +1) and it amounts to -1,64 % for the total sample. Our result is overall consistent with previous studies conducted on European markets. For example, the negative stock price reaction is slightly higher than the on the UK market (in absolute terms). The UK market was investigated by Abhyankar and Dunning (1999) who employ similar selection criteria as this study and find the CAAR(0, +1) to be equal to -1,21 %. In the study on the Swiss and German market, Ammann et al. (2006) find the joint CAAR(0, +1) on the markets to be -1,36 %. The results differ from findings in the Netherlands where the same CAAR was found to be positive and insignificant (de Roon & Veld, 1998). On the other hand, comparing the results to the research in the U.S. (Arshanapalli et al., 2006; Eckbo, 1986; Dann & Mikkelson, 1984), we see that the negative announcement effect in the investigated countries is lower than in the U.S. market.The smaller negative stock price reactions compared to the US might be seen as an indication that Sweden, Norway and Finland are more similar to other European markets than the U.S. market in the sense of convertible bonds.

As previously mentioned, the announcement effect is more negative in Norway than it is in Sweden and Finland. Hence there is an indication that the convertible debt announcement effect differs to some extent between the investigated countries. A potential reason for why this is the case could be due to differences in governance structures and regulatory environments between the countries as mentioned by Kang and Stulz (1996). However, to investigate this is beyond the scope of this thesis. On the other hand, another possible explanation could be that the announcement effect differs due to differences of the underlying companies issuing convertible bonds. As an example, the U.S. convertible bond issuers tend to be smaller firms with high risk whereas the issuing companies are larger and more mature in general in Europe (Lewis et al., 2003; Dutordoir & Van de Gucht, 2004). It is possible that there could be similar differences between the countries in our sample. By examining the descriptive statistics of the subsamples (see Appendix G), it can be seen that there are some differences among the issuing companies between the countries. For example, the Norwegian firms are larger and more highly levered than the rest of the sample. These differences between the companies could potentially offer some explanation of why the announcement effect alters between the countries.

We find that the joint sample including Sweden, Norway and Finland to be subject to negative significant CAARs as a whole for the different event windows. Therefore, we conclude that there is a negative announcement effect associated with convertible bond issuance when examining the countries together. As we have excluded Denmark and Finland, we cannot make an overall conclusion for all the Nordic markets. However, as we find strong support that the stock price reacts negatively to the announcement of convertible issuance in three out of the five Nordic countries it is not unreasonable to assume that the effect is similar in Iceland and Denmark. Thus, when taking on an overall perspective we cannot reject our first hypothesis.

Since we see that the announcement effect of convertible bond issues is negative, it could imply that negative information is conveyed from an information asymmetry perspective. Thus the investors might interpret the announcements of the issues as negative for the future value of the firm as it could indicate that a so-called "bad state" state is more likely to occur than a "good state". Since convertible bonds is a mixture of debt and equity, it could communicate that the firm might be overvalued, and that might be why we see a negative outcome. Additionally, as the announcement effect is negative, it could be the case that it reflects the equity feature more than the debt feature of the convertible bond.

In the total sample, the same event windows are significant for both the CAAR and the median CAR, it could indicate that the abnormal returns of the total sample are not heavily affected by outliers. Additionally, by examining the CAARs and the median CARs, we can see that they are more similar in the total sample than they are for the respective subsamples. This is reasonable as the sample is larger which makes the mean and the median more likely to converge. When investigating each country separately, we see that all the event windows for both CAAR and median CAR are negatively significant except one in Norway; hence we can conclude that the announcement effect of convertible bonds is negative in the Norway. For the Swedish and Finnish samples four of the five event windows yield negative CAARs. However, no significance can be found when examining them. As the samples are small, they could be more affected by outliers. This together with the fact that they are not necessarily normally distributed leads the median CARs to play a major role. We find that two of the event windows each for the Swedish and Finnish sample have significant median CARs. Therefore, we find some evidence that these countries also have a negative announcement effect for convertible bond issues.

The second hypothesis states that the stock price reaction to the announcements of convertible bonds should be positively affected by the size of the firm. As we find negative insignificant coefficient estimates for size in all of our regressions, we do not find any support for this hypothesis. Based on our results we cannot find any support for Stein's (1992) proposal that larger firms are subject to less information asymmetry than smaller firms where the size is a proxy for information asymmetry.

That we do not find any support for this hypothesis is similar to what previous studies on other European markets have found. Abhyankar and Dunning (1999) and Ammann et al. (2006) also based their hypotheses on Stein (1992) and sought of size as a proxy for the level of information asymmetry, suggesting a positive association between size and the cumulative abnormal returns since larger firms are subject to less information asymmetry. However, they were not able to find any positive significance for the size of the firm which Arshanapalli et al. (2004) found on the U.S. market. Another potential implication of this could be that the size of a firm is not as suitable as a proxy in the Nordic markets as it for the U.S. market.

The third hypothesis states that the stock price reaction to the announcements of convertible bonds should be positively affected by leverage. We find support for this hypothesis as all of our four regressions yields significant positive coefficients for leverage. The results give support to Stein's (1992) theory which states that convertible debt issuance by a highly leveraged firm can be seen as a credible signal of improved performance in the future. It is, therefore, possible that investors in the examined countries are viewing the announcement more positively when a firm with high leverage chooses to issue a convertible bond. This could indicate that the positive effect of better future performance outweighs the potential negative effects that can come with enhanced leverage.

There is no consensus regarding the effect of leverage which can be seen by examining similar studies conducted in other European markets. Abhyankar and Dunning (1999) also investigated the effect leverage has on the announcement effect on the UK market and found a positive insignificant coefficient for leverage. Ammann et al. (2006) concluded similar results on the Swiss and German market where the coefficient for leverage was close to zero in all their regressions. On the other hand, our results are more in line with Fenech (2008) who likewise found a significant positive relationship between leverage and the announcement effect. However, Fenech's research is based on the Australian market where the announcement effect of convertible bonds is positive.

The fourth hypothesis declares that the stock price reaction to the announcements of convertible bonds should be positively affected by market-to-book ratio. As stated in the hypothesis development, this is based on that market-to-book is a proxy for growth opportunities which should have a positive effect on the cumulative abnormal returns as high growth firms have the most to lose if they are unable to convert their bonds. Thus, when a high growth firms chooses to issue a convertible bond it can be seen as a signal that the firm has a positive view of its future financial performance (Stein, 1992). In our conducted regressions we find the sign of the market-to-book ratio coefficient to be positive which is in line with the stated hypothesis, but it is insignificant. The result indicates that the market-to book-ratios of the underlying firms are not significantly affecting the abnormal returns of the announcements of convertible bonds. Our results imply that we are unable to find significant support for Stein's proposal and our hypothesis.

The effect that the market-to-book ratio has on the cumulative abnormal return is quite ambiguous in the previous research where no clear pattern of the effect can be found. The result of this study regarding market-to-book is similar to the study conducted on the UK market by Abhyankar et al. (1999) who also found an insignificant positive result for the market-to-book ratio. Comparing our result to findings outside Europe, Fenech (2008) for example also based his hypothesis on Stein's prediction found a positive significant effect for the market-to-book ratio. On the other hand, our result contradicts the findings of Arshanapalli et al. (2006) and Cheng et al. (2005) that both found the coefficient of the market-to-book to be negative and significant in the U.S. and the Japanese market respectively.

The last hypothesis states that the stock price reaction to the announcements of convertible bond should be negatively affected by the relative size of the issue. We find support for this hypothesis as the coefficient is negatively significant in all our regressions. These results indicate that we find support for Myers and Majluf's prediction that larger issues convey more unfavorable information regarding the firm to the market. This finding stands out from the previous research in Europe regarding the relative issues size effect on the cumulative abnormal returns of the announcement of convertible bonds. Examining previous studies, Abhyankar and Dunning (1999) found a negative coefficient as well, but the result was not significant. The same goes for Ammann et al. (2006) who identified an insignificant negative coefficient for the relative issue size. Our results could be an indication that the countries in our study differ in respective of how investors interpret the effect of the relative issue size compared to other countries in Europe.

Additionally, it can be seen from Table 4.5 that the average relative issue size for the total sample is 26 %. This figure is much higher than the average relative issue size of the sample for Abhyankar and Dunning (1999) where it amounts to 9,1 % and for Ammann et al. (2006) where the clean sample exhibits an average level of 14,2 %. When larger issues are converted into company shares, it can have larger impacts on the firms' capital structure compared than smaller ones. As our sample has a higher average relative issue size compared to previous research, the potential effect of conversion is larger. If this is seen as a negative by the investors; the potential effect might therefore be greater in the countries included in this study. That could be why we see that there is a significant negative effect of the relative issue size while the two previous studies did find this.

6. Summary and Conclusion

The aim of this study is to examine if there is an announcement effect of convertible bond announcements in the Nordic market. We conduct an event study on 53 convertible bond observations from May 1992 to October 2016. The observations are distributed the following; 22 from Sweden, 21 from Norway and ten from Finland. Due to data limitations, the study does not include observations from Denmark and Iceland. We define the announcement date as the date when the size of the convertible bond issue is announced to the market. By investigating the associated abnormal returns for a range of event windows we examine if there is an announcement effect in the Nordic markets. Our findings are that the announcement of convertible bond issuance leads to a negative stock price reaction meaning that we find a negative announcement effect of convertible bond issuance. As the study examines three out of five Nordic countries, we cannot be certain that this result also holds for the two excluded Nordic markets; Denmark and Iceland. However, taking an overall perspective on the whole Nordic market, we do not reject our first hypothesis which states that the stock price reacts negatively to the announcement of convertible bond issuance in the Nordic markets. We find that this negative announcement is in line in with what the majority of the previous research has found in other European markets.

Furthermore, we examine if four firm-specific variables; the size of the firm, the leverage, the market-to-book ratio and the relative issue size affect the stock price reaction. By conducting cross-sectional regressions on the cumulative abnormal returns for two event windows, we find support for two of the four hypotheses. We find that leverage is positively affecting the stock price reaction as we find significant positive betas and that the relative issue size is affecting the price negatively as we find significant negative betas. Thus we conclude that the positive effect of leverage gives support to Stein's theory that states that the announcement of convertible bond issues can be seen as a credible signal of future financial performance in the future. Furthermore, the negative effect of the relative issue size gives support to Myers and Majluf's prediction that larger issues signal more negative information regarding the firm.

Our study contributes with new knowledge regarding the announcement effect of convertible bond issuance in the Nordic markets and how different firm-specific factors affect this announcement effect. However, as this study investigates how firm-specific factors affect the announcement effect of convertible bonds it could be of interest in future research to investigate how issue-specific variables affect the announcement effect on the Nordic markets. By using issue-specific variables, it can be examined how the equity and debt component of convertible bonds are affecting the announcement effect. However, another announcement date would have to be used where the full terms of the issue have been released. As this study only investigates the short-term announcement effect it could also be of interest to examine how the issuance of convertible bonds affects the underlying firms over a longer period. These suggestions can further contribute to the knowledge on convertible bond issues in the Nordic countries.

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Appendix

Appendix A: List of the underlying firms included in this study

Company	Country	Announcement date
Recipharm	Sweden	29-sep-16
Seamless Distribution	Sweden	30-aug-16
Karolinska Development	Sweden	04-dec-14
Midway Holding	Sweden	21-mar-14
ExeoTech	Sweden	21-jan-13
Elekta AB	Sweden	30-mar-12
Rörvik Timber	Sweden	08-apr-11
Industrivärden	Sweden	11-jan-11
SAS AB	Sweden	19-mar-10
Wiking Mineral	Sweden	24-jan-10
Industrivärden	Sweden	12-jan-10
PA Resources AB	Sweden	04-dec-08
LB ICON AB	Sweden	01-dec-04
Active Biotech	Sweden	15-sep-04
Alliance Oil Company Ltd	Sweden	08-apr-02
Modern Times Group	Sweden	21-maj-01
Biophausia AB	Sweden	29-okt-99
Intentia International AB	Sweden	07-jun-99
Elekta AB	Sweden	05-jun-98
Concordia Maritime	Sweden	07-feb-95
Ericsson	Sweden	26-mar-93
SKF	Sweden	13-maj-92
Marine Harvest	Norway	29-okt-15
Norwegian Energy Company AS	Norway	04-nov-13
Algeta ASA	Norway	04-sep-13
Subsea	Norway	27-sep-12
Norse Energy	Norway	28-feb-12
TTS Group	Norway	14-dec-10
Bergen Group	Norway	11-aug-10
Frontline	Norway	26-mar-10
Marine Harvest	Norway	24-feb-10
REC Silicon ASA	Norway	02-okt-09
Seadrill	Norway	11-sep-09
Sevan Marine	Norway	17-apr-09
Petroleum-Geo Services	Norway	03-dec-07
Songa Offshore	Norway	23-maj-07
Tandberg	Norway	31-okt-06
Altinex ASA	Norway	01-aug-06
Subsea	Norway	03-maj-06
Fred Olsen Energy	Norway	03-mar-04
Sinvest ASA	Norway	15-nov-02
Ocean Rig ASA	Norway	18-apr-00
Aker RGI	Norway	18-jul-97
Componenta oyj	Finland	24-mar-16
Outokumpu oyj	Finland	18-feb-15
Nokia	Finland	23-okt-12
Neo Industrial	Finland	23-nov-11

Panostaja	Finland	16-dec-10
Biohit oyj	Finland	03-aug-10
Glaston oyj ABP	Finland	16-jun-09
Nokian Renkaat	Finland	20-jun-07
Citycon	Finland	25-jul-06
Biohit oyj	Finland	04-okt-05

Appendix B: Table for robustness check

The table shows the AARs and CAARs for the pre-event and the post-event window as well as the associated standard deviations, t-statistics and p-values.

Robustness check								
(-10, -1)	AAR	St.dev	t-stat	p-value	CAAR	St.dev	t-stat	p-value
-10	-1,48	10,36	-1,04	0,30	-1,48	10,36	-1,04	0,30
-9	-0,52	2,61	-1,47	0,15	-0,52	10,74	-0,36	0,72
-8	0,48	8,26	0,42	0,67	0,48	8,26	0,42	0,67
-7	0,40	4,11	0,71	0,48	0,40	11,19	0,26	0,79
-6	0,41	3,00	1,00	0,32	0,41	3,00	1,00	0,32
-5	0,83	5,32	1,13	0,26	0,83	6,26	0,96	0,34
-4	0,35	3,17	0,80	0,43	0,35	3,17	0,80	0,43
-3	0,15	3,98	0,27	0,79	0,15	5,33	0,20	0,84
-2	-0,35	2,64	-0,95	0,34	-0,35	2,64	-0,95	0,34
-1	-0,15	2,53	-0,45	0,66	-0,15	3,06	-0,37	0,71
(+1, +10)	AAR	St.dev	t-stat	p-value	CAAR	St.dev	t-stat	p-value
1	-0,53	3,36	-1,15	0,26	-0,53	3,36	-1,15	0,26
2	0,14	3,79	0,27	0,79	0,14	5,53	0,18	0,86
3	-0,74	2,45	-2,20	0,03	-0,74	2,45	-2,20	0,03
4	0,02	2,72	0,06	0,95	0,02	3,59	0,05	0,96
5	0,02	2,90	0,04	0,97	0,02	2,90	0,04	0,97
6	-0,74	3,58	-1,51	0,14	-0,74	4,98	-1,08	0,28
7	0,63	3,60	1,29	0,20	0,63	3,60	1,29	0,20
8	-0,61	2,30	-1,92	0,06	-0,61	4,49	-0,99	0,33
9	-0,25	3,33	-0,54	0,59	-0,25	3,33	-0,54	0,59
10	-0,25	3,76	-0,49	0,63	-0,25	3,17	-0,58	0,57

Appendix C: Heteroscedasticity test White

The null hypothesis of the White test for heteroscedasticity states that the variance is homoscedastic (Brooks, 2014), and cannot be rejected for regression 2, 3 and 4. We perform one test for each regression. By looking at the p-value of the "Obs*R-squared" we determine whether to reject or not reject the null hypothesis. We reject the null hypothesis if the p-value is lower than 5 %. In regression 1, the null hypothesis is rejected at the 5% level indicating that the regression is heteroscedastic. For that reason, White robust standard errors are employed in the first regression. For the other regressions we cannot reject the null, thus we do not include White standard errors in those regressions.

Regression 1:

Heteroskedasticity Test: White				
F-statistic	2.266176	Prob. F(14,36)		0.0243
Obs*R-squared	23.89095	Prob. Chi-Square(14)		0.0472
Scaled explained SS	29.74676	Prob. Chi-Square(14)		0.0083
Test Equation:				
Dependent Variable: RESID^2				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-129.3765	63.35432	-2.042111	0.0485
LN(AVERAGE SIZE)^2	-1.360501	1.234860	-1.101745	0.2779
LN(AVERAGE SIZE)*LEVERAGE	0.044082	0.038031	1.159087	0.2541
LN(AVERAGE SIZE)*MARKET-TO-BOOK	-0.041507	0.011672	-3.556132	0.0011
LN(AVERAGE SIZE)*RELATIVE ISSUE SIZE	-0.463444	0.156965	-2.952534	0.0055
LN(AVERAGE SIZE)	29.08784	17.78849	1.635206	0.1107
LEVERAGE^2	0.000157	0.000156	1.003628	0.3223
LEVERAGE* MARKET-TO-BOOK	0.000117	0.000191	0.612564	0.5440
LEVERAGE*RELATIVE ISSUE SIZE	0.000384	0.001765	0.217365	0.8292
LEVERAGE	-0.305493	0.266684	-1.145522	0.2596
MARKET-TO-BOOK ^2	7.92E-05	2.13E-05	3.711582	0.0007
MARKET-TO-BOOK *RELATIVE ISSUE SIZE	-0.004042	0.001440	-2.807246	0.0080
MARKET-TO-BOOK	0.274720	0.070134	3.917078	0.0004
RELATIVE ISSUE SIZE^2	-0.019489	0.007231	-2.695073	0.0106
RELATIVE ISSUE SIZE	4.193010	1.304640	3.213922	0.0028
R-squared	0.468450	Mean dependent var		11.03544
Adjusted R-squared	0.261736	S.D. dependent var		19.49935
S.E. of regression	16.75429	Akaike info criterion		8.715114
Sum squared resid	10105.42	Schwarz criterion		9.283298
Log likelihood	-207.2354	Hannan-Quinn criter.		8.932234
F-statistic	2.266176	Durbin-Watson stat		1.696831
Prob(F-statistic)	0.024251			

Regression 2:

Heteroskedasticity Test: White			
F-statistic	2.192029	Prob. F(24,26)	0.0267
Obs*R-squared	34.13164	Prob. Chi-Square(24)	0.0824
Scaled explained SS	36.30403	Prob. Chi-Square(24)	0.0513

Test Equation:
Dependent Variable: RESID^2

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-197.7766	85.02791	-2.326020	0.0281
LN(AVERAGE SIZE)^2	-2.271332	1.441891	-1.575245	0.1273
LN(AVERAGE SIZE)*LEVERAGE	0.036330	0.039340	0.923478	0.3642
LN(AVERAGE SIZE)* MARKET-TO-BOOK	-0.035720	0.014055	-2.541451	0.0173
LN(AVERAGE SIZE)*RELATIVE ISSUE SIZE	-0.546150	0.189734	-2.878507	0.0079
LN(AVERAGE SIZE)*FINLAND_DUMMY	-9.058457	5.060801	-1.789926	0.0851
LN(AVERAGE SIZE)*NORWAY_DUMMY	2.087716	5.694363	0.366629	0.7169
LN(AVERAGE SIZE)	43.68480	22.94714	1.903715	0.0681
LEVERAGE^2	0.000112	0.000191	0.588485	0.5613
LEVERAGE* MARKET-TO-BOOK	0.000614	0.000348	1.765056	0.0893
LEVERAGE*RELATIVE ISSUE SIZE	2.41E-05	0.001589	0.015152	0.9880
LEVERAGE*FINLAND_DUMMY	0.065273	0.143686	0.454276	0.6534
LEVERAGE*NORWAY_DUMMY	0.120117	0.100227	1.198450	0.2416
LEVERAGE	-0.343210	0.257678	-1.331933	0.1944
MARKET-TO-BOOK ^2	9.57E-05	2.58E-05	3.708317	0.0010
MARKET-TO-BOOK *RELATIVE ISSUE SIZE	-0.004901	0.001326	-3.694726	0.0010
MARKET-TO-BOOK *FINLAND_DUMMY	-0.081854	0.071428	-1.145965	0.2622
MARKET-TO-BOOK *NORWAY_DUMMY	-0.056337	0.035634	-1.580985	0.1260
MARKET-TO-BOOK	0.258458	0.072714	3.554431	0.0015
RELATIVE ISSUE SIZE^2	-0.016792	0.008685	-1.933520	0.0641
RELATIVE ISSUE SIZE*FINLAND_DUMMY	-2.056536	0.913755	-2.250642	0.0331
RELATIVE ISSUE SIZE*NORWAY_DUMMY	-0.728295	0.386008	-1.886737	0.0704
RELATIVE ISSUE SIZE	5.112508	1.551022	3.296219	0.0028
FINLAND_DUMMY^2	102.7123	44.50278	2.307998	0.0292
NORWAY_DUMMY^2	2.704991	47.63819	0.056782	0.9552

R-squared	0.669248	Mean dependent var	10.27063
Adjusted R-squared	0.363938	S.D. dependent var	17.53592
S.E. of regression	13.98551	Akaike info criterion	8.420583
Sum squared resid	5085.454	Schwarz criterion	9.367557
Log likelihood	-189.7249	Hannan-Quinn criter.	8.782450
F-statistic	2.192029	Durbin-Watson stat	2.175351
Prob(F-statistic)	0.026664		

Regression 3:

Heteroskedasticity Test: White				
F-statistic	1.766731	Prob. F(14,36)		0.0844
Obs*R-squared	20.76994	Prob. Chi-Square(14)		0.1077
Scaled explained SS	50.42616	Prob. Chi-Square(14)		0.0000

Test Equation:
Dependent Variable: RESID^2

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-123.1414	309.1976	-0.398261	0.6928
LN(AVERAGE SIZE)^2	-3.809314	6.026675	-0.632076	0.5313
LN(AVERAGE SIZE)*LEVERAGE	0.144252	0.185610	0.777176	0.4421
LN(AVERAGE SIZE)* MARKET-TO-BOOK	-0.094493	0.056964	-1.658818	0.1058
LN(AVERAGE SIZE)*RELATIVE ISSUE SIZE	0.258058	0.766058	0.336865	0.7382
LN(AVERAGE SIZE)	52.02542	86.81583	0.599262	0.5528
LEVERAGE^2	0.000474	0.000761	0.623178	0.5371
LEVERAGE* MARKET-TO-BOOK	-0.001960	0.000933	-2.100350	0.0428
LEVERAGE*RELATIVE ISSUE SIZE	0.018511	0.008614	2.149032	0.0384
LEVERAGE	-1.245445	1.301540	-0.956901	0.3450
MARKET-TO-BOOK ^2	0.000179	0.000104	1.714892	0.0950
MARKET-TO-BOOK *RELATIVE ISSUE SIZE	0.005093	0.007027	0.724689	0.4733
MARKET-TO-BOOK	0.561933	0.342285	1.641709	0.1094
RELATIVE ISSUE SIZE^2	0.023614	0.035293	0.669097	0.5077
RELATIVE ISSUE SIZE	-3.476871	6.367229	-0.546057	0.5884

R-squared	0.407254	Mean dependent var	36.52412
Adjusted R-squared	0.176741	S.D. dependent var	90.11926
S.E. of regression	81.76846	Akaike info criterion	11.88559
Sum squared resid	240698.9	Schwarz criterion	12.45377
Log likelihood	-288.0825	Hannan-Quinn criter.	12.10271
F-statistic	1.766731	Durbin-Watson stat	1.871351
Prob(F-statistic)	0.084356		

Regression 4:

Heteroskedasticity Test: White			
F-statistic	1.809540	Prob. F(24,26)	0.0711
Obs*R-squared	31.90134	Prob. Chi-Square(24)	0.1295
Scaled explained SS	71.63269	Prob. Chi-Square(24)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-709.8013	467.3073	-1.518918	0.1409
LN(AVERAGE SIZE)^2	-15.68897	7.924532	-1.979797	0.0584
LN(AVERAGE SIZE)*LEVERAGE	-0.077914	0.216212	-0.360362	0.7215
LN(AVERAGE SIZE)* MARKET-TO-BOOK	-0.171676	0.077245	-2.222499	0.0352
LN(AVERAGE SIZE)*RELATIVE ISSUE SIZE	-0.934202	1.042763	-0.895891	0.3785
LN(AVERAGE SIZE)*FINLAND_DUMMY	-25.01582	27.81380	-0.899403	0.3767
LN(AVERAGE SIZE)*NORWAY_DUMMY	52.66746	31.29581	1.682892	0.1044
LN(AVERAGE SIZE)	246.3185	126.1158	1.953113	0.0616
LEVERAGE^2	-0.001289	0.001048	-1.230284	0.2296
LEVERAGE* MARKET-TO-BOOK	-0.000558	0.001911	-0.292151	0.7725
LEVERAGE*RELATIVE ISSUE SIZE	0.016767	0.008733	1.919892	0.0659
LEVERAGE*FINLAND_DUMMY	0.075750	0.789687	0.095924	0.9243
LEVERAGE*NORWAY_DUMMY	1.714150	0.550842	3.111870	0.0045
LEVERAGE	-0.510348	1.416180	-0.360370	0.7215
MARKET-TO-BOOK ^2	0.000305	0.000142	2.151604	0.0409
MARKET-TO-BOOK *RELATIVE ISSUE SIZE	0.005302	0.007290	0.727267	0.4736
MARKET-TO-BOOK *FINLAND_DUMMY	-0.173597	0.392564	-0.442214	0.6620
MARKET-TO-BOOK *NORWAY_DUMMY	0.245129	0.195844	1.251656	0.2218
MARKET-TO-BOOK	0.782403	0.399633	1.957806	0.0611
RELATIVE ISSUE SIZE^2	0.030630	0.047730	0.641742	0.5267
RELATIVE ISSUE SIZE*FINLAND_DUMMY	-0.987064	5.021932	-0.196551	0.8457
RELATIVE ISSUE SIZE*NORWAY_DUMMY	2.110123	2.121472	0.994651	0.3291
RELATIVE ISSUE SIZE	1.789204	8.524306	0.209894	0.8354
FINLAND_DUMMY^2	188.3807	244.5841	0.770208	0.4481
NORWAY_DUMMY^2	-598.8885	261.8161	-2.287439	0.0306

R-squared	0.625517	Mean dependent var	36.51076
Adjusted R-squared	0.279839	S.D. dependent var	90.57422
S.E. of regression	76.86334	Akaike info criterion	11.82860
Sum squared resid	153607.3	Schwarz criterion	12.77557
Log likelihood	-276.6293	Hannan-Quinn criter.	12.19046
F-statistic	1.809540	Durbin-Watson stat	1.436677
Prob(F-statistic)	0.071142		

Appendix D: Jarque Bera test

The Jarque Bera test examines whether the skewness of the distribution and the excess kurtosis are jointly zero (Brooks, 2014). We use a significance level of 5 %. The null hypothesis which state that the data is normally distributed is not rejected for regression 1 and 2. However it is rejected in regression 3 and 4. In this case we choose to not make any further adjustments since we have sufficiently large sample. The violation of the normality assumption is therefore virtually inconsequential (Brooks, 2014).

Regression 1:

Normality Test: Jarque Bera	
Series: Residuals	
Sample 1 53	
Observations 51	
Mean	-5,14E-16
Median	0,016998
Maximum	9,633687
Minimum	-9,020407
Std, Dev,	3,355018
Skewness	0,094508
Kurtosis	4,060983
Jarque-Bera	2,468002
Probability	0,291125

Regression 2:

Normality Test: Jarque Bera	
Series: Residuals	
Sample 1 53	
Observations 51	
Mean	-1,13E-16
Median	-0,180796
Maximum	8,778687
Minimum	-9,202139
Std, Dev,	3,236672
Skewness	-0,054151
Kurtosis	3,858003
Jarque-Bera	1,589283
Probability	0,451743

Regression 3:

Normality Test: Jarque Bera	
Series: Residuals	
Sample 1 53	
Observations 51	
Mean	-2,22E-16
Median	-0,91299
Maximum	22,27395
Minimum	-16,79666
Std, Dev,	6,103655
Skewness	0,972411
Kurtosis	6,96864
Jarque-Bera	41,50644
Probability	0,00000

Regression 4:

Normality Test: Jarque Bera	
Series: Residuals	
Sample 1 53	
Observations 51	
Mean	-4,96E-16
Median	-0,808556
Maximum	22,34019
Minimum	-16,81044
Std, Dev,	6,102538
Skewness	0,988251
Kurtosis	7,033472
Jarque-Bera	42,87285
Probability	0,00000

Appendix E: Multicollinearity test

In order to check for multicollinearity we conduct a correlation table of the different variables we use in our regression. Multicollinearity occurs when the explanatory variables in the regressions are highly correlated with each other. A rule of thumb is that the variables correlation is over 0,8 it is needed to perform remedies to reduce the multicollinearity (Brooks, 2014). As we according to the table we do not have any correlation above 0,8 we do not take any actions.

CORRELATION TABLE	SIZE	LEVERAGE	PRICE-TO-BOOK	RELATIVE ISSUE SIZE	NORWAY_DUMMY	FINLAND_DUMMY	SWEDEN_DUMMY
SIZE	1						
LEVERAGE	-0,33	1					
PRICE-TO-BOOK	0,37	-0,19	1				
RELATIVE ISSUE SIZE	-0,64	0,33	-0,16	1			
NORWAY_DUMMY	0,26	0,18	0,07	-0,12	1		
FINLAND_DUMMY	-0,05	0,02	0,02	-0,10	-0,39	1	
SWEDEN_DUMMY	-0,22	-0,20	-0,09	0,19	-0,70	-0,39	1

Appendix F: Linearity test: Ramsey RESET Test

The Ramsey RESET test is used to detect whether there are any neglected nonlinearities in the model. We use the significance level of 5 % and we compare this to the p-value of “FITTED^2”.The null hypothesis states that the model is correctly specified and is not rejected for all of four regressions, indicating that we have no nonlinearities in the model (Brooks, 2014).

Regression 1:

Ramsey RESET Test				
Specification: CAR(0,1) C LN(SIZE) LEVERAGE MARKET-TO-BOOK RELATIVE ISSUE SIZE				
Omitted Variables: Squares of fitted values				
	Value	df	Probability	
t-statistic	0.449228	45	0.6554	
F-statistic	0.201805	(1, 45)	0.6554	
Likelihood ratio	0.228201	1	0.6329	
F-test summary:				
	Sum of Sq.	df	Mean Squares	
Test SSR	2.512677	1	2.512677	
Restricted SSR	562.8073	46	12.23494	
Unrestricted SSR	560.2946	45	12.45099	
LR test summary:				
	Value	df		
Restricted LogL	-133.5942	46		
Unrestricted LogL	-133.4801	45		
Unrestricted Test Equation:				
Dependent Variable: CAR(0,1)				
Method: Least Squares				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.073385	2.540558	0.422500	0.6747
LN(AVERAGE SIZE)	-0.382296	0.350983	-1.089215	0.2819
LEVERAGE	0.012751	0.004156	3.067834	0.0036
MARKET-TO-BOOK	0.001036	0.001381	0.750289	0.4570
RELATIVE ISSUE SIZE	-0.066629	0.034195	-1.948492	0.0576
FITTED^2	-0.031214	0.069483	-0.449228	0.6554
R-squared	0.245560	Mean dependent var		-1.547722
Adjusted R-squared	0.161734	S.D. dependent var		3.853993
S.E. of regression	3.528596	Akaike info criterion		5.469808
Sum squared resid	560.2946	Schwarz criterion		5.697082
Log likelihood	-133.4801	Hannan-Quinn criter.		5.556656
F-statistic	2.929383	Durbin-Watson stat		2.401172
Prob(F-statistic)	0.022572			

Regression 2:

Ramsey RESET Test

Specification: CAR(0,1) C LN(SIZE) LEVERAGE
MARKET-TO-BOOK RELATIVE ISSUE SIZE
FINLAND_DUMMY NORWAY_DUMMY
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.456075	43	0.6506
F-statistic	0.208005	(1, 43)	0.6506
Likelihood ratio	0.246108	1	0.6198

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	2.521599	1	2.521599
Restricted SSR	523.8022	44	11.90459
Unrestricted SSR	521.2806	43	12.12280

LR test summary:

	Value	df
Restricted LogL	-131.7627	44
Unrestricted LogL	-131.6397	43

Unrestricted Test Equation:

Dependent Variable: CAR(0,1)
Method: Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.622421	2.585039	0.627620	0.5336
LN(AVERAGE SIZE)	-0.286537	0.353535	-0.810490	0.4221
LEVERAGE	0.015947	0.004515	3.532041	0.0010
MARKET-TO-BOOK	0.001244	0.001363	0.912168	0.3668
RELATIVE ISSUE SIZE	-0.088340	0.034644	-2.549952	0.0144
FINLAND_DUMMY	-1.341762	1.442014	-0.930478	0.3573
NORWAY_DUMMY	-2.405818	1.351479	-1.780137	0.0821
FITTED^2	0.024758	0.054285	0.456075	0.6506

R-squared	0.298093	Mean dependent var	-1.547722
Adjusted R-squared	0.183829	S.D. dependent var	3.853993
S.E. of regression	3.481782	Akaike info criterion	5.476065
Sum squared resid	521.2806	Schwarz criterion	5.779097
Log likelihood	-131.6397	Hannan-Quinn criter.	5.591863
F-statistic	2.608811	Durbin-Watson stat	2.607082
Prob(F-statistic)	0.024536		

Regression 3:

Ramsey RESET Test

Specification: CAR(-2,2) C LN(SIZE) LEVERAGE
MARKET-TO-BOOK RELATIVE ISSUE SIZE
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	1.126265	45	0.2660
F-statistic	1.268472	(1, 45)	0.2660
Likelihood ratio	1.417713	1	0.2338

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	51.06762	1	51.06762
Restricted SSR	1862.730	46	40.49414
Unrestricted SSR	1811.663	45	40.25917

LR test summary:

	Value	df
Restricted LogL	-164.1142	46
Unrestricted LogL	-163.4053	45

Unrestricted Test Equation:

Dependent Variable: CAR(-2,2)
Method: Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.463643	4.486089	0.103351	0.9181
LN(AVERAGE SIZE)	-0.327396	0.619385	-0.528582	0.5997
LEVERAGE	0.013812	0.007725	1.787985	0.0805
MARKET-TO-BOOK	0.001660	0.003025	0.548844	0.5858
RELATIVE ISSUE SIZE	-0.053296	0.061108	-0.872167	0.3877
FITTED^2	-0.087168	0.077395	-1.126265	0.2660

R-squared	0.175228	Mean dependent var	-2.015363
Adjusted R-squared	0.083587	S.D. dependent var	6.628064
S.E. of regression	6.345011	Akaike info criterion	6.643346
Sum squared resid	1811.663	Schwarz criterion	6.870619
Log likelihood	-163.4053	Hannan-Quinn criter.	6.730194
F-statistic	1.912105	Durbin-Watson stat	2.651267
Prob(F-statistic)	0.111080		

Regression 4:

Ramsey RESET Test				
Specification: CAR(-2,2) C LN(SIZE) LEVERAGE MARKET-TO-BOOK RELATIVE ISSUE SIZE FINLAND_DUMMY NORWAY_DUMMY				
Omitted Variables: Squares of fitted values				
	Value	df	Probability	
t-statistic	1.103415	43	0.2760	
F-statistic	1.217526	(1, 43)	0.2760	
Likelihood ratio	1.423976	1	0.2328	
F-test summary:				
	Sum of Sq.	df	Mean Squares	
Test SSR	51.27135	1	51.27135	
Restricted SSR	1862.049	44	42.31929	
Unrestricted SSR	1810.777	43	42.11110	
LR test summary:				
	Value	df		
Restricted LogL	-164.1048	44		
Unrestricted LogL	-163.3929	43		
Unrestricted Test Equation:				
Dependent Variable: CAR(-2,2)				
Method: Least Squares				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.578997	4.752893	0.121820	0.9036
LN(AVERAGE SIZE)	-0.359972	0.657558	-0.547438	0.5869
LEVERAGE	0.013229	0.008501	1.556201	0.1270
MARKET-TO-BOOK	0.001597	0.003121	0.511543	0.6116
RELATIVE ISSUE SIZE	-0.051804	0.063530	-0.815416	0.4193
FINLAND_DUMMY	-0.062605	2.678364	-0.023374	0.9815
NORWAY_DUMMY	0.339374	2.230510	0.152151	0.8798
FITTED^2	-0.089807	0.081390	-1.103415	0.2760
R-squared	0.175631	Mean dependent var		-2.015363
Adjusted R-squared	0.041431	S.D. dependent var		6.628064
S.E. of regression	6.489307	Akaike info criterion		6.721288
Sum squared resid	1810.777	Schwarz criterion		7.024320
Log likelihood	-163.3929	Hannan-Quinn criter.		6.837086
F-statistic	1.308729	Durbin-Watson stat		2.650178
Prob(F-statistic)	0.269443			

Appendix G: Descriptive statistics of the full sample and the subsamples

Descriptive statistics of convertible bond sample				
	Full sample	**Sweden**	**Norway**	**Finland**
Sample size	53	22	21	10
Market value (in million Euro)				
Mean	1190,7	691,1	1696,2	1364,9
Median	304,9	114,1	796,0	80,6
Maximum	7703,4	4753,0	6518,5	7703,4
Minimum	5,04	5,04	15,5	15,6
Leverage % (Debt to market value of equity)				
Mean	100,9	70,8	129,6	103,9
Median	40,6	32,9	34,7	88,2
Market-to-book % (Market value of equity to book value of equity)				
Mean	180,6	139,2	214,4	198,1
Median	132	138	119	119
Relative size % (issue size to market value of equity)				
Mean	26	30,9	23,2	21,3
Median	15,7	25,3	11,7	14,6