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Applying Altman's Z-Score to the Financial Crisis

An Empirical Study of Financial Distress on Oslo Stock Exchange

by

Morten Reistad Aasen

Master thesis in Financial Economics

Thesis Supervisor: Zuzana Laffársová

Norwegian School of Economics

Abstract

In this thesis, I study the financial distress status for a sample of 180 enterprises listed on Oslo Stock Exchange. The thesis addresses the impact of the financial crisis on these enterprises and has a particular focus on the probability of financial distress, measured by Edward Altman's Z-Score models. I find evidence that manufacturers listed on Oslo Stock Exchange were generally more financially distressed than non-manufacturers, which is consistent with what one could observe at a national level. The estimated probability of default for the listed enterprises increased substantially during the crisis. The findings also indicate that the Z-Scores ability to predict bankruptcies significantly worsened during the financial crisis. Moreover, on the subject of capital structure, I document a positive relationship between financial distress and equity issuance within the financial crisis. Also, I find evidence that supports both the market timing theory and pecking order theory of corporate finance. Finally, the results indicate that there is evidence of a structural break around the outbreak of the financial crisis, which means that the enterprises listed on OSE were more financially distressed in 2008 and 2009, relative to the years 2004 to 2007.

Keywords: Financial distress, Altman's Z-Score models, Oslo Stock Exchange, Financial crisis, Equity issuance, Pecking order theory, Market timing by managers, Industry differences, Probability of default, Structural break

Preface

The outbreak of the global financial crisis in the fall of 2008 initiated one of the most serious international recessions in our time, leading to radical changes in the economy. As a consequence, there was a clear decline in Norway's gross domestic product from the third quarter of 2008 to the first quarter of 2009. The negative implications of the crisis are countless and the full consequences are yet to be understood, which is evident at the end of 2011 in terms of the debt crisis in Europe.

During the crisis, the extent of financial distress grew as systemic risk, default rates and bankruptcies increased considerably throughout the Norwegian economy. In this sense, the impact of the recent crisis provides an excellent opportunity to study financial distress, as well as its implications and relations. Studying financial distress is of crucial importance in order to make an effective and correct assessment on the financial state of companies, especially in times of crisis. In this respect, strengthening the research on financial distress is vital for protection against the risk of bankruptcy for companies, as well as protecting the rights of investors and creditors. Hence, a comprehensive analysis of enterprises exposure to distress risk and investigating the risk behaviour in financial distress is of utmost relevance.

Working on the thesis has been educational and exciting. It has been especially motivating to study issues of current interest and relevance.

I would like to express gratitude to my supervisor at the Norwegian School of Economics, Zuzana Laffársová, for good advice and supportive guidance.

Contents

1 Introduction

1.1 Research questions

In this thesis, I study the financial distress status for a sample of 180 enterprises listed on Oslo Stock Exchange (OSE). Year 2008 and 2009 is primarily the scope of this thesis, because this is the time when financial distress is likely to have been most evident, although some of the tests performed apply observations dating back to 2004. In this regard, the years 2004 to 2007 are referred to as the "pre-crisis" period and the years 2008 to 2009 as the "financial crisis" period.

The thesis provides evidence on the impact of the financial crisis on these enterprises from two perspectives. First, I investigate the effect on different industries, especially manufacturers versus non-manufacturers, and whether the financial distress of enterprises was different before and during the crisis. The thesis mainly focuses on the probability of financial distress, measured by Edward Altman's Z-Score models, which has become a popular and widely accepted measure of financial distress. Also, the Z-Score models are used to predict corporate defaults. The financial crisis forms the basis for testing the robustness and applicability of the Z-Scores, as one in retrospective can compare the predictions of the models to actual events. This is an appealing approach, as it dwells in the intersection of theory and real life. While the Z-Score models provide a continuous evaluation of corporate health, we cannot derive an estimate for the probability of default directly from the score. Hence, I have made an estimate using Altman's bond rating equivalent method.

Second, in the context of the influence of financial distress on enterprises' behaviour and decision making process, I analyze the effect on their capital structure. The critical problems in the bank sector and reduced appetite for risk were factors that affected the supply and demand for external financing, resulting in significant changes in the capital structure of companies. The thesis has a particular focus on the link between financial distress and equity issuance.

The most central research questions can be summarized as follows:

- Is there evidence of a structural break with regards to financial distress at the outbreak of the crisis?
- Which industry groups were most affected by the crisis?
- What is the relationship between financial distress and equity issuance and how does this relate to the pecking order theory and market timing by managers?
- How did the probability of default on OSE evolve prior to and during the crisis?
- What are the implications of the financial crisis on the predictive ability of the Z-Score models?

1.2 Contribution to existing research and literature

This thesis makes several contributions in multiple fields. First and foremost, the thesis addresses the impact of the financial crisis on the enterprises listed on OSE. Specifically, it has a focus on how the various industry groups were affected relative to each other, as well as emphasizing the differences between manufacturers and non-manufacturers. This may give valuable insight into which industries that are more likely to be exposed to financial distress. Furthermore, the thesis examines the predictive ability of the Z-Score models under the conditions of the financial crisis. Also, to my best knowledge, this is the first attempt to empirically model the structural break of financial distress at the outbreak of the recent financial crisis, at least based on Altman's Z-Score. Finally, by investigating the impact of financial distress on the capital structure of firms, the thesis contributes to the corporate finance literature. The thesis particularly adds to the literature on the relationship between financial distress and equity issuance, as it provides new evidence on a positive relationship in times of crisis, as well as finding evidence of both market timing by managers and the pecking order theory.

1.3 Key results

I find evidence that manufacturers listed on OSE were generally more financially distressed than non-manufacturers in the recent financial crisis, something that is consistent with what one could observe at a national level. Specifically, the findings indicate that among the most strongly affected are enterprises exposed to consumer durables, export and import industries dependent on international trade, offshore and shipping, as well as enterprises engaged in commercial properties. Among the least affected were enterprises involved in engineering, seismic activities and surveying services. Many of the findings related to the industry groups also seem to be in accordance with reality. Thus, the Altman Z-Score models prove to be accurate in correctly classifying the financial distress of firms and relevant even in times of crisis.

However, the Type II error of classifying firms as bankrupt when they do not go bankrupt increased substantially during the crisis, with as much as 40-50% of the enterprises incorrectly classified as bankrupt. This indicates that the Z-Scores ability to predict bankruptcies significantly worsened in the financial crisis, although its ability to identify financial distress in general still may be intact. The increase in financial distress also implies a greater probability of default for the listed enterprises, which was estimated to be in excess of 10% during the crisis, in contrast to the pre-crisis period where it was almost non-existent, based on the average of all the enterprises in the data sample.

Moreover, on the subject of capital structure, I document a positive relationship between financial distress and equity issuance in the financial crisis. Also, I find evidence that supports both the market timing theory and pecking order theory of corporate finance. Evidence of the market timing of managers was found just before the outbreak of the crisis, i.e. in 2006 and 2007. The results indicate that equity issuance at historically high stock prices was followed by post-issue under-performance, as the issuers tended to be more financially distressed than non-issuers. Related to the pecking order theory, the findings indicate that the financially distressed enterprises followed the predicted pattern of the theory over the course of the crisis, in the sense that internal financing typically was depleted before using external financing. The findings indicate that the adverse selection problem was particularly evident among financially distressed enterprises that issued equity just prior to and during the crisis, which also is in line with the pecking order theory.

Finally, the results indicate that there is evidence of a structural break around the outbreak of the financial crisis, which means that the enterprises listed on OSE were more financially distressed in 2008 and 2009, compared to the years 2004 to 2007.

1.4 Limitations of the study

Perhaps the most important weakness of the thesis is that I am relying solely on the Z-Score models as the only means of analysis. Including other measures of financial distress would have strengthened the results. It is also possible that the thesis has a geographic limitation, in the sense that the findings related to the enterprises listed on OSE might not be directly transferable to other settings. For instance, it may be that certain conditions in Norway are decisive for the findings. Testing the validity for some of the results on broader stock exchanges may help to clarify this potential restriction.

1.5 Structure of the study

The thesis is organized as follows. Chapter 2 accounts for the development of OSE during the crisis, defines the term financial distress, as well as presenting reasons for corporate failures and the Z-Score models. Chapter 3 presents the data collection process and the final data sample used in the study. Chapter 4 concerns the analysis of the introduced research questions, which presents the hypotheses that are tested in the thesis, reviews the methodologies applied, as well as showing and discussing the empirical results. The analysis follows the sequence of the research questions presented previously. Chapter 5 concludes on the research questions presented in this thesis.

2 Oslo Stock Exchange, Financial distress and Altman's Z-Score models

2.1 The development of Oslo Stock Exchange during the crisis

This section summarizes the development of OSE over the course of the financial crisis.

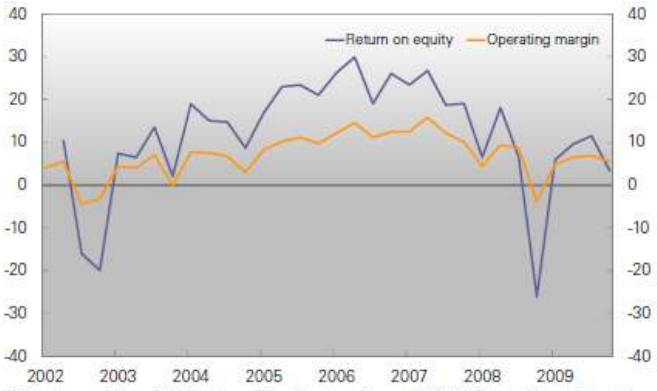
2.1.1 Year 2007

The OSE Benchmark Index increased 11.5% in 2007, despite more international uncertainty in the second half of the year. Trading activity was higher than ever before. Growth in the companies' results started to slow down both at home and abroad, but many investors entered 2008 remaining rather optimistic about the future outlook for the global economy (Oslo Børs ASA 2007).

2.1.2 Year 2008

Figure 1 (Norges Bank)

Key ratios (%) for enterprises listed on OSE



1) Sample consisting of 141 listed non-financial enterprises as of 2009 Q4. Statoil is not included in the sample.

After over four years of continuous growth, with equity values multiplying and an almost endless flow of positive news, the Benchmark Index fell by 54% in 2008, which is the steepest fall in Norway in modern times. 140 companies on OSE lost more than half of their value. Oil prices reached new heights in 2008, peaking when the oil price almost reached USD 150 per barrel, but this changed very quickly as the oil price decreased by almost 80%. Also, operating margins and returns on equity capital for the listed enterprises on OSE became negative in 2008 (FIGURE 1). (Oslo Børs ASA 2008).

Uncertainty increased during the summer, but the major fall in stock markets came in September, when a number of American banks ran into major difficulties. At this point, similar problems also started to emerge in Europe. The investment bank Lehman Brothers collapsed and this immediately

led to a substantial increase in money market interest rates. Furthermore, several banks in the USA and Europe faced trouble and needed to recognize substantial losses due to falling housing prices. Consequently, some banks had to be rescued by the authorities. In addition, it became apparent that the emerging markets could no longer maintain their explosive growth.

Efficient modern stock markets have the property that share prices follow the expectations for future economical developments. Therefore, the large decrease in share prices were partly due to the market's anticipating weaker economic growth and earnings in the future. Other factors that played an important role were behavioural elements such as panic and high levels of uncertainty, which in retrospective indicates that some shares suffered from over-reactions. The dramatic falls in share prices do however also suggest that a great number of shares were priced with substantial bankruptcy risk (Oslo Børs ASA 2008).

2.1.3 Year 2009

Following the terrible year of 2008, the OSE Benchmark Index increased 64.8% over the course of 2009. Financial markets were returning to normal conditions, as evidenced by a slow return of risk willingness among investors. Companies focused on cutting costs in order to improve their results, which helped corporate earnings to start increasing again in 2009, together with renewed revenue growth. Although OSE was one of the best performing stock markets in the world in 2009, it should be remembered that it was one of the worst performers in 2008.

The year started out rather cautious, but it became increasingly evident during the spring that the emergency policy packages and other measures implemented by authorities around the world were dampening the worst consequences of the financial crisis. In addition, some signs of improved access to financing started to appear. Bond markets in particular improved as key economic indicators at first levelled off and then started to turn upwards. Demand for commodities returned as optimism recovered. This contributed to the oil price almost doubling during 2009, which definitely had its positive effect on the OSE. (Oslo Børs ASA 2009).

Although 2009 was a very good year for the market as a whole, one in five of the listed companies saw a decrease in its share price, which shows that the market differentiated between enterprises to a greater extent. Several enterprises with liquidity problems were quick to arrange new financing,

which not only provided a lifeline for their investors and employees, but also contributed to restoring confidence in the capital markets.

However, not all issuers were able to access new capital. Thus, it may be the case that investors were more selective than in the years before the crisis, which was reflected in a number of company failures, in fact the first on OSE since 2002. During 2009, seven companies listed on OSE and Oslo Axess became insolvent and went bankrupt. Tandberg Data and Tandberg Storage, both listed on OSE, went bankrupt in 2009. In addition to these bankruptcies, a number of companies struggled with financial challenges, which are high up on the list of shares that fell most in value. This indicates that 2009 was a year when investors separated the healthy from the unhealthy companies, with risk capital readily available for those companies and projects that represented an acceptable level of risk, while several companies with high indebtedness and weak cash flows had trouble with attracting investors (Oslo Børs ASA 2009).

2.2 Financial distress and financial distress costs

This section defines the term financial distress, its implications for the market value of a firm and the key factors that determine the present value of financial distress costs.

Financial distress occurs when obligations to creditors are broken or honoured with difficulty by failing to make the required interest or principal payment on the debt. Sometimes financial distress leads to bankruptcy. However, it could just mean that the company is in an unfavourable and risky position. Financial distress is costly, arising from bankruptcy or distorted business decisions, which represent an important departure from Modigliani and Miller's assumption of perfect capital markets. Modigliani and Miller assumed that the cash flows of a firm's assets are independent of its choice of capital structure, but leveraged firms risk incurring financial distress costs that reduce the cash flows available to investors.

Investors are aware of the potential financial difficulties related to leveraged firms. Consequently, investors worry about the costs of financial distress, something that is believed to be reflected in the current market value of the firm. Even if the firm is not currently in financial distress, investors include the potential for future distress into their assessment of the market value. Thus, if there is a

possibility of bankruptcy, the firm's current market value is reduced by the present value of these potential financial distress costs. (Berk and DeMarzo 2011).

Three key factors determine the present value of financial distress costs. First, the probability of financial distress depends on the likelihood that a firm will be unable to fulfill its debt obligations and therefore default, which increases with the amount of a firm's liabilities relative to its assets, as well as the volatility of a firm's cash flows and asset values. Financial distress is generally more likely for companies with high business risk, which is why companies associated with high risk often issue less debt. The probability of financial distress is the main topic raised in this thesis. Second, the magnitude of the financial distress costs will depend on the presence of direct and indirect bankruptcy costs. More debt is equivalent with a higher chance of default, thereby increasing the expected value of the associated costs. The costs can be broken down in three components. Direct bankruptcy costs (primarily legal and administrative costs), indirect bankruptcy costs (reflecting the difficulty of managing a company when it faces bankruptcy) and costs of the threat of bankruptcy (such as poor investment decisions resulting from conflicts of interest between stakeholders, e.g. agency costs). Third, the appropriate discount rate for the distress costs will depend on the firm's market risk (Berk and DeMarzo 2011).

2.3 Reasons for corporate failures

This section provides common reasons for corporate failures.

A high corporate failure rate is not always a cause for concern. Entries and exits are part of the process whereby companies react to market reality, i.e. changing consumer preferences and new technologies. Low productivity firms exit the market and are substituted by better ones. In other words, there is a continuous flow of resources from inefficient users to more efficient users. This is often referred to as "creative destruction", which is an essential part of a strong and healthy economy. An optimal social strategy is not necessarily to reduce bankruptcies to zero, but instead to support viable companies and letting some companies fail in order to improve economic efficiency and growth.

The most common reason for a company's distress and possible failure is some type of managerial incompetence. Companies naturally fail for multiple reasons, but management failure is often at the

core of the problems. The ultimate cause of failure is often simply running out of cash and other liquid funds. There are multiple factors that contribute to bankruptcies and other distressed conditions. These reasons include (Altman and Hotchkiss 2006):

- Chronically sick industries (e.g. agriculture and textiles)
- Deregulation of industries (e.g. airlines, financial services, health care, energy)
- High real interest rates in certain periods
- International competition
- Overcapacity within an industry
- Increased leveraging of corporations
- Relatively high new business formation rates in certain periods

While some of these reasons are rather obvious, some of them deserve an explanation. Deregulation removes the protection of a regulated industry and causes large numbers of entering companies. Therefore, competition is fiercer in a deregulated environment. Furthermore, it is plausible that increased international competition may have a negative impact on some industries, since not all companies have the necessary resources or opportunities needed to adapt to the continuous change and restructuring related to the development of new products, technologies and innovation. Hence, global competition may lead to more bankruptcies within certain industries. The impact of increased leverage varies among industries. For instance, the future cash flows of airlines are unstable and sensitive to shocks in the economy, so they run the risk of bankruptcy if they use too much leverage, while retailers can borrow more because their assets are tangible and relatively safe. New business formation is usually based on an optimistic outlook for the future, but history shows that young companies fail with greater frequency than older companies do. Thus, one might expect to observe that the failure rate increases in the years following a surge in new business activity.

2.4 Edward Altman's Z-Score Models

This section presents the Z-Score models applied in this thesis to measure financial distress.

2.4.1 The original Z-Score model

In 1968, NYU Professor Edward Altman created the Z-Score model, which is the first multivariate credit scoring model. The model predicts the likelihood that a firm will go bankrupt by combining five financial statement and market value measures to produce the Z-Score, which involves measuring how closely a firm resembles other firms that have filed for bankruptcy. This allows the user to classify firms as either distressed (high risk of bankruptcy) or non-distressed. In this sense, the Z-Score measures corporate financial health and provides a foundation for more secure investment decisions and better assessments of firms' credit worthiness. It should be noted that the original Z-Score model is primarily for manufacturers.

Altman's original Z-Score was based on a sample of 66 publicly held manufacturing companies. Half of the companies were distressed manufacturers that had filed for bankruptcy from 1946 through 1965, while the other half were randomly selected non-bankrupt companies from the same time period. The asset size of the companies ranged from $1 million to $25 million (Altman 2000).

Due to the large number of variables that may be significant indicators of financial distress, Altman chose 22 financial ratios based on relevancy and their popularity in the literature. His goal was to find a small number of ratios that could best distinguish between bankrupt and non-bankrupt corporations. From these 22 ratios, five were selected as being the best combination to predict corporate bankruptcy.

In order to test the model, Altman calculated the Z Scores for a new sample of bankrupt and non-bankrupt companies. The non-bankrupt companies were manufacturers that had recently reported deficits. This enabled him to evaluate how well the Z-Score model could distinguish between sick and terminally ill corporations. He found that 96% of the bankrupt firms were correctly classified as bankrupt, while 79% of the sick, non-bankrupt firms were correctly classified as non-bankrupt (Altman 2000).

Furthermore, in three subsequent tests, Altman examined distressed companies from 1969 up until 1999 in order to observe the continuing accuracy and relevance of the Z-Score model. The Z-Score was found to be 80-90% accurate in predicting bankruptcy one year prior to the event. The Type II error (classifying the firm as distressed when it does not go bankrupt), however, increased substantially with as much as 15-20%. Recent tests show that the average Z-Score has increased due

to the substantial increases in stock prices and its impact on X4, which may help explain this result. Consequently, it should be understood that the Z-Score is not exactly 100% accurate. It is recommended to compare a company's Z-Scores over time in order to make an assessment of how it is doing. Z-Score profiles for distressed companies often indicate a consistent downward trend as they approach bankruptcy.

Altman's results suggests that the Z-Score is an accurate forecaster of bankruptcy up to two years prior to distress and that accuracy diminishes substantially as the lead time increases. Thus, the Z-Score model has retained its high accuracy and is still quite robust despite being developed over 40 years ago. Over the years, the Z-Score model has become a popular tool among analysts, as it has proved to be one of the best statistical models for determining the health of companies and estimating the likelihood of bankruptcy within 1 to 2 years. This is why I decided to use the Z-Score model as the basis for the study of financial distress.

Altman's original Z-Score:

$Z = 1.2(X1) + 1.4(X2) + 3.3(X3) + 0.6(X4) + 1.0(X5)$

where

X1 = working capital/total assets,

X2 = retained earnings/total assets,

X3 = earnings before interest and taxes/total assets,

X4 = market value equity/book value of total liabilities,

X5 = sales/total assets

Boundary values:

$Z > 2.99$ Safe Zone: Considered financially healthy

$1.81 < Z < 2.99$ Grey Zone: Could go either way

$Z < 1.81$ Distress Zone: Risk that company will go bankrupt within two years

The Z-Score is calculated by multiplying each of the financial ratios by an appropriate coefficient and then adding the results together. The lower the score, the greater is the risk of financial distress, as a company with a Z-score of -2 is in worse condition than one with a score of 1. However, the Z-Score indicates a condition of financial distress with a high probability of bankruptcy at both levels. The coefficients describe the importance of each ratio, since larger coefficients affect the Z-score more. Each of the ratios is discussed below (Altman 2000):

X1: Working Capital/Total Assets

The working capital/total assets ratio is a measure of the net liquid assets of the firm relative to the total capitalization. Working capital is equal to the difference between current assets and current liabilities, while total assets include both current and fixed assets. In this ratio, liquidity and size characteristics are explicitly taken into account. A firm with consistent operating losses will often have shrinking current assets in relation to total assets.

X2: Retained Earnings/Total Assets

Retained earnings report the accumulated reinvested earnings and/or losses of a firm. It is found in the Stockholders Equity section of the Balance Sheet. The ratio measures the cumulative long-term profitability of the company and implicitly considers the age of a firm. Studies have shown that corporate failures are much more common in a firm's earlier years, as many firms that go bankrupt are relatively young ones that have not yet had the time to build up its cumulative earnings. Hence, it makes sense that young companies are more likely to default on their obligations. In addition, X2 measures the leverage of a firm. Companies with high retained earnings relative to total assets have to a greater extent financed their assets through retention of earnings rather than debt financing, which may reduce the likelihood of bankruptcy.

X3: Earnings Before Interest and Taxes/Total Assets

This ratio illustrates the productivity of the company's assets before tax or leverage factors are taken into consideration. Firms depend on operating efficiently through the earning power of its assets in order to have long-term viability. Return on total assets appears to be particularly appropriate for predicting bankruptcies, since it has the highest weighting in each of the Z-Score models. EBIT is found in the company's Income Statement.

X4: Market Value of Equity/Book Value of Total Liabilities

The market value of equity is the combined market value of all shares of common and preferred stock. Total liabilities include all current and long-term liabilities found in the firm's Balance Sheet. X4 indicates how much the company's assets can decline in value before the liabilities exceed the assets and it becomes insolvent. Equity to debt also emphasizes the leverage of the firm. The higher the debt relative to the equity, the more high risk the firm is considered as. In addition, this ratio adds a market dimension to the Z-Score, within the meaning that falling stock prices may be a sign of upcoming problems. This should ensure that systematic risk is incorporated in the model, which is essential when considering the financial crisis.

Also, the market value of equity partly reflects a company's credit risk and risk of bankruptcy. When the stock market sentiment is overall positive, and stock prices are generally high, it will be easier for companies to borrow money and attract cash on the stock exchange through equity issues. Thus, the market value's impact on X4 partly incorporates the funding accessibility of enterprises in the Z-Score model, in the sense that a low ratio may indicate that the company might encounter difficulties in obtaining financing. This is also an important aspect in the context of the financial crisis.

X5: Sales/Total Assets

The asset-turnover ratio is a standard financial ratio measuring the ability of the company's assets to generate sales and the management's capacity in dealing with competitive conditions. Sales are categorized as revenues in the company's Income Statement. One should use net sales, which reflects the deduction of returns, allowances and discounts. Altman found that X5 is the least significant on an individual basis, but it is quite important because of its unique relationship to the other ratios in the Z-Score for manufacturers.

2.4.2 Adapting the Z-Score model for non-manufacturers

Later on, Altman also developed a modified Z"-Score model for non-manufacturers and private manufacturers. This was done mainly because of the limitations of the original Z-Score model, which is based on data sources that make it inappropriate for other firms than public manufacturers. Two of the original Z-Score's ratios have tended to limit its usefulness on firms that are not publicly traded manufacturers.

One of these ratios is X4, the Market Value of Equity divided by Total Liabilities. Clearly, if a firm is not publicly traded, its equity has no market value. This has the consequence that private firms cannot use the original Z-Score. Thus, Altman decided to use the book value of equity, not the market value, as the fourth variable in the modified version. By using the book value of equity for X4 in the Z"-Score model, Altman avoids restricting its applicability to just public non-manufacturers (Altman 2000).

The Z"-Score can be applied to public non-manufacturers as well. Altman demonstrates this by applying the Z"-Score to study Enron and Worldcom prior to their failures (Altman and Hotchkiss

2006). On the other hand, removing the market value of equity from X4 should to some degree reduce the X4 variable's usefulness on public enterprises, even though it has the lowest weight (1.05) of all the ratios. Hence, it is recommended to use the original Z-Score model on public manufacturers, which I have done, since it is specifically developed for this type of companies and is therefore more suitable.

The other ratio that restricts the usefulness of the original Z-Score is X5, Assets Turnover, as it varies significantly by industry. Hence, this ratio is excluded from the modified Z"-Score model. Altman did this in order to minimize the sensitivity of the industry effect, which makes the model useful for a wider range of non-manufacturing companies (Altman 2000).

I believe this model is more appropriate for non-manufacturers than the original Z-score. Naturally, models developed for specific industries (e.g. retailers, airlines etc.) would be an even better method for assessing distress potential of firms in the same industry, but such models are hard to come by (Altman and Hotchkiss 2006). However, the Z"-Score should be appropriate for the primary and tertiary/service industries.

The modified Z"-Score model:

$Z'' = 3.25 + 6.56\,(X1) + 3.26\,(X2) + 6.72\,(X3) + 1.05\,(X4)$

Boundary values:

$Z > 5.85$ Safe Zone

$4.35 < Z < 5.85$ Grey Zone

$Z < 4.35$ Distress Zone

2.4.3 Problems and limitations of the Z-Score models

The Z-Score models have proven to be a reliable tool for predicting corporate failures in a broad variety of contexts and markets. However, it should be noted that the Z-Score is not valid in every situation, as the models have drawn several objections over the years.

The models should only be used for forecasting financial distress if the company being analyzed is comparable to the firms in Altman's samples (Altman 2000). The data that Altman used as the basis

of the models is now several decades old, which is evident in the original Z-Score, since it uses data from relatively small firms with total asset values ranging between $1 million and $25 million. Thus, it is not particularly appropriate for small firms with total assets values less than $1 million, since they may have different ratios than larger firms. Also, the Z-Score models are generally not appropriate for small corporations with little or no earnings.

Altman has tested the accuracy of the original Z-score model on companies selected regardless of their asset size and it appears to be sufficiently robust to handle large companies. A frequent argument is that financial ratios, by their very nature, have the effect of deflating statistics by size, and that therefore a good deal of the size effect is eliminated (Altman 2000). Thus, the original Z-Score model should be applicable on firms with more than $25 million in total assets. The model for non-manufacturers is based on companies with total assets averaging approximately $100 million (Covering business credit 2001), which makes it is more comparable to publicly listed enterprises in Norway.

Furthermore, the models use unadjusted accounting data. For instance, one-time write-offs can cause dramatic changes in the Z-Scores from quarter to quarter. In addition, the models have the weakness of not being immune to false accounting practices. It is stated by Altman that the retained earnings account is subject to manipulation via corporate quasi-reorganizations and stock dividend declarations, which may cause a bias (Altman 2000). Altman also states that retained earnings relative to total assets (X2) has shown a marked deterioration in the average values of non-distressed firms in the past years. Therefore, he reduced the ratio's impact on Z"-Scores in the subsequent model for non-manufacturing firms. EBIT may also be exposed to manipulation of accounting data.

Because the market value of equity is substituted by the book value, the Z"-Score for non-manufacturers will not pick up bankruptcies caused by factors other than those that show up on the Balance Sheet, like unexpected business disruptions for instance. This makes the Z"-Score especially vulnerable to potential manipulation of accounting data, as it is unadjusted.

The Z-score models should not be applied on financial firms due to their frequent use of off-balance-sheet items (Altman 2000). However, it is a known fact that financial enterprises were to varying degrees negatively affected by the crisis, so the financial industry is not the most interesting to examine.

Another consideration is the volatility of the results of the original Z-Score due to stock price changes. The results of the model may vary over time, which may be explained by the uncertainty of stock prices, since they are subject to the stock market's opinion. During periods when the stock market is relatively high, the Z-Score outcomes will be higher than in times when stock prices are low. As I have mentioned, recent tests show that the average Z-Score has increased due to the substantial increases in stock prices and its impact on X4 (Altman 2000). It is possible that mispriced stocks would create a bias among the Z-Scores, for instance in the case of stock price bubbles. Because the market value of equity is part of the formula, this should be kept in mind when evaluating the results.

Despite these concerns, the Z-Score models are still among the best-known and widely used measures of financial distress. These credit risk models have proven to be important tools to help analyze corporate health and the possibility of bankruptcy. In order to strengthen and verify the results, the models can be supplemented with other analytical tools.

3 Data

In order to apply Altman's Z-Score models for the purpose of measuring the financial distress of enterprises listed on OSE, I needed to gather the necessary data. Samples were drawn from manufacturing and non-manufacturing companies and Z-Scores were measured. The data sample consists of a total of 180 publicly listed enterprises, including 913 measured Z-Score observations spanning the years 2004 to 2009. This chapter introduces the data collection process and outlines the final samples, as well as a comment on retained earnings. A summary of the data sample is found in the appendix.

3.1 The sample collection process

I decided to retrieve annual data for the years 2004 to 2009 for those enterprises that have been listed the whole period. In the case where an enterprise, either manufacturer or non-manufacturer, was listed later than 2004 or delisted before 2009, I have only included the years when it was listed on OSE in the sample. In this respect, I retrieved market data published by OSE, most importantly the list changes, which gives a summary of all listings, de-listings, changes of list and changes of name (Oslo Børs ASA 2011). This was important because it gave me an overview of the companies

listed in 2009, in addition to the companies that have been delisted in the period under consideration. Because the sample only consists of listed enterprises, I could track each enterprise back in time to find out when it was really listed. There are two main reasons why I chose not to use quarterly data in the thesis. First, I believe that annual data is adequate to successfully complete the objectives of the thesis. Also, the sample consists of many enterprises in any given year, which strengthens the explanatory power of the results. Second, quarterly data was more difficult to acquire, as I had trouble finding a database containing quarterly data for public enterprises in Norway.

To calculate the Z-Scores, accounting data is the most vital component, which is published in the enterprises' financial statements. In this respect, it is essentially data from the Balance Sheet and Income Statement of the enterprises that I needed to collect. The database ORBIS, which contains company information across the world, provided me with a detailed presentation of each enterprise's financial statement in the relevant years (ORBIS 2011). This includes both the balance sheet and profit & loss account (income statement). However, I was unable to retrieve the accounting data for a few of the enterprises listed on OSE in 2009, because I could not find the relevant information about them on the ORBIS database. This concerns Dockwise, Intex Resources, Bionor Pharma, Nio Security, Northern Offshore, Prosafe Production Public, EOC. It was also difficult to find the relevant data on ORBIS for several of companies that were delisted from OSE in 2008 and 2009. Still, I was able to obtain the necessary data for some of them. The delisted companies included in the sample are BH Ocean Carriers, Luxo, Norgani Hotels, Norman, Otrum, Petrobank energy and resources, Roxar, Software Innovation, Stavanger Aftenblad, Stepstone and Synnøve Finden.

Furthermore, I had to retrieve the market value of equity to compute the fourth ratio of the Z-Score for manufacturers. Amadeus 2.0 is the client I used for obtaining the market value of equity, i.e. the market capitalization, of each listed company from the database of Børsprosjektet NHH (Børsprosjektet NHH 2011). For a given company, the market cap of each year is taken from that year's last trading day in December. In the context of calculating the Z-Score, the optimal would be to match the dates of the market cap and the publication of the annual financial statement, because this is the point in time where the accounting data is most likely to be accurately reflected in the market value of equity. Though it varies between companies, this is usually in January/February, resulting in a slight mismatch between the dates of the market cap and the publication of the financial statement. However, considering that the past publishing dates are often unknown and

tend to vary, I argue that the last trading day of the year is the best approximation for the market cap. Additionally, it has previously been noted that the date of the market value does not need to correspond exactly with the date of the financial statement.

One of the main goals of the thesis is to examine which industries were most distressed in the financial crisis. This means that I had to group the companies in the sample into fitting industries. ORBIS gave me access to general information about the companies, such as history, description and industry classification codes. This made it possible to sort all the companies using Standard Industrial Classification (SIC) codes, which is a United States government system for classifying industries (United States Department of Labor 2011). The whole SIC codes are four digits, but using them would result in very few companies in each industry, which would give a narrow comparison of industries. Therefore, I have relied on the two digits SIC codes, which is a broader classification for major industry groups, although it still gives a clear distinction between industries. Figure 2 gives an overview of the grouping of enterprises into different industries. A few of the SIC classifications provided by ORBIS seemed inappropriate when I compared them to the description and history of the company. Thus, I changed the SIC code for these companies under evaluation to more suitable industry classifications. This concerns Bionor Pharma, Codfarmers, Hexagon Composites, Hurtigruten, Medi-stim, Orkla, Renewable energy corporation, Reservoir exploration technology, Rocksource and Simrad Optronics.

Figure 2

SIC Industry Major Groups

SIC Industry Group	SIC Code	Number of enterprises
Agriculture production livestock and animal specialties	2	1
Fishing, Hunting, and Trapping	9	6
Metal mining	10	3
Oil and Gas Extraction	13	27
Building Construction General Contractors and Operative Builders	15	2
Heavy Construction Other Than Building Construction Contractors	16	2
Construction Special Trade Contractors	17	1
Food and kindred products	20	6
Lumber and wood products, except furniture	24	1
Furniture and Fixtures	25	2
Paper and allied products	26	1
Printing, Publishing and Allied Industries	27	4
Chemicals and Allied Products	28	10
Petroleum refining and related industries	29	1
Rubber and Miscellaneous Plastics Products	30	1
Primary Metal Industries	33	1
Fabricated metal products, except machinery and transportation equipment	34	2
Industrial And Commercial Machinery and Computer Equipment	35	7
Electronic and Other Electrical Equipment and Components, Except Computer Equipment	36	9
Transportation equipment	37	10
Measuring, Analyzing, and Controlling Instruments: Photographic, Medical and Optical Goods; Watches and Clocks	38	5
Miscellaneous Manufacturing Industries	39	2
Water Transportation	44	24
Transportation by air	45	2
Transportation services	47	5
Communications	48	4
Electric, Gas, And Sanitary Services	49	4
Wholesale Trade-durable Goods	50	3
Wholesale Trade-non-durable Goods	51	2
Miscellaneous Retail	59	1
Real estate	65	7
Business Services	73	17
Engineering, Accounting, Research, Management, And Related Services	87	7

Moreover, SIC codes starting with 2 and 3 are classified as manufacturing industries. Hence, I classify the SIC codes not beginning with 2 and 3 as non-manufacturing industries. By separating manufacturers from non-manufacturers, I could apply the proper Z-Score based on the industry classification of the enterprises.

As mentioned previously, the Z-Score is not appropriate for financial companies due to their frequent use of off-balance-sheet items. Grouping the companies by SIC codes enabled me to exclude the public companies that are classified as financial from the sample, i.e. banks, insurance companies, brokerage houses and other firms directly involved in investments in other companies. This concerns DNB, Storebrand, Acta Holding, Aktiv Kapital, ABG Sundal Collier, GTB Invest, Imarex, Unison Forsikring, Protector Forsikring, Skiens Aktiemølle and Voss Veksel- og Landmandsbank. Corporations involved in real estate activities, such as real estate agencies, are included in the sample (SIC Major Group 65). Even though financial activities is a central part of their operations, I argue that these firms do not use off-balance-sheet items to the same extent as banks and associated businesses, which means that they should be compatible with the Z"-Score model. This relates to Faktor Eiendom, Fornebu Utvikling, NEAS, Northern Logistic Property, Norwegian Property and Olav Thon Eiendom.

3.2 Sample characteristics

I decided to transform the initial Z-Scores into ordinal data, i.e. sorting them into three categories that can be ranked in an increasing order. These categories are 1 = financial distress zone, 2 = grey zone and 3 = safe zone, which is consistent with the different zones of discrimination of the Z-Scores. There are basically three reasons that speak in favour of using ordinal data.

First, the Z-Scores of manufacturers and non-manufacturers are not directly comparable. The two groups have different limits (1.81 and 4.35) for when they are predicted to be financially distressed and this would restrict me from comparing them directly. Transforming the observations into ordinal data and classifying them as being in one of three states solves this problem.

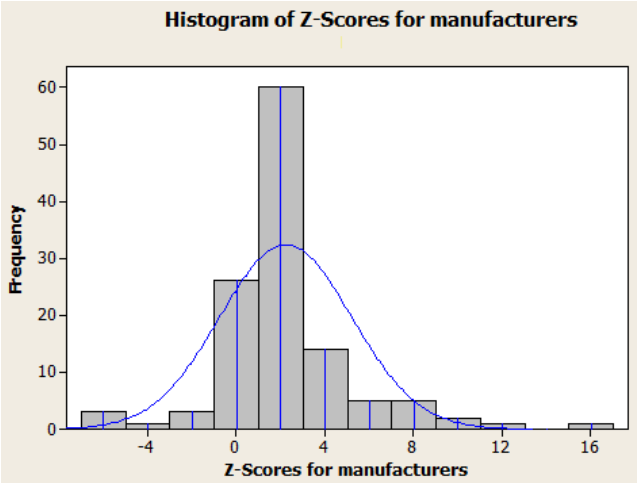
Second, some of the companies in the sample had Z-Scores that were abnormally high or low for one or more years. This is especially true for some of the recently listed enterprises involved in mining, oil exploration and biotechnology, which typically share some of the same characteristics

as small firms. As mentioned, the Z-Score model is known to have problems handling small firms, which could cause Altman's models to produce abnormal Z-Scores. All the firms in the sample have total asset values greater than $1 million. This should make them comparable in size to the firms that Altman used. However, this does not solve the small firm problem entirely, because a few of the firms in the sample have negative earnings.

I have made a couple of comments regarding this observation. It seems that the Z-Score models have problems dealing with firms that are in a growth phase. For instance, exploration companies often have low asset values the first years, because they are still examining the true value of their resources. In addition, it takes time to build infrastructure, as well as extracting, developing and start selling their products, which may result in a negative EBIT. The same arguments apply to the biotech sector, as they often have few tangible assets, low income and high R&D costs due to product development, which is a time-consuming process.

Figure 3

Histogram of Z-Scores for manufacturers

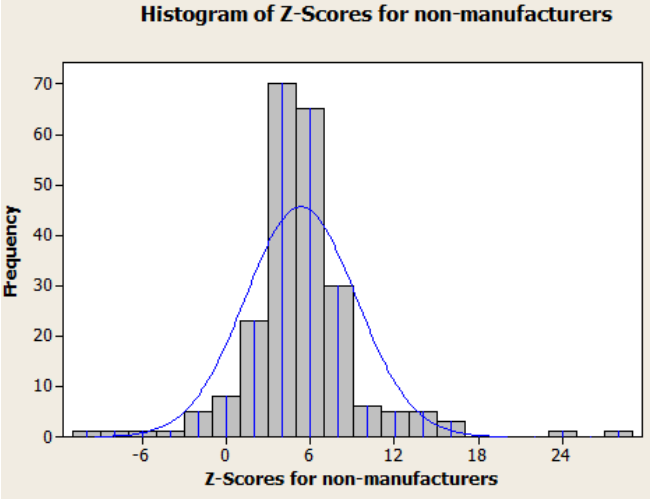


These outliers (very high or low Z-Scores) could potentially influence the results in undesirable ways. Sorting the data into three categories effectively dampens the effect of outliers on the results, so this is one of the reasons why I decided to transform the data**.** Third, because the financial crisis was systematic and affected most companies, it is plausible that the sample data is skewed towards the distress zone during 2008 and 2009 in particular. One might expect to see that the probability for bankruptcy and financial distress increased for a typical company, which would result in lower Z-Scores. Figures 3 and 4 show that this is the case during the crisis, especially for manufacturers, in the sense that the normal distribution seems like a poor fit for the observations. Thus, the observations in the sample are positively skewed or right skewed data, because the tail of the distribution points to the right.

This has implications for the choice of statistical tests, since normally distributed data is a prerequisite for using tests that involve the means and standard deviations of the two groups. Ordinal data opens up for using non-parametric tests based on the medians of the observations.

Figure 4

Histogram of Z-Scores for non-manufacturers



3.3 Retained earnings

This section concerns the calculation of the second factor in Altman's Z-Score models. Retained earnings are reported in the shareholders' equity section of the balance sheet and refers to the portion of net income which is retained by the corporation rather than distributed to its owners as dividends. The earnings can be retained by the company to be reinvested in its core business' growth opportunities, increase liquidity or to pay debt. Similarly, if the corporation takes a loss, then that loss is retained and called retained losses. Thus, retained earnings can become negative, creating a deficit. Retained earnings and losses are cumulative from year to year with losses offsetting earnings. For some of the firms in the sample, retained earnings were not available on ORBIS for all of the years. However, the financial statements included the other components that I needed to compute retained earnings. I have based the calculations on the following relationship (Business accounting guides 2008):

Retained Earnings (RE) = Beginning RE + Net Income - Dividends

(RE at the end of a year is equal to the RE at the start of the year plus net income minus dividends).

4 Analysis

This chapter presents and discusses the methodology and results from the empirical analyses that I performed in order to address the key research questions of the thesis. The first section gives an introduction to the hypothesis testing, while the second section concerns the testing of a structural break with regards to financial distress at the outbreak of the crisis using the Chow test. The third section concentrates on comparing manufacturers relative to non-manufacturers using the Mann-Whitney test. The fourth section elaborates on the testing of differences between industry groups, performed with the Kruskal-Wallis test. The fifth section concerns the relationship between equity issuance and financial distress and how this relates to the pecking order theory and market timing by managers, while the sixth section deals with the probability of default measured by the bond equivalent rating method. Finally, the seventh section concerns the predictive ability of the Z-Score models, in terms of the Type I and Type II errors.

4.1 Hypothesis testing

The approach employed in this thesis involves conducting the tests at the 5% and 1% significance level, where the level of significance constitutes a limit for how low the P-value must be before we reject the null hypothesis (H0). The P-value tells us the probability of making a statistical Type I error, i.e. incorrectly rejecting H0 (Ubøe and Jørgensen 2006). The software I have used to perform the statistical tests is Minitab 16.

It is often a realistic assumption that the data being analysed is normally distributed, but as I have explained above, this may be a situation where that prerequisite does not hold. In such situations, I want test procedures that are independent of probability distributions. Non-parametric tests do not require a given probability distribution, which allows me to apply them at a wider range of data. They are also known to be more robust than their parametric alternatives, which makes them less sensitive to outliers and measurement errors in the data. Taking this into account, I believe that using non-parametric tests is the best alternative for the purpose of testing the hypotheses of this thesis.

4.2 Comparing financial distress state before and during the financial crisis

This section seeks to answer the research question: Is there evidence of a structural break with regards to financial distress at the outbreak of the crisis?

4.2.1 Introduction

Most of the enterprises listed on OSE were negatively affected by the financial crisis. This is evident in the sharp decline in share prices, which may suggest a shift towards an increased probability of encountering financial distress. In this regard, I want to compare the financial health of Norwegian public enterprises and test whether it was different before and during the financial crisis. In order to examine this, I need a framework that allows me to test dependent observations. The paired t-test is an alternative, but this assumes that the data follows a normal distribution. As mentioned above, this may not be the case, which restricts me from applying it for the intended purpose. However, this can be overcome by applying the Chow test for structural breaks.

4.2.2 Data

Because the same Z-Score value means something different for manufacturers and non-manufacturers, I have divided the data and performed the Chow test separately for each industry group. Based on the SIC classifications, I have sorted all the listed enterprises in the data sample into a manufacturers sample and a non-manufacturers sample. I used the Z-Scores in their original values (not as ordinal data) and all the 913 observations in the data sample are included in this test.

4.2.3 Methodology

The Chow test for structural breaks is an econometric test used to determine whether the coefficients in a regression model are the same in separate subsamples. Structural breaks can occur in time series data when there is a sudden change in the relationship being examined. Thus, the approach is to test if there is a significant difference before and during the financial crisis by testing two different datasets. One of the datasets is the time period before the financial crisis (2004 to 2007), and the other during the financial crisis (2008 to 2009). I took time as the variable X and Z-

Scores for all manufacturers or non-manufacturers at a particular time as the variable Y. This means that for every year I will have a lot of observations. The Chow test statistic is defined as (Chow 1960):

$$\text{Chow} = \frac{(RSS - RSS_1 - RSS_2)/k}{(RSS_1 + RSS_2)/(n_1 + n_2 - 2k)}$$

Where RSS is the sum of squared residuals from the combined data (2004 to 2009), RSS1 is the sum of squared residuals from the first group (2004 to 2007) and RSS2 is the sum of squared residuals from the second group (2008 to 2009). N1 and N2 are the number of observations in each group and k is the total number of parameters (2 in this case). The test statistic follows the F distribution with k and N1 + N2 − 2k degrees of freedom (Chow 1960).

There are mainly two factors that influence the robustness and efficiency of the Chow test. First, the test assumes that the variance of the error terms in each regression is the same, i.e. the test requires that the model is free of heteroscedasticity. If this is not the case, then the Chow test may be inaccurate, especially when the two samples are of small size (Toyoda 1974). Thus, it may be necessary to assume homoscedasticity to carry out the test. On the other hand, it is also stated that the test behaves well when at least one of the two sample sizes is very large. The pre-crisis sample consists of 601 observations, which might be sufficiently large. Second, the test is conditional on knowing the breaking point. This is not always the case, but I believe that a natural breaking point for the Z-Scores is at the outbreak of the financial crisis in 2008, where many companies may have entered the distress zone.

I performed the Chow test by splitting the time line into two parts and performing regressions for both the period before (2004 to 2007) and during the financial crisis (2008 to 2009), in addition to the whole period (2004 to 2009). In the regressions, the variable X is time (1=2004, 2=2005,.., 6=2009) and Y is Z-Scores. Then I retrieved the Sum of Squared Residual Error from each regression analysis, which I used to calculate the Chow test statistic. The hypothesis for the Chow test of structural break follows:

H0: The coefficients of the regression model are equal in separate subsamples
HA: The coefficients of the regression model are not equal in separate subsamples (indicating a structural break)

4.2.4 Results

Figure 5 displays the results of the Chow test. The test statistic is larger than the critical value for both manufacturers and non-manufacturers, so H0 is rejected in both cases, which means that there are significant differences between the Z-Scores before and during the financial crisis at the 5% level. Consequently, there is evidence of a structural break around the outbreak of the financial crisis, which indicates that the financial distress of enterprises listed on OSE may have been different before and during the financial crisis, in the sense that they were generally more distressed in the crisis period.

Figure 5

Results of Chow test for manufacturers and non-manufacturers

Chow test manufacturers		
Test statistic	3.34	
Critical value at 5% significance level	3.00	
	Sum of squared residuals	Number of observations
Pre-crisis period (2004-2007)	11795.49	191
Financial crisis period (2008-2009)	1055.89	121
Whole period (2004-2009)	13130.16	312

Chow test non-manufacturers		
Test statistic	3.04	
Critical value at 5% significance level	3.00	
	Sum of squared residuals	Number of observations
Pre-crisis period (2004-2007)	9025.67	375
Financial crisis period (2008-2009)	3517.03	226
Whole period (2004-2009)	12670.25	601

4.2.5 Discussion

The results indicate that there is evidence of a structural break around the outbreak of the financial crisis, which means that both manufacturers and non-manufacturers listed on OSE were more financially distressed in 2008 and 2009 relative to the years 2004 to 2007. This is consistent with the fact that most enterprises experienced weaker profitability and more uncertain prospects for the future. Additionally, the sharp decline in share prices in the crisis may reflect a change towards larger exposure to financial distress. However, for robustness purposes, the potential presence of heteroscedasticity and its implications should be looked further into, since this may influence the significance of the results.

4.3 Comparing the financial distress state of manufactures and non-manufacturers

This section concerns the comparison of manufacturers versus non-manufacturers during the financial crisis period of 2008 to 2009 and seeks to answer the research question: Which industry groups were most affected by the crisis?

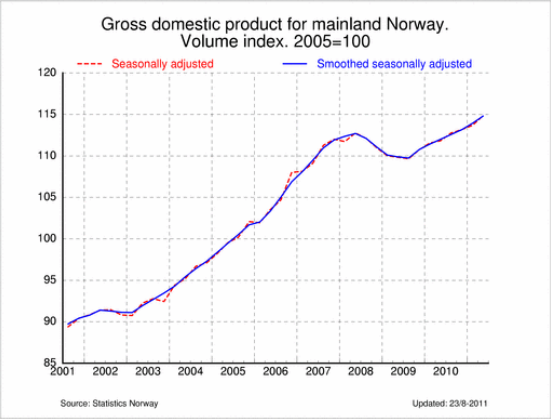
4.3.1 Introduction: The impact of the financial crisis on the Norwegian economy

This section provides an overview on the impact of the financial crisis on the Norwegian economy at a national level, as well as certain listed enterprises that were particularly affected.

The Norwegian economy prior to the Financial Crisis

Figure 6 (Statistics Norway)

GDP Mainland Norway



The decade prior to the financial crisis was overall good, but there were also periods of decline in the Norwegian economy (Figure 6). When the dotcom bubble burst around the turn of the millennium, the economic growth in OECD economies decreased significantly. Simultaneously, a high interest rate differential against other countries resulted in an appreciation of the Norwegian krone. The Norwegian economy entered a recession in 2002. However, this recession was brief, since increased demand for Norwegian exports and lower interest rates placed the basis for a new upturn in the economy. The upswing was then particularly strong from 2003 to 2007. A primary cause was that Norway received large gains from increased world trade, where a distinct increase in demand from emerging economies resulted in a high growth for Norwegian export prices. Furthermore, high profitability and rising capacity utilization contributed to increased investments levels in Norway.

Norway's economy peaked in the beginning of 2008. High interest rates contributed to lower growth in private consumption. Moreover, decreased business investments and growth contributed

to reduced demand for Norwegian export goods. Thus, the Norwegian economy was already on the way down when the global financial turmoil escalated to a crisis in the fall of 2008.

The Norwegian economy during the Financial Crisis

The outbreak of the most serious global financial crisis in our time occurred in the fall of 2008, which initiated the strongest international recession since the Great Depression of the 1930s. The full consequences of the financial crisis remain to be known, which is evident today, as public finances have been weakened in many countries. Several countries are struggling with high sovereign debt and tight government budgets. This is a result of the financial sector support measures and the active use of fiscal policy to reduce the impact of the crisis (Finansdepartementet 2011).

Norway is among the countries that was the least affected by the financial crisis. A number of aspects of Norway's economy and financial markets helped to mitigate the effects of the crisis. The Norwegian government implemented a series of measures to restore confidence in the financial system and sustain banks' lending activities by improving their access to liquidity.

In addition, Norwegian manufacturing was to a small extent exposed to goods that had the greatest decline in demand internationally, such as consumer durables (e.g. automobiles and consumer electronics). The demand from the petroleum sector remained relatively high throughout the crisis, which was essential for the Norwegian oil service sector. Moreover, Norway has a fairly large public sector and a well-developed social safety net, which may have contributed to prevent large falls in the demand for goods and services (Finansdepartementet 2011).

Expansive monetary and fiscal stimulus also helped to stabilize the economy. Fiscal policy was heavily shifted in an expansionary direction and the Norwegian government initiated several fiscal stimulus packages to counteract the negative impact of the financial crisis. Norwegian authorities had greater flexibility in economic policy than most others due to Norway's solid financial situation. This flexibility made it possible to perform the necessary support measures for the financial markets and the real economy, and also contributed to strengthen the financial market's confidence in the Norwegian financial institutions.

Facing weaker prospects for inflation and economic growth, central banks in most countries rapidly reduced interest rates, which helped to dampen the decline in the real economy. This was the case in

Norway as well. From the second half of 2008, Norges Bank gradually reduced the key policy rate to 1.25% in 2009. Lower interest rates quickly resulted in an improvement in the housing market and increased households' demand.

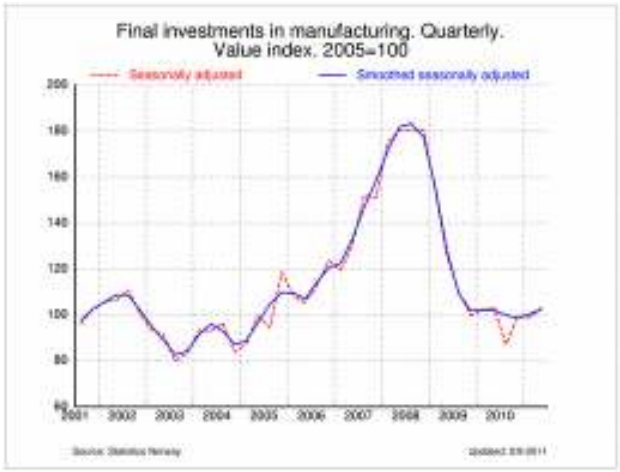
Figure 7 (Statistics Norway)

Index of production Manufacturing

Nevertheless, the failure of international financial markets gave acute challenges to Norwegian banks and companies, which resulted in the extensive actions of the authorities. Starting in the third quarter of 2008 to the first quarter of 2009, there was an evident decline in Norway's gross domestic product. Less promising prospects for economic growth, increased lending rates and tightened bank lending standards, contributed to a fall in property prices and a decrease in household demand.

Figure 8 (Statistics Norway)

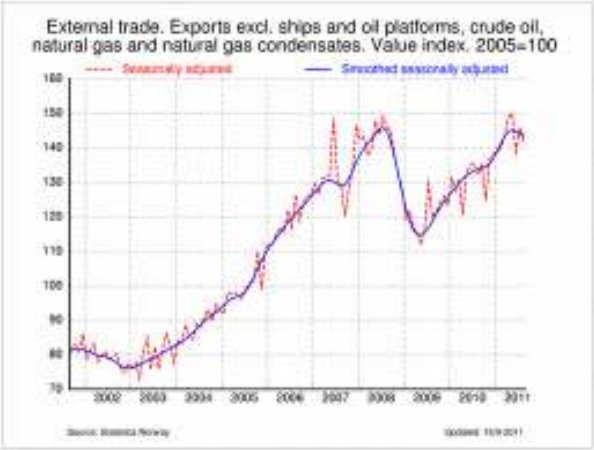
Final investments in manufacturing



There was a broad decline in the private sector for different industry groups. However, the decline was especially strong in manufacturing and construction, which is observable in the index of production for manufacturers (Figure 7). The impact on manufacturers is also apparent in the huge decline in order reserves and new orders. Investments in manufacturing show similar progression (Figure 8). Important factors that contributed to lower activity were reduced private consumption, investments and exports.

Figure 9 (Statistics Norway)

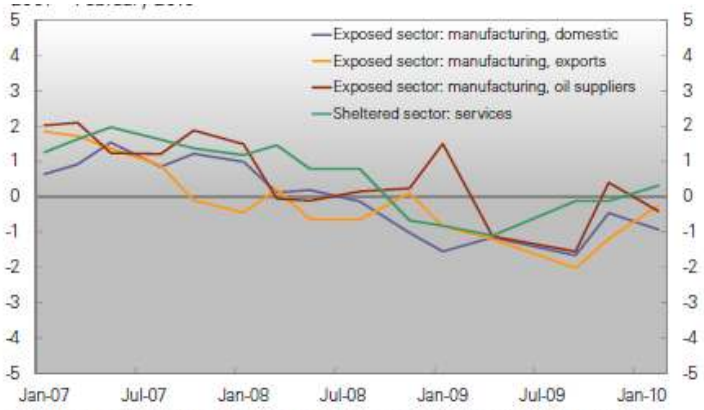
External trade



The fall in industrial production in the aftermath of the financial crisis is associated with the marked decline in demand at home and abroad. The temporary collapse in world trade had its negative impact, as the sharp fall in activity among foreign trade partners resulted in reduced demand for Norwegian export products (Figure 9). The krone appreciation and high labour costs compared to trade partners contributed negatively as well. (Finansdepartementet 2011).

Figure 10 (Norges Bank)

Operating margins (%) in various industries

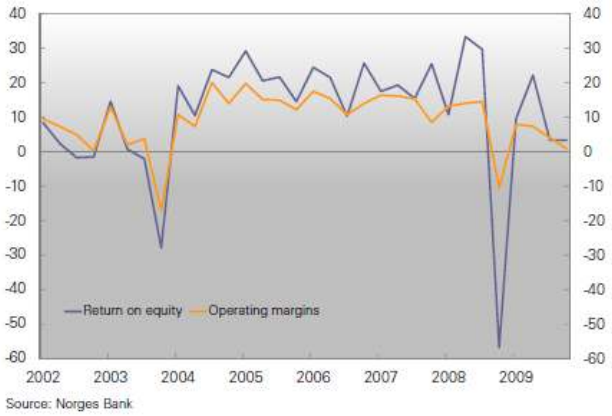


1) The chart shows growth in operating margins over the past three months compared with the corresponding period last year. The scale runs from -5 to 5, where "-1" corresponds to approximately 5% to 15% decline in operating margins.
Source: Norges Bank's regional network

This is evident among listed companies, since the weakest developments among them were in the exposed sector (Figure 10), which consists of both internationally exposed export and import industries (Norges Bank 2010). Examples of such industries are enterprises supplying the petroleum sector and the maritime construction industry. The graph shows that the service sector, i.e. non-manufacturers, experienced a generally less dramatic fall in operating margins compared to manufacturing enterprises. A reason for this may be that the service sector is more sheltered from international conditions, consequently being less exposed to financial distress than manufacturers.

Figure 11 (Norges Bank)

Key ratios (%) for listed shipping enterprises



The financial crisis hit the offshore industry hard, both in Norway and on a global basis. The industry is known to be capital intensive, pro-cyclical and internationally exposed because of its dependency on the level of activity in the global economy. Oil and gas companies' exploration and production activity is a key driving force for the demand in the industry, which came to a halt in 2008 due to lower commodity prices. Return on equity and operating margins decreased for listed shipping enterprises (Figure 11), as a result of lower operating income and increased writedowns due to low freight and market prices (Norges Bank 2010). Furthermore, reduced world trade resulted in surplus capacity, which led to a noticeable fall in freight rates and therefore lower profitability and debt-servicing capacity for many of the affected companies. Norwegian shipyards and related maritime producers experienced a drop in incoming orders, layoff of workers and bankruptcies.

For many of the affected firms, the financing situation became demanding, since credit practices among banks were tightened, causing it difficult to finance new projects. Declining market prices for ships reduced collateral values, making the shipyards dependent on equity issues in order to comply with loan conditions on bank debt. In December 2008, as much as 51 % of offshore ships to be built in Norway with delivery towards 2011 lacked financing. The corresponding number in August 2009 was 40% (Norges Rederiforbunds medlemsundersøkelse 2009). It is clear that the situation in the industry was fairly severe.

Figure 12 (Norges Bank)
Key ratios (%) for listed commercial property enterprises

Moreover, the collapse of the American housing market and the general financial crisis also had an effect on the Norwegian property market. The house price index show drastic falls in prices through 2007 and 2008 (Statistics Norway 2011), which led to higher writedowns, lower turnover as well as reduced collateral values. Property companies are often highly geared, something that itself leads to potential problems. In addition, banks' lending terms became tighter. This may make refinancing difficult and create a need to increase their equity capital in order to comply with loan conditions on bank debt. Figure 12 shows that the key ratios for listed commercial property enterprises were significantly reduced (Norges Bank 2010).

Taking these observations into consideration, one would expect that the manufacturers listed on OSE were generally more affected by the crisis. It is therefore plausible that they have more Z-Scores in the distress zone relative to non-manufacturers, which I have tested using the Mann-Whitney test.

4.3.2 Data

For a given year, the applied data consists of a manufacturer sample and a non-manufacturer sample including all the enterprises in the respective groups. Each sample consists of all the corresponding Z-Scores (transformed into ordinal data) for these two groups in the relevant time period.

4.3.3 Methodology

The Mann-Whitney test is a non-parametric hypothesis test that is appropriate for determining whether two samples of independent observations have the same median. The test allows its user to

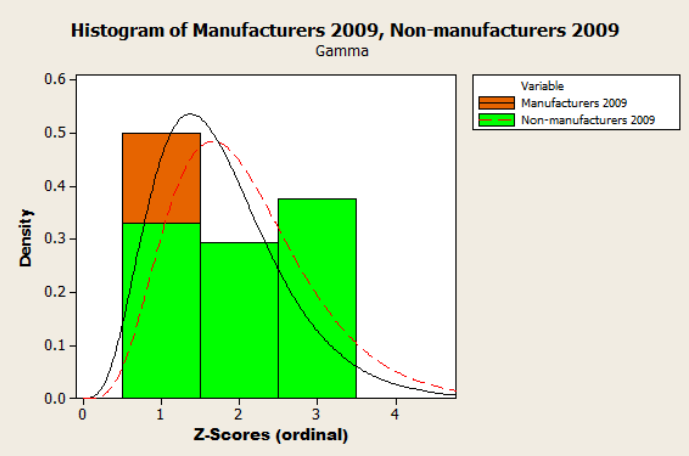
assess whether one of the samples tends to have different values, either smaller or larger, than the other. Hence, it is a non-parametric alternative to the t-test. It involves calculating a test statistic by using the ranks of the observations rather than their raw values. The smallest number gets a rank of 1, while the largest number gets a rank of N, where N is the total number of values in the two samples. The test statistic is found by ranking all the values from low to high, adjusting for ties, and summing the ranks in each group. If the sums of the ranks are very different, the P-value will be small, which may be sufficient to conclude that the medians are different (Ubøe and Jørgensen 2006).

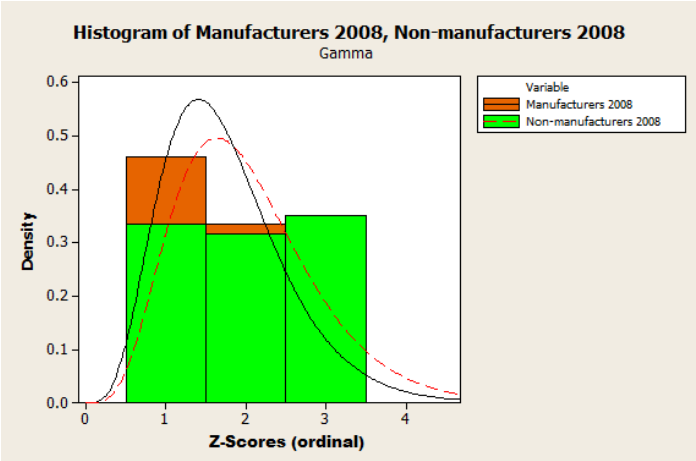
There are several reasons why I chose the non-parametric Mann-Whitney test rather than the t-test. First, the former test is the logical choice when the data is ordinal. The Mann-Whitney test is also more robust against outliers than the t-test. In terms of efficiency, the Mann-Whitney test is slightly less powerful than the t-test when the samples are normal, with an efficiency loss of 5%. However, it is considerably more powerful for many other populations that are sufficiently far from normal (Conover 1980). As I have mentioned, this may be the case with the sample. It should also be noted that the test has little power when used on very small samples (Motulsky 2007), but this is not the case for the samples. Overall, the Mann-Whitney test is more robust and widely applicable than the t-test, and the efficiency loss is rather small in case of normally distributed data, which should make the Mann-Whitney test a more appropriate choice than the t-test.

Furthermore, the Mann-Whitney test's null hypothesis is that the two sample medians are equal (H_0: $\eta_1 = \eta_2$). The alternative hypothesis can be left-tailed ($\eta_1 < \eta_2$), right-tailed ($\eta_1 > \eta_2$), or two-tailed ($\eta_1 \neq \eta_2$). If the test statistic, U, exceeds the critical value for U at the chosen significance level, there is evidence to reject H0 in favour of HA. The test does not require the data to come from normally distributed populations, but it does make the following assumptions: First, the samples must have the same shape, but do not have to be symmetric. Second, the samples must be independent (Ubøe and Jørgensen 2006).

Figure 13 (14)

Histogram of manufacturers and non-manufacturers 2009 (2008)





I want to apply the Mann-Whitney test in order to compare the transformed Z-Scores of manufacturers and non-manufacturers during the crisis to determine whether their median values differ. The first assumption of the test is that the samples have the same shape, although they may have different medians and be asymmetric. As mentioned, the data is non-normal, i.e. skewed during the crisis, with many firms having low Z-Scores. The gamma distribution is often used to model positively skewed data when random variables are greater than zero, which should make it applicable purely for illustrative purposes, as it gives an impression of how the shapes looks. One can see that the lines correspond to the histograms rather well. Figure 13 and 14 display the overlap of the histograms for the two samples, and shows that the skew towards the distress zone applies to both samples, although manufacturers are somewhat more skewed. However, I presume that the samples are sufficiently similar to satisfy the same shape assumption.

The other assumption for the Mann-Whitney test is that the data are independent random samples from two populations. Two different samples/industries are arguably independent, but taking before and after measurements for the same sample/industry can be considered dependent, e.g. as the Chow test performed previously. The two populations must be independent; in other words, the observations from the first sample must not have any bearing on the observations from the second sample. I have ensured that the samples are independent, since I only compare manufacturers versus non-manufacturers in a given year, which are independent samples. Testing manufacturers during the crisis versus manufacturers during the pre-crisis period would have been dependent observations, and that is one of the reasons why I do not use that approach.

To summarize, the two populations are independent and seem to have approximately the same shape, and so I believe the Mann-Whitney test is suitable and reliable in comparing manufacturers against non-manufacturers.

In order to determine whether there is evidence of a difference between manufacturers and non-manufacturers during the crisis, I have computed the sample medians in order to find out which one is lower. The medians are equal (2) in 2008, while manufacturers have a lower median (1.5) than non-manufacturers (2) in 2009. Hence, taking into account that manufacturers have a lower median in 2009 and with history showing that they were generally more affected by the crisis, I test whether manufacturers have a lower median than non-manufacturers using the (left-tailed) Mann-Whitney test. If they are significantly different, this would indicate that manufacturers were more negatively affected by the crisis. Thus, I performed a left-tailed Mann-Whitney test with the following hypothesis for the years 2008 and 2009, as well as the two years combined:

H0: The median scores of manufacturers and non-manufacturers are equal ($\eta_1 = \eta_2$)

HA: The median of manufacturers is less than the medians of non-manufacturers ($\eta_1 < \eta_2$)

Figure 15

Results of Mann-Whitney tests for manufacturers and non-manufacturers test 2009, 2008 and 2008-2009

Mann-Whitney test 2009		
Test statistic	4288.5	
P-value	0.0250	
P-value adjusted for ties	0.0185	
	Manufacturers	Non-manufacturers
Median	1.5	2
Number of observations	58	109

Mann-Whitney test 2008		
Test statistic	5043.5	
P-value	0.0243	
P-value adjusted for ties	0.0181	
	Manufacturers	Non-manufacturers
Median	2	2
Number of observations	63	117

Mann-Whitney test 2008-2009		
Test statistic	18568.5	
P-value	0.0026	
P-value adjusted for ties	0.0015	
	Manufacturers	Non-manufacturers
Median	2	2
Number of observations	121	226

4.3.4 Results

Figure 15 displays the results for 2008, 2009, as well as 2008 and 2009 combined. The test statistic has a p-value of 0.0154 and 0.0159 when adjusted for ties in 2008 and 2009 respectively. Since the p-value is less than the chosen significance level of 0.05, I conclude that there is sufficient evidence to reject H0. Therefore, the data supports the alternative hypothesis that there is a difference

between the sample medians. In other words, the results indicate that manufacturers had significantly lower Z-Scores than non-manufacturers in 2008 and 2009, which is equivalent to a greater probability of bankruptcy. The result of testing H0 on the "financial crisis" period of 2008 to 2009 is significant at a 99% level (both adjusted and unadjusted for ties).

4.3.5 Discussion

This implies that, measured with Altman's Z-Score, public manufacturing firms were generally more negatively affected by the financial crisis than public non-manufacturing firms. This is consistent with the observations made in the crisis, as the Norwegian industry was badly affected by the crisis. Reality shows that the weakest developments among the listed enterprises were in the exposed sector, while the service sector experienced generally less dramatic fall circumstances. Hence, even though the original Z-Score model was created several decades ago, it does an adequate job at classifying manufacturers as more financially distressed than non-manufacturers in the crisis. This may also imply that manufacturers are more exposed to financial distress in times of crisis, in comparison to non-manufacturers, which may be more sheltered against the development in the world economy.

4.4 Differences among SIC-classified industries

This section examines differences among the SIC classified industry groups during the financial crisis period of 2008 to 2009 and seeks to answer the research question: Which industry groups were most affected by the crisis?

4.4.1 Introduction

The source of financial distress differs among the various industry groups. According to the Norwegian business newspaper Dagens Næringsliv, over 33% of the companies listed on OSE were facing major financial challenges at the start of 2009, which can roughly be divided into the following five categories (Dagens Næringsliv 2009, February 02):

- Companies that are losing money (loss of revenues) and that can be forced to issue new shares at a low price
- Companies that are struggling to get financing (lack of funding) for the implementation of new projects because of banks' lending reluctance
- Companies that are trying to restructure debt and raise money
- Companies that have challenges with debt maturities (high debt)
- Companies who risk violating their debt covenants

4.4.2 Data

I have sorted all the enterprises in the data into samples based on their SIC industry classification. As I have tested 2008 and 2009 as a whole, the samples consists of all the enterprises that were listed in the relevant time period and their corresponding Z-Scores (transformed into ordinal data).

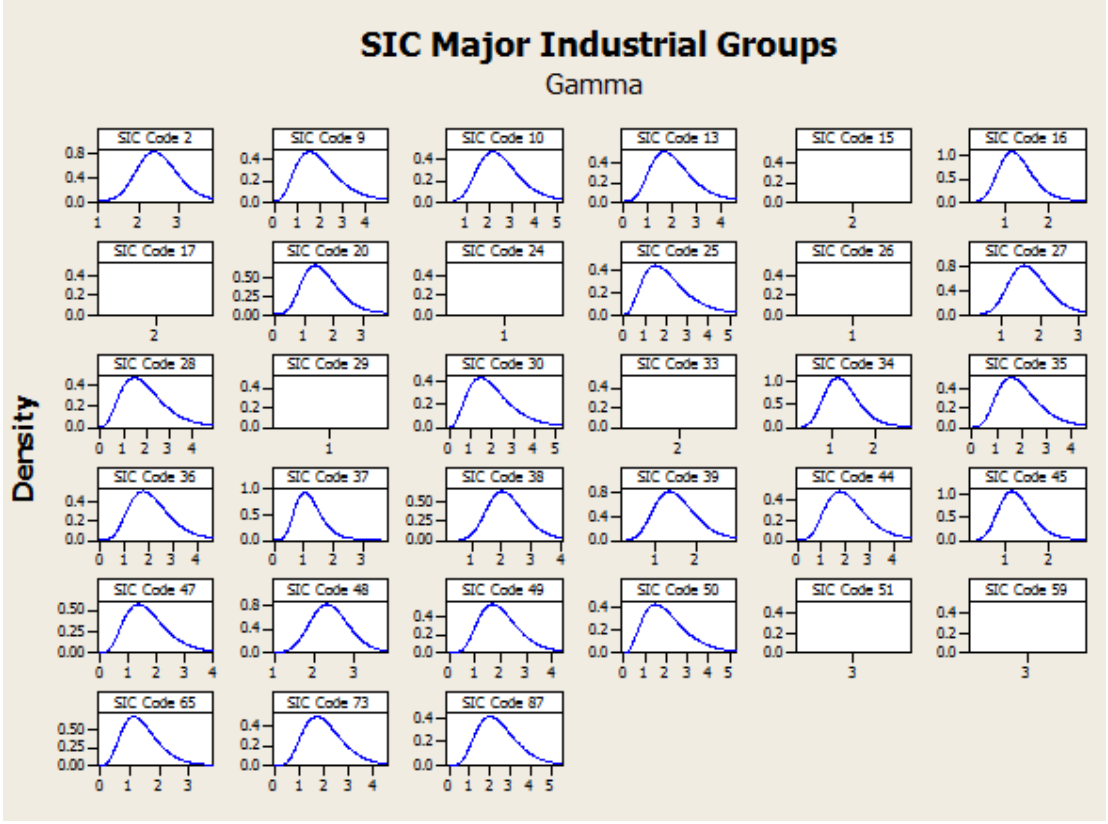
4.4.3 Methodology

The Kruskal-Wallis test is a generalization of the Mann-Whitney test, as it tests whether three or more independent samples of ordinal data have the same median. Thus, everything regarding the Mann-Whitney test discussed above applies to it. The calculation of the test statistic is quite similar. The same assumptions also apply here as in the Mann-Whitney test, i.e. independent random samples that have the same shape. Following the same reasoning as above, the samples are independent. Also, the test does not require the data to be normal, but instead uses the rank of the observations rather than the actual observations. In this sense, it is a non-parametric analogue of the one-way ANOVA test, but the Kruskal-Wallis test is powerful for data from many other distributions than just the normal distribution. (Ubøe and Jørgensen 2006).

Figure 16 displays the shape of the samples, modelled and illustrated using the gamma distribution. Many of the industry groups seem to have a similar shape with a skew towards the distress zone, which should make them suitable for the Kruskal-Wallis test. However, the skew and size of the shapes varies among industry groups, as the density varies for some of them. Also, a few of the graphs are blank, because these industries only have observations in one of the zones (all observations on X-axis are 1, 2 or 3), typically due to few enterprises within those industries. This

implies that the results for some of the industries should be interpreted with caution. In this regard, I have gathered information on the development of the different industries' index of production, as well as the percentage of bankruptcies at a national level corresponding to each industry group (Statistics Norway 2011). This data is aggregated, as each industry includes all company forms in Norway, and is used to compare the results of the SIC classified industries in order to find out of how well their predicted condition fits with reality. Comparing the results with real world observations should give a better assessment of how well the results correspond with reality, which I have done in the discussion section below.

Figure 16 SIC Major Industrial Groups: Shape of samples



In summary, I believe that the Kruskal-Wallis test is appropriate for testing whether the median Z-Score is the same in each SIC-classified industry during the financial crisis, although one should bear in mind the shortcomings mentioned above. Therefore, I used the Kruskal-Wallis procedure to test:

H0: The medians of all industry groups are equal
HA: Not all medians are equal

However, rejecting H0 only tells us that there are differences among the industries, but it does not reveal what industries were most affected and how this compares to the other industries. Luckily, Minitab provides a Z statistic (which has no relation to Altman's Z-Score) that gives a good indication of how the industry groups differ. It is merely a statistic used to determine how the median for each industry group differs from the median of all observations (Minitab 16 User Guide). The more negative the Z statistic is, the more financially distressed that industry is expected to be, and vice versa. Hence, I can get an overview of how distressed the different industries were relative to each other by ranking them by their respective Z statistic. The industries with a negative Z statistic are given a state as financially distressed, since the mean rank for each of these industries are lower than the mean rank for all observations, while the industries in the safe zone all have medians of 3. The remaining industries are placed in the grey zone. To test if this grouping of the industries using the Z statistic is appropriate, I used left-tailed Mann-Whitney tests to see if the median of the groups are different, in the sense that the scores in the distress zone are less than those in the grey zone and the scores in the grey zone are less than those in the safe zone. Rejecting H0 will indicate that the Z statistic does a good job at separating the SIC classified industries and stating their condition. This results in the following hypotheses:

H0: The median scores in the distress zone and grey zone are equal HA: The median score in the distress zone is less than the median in the grey zone

H0: The median scores in the grey zone and safe zone are equal HA: The median score in the grey zone is less than the median in the safe zone

4.4.4 Results

Figure 17 displays the results of the Kruskal-Wallis test. The test statistic had a p-value of 0.002 unadjusted for ties and 0.000 adjusted for ties. Hence, the results are significant at the 1% level and I conclude that there is sufficient evidence to reject H0 in favour of the alternative hypothesis of at least one difference among the industry medians.

Figure 17 Results of Kruskal-Wallis test on Z-Scores in 2008 to 2009

Kruskal-Wallis test on Z-Scores 2008-2009			
	Unadjusted for ties	Adjusted for ties	
Test statistic	59.29	66.98	
P-value	0.002	0.000	
SIC code	Number of observations	Median	Z statistic
2	2	2.5	0.91
9	12	2	0.21
10	6	3	1.54
13	54	2	0.55
15	4	2	0.21
16	4	1	-1.56
17	2	2	0.15
20	11	2	-1.12
24	2	1	-1.52
25	4	2	0.10
26	2	1	-1.52
27	7	2	-0.62
28	20	2	0.02
29	2	1	-1.52
30	2	2	0.07
33	2	2	0.15
34	4	1	-1.56
35	13	2	-0.07
36	16	2	0.87
37	20	1	-3.90
38	10	2	0.99
39	4	1.5	-0.97
44	47	2	1.39
45	4	1	-1.56
47	10	1.5	-0.86
48	7	2	1.50
49	7	2	0.20
50	6	2	0.13
51	4	3	2.36
59	2	3	1.67
65	14	1	-2.22
73	29	2	0.84
87	16	3	2.24

As previously mentioned, ranking the different industries by their respective Z statistic should give an overview of how financially distressed they are relative to each other. The more negative the Z

statistic is, the more financially distressed that industry is expected to be, and vice versa. The ranking of the industries is shown below in figure 18:

Figure 18 SIC industry groups placed in distress, grey and safe zone based on Z statistic

	SIC Industry Group (Code)	Z statistic
Distress zone	Transportation equipment (37)	-3.90
	Real estate (65)	-2.22
	Heavy Construction Other Than Building Construction Contractors (16)	-1.56
	Fabricated metal products, except machinery and transportation equipment (34)	-1.56
	Transportation by air (45)	-1.56
	Lumber and wood products, except furniture (24)	-1.52
	Paper and allied products (26)	-1.52
	Petroleum refining and related industries (29)	-1.52
	Food and kindred products (20)	-1.12
	Miscellaneous Manufacturing Industries (39)	-0.97
	Transportation services (47)	-0.86
	Printing, Publishing and Allied Industries (27)	-0.62
	Industrial And Commercial Machinery and Computer Equipment (35)	-0.07
Grey zone	Chemicals and Allied Products (28)	0.02
	Rubber and Miscellaneous Plastics Products (30)	0.07
	Furniture and Fixtures (25)	0.10
	Wholesale Trade-durable Goods (50)	0.13
	Construction Special Trade Contractors (17)	0.15
	Primary Metal Industries (33)	0.15
	Electric, Gas, And Sanitary Services (49)	0.20
	Fishing, Hunting, and Trapping (9)	0.21
	Building Construction General Contractors and Operative Builders (15)	0.21
	Oil and Gas Extraction (13)	0.55
	Business Services (73)	0.84
	Electronic and Other Electrical Equipment and Components, Except Computer Equipment (36)	0.87
	Agriculture production livestock and animal specialties (2)	0.91
	Measuring, Analyzing, and Controlling Instruments: Photographic, Medical and Optical Goods; Watches and Clocks (38)	0.99
	Water Transportation (44)	1.39
	Communications (48)	1.50
Safe zone	Metal mining (10)	1.54
	Miscellaneous Retail (59)	1.67
	Engineering, Accounting, Research, Management, And Related Services (87)	2.24
	Wholesale Trade-non-durable Goods (51)	2.36

The Z-Value for SIC 28 is 0.02, the smallest absolute Z-Value. This size indicates that the mean rank for SIC 28 differed least from the mean rank for all observations. Thus, this industry was typically somewhere in the "grey zone" and it should include both distressed and safe firms. The mean rank for SIC 37 was lower than the mean rank for all observations, because the z-value is negative (z = -3.9). It actually has the most negative Z statistic, which indicates that SIC 37 was one of the most financially distressed industries during the crisis. The mean rank for SIC 51 is higher than the mean rank for all observations, as the z-value is positive (z = 2.36). It has the highest Z statistic of all industries, indicating that it was relatively safe and that the companies within the industry avoided most of the impact of the financial crisis. Hence, the industries with a negative Z statistic are given a state as financially distressed, since the mean rank for each of these industries are lower than the mean rank for all observations, while the industries in the safe zone all have medians of 3. The remaining industries are placed in the grey zone. One should keep in mind that these are relative numbers, since there are exceptions within all industries.

Mann-Whitney tests of Grey Zone < Safe Zone and Distress Zone < Grey Zone are statistical significant at the 1% level (Figure 19), which indicates that the Z statistic does a good job at separating the condition of the SIC classified industries. One should also note that the median value of the different zones is according to the ranking of the Z-Scores that I used initially.

Figure 19 Mann Whitney tests of distress zone and safe zone

Mann-Whitney test of distress zone		
Test statistic	41036.5	
P-value	0.0000	
P-value adjusted for ties	0.0000	
	Distress zone	Grey zone
Median	1	2
Number of observations	96	227

Mann-Whitney test of safe zone		
Test statistic	3841.5	
P-value	0.0079	
P-value adjusted for ties	0.0051	
	Grey zone	Safe zone
Median	2	3
Number of observations	227	24

4.4.5 Discussion

The DN article stated that 33% of all listed companies in Norway had great financial challenges at the start of 2009, which supports the low Z-Scores during the crisis. As follows, the five major challenges mentioned in the article seem to be relevant for many of the struggling enterprises. I have commented on the companies within the industries that stand out and contribute most to the result.

Distress Zone

The enterprises placed in the distress zone are characterized by having risk of bankruptcy within the next two years.

37 Transportation equipment

The industry includes establishments engaged in manufacturing equipment for transportation by land, air and water. In this case, these are primarily offshore companies involved in manufacturing and repairing ships and boats, production of maritime equipment and associated services.
On the basis of the Z statistic, SIC major group 37 was the most financially distressed industry of the crisis. 9 of 10 companies within the industries have Z-Scores in the distress zone in both 2008 and 2009, something that is definitely alarming. Several of the listed enterprises in this group encountered liquidity problems during the crisis and required debt restructuring. For instance, Eitzen Chemical suffered from high indebtedness and needed to take action in order to ensure short-term liquidity, which resulted in a complete financial restructuring (Dagens Næringsliv 2009, November 05). One of the affected companies, Petrojack, was not able to meet its debt obligations in late 2009. Liquidating the company's assets was not enough to cover its liabilities, so Petrojack found no other option than to file for bankruptcy in 2010 (Dagens Næringsliv 2010, March 08).

The index of production for all transport equipment producers fell considerably during the crisis (Statistics Norway 2011), which is consistent with the predicted state of this industry.
This certainly contributes to the result that manufacturing firms were more affected by the crisis than non-manufacturers. It is also among the more financially unhealthy industries during the pre-crisis period, since several of the affected companies were in the distress zone already in 2006 and 2007. However, the industry accounted for only 0.40% of all Norwegian bankruptcies in 2008 and 2009 (Statistics Norway 2011), which certainly contrasts the state of the listed enterprises.

Classifying this industry group as the most financially distressed is in line with the observations made during the crisis, as the offshore industry both in Norway and globally was badly affected. As previously mentioned, return on equity and operating margins decreased for listed shipping enterprises. The industry is known to be capital intensive, pro-cyclical and internationally exposed because of its dependency on the level of activity in the global economy. Norwegian shipyards and related maritime producers experienced few incoming orders. Furthermore, reduced world trade resulted in surplus capacity, which led to a marked fall in freight rates and therefore lower profitability and debt-servicing capacity for many of the affected companies. The financing situation became demanding, since credit practices among banks were tightened. Declining market prices for ships reduced collateral values, making them dependent on equity issues in order to comply with loan conditions on bank debt.

65 Real Estate

Declining housing prices and lower projected profitability meant that listed property companies were among those showing the largest falls in share prices. Fornebu utvikling, Norwegian Property and Faktor Eiendom all lost around 90% of their value over the course of 2008 (Oslo Børs ASA 2008). The listed property companies' fall in stock prices correspond well with the Z-Scores, since all the mentioned companies were in the distress zone, except Fornebu Utvikling which was not classified as distressed. In addition, NEAS, Northern logistic property and Norgani Hotels were also in the distress zone in 2008 and 2009. Some of these companies entered the distress zone already in 2007, which indicates that the Z-Score was sufficiently able to predict the distress of this industry. On a national basis, real estate firms accounted for 5.43% of all bankruptcies in Norway during 2008 and 2009 (Statistics Norway 2011).

Classifying this industry group as one of the most distressed is consistent with what one could observe in the financial crisis, as the Norwegian property market was badly affected and the key ratios for listed commercial property enterprises were significantly reduced. The sharp decline in housing prices led to higher writedowns, lower turnover as well as reduced collateral values.

16 Heavy Construction Other Than Building Construction Contractors

This industry consists of Oceanteam Shipping and Veidekke. The former company contributed most to this result, with Z-Scores in the distress zone in 2008 and 2009. Facing large deficits and great financial challenges (Bergens tidende 2009), it was among the companies that recorded substantial falls in its share price, losing about 95 % of its market value in 2009 (Oslo Børs ASA 2009). In the figurative sense this shows how indebted companies are particularly vulnerable if earnings start to decline considerably.

Oceanteam Shipping is classified as a construction company, which was one of the crisis' most affected industries. Construction stood for 23.66% of all Norwegian bankruptcies in 2008 and 2009, and 12.98 % if we exclude construction contractors, which is the relevant number for this industry. Also, the production index for Norwegian construction firms declined considerably in the second half of 2008 (Statistics Norway 2011).

34 Fabricated metal products, except machinery and transportation equipment

This industry consists of Akva Group and Kongsberg Automotive Holding. The latter company contributed most to this result, as Akva Group only was in the distress zone in 2009, while

Kongsberg Automotive Holding was classified as distressed in 2007, 2008 and 2009. Kongsberg experienced major liquidity problems during 2008 and lost more than 90% of its market value (Oslo Børs ASA 2008). It manufactures components for automobiles and was therefore exposed to consumer durables, which had one of the greatest declines in demand internationally. The major problems in the international automotive industry had a clear impact on the demand of the enterprise's products. In other words, the company was indirectly affected by the global financial crisis. This emphasizes the dependency between national economies and how an international crisis can spread and have impacts on a small, open economy like the Norwegian. Kongsberg Automotive Holding made it through the crisis by substantial workforce reductions, restructuring its operations in order to adapt to market conditions and renegotiating its terms of debt (VG Nett 2008). The index of production for producers of fabricated metal products dropped markedly during the crisis (Statistics Norway 2011).

45 Transportation by air

The airline industry is among the most distressed industries both in the "pre-crisis" and "crisis" periods. Norwegian aviation was for a number of years strictly regulated in terms of prices and flights, but has entered a deregulated environment since 1994. Competition is far greater in a deregulated environment and often causes a number of firms to both enter the industry (Altman and Hotchkiss 2006), something that in fact has happened in the Norwegian airline industry in recent years. The Norwegian airline industry today can be characterized as a duopoly, where SAS and Norwegian Air Shuttle dominate the market. This has resulted in an industry characterized by tough price competition, which stresses the need to cut costs and increase efficiency. A recession would possibly intensify these factors and in this sense justify why the airline industry is among the more troubled industries in the crisis. The observation that the industry is struggling in the "pre-crisis" period as well strengthens the view that this is an industry with small margins and subject to financial distress, although Norwegian contributes most to this result.

Both companies experienced falling share prices in 2008 (Oslo Børs ASA 2008). 2009 was a good year for Norwegian's stock price, which gained 211% over the course of the year. Unlike its competitor Norwegian, shares in SAS experienced another difficult year and fell by more than 40% in 2009 (Oslo Børs ASA 2009). Both companies had Z-Scores in the distress both in 2008 and 2009, while Norwegian also had it for several years prior to the crisis.

Although a turbulent industry, it only stood for 0.03% of all bankruptcies in 2008 and 2009. This is probably a result of relative few firms in this industry compared to other Norwegian industries.

24 Lumber and wood products, except furniture

This industry classification comprises Byggma, which is a manufacturer of construction materials. Reduced construction activity in Norway negatively affected the lumber and wood products (NA24 2008, November). A declining housing market affected construction that in turn had its negative effect on the demand for construction supplies. The industry encountered reduced activity and profitability over the course of the crisis period. Byggma has Z-Scores in the distress zone both in 2008 and 2009.

However, it is important to bear in mind that one company's performance does not necessarily say much about the performance of a whole industry, although the index of production for this industry group fell steeply in 2007 and 2008. On the other hand, only 0.55 % of all bankruptcies in Norway during 2008 and 2009 were accounted for by this industry (Statistics Norway 2011).

26 Paper and allied products

The pulp and paper industry is a cyclical industry where profits fluctuate with the situation in the world economy. It has in recent years been distinguished by fierce competition and overcapacity within the industry, which can partly be seen in the context of lower demand for paper due to the IT revolution. This requires productivity improvements and balancing costs with the income potential (Skogindustri 2010).

Norske Skog is no exception, which has struggled for a number of years with weak profitability and hefty losses caused by tough competition in the paper industry. The scale of the company's losses became a hot topic for investors already in 2007. The Norske Skog share price declined 55.63% for the year as a whole. In 2008, Norske Skog struggled for much of the year with its high indebtedness and a lack of investor confidence. The company closed 2008 with a fall in share price of 70%. 2009 was also difficult year for Norske Skog, which lost 30% of its market value and dropped out of the OBX index (Oslo Børs ASA 2007, 2008, 2009). Norske Skog has Z-Scores in the distress zone in 2008 and 2009, in addition to the years prior to the crisis, which strengthens the view that the company has encountered economic problems over the past few years.

0.08% of all Norwegian bankruptcies in 2008 and 2009 were accounted for by this industry, which is possibly because of few firms in the industry. As this industry group consists of only one enterprise, the results do not necessarily say much about the development on a national level. However, the index of production for paper and paper products illustrates that the industry has been struggling for several years, as it started to decline already in 2005 (Statistics Norway 2011).

29 Petroleum refining and related industries

This major group consists of Interoil Exploration and Prodution, which encountered large financial challenges after violating the payment terms and defaulting on a bond in 2009 (Dagens Næringsliv 2009, May 29). The financing problem was solved through negotiations with the lenders. This is also one of the more financially disturbed industries of the "pre-crisis" period. Hence it seems like the company has struggled financially for several years prior to the crisis. In this industry, there were none Norwegian bankruptcies in 2008 and 2009. However, one should be careful interpreting industry performance based on a single company, since it is not necessarily representative for the whole industry. Hence the result is inconclusive. Interoil has Z-Scores in the distress zone both in 2008 and 2009, as well as the years prior to the crisis. The index of production for this group shows a moderate downturn in 2008 (Statistics Norway 2011).

20 Food and kindred products

Based on the Z-Scores, the most distressed companies in this industry were Aker Biomarine, Lerøy Seafood and Copeinca. These are companies producing fish oil, fish meal and packaged foods, especially seafood. Because they are of an international character, the global economic consequences affect the demand for their products. Furthermore, household consumption in Norway declined in 2008, which might contribute to the result. Also, the prices of fish related products are known to be volatile. The Z-Scores indicate that they were mainly affected in 2008, where they were classified as financially distressed, partly due to the aftermath of falling prices and fish diseases. However, limited global growth in supply helped stabilizing the prices through the year. Furthermore, these export firms are affected by variations in the Norwegian currency. 2009 was actually quite a good year for several of the firms, since the list of winning companies on OSE that year features the aquaculture sector (Oslo Børs ASA 2009). During 2008 and 2009, this industry accounted for 1.01% of all bankruptcies in Norway (Statistics Norway 2011).

39 Miscellaneous Manufacturing Industries

Based on the Z statistic, this was one of the most financially healthy industries of the "pre-crisis" period. The industry consists of Orkla and Funcom. On the basis of the companies' Z-Scores, both of them have undergone a worsening of their financial situation since the "pre-crisis" period. However, the deterioration seems more dramatic for Funcom, a computer game developer, which contributes most to this observation. It is placed in the distress zone both in 2008 and 2009. The company's stock price plummeted in 2008 after an unsuccessful release of one of their most anticipated games (Oslo Børs ASA 2008). In addition, earnings were decreasing at the time, although the company never faced liquidity problems, as it had sufficient cash reserves (DagensIT 2009, February 23). Miscellaneous manufacturing industries accounts for 0.22% of all bankruptcies in Norway during 2008 and 2009 (Statistics Norway 2011).

47 Transportation services

The affected companies in this industry are mostly providers of transportation services for the offshore and onshore industries. Basically, many of the same arguments apply here as under SIC major group 37, since the performance of these firms follows the activity of the maritime industry. This is also one of the more financially disturbed industries of the "pre-crisis" period. The worst performers are Fairstar Heavy Transport and Golar LNG, which were classified as financially distressed in both 2008 and 2009. Fairstar obtained this classification in 2007 as well, which can be interpreted as a warning sign. Onshore and offshore transportation services stood for 5.62% of all Norwegian bankruptcies during 2008 and 2009. The index of production shows a decline in 2007 (Statistics Norway 2011).

27 Printing, Publishing and Allied Industries

Schibsted and Polaris Media contribute most to this result. Both the enterprises are media conglomerates and their business areas include newspapers, television, movies and publishing. The two companies share a high degree of dependency on advertising funding. The financial crisis had a particularly negative effect on advertising revenues, which consequently reduced the earnings of the companies (Hegnar Online 2008). Schibsted was classified as financially distressed in 2008 and Polaris Media in 2009. 0.57% of all Norwegian bankruptcies were in this industry during 2008 and 2009. The index of production was somewhat reduced during the crisis (Statistics Norway 2011).

35 Industrial And Commercial Machinery and Computer Equipment

The most affected companies include Kverneland, Repant and Tandberg Data. They all share the fact that they produce durable goods and that their Z-Scores warned financial distress already in 2007. The industry has low scores in the "pre-crisis" period as well. 0.17% of all Norwegian bankruptcies were in this industry in 2008 and 2009. The index of production for durable consumer goods shows a sharp decline since early 2008, while the same index for computer and electrical equipment decreased much in 2009 (Statistics Norway 2011).

Joining the stock market in 2007 proved to be a tough experience for Repant, a company which manufactures reverse vending machines. Turnover was affected by the financial crisis, which led to the postponement of many purchase decisions. Also, the liquidity situation indicated that Repant needed additional capital (Dagens Næringsliv 2009, August 26).

Kverneland is a producer of agricultural equipment, focusing on farm machinery. Farmers had trouble financing their purchases, which led to a decline in the demand of Kverneland's products. The company, like the rest of the export sector, also struggled with an unfavourable strong Norwegian currency in 2009 (Nationen 2009).

Another IT company that experienced major liquidity problems was Tandberg Data, which focused on data storage products. The company struggled for a long time with high indebtedness, bankruptcy risk and massive losses. It attracted a lot of attention towards the end of 2007 with shareholder disquiet, replacement of both the executive management and the board of directors, and last but not least, a warning that the company needed to raise more capital. The liquidity problems worsened during 2008 and the share price fell by more than 95% throughout the year (Oslo Børs ASA 2007, 2008). In 2009, it planned to get rid off most of its debt through raising more capital and converting debt to shares (DagensIT 2009, February 12). However, Tandberg Data failed to raise new capital and was not able to restructure its debt. It was ultimately left with no other option than to file for bankruptcy (Dagens Næringsliv 2009, April 24).

Grey Zone

The industries that are in the grey zone are generally characterized by including both distressed and relatively healthier companies. I will comment on the financially distressed companies below.

28 Chemicals and Allied Products

Major group 28 consists mostly of chemical, pharmaceutical and biotechnology companies. This sector did partly struggle in 2007 and 2008. However, several of the involved companies did a comeback in 2009, since the stock exchange's list of winning companies that year contains multiple firms from the health section. The pharmaceutical company Algeta is at the very top of the list, with an impressive 781% increase in its share price as the company passed a number of important milestones and kept the market happy with positive news. Clavis Pharma, also in the pharmaceutical sector, was not far behind with an increase for the year of 565% (Oslo Børs ASA 2009). The index of production for chemicals displays a considerable decrease in the crisis period (Statistics Norway 2011). It should be noted that the Z-Scores for several of these biotechnology companies seem rather volatile, cf. the previous discussion in the data chapter.

30 Rubber and Miscellaneous Plastics Products

Major group 30 consists of Hexagon composites, which had a Z-Score in the distress zone in 2008. Demand for some of Hexagon's products fell in the financial crisis, but there was never reported any crisis with respect to the company's financials (NA24 2009). The lower demand is consistent with the fall in the industry's index of production (Statistics Norway 2011).

25 Furniture and Fixtures

This major group is covered by the furniture manufacturers Ekornes and Hjellegjerde. The financial crisis affected the whole furniture industry in Norway, but it was Hjellegjerde that got affected the worst. Based on its Z-Scores, it went into the distress zone already in 2007, and stayed there in 2008 and 2009. After massive deficits over a longer period, the company encountered severe financial problems in 2010, when it did not manage to repay its debt. Hjellegjerde was saved from bankruptcy through a private placement and was delisted from OSE later that year (E24 2011). Hence, the Z-Score did an adequate job at predicting the financial distress of this furniture company. The index of production displays a decline since 2008 (Statistics Norway 2011).

50 Wholesale Trade-durable Goods

This industry consists of Birdstep Technology and Contextvision. The former was most affected by the crisis, with a Z-Score in the distress zone in 2008. It is an IT company selling durable goods and has for several years struggled with deficits (NA24 2008, August 14). Being exposed to consumer durables is a possible explanation to the classification as distressed in 2008.

33 Primary Metal Industries

This major group consists of industry giant Norsk Hydro, which never entered the distress zone. The industry's index of production fell substantially in late 2008 and early 2009 (Statistics Norway 2011), which may indicate that the international problems related to consumer durables had an effect on the demand of metal. Thus, it seems that Norsk Hydro managed the crisis rather well.

49 Electric, Gas, And Sanitary Services

Among the companies in this group we find Wentworth Resources, which recorded one of the biggest falls in share prices in 2009 (Oslo Børs ASA 2009). The company disclosed major financial challenges and has Z-Scores in the distress zone in both 2008 and 2009. The index of production shows a decline during the crisis, although it is quite volatile (Statistics Norway 2011).

9 Fishing, Hunting, and Trapping & 2 Agriculture production livestock and animal specialties

At the outbreak of the financial crisis in 2007 and 2008, falling prices and salmon diseases made life more difficult for a number of the fishery and aquaculture companies listed on the stock exchange - a sector that was the strongest performer in 2006. Marine Harvest and Grieg Seafood were among the companies that saw sharp declines in their share price. However, there were also some stronger performances in this sector. Salmar and Codfarmers are examples of companies that produced a decent share price performance. On the other side, the list of the winning companies in 2009 features the aquaculture sector. It was a good year for Marine Harvest, Austevoll Seafood and Grieg Seafood, with increases in share price of 303%, 228% and 209%, respectively (Oslo Børs ASA 2007, 2008, 2009). These observations seem to correspond quite good with the companies' Z-Scores for 2008 and 2009. In addition, Aker Seafoods and Domstein had Z-Scores in the distress zone in 2008, while Codfarmers entered the distress zone in 2009. The observed development of this industry group is consistent with its index of production, which displays a sharp increase in 2009 (Statistics Norway 2011).

15 Building Construction General Contractors and Operative Builders &
17 Construction Special Trade Contractors

Major group 15 covers AF Gruppen and BWG Homes, while Major group 17 includes Grenland Group. All three firms have only Z-Scores in the grey zone both in 2008 and 2009. It comes as a surprise that these companies were not classified as distressed, given that construction was one of the crisis' most affected industries in Norway on a national basis, although these industry groups

consists of only a few and relatively large enterprises. A declining housing market and banks' reluctance to lend left its mark on the demand for construction activities, something that was reflected in the companies' share prices. BWG Homes lost around 90% of its market value in 2008, which indicates that the future of the company was very uncertain. The market value of Grenland Group and AF Gruppen was also substantially reduced during the crisis (Oslo Børs ASA 2008).

13 Oil and Gas Extraction

Financial turmoil had its effect on the activity of this industry. Low oil and gas prices decreased the level of investments (Statistics Norway 2011), which in turn led to a lower demand for oil services. OSE is famous for its close relation to the oil industry, so there is no wonder that this industry group consists of 27 companies.

The following companies were financially distressed in both 2008 and 2009 according to their Z-Scores: AGR Group, BW Offshore, Norse Energy Corporation, Petrolia Drilling and Sevan Marine. A number of these companies encountered financial problems, including AGR Group and Petrolia Drilling, which violated their debt covenants and needed to adjust their capital structure (Dagens Næringsliv 2009, May 05). Sevan Marine faced the threat of bankruptcy in 2011.

The Z-Score placed some of the companies as distressed in either 2008 or 2009: Norwegian Energy Company, Rocksource, Seabird Exploration, Seadrill, Songa Offshore, Petrobank and Scorpion offshore. Several of these companies needed refinancing in order to improve their liquidity, for instance Seabird Exploration (Dagens Næringsliv 2009, May 08) and Songa Offshore (E24 2008, November 06). Among the larger companies, Seadrill had a difficult year in 2008.

A few of the companies also had Z-Scores in the distress zone as early as 2006 and 2007, suggesting potential problems in the future.

73 Business Services

Within this group are mainly companies engaged in IT, computer programming and software solutions. The companies that were classified as financially distressed in 2008 and/or 2009 are Apptix, Atea, Ignis, Global IP Solutions and Software Innovation. Some IT companies have generally short order contracts and relies on selling their products continuously. Therefore, they are quickly affected by reduced demand. This especially concerns Atea (DagensIt 2009, March). Global IP Solutions struggled with negative earnings and was acquired by Google in 2010. The index of

production for business services show a rather steady development during the crisis (Statistics Norway 2011), which may defend its placement in the grey zone.

36 Electronic and Other Electrical Equipment and Components, Except Computer Equipment

The two most affected companies within this industry group are Fara and Tandberg Storage. Fara, which is an IT company developing products for the transport sector, struggled with deficits and needed to restructure its operations in order to reduce costs (Dagens Næringsliv 2008, October 16). The company is placed in the distress zone in 2007, 2008 and 2009.

Tandberg Storage, a subsidiary and subcontractor of Tandberg Data, is another IT company that experienced major liquidity problems during 2008 due to high debt levels, which led to a reduction of more than 95% of its market value that year (Oslo Børs ASA 2008). After Tandberg Data's bankruptcy in 2009, Tandberg Storage had no other choice than to file for bankruptcy, since its only customer was the parent company (E24 2009). According to the enterprise's Z-Score, Tandberg Storage was considered as financially distressed in 2007 and 2008. Thus, the Z-Score successfully predicted the bankruptcy of Tandberg Storage.

38 Measuring, Analyzing, and Controlling Instruments: Photographic, Medical and Optical Goods; Watches and Clocks

Among the companies in this industry, Simtronics is the only company that has a Z-Score in the distress zone. The company experienced lower margins and high interest costs, which might contribute to this result (E24 2008, November 24).

44 Water Transportation

This is one of the major groups containing most companies, so it is not a big surprise that the Z-Scores are rather variable among them. Based on the Z-Scores in 2008, Golden Ocean Group, Green Reefers, Hurtigruten, Namsos Trafikkselskap, Norwegian Car Carriers, Tide and BH Ocean Carriers are in the distress zone, while DOF, Green Reefers, Norwegian Car Carriers, Tide, Wilson and BH Ocean Carriers are in the distress zone in 2009.

Golden Ocean was in serious economic trouble during the first quarter of 2009. The company lacked the liquidity to meet its short-term liabilities, but survived by finding a solution with the lenders and performing a financial restructuring, where equity was issued and the company's debt

reduced (Dagens Næringsliv 2009, April 02). Thus the Z-Score did a satisfying job at predicting Golden Ocean's financial distress already in 2008.

BH Ocean Carriers, Wilson and Green Reefers struggled with deficits. Hurtigruten and Tide, which are involved in passenger transportation, were met by declining demand. Several of these companies were also burdened by the decline in the maritime and offshore industries, as discussed above.

48 Communications

Eltek is another IT company that experienced major liquidity problems during 2008, which lost more than 95% of its market value. The company's Z-Score does not fully capture this state of distress, since it is classified in the grey zone. It is the worst performer of this group during the crisis. The index of production of this industry group displays a steady increase during the financial crisis (Statistics Norway 2011).

Safe Zone

The industries that are placed in the safe zone are companies predicted to be relatively healthy.

10 Metal mining

Crew Gold Corporation experienced major liquidity problems during 2008, which lost more than 90% of its market value. Crew Gold Corporation also disclosed major financial challenges in 2009 (Oslo Børs ASA 2008, 2009). This is captured by the Z-Score, which places Crew Gold in the distress zone in 2007 and 2008. Therefore, the liquidity problems seem to be predicted by the Z-Score. IGE Resources and Northland Resources are classified in the safe zone during and prior to the crisis, even though both companies experienced sharp declines in their market value in 2007 and 2008. However, I believe that one should interpret these results regarding mining and exploration enterprises with scepticism, cf. the discussion in the data chapter above.

59 Miscellaneous Retail

This industry contains Komplett, an online retailer focusing on consumer electronics. The index of retail sales shows a moderate decrease in 2008 (Statistics Norway 2011). The Z-Scores indicate an overall good performance both during and prior to the crisis. All of them are in the safe zone, though the Z-Score in 2008 seems slightly lower than the rest. The company was in no manner unaffected by the crisis, since turnover did decline and the company had a deficit in 2008. Also,

retail is one of the industries with most bankruptcies on a national basis in Norway during the crisis. Given that this industry only contains one public company, it does not give a clear answer to how good its performance during the crisis really was.

87 Engineering, Accounting, Research, Management, And Related Services

This industry classification group includes eight companies, who are mainly concentrated on engineering, seismic activities and surveying services. Six of them are in the safe zone prior and during the crisis, while two of them stand out as financially distressed. This concerns Electromagnetic Geoservices and Reservoir Exploration Technology. The former company experienced severe liquidity problems during 2009 and lost more than 90% of its value (Oslo Børs ASA 2009). It barely avoided bankruptcy. The latter company also struggled during the crisis. Both of the two companies' Z-Scores warned about financial distress prior to the crisis.

1.61 % of all bankruptcies in Norway during 2008 and 2009 came from this industry. I believe that the result of this group is more conclusive. This is because it contains several companies that show good performance, which should make the result more trustworthy, even though there is variation among the companies. The performance of the industry group also seems stable, since it is classified as safe in the "pre-crisis" period as well. Thus I would regard this industry as relatively safe during the crisis. The index of production for this industry group is rather volatile, although it has displayed an upward going trend during the crisis (Statistics Norway 2011).

51 Wholesale Trade-non-durable Goods

Major group 51 consists of Cermaq and Marine Farms, which are classified as safe companies during and prior to the financial crisis. Both are companies producing non-durable goods in the aquaculture sector, so they should resemble the companies in major group 2 and 9. Consequently, it is plausible that they benefited from the favourable market conditions in 2009. However, if this is the case, the Z-Scores should have reacted more negatively in 2008, when the performance of the aquaculture sector was weaker. Cermaq's share price seems to follow this pattern, which declined rather sharply in 2007 and 2008 and increased formidably in 2009 (Oslo Børs ASA 2007, 2008, 2009). Thus, I emphasize that this is a questionable result, in the sense that the Z-Scores might at least be too optimistic in 2008. The index of production for non-durable consumer goods shows a fairly flat development during the crisis (Statistics Norway 2011), which indicates that it was to a small degree affected. This speaks in favour of placing the industry in the safe zone.

4.5 The relationship between financial distress and equity issuance

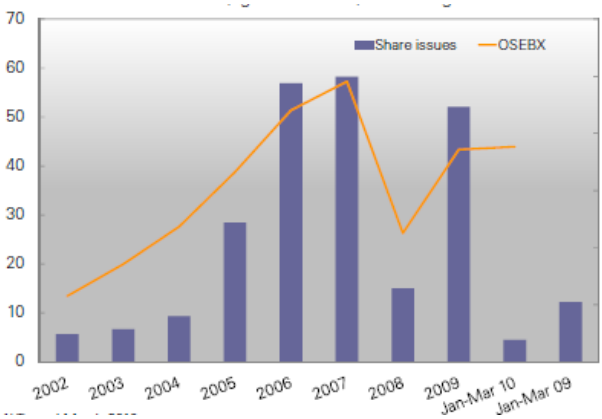
This section seeks to answer the research question: What is the relationship between financial distress and equity issuance and how does this relate to the pecking order theory and market timing by managers?

4.5.1 Introduction

This section summarizes the development the securities markets in the crisis. Functioning securities markets are vital for financial stability. When crises occur, many companies often need to increase their outstanding debt or equity share. For many firms it will sometimes be too late to provide funding after the outbreak of a crisis. Hence, those who were best positioned when the crisis occurred are often the ones that escape a crisis in the best manner.

Throughout 2008, it was difficult for Norwegian enterprises to obtain funding in the securities markets. However, market funding became more accessible in 2009. During the financial crisis, public companies generally issued shares and reduced their debt, something that contributed to increased equity capital ratios. For the more solid enterprises, the higher equity ratios may be attributable to a high level of retained earnings as well, which was a valuable buffer during the crisis, as this enabled enterprises to draw on retained earnings in periods of reduced access to credit and new equity capital (Norges Bank 2009, December). Thus, the best positioned enterprises with high levels of retained earnings may have been less affected by the financial crisis.

Figure 20 (Norges Bank)
Share issues (billions of NOK) on OSE
(OSEBX=OSE Benchmark Index)

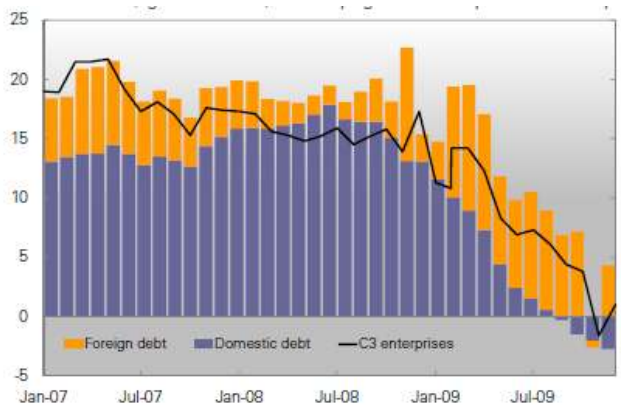


In 2007, listed enterprises raised a record amount of new capital (Figure 20). However, new issue activity in the equity market decreased considerably in 2008, although a number of public enterprises still issued equity during the financial crisis. A portion of them were crisis-related issues by companies with solvency

problems, where a recurring feature was that several of the issues were offered at an issue price below the equity price, as well as often being carried out at low prices compared to 2006 and 2007 prices (Norges Bank 2010). Much of the decline in new issues can be explained by the severely lower level of new listings and fewer big projects, as well as reduced appetite among investors to provide risk capital for companies' future plans. It may also be that some enterprises were unwilling to raise fresh capital in equity markets when prices are low (Norges Bank 2009, May).

The equity market recovered in 2009, where investment appetite and optimism picked up again. Most of the issuers who needed to raise equity capital were able to do so. Companies listed on OSE raised one of the highest-ever annual totals of share capital that year (Oslo Børs ASA 2009). None of the equity market's issues in 2009 is related to new listings on OSE, because no new companies were listed that year. Therefore, one might say that new equity issues on OSE helped to strengthen the financial state of listed enterprises. Common for many of the share issues in 2009 was the size of the discount offered in order to attract new capital, since it was not unusual to see new shares offerings at discounts of 35-40% to the current market price (Oslo Børs ASA 2009).

Figure 21 (Norges Bank)
12-month growth (%) in credit (C3) to mainland enterprises

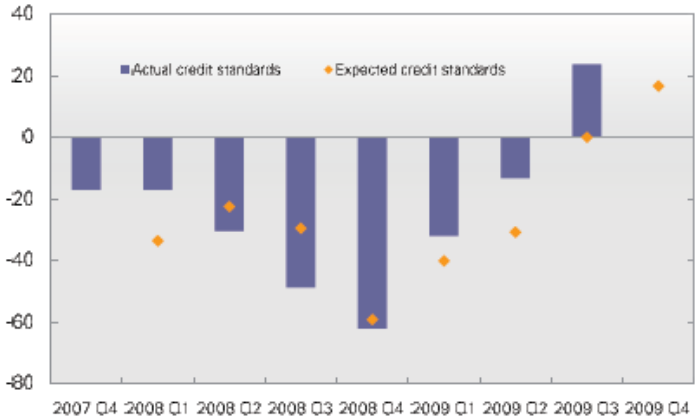


Many public enterprises found it expensive and difficult to obtain credit, particularly in 2008 (Norges Bank 2009, May). Thus, those seeking to refinance their debt often encountered problems. This is illustrated by the clearly decreased growth in corporate debt in 2008 and 2009 (Figure 21), which also was negative for a short time period (Norges Bank 2010). The growth in credit includes both foreign and domestic debt. According to Norges Bank's lending survey, corporate credit growth fell significantly because of two main reasons.

First, weaker growth prospects led to reduced corporate demand for loans (Norges Bank 2008, June). Several factors point to lower demand for corporate loans. Investments declined in many industries. Weakened economic growth on a global scale resulted in a reduced manufacturing output in Norway. Also, in order for companies with high debt to raise new loans, balance-sheets

needed restructuring due to lower corporate asset values (Norges Bank 2010). Another reason for the lower demand for corporate loans is the decrease in the debt-servicing capacity of most industries during the crisis, especially in 2008, as it became negative for approximately 30% of enterprises that year (Norges Bank 2009, December). Enterprises with negative debt-servicing capacity must often use their accumulated liquidity reserves in order to service their debt, which reduces retained earnings. In 2009, enterprises generally improved their debt-servicing capacity due to higher earnings and reduced debt levels, although there were considerable differences between industries that year as well (Norges Bank 2010).

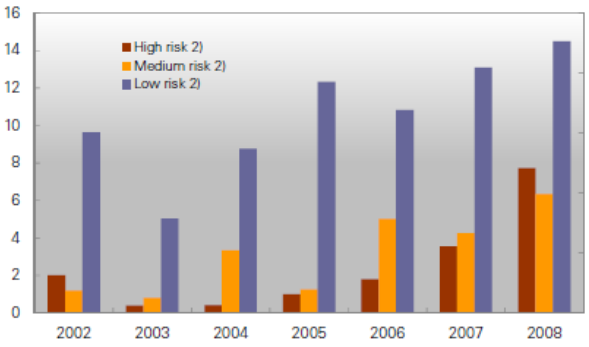
Figure 22 (Norges Bank)
Banks' credit standards for approving loans to non-financial enterprises (net percentage balances)



1| Negative net percentage balances indicate tighter credit standards

Second, banks became more reluctant to approve new loans due to tighter credit standards (Figure 22). The Banks' credit standards for issuing new loans to non-financial enterprises were tightened in 2008 and the first half of 2009, although the credit standards were eased in the second half of 2009, making it easier for enterprises to obtain debt funding (Norges Bank 2009, December). The lower supply of loans during the crisis is related to the banks' reluctance to lend, which was partly caused by problems linked to distinguishing healthy from unhealthy firms. Companies had to pay greater margins on interest rates, which may indicate compensation for increased uncertainty (Norges Bank 2010). Thus, information asymmetry related to debt financing may have increased in magnitude during the crisis.

Figure 23 (Norges Bank)
Corporate bond debt
as % of total bank and bond debt



1) Public administration and oil and gas production not included.
2) In enterprises with low risk the likelihood of default is less than or equal to 1 per cent. In enterprises with high risk the probability of default is 5 per cent or higher.
Source: Norges Bank

Historically, large and medium-sized enterprises with low risk have the largest share of bond debt (Figure 23). However, in recent years, enterprises associated with high and medium risk exposure have increased their bond debt the most, which is particularly evident in 2008 (Norges Bank 2010). Enterprises with high risk have a probability of default of 5% or higher. Throughout most of 2008, growth in bond debt for non-financial enterprises was negative. However, in 2009, primarily solid enterprises with high credit ratings were able to raise capital in the bond market.

The considerable new issue activity in 2007 may be related to increased investment at enterprises with solid growth and confidence in the market. However, such new issue activity can also signal a turnaround in enterprises' financial strength, as those with capital problems often invite fresh investment (Norges Bank 2008, December). In this respect, I have examined if there is a connection between those enterprises predicted to encounter financial distress and the timing of equity issuance by managers. Also, in the context of firms' choice of capital structure in the presence of financial distress, I have studied if the relatively solid enterprises are relying on internal financing in form of retained earnings and if the financially distressed enterprises tend to use external financing.

4.5.2 Literature review

This chapter highlights relevant literature. The related literature spans two sections. The first section concentrates on the relationship between financial distress and equity issuance, while the second section summarizes relevant literature and empirical results on firms' capital structure.

Financial distress and equity issuance

Several empirical papers have documented the distressed nature of firms that issue equity. Park (2011) documents a positive relationship between financial distress and equity issuance, by looking

at public and private issuance together and applying the distress measure of Campbell, Hilscher and Szilagyi. Using broad cross-sectional data on all publicly traded firms in the Center for Research in Security Prices' database, he finds that distressed equity issuance primarily occurs through private offerings, rather than through public secondary equity offerings. Moreover, Hertzel, Lemmon, Linck, and Rees (2002) document the distressed condition of firms that issue equity privately by considering the long-run underperformance of private equity issuance.

Relevant theories of capital structure and empirical evidence

The empirical corporate finance literature does not agree on whether distressed firms should issue equity. The pecking order theory suggested by Myers and Majluf (1984) considers equity issuance as financing of last resort. It suggests that firms prefer internal financing, i.e. earnings retained and reinvested, to external financing. The theory starts with the observation that managers have private information, as they often know more than outside investors about the firm's prospects and fundamental value. Consequently, the firm's stock price may decrease when an equity issue is announced, because investors realize that managers may issue equity when their share price is overvalued. This problem with asymmetric information may be avoided by using internal financing. If external financing is necessary, firms prefer to issue debt rather than issue equity, which means that the amount of debt a firm issues will depend on its need for external financing. In the presence of asymmetric information, issuing debt signals that investments are profitable and that the current share price is undervalued. Hence, retained earnings are used first, and when it is depleted, debt is issued. When it is not reasonable to issue any more debt, equity financing is a last resort.

The pecking order theory implies that the adverse selection problem is likely to be large when firms do not have promising investment opportunities, especially when the economy is in a downturn. According to the theory, the cost of issuing equity increase as the lemons problem grow in importance, making it harder to distinguish between good and bad investment opportunities, which leads to firms preferring to use internal capital or issuing risk-free debt (Myers and Majluf 1984 and Choe et al. 1993).

While some papers support the idea of equity issuance as financing of last resort, others draw different conclusions. For instance, the pecking order theory has been criticized by Fama and French (2005). They conclude that issuing equity is not a financing of last resort, due to high frequencies of equity issuances and the order of financing decisions.

On the other hand, agency theories suggest that shareholders would not want the firm to issue equity when firms are distressed. Myers (1977) suggests that because of value transfer to debtholders, equity would be difficult to issue, which is known as the debt overhang problem. Also, Jensen and Meckling (1976) propose that distressed equity holders prefer shifting risk to creditors rather than issuing equity and diluting future payoffs. This is known as the asset substitution problem. Such conflicts of interest between stakeholders, which theoretically affect all levered firms, are more likely to occur when the risk of financial distress increases. If the probability of default is high, managers and stockholders may be tempted to take on excessive risky projects. At the same time, stockholders may refuse to provide more equity capital, even if the firm has relatively safe and positive net present value projects.

Another of the leading empirical explanations for equity issuance is that managers time the market and issue equity when their market prices are high, which is based on the observation that there is a long-run underperformance after equity issuance. Several empirical papers have documented this phenomenon, for instance Baker and Wurgler (2000, 2002) find evidence of pre-issue over-performance and post-issue under-performance of firms, something that suggests market timing by managers. By examining the time series variation of equity issues' share in total new capital issues, they find that equity issue volumes peak at times of high past aggregate market values, just before periods characterized by low market returns. Also, a survey performed by Graham and Harvey (2001) reveals CFOs to issue equity when market values are high.

4.5.3 Data

The types of issues include public, private, employee and IPOs. The overview of equity issuance in the relevant period was retrieved at OSE's website (Oslo Børs ASA 2011). The approach was to sort the listed enterprises in the data into an issuer sample and a non-issuer sample for each year. I had doubts regarding whether I should include the companies with IPOs. Therefore, for robustness purposes, I placed the IPOs among those companies not issuing equity in the 2007 sample, and the results were still significant (not shown in the thesis). Additionally, the IPOs are not really a concern for 2008 and 2009, since they counted for a very limited number during those years.

4.5.4 Methodology

This section involves testing the performance of companies that issued equity (issuers) compared to those who did not issue equity (non-issuers). The reason is twofold. First, I want to examine if there exists a positive relationship between issuing equity and financial distress on OSE prior to and during the crisis. Second, there may be a link between the financial state of the enterprises and their choice of capital structure**.**

To investigate the market timing of equity issuing by managers, I used the Mann-Whitney test to examine whether issuers performed worse (had lower scores) than non-issuers in the year of issuance, as well as the years after issuance. If issuers are more financially distressed after issuing equity, this should capture the post-issue under-performance of firms, which may suggest market timing by managers. One may expect that this phenomenon is particularly evident prior to the crisis, e.g. 2006 and 2007, when stock prices were historically high, which would indicate pre-issue over-performance. I excluded all companies that were listed later than the year of issuance from the sample, since they obviously did not have access to capital at that time. For instance, I removed the companies that were listed in 2008 (no companies were listed in 2009) when conducting the experiment on the companies issuing equity in 2007. As previously mentioned, the overview of list changes was retrieved at OSE's website (Oslo Børs ASA 2011).

With respect to the assumptions of the Mann-Whitney test, the same mindset applies here for testing the financial distress of companies issuing equity versus those who do not. I have only tested issuers versus non-issuers in a given period of time, which involves only independent data. Also, figure 24 (shown on next page) displays the overlap of the histograms fitted to the gamma distribution. The shape of the samples seems to be generally similar, which should make the test appropriate. The histograms show that issuers in 2006 and 2007 tended to have high scores in the year of issuance and be generally more distressed in the years after issuance. In addition, issuers during the crisis seem to typically be distressed, as the median is lower for issuers (1 and 1.5) relative to non-issuers (2). Thus, I have formulated the following hypotheses to study the market timing by managers, as well as the relationship between financial distress and equity issuance:

Test of differences in financial distress for equity issuers relative to non-issuers

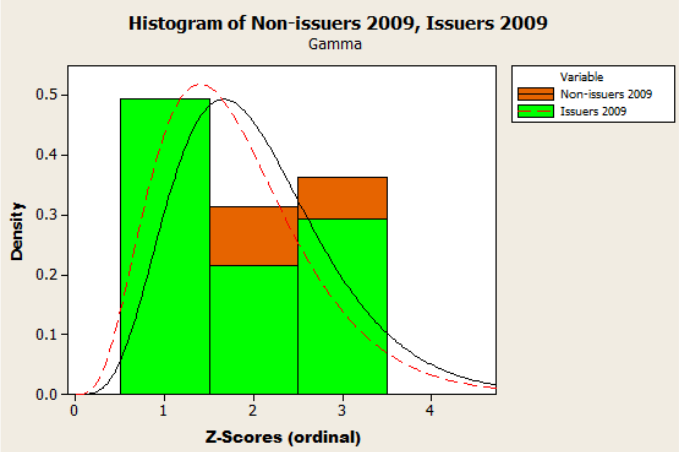
H0: The median scores of issuers and non-issuers are equal

HA: The median score of issuers is less than the median of non-issuers

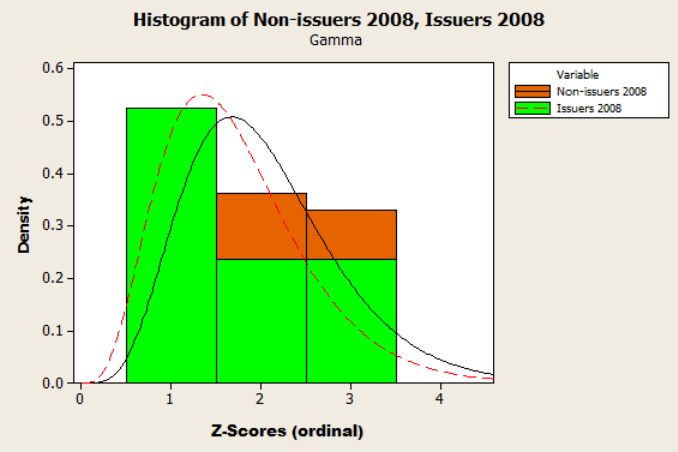
(The only exception is for equity issuance in 2005, where the median of issuers (3) is greater than the median of non-issuers (2). Hence, in that particular test, I test if the median of issuers is greater than the median of non-issuers)

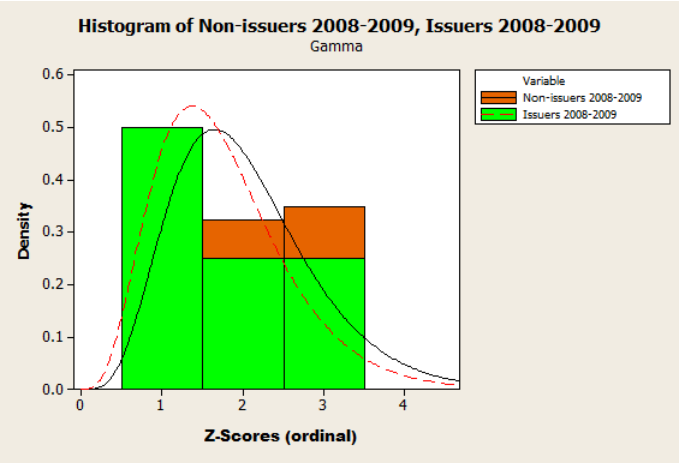
Figure 24 Histograms of issuers and non-issuers in the year of issuance and the years after issuing equity

Equity issued in 2009

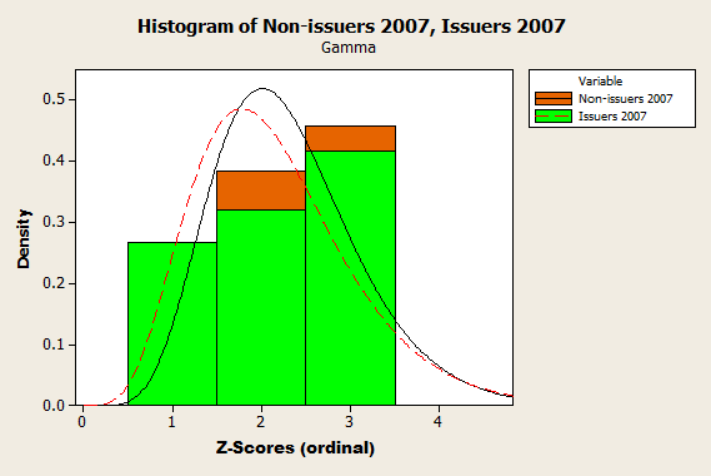


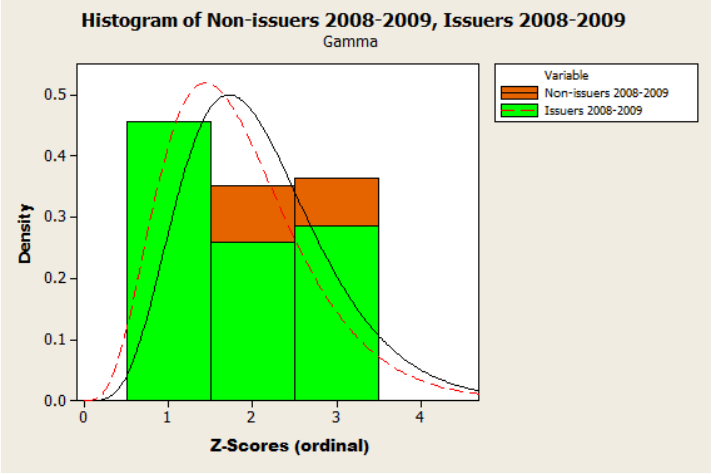
Equity issued in 2008



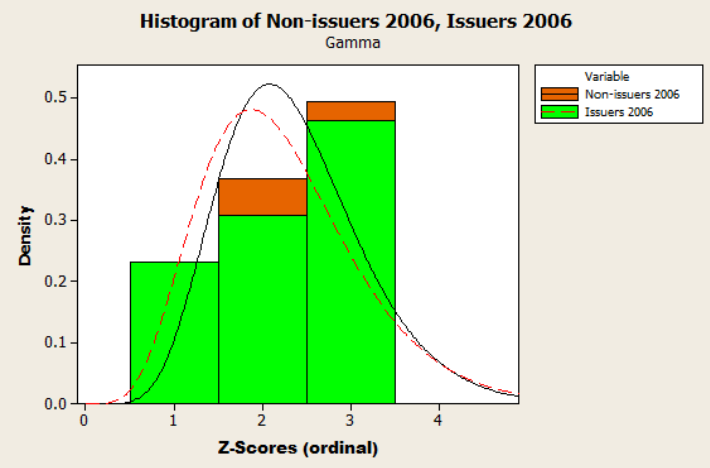


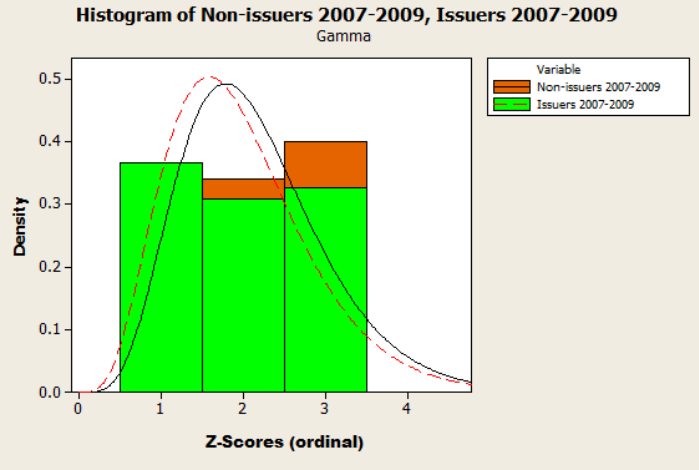
Equity issued in 2007



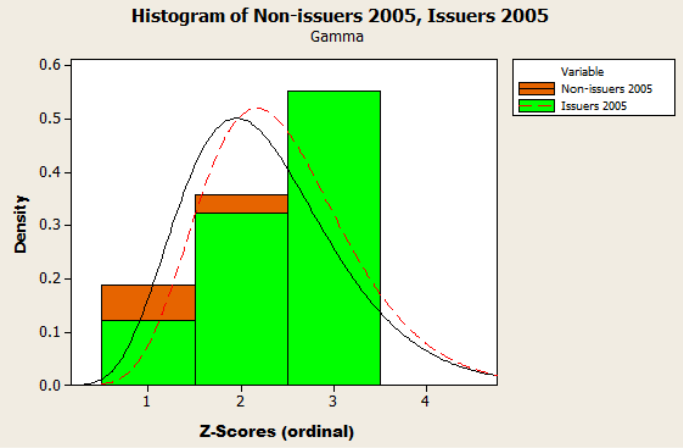


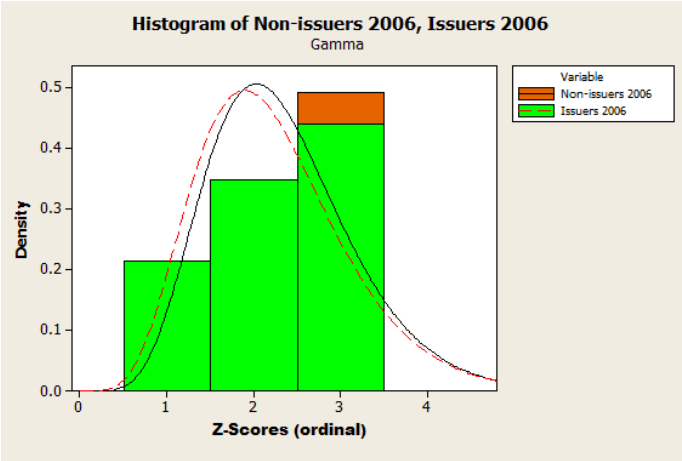
Equity issued in 2006

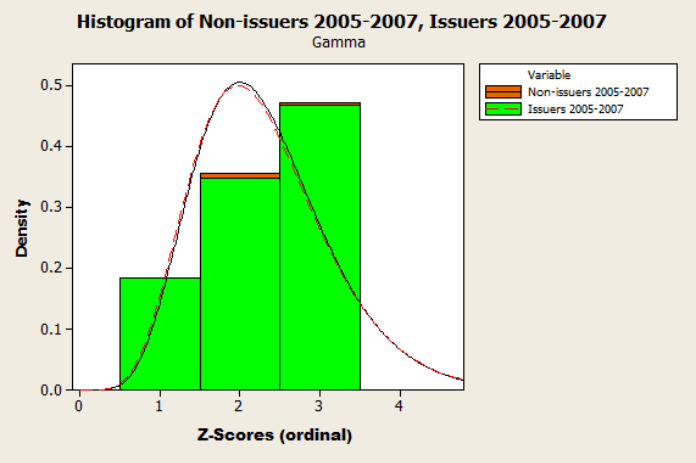




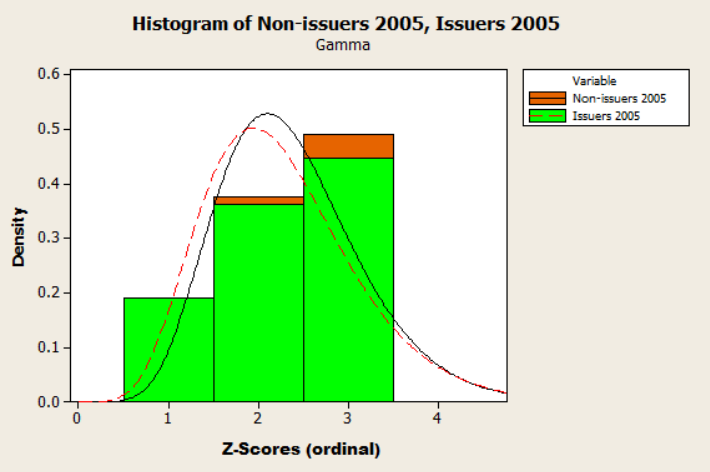
Equity issued in 2005

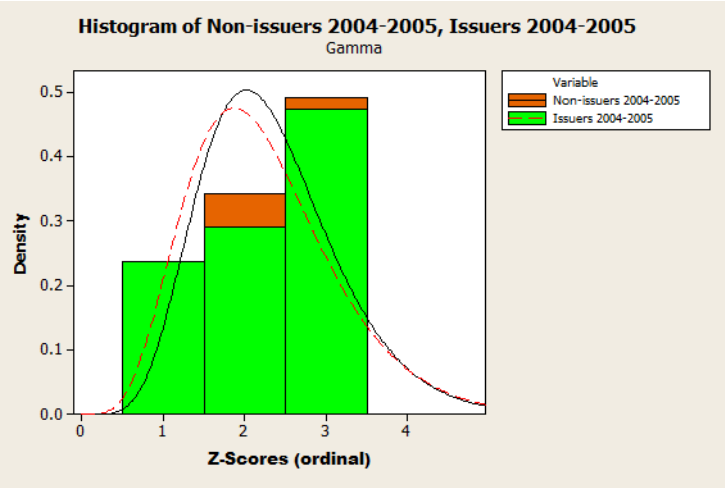






Equity issued in 2004





Moreover, I wanted to perform a test related to the pecking order theory using Mann-Whitney tests. The pecking order theory states that firms' first choice of financing is retained earnings. Retained earnings are included in the Z-Score's second factor (retained earnings relative to total assets), so the companies that are regarded as distressed often have a low retained earnings ratio. The weighting of this ratio is rather high for manufacturers and moderate for non-manufacturers. Consequently, many of the distressed firms with low Z-Scores are expected to be short on retained earnings during 2008 and 2009. I examined the companies that issued equity in 2008 and 2009 to see if they had lower retained earnings to total assets ratios, which would be in line with the pecking order theory.

According to the pecking order theory, firms should not issue equity and increase their debt (use external financing) until retained earnings are depleted, which in this case may coincide with firms being financially distressed. I tested whether companies that issued equity in 2009 have increased their total liabilities more than non-issuers during 2008 and 2009. This was measured based on increases in book values of total liabilities and debt from the end of 2007 to the end of 2009. Only the issuers and non-issuers with increases are included in the sample, i.e. not those decreasing their debt levels. Further, I tested whether issuers of bonds were more financially distressed than those who did not. To be in accordance with the pecking order theory, one would expect to see the distressed companies using debt financing at the start of the crisis, i.e. particularly in 2007 and 2008, before resorting to issuing equity at a later stage, i.e. in 2009. Oslo ABM, the largest secondary market for bonds in Norway, provided me with an overview of the listing of bonds and short-term fixed income instruments (Oslo ABM 2011). I used a similar approach as before, i.e. to sort the listed enterprises in the data into an issuer sample and a non-issuer sample for each year.

With regards to the assumptions of the Mann-Whitney test, following the same reasoning as previously, the data is independent. Additionally, figures 25 to 27 displays the overlap of the histograms fitted to the gamma distribution (shown on page 73). Regarding the increases in total liabilities, the shape of the samples seems rather similar. The histogram indicates that issuers of equity increased their book value of debt more than non-issuers. For the issuers of bonds, the shape of the samples seems to be quite similar in 2006 and 2007. The shapes are somewhat more different in 2008 and 2009. However, the histograms display that issuers of bonds are generally more distressed than non-issuers in 2006 to 2008, while the same is not evident in 2009.

I was not able to model the samples of retained earnings to total assets to the gamma distribution. This is because the samples include a few negative observations due to negative retained earnings, which is not allowed in the gamma distribution. As a result, I only have the histograms to evaluate the shape of the samples, which makes it more difficult to make an assessment. Thus, I have performed a two-sample t-test in addition to the Mann-Whitney test in order to strengthen the results. On the other hand, the histograms show similarity, making the samples appropriate for the Mann-Whitney test, although issuers tend to have lower ratios.

I present the following hypotheses related to the pecking order theory:

Test of differences in retained earnings ratios of equity issuers relative to non-issuers

H0: The median retained earnings ratios are equal for issuers and non-issuers

HA: The median retained earnings ratio of issuers is less than for non-issuers

Test of differences in increase of debt for issuers of equity relative to non-issuers

H0: The median increase in debt for issuers and non-issuers are equal

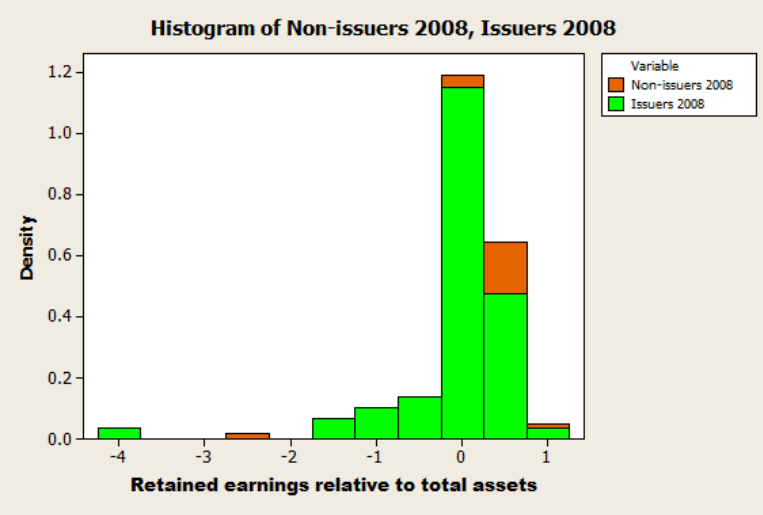
HA: The median increase in debt for issuers is greater than the median of non-issuers

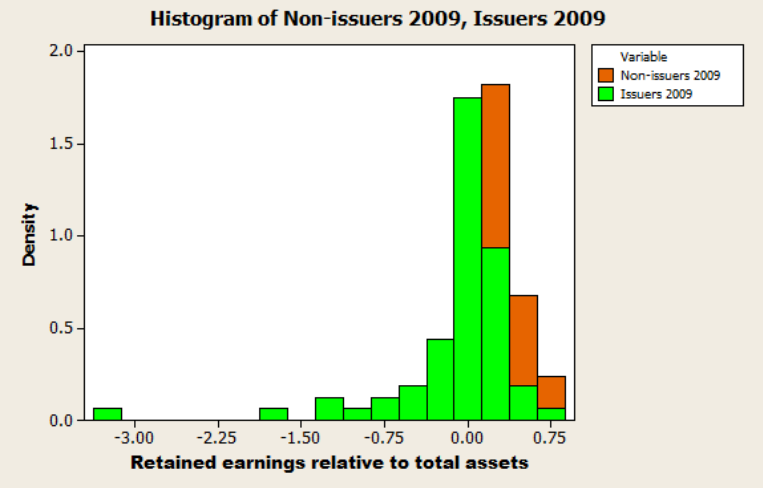
Test of differences in financial distress for bond issuers relative to non-issuers

H0: The median scores of issuers and non-issuers are equal

HA: The median score of issuers is less than the median of non-issuers

Figure 25 Retained earnings to total assets ratio:





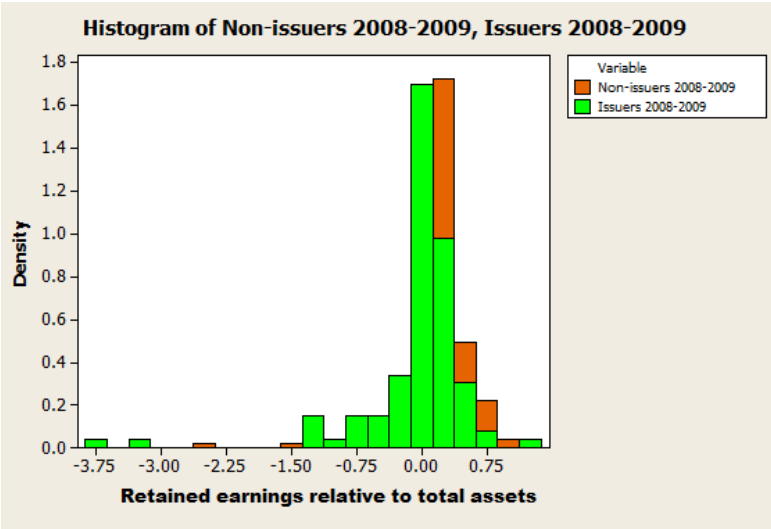


Figure 26 Increase in total liabilities and debt (book values):

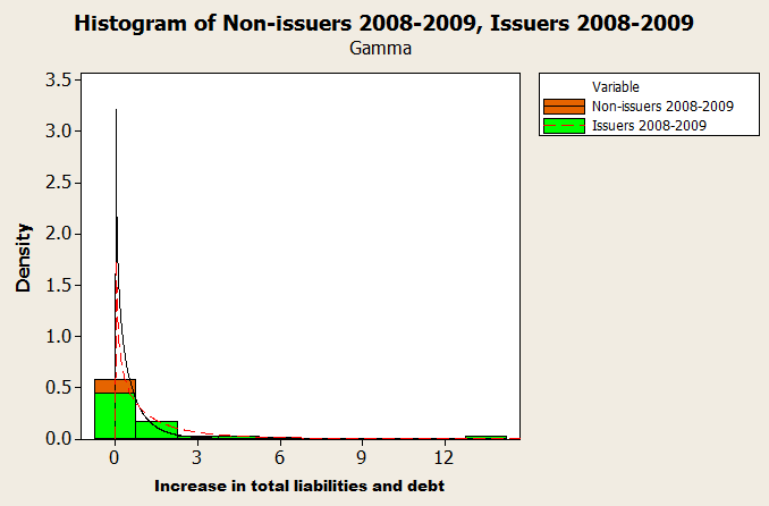
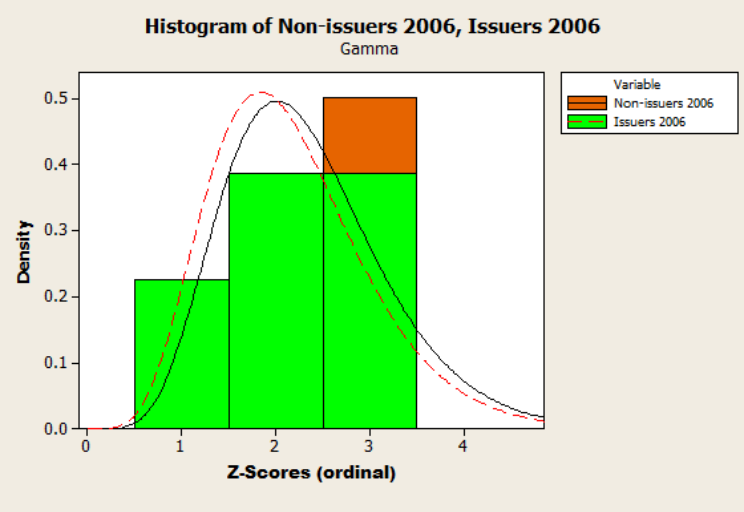
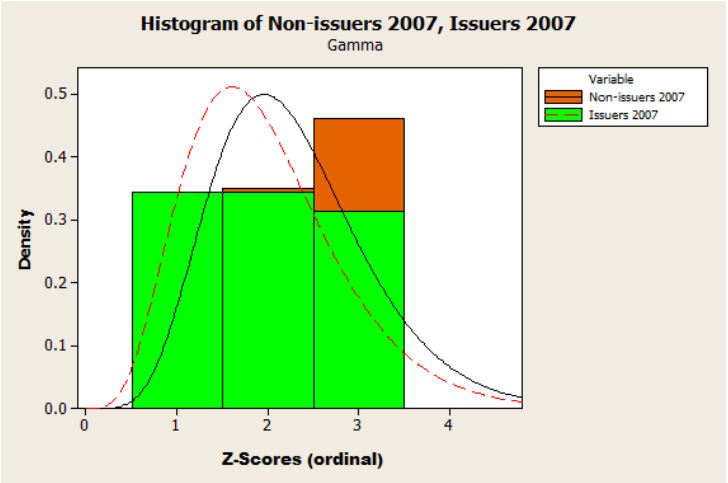
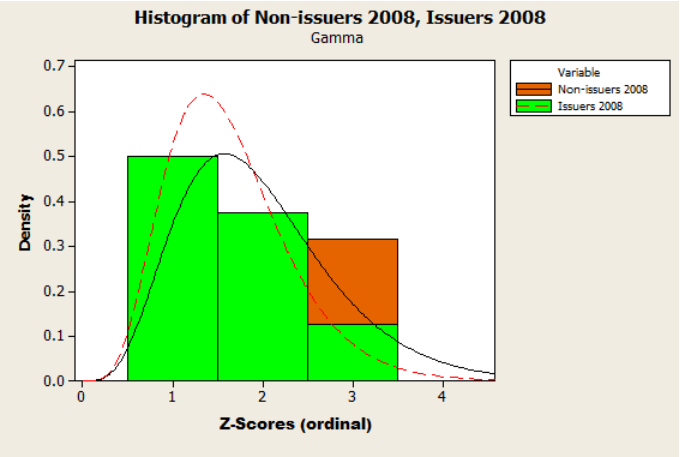
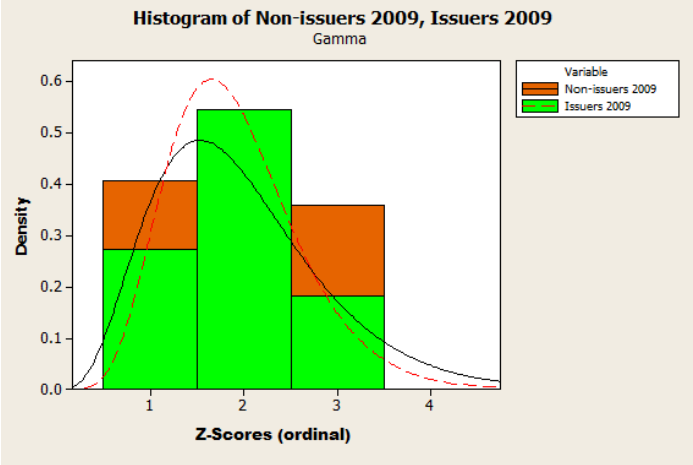


Figure 27 Issuers of bonds:









4.5.5 Results

Testing financial distress after issuing equity (figure 28 on page 76), I found that issuers in 2009 had significantly lower scores than the non-issuers. In other words, the firms that issued equity in 2009 were generally more financially distressed than those who did not issue equity. The result is significant at the 5% level. Furthermore, I found similar results for the companies that issued equity in 2008. Issuers in 2008 were also more distressed than non-issuers for 2008 and 2009 combined. Both of these results are significant at the 1% level. Issuers in 2007 were more distressed during 2008 and 2009 than non-issuer, which is also significant at the 1% level. Correspondingly, the companies issuing equity in 2006 were more distressed in 2007 to 2009, significant at the 5% level. However, the companies issuing equity in 2006 and 2007 were found to be insignificantly more distressed than non-issuers in the year of issuance, something that contrasts the 2008 and 2009 results. Also, the companies issuing equity in 2004 and 2005 were not found to be significantly more distressed than those who did not issue equity. In fact, I found that firms issuing equity in

2005 tend to be less distressed, i.e. having higher median Z-Scores than non-issuers. Therefore, the results before 2006 seem rather ambiguous.

Related to the pecking order theory, all tests reject H0, which indicate that issuers have significantly lower retained earnings to total assets ratios than non-issuers (figure 29). The results are statistically significant at the 1% level for 2008 and 2009, as well as the two years combined. The two-sample t-test for 2008 and 2009 is also significant at the 1% level. Moreover, companies that issued equity in 2009 have generally increased their total liabilities more than non-issuers during 2008 and 2009 (figure 30), which is significant at the 5% level. Also, the results indicate that issuers of bonds are more financially distressed than non-issuers in 2007 (figure 31), which is significant at the 5% level. Issuers of bonds are not significantly more distressed in 2006, 2008 and 2009, although the 2008 results are significant at 10% level.

Figure 28 Results of testing financial distress in the year of issuance and the years after issuing equity

Equity issued in 2009		
Mann-Whitney test 2009		
Test statistic	9082.5	
P-value	0.0458	
P-value adjusted for ties	0.0363	
	Issuers	Non-issuers
Median	2	2
Number of observations	65	102

Equity issued in 2008		
Mann-Whitney test 2008		
Test statistic	11706.5	
P-value	0.0107	
P-value adjusted for ties	0.0072	
	Issuers	Non-issuers
Median	1	2
Number of observations	59	121

Equity issued in 2008		
Mann-Whitney test 2008-2009		
Test statistic	43242	
P-value	0.0036	
P-value adjusted for ties	0.0021	
	Issuers	Non-issuers
Median	1.5	2
Number of observations	112	235

Equity issued in 2007		
Mann-Whitney test 2007		
Test statistic	7480	
P-value	0.1464	
P-value adjusted for ties	0.1291	
	Issuers	Non-issuers
Median	2	2
Number of observations	94	81

Equity issued in 2007		
Mann-Whitney test 2008-2009		
Test statistic	29020	
P-value	0.0048	
P-value adjusted for ties	0.003	
	Issuers	Non-issuers
Median	2	2
Number of observations	182	157

Equity issued in 2006		
Mann-Whitney test 2006		
Test statistic	6469	
P-value	0.2122	
P-value adjusted for ties	0.1926	
	Issuers	Non-issuers
Median	2	2
Number of observations	78	79

Equity issued in 2006		
Mann-Whitney test 2007-2009		
Test statistic	57166	
P-value	0.0154	
P-value adjusted for ties	0.0109	
	Issuers	Non-issuers
Median	2	2
Number of observations	230	233

Equity issued in 2005		
Mann-Whitney test 2005		
Test statistic	3159	
P-value	0.1278	
P-value adjusted for ties	0.1052	
	Issuers	Non-issuers
Median	3	2
Number of observations	74	53

Equity issued in 2005		
Mann-Whitney test 2006		
Test statistic	3742.5	
P-value	0.2555	
P-value adjusted for ties	0.2383	
	Issuers	Non-issuers
Median	2	2
Number of observations	75	55

(Testing if median of issuers is greater than median of non-issuers)

Equity issued in 2005		
Mann-Whitney test 2005-2007		
Test statistic	31785.5	
P-value	0.4404	
P-value adjusted for ties	0.4353	
	Issuers	Non-issuers
Median	2	2
Number of observations	224	163

Equity issued in 2004		
Mann-Whitney test 2005		
Test statistic	3424.5	
P-value	0.2688	
P-value adjusted for ties	0.2506	
	Issuers	Non-issuers
Median	2	2
Number of observations	47	61

Equity issued in 2004		
Mann-Whitney test 2004-2005		
Test statistic	13125	
P-value	0.2622	
P-value adjusted for ties	0.2445	
	Issuers	Non-issuers
Median	2	2
Number of observations	93	120

Figure 29 Results of testing retained earnings relative to total assets

Mann-Whitney test 2008		
Test statistic	11779	
P-value	0.0058	
P-value adjusted for ties	0.0058	
	Issuers	Non-issuers
Median	0.0738	0.1858
Number of observations	59	121

Mann-Whitney test 2009		
Test statistic	9790	
P-value	0.0000	
P-value adjusted for ties	0.0000	
	Issuers	Non-issuers
Median	0.0189	0.2322
Number of observations	64	101

Mann-Whitney test 2008-2009		
Test statistic	34388	
P-value	0.0000	
P-value adjusted for ties	0.0000	
	Issuers	Non-issuers
Median	0.0639	0.1879
Number of observations	106	202

Two-sample t-test 2008-2009		
T-value	3.06	
Degrees of freedom	160	
P-value	0.003	
	Issuers	Non-issuers
Mean	-0.062	0.146
Number of observations	106	202

Figure 30 Results of testing increase in total liabilities and debt

Mann-Whitney test 2008-2009		
Test statistic	2252	
P-value	0.0464	
P-value adjusted for ties	0.0464	
	Issuers	Non-issuers
Median	0.411	0.293
Number of observations	33	55

Figure 31 Results of testing financial distress in the year of issuance and the years after issuing bonds

Mann-Whitney test 2006		
Test statistic	10186	
P-value	0.1537	
P-value adjusted for ties	0.1336	
	Issuers	Non-issuers
Median	2	2.5
Number of observations	31	126

Mann-Whitney test 2007		
Test statistic	13052	
P-value	0.0357	
P-value adjusted for ties	0.0263	
	Issuers	Non-issuers
Median	2	2
Number of observations	32	143

Mann-Whitney test 2008		
Test statistic	15122	
P-value	0.0800	
P-value adjusted for ties	0.0677	
	Issuers	Non-issuers
Median	1.5	2
Number of observations	16	164

Mann-Whitney test 2009		
Test statistic	12210	
P-value	0.4445	
P-value adjusted for ties	0.4409	
	Issuers	Non-issuers
Median	2	2
Number of observations	22	145

4.5.6 Discussion

The results are intriguing, since this documents a positive relationship between issuing equity and financial distress on OSE prior to and during the crisis. The findings of this positive relationship are consistent with those of Park (2011). This means that it is generally the companies that, according to the Z-Score, have the weakest performance today, or are predicted to encounter financial problems in the close future, that are financed with equity prior to and during the crisis.

Companies that issued equity in 2006 and 2007 were more distressed during the crisis than those who did not. This observation may be related to the market timing of managers, as many firms might have seized the opportunity to issue equity when stock prices were historically high in 2006 and 2007, at the presence of pre-issue over-performance. This is supported by the observation that the results are only significant after issuing equity, i.e. during the crisis, and not in the year of issuance in 2006 and 2007, which indicates post-issue under-performance. In other words, the positive relationship between issuing equity and financial distress seems to be strongest in 2007, 2008 and 2009. If this is a general phenomenon, happening every year, I should have found more significant results in 2004 and 2005. This indicates that firms' decisions to issue equity are influenced by past securities prices and current market conditions, in the sense that equity issues occur at times of high recent stock market performance and are aligned with rising economic activity. These findings are consistent with those of Baker and Wurgler (2000, 2002) and Graham and Harvey (2001).

The pecking order theory of Myers and Majluf (1984) implies that the adverse selection problem is likely to be large when firms do not have promising investment opportunities, especially when the economy is in a downturn. The problem with adverse selection is evident during the crisis, since issuers were more distressed than non-issuers at that point. It may also be that unhealthy firms (lemons), which are equivalent to distressed firms with low Z-Scores, are issuing equity at overpriced share prices, particularly in 2007. Managers' information about the firm's true value and its future cash flows is likely to be superior to that of outside investors; there is asymmetric information between managers and investors. Capital structure can be used to signal the company's quality. Healthy firms try to avoid issuing equity and use retained earnings and debt instead, while unhealthy firms are willing to issue equity. Also, managers who perceive the firm's equity to be overpriced will prefer to issue equity. For instance, it could be that managers of these unhealthy firms had private information about a less favourable business climate in the near future, and

therefore seized the opportunity to issue equity while stock prices still were high. Thus, issuing equity in 2006 and 2007 may indicate that managers of bad firms time the market and sell expensively priced equity, as the issuers were found to be more distressed during the crisis, i.e. post-issue, than non-issuers. This means that the lemons problem may have been particularly high on OSE just before and during the outbreak of the financial crisis. Linking distressed firms to adverse selection and the lemons problem suggests an issue regarding information asymmetry that exists among distressed firms.

Furthermore, issuers of equity in 2008 and 2009 are in general found to be more financially distressed than non-issuers, which add to the results related to the pecking order theory. Managers who perceive the firm's equity as underpriced will have preferences to fund investments using debt rather than equity. Share prices declined sharply during the crisis, so issuing equity should definitely be a last resort for many firms, especially the financially distressed. Also, the cost of issuing equity increase as the lemons problem grow in importance, making it harder to distinguish between good and bad investment opportunities, which leads to firms preferring to use internal capital or issuing risk-free debt. Thus, we might expect that firms having access to retained earnings and debt financing would choose those options over equity during the crisis. However, the results indicate that issuers of equity in 2008 and 2009 have less retained earnings relative to total assets, as they possibly depleted it during the crisis. For instance, it may be that the enterprises with negative debt-servicing capacity depleted their retained earnings in order to service their debt. This indicates a need to increase liquidity and may help explain the fact that equity was issued at considerable discounts during the crisis, as some distressed firms may not have been able to raise debt capital due to banks' reluctance to lend. Non-issuers have more retained earnings and may therefore have less need for external financing. This is also consistent with reality, as retained earnings were a valuable buffer during the crisis, something that enabled solid enterprises to draw on retained earnings instead of issuing equity. The observation that companies with little retained earnings are issuing equity is in line with the pecking order theory. Given the circumstances, these distressed firms may not have had access to the preferred sources of financing, so issuing equity may have been the only way out for some of them in order to improve their financial situation, while the companies in a better position may preferably use internal financing instead.

As previously mentioned, the Z-Score models have the weakness of not being immune to false accounting practices. For some enterprises, the retained earnings account may be subject to such manipulation. In addition, retained earnings were not available in the ORBIS database for some of

the companies in the sample. Hence, I calculated the retained earnings for these enterprises using a standard formula. These are factors that may influence the results.

Moreover, if companies do not have access to retained earnings, their next source of financing is debt. The relevant literature shows that growth in corporate debt for all enterprises decreased in 2008 and 2009, as a result of lower supply and demand for debt financing. However, although the growth declined, it was still positive most of the time. Companies that issued equity in 2009 have generally increased their total liabilities more than non-issuers during 2008 and 2009. Keeping in mind that issuers were found to have less retained earnings, this indicates that the distressed companies to a greater extent financed their operations with equity and debt (external financing) during the crisis period. Moreover, the results indicate that issuers of bonds are more financially distressed than non-issuers in 2007. Issuers of bonds were not found to be significantly more distressed in 2006, 2008 and 2009, although the 2008 results were significant at the 10% level. Hence, this indicates that distressed companies used debt financing to a larger extent in 2007 and 2008, i.e. the first years of the crisis, and therefore possibly prior to equity financing in 2008 and 2009, which also is according to the pecking order theory. The fact that enterprises associated with high and medium risk exposure increased their bond debt the most in 2007 and 2008 is consistent with the observation that issuers of bonds, who are more distressed and have higher risk of default, increased their debt more than non-issuers.

This may have implications for the capital structure of firms. Financially distressed companies had less retained earnings during the crisis, while it is likely that the financially stronger companies with higher Z-Scores to a greater degree used retained earnings as financing. Additionally, financially distressed companies were to a greater extent financed by debt in 2007 and possibly 2008 than the companies with better performance. Finally, financially distressed companies used more equity financing in 2008 and 2009 relative to the more solid firms. Since retained earnings and debt were not readily available in general, these distressed firms might have needed to issue equity at low share prices as a last resort. Consequently, this pattern observed for distressed firms in the financial crisis seems to follow the pecking order theory of corporate finance proposed by Myers and Majluf (1984).

4.6 Probability of default on Oslo Stock Exchange

This section seeks to answer the research question: How did the probability of default on OSE evolve prior to and during the crisis?

4.6.1 Introduction

The purpose of this section is to make an estimate of the default probability on OSE prior and during the financial crisis. While the Z-Score models provide a continuous evaluation of corporate health, we cannot derive an estimate directly from the score. Thus, I have made an estimate using Altman's bond rating equivalent method, which is based on the experience of over 2000 defaulting firms over the past 35 years.

4.6.2 Methodology

The bond rating equivalent method consists of three steps (Altman and Hotchkiss 2006):

1. The calculation of Z-Scores
2. Mapping the Z-Score to a bond rating equivalent
3. Utilizing historical default rates in order to specify an estimate of default probability, given a specific bond rating

Based on either of the Z-Score models, one can calculate a score and link it to a bond rating equivalent, which leads to the estimated probability of default by obtaining it from one of the bond and bank loan rating agencies. Rating agencies are not perfect in their credit risk assessments, but they do provide important and consistent estimates of default. All the 180 enterprises in my data sample are included in the estimation of the default probability, which is based on the average of each industry group.

I have used Standard & Poor's one-year global corporate default rates (Standard & Poor's 2011) as a measure of expected default probability. Figure 32 displays S&P's global corporate annual default rates by rating category, as well as their rating hierarchy of credit and default risk. Moreover, I had the choice between using average default rates over a longer period and default rates for a specific

year. The average method may dampen the results, since default rates can vary significantly from one year to the next, thereby varying significantly from the average. Thus, one might expect that the average method gives too low probabilities during times of crisis and too high probabilities during periods of solid economic growth. Consequently, I have decided to use the historic global default rates for each year, since I want to investigate differences between the "financial crisis" period and the "pre-crisis" period.

Figure 32 Global corporate annual default rates by rating category

(%)	AAA	AA	A	BBB	BB	B	CCC/C
2004	0	0	0.08	0	0.53	1.56	15.33
2005	0	0	0	0.07	0.2	1.73	8.94
2006	0	0	0	0	0.3	0.81	12.38
2007	0	0	0	0	0.19	0.25	15.09
2008	0	0.38	0.38	0.48	0.78	3.98	26.26
2009	0	0	0.22	0.54	0.72	10.38	48.68

The companies that were classified as in default (D) and did not go bankrupt that year, have been given the same probability as CCC. This should reflect the substantial risk of bankruptcy, as a company rated CCC is regarded as vulnerable and dependent upon favourable business, financial, and economic conditions to meet its financial commitments (Standard & Poor's 2011).

Altman specifies the bond rating equivalents for the Z-Score and Z"-Score models (Altman and Hotchkiss 2006). These were based on recent samples of average Z-Scores for the various major bond rating classes and calibrates the Z-Scores to the bond ratings. Figure 33 lists the bond rating equivalents for various Z-Score intervals (manufacturers). For instance, triple-B bonds have an average Z-Score of 2.81. Based on the average of the Z-Score, the lower limit is 2.595 and the upper limit is 3.725. One can then observe the historic likelihood that a company with a certain Z-Score and bond rating equivalent has defaulted. For instance, a manufacturer with a Z-Score of 1.8 in 2005 has a bond equivalent rating of B, which corresponds to a one-year default probability of 1.73% in that particular year, based on S&P's estimates. Figure 33 also display the bond rating equivalents for the Z"-Score (non-manufacturers). For instance, a triple-B rating has a lower limit of 5.85 and an upper limit of 6.25. Recall that a score of 1.8 and 4.35 is the upper bound of the distress zone for manufacturers and non-manufacturers, respectively. This is approximately equal to a rating of B. (Altman and Hotchkiss 2006).

Figure 33 Bond rating equivalents for Z-Score model (manufacturers) and Z”-Score model (non-manufacturers)

Average Z-Score	Upper limit	Rating
6.20	>6.2	**AAA**
4.73	5.465	**AA**
3.74	4.235	**A**
2.81	3.275	**BBB**
2.38	2.595	**BB**
1.80	2.090	**B**
0.33	1.065	**CCC**
<-0.2	0.065	**D**

Z"-Score (Lower limit)	Upper limit	Rating
8.15	>8.15	AAA
7.6	8.15	AA+
7.3	7.6	AA
7	7.3	AA-
6.85	7	A+
6.65	6.85	A
6.4	6.65	A-
6.25	6.4	BBB+
5.85	6.25	BBB
5.65	5.85	BBB-
5.25	5.65	BB+
4.95	5.25	BB
4.75	4.95	BB-
4.5	4.75	B+
4.15	4.5	B
3.75	4.15	B-
3.2	3.75	CCC+
2.5	3.2	CCC
1.75	2.5	CCC-
<1.75	1.75	D

4.6.2 Results

The resulting estimates of the default probabilities/expected defaults are summarized below:

Figure 34 Estimates of the probability of default

Probability of default	2009	2008	2007	2006	2005	2004	2008-2009	2004-2007
Total (all enterprises)	14.34%	8.18%	1.55%	1.14%	0.77%	2.23%	11.26%	1.42%
Manufacturers	16.77%	8.72%	1.87%	0.87%	0.58%	0.34%	12.75%	0.92%
Non-manufacturers	13.06%	7.89%	1.38%	1.28%	0.86%	3.13%	10.47%	1.66%
SIC Major Groups								
2	0.22%	3.98%	0.00%	0.00%	0.00%	1.56%	2.10%	0.39%
9	10.14%	13.26%	0.15%	0.28%	0.90%	15.33%	11.70%	4.16%
10	0.24%	8.88%	5.03%	0.27%	0.00%	0.78%	4.56%	1.52%
13	16.18%	7.71%	1.22%	1.12%	1.20%	4.40%	11.95%	1.98%
15	0.72%	2.38%	0.19%	0.15%	0.07%	0.00%	1.55%	0.10%
16	29.53%	13.52%	0.00%	0.30%	0.20%	1.56%	21.53%	0.52%
17	0.72%	0.78%	0.25%	0.81%	0.07%		0.75%	0.38%
20	12.14%	9.71%	3.82%	4.13%	0.09%	0.57%	10.92%	2.15%
24	10.38%	3.98%	0.19%	0.00%	0.07%	0.00%	7.18%	0.07%
25	24.34%	13.32%	0.13%	0.15%	0.04%	0.00%	18.83%	0.08%
26	48.68%	26.26%	0.25%	0.81%	1.73%	1.56%	37.47%	1.09%
27	3.94%	1.43%	0.17%	0.20%	0.02%	0.05%	2.69%	0.11%
28	12.98%	8.76%	0.04%	0.00%	0.00%	0.02%	10.87%	0.01%
29	48.68%	26.26%	15.09%	0.81%			37.47%	7.95%
30	0.22%	3.98%	0.19%	0.81%	0.00%	0.00%	2.10%	0.25%
33	0.54%	0.78%	0.00%	0.00%	0.07%	0.00%	0.66%	0.02%
34	29.53%	2.38%	0.13%	0.00%	0.00%		15.96%	0.04%
35	11.77%	5.23%	2.26%	2.00%	2.11%	0.28%	8.50%	1.66%
36	8.59%	6.55%	1.75%	0.04%	0.33%	0.40%	7.57%	0.63%
37	36.17%	16.99%	5.14%	1.68%	0.99%	1.04%	26.58%	2.21%
38	2.36%	1.84%	0.05%	0.41%	0.58%	0.55%	2.10%	0.39%
39	24.70%	15.12%	0.00%	0.00%	0.04%	0.08%	19.91%	0.03%
44	9.71%	5.63%	0.14%	0.85%	0.83%	1.27%	7.67%	0.77%
45	24.70%	15.12%	0.22%	6.19%	1.73%	15.33%	19.91%	5.87%
47	19.72%	12.10%	3.16%	0.28%	0.64%	8.45%	15.91%	3.13%
48	0.42%	0.51%	0.10%	3.17%	0.58%	0.18%	0.47%	1.00%
49	16.47%	7.85%	3.77%	0.20%	0.43%	0.52%	12.16%	1.23%
50	16.23%	17.51%	0.00%	0.00%	0.00%	0.00%	16.87%	0.00%
51	0.00%	0.38%	0.00%	0.00%	0.00%		0.19%	0.00%
59	0.00%	0.48%	0.00%	0.00%	0.00%	0.00%	0.24%	0.00%
65	23.93%	17.72%	2.25%	0.35%	0.20%	0.00%	20.82%	0.70%
73	11.74%	5.85%	1.97%	3.70%	1.45%	4.90%	8.79%	3.00%
87	12.20%	6.76%	3.80%	0.32%	0.01%	0.03%	9.48%	1.04%

4.6.3 Discussion

Based on these estimates (figure 34), the probability of default increased substantially in 2008 and 2009 compared to the "pre-crisis" period of 2004 to 2007. It went from being practically non-existent to quite high in 2008 and 2009, gradually increasing from 2004 and 2005. Furthermore,

manufacturers had slightly higher probabilities on average than non-manufacturers during the crisis, while the opposite was true in 2004 to 2007, which is consistent with the test results. The probabilities of the SIC groups, as one should expect, show variety. Some seem a little high, which might be due to few companies in those groups. I stress that these are only estimates, but the expected default rates should at least give an idea of how the default probability on OSE evolved around the crisis

The findings are consistent with the sharp declines in share prices, which indicate that companies were priced at a significant probability of going bankrupt.

The sharp increase in default probabilities implies that bankruptcy costs also increased by a fair amount in the crisis, since these should be positively correlated. In addition, conflicts between stockholders and debtholders may become more serious when the chance of bankruptcy increases, in terms of the asset substitution and the debt-overhang problems. If the probability of default is high, managers and stockholders may be tempted to take on projects of excessive risk. At the same time, stockholders may refuse to contribute more equity capital even if the firm has safe and positive NPV projects.

4.7 The predictive ability of Altman's Z-Score within the financial crisis

This section seeks to answer the research question: What are the implications of the financial crisis on the predictive ability of the Z-Score models?

4.7.1 Introduction

This section examines whether the Z-Score has good predictive power in times of crisis. In this respect, I will look at firms that went bankrupt, but were not expected to do so according to the Z-Score (Type I error). Also, I will consider the firms that were classified as distressed and did not go bankrupt (Type II Error).

Bankruptcies on OSE

The bankruptcies on OSE came in 2009 and 2010, in the aftermath of the financial crisis. Tandberg Data and Tandberg Storage went bankrupt in 2009, while Petrojack went bankrupt in early 2010 (RavnInfo 2011). OSE has historically been relatively spared from many bankruptcies, but there is little doubt that the risk of bankruptcy increased during the financial crisis. Financial problems will always worry investors, but considering the market conditions during the crisis, where capital was scarce, investors are afraid of single companies going bankrupt due to lack of financing. This attention did not surprisingly affect the stock price development of the bankrupt companies, since they lost much of its market value due to what is characterized as risk of bankruptcy.

4.7.2 Methodology

Type I Error

The Altman Z-Score was found to be 72% accurate in predicting bankruptcy two years prior to the event in its initial test. In subsequent tests, the model was found to be 80-90% accurate in predicting bankruptcy one year prior to the event. Altman calculates the Type I error as the percentage of bankrupt firms that were incorrectly classified as non-bankrupt by the Z-Score model (Altman 2000). I have applied the same method as Altman in order to assess the models' predictive ability of bankruptcy.

Type II Error

Altman has found that the Type II error (classifying the firm as distressed when it does not go bankrupt the next two years) has increased substantially with as much as 15-20% of all firms.
To calculate the Type II error, Altman performs a rigorous test of the Z-Score model's effectiveness by selecting a sample of below-average performers that have encountered earning problems and then calculating the Z-Scores for these companies. In order to perform the test, Altman selected a sample of 66 non-bankrupt firms on the basis of net income (deficit) reports in the years 1958 and 1961, with 33 from each year, where about 65% had suffered two or three years of negative profits in the previous three years. Altman chose the firms regardless of their asset size, with the only two criteria being that they were non-bankrupt manufacturers that suffered losses in the year 1958 or 1961. The companies are then evaluated by the Z-Score model to determine their bankruptcy potential. His results show that 14 of the 66 firms are incorrectly classified as bankrupt, with the remaining 52 correctly classified, which equals a Type II error of 21% (Altman 2000).

I have applied a similar robust method as Altman did, where I only include the non-bankrupt enterprises that have reported net income deficits during 2004 to 2009. The Type II error was examined in both the financial crisis and pre-crisis periods, in addition to the period as a whole. For each period, the Type II error was calculated by dividing the number of companies with Z-Scores in the bankrupt (distress) zone by the total number of companies with deficits. I have also differentiated between manufacturers and non-manufacturers to find out which Z-Score model that produces the most prediction errors.

4.7.3 Results

Type I Error

Three companies on OSE went bankrupt during the period under consideration. All of them are manufacturers, which should contribute somewhat to manufacturers being more distressed. Among these three companies, the Z-Score successfully predicted the financial distress of two of them one year ahead of the bankruptcy. This equals a Type I error of 33.33% one year prior to bankruptcy. However, all bankruptcies were predicted when considering the Type I accuracy two years ahead. Therefore, it seems that the best way to interpret the Z-Score is to consider its development over several years and conclusions should arguably not be drawn based on a single year.

Tandberg Storage went bankrupt in 2009. The company had deteriorating Z-Scores from 2005 to the year of bankruptcy. In 2005, it was in the safe zone, while in the 2006, it fell into the grey zone. In 2007 and 2008 it had a Z-Score of 1.68 and -5.01 respectively. These scores can be interpreted in the following way: Tandberg Storage went into a state of financial distress already in 2007, but its conditions worsened significantly during 2008. Thus the Z-Score does a good job at predicting Tandberg Storage's way towards bankruptcy.

Tandberg Data is a different story. Based on its Z-Scores, the firm went from the grey zone to the distress zone already in 2005, indicating that it encountered financial challenges several years prior to its bankruptcy. Then it continued being in a state of financial distress until 2008, where the Z-Score increased and again placed the firm in the grey zone. The company went bankrupt the next year. Consequently, the Z-Score actually predicted the bankruptcy two years before the incident, but it was inconclusive one year prior to bankruptcy. So, one may evaluate the result in the following

way: The Z-Score did not successfully predict the bankruptcy of Tandberg Data, although it showed clear indications of distress in the years before the incident.

Petrojack moved from the grey zone to the distress zone already in 2007. It has a Z-Score of 0.73, -1.42 and -0.32 in 2007, 2008 and 2009 respectively. Hence, the company seemed to be struggling financially several years during the crisis before finally going bankrupt in 2010. The Z-Score successfully predicted Petrojack's bankruptcy. So it seems that the Z-Score was an adequate tool to assess the financial state of Petrojack prior to its bankruptcy.

As I have mentioned above, the Altman Z-Score was found to be 72% accurate in predicting bankruptcy two years prior to the event in its initial test. In subsequent tests, the model was found to be 80-90% accurate in predicting bankruptcy one year prior to the event. The results are comparable to this. However, in contrast to Altman's results, the results are based on just a few bankruptcies. Thus, the results from Type I error are not very reliable.

Type II Error

Figure 35 Type II Error

Type II Error	Financial crisis period	Pre-crisis period	Overall
Manufacturers	50.98%	22.22%	36.19%
Non-Manufacturers	41.49%	28.57%	34.90%
All enterprises	44.83%	26.32%	35.35%

The results (figure 35) indicate that both manufacturers and non-manufacturers have substantially higher Type II error in the financial crisis period of 2008 to 2009. These numbers seem quite high when compared to the pre-crisis years of 2004 to 2007, where the Type II error is generally more in line with Altman's results. Manufacturers have higher Type II error than non-manufacturers in the crisis, while the opposite seems to be the case in the pre-crisis period. The Type II error for non-manufacturers is relatively high in both periods, yet more stable, as the Type II error for manufacturers has the largest increase in the financial crisis period.

The overall Type II error for all enterprises is 35.35%, which seems rather high compared to Altman's results. This observation is mostly due to the high Type II error in the crisis period, measured at a total of 44.83%, as the pre-crisis period has a considerably lower Type II error.

Consequently, it seems that the Z-Score models incorrectly classify many of the distressed non-bankrupt enterprises as bankrupt during the financial crisis, which results in many false signals regarding the actual state of the distressed enterprises. A potential reason for the high Type II error may be that the models have problems tackling the extraordinary and quite extreme conditions of the financial crisis. However, it is important to bear in mind that failing to predict bankruptcy is not necessarily equivalent with failing to predict financial distress, since it is possible for an enterprise to have severe financial problems without going bankrupt.

In other words, classifying enterprises as distressed, when in fact they do not go bankrupt, does not necessarily affect the Z-Score's ability to predict and measure financial distress.

4.7.4 Discussion

Considering the high levels of the Type II error, one may question why the stock exchange did not see as high bankruptcy rates as predicted by the Z-Score models. Also, the sharp declines in share prices indicate that companies were priced with a significant probability of going bankrupt, which is consistent with the findings. This section discusses potential reasons for the high Type II error, as well as the large difference between the "pre-crisis" and "financial crisis" periods.

The first possible reason is related to the fact that expansive monetary and fiscal stimulus performed in late 2008 and early 2009 helped to stabilize the economy. Fiscal policy was heavily shifted in an expansionary direction and the Norwegian government initiated several fiscal stimulus packages to counteract the negative impact of the financial crisis. Norges Bank reduced interest rates rapidly, which also helped to dampen the decline in the real economy. It may be that these actions are not reflected in the Z-Score, particularly in 2008. The government support measures to the industrial sector helped stabilizing the development quickly, which may help explain why manufacturers had the highest Type II error and probability of default.

Moreover, the restructuring of firms' capital structure may be a possible explanation. Banks have shown a flexible attitude to existing customers who have breached loan terms during the financial crisis. Some enterprises have had the terms of their loans changed through negotiations, owing to major payment problems, while some have had their repayment of debt postponed. Initiatives implemented by the Norwegian government may have helped to improve the situation in the bank

sector, hence securing its role as a capital provider. These factors have probably reduced the number of bankruptcies and banks' actual losses, which adds to the explanation of the high levels of Type II error for both manufacturers and non-manufacturers.

The previous results indicate that the issuers of equity were more financially distressed than the non-issuers. Hence, the distressed firms generally issued more equity prior to and during the crisis. As a result, a well-functioning market for issuing equity may have contributed to saving these firms from bankruptcy. The fact that a number of public enterprises issued equity during the financial crisis, where a portion of them were due to solvency problems, is consistent with this. Thus, one might say that new equity issues on OSE helped to strengthen the financial state of listed enterprises. This could also be a reason for the high levels of Type II error. In addition, it may be that some managers of these unhealthy firms had private information about a less favourable business climate in the near future, and therefore seized the opportunity to issue equity while stock prices still were high and therefore preventing bankruptcy in the crisis.

When asset prices deviate significantly from the fundamentals, there may be an asset price bubble. The financial crisis was characterized by substantial and credit-driven gains in equity and housing prices before the crisis, which was followed by a sharp decline when the crisis occurred. Stock price bubbles can potentially have contributed to making the Z-Scores for manufacturing firms too high prior to the crisis, increasing the Type I error, since the market value of equity may have been overpriced, which is one of the factors used to compute the Z-Score for manufacturers. An implication of this is a worsening of the Z-Score's predictive ability of bankruptcies, in the sense that the assessment of financial health may be too optimistic for some companies. Further, the sharp decline in stock prices contributes much to the low Z-Scores for manufacturers, which reflects the systematic risk. This may have been a situation where the market value of the companies actually was lower than their true fundamental value, i.e. a negative stock price bubble, which may result in higher levels of Type II error than in normal stock market conditions. As a result, the assessment of financial health may have been too pessimistic for some companies.

5 Conclusion

This section concludes on the research questions presented in this thesis.

The thesis was motivated by the opportunity to study financial distress at a large scale in the recent financial crisis. Corporate failures, widespread influence on publicly listed enterprises and extensive actions by the authorities during the crisis point to the need for extended and deepened research on financial distress. In this respect, strengthening the research on enterprises exposure to distress risk and investigating the risk behaviour in financial distress is of vital importance.

The results of the Chow test indicate that there is evidence of a structural break around the outbreak of the financial crisis, which means that the enterprises listed on OSE were more financially distressed in 2008 and 2009 compared to the years 2004 to 2007.

I find evidence that manufacturers listed on OSE were in general more financially distressed than non-manufacturers in the recent financial crisis, something that is consistent with what one could observe at a national level. Particularly, the findings indicate that among the worst affected are enterprises exposed to consumer durables, export and import industries dependent on international trade, offshore and shipping, as well as enterprises engaged in commercial properties. This implies that these industries are particularly exposed to financial distress in times of crisis. Among the best performers were enterprises involved in engineering, seismic activities and surveying services. Many of the findings related to the industry groups also seem to be according to reality. Thus, the Altman Z-Score models prove to be accurate in correctly classifying the financial distress of firms and relevant even in times of crisis.

The Type II error of classifying firms as bankrupt when they do not go bankrupt increased substantially over the course of the crisis, with as much as 40-50% of the enterprises incorrectly classified as bankrupt. This indicates that the Z-Scores ability to predict bankruptcies worsened significantly in the financial crisis, although its ability to identify financial distress in general still may be intact. The increase in financial distress also implies a greater probability of default, which was estimated to be in excess of 10% during the crisis, in contrast to the pre-crisis period where it was almost non-existent.

Moreover, on the topic of capital structure, I document a positive relationship between financial distress and equity issuance in the financial crisis. Also, I find evidence that supports both the market timing theory and pecking order theory of corporate finance. Evidence of the market timing of managers was found just before the outbreak of the crisis, i.e. in 2006 and 2007. The results indicate that equity issuance at historically high stock prices was followed by post-issue under-performance, as the issuers tended to be more financially distressed than non-issuers. Related to the pecking order theory, the findings indicate that the financially distressed enterprises followed the predicted pattern of the theory during the crisis, in the sense that internal financing typically was used before external financing. Related to this, the findings indicate that the adverse selection problem was particularly evident among financially distressed enterprises which issued equity just prior to and during the crisis, which also is in line with the pecking order theory.

Further research

Perhaps the most important weakness of the thesis is that I am relying solely on the Z-Score models as the only measure of financial distress. In order to strengthen and verify the results, the Z-Scores should be combined with other credit risk models, for instance Ohlson's O-Score. Another suggestion for further research relates to the findings on the market timing theory and pecking order theory prior to and in the financial crisis. It could be interesting to use a larger sample than I have done, in addition to covering a longer time period. For instance, it may be that the findings are particularly evident prior to and during times of crisis, which can be examined by studying other crises and recessions. Moreover, in terms of the Chow test on structural breaks, the potential presence of heteroscedasticity might have implications for the results. Thus, this is something that can be examined further to strengthen the results.

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7 Appendix: Summary of data sample

			2009			2008			2007			2006			2005			2004		
Name of enterprise	Comments	SIC Code	Z-Score	Zone of discrimination	Bond equivalent rating	Z-S	ZoD	BER	Z-S	ZoD	BER	Z-S	ZoD	BER	Z-S	ZoD	BER	Z-S	ZoD	BER
Acergy	Non-manufacturer	13	6.32	3	BBB	5.80	2	BBB	5.47	2	BB	5.82	2	BBB	3.70	1	CCC	1.50	1	D
AF gruppen	Non-manufacturer	15	5.21	2	BB	5.12	2	BB	5.47	2	BB	5.62	2	BB	5.67	2	BBB	5.78	2	BBB
AGR group	Non-manufacturer	13	2.49	1	CCC	1.31	1	D	4.05	1	B	4.88	2	BB						
Aker	Non-manufacturer	13	4.18	1	B	4.44	2	B	8.16	3	AAA	4.61	2	B	4.84	2	BB	4.39	2	B
Aker biomarine	Manufacturer	20	-1.00	1	D	-0.21	1	D												
Aker floating production	Manufacturer	37	-0.23	1	D	-0.49	1	D	-0.35	1	D	43.49	3	AAA						
Aker seafoods	Non-manufacturer	9	4.14	1	B	3.66	1	CCC	4.51	2	B	4.91	2	BB	4.67	2	B			
Aker solutions	Manufacturer	35	2.39	2	BB	2.15	2	BB	3.91	3	A	3.58	3	A	2.61	2	BBB	2.32	2	BB
Akva group	Manufacturer	34	1.65	1	B	2.35	2	BB	3.19	3	BBB	2.88	2	BBB						
Algeta	Manufacturer	28	2.49	2	BB	-5.56	1	D	11.19	3	AAA									
American shipping company	Manufacturer	37	-0.09	1	D	-0.85	1	D	1.13	1	B	1.13	1	B	1.98	2	B			
Apptix	Non-manufacturer	73	-1.29	1	D	-1.63	1	D	-2.21	1	D	2.28	1	CCC	0.45	1	D	1.47	1	D
Arendals fossekompani	Non-manufacturer	49	8.01	3	AA	7.51	3	AA	9.95	3	AAA	9.63	3	AAA	10.32	3	AAA	9.84	3	AAA
Atea	Non-manufacturer	73	4.70	2	B	4.33	1	B	4.20	1	B	3.40	1	CCC	-12.55	1	D	-8.64	1	D
Austevoll seafood	Non-manufacturer	9	6.04	3	BBB	5.10	2	BB	5.43	2	BB	6.54	3	A						
Axis shield plc	Manufacturer	38	4.38	3	AA	2.60	2	BBB	2.97	2	BBB	4.01	3	A	4.52	3	AA	3.55	3	A
Belships	Non-manufacturer	44	5.94	3	BBB	6.85	3	A	8.66	3	AAA	8.82	3	AAA	5.72	2	BBB	8.48	3	AAA
Bergen group	Manufacturer	37	1.40	1	B	1.12	1	B												
BH ocean carriers	Non-manufacturer (delisted)	44	1.71	1	D	1.59	1	D	4.67	2	B	5.17	2	BB						
Biotec pharmacon	Manufacturer	28	0.76	1	CCC	5.48	3	AAA	28.59	3	AAA	30.89	3	AAA	22.80	3	AAA			
Birdstep technology	Non-manufacturer	50	8.28	3	AAA	2.05	1	CCC	9.44	3	AAA	8.91	3	AAA	9.00	3	AAA	8.57	3	AAA
Bjørge	Non-manufacturer	13	6.46	3	A	6.27	3	BBB	7.16	3	AA	5.99	3	BBB	5.02	2	BB	7.02	3	AA
Blom	Non-manufacturer	87	7.11	3	AA	7.75	3	AA	10.10	3	AAA	4.60	2	B	5.68	2	BBB	6.44	3	A
Bonheur	Non-manufacturer	13	6.02	3	BBB	6.21	3	BBB	6.67	3	A	6.17	3	BBB	19.59	3	AAA	14.58	3	AAA
Borgestad	Non-manufacturer	44	15.27	3	AAA	13.34	3	AAA	10.63	3	AAA	4.70	2	B	4.49	2	B			
Bouvet	Non-manufacturer	73	7.87	3	AA	8.35	3	AAA	8.64	3	AAA									
BW offshore	Non-manufacturer	13	3.31	1	CCC	1.97	1	CCC	3.87	1	B	7.02	3	AA						
BWG homes	Non-manufacturer	15	5.34	2	BB	4.45	2	B	5.11	2	BB	6.41	3	A						
Byggma	Manufacturer	24	1.49	1	B	1.57	1	B	2.31	2	BB	2.78	2	BBB	2.82	2	BBB	2.67	2	BBB
Camillo Eitzen & CO	Manufacturer	37	-0.11	1	D	-0.38	1	D	0.91	1	CCC	1.30	1	B	1.57	1	B	1.80	1	B
Cermaq	Non-manufacturer	51	7.89	3	AA	6.72	3	A	7.98	3	AA	9.49	3	AAA	7.83	3	AA			
Clavis pharma	Manufacturer	28	7.47	3	AAA	3.28	3	A	13.65	3	AAA	34.80	3	AAA						
Codfarmers	Non-manufacturer	9	2.22	1	CCC	10.36	3	AAA	18.72	3	AAA	8.36	3	AAA						
Comrod communication	Manufacturer	36	2.69	2	BBB	1.99	2	B	2.27	2	BB									
Contextvision	Non-manufacturer	50	13.68	3	AAA	13.90	3	AAA	14.87	3	AAA	13.50	3	AAA	13.72	3	AAA	13.54	3	AAA
Copeinca	Manufacturer	20	1.28	1	B	0.62	1	CCC	0.96	1	CCC									
Crew gold corporation	Non-manufacturer	10	4.88	2	BB	0.07	1	D	3.29	1	CCC	4.19	1	B	6.58	3	A	4.47	2	B
Data respons	Non-manufacturer	73	4.68	2	B	6.55	3	A	6.09	3	BBB	7.37	3	AA	7.53	3	AA	6.77	3	A
Deep sea supply	Non-manufacturer	47	4.92	2	BB	4.69	2	B	4.68	2	B	6.66	3	A						
Det norske oljeselskap	Non-manufacturer	13	5.19	2	BB	6.39	3	BBB	8.69	3	AAA	10.74	3	AAA						
Diagenic	Manufacturer	28	4.82	3	AA	6.37	3	AAA	17.19	3	AAA	20.26	3	AAA	48.20	3	AAA	24.58	3	AAA
DNO International	Non-manufacturer	13	5.13	2	BB	4.84	2	BB	7.02	3	AA	5.24	2	BB	7.43	3	AA	9.15	3	AAA
DOF	Non-manufacturer	44	4.32	1	B	4.57	2	B	4.77	2	BB	5.36	2	BB	5.35	2	BB			
Dolphin group	Non-manufacturer	50	-2.73	1	D	-2.62	1	D	14.74	3	AAA	17.89	3	AAA						
Domstein	Non-manufacturer	9	4.84	2	BB	3.11	1	CCC	4.53	2	B	4.40	2	B	6.22	3	BBB	2.98	1	CCC
EDB ergogroup	Non-manufacturer	73	4.92	2	BB	5.45	2	BB	5.71	2	BBB	5.21	2	BB	6.27	3	BBB	5.41	2	BB
Eidesvik offshore	Non-manufacturer	47	5.79	2	BBB	4.27	1	B	5.05	2	BB	5.54	2	BB	5.16	2	BB			
Eitzen chemical	Manufacturer	37	-0.04	1	D	-1.04	1	D	1.37	1	B	0.49	1	CCC						
Eitzen maritime services	Manufacturer	35	1.56	1	B	1.52	1	B	1.13	1	B	0.66	1	CCC	0.44	1	CCC	3.43	3	A
Ekornes	Manufacturer	25	8.86	3	AAA	5.07	3	AA	7.09	3	AAA	9.13	3	AAA	8.78	3	AAA	9.82	3	AAA
Electromagnetic geoservices	Non-manufacturer	87	-5.39	1	D	-0.60	1	D	3.63	1	CCC									
Eltek	Non-manufacturer	48	4.96	2	BB	4.79	2	BB	6.34	3	BBB	7.85	3	AA	10.94	3	AAA	10.80	3	AAA
Fairstar heavy transport	Non-manufacturer	47	2.88	1	CCC	1.42	1	D	3.38	1	CCC	5.23	2	BB						
Faktor eiendom	Non-manufacturer	65	1.54	1	D	0.41	1	D	6.25	3	BBB	11.39	3	AAA						
Fara	Manufacturer	36	1.04	1	CCC	0.55	1	CCC	-0.21	1	D	6.71	3	AAA	3.08	3	BBB			
Farstad shipping	Non-manufacturer	44	7.05	3	AA	5.90	3	BBB	5.12	2	BB	5.24	2	BB	6.43	3	A	5.83	2	BBB
Fornebu utvikling	Non-manufacturer	65	9.15	3	AAA	6.09	3	BBB	8.79	3	AAA									
Fred Olsen energy	Non-manufacturer	13	7.08	3	AA	6.85	3	A	6.13	3	BBB	6.86	3	A	5.14	2	BB	4.76	2	BB
Fred Olsen production	Non-manufacturer	13	4.98	2	BB	5.08	2	BB	6.96	3	A									
Frontline	Non-manufacturer	44	4.46	2	B	5.37	2	BB	5.29	2	BB	5.57	2	BB	5.79	2	BBB	6.67	3	A
Funcom	Manufacturer	39	0.36	1	CCC	-0.67	1	D	17.87	3	AAA	23.61	3	AAA	7.01	3	AAA			
Ganger rolf	Non-manufacturer	44	13.11	3	AAA	16.47	3	AAA	17.85	3	AAA	37.11	3	AAA	21.59	3	AAA	13.64	3	AAA
GC Rieber shipping	Non-manufacturer	44	7.05	3	AA	8.79	3	AAA	13.05	3	AAA	5.43	2	BB	8.10	3	AA	7.53	3	AA
Global IP solutions	Non-manufacturer	73	2.44	1	CCC	3.70	1	CCC												
Golar LNG	Non-manufacturer	47	3.74	1	CCC	3.39	1	CCC	4.54	2	B	4.19	1	B	3.93	1	B	3.94	1	B
Golden ocean group	Non-manufacturer	44	6.18	3	BBB	1.90	1	CCC	4.74	2	B	4.19	1	B	3.77	1	B	5.79	2	BBB
Goodtech	Manufacturer	35	3.44	3	A	3.26	3	BBB	5.19	3	AA	3.74	3	A	1.74	1	B	2.95	2	BBB
Green reefers	Non-manufacturer	44	2.60	1	CCC	3.78	1	B	4.15	1	B	3.13	1	CCC	6.03	3	BBB	6.95	3	A
Grenland group	Non-manufacturer	17	4.97	2	BB	5.42	2	BB	4.67	2	B	3.92	1	B	6.09	3	BBB			
Grieg seafood	Non-manufacturer	9	6.04	3	BBB	2.34	1	CCC	5.62	2	BB									
Gyldendal	Manufacturer	27	2.28	2	BB	2.18	2	BB	1.88	2	B	2.24	2	BB	2.83	2	BBB	2.91	2	BBB
Hafslund	Non-manufacturer	49	5.39	2	BB	5.35	2	BB	9.78	3	AAA	7.92	3	AA	4.03	1	B	3.90	1	B
Havila shipping	Manufacturer	37	0.93	1	CCC	0.97	1	CCC	1.43	1	B	1.68	1	B	1.07	1	B			
Hexagon composites	Manufacturer	30	3.42	3	A	1.72	1	B	2.29	2	BB	2.02	2	B	4.17	3	A	3.19	3	BBB
Hjellegjerde	Manufacturer	25	0.65	1	CCC	0.55	1	CCC	1.46	1	B	2.35	2	BB	2.30	2	BBB	3.03	3	BBB
Hurtigruten	Non-manufacturer	44	4.41	2	B	0.25	1	D	3.90	1	B	3.98	1	B	3.67	1	CCC	4.65	2	B
IGE resources	Non-manufacturer	10	16.27	3	AAA	7.30	3	AA	8.17	3	AAA	48.40	3	AAA	17.70	3	AAA	11.11	3	AAA
Ignis	Non-manufacturer	73	3.81	1	B	5.14	2	BB	3.46	1	CCC	3.63	1	CCC	4.81	2	BB	3.64	1	CCC
IM Skaugen	Non-manufacturer	44	5.87	3	BBB	6.50	3	A	7.35	3	AA	6.74	3	A	6.50	3	A	5.58	2	BB
Infratek	Non-manufacturer	73	7.33	3	AA	7.89	3	AA	7.74	3	AA									
Inmeta	Non-manufacturer	73	6.22	3	BBB	5.65	2	BB	6.08	3	BBB	5.85	3	BBB	7.07	3	AA	7.01	3	AA
InterOil exploration and production	Manufacturer	29	-1.43	1	D	0.63	1	CCC	0.34	1	CCC	1.17	1	B						
Itera consulting group	Non-manufacturer	87	7.88	3	AA	8.31	3	AAA	8.98	3	AAA	9.20	3	AAA	8.65	3	AAA	8.48	3	AAA
Jinhui shipping and transportation	Non-manufacturer	44				7.16	3	AA	5.54	2	BB	6.55	3	A	7.46	3	AA	6.31	3	BBB
Kitron	Manufacturer	36	2.75	2	BBB	2.59	2	BB	2.31	2	BB	2.12	2	BB	1.86	2	B	2.18	2	BB
Komplett	Non-manufacturer	59	7.35	3	AA	6.12	3	BBB	7.07	3	AA	10.12	3	AAA	10.09	3	AAA	9.87	3	AAA
Kongsberg automotive holding	Manufacturer	34	1.06	1	CCC	1.42	1	B	1.15	1	B	3.74	3	A	3.43	3	A			
Kongsberg gruppen	Manufacturer	38	2.57	2	BB	1.90	2	B	2.64	2	BBB	1.97	2	B	1.82	2	B	1.96	2	B
Kverneland	Manufacturer	35	1.64	1	B	1.81	2	B	2.00	2	B	1.32	1	B	2.33	2	BB	2.29	2	BB

Lerøy seafood	Manufacturer	20	2.64	2	BBB	1.72	1	B	2.43	2	BB	2.85	2	BBB	3.98	3	A	3.45	3	A
Luxo	Manufacturer (delisted)	36				2.88	2	BBB	2.96	2	BBB	2.71	2	BBB	2.12	2	BB	2.55	2	BB
Mamut	Non-manufacturer	73	5.13	2	BB	4.60	2	B	5.04	2	BB	4.36	2	B	9.35	3	AAA	8.06	3	AA
Marine farms	Non-manufacturer	51	7.26	3	AA	6.90	3	A	7.66	3	AA	7.52	3	AA						
Marine harvest	Non-manufacturer	2	6.56	3	A	4.40	2	B	6.42	3	A	6.54	3	A	6.48	3	A	4.25	1	B
Maritime industrial services	Non-manufacturer	87	6.84	3	A	5.49	2	BB	6.98	3	A									
Medi stim	Manufacturer	38	9.35	3	AAA	6.15	3	AAA	9.26	3	AAA	6.22	3	AAA	10.67	3	AAA	11.02	3	AAA
Namsos trafikkselskap	Non-manufacturer	44	5.19	2	BB	3.81	1	B	4.13	1	B	4.83	2	BB	4.68	2	B	4.24	1	B
Navamedic	Manufacturer	28	1.80	1	B	0.83	1	CCC	2.48	2	BB	14.67	3	AAA						
NEAS	Non-manufacturer	65	4.19	1	B	3.12	1	CCC	6.52	3	A									
Nordiag	Manufacturer	28	0.07	1	CCC	0.40	1	CCC	4.68	3	AA	14.91	3	AAA	19.33	3	AAA			
Nordic semiconductor	Manufacturer	36	12.63	3	AAA	7.49	3	AAA	13.45	3	AAA	24.72	3	AAA	30.35	3	AAA	26.82	3	AAA
Norgani hotels	Non-manufacturer (delisted)	65	3.34	1	CCC	3.44	1	CC	4.53	2	B	4.82	2	BB						
Norman	Non-manufacturer (delisted)	73				4.51	2	B	4.36	2	B	4.11	1	B	4.73	2	B	3.37	1	CCC
Norse energy corporation	Non-manufacturer	13	0.58	1	D	1.91	1	CCC	2.93	1	CCC	3.56	1	CCC	4.96	2	BB	2.77	1	CCC
Norsk hydro	Manufacturer	33	2.97	2	BBB	2.38	2	BB	4.03	3	A	3.37	3	A	2.90	2	BBB	2.64	2	BBB
Norske skogindustrier	Manufacturer	26	0.65	1	CCC	0.85	1	CCC	1.23	1	B	1.11	1	B	1.18	1	B	1.48	1	B
Northern logistic property	Non-manufacturer	65	3.80	1	B	3.58	1	CCC	4.60	2	B									
Northland resources	Non-manufacturer	10	23.77	3	AAA	28.29	3	AAA	32.86	3	AAA	19.44	3	AAA						
Norway pelagic	Manufacturer	20	3.07	3	BBB	2.78	2	BBB												
Norwegian air shuttle	Non-manufacturer	45	4.81	2	BB	2.86	1	CCC	4.17	1	B	3.39	1	CCC	4.20	1	B	1.40	1	D
Norwegian car carriers	Non-manufacturer	44	2.96	1	CCC	3.76	1	B	4.01	1	B	4.03	1	B	3.84	1	B	4.02	1	B
Norwegian energy company	Non-manufacturer	13	3.74	1	CCC	4.48	2	B	3.85	1	B									
Norwegian property	Non-manufacturer	65	3.04	1	CCC	3.09	1	CCC	3.43	1	CCC	4.41	2	B						
Oceanteam shipping	Non-manufacturer	16	-0.71	1	D	2.78	1	CCC	6.03	3	BBB									
Odfjell	Non-manufacturer	44	5.22	2	BB	5.05	2	BB	5.00	2	BB	5.40	2	BB	5.37	2	BB	4.91	2	BB
Odim	Manufacturer	37	3.48	3	A	3.51	3	A	5.14	3	AA	5.27	3	AA	4.18	3	A			
Olav Thon eiendom	Non-manufacturer	65	5.03	2	BB	4.81	2	BB	5.11	2	BB	5.18	2	BB	4.82	2	BB	6.03	3	BBB
Opera software	Non-manufacturer	73	11.04	3	AAA	12.05	3	AAA	15.80	3	AAA	16.97	3	AAA	18.08	3	AAA	25.98	3	AAA
Origio	Manufacturer	28	1.58	1	B	1.16	1	B	2.66	2	BBB	5.23	3	AA	3.81	3	A	3.76	3	A
Orkla	Manufacturer	39	2.23	2	BB	1.81	2	B	3.29	3	A	3.39	3	A	2.65	2	BBB	4.01	3	A
Otrum	Non-manufacturer (delisted)	48				6.22	3	BBB	6.52	3	A	5.99	3	BBB	8.96	3	AAA	8.45	3	AAA
PA resources	Non-manufacturer	13	4.64	2	B	4.95	2	BB	6.70	3	A	5.24	2	BB	5.30	2	BB	8.90	3	AAA
Petrobank energy and resources ltd	Non-manufacturer (delisted)	13	4.18	1	B	5.65	2	BB	4.95	2	BB	5.10	2	BB						
Petrojack	Manufacturer (bankrupt)	37	-0.32	1	D	-1.42	1	D	0.73	1	CCC	2.39	2	BB	37.15	3	AAA			
Petroleum geo-services	Non-manufacturer	13	7.31	3	AA	6.72	3	A	5.15	2	BB	7.02	3	AA	5.04	2	BB	4.19	1	B
Petrolia drilling	Non-manufacturer	13	2.94	1	CCC	-3.71	1	D	5.32	2	BB	5.95	3	BBB	3.99	1	B	-0.56	1	D
Photocure	Manufacturer	28	16.11	3	AAA	8.07	3	AAA	16.05	3	AAA	17.31	3	AAA	8.39	3	AAA	5.14	3	AA
Polaris media	Manufacturer	27	1.72	1	B	2.91	2	BBB												
Powel	Non-manufacturer	73				7.13	3	AA	5.40	2	BB	5.78	2	BBB	7.29	3	AA			
Pronova biopharma	Manufacturer	28	1.88	2	B	1.73	1	B	2.55	2	BB									
Prosafe	Non-manufacturer	87	7.38	3	AA	7.30	3	AA	5.26	2	BB	5.23	2	BB	7.22	3	AA	6.71	3	A
PSI group	Non-manufacturer	73	4.06	1	B	4.62	2	B	5.79	2	BBB	5.60	2	BB	5.48	2	BB	6.42	3	A
Q-free	Non-manufacturer	47	10.31	3	AAA	8.71	3	AAA	10.46	3	AAA	9.45	3	AAA	8.23	3	AAA	3.23	1	CCC
Questerre energy corporation	Non-manufacturer	13	11.97	3	AAA	9.43	3	AAA	6.12	3	BBB	8.83	3	AAA	7.47	3	AA			
Renewable energy corporation	Manufacturer	36	1.37	1	B	2.30	2	BB	14.61	3	AAA	9.59	3	AAA						
Repant	Manufacturer	35	-4.42	1	D	-5.39	1	D	-3.02	1	D	3.46	3	A						
Reservoir exploration technology	Non-manufacturer	87	-7.69	1	D	-0.36	1	D	2.67	1	CCC	4.46	2	B						
Rieber & Søn	Manufacturer	20	2.89	2	BBB	2.34	2	BB	2.82	2	BBB	2.78	2	BBB	2.90	2	BBB	3.95	3	A
Rocksource	Non-manufacturer	13	1.84	1	CCC	5.97	3	BBB	4.84	2	BB	13.69	3	AAA	25.22	3	AAA	2.99	1	CCC
Roxar	Non-manufacturer (delisted)	49				4.57	2	B	3.01	1	CCC	10.00	3	AAA	6.91	3	A	6.36	3	BBB
Royal Caribbean cruises	Non-manufacturer	44	4.43	2	B	4.44	2	B	4.76	2	BB	4.78	2	BB	4.79	2	BB	4.31	1	B
Salmar	Non-manufacturer	9	8.69	3	AAA	8.22	3	AAA	8.36	3	AAA									
SAS	Non-manufacturer	45	2.66	1	CCC	3.91	1	B	5.16	2	BB	5.73	2	BBB	3.97	1	B	3.61	1	CCC
Scana industrier	Non-manufacturer	13	7.05	3	AA	6.40	3	BBB	7.73	3	AA	6.85	3	A	6.66	3	A	5.31	2	BB
Schibsted	Manufacturer	27	2.11	2	BB	1.08	1	B	2.07	2	B	2.12	2	BB	3.83	3	A	3.44	3	A
Scorpion offshore	Non-manufacturer	13	4.79	2	BB	4.14	1	B	4.43	2	B	6.65	3	A	3.07	1	CCC			
Seabird exploration	Non-manufacturer	13	3.19	1	CCC	4.50	2	B	4.05	1	B	6.04	3	BBB						
Seadrill	Non-manufacturer	13	4.66	2	B	3.59	1	CCC	4.97	2	BB	4.36	2	B	7.00	3	AA			
Sevan marine	Non-manufacturer	13	0.96	1	D	2.58	1	CCC	3.64	1	CCC	5.44	2	BB	5.05	2	BB	15.46	3	AAA
Siem offshore	Non-manufacturer	13	5.55	2	BB	5.45	2	BB	6.78	3	A	5.68	2	BBB	10.27	3	AAA			
Simrad optronics	Manufacturer	38	2.11	2	BB	2.58	2	BB	1.11	1	B	1.96	2	B						
Simtronics	Manufacturer	38	1.16	1	B	1.83	2	B	3.36	3	A									
Software innovation	Non-manufacturer (delisted)	73				2.90	1	CCC	4.78	2	BB	3.16	1	CCC	6.74	3	A	6.71	3	A
Solstad offshore	Non-manufacturer	44	5.77	2	BBB	5.57	2	BB	5.18	2	BB	6.30	3	BBB	5.82	2	BBB	5.33	2	BB
Solvang	Non-manufacturer	44	13.48	3	AAA	7.75	3	AA	19.66	3	AAA	18.85	3	AAA	18.82	3	AAA	22.39	3	AAA
Songa offshore	Non-manufacturer	13	5.70	2	BBB	3.44	1	CCC	4.43	2	B	2.36	1	CCC						
Star Reefers inc	Non-manufacturer	44	5.72	2	BBB	6.98	3	A	6.32	3	BBB	5.79	2	BBB	4.84	2	BB	5.11	2	BB
Statoil	Manufacturer	13	2.67	2	BBB	3.19	3	BBB	3.48	3	A	3.47	3	A	3.87	3	A	3.12	3	BBB
Stavanger aftenblad	Manufacturer (delisted)	27				2.80	2	BBB	4.19	3	A	4.68	3	AA	4.53	3	AAA	4.02	3	A
Stepstone	Non-manufacturer (delisted)	73				5.91	3	BBB	6.01	3	BBB	7.37	3	AA	5.58	2	BB	4.31	1	B
Stolt Nielsen	Non-manufacturer	44	4.72	2	B	4.44	2	B	5.68	2	BBB	4.29	1	B	5.57	2	BB	4.33	1	B
Subsea 7 inc	Non-manufacturer	13	7.06	3	AA	6.53	3	A	6.71	3	A	6.33	3	BBB	4.64	2	B	4.97	2	BB
Synnøve finden	Manufacturer (delisted)	20				2.65	2	BBB	2.66	2	BBB	0.86	1	CCC	2.46	2	BB	1.51	1	B
Tandberg	Manufacturer	36	8.51	3	AAA	9.88	3	AAA	8.40	3	AAA	14.06	3	AAA						
Tandberg Data	Manufacturer (bankrupt)	35				2.27	2	BB	1.40	1	B	1.47	1	B	1.69	1	B	2.35	2	BB
Tandberg Storage	Manufacturer (bankrupt)	36				-5.01	1	D	1.68	1	B	2.62	2	BBB	3.86	3	A	2.41	2	BB
Teco maritime	Manufacturer	37	1.11	1	B	1.29	1	B	3.07	3	BBB	4.75	3	AA	6.07	3	AAA	8.45	3	AAA
Telecomputing	Non-manufacturer	73				5.63	2	BB	5.62	2	BB	7.71	3	AA	6.15	3	BBB	6.70	3	A
Telenor	Non-manufacturer	48	5.65	2	BBB	5.06	2	BB	5.62	2	BB	5.01	2	BB	4.53	2	B	5.02	2	BB
Telio holding	Non-manufacturer	48	9.90	3	AAA	9.12	3	AAA	5.47	2	BB	3.42	1	CCC						
TGS-Nopec Geophysical company	Non-manufacturer	87	11.79	3	AAA	11.40	3	AAA	11.48	3	AAA	12.89	3	AAA	11.59	3	AAA	10.77	3	AAA
Tide	Non-manufacturer	44	4.14	1	B	3.16	1	CCC	3.76	1	B	3.77	1	B	3.82	1	B	3.11	1	CCC
Tomra systems	Manufacturer	35	3.96	3	A	3.52	3	A	4.89	3	AA	5.71	3	AAA	7.85	3	AAA	6.97	3	AAA
TTS group	Manufacturer	37	0.98	1	CCC	1.26	1	B	1.88	2	B	2.60	2	BBB	2.01	2	B	1.87	2	B
Veidekke	Non-manufacturer	16	4.26	1	B	4.84	2	BB	5.67	2	BBB	5.40	2	BB	5.00	2	BB	4.65	2	B
Vizrt	Manufacturer	36	5.98	3	AAA	4.25	3	AA	9.78	3	AAA	8.51	3	AAA	8.44	3	AAA			
Wentworth resources	Non-manufacturer	49	-10.56	1	D	-1.78	1	D	6.34	3	BBB	4.29	1	B	9.63	3	AAA			
Wilh. Wilhelmsen holding	Non-manufacturer	44	6.14	3	BBB	5.05	2	BB	6.14	3	BBB	6.63	3	A	5.77	2	BBB	6.60	3	A
Wilson	Non-manufacturer	44	3.83	1	B	5.05	2	BB	4.63	2	B	4.75	2	B	5.86	3	BBB			
Yara International	Manufacturer	28	3.23	3	BBB	2.98	2	BBB	4.15	3	A	4.23	3	A	3.89	3	A	3.25	3	BBB