The relationship between Credit Ratings and Beta
- A quantitative study on the Nordic market
Abstract

This study aims to investigate the relationship between systematic risk and credit ratings. The systematic risk, frequently measured by beta, is an important consideration for both investors and corporations. Therefore it is interesting to examine if indications about the systematic risk could be gained by looking at credit ratings, especially on the Nordic market, where credit ratings are seemingly growing in importance. Consequently, the following research hypothesis is posed; We intend to establish a relationship between market risk (Beta) and credit ratings for firms in the Nordic countries.

In order to confirm or deny the research hypothesis, theories from peer reviewed databases were collected. These were divided into three sections; background theories, hypotheses about credit ratings and a literature review. The background theories consisted of two classical financial theories, the Capital Asset Pricing Model and the Efficient Market Hypothesis, which are the foundation upon which the research field have progressed. The hypotheses is specifically designed to explain the relationship between credit ratings and either systematic risk or stock price. The literature review contains information about studies which did not contribute to theory building, but produced results interesting in the research area.

The actual sample in the thesis consisted of the 58 credit rated companies on the Nordic stock market. These companies were rated by Moody’s and/or Standard & Poor’s, the two largest credit rating agencies in the world. As a measure of the systematic risk, betas for each of the companies were calculated. To investigate the relationship between these variables a regression analysis was performed, as well as one sample T-test using the software SPSS.

The result revealed a moderate relationship between beta and credit risk, a relationship which was not statistically significant on the five percent level. Our results suggest that credit ratings contain some information about companies’ systematic risk, a finding that might be useful for market participants.
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1. Introduction
It is a well known fact that risk, along with return, is the central concept within finance. Risk has always been a key variable to measure in its different forms, since risk both relates to a firm’s ability to survive (i.e. its bankruptcy risk) and prosper (i.e. gain a high return). The reason for this is the traditional financial relationship that says higher risk equals higher return,\(^1\) although there is some evidence suggesting that this relationship is not true in certain circumstances.\(^2\)

Since the risk is such a critical consideration for firms there is also a need for companies to decompose and dissect it. There are great benefits for companies and investors to see what part of risk is negligible, which parts are diversifiable, and which risks could be hedged.

Total risk is commonly divided into systematic and unsystematic risk. The systematic risk is the most important risk for investors since it cannot be diversified away by holding more securities. Systematic risk is frequently measured by beta, a number which measures an individual stock’s covariance with the market. Beta therefore gives a figure on how the individual stock is expected to react for a given movement of the market. Beta is composed of many different parts of risk, of which this thesis will focus on the credit risk.

Credit risk is; “the risk that a counterparty to a financial transaction will fail to fulfill its obligation.”\(^3\) Credit risk is a vital consideration since all well managed large companies should have at least some debt in its capital structure.\(^4\) Furthermore, credit risk has empirically been demonstrated to be an important part of valuing securities.\(^5\) Therefore a comparison of this risk becomes more valid since it is a risk needed to be considered to some extent for all companies.

Since few good measures of credit risk exist, credit ratings are often used as a proxy for the


credit risk. Credit ratings are issued by credit rating agencies to measure companies’ ability to meet its financial obligations. The credit rating agencies base their ratings on both publicly held information and private information, as well as their ratings on their subjective view of a company. Since companies cannot exactly overview a counterpart’s financial situation, many companies rely on rating agencies to get an accurate depiction of debtor’s ability to repay the obligation. This means that a favorable credit rating is very important to get beneficial terms and conditions when firms issue debt on financial markets.\(^6\)

Since credit agencies have considerable influence over firms’ financial policy, they have been scrutinized and criticized over the last few years. This criticism has come from both regular press and from academic circles, with examples such as the crash of Enron and WorldCom.\(^7\) Only a couple of months before the crash, S&amp;P and Moody’s gave Enron a solid investment grade rating.\(^8\) The scandal with Enron has made the issue of credit ratings a widely discussed topic and spurred the debate of the reputation of the credit rating agencies.

The actual relationship between credit ratings and beta at one point in time seemingly has not been thoroughly researched. In fact only one study of this nature could be found. Schwendiman and Pinches conducted this kind of study on the American market in 1975. The findings of this study showed an inversed relationship between these two variables, i.e. a higher rating meant a lower beta.\(^9\) A research area that is well developed is what effect rating changes have on stock price and risk. The results within this area have indicated that credit rating downgrades are associated with higher beta. For instance Impson et al. researched almost 300 upgrades and 400 downgrades and concluded that while no visible effect could be noted in regards to upgrades,

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\(^8\) Financial Times, 30 November, 2001

downgrades led to increase of the systematic risk.  

This thesis will attempt to establish a relationship between companies' credit ratings and their beta; intuitively a relationship should exist between these variables. Since the rating is a measure of credit risk, and credit risk is a part of systematic risk, then logically an unfavorable rating should indicate a higher credit risk and those companies should on average have a higher beta. This has also been indicated in studies conducted on how changes in credit ratings affect beta where a downgrade has been followed by an increase in systematic risk.

Previously on the Nordic market companies having credit ratings have been more an exception than a rule. The reason for this could be that the Nordic countries are often included in the continental European financial system, which relies more heavily on banks than capital markets for funds. Because of the lack of listed companies with a credit rating, previously it has not been a necessity for research within this area. However when capital markets have become more integrated, Nordic companies might need to adapt to the new business climate. This implies that companies in this region could need a credit rating to get access to favorable conditions on the bond market. Hence, we will conduct the research on the Nordic market since we believe that credit ratings will play an important role for Nordic companies in the future.

1.1. Hypothesis and Purpose
Our hypothesis will therefore be:

• We intend to establish a relationship between market risk (Beta) and credit ratings for firms in the Nordic countries

The purpose of this study is to investigate the relationship between market risk and the credit

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rating for companies in the Nordic markets, as these measures of risk are crucial for both investors and companies. The high level of efficiency in the capital markets, as well as the fact that previous studies have established a connection between these variables, has guided this thesis.\(^\text{14}\)

1.2. Selection of subject

The interest of the subject was first introduced in a finance class at Umeå University. Both of the authors are business students majoring in finance, and had therefore encountered especially beta in almost all finance classes and which made it a good starting point. The connection with credit ratings was introduced in a class called cash and risk management. The lecturer stated that the highest rated companies should have a beta around one, or as she stated it: they should be the market. That made us curious to see if this depiction was accurate on the Nordic market. When doing background research we found only one study that deployed the same methodology that we intended to carry out. We also found studies that contradicted the hypothesis laid out by our lecturer, which made the topic even more interesting. The existing studies were predominately focused on rating changes and concentrated on the US market, implying that this study could fill a knowledge gap.

The topic was an interesting, although challenging one. Previously only a few studies have focused on credit ratings affect on the Nordic market. Therefore, it was demanding to determine if the American studies’ results would be applicable to this context. Thus, this study can also be seen as an explorative study, to give an indication if American results are useful to consider in a different economic environment. Furthermore, this study gives an indication of the relationship between beta and ratings. This is beneficial for all parties in the capital markets, since we believe ratings and capital markets will be more important in the Nordic countries in the future.

1.3. Outline

The Credit Rating Process

In this part the credit rating process will be presented as background information for the reader.

The importance of credit ratings and the practical use will be explained, as well as the performance of the credit ratings in an historical perspective.

**Theoretical Foundation**

The theory section will be divided into three different parts. The first of will explain some fundamental and classical finance theories that are used as a foundation for this thesis. The second part presents hypotheses which have tried to explain the relationship between credit ratings and systematic risk or share price. The last part presents studies that have not necessarily introduced any new theory, however still have produced relevant results.

**Method**

This part will begin with a description of the literature search. An explanation of how the research strategy was chosen will follow, as well as a discussion about the data processing decisions and its implementations.

**Empirical results**

Here the results will be presented in the form of statistical tables, to ensure that the reader understand the key figures, they will be explained thoroughly.

**Analysis**

In the analysis section the results will be analyzed using the existing theory. This section will also be used to analyze specific characteristics of the Nordic market.

**Conclusions**

In the last section we will draw our conclusions from the material analyzed. Furthermore a new topic will be presented as an interesting starting point for future research. Lastly the reliability and validity will be evaluated for this research.
2. The Credit Rating Process
To be able to understand the dynamics of credit ratings and the systematic risk, a thorough examination of the credit rating process is required. In this section we will therefore try explain the credit rating process, before commencing with the theoretical foundation and empirical data.

2.1 Credit rating agencies
The credit rating market is dominated by two large US based companies, Standard & Poor’s (S&P) and Moody’s Investors Service. Their respective market share in the credit rating industry is about 40%, and the closest competitor is Fitch Investors Service with about 14%. The two giants has a clear competitive advantage in the credit rating market around the world compared to Fitch and our thesis will therefore concentrate on these two companies, when making the investigation.

2.2 Explanation of credit ratings
Credit ratings are opinions about credit risk and S&P ratings express the company’s opinion about the willingness and ability of an issuer, such as a corporation, to meet its financial obligations in full and on time. Subsequent Moody’s definition is: “A rating is Moody’s opinion of the credit quality of individual obligations or an issuer’s general creditworthiness.” S&P and Moody’s credit ratings assess total credit loss for companies, which include both the probability that an issuer will default in addition to the expected severity of the loss if default occurs.

The rating symbols for both S&P and Moody’s are shown in figure 1. The highest rating for S&P and Moody’s respectively is AAA and Aaa. Ratings above BBB- or Baa3 have the status investment grade. The term is broadly used to describe issuers and issues with relatively high levels of credit quality and creditworthiness. On the other hand ratings lower than BBB- or Baa3 are assigned a speculative grade, which implies that issuers has the ability to repay their debt obligations but face considerable uncertainties, for instance unfavorable business or financial

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conditions that could affect credit risk. According to S&P their “…ratings express relative opinions about the creditworthiness of an issuer or credit quality of an individual debt issue, from strongest to weakest within a universe of credit risk.”19 This is expressed in terms of their symbols for rating.

The credit rating agencies stress that credit ratings are not buy, sell, or hold recommendations, or intended to signal the appropriateness of an investment.20 They reveal one dimension of the investment decisions, the credit quality of the issuer/issues and in some cases what can be recovered in the event of default. Furthermore the ratings are supposed to show the long-term default risk rather than short-term fluctuations. The rating agencies do their best to achieve stable credit ratings through the business cycle (rating “through the cycle”).21 Hence, credit ratings are not expected to react suddenly to changes in default risk, though rather demonstrate a large degree of robustness.

19 Standard and Poor’s, (2009), “Guide to Credit Rating Essentials”.
### The rating categories of S&P and Moody’s respectively: Figure 1.

<table>
<thead>
<tr>
<th>S&amp;P</th>
<th>Moody’s</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAA</td>
<td>Aaa</td>
<td>Extremely strong capacity to meet financial commitments, Highest rating</td>
</tr>
<tr>
<td>AA</td>
<td>Aa</td>
<td>Very strong capacity to meet financial commitments</td>
</tr>
<tr>
<td>A</td>
<td>A</td>
<td>Strong capacity to meet financial commitments, but somewhat susceptible to adverse economic conditions and changes in circumstances</td>
</tr>
<tr>
<td>BBB</td>
<td>Baa</td>
<td>Adequate capacity to meet financial commitments, but more subject to adverse economic conditions</td>
</tr>
</tbody>
</table>

**Investment Grade**

| BB+  | Ba1     | Considered highest speculative grade by market participants |
| BB   | Ba      | Less vulnerable in the near-term but faces major ongoing uncertainties to adverse business, financial and economic conditions |
| B    | B       | More vulnerable to adverse business, financial and economic conditions but currently has the capacity to meet financial commitments |
| CCC  | Caa     | Currently vulnerable and dependent on favorable business, financial and economic conditions to meet financial commitments |
| CC   | Ca      | Currently highly vulnerable |
| C    | C       | A bankruptcy petition has been filed or similar action taken, but payments of financial commitments are continued |
| D    | D       | Payment default on financial commitments |

Each rating class, from AA (Aa) to CCC (Caa) are divided into subsections numbered +, neutral or –(1-3) where+ (1) indicates that the obligation is ranked within the higher part of the rating class and – (3) indicates that it is within the lower part of the rating class.

**2.3 The use and role of credit ratings**

Credit ratings are used by a large number of different agents, such as investors, intermediaries, issuers, businesses and financial institutions. Each of these parties has their own use and objective for the credit ratings provided by the credit rating agencies. Investors mostly use the
Credit ratings to help evaluate credit risk and compare different issuers and debt issues when making investment decisions and managing their portfolios. Intermediaries, such as investment bankers help to facilitate the flow of capital from investors to issuers. They might use the credit ratings to set a standard for the relative credit risk of various debt issues, along with the establishment of the initial pricing for individual debt issues they form and to assist with the determination of interest rate these issues will pay. Businesses and financial institutions, particularly those involved in credit sensitive transactions, might want to use credit ratings to assess counterparty risk, which is the potential risk that a party in a credit agreement will default on its payments. Issuers, including include corporations, financial institutions, governments, states, and municipalities, use credit ratings to acquire independent scrutiny of their creditworthiness and the quality of their debt issues. They also use ratings to communicate the quality of their debt issues to prospective investors, as well as use them to anticipate the interest rates on their new debt issues.\footnote{European Central Bank, (2004), “Market dynamics associated with credit risk, a literature review”, Occasional Paper Series. P.9}

Furthermore it is crucial for the rating function that credits rating agencies maintain a reliable reputation and are seen as objective in their judgment.\footnote{European Central Bank, (2004), “Market dynamics associated with credit risk, a literature review”, Occasional Paper Series. P.22} Otherwise the debt markets will become unstable and investors will not trust the ratings that are the foundations for the pricing of debt instruments. The scandal with Enron has shown us the vulnerability of the credit ratings when trying to assess the credit worthiness of companies, which are believed to be safe. Also the dependence on the credit ratings has given the markets some caution and the credit rating agencies have been trying to rebuild their reputation.

\section*{2.4 Credit rating in practice}

The process of assigning a credit rating to an issuer is very important to be able to understand the dynamics and intuition behind the credit ratings. The transparency of the process is one of the key elements which the credit rating agencies can show the fundamentals behind their ratings and make the market satisfied with their information. The agencies use an analyst approach for assigning credit ratings and there are certain steps followed by both the issuer and the rating
agency. These steps are stipulated in figure 2, which have been provided by Standard and Poor’s.25

![Figure 2- The Rating Process](image)

At first the issuer requests a rating from a rating agency and a lead analyst is assigned to the company in question. Subsequently a team of specialists are also assigned and together they start an initial evaluation of the issuer. Next step is to meet with the management of the issuer and acquire the information needed to be able to assign a fair rating of the company. Typically, the analysts acquire information from published reports, as well as from interviews and discussions with the issuer’s management. They use this material to assess the issuer’s financial condition, operating performance, policies, and risk management strategies. After this analysis, a rating committee reviews the recommendation from the lead analyst and makes a majority vote on what rating is appropriate. The issuer can at this stage appeal the rating decision, but must present relevant facts for its case. The rating committee will vote with a majority decision if the appeal will be rejected or accepted. The issuer will then be notified which rating that has been assigned to them and the market will also get the information about the specific credit rating. As a final stage in the process, the credit rating agency will have surveillance on the issuer and if conditions change, the rating will have to be reviewed.

The agencies track development of the issuers and if an anticipated change in the upcoming 6 to

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24 months is present, the agency may issue an updated ratings outlook. Which includes an indication whether the change might be positive, negative, stable, or developing (uncertain if the change will be positive or negative). Furthermore if the circumstances change in the near future, usually within 90 days, the rating agencies might put the rating on CreditWatch. This means that it will be closely monitored and usually stated why it might change and in what direction.\textsuperscript{26}

The rating agencies stress their independence in the rating process, which is vital for their reputation and status as objective information processors. The members of the rating committee are held secret throughout the entire process to ensure that no influence from the outside occurs. This process could give rise to conflicts of interest if the process is not clearly separated between the issuer and the agency.

Another aspect that should be considered is how the credit rating agencies get paid, and this could also be a source for conflicts of interest. Agencies can be paid either from the issuer who requests the rating or from subscribers that will receive the published ratings. With the issuer pay model, rating agencies charge a fee when ratings are requested. They might include information that is not public into their ratings, which are good for the investors as well. The agencies can provide the ratings free of charge to the public, because they do not rely solely on subscribers for fees. The subscription model makes the investors or other market actors pay the fees to get access to the ratings. The critics against this model points out that investors might try to influence the ratings and this would be a conflict of interest. Furthermore the paying subscribers tend to be large institutional investors, which leave out small investors. In addition this model would make it more difficult to get access to issuers, who have no obligation to inform the agencies of changes in their business. The issuer model is the most used, however a combination is also quite common.\textsuperscript{27}

2.5 The performance of credit ratings
One can easily analyze the performance of credit ratings using historical data, which includes default rates and figures showing how stable the ratings are in both the short and long-run. Both

\textsuperscript{26}Standard and Poor’s, (2009), “Guide to Credit Rating Essentials”.
\textsuperscript{27}Standard and Poor’s, (2009), “Guide to Credit Rating Essentials”.
Moody’s and S&P publish relevant research in this area on their homepages and encourage further research to ensure the stability of their ratings. The historical data supports the notion that credit rating agencies are quite successful in measuring credit risk. Credit risk can be measured in different ways, one of which implies comparing the consistency of credit ratings with the pricing in financial markets. According to Sarig and Warga, the market demands higher spreads on debt securities with lower credit ratings.28

Another approach would be to look at the default probabilities for each category of credit ratings and see if they are consistent. A study written by Cantor et al suggested that default probabilities for different credit ratings could vary over time.29 However in the long run the credit risk measures should display a high degree of stability in each rating category and credit ratings could then be used as measures of long term credit risk. The stability of the default probabilities in each rating category can be seen in figure 3 from Moody’s.30

![Cumulative Default Rates by Rating Categories](image_url)

**Figure 3- Default Rates by Rating Categories**

This figure show the stable pattern of default rates for the ratings of Moody’s in the medium and long run. One can see that default has a higher probability of occurrence in the lower parts of the

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29Cantor, R., Packer, F., (1994), ”The credit rating industry”, Federal Reserve Bank of New York Quarterly Review. P.1
grading system than the higher. Which confirms the fact that credit ratings seem to be stable in the long run, however the rating agencies have been criticized for their ratings when the economic climate is in recession, such as today. Ratings seem to exhibit a certain degree of procyclicality and this can be seen in ECBs paper series where they review the research on credit ratings as well as their pro-cyclical nature. Several researchers confirm the overreaction of credit ratings and this is especially true in times of recession.\textsuperscript{31}

3. Theoretical Foundation
The theory section will start with a brief description of two classical financial theories; the Capital Asset Pricing Model (CAPM) and the Efficient Market Hypothesis (EMH). These theories will be used as background theories, since numerous studies are based on these and the fact CAPM introduced the beta measure which will figure prominently in this thesis. After this three hypotheses will be presented that aim to explain the relationship between credit ratings and systematic risk or stock price. The chapter ends with a literature review which introduces findings that are not coherent theory but are important to get a grasp of this research field.

3.1. The development of the capital asset pricing model
The first reputed model trying to connect return and risk was developed by Markowitz in 1952. It dealt with how to perfectly construct a portfolio by looking at the portfolio risk and return, rebuking previous ideas that it was only the individual shares combination of risk and return that mattered when selecting a portfolio. Markowitz proved that a portfolio is efficient only when either extra return cannot be achieved without additional risk, or no more diversification can lower risk while maintaining the return. He also argued that the covariance was vital for diversification and therefore a portfolio containing only securities from the same industry would be less diversified than one containing securities from a variety of industries.32

Markowitz model was the starting point for more sophisticated models, which only took into account market risk. Other researchers started to assume that investors were well-diversified and therefore they should only be compensated for market risk. Models were developed independently by several scholars that only exhibited how much the single share contributed to the market risk of a well diversified portfolio.33 Their initial contributions were later slightly revised and became the capital asset pricing model. The model uses a measure called beta to show an individual share’s market risk. The beta value is based on that share’s co-variation with the market (where a market index is commonly used as a proxy). The market has, by definition, a beta of one and this means that a share that has a beta below one varies less than the market as a

whole. On the other hand, a share that has a beta over one would be expected to vary more than the market since it has done so historically. The beta value is based on the risk that cannot be diversified, and as such is the relevant risk for an investor trying to create a portfolio. High beta securities should yield a higher return, since they contribute more to the portfolio risk.

This theory about market risk is vital in the thesis. It seems reasonable to assume that companies with lower credit rating should have a higher market risk as measured by beta. For instance, a higher beta than average could be due to a considerable financial leverage, which could lead to a higher payoff in bull market but may lead to financial distress when the market turns sour.

![Figure 4- Security Market Line](image)

The need for investors to be compensated for higher level of systematic risk is normally graphically represented by the Security Market Line (SML) as seen in figure 4. The line represents the expected return for different levels of beta. The capital asset pricing model also implicitly connects share price of a stock based on its risk and return. When a company is in disequilibrium on the Security Market Line (SML), it is noted by the investors and is bought or sold until the stock price has adjusted enough so that the security yields an appropriate return for its riskiness. For instance, if a share gives a high return considering risk, represented by the point

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plotted above the SML in figure 4, investors will purchase the security until the price increases and the return is equal to its required return. Consequently, this also means that a share which yields too low of a return, represented in figure 4 by the point below the line, is forced to decline in share price to adjust to the suitable required rate of return.\(^{35}\)

Further on in this study hypothesis will be used that has been research by connecting rating change and share price reaction. The researchers have compiled how share prices reacted when the companies’ ratings were either upgraded or downgraded. To fully appreciate the importance of these results, it is important for the reader to comprehend how share prices are connected in the CAPM. Following the previous paragraph’s reasoning, a fall in share price after a rating change would imply a higher beta going forward. While an increased share price would suggest that the share price would vary less in the future, i.e. a lower beta. It is however important to note that since beta is based on historical data it does not adjust fully immediately. Thus, having this knowledge will aid the readers to see how previous studies could be included, despite not being concerned with exactly the same variables.

### 3.2. Efficient market

The efficient market hypothesis (EMH) was first introduced by Fama in 1970 when he wrote his article “Efficient Capital Markets: A Review of Theory and Empirical Work” which was a review of the existing research and gathering of the theories in this field. In general the theory of efficient markets was concerned with whether prices at any point in time fully reflected all available information.\(^{36}\)

The theory was based on the random walk notion which implied that security price changes in capital markets were seen as random and uncorrelated with each other.\(^ {37}\) Furthermore the theory was divided into three different categories: weak form, semi-strong form and strong form. Each of these categories had there own assumptions and implications for how the efficient market


hypothesis could be interpreted.

The strong form of the efficient market hypothesis states that security prices fully reflect all available information, even insider information. This means that even a person with monopolistic access to information will not be able to make an excess profit on the capital market. As Fama states: “One would not expect such an extreme model to be an exact description of the world, and it is probably best viewed as a benchmark against which the importance of deviations from market efficiency can be judged.”38 This explanation of the strong form makes it more a theoretical concept than a measure that can be used in reality. The less selective semi-strong form includes all obviously publicly available information, which seem to be more realistic and it has been shown by Fama that no contradictory evidence was found. The weak form only reflects historical information and this has also been proven to hold. Consequently this means that no new information or expectations has any affect for the security prices on the capital market.

The issue concerning the evidence of the EMH has divided the academic side which often believes in the semi-strong form and the actors on the capital markets who believe they can beat the market. The anomalies of the efficient market hypothesis have made this area an extensive research field in finance, which have lead to other models such as Behavioral Finance. Furthermore the consistent success of the mogul Warren Buffet and his company have made people having doubts about the efficient market hypothesis.

The efficient market hypothesis (EMH) will mainly be used as a background theory in this thesis. It is crucial for the reader to understand EMH, since many of the subsequent theories about capital markets are based on it. Later on in the theory section hypothesis will be presented that is to a high extent dependent on the EMH. Especially the information content hypothesis, presented in the next section, seems to rely and incorporate the semi-strong efficiency form.

3.3. Information Content
One attempt to explain credit rating’s relationship to risk is that the rating alleviates the problem

38Fama, E. F.,(1970), P. 414
of information asymmetry. Information asymmetry is a problem that originates due to the fact that one party in a transaction has more information. Nobel laureate George A. Akerlof, famously described information asymmetry with an example about used cars. His point was that the buyer has an information disadvantage in the transaction and therefore used cars must sell at a significant lower price than a new car even if the used car is only a few weeks old.

In the financial world information asymmetry is in effect when a company that issues bonds knows more about their ability to repay this obligation than the lender does. This could lead to situations where the lender cannot distinguish between high or low quality borrowers and therefore treats them all the same. Thus, low risk bond issuers pay a relatively high interest rate, considering risk, while riskier borrowers pay too little. Furthermore, this unfairness will harm other parts of the financial system as well, since low risk borrowers will abandon the bond market due to too high interest costs and therefore profitable projects might never be undertaken due to under-financing. Additionally when high quality borrowers drop-out of the market lenders might migrate to higher risk bonds, leading to a higher percentage default in the debt markets. To summarize, information asymmetry could be harmful to the debt market, which could stunt the growth in the whole economy.

The credit agencies tries to level the playing field by issuing a rating that describes the company’s ability to repay their financial obligation, and thereby disclosing vital information to the lender. The credit rating agencies’ ability to overcome the problem with information asymmetry depends on to which degree their reports contain new information for the market. This is often referred to as the information content, and it is debated among scholars “news” that actually are revealed in the rating reports. Both Moody’s and Standard & Poor’s insist that they get some of the data that goes into the credit report from the company themselves. This was also indicated in Cantwell & company’s survey from 1999, were a majority of participating

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42 For instance see Standard and Poor’s, (2009), “Guide to Credit Rating Essentials”. P.8
companies revealed that they reveal non-public information to credit rating agencies\textsuperscript{43}, implying that there is some information content in the rating reports previously unknown to the market.

Wakeman vehemently denies the information content hypothesis claiming that the evidence against changes in security value in direct association with rating changes is “emphatic”.\textsuperscript{44} He sees the bond rating agencies simply as information collectors that benefits the financial system by lowering search costs through economies of scale. Several empirical studies have shown some evidence for that there is some truth to the information content. The information content is especially visible in the case of downgrades, where the announcement seemingly has an almost immediate impact on the market. For instance Dichev and Piotroski conducted a study based on almost all of Moody’s bond rating changes between 1970 and 1997 found that downgrades were associated with “substantial abnormal negative returns”\textsuperscript{45}, while no abnormal returns could be detected in the case of upgrades.\textsuperscript{46}

Goh and Ederington published an article in 1998, which speculated on the reason why the information content effect seemed to be greater for downgrades then upgrades. The two main explanations were that while companies have an incentive to release positive information to the market they are not necessarily that open in regards to negative information. Which could be the reason that higher response to the downgrade, since more of the information released is previously unknown to the market. The second reason Goh and Ederington presented was that rating agencies spend more resources trying to uncover private negative information compared to private positive information.\textsuperscript{47} While it is vital to for the agencies to find if the companies have higher credit risk than it appears on the surface, it is not of such importance to uncover higher credit ratings. While a too low credit rating forces companies to pay slightly higher interest rates

on bonds and loans, a too high credit rating does not inform the creditors of the real risk of the company defaulting which could have catastrophic consequences. These two explanations are seemingly working well together; since companies are issuing more of their positive information themselves, the agencies can focus their time and effort uncovering private negative information. Goh and Ederington only speculated about these being the reason that the market reacting more strongly to downgrades, but they seem reasonable and plausible. The actual result of the study confirms previous findings regarding credit rating changes that the market reacts more strongly to rating downgrades than upgrades of credit ratings. 48

3.3.1. Critique against the Information content hypothesis
There are some arguments that support the belief that the information released by rating agencies is not vital to the market and may even be biased. Rating agencies wield a certain amount of influence on companies’ business decisions, e.g. how alternative strategies will affect their rating but also what kind of securities companies invest in. Thus, rating agencies have considerable impact on financial markets, but as Kuhner (2001) notes that they have very little accountability. As a private company, that still figure in some countries regulations regarding what kind of securities certain companies can invest in, it is surprising how little supervision they have to deal with. For instance in many countries certain kinds of companies, e.g. banks, can only invest in investment grade securities, meaning that the agencies directly affect business decisions.49

Another reason is that there is suspicion among some that rating agencies are herding, meaning that the same borrowers rarely get different grades among different agencies. According to a study from 1998 over eighty percent of companies have the same letter rating from both Moody’s and Standard & Poor’s. Over half have exactly the same rating even when including rating modifiers (+ and -).50 If both credit rating agencies consistently assign the same rating it would imply that the agencies do not undertake independent thorough credit evaluations. For lenders it would mean that even though they think that they are getting additional information by comparing credit ratings from different agencies it may mean that they are really only

investigating the same information repackaged.\textsuperscript{51}

Speculation has also existed that since the major credit agencies are located in USA, the agencies have a strong preference for American business methods and therefore discriminate against certain other companies not using this system. This is a serious accusation that they do not rate companies on their default probability, but rather start using other criteria. Another one of Kuhner’s criticisms of the agencies is the pro-cyclicality of the ratings; meaning that agencies typically downgrade companies in recessions even though nothing fundamentally has changed in their core business operations. He points to the Asian financial crisis in the late 90’s and reflects over why no indications existed until the turmoil had commenced, and then the agencies almost acted irrationally by downgrading almost every company. Because of this, little consideration was seemingly taken to individual firm’s situation, only the macro-environment was apparently enough for an almost collective downgrade. This claim has been supported by numerous other scholars.\textsuperscript{52} These reasons distort the trustworthiness, credibility and relevance of the credit report.

Kuhner also points out that companies not requesting a rating, and therefore not paying the agencies for the service rendered, could still be given a rating. This practice contradicts the normal routine, where the rated company orders the service themselves to get a clearer grasp of their borrowing conditions. These ratings, called unsolicited ratings, have frequently been worse than what can be seen as justified by the company’s financial situation. Due to this kind of revenge for companies unwilling to pay for their service, Moody’s was involved in legal proceedings in 1996. The criticism against the unsolicited ratings has been disputed by some scholars that claim that there is no empirical evidence of lower quality among these ratings compared to other ratings.\textsuperscript{53} This critique is very intriguing to this thesis authors, and therefore it

will be investigated if unsolicited ratings seemingly have lower informational value than solicited ratings. Although, the reason for a potential discrepancy in informational value could not be explained, only speculated on, it would still be an interesting indication to see if these ratings fit in to the same research pattern as the other ratings.

3.4. Wealth redistribution

Early on when discussing the effect of credit rating changes many researchers kept to the rational idea that since credit ratings are a proxy for credit risk, which should be included in systematic risk, shares with poor credit rating are expected to be riskier than those with high credit ratings. Zaima and McCarthy (1988) were among the first who hypothesized about the manner that bond ratings affect stock price, and thereby risk. They claimed that there is an inherent conflict between bondholders and shareholders. This means that in certain cases, for instance when a bond is downgraded due to an increase riskiness because of higher financial leverage, a lower rating will cause outstanding bond prices to fall in value and the fall in value will be transferred to the shareholders. According to this hypothesis, the wealth redistribution hypothesis, a downgraded credit rating should be associated with increased share price and vice versa.\(^{54}\)

The researchers also presented the information content hypothesis, concerning the information quality of the credit rating reports. This hypothesis states that rating agencies gain access to non-public information; consequently the prices of the securities should adjust when the agencies release their ratings. Hence, this reasoning is seemingly built on and almost analogous with the semi-strong form of the efficient market hypothesis, which states that when new information becomes public the stock prices instantaneously reacts. The information content hypothesis claims that downgraded company’s securities should fall in value, this decreased value representing the increased risk for investors. Therefore the two hypotheses were in conflict. The results of the study showed that downgrades leads to decreased security price, indicating support for the information content hypothesis. The results for upgrades were mixed, which the authors attributed to the confounding effect of the two hypothesis stating different directions for share

prices in the case of upgrades.\textsuperscript{55}

Goh and Ederington builds on Zaima and McCarthy’s previous theory’s about wealth redistribution by noting “…if the bonds are downgraded because the rating agencies foresee an increase in leverage that will transfer wealth from bondholders to stockholders, bond prices should fall but equity prices should rise.”.\textsuperscript{56} Therefore they separated their sample, consisting of credit rating downgrades, due to the cause of that downgrade. By distinguishing the cause of the deterioration of the credit rating, they hope to detach the information content effect. The researchers separated the sample depending on the reason for the lower rating, due to decreased financial forecast for the company, or if the rating was changed because of increased leverage. The downgrades that were based on loss of sales and earnings lead to a fall in share prices. However, the shares that were downgraded due to increased leverage were affected little by the rating agency’s announcement. This result the researchers attributed to the wealth redistribution effect.\textsuperscript{57}

Goh and Ederington concluded that all downgrades cannot be handled in the same manner, the root cause of the rating change have to be distinguished and considered.\textsuperscript{58} Goh and Ederington’s result should be considered even in this study concerning static ratings; if the rating is poor due to high leverage it might not mean that the company has a high systematic risk for shareholders. This sort of reasoning is however contradictory to the normal pattern of beta, a higher leverage should lead to a higher beta\textsuperscript{59} and therefore a lower share price.

The authors of this thesis are sceptical about the wealth redistribution hypothesis. First and foremost Zaima and McCarthy have constructed a theory that is almost impossible to either


dispute or support. Zaima and McCarthy used this theory along with the information content hypothesis, which confounded the results. When the results showed support for the information content effect, they simply stated that the wealth redistribution effect also exists but is smaller than the information content effect. To be able to detect a wealth redistribution effect, researches must separate their sample based on some type of criteria.

Goh and Ederington separated the credit rating downgrades in their study from 1993, based on the cause of the downgrade. The criteria were based on if the cause was increased financial leverage, or a worsening of the firm’s financial prospect. However, the authors of this thesis have some reservations about this research also. The main objection is if markets have not taken the increased leverage already into account. The market is hardly oblivious to a company increasing the financial leverage, regardless if the company is raising money publicly through the bonds market or if they raising it through banks, the market will detect the increased borrowing. This means that potentially the market value and risk of the company adjusts gradually and continually, and therefore when the actual rating change occurs it only reflects information already incorporated in the market price. Therefore we believe that the results gathered by Goh and Ederington might not necessarily be because of an increase in the wealth redistribution effect, but rather due to a loss of information effect.

Since the authors have some reservations about the hypothesis, along with the fact it is virtually impossible to separate the sample in a sensible way, the study proceed with this hypothesis with caution.

3.5. Signaling
Some scholars have suggested that a rating change is a signal to the market, not only about that company but also about the industry the company operates in. Akhigbe et al. speculate that a downgraded rating for a rival could mean good news for other companies within the industry, if that downgrade is based on possibility for bankruptcy or loss of market share. However, if the downgrade is based upon falling demand for the industry’s product it could affect other

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companies adversely as well. A third case is also elaborated on where the rating is due to firm-specific issues, in which case the rating will have no intra-industry effect. 61

Even though Akhigbe et al.’s study related to rating changes and not at one point in time as this one, the intra-industry effect result would still be interesting. For instance, if they proved the first case was most frequent it would mean that an industry divergence could be expected within the sample. It would mean that a whole range of credit ratings and betas could be anticipated within the same industry. Thus, more often than not, when a company got downgraded their competitors share price should go up and their beta should decrease. On the other hand, if Akhigbe et al. could prove the second case, it could mean that betas in the sample would converge. It would indicate that one individual company’s rating could influence value and risk within a whole industry. If the third case was the most common it would suggest that company share value is indifferent to newly uncovered competitor’s information. Akhigbe et al.’s result implied that the second case was most common and the average observed loss of shareholder value in their sample due to a competitors rating downgrade was over seventy million dollars. 62 These results indicates that betas within an industry would converge somewhat, since the companies on average react the same way on credit rating downgrade for a competitor.

Akhigbe et al.’s intra-industry effect was corroborated in a study by Caton and Goh in 2003. While the methodology differed between the studies the result was the same, an intra-industry effect existed in association with bond rating changes. Caton and Goh did uncover some new information that suggests that this effect is mostly driven by changes in rating for companies already in the speculative rating grade. Their attempt to explain this is that fewer stock analysts follow these financially weak companies, and therefore when rating agencies release new information it echoes throughout the industry. On the other hand when financially strong companies get downgraded, often the countless analysts following these companies have foreseen the rating announcement and therefore the prices already have adjusted, which then

leads to less intra-industry reaction.\textsuperscript{63}

3.6. Literature review
An early attempt to find a relationship between systematic risk and credit rating was made by Schwendiman and Pinches 1975. Their article was conducted by grouping different credit ratings and investigating if these groups had statistically different beta. The study concluded that the highest rated investment grade credit ratings (in this case Aaa, Aa and A) were virtually indistinguishable from each other. However, statistical different beta did exist between the top investment grade credit rating (Aaa, Aa and A), and those that had a speculative grade investment grade (Ba and B). Furthermore it was found that middle groups such as Baa were in the cutoff where the difference in beta between the highest grades was quite large, but statistical significance could not be established.\textsuperscript{64}

Schwendiman and Pinches article is perhaps the closest match to the methodology and intention of this thesis. Although, there will be considerable differences in the way that the results emerging from the research will be explained. First of all, this thesis will use existing theory to explain the empirical results, and if necessary will revise prevailing research to fit the scientific context. Schwendiman and Pinches review literature of the research area, but their goal seemingly was only to establish a connection between the rating and a company’s beta, not to explain that connection. Further differences include the time frame, since Schwendiman and Pinches’ article was researched over thirty years ago. One final big difference is the market; it is not certain that previous results researched on the US markets are applicable elsewhere.

While Schwendiman and Pinches results seemed logical, in the end of the 70’s a number of studies came out suggesting that bonds with high rating had as much or more systematic risk as poorly rated bonds. Studies by McEnally and Boardman 1979 and Ferri 1978 both show that low

rated bonds had a higher total risk, but they had a greater potential for diversification effect.\textsuperscript{65} These results seemed to indicate that credit risk is a diversifiable risk, and that the systematic risk for both investment grade and speculative grade credit rated securities should be similar. The implications for this thesis if these results prove accurate in this context would be that a credit ratings effect on risk would be expected to be found not in the systematic risk measure, but rather in measurements for total or diversifiable risk. Brooks et al.’s study conducted in 1983 disputed these results and argued that McEnally & Boardman and Ferri had done crucial methodological errors including using an inappropriate market index.\textsuperscript{66}

Impson et al.’s result displayed the same tendencies, videlicet that downgrades seem to prove the support an information content hypothesis. In their study the beta risk went up in connection to the release of the bond downgrade. Once again upgrades did not produce any statistically significant market response.\textsuperscript{67}


4. Method
In this section the research methods employed will be described. The chapter starts with a brief description of the literature search. This will be followed by a justification of why the quantitative approach was deemed suitable. A thorough presentation of how the practical data processing was conducted is also included.

4.1. Literature search
The literature search began by typing in some key phrases into the university library databases Emerald Fulltext and Business Source Premier, these key phrases included but were not limited to “credit ratings and beta” and “credit rating and systematic risk”. The newest research from the area was then collected and compared to see if they were based on a joint foundation, i.e. if they had used the same references. In that way both old classic studies upon which the research area is built on and more modern research could be accumulated. These studies were peer reviewed, which should mean that they have both some minimal level of methodological and theoretical quality. This first step of collecting academic articles was then augmented by looking at Swedish thesis database and finding credible non-academic sources. By comparing their theories to those already collected, it was possible to make sure that a limited number of pertinent studies were missed.

After the article search had been concluded, we proceeded with categorizing different articles to the different hypotheses that exist within this research field. Since there is no comprehensive theory about credit ratings relationship with systematic risk, the theory section was limited to short paragraphs describing the scholars proposed hypothesis for the relationship. It was shortly discovered that this was not sufficient knowledge for the reader to get an adequate background. Therefore it was decided to write a literature review section. Since there were several studies that presented interesting findings but contained very little in the way of theory, in that manner they

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were ill-equipped to be included in the regular theory section. These studies benefit the reader, since they gain access to the result in previous similar studies, and therefore it was determined that they must be included.

4.2. Research method
The research method depends to a large extent on the purpose of the thesis as well as the research question. Furthermore the subject itself is also one of the factors that will influence the choice of research method. Quantitative data are concerned with numbers to represent properties of something and therefore this approach lends itself to statistical analysis. On the other hand qualitative data represent descriptions of things without using numbers directly. The data is usually collected using some sort of unstructured interviews and instead of numbers words and pictures are used for analysis. 69

Since we wanted to test two variables, credit ratings and beta, to be able to establish a relationship it was natural to choose a quantitative method. The literature search revealed that most previous scholars which have previously researched these two variables had used the quantitative research method, confirming our belief that the quantitative method was the most suitable method for this kind of study. This allowed us the opportunity to statistically try to uncover the relationship between the variables.

4.3. Scientific Approach
The scientific approach regards the relationship between theory and empiricism. A research approach where theory is followed by data is called deductive, while when data comes before theory in the research process it is called inductive. 70 While there are other differences as well between the approaches, this difference is the most important and is therefore the one focused on.

Starting out it was quickly discovered that no coherent theory existed. The theory that did exist


was disconnected hypotheses trying to explain the connection between credit rating and either risk or stock price. Since the capital asset pricing model connects risk, return and stock price, all of these hypotheses could be collected. It soon was discovered that these studies, that developed the hypotheses, were conducted in a thoroughly different scientific context. The previous research was important and therefore could not be neglected, but it was uncertain if these findings were pertinent in this research environment. The drawbacks of previous theories, the lack of one coherent theory and a lack of theories produced in this context, made it suitable to aim to speculate about what could be the relationship between beta and credit ratings in the Nordic market. The aim with this is not really to create new theory, but rather to be able to comment on some special characteristics on the Nordic market by utilizing background information. It will also be investigated if the American studies’ findings are relevant in Scandinavia. Therefore this study will use a mix of the two approaches.

A combined approach is beneficial according some scholars, since it could mitigate the drawbacks of both the deductive and inductive approach. For instance, the inductive step in a combined approach could be made less protracted and potential unease over that no relevant patterns are developing could be alleviated by having additional deductive steps. On the other hand, the inductive step allows deeper insight about processes of change which would not be possible to detect in a strict deductive research paper. Although, the inductive part of this study will predominantly be used to comment on the specific situation on the Nordic market, it will allow us the opportunity to speculate in a manner that would be difficult to achieve otherwise.

4.4. Theoretical method consideration
Frequently in academic theses from Swedish universities at this point a section about theoretical method considerations, such as epistemology and ontology, are included. These sections often spend far too much time and effort reciting research method books, and hardly any time arguing for their own stance. Even in the theses were the argumentation are expanded, it is still commonplace that the reader do not understand how the epistemological and ontological stance

guided their research process. The authors of this thesis have constructed sections like this in previous papers, and when they have been finished they have hardly been given additional consideration. Since previous experience of writing the epistemological and ontological stances was to no avail, because it did not aid the research process, these sections were decided to be omitted.

4.5. Beta calculations
To calculate the beta one requires the historical prices of a stock as well as the historical prices of an index. Since this study was conducted on the Nordic market, the index chosen was the VINX benchmark. The index consisted of the most traded shares from the Nordic exchange and the Oslo stock market, with a wide number of sectors represented.\textsuperscript{72} This index was chosen because it allowed us to isolate the macroeconomic effects on the Nordic market. The index contained between 150-200 stocks, which might seem light compared to for instance S&P 500, that are commonly used when calculating American stock betas. However the listings on the Nordic stock exchange are more limited compared to the US stock market, making the VINX benchmark index a suitable proxy for the Nordic market.

The next choice was what kind of data to be used, the options were monthly, weekly, or daily data. The decision was made to use monthly data, which is commonly used in beta calculations.\textsuperscript{73} Furthermore on a daily basis a stock can move independently compared to an index, however on a monthly basis most stocks should co-vary to a higher degree with the market. By utilizing monthly data, the aim was to eliminate randomness within the stock and market co-variation. This randomness could for instance be the effect of non-synchronous trading or trading friction, which some academics suggest could be eliminated using longer time periods, e.g. monthly data.\textsuperscript{74} Therefore, factors that affect the market directly could take a day to be reflected in an individual share’s price or vice versa. Such an effect could mean that it would be inappropriate to use daily data. However, over a longer time frame, for instance a month, such effects should

\footnotesize{\textsuperscript{72}http://omxnordicexchange.com/tuotteet/indeksit/OMXn_indeksit/VINX_index Retrieved 2009-04-09
}
even out. This might mean that monthly data leads to a higher degree of accuracy of the co-
variation between the market and individual shares.

Additionally, a choice had to be made over how long time frame the betas would be calculated
over. Five years was decided to be a suitable time period, since a shorter time frame was
determined to overestimate the significance of short-term fluctuations. Hence, by using five
years a more accurate depiction of the individual shares beta could be gathered. Using five years
of data is common practice when calculating beta. The actual calculations were made by
taking the co-variance between the monthly market return and the individual stock return, and
dividing that with the variance of the market, which was done in Microsoft Excel.

Two measures were taken to ensure the credibility of the beta calculation. Primarily the beta
value calculated was compared to publically available beta calculations online to ensure that the
values corresponded somewhat with their findings. While the online betas were not expected to
be the same, since the online sources could have used a different methodology in respect to
indices and the data processing, at least they should be in the same range. After this comparison
with the betas, it was established that the beta calculation produced acceptable results. A
secondary measure was taken where we swapped indices to ensure the consistency of the beta
calculation. This time we used S&P 500, while this is an American index markets around the
world are correlated a phenomenon that is growing stronger over time. This implies that
exchanging indices should not lead to extremely different results. When conducting beta
calculations with this index the results was similar, this seemingly confirmed that our beta
calculations were sound.

4.6. Credit ratings
Our intent was to find as many companies as possible that were listed on the Nordic stock
markets with a credit rating from the two largest credit rating agencies. This meant that our


76For instance from the sources; http://www.reuters.com/finance 2009-03-03; http://www.avanza.se 2009-03-03
77Morana, C., Beltratti, A., (2008),” Comovements in international stock markets.”, Journal of International
The selection process was to search for all listed Nordic companies and compared them to Moody’s and S&P’s databases. The process was made by two people to ensure that the data was correctly interpreted and that minimal mistakes were done.

The search yielded 58 companies with a credit rating from at least one of the rating agencies. This number was surprisingly low considering that about 800 companies were listed on the OMX Nordic Exchange and the Oslo stock exchange, which could be due to that companies in the Nordic region are to a higher extent dependent on banks to access funds instead of reaching out to investors for capital. Furthermore the rating agencies are mostly US based and might not have the same connection to the Nordic markets.

Among the ratings gathered two were unsolicited, i.e. the company itself had not ordered or paid for the service rendered. These kinds of ratings have previously been shown to be less reliable than the actual solicited ratings. Furthermore a number of the ratings were last changed several years ago, meaning that they might not include new information about the company. However, since the agencies themselves continually keep track of the companies the reason for this stability could be that nothing dramatically have changed for the company. For instance, Atlas Copco’s rating has not been changed over last ten years, but the last credit review by Moody’s was conducted last year displaying their commitment to continuously investigate companies’ financial situation. Therefore we included every company with a credit rating in the sample.

Next problem encountered was which rating should be used if the ratings differed between the agencies. This problem was however smaller than anticipated, since both agencies had the same rating for most companies. In case of differing ratings a balance was struck between the recentness of the ratings and the credit watch status. For instance if one agency had a company at a lower rating but the other agency had the company on credit watch status negative, indicating that in the nearby future the company could get downgraded, the first credit rating was chosen because it was determined that it better represented the company’s credit risk. If no credit watch status was assigned, the most recent update of the credit rating was used.
4.7. Sampling problems
If we see the population as the entire Nordic stock market, our sample of the 58 companies has an over-reliance on those companies with a financial nature. Foremost banks have a need to access capital markets quickly to maintain sufficient cash balances. Almost every one of the banks listed on the Nordic market had a credit rating at the two large credit rating agencies. This meant that about 22 percent of our sample consisted of banks, which was notably higher than the population percentage. A bias could have been introduced in the research due to this, especially since the current recession seems to have affected the banks to a higher degree than others and therefore their beta could have changed. However there ratings should not have been adjusted directly since the agencies try to rate “trough the cycle”. This means that the relationship between the two variables, beta and ratings, could be weaker in crisis than in normal economic climates. The results could be distorted since the sample contained an overrepresentation of these kinds of companies, mainly banks.

4.8. Data processing
When credit ratings had been gathered and betas calculated, it was time to process them. A regression analysis was decided to be the best course of action. Regression analysis is a method to investigate the strength of a linear relationship between variables. For this we needed to code the credit rating of the participating companies to allow the statistical computer software to process it. This was done by assigning a number to each category (AAA was one, AA was two and so on). The decision was made to use the major rating categories without any rating modifiers (+ or -). When performing the regression there is an argument to be made for either choice, but we chose to keep to the major categories. The reason for this was that it would display a clearer relationship between the two variables, and therefore the results would be easier to appreciate for the reader. The coding was done using supervision and control mechanisms, to ensure high reliability and accuracy. These codes along with the corresponding beta were then plugged into the statistical software SPSS, where we had prior experience in. When comparing group means larger sample sizes were needed and therefore the decision was made to once again use the major rating categories. This had the added benefit of keeping a consistent approach throughout the study.
The regression was undertaken with the credit rating codes as the independent variable and the betas as the dependent. The result was then interpreted using the regression coefficient, the $R^2$ square value and the significance level. To ensure an accurate interpretation, we consulted a teacher with substantial experience with both statistics and the specific software. That made us feel confident in the methodological validity of the regression analysis, and therefore it was inserted into the thesis. To further visualize the result for the reader it was also decided to compare the different credit rating categories means. This was done by a one sample t-test, using the SPSS software. Since this only required one numerical value, the original letter credit ratings could be used as labels.
5. Empirical Results
In the empirical section results will be presented. The results that aim primarily to answer the research question will be presented according to the method employed, therefore the regression analysis will be presented first followed by the T-tests. Later on test aiming to support specific hypotheses in the theory section will be presented.

5.1. Regression analysis
A regression analysis was executed with the beta as the dependent variable and the credit ratings as the independent variable. To be able to do this the credit ratings was transformed from letters into numerical values. The results can be seen in figure 5;

Model Summary and Parameter Estimates
The independent variable is Ratings.
Dependent Variable: Beta

<table>
<thead>
<tr>
<th>Equation</th>
<th>Model Summary</th>
<th>Parameter Estimates</th>
</tr>
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<tr>
<td></td>
<td>R Square</td>
<td>Sig.</td>
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<tr>
<td>Linear</td>
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<td>.124</td>
</tr>
</tbody>
</table>

*Figure 5 – Regression analysis*

In this table the calculated values of the intercept and the regression coefficient can be seen. The intercept is 0,712, representing the average beta for companies holding an imaginary rating better than AAA. The number 0,071 represents the average increase in beta when moving from a higher rating category to a lower one. This can be illustrated in an equation for a straight line;

\[ Y = 0.712 + (0.071 \times X) \]

The X values for the different credit ratings can be found in figure 6.
The R Square, in figure 5, is a measure of how much of the variability of the Y value can be explained by the X variable. Our value is slightly over four percent, meaning that a lot of the variability of the beta can not be accounted for using only credit ratings.

The significance level of the regression was 0.124, which would imply that it is 12.4 percent risk that the regression relationship was just by coincidence. This will in turn suggest that about 88 percent chance that there is a connection between the independent and dependent variable. Normally a significance level of five percent is used to confirm or reject hypothesis and therefore we can not say that these results are statistically significant, but they do give an indication of an existing relationship.

5.2. One sample T-test

<table>
<thead>
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<th>Credit Rating</th>
<th>X Value</th>
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</tr>
<tr>
<td>AA</td>
<td>2</td>
</tr>
<tr>
<td>A</td>
<td>3</td>
</tr>
<tr>
<td>BBB</td>
<td>4</td>
</tr>
<tr>
<td>BB</td>
<td>5</td>
</tr>
<tr>
<td>B</td>
<td>6</td>
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<td>CC</td>
<td>8</td>
</tr>
<tr>
<td>C</td>
<td>9</td>
</tr>
</tbody>
</table>

Figure 6- Credit Rating Codes
To get a clearer depiction of the differences between different credit rating groups a one sample t-test was performed. If we start looking at the mean values in figure 7, one can see a tendency that a lower credit rated company has a higher beta, although the category BB does not really fit into the pattern suggested by the linear relationship. The total sample size is 58 and it should be noted that the sample size for most of the categories is too low (especially category B with 2 samples) and therefore it could be hard to draw any definitive conclusion.

Only the categories A and BBB has close to the sample size needed to get a normal distribution. It is interesting to look at the confidence intervals even though the samples are too small. The two categorize with the largest samples show a range that could be representative for that rating category. Category A has a narrow range which seemingly indicates that this category of relatively highly rated companies is commonly tightly bunched together when it comes to the systematic risk. The category BBB in comparison to A shows a slightly wider range, indicating that there is more volatility among the companies in this category.

Some sort of relationship can also be seen in the upper limit of the confidence interval, which shows rising values for each category, implying that the riskiest companies within each category become more volatile the more you move down the rating scale. The significant level is irrelevant since it displays the probability that we gotten a positive result for beta when the beta value is actually zero. Since it is irrelevant it will hereafter be removed in subsequent figures to increase lucidity.
One-Sample Test

<table>
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<th>N</th>
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<th>Upper</th>
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95% Confidence Interval of the Difference

In figure 8 we have combined all of the A categories into one category and all the B categories into one. The benefit with this is that it increases the samples size which makes it easier to compare means and see other tendencies. As seen in the table we have 30 companies in the A category and 28 in the B. If we start looking at the mean differences, category A has a mean of 0.91 and 1.02 for B. This could suggest that the companies in category B is more risky than companies in A, using the beta value as an estimate. Furthermore if we compare the standard deviations, category A seems to be more stable which should be expected of the category with the highest rated companies. The confidence intervals are more stable since the sample sizes has increase compared to our previous test. Category A shows an interval between 0.8 and 1.02 compared to B with 0.87 and 1.17, revealing the tendency that the companies in category A are more stable since the interval is slightly narrower than category B.

5.3. Unsolicited Credit ratings

Model Summary and Parameter Estimates

The independent variable is Ratings.

Dependent Variable: Beta

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<th>Equation</th>
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<th>Parameter Estimates</th>
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To be able to investigate if the unsolicited ratings held usual information quality, they were removed and the regression was performed again. If the regression now showed a stronger linear relationship between the two variables it meant that the unsolicited ratings were outliers. The $R^2$ square measure increased and the significant level decreased, as seen in figure 9 in comparison with figure 5. Furthermore the difference between the credit ratings, as measured by $b_1$ in the table, increased. This meant that on average the difference between the different credit rating classes was previously approximately 0.07 beta points, it now was 0.085. This change was rather large percentage wise.

### 5.4. Banks

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*Figure 10 – One Sample T-test Banks*

When conduction a t-test where the banking sector was in focus, 13 of the sample was banks and 45 were all the other companies. This was done to see a signaling effect within sectors, since the banking sector was the biggest sector within are sample it was the most suitable to utilize for this purpose. In figure 10 it can be seen that the means are similar but one can see a slight difference
which could indicate that the banks are less risky. Furthermore the standard deviation was smaller indicating that the risk is somewhat more concentrated in this sector.
6. Analysis
The analysis chapter will start presenting the theories and comparing them with the results. It will be followed by the data analysis, finally the chapter will end with an analysis of the Nordic market 2009. Allowing us the opportunity to approach some issues special to the Nordic market and comparing this market with the US.

6.1. Information Content
The mean values of the beta for the highest rated companies were consistently lower than the companies with poor ratings. This suggests that there might be some truth to the information content hypothesis. The rating agencies can therefore be seen as having released new information to the market, through their ratings. These results are similar to the result of numerous academics articles, that ratings introduce new information to the market. Previously several academics have demonstrated that credit changes, especially downgrades, affect share prices. Therefore the results gathered here share a kinship with studies as the ones made by e.g. Dichev & Piotroski and Ederington & Goh (1998).\(^\text{78}\) The difference being obviously that the previous studies were research about rating changes. Since we only do a static study on one occasion a chicken or the egg causality dilemma exist. There could not be determined for certain if the credit agencies change their ratings due to a high level of volatility of the stock securities, or if the credit agencies are first to uncover new information that change the stock price and therefore the beta. According to our research there exist some informational value in credit ratings, which influence the beta. This was also the findings of Schwendiman & Pinches research from 1975, that a high credit rating is on average associated with a lower beta.\(^\text{79}\) That can be seen in the regression analysis, where a moderate relationship exists between the variables.

6.2. Wealth redistribution
The wealth redistribution effect is hard to detect in the empirical results, as Zaima and McCarthy notes in their article for 1988\(^\text{80}\), this effect works in the opposite direction to the information content effect. This means that if both these effect works in conjuncture it is hard to see the


individual influence on beta since only the net effect is visible. To be able to see the wealth redistribution effect more clearly, the researcher needs to categorize companies by key financial ratios, such as the financial leverage. Although this thesis authors have some doubts about this methodology also. This is what Goh and Ederington did when they studied rating changes in 1993 by separating their sample due to the cause of the change.\(^{81}\) This study can only show that the wealth redistribution effect seems to be smaller than the information content effect on average.

### 6.3. Signaling

Testing a group of banks in a comparison with other companies the results was that the banks had much lower standard deviation. This test was done to see if any indications about the effects of the signaling hypothesis on the Nordic market could be gained. The obvious problem when using this procedure is that it is impossible to separate the reason for the result presented in the empirical section. The differences that were presented in the empirical part could be due to similar business nature among banks or due to the convergence of share prices within a sector after a credit rating change, as suggested by Akhigbe et al. in 1997.\(^{82}\) The most likely scenario is that the concentration of the betas in this sector is due to that banks are affected in a similar way to market conditions. But it can not be ruled out that the signaling effect has contributed to the concentration. Also when making this comparison it should be noted that all other sectors are bunched together into one group, making it far more likely that this category will have a high standard deviation. When looking at other groups of companies in our sample, it was also apparent that companies within each sector usually had similar betas as with the banks it could not be established which effect that was dominating.

### 6.4. Unsolicited ratings

The credit rating agencies have been heavily criticized for the quality of the unsolicited credit ratings.\(^{83}\) To see if they had the same information content on the Nordic market as the actual solicited ratings we removed them and redid the regression. The results were staggering, the significance level decreased to seven percent while the R square measure increased to six

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percent, meaning that now the underlying variable, the rating, explained more of the variability of the beta. The unsolicited ratings could be seen to be tainting the sample and the relationship between beta and ratings were clearer after their removal. Although these two ratings were not the biggest outliers, it seemed that they did have less informational value to the market then the other ratings had on average. This indicated that there is an argument that the reviews of the unsolicited ratings are not as closely scrutinized, just as the agencies have been blamed for in other markets.

6.5 Data Analysis
The empirical results indicated that the credit ratings did not explain the variability in the beta to a large extent. This could be seen by looking at the R Square measure, according to this only about four percent of the variability could be explained. This was not unexpected since several other important components are included in systematic risk as measured by beta, such as the nature of the goods and services produced. A low R square measure also implies that larger sample sizes would be needed to get statistically significant results and therefore establish the relationship between the variables beta and credit ratings. While credit rating only explains small part of the value on average, the relationship holds that high credit on average rating means lower risk. A small sample size therefore means a higher probability for the relationship to be distorted by random fluctuations. This probability would have been considerably smaller for a stronger linear relationship, as measured by R square. An increased sample size was impossible in the setting since all companies in the population with a credit rating were included in the sample.

In this section the Nordic market will be analyzed and compared to the US market where most previous studies have been researched. Several studies have been conducted with a connection between credit ratings and other variables such as stock price and risk, very few has been performed outside the US. The institutions and the dynamics of the Nordic market are different from where the previous results have been researched. While most American listed companies have a credit rating\textsuperscript{84} the use of these is not as widespread in our context. The reason for this

might be a reliance on banks instead of capital markets for financing sources, since the Scandinavian countries traditionally is thought to have a bank dominated financial system.\textsuperscript{85} Furthermore the credit rating agencies are mostly focused on the US market, where they are situated. This could have some interesting implications, primarily that the information content in the credit report might suffer since they might not uncover as much information as they can do on the US market. Additionally, the less than extensive use of credit ratings at the Nordic market could imply that the market actors do not know how to appreciate the informational value of the rating. While this is contradictory to the efficient market hypothesis, there is argument to be made that the Nordic market is not totally efficient.\textsuperscript{86} Although this article is quite dated the argument that smaller markets equal less efficiency still holds.

The reliance on banks at the Nordic market also means that companies in the Nordic market are not as dependent on credit ratings as the US companies. This purports that not as many companies have a credit rating on this market and therefore the sample will not be representative for all sectors, as would have been the case on the US market where almost all companies has a rating. This might introduce another bias in the sample in that only companies that can gain access to cheaper financing than from banks through soliciting a credit rating agency and thereafter acquire funds on a capital market will be included in the sample. Alternatively, companies that fight credit restrictions from the banks might have better luck from capital markets and therefore they covet a rating. In short, unlike the US market, the credit ratings on the Nordic market might consist of companies finding it beneficial to access funds other than bank financing. Comparatively, the US market have a more established credit rating practice meaning that a whole range of companies have a rating, regardless of their financial position. Even including all these differences this study’s results supports those findings on the US market, namely that companies with poor credit rating tends to be riskier than those with good ratings.\textsuperscript{87}

In situations with large economic turmoil such as a recession, the connection between credit ratings and beta might be worse than in a normal economic climate. While beta could change fast, credit ratings is a somewhat lagging indicator and should be stable throughout a foreseeable time period.\(^88\) This could be seen in our sample where many of the financial institutions stocks did not fit the pattern. While the last few months’ volatility had increased their beta, the agencies are just starting to review the ratings in the spring of 2009. The credit rating agencies has been blamed to be pro-cyclical, especially in an economic crisis.\(^89\) Where the agencies downgrades companies systematically and follow the overall opinion about the negative effects of the crisis. This can be seen in a study conducted by Kuhner for example.\(^90\) The agencies ratings are supposed to be seen as having a long run view and therefore the agencies should not panic when a recession appears in the horizon. While this is generally good that the ratings are stable, since companies’ payment ability does not change overnight due to a recession, it does mean that our regression results will not be as clear as if they did panic.

\(^{88}\)E.G. ECB, op.cit. P.16.  
7. Conclusions
The primary goal of this thesis was to establish a relationship between beta and credit ratings on the Nordic stock market. Regression results indicate that a relationship exists, however it could not be demonstrated to be statistically significant at a five percent level. The connection between the variables became stronger when the unsolicited ratings were removed. The results were similar regardless if regression or one sample t-test were employed. This suggests that the ratings have informational value to the market, perhaps especially if the ratings are on the company’s own behest. Information content hypothesis were therefore seemingly validated, the rating agency appears to uncover new information. The rational explanation, which the authors of this thesis started out with, seems to hold water. Since a connection between the variable exist it does indicate that credit ratings work as a proxy for credit risk, which is indeed a part of the systematic risk. It was also attempted to exhibit a signaling effect using only one sector. While this sector, banking, had similar beta means it had lower standard deviation. This could indicate some signaling effect, but it is far more likely that they had more concentrated betas due to the nature of their business. Wealth redistribution effect could not be demonstrated, which was not surprising for reasons previously mentioned in the theory chapter.

7.1 Further research
An interesting future research topic would be if Moody’s or Standard & Poor’s rating changes gives more information to the market, such a research would however probably need to be investigated on another market since large sample sizes would be needed. Therefore the market must consist of many credit rated companies, making the Nordic market ill-suited to host such an investigation. The study could be done by investigating how much share prices move when Standard & Poor’s downgrades companies compared to when Moody’s does it, employing the same methodology for upgrades. The study would need to have a large sample size to even out potential interdependence bias, i.e. if Moody’s downgrade a company and S&P’s does it the day after, S&P’s will probably have a lesser effect because the market has already incorporated this information. In small sample these factors can be a problem but in large sample sizes they tend to even out.

7.2. Reliability
Reliability is concerned with the consistency of a measure of a concept. Hence, reliability entails
asking if a measure is stable over time and that one can be confident that the results relating to a measure for a sample do not fluctuate. Furthermore to obtain high reliability it should be possible to replicate the study and get little variation over time in the results.\(^{91}\)

Replicating this study a few months later, it would yield a different result. Changes in beta, credit ratings and selection process of which credit rating to use when both S&P and Moody’s are rated, will impact the results. While this sounds like significance critique of the reliability, it is less severe than it appears on the surface. Credit rating agencies are aimed stability of ratings, meaning that only a handful or so is expected to be changed over the upcoming months. The selection process could alter the results, but it is important to note that most companies have equal rating from both agencies making this problem smaller than anticipated. Betas will change over the next few months, and will affect similar investigations results. Consequently, since these problems are not as large as one might think the reliability is pretty strong and it is therefore fairly certain that a replication of this study would come to similar conclusions.

### 7.3. Validity
Measurement validity is concerned with whether a measure of a concept truly measures that concept. E.g. when professors or students debate whether university examinations present an accurate measure of academic ability, they raise the question about measurement validity. \(^{92}\)

While the use of credit ratings was given, the use of the measure beta could be questioned. Using beta as a measure for systematic risk has been scrutinized over the last decades, proponents of competing theories such as the arbitrage pricing theory has pointed out the problems with beta. Therefore the validity of the beta measure is still under review, however since this measure is widely used in both academic and business circles it was used in this thesis. Because of the polemic that exist between scholars it is difficult to accurately gauge the validity of this study, however since the measure was consistently applied using the same methodology that is customary in these kinds of studies the validity of this study at least reaches an acceptable level.


8. References

8.1. Articles


8.2. Books


8.3. Internet Sources

International Herald Tribune  

OMX Nordic Exchange  
http://omxnordicexchange.com/tuotteet/indeksit/OMXn_indeksit/VINX_index retrieved 2009-04-09

Reuters Finance  
http://www.reuters.com/finance retrieved 2009-03-03

Avanza Bank  
http://www.avanza.se retrieved 2009-03-03

8.4. Brochures and information material


8.5. Newspaper articles


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