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Risk reporting by European insurance companies and information asymmetry

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Chapter 1 Introduction

1.1 Research question

Risk reporting has become an important part of the annual report over the past few years (Höring & Gründl, 2011). In the period of 2005 to 2009 "the importance of risk disclosure increased substantially with regard to extent and location in the annual reports" (Höring & Gründl, 2011). The topic of risk disclosures is a hot topic at the moment. Currently the International Accounting Standards Board (IASB) is developing a new standard regarding the accounting of insurance contracts, which contains new risk disclosure requirements. The European Insurance and Occupational Pensions Authority (EIOPA) is developing a new set of regulation for insurance companies. This future regulation of the EIOPA will also require more risk information in the annual reports of insurance firms. Most likely, the risk disclosure information in future annual reports will increase as a result of the rules and regulation which is currently being developed. It can be said that a development is taking place in which the provision of more and more information is favoured.

On the other hand, the extensive amount of information provided in the annual reports of firms is questioned. Mary Jo White, the chairwomen of the security exchange commission in the United States, stated in October 2013: "I am raising the question... as to whether investors need and are optimally served by the detailed and lengthy disclosures about all of the topics that companies currently provide in the reports they are required to prepare and file with us". This concern is legit if the information overload theory is taken into account. At some point, the provision of extra information (even if it is accurate and relevant) does not lead to an increased understanding of the (performance of the) firm. If the provided information is too much, stakeholders will not consider all of the available information, as they are not able to cope with all of it. Although regulators are favouring increasing risk disclosure requirements, the opinion that more information is not always better is expressed as well.

The central issue here is whether the provision of more risk information is necessarily positive. At the basis of this issue lies a fundamental question which first needs to be answered, before the issue can be resolved. That question is: is risk information useful? This thesis tries to answer part of that question.

The question whether risk information is useful can be answered for different stakeholders. The stakeholder considered in this thesis is the investor, as they are considered to be the primary users of the financial statements (IASB, 2013). If the investment choice of an investor is influenced by the risk information provided by the firm, this would mean that investors do take the risk information into account. Information that is taken into account in the investment decision would typically be perceived as relevant and accurate information.

If accurate and relevant information is provided by the firm, this would reduce information asymmetry between the firm and its stakeholders. Therefore, usefulness to the investor in an investment decision is investigated in terms of information asymmetry reduction.

Lastly, the issue as to whether risk disclosures are useful for investors in their investment decision is investigated in a specific industry. This industry is the insurance industry. The insurance industry is an industry in which the transferral of risks is the core business (Doff, 2006). The insurance company is bearing the risks and costs associated with finding, screening and monitoring market participants once an insurance package is sold (Doff, 2006). In return the insurer receives a premium from the insurance buyer, the policyholder (Doff, 2006). A market participant is defined as an individual searching for insurance or an individual willing to share risks with other individuals (Doff, 2006).
Information on the core business is important for investors in calculating the expected future value of the firm (Palepu, et al., 2013). Information on risks faced by the insurer is important for assessing whether the firm can maintain its usual business in the future. The risk information is input in the valuation model an investor can use. If an investor doubts whether a firm is able to maintain its competitive advantage in the future, the investor will value the current firm value less than when the investor is quite certain the company can maintain its competitive advantage (Palepu, et al., 2013). In order to make an assessment of the value of an insurer, an investor would therefore appreciate information on the risks the insurer is facing. Especially which risks are identified and the process of how these risks are managed are important (Höring & Gründl, 2011).

The specific question to which this thesis tries to find an answer therefore becomes:

'Do risk disclosures provided by insurance companies reduce the information asymmetry between the insurance company and its investor?'

This topic will be researched for the aggregate of risk disclosures, i.e. the sum of all risk disclosures provided in the annual report. Additionally, the usefulness of the disaggregate risk disclosures, i.e. the sum of the risk disclosures per type of risks, will be researched.

1.2 Relevance of the research

The research on risk disclosure usefulness is a relevant one for different stakeholders. The relevance of this study for regulators, academics, financial statement preparers and financial statement users will be described respectively.

Regulators

An increasing focus of local and international regulation on risk disclosures is visible (Linsley & Shrives, 2006). In Europe the local regulation on risk disclosures of Germany, Finland and the UK are considered to be the most developed of the continent (Miihkinen, 2013). In these countries companies are required to include risk disclosures in the annual report (Dobler, et al., 2011). Also international regulation is acknowledging the importance of risk disclosures. The IFRS Practice Statement on Management Commentary (2010) indicates the importance of risk disclosures in annual reports. The IFRS considers risk information as content of the management commentary section to be useful for investors in their investment decision (IASB, 2014). IFRS currently requires risk disclosures on financial instruments as formulated in IFRS 7 'Financial instruments: Disclosures' an risk disclosures on insurance contract as formulated in IFRS 4 'Insurance contracts'.

It can be expected that future regulation will evolve from only requiring risk disclosures on financial instruments and insurance contracts to other risk categories (Miihkinen, 2013). Additionally regulation will focus on increasing comparability of risk disclosures, as the content of risk disclosures varies substantially across firms at the moment (Lajili & Zéghal, 2009). However, only little research is done on the usefulness of risk disclosures in terms of information asymmetry reduction between investors and (insurance) companies. It is important for regulators to know whether risk disclosures reduce the information asymmetry between investors and the insurance firms they invest in. Additionally it is important to know which risk disclosures (i.e. on which risk categories) are most successful in reducing the information asymmetry. This thesis helps providing empirical evidence on which future regulation can be based.

Academics

Little academic research is done on risk disclosure usefulness in terms of information asymmetry reduction. Therefore this research will contribute by providing more empirical evidence on risk disclosures. This thesis focusses on a specific area of risk disclosures, as it:

1. takes a market-based approach;
2. considers insurance firms; and
3. investigates the effect of risk disclosures on different types of risks.

Firstly, a contribution is made as a market-based approach instead of a positive accounting approach is taken in investigating risk disclosures. Most prior literature takes a positive accounting approach regarding risk disclosures, as they search for firm specific and regulatory characteristics determining risk disclosure practices. Examples of such literature are Linsley & Shrives (2006), Abraham & Cox (2007), Lajili & Zéghal (2009) and Höring & Gründl (2013). Only a few researchers take a market-based approach and investigate the market responses to the quality or amount of risk disclosures in the annual reports. Examples of such literature are Baumann & Nier (2004), Deumes (2008), Pérignon & Smith (2010), Kravet & Muslu (2013) and Miihkinen (2013). These papers will be extensively discussed in chapter three.

Secondly, a contribution is made to the existing literature because of the scope of the research. Usually risk disclosure literature makes a distinction between the investigation of financial and non-financial firms. This is done because financial and non-financial firms' risk disclosures need to be investigated using different frameworks (Linsley & Shrives, 2006). Limited research is done on financial firms. Mostly banks are considered in research to represent financial firms. However, especially for risk disclosure literature, insurance firms are good representatives of financial firms. As mentioned before, insurers core business is regarding transferring risks, therefore it is expected that risk disclosures are important for insurers.

Thirdly, the effect of risk disclosures on information asymmetry is researched extensively. The effect of the sum of *all* risk disclosures in the annual report on information asymmetry is considered. Additionally, the effect of risk disclosures *in different risk categories* on information asymmetry is researched. In prior literature the aggregate of risk disclosures are taken into account. Previous literature does make a distinction between risk disclosures on different types of risks, but does not provide empirical evidence on what risk categories are more important for reducing information asymmetry. These unique features of this thesis make sure that an adequate contribution to the existing literature is made.

Financial statement preparers

This research is important for financial statement preparers of the insurance companies. Financial statement preparers have the duty to provide reliable, accurate and useful information in the financial statements (Arens, et al., 2013). Information should be included in the financial statements of the insurance company if it is likely to affect the investment decision of a (potential) investor (Arens, et al., 2013). In order to provide useful information in the annual report of the insurance company, one should first know what kind of information is considered useful for these investors. This research provides an answer to which risk disclosures are considered to be useful for investors in terms of information asymmetry reduction. It investigates what risk disclosures are useful to investors and in what form they are considered to be most useful.

Financial statement users

Information on what risk disclosures is useful for the aggregate of investors is also useful for financial statement users. Knowing what features of risk disclosures are considered to be useful for the aggregate of investors, helps individual investors by pointing out on what information they should focus. This might help the valuation process and investment decision of these individual investors. Additionally an indirect effect of the outcome of this research might be that regulation on risk disclosures is improved. Improved risk disclosure regulation may lead to more comparable risk disclosures across firms. If risk disclosures are more comparable, it will take less effort for an individual to evaluate different investment options.

1.3 Current state of knowledge

Currently, not much research on risk disclosures is available. Most research on risk disclosures takes a positive accounting approach and considers non-financial firms. This positive accounting research looks for firm-specific characteristics determining the amount of risk disclosures.

Pivotal for the area of research considering non-financial firms is the paper of Linsley & Shrives (2006). They found that firm size positively relates to number of risk disclosures and level of risk is not associated with risk disclosures (Linsley & Shrives, 2006). Also do they research risk disclosure features and find that risk disclosures are usually non-monetary, either past or future oriented and on good news (Linsley & Shrives, 2006). Other research in this area is done by Lajili & Zéghal (2009). Here both financial as well as non-financial firms were considered. Their findings contradict the research of Linsley & Shrives (2006). Lajili & Zéghal found that firms disclose more on bad news than on good news (Lajili & Zéghal, 2009). Also, these authors were inconclusive about whether quantified risk disclosures are better than non-quantified risk disclosures (Lajili & Zéghal, 2009).

Research with a positive accounting approach considering financial firms is taken by Höring & Gründl (2011). These authors investigate insurers and find that size, risk, profitability, cross listing and ownership dispersion have an effect on risk disclosing practices (Höring & Gründl, 2011). The findings of the positive accounting research discussed above are taken into account in the expected outcomes of the hypotheses. A market-based approach is taken by researchers like Baumann & Nier (2004), Deumes (2008), Pérignon & Smith (2011) and Miihkinen (2013). These researchers investigate the effect of risk disclosures on the market. Miihkinen (2013) investigates non-financial firms and finds that risk disclosures reduce the information asymmetry between investors and the company (Miihkinen, 2013). In addition this research indicates that certain contingency factors such as high inherent risk, low analyst following and recovering market conditions strengthen the relation between risk disclosures and the market (Miihkinen, 2013). However, this might not be the case for financial firms.

Baumann & Nier (2004), Deumes (2008) and Pérignon & Smith (2011) investigate the effect of risk disclosing by banks on certain market variables. Deumes (2008) found that risk disclosures successfully predict the volatility of stock prices, the sensitivity of future stock prices to market-wide fluctuations and predict severe declines of stock prices (Deumes, 2008). Baumann & Nier confirm the relation between risk disclosures and stock prices volatility (Baumann & Nier, 2004). In addition these authors reason that if this relation is true, this entails that risk disclosures are useful to investors. However, Pérignon & Smith (2010) do not provide such convincing evidence on the predictability of risk disclosures on the volatility of future stock returns (Pérignon & Smith, 2010).

Taken together, not enough evidence on usefulness of risk disclosures for investors is available. The existing literature does not provide unanimous evidence on the effect of risk disclosures on different market variables (for example stock prices). This is particularly the case for financial firms and especially for insurance firms.

1.4 Research method

This thesis analyses 27 European insurers included in the STOXX 600 European Insurance Index. The central relation investigated in this thesis is between the risk disclosure quality in the annual report of the insurers and the information asymmetry between that insurer and its investor.

The sample period consists of the annual reports of 2007 and 2013. The year 2007 is considered as it marks the introduction of IFRS 7 and IFRS 4. IFRS 7 is a standard which requires risk disclosures on financial instruments as of 2007 (IASB, 2014). IFRS 4 regards insurance contracts and includes risk disclosure requirements on insurance contracts as of 2007 (IASB, 2014). These standards and other regulation is discussed in chapter 2. As of 2007 regulatory bodies have been further developing regulation regarding risk disclosures. The regulation of Solvency II has developed in those years. For quite some time, the expected implementation of Solvency II was the first of January 2013 (Ernst & Young LLP, 2013). A survey of Ernst & Young in 2013 revealed that 76% of the questioned insurers started or completed analyzing the gap between their reporting capabilities now and what will be required for Solvency II (Ernst & Young LLP, 2013). Because of the high possibility of increased new regulation regarding risk disclosures, the fact that the majority of insurers if preparing for increased regulation and the possibility of a learning effect on risk disclosing, it is expected that the level of risk disclosing practices in 2007 and 2013 by the considered insurance companies is significant and significantly different from each other. This enables the investigation of the effect of different levels of risk disclosure quality on the extent of information asymmetry.

The data on risk disclosure quality is hand collected using content analysis. The management discussion & analysis (MD&A) section and the notes to the financial statements are considered. A disclosure index study is developed in order to assign a score of risk disclosure quality to the annual reports. This disclosure index study consists of different information items on which a score can be assigned. The disclosure index study can be found in Appendix D. The scoring system used is an ordinal scoring system, which assigns a score of 0, 1 or 2. If no information is provided on an information item, a value of 0 is assigned. If limited information is provided on an information item, a value of 1 is assigned. If the information regarding an information items is extensive, a value of 2 is assigned. The sum of all assigned values is divided by the total maximum score of the disclosure index study. This will result in a value between 0 and 1, which represents the quality of risk disclosures.

Additionally data is needed for the control variables in the linear regression models. These data are: market capitalisation, volatility of the stock, US cross-listing, foreign ownership, ownership concentration, type of insurance, number of analysts following the firm, page count of the annual report, banking activity and dummies for different countries. These data are retrieved from the annual reports of the insurance firms, Datastream and Factset. More information about the models is provided in chapter five.

After the data is obtained, the analysis by means of a linear regression model is done. The risk disclosure information is regressed on a measure of usefulness to investors. Usefulness to investors is considered in terms of information asymmetry as measured by relative bid-ask spread and trading volume. If the risk disclosures are useful, the disclosures reduce the information asymmetry between the insurer and the investor. The bid-ask spread is a measure of information asymmetry, because if both the seller and the buyer of the stock would possess the same information, they would have valued the stock at the same price (Miihkinen, 2013). However, the seller usually possesses more information regarding the insurance company which is selling the stock. A bigger discrepancy between the ask price and bid price, indicates a high level of information asymmetry (Miihkinen, 2013). Volume of trading is a measure of information asymmetry because of the notion that on average the willingness to do business with a counterparty increases if the counterparty is more transparent (Miihkinen, 2013). The information asymmetry decreases if a company is more transparent. Therefore a higher trading volume would indicate a lower information asymmetry.

The outcome of the analysis will be used to support or reject the hypotheses. These hypotheses are developed in chapter four. If a positive relation between the aggregated risk disclosure quality and trading volume is found, and a negative relation between risk disclosures and relative bid ask spread, then it can be concluded that risk disclosures reduce the information asymmetry between investor and the insurance company. It would then appear that risk disclosures in the annual reports of insurers are useful to investors.

The same analysis is done for the risk disclosure quality regarding the different risk categories. If the levels of information asymmetry reduction per risk category are significantly different, then it can be concluded that risk disclosures on certain risk categories are more useful than others.

1.5 Empirical findings

The expectations whether estimated betas on the aggregated risk disclosure quality would be negative or positive did hold. The estimated beta of the aggregated risk disclosure quality in the model with relative bid-ask spread as dependent variable was (although not significant) negative. This would mean that an increase in risk disclosure quality leads to a decrease in relative bid-ask spread. However, this decrease is not significant. It was expected that the estimated beta of the aggregated risk disclosure quality in the model with dependent variable trading volume would be positive. This was also the output of the regression model, but again the beta estimate was not significant.

In the models which considered the disaggregated risk disclosure quality the expectations were not met. The expectation was that high quality risk disclosures on market risk and credit risk were the most useful in reducing information asymmetry between the insurance company and its investor. The estimated betas of market risk was the most negative in the spread model, but not the most positive in the volume model. The estimated beta of the market risk category were according to the expectation, as the estimated beta was one of the most negative in the spread model and one of the most positive in the volume model. However, in all four models no statistically significant beta was found. Therefore, none of the estimated betas are considered to have insignificant effect on the measures of information asymmetry.

As no statistical significant findings are found after the analyses of this thesis, the hypotheses (formulated in chapter four) are both rejected. This has resulted in an answer to the research question. Based on the data and models used in this thesis it can be concluded that risk disclosure quality does not significantly influence information asymmetry as measured by relative bid-ask spread and trading volume.

1.6 Contribution of this research

The contribution of this thesis is twofold. First this thesis indicated that it is noteworthy to investigate risk disclosure information on a disaggregated level. This is due to the fact that the explanatory power of the models in which disaggregated risk disclosure quality instead of aggregated risk disclosure quality is used is higher.

Secondly this thesis makes a contribution as it provides hints about a possible non-linear relationship between risk disclosure quality and information asymmetry. In the analysis of the linear regression model assumptions it becomes clear that the linear regression is not perfectly suitable for investigating the dataset considered in this thesis. Therefore it might be the case that the relationship between risk disclosure quality and information asymmetry is non-linear.

1.7 Structure of the thesis

This thesis consists of seven chapters. The topics of the next chapters will be as follows.

Chapter two will provide the necessary background for this research. The applicable regulation will be discussed. This current regulation (IFRS 7 and IFRS 4) and expected regulation (Solvency II and Project Insurance Contracts) regarding risk disclosures by European insurers is discussed. Also the theoretical framework on which the research is based will be explained. This consists of the information asymmetry theory, the agency theory and information overload theory. Lastly chapter two concludes with which research approaches are relevant to this thesis.

Chapter three is devoted to prior literature. Pivotal research in previous years will discussed. This includes both risk disclosure literature with a positive accounting approach as well as literature with a market-based approach. On top of that research on financial and non-financial firms will be included.

Chapter four will elaborate on the hypothesis development. These hypothesis are based on previous literature. Also attention will be paid to the expectations of the outcomes of the hypotheses.

Chapter five explains the research design of this thesis. A description of the content analysis process can be found here. Besides the linear regression model is explained thoroughly in this chapter. The process of data collection and statistical analysis is also elaborated on.

Chapter six continues with the results of the research. Descriptive statistics of the data will be given here. The preliminary analysis such as R^2 discussion, correlation analysis and linear regression model output will be given in this section. Additionally, it will provide the statistical t-tests procedures and outcomes. These outcomes will be used to reject or support the hypothesis.

Chapter seven will eventually provide the conclusions to the hypothesis. This will enable the answering of the research question. The contribution of this research and its limitations will be discussed. Lastly some suggestions for future research will be given.

1.8 Summary

The first chapter explained the research question and relevance of this thesis. The research question is formulated as 'do risk disclosures provided by insurance companies reduce the information asymmetry between the insurance company and its investor?'

This research is relevant to regulators, academics, financial statement preparers and financial statement users. Regulators can base their rules and regulations on empirical evidence of the usefulness of risk disclosures. This thesis can have implications for future regulation regarding risk disclosures by insurance firms. The academic world also benefits from this research. Little research is done on risk disclosures in the specific setting of this thesis. Especially a lack of research on insurance firms with a market-based approach exists. Additionally this thesis researches risk disclosures even more thoroughly as it not only considers the aggregate of risk disclosures, but also analyses the difference in usefulness of disclosures in different risk categories. Financial statement prepares can profit from this thesis as they have the duty to provide relevant and useful information for investors in insurance firms. Shedding light on what is useful for investors in insurance companies is therefore valuable for these financial statement preparers. At last this thesis will be of assistance to financial statement users, as it makes the investment decision process more efficient. If investors in insurance companies know where the aggregate of investors are focussing on, they know which information is important to take into account in an investment decision.

Currently not enough evidence on usefulness of risk disclosures for investors is available. The existing literature does not provide unanimous evidence on the effect of risk disclosures on different market variables (for example stock prices). This is particularly the case for financial firms and especially for insurance firms.

The research method used in this thesis consists of three parts. First the gathering of data is discussed. Data on the risk disclosure quality is hand-collected from the annual reports of the sample firms by using a disclosure index study. Other data necessary in the considered models are gathered from Datastream and Factset. Secondly the analysis of the data is elaborated on. This analysis is done via a linear regression model.

Lastly this section provides an overview of this thesis' structure.

Chapter 2 Background

This section provides the background information of risk disclosure research. Basically this section answers the questions:

1. what regulation regarding risk disclosures is currently applicable and is expected to be applicable in the near future to European insurers;
2. how can the relationship between risk disclosures and information asymmetry be explained and;
3. how can risk disclosures be investigated.

Firstly the context under which risk disclosures are considered should be identified. Therefore the main concepts of this thesis are first discussed. The main concepts are risk, risk disclosures, usefulness to investors and the insurance sector. In the explanation of the insurance sector attention is also paid to the different risks faced by insurance companies. This gives insight on what risks an insurance company *can* disclose.

After it is established on which risks an insurer can disclose, the applicable regulation is discussed. In this way insight is given in insurers' risk disclosures practices which are expected by rules and regulation. Therefore the current regulation (IFRS 7) regarding risk disclosures by European insurers is discussed. Additionally the expected future regulation (Solvency II, IASB Project insurance contracts) is explained.

Thirdly, theories which may explain why firms (voluntary) engage in risk disclosures practices are explained. These theories are the information asymmetry theory, agency theory and information overload theory. The theories can also be used to explain the relationship between risk disclosure practices and usefulness to investors in terms of information asymmetry.

Lastly the different approaches which are possible for risk disclosure research are discussed. These approaches are the positive approach and the market based approach. Of these the latter is chosen as a research approach for this thesis.

2.1 Main theme and subthemes

Risk and risk disclosures

The concept of risk can be defined in different ways. In the past risk was generally defined as the negative outcomes of activities (Linsley & Shrives, 2006). However, this definition excludes the positive effect of risks. Nowadays risk is seen as the variability of both possible outcomes of activities and their accompanying possibilities (Michiels, et al., 2009). This means that usually possible outcomes can be measured with some probability. However, when uncertainty increases, the variability of the possibilities of events occurring and the variability of their possible outcomes also increases (Michiels, et al., 2009). Therefore the risk increases. An example would be the risk associated with investing in a certain company. The increase in uncertainty related to the outcome would mean that the expected future value of the firm (and therefore the share) cannot be calculated or anticipated with a high degree of certainty. An increase of uncertainty regarding the possibility of events occurring would mean that it is difficult to assess whether the stock will increase in value or decrease in value. The uncertain outcome (stock value) and the uncertain probability (increase or decrease), result in a riskier and therefore more volatile stock. This new vision of risk includes both the negative as well as the positive sides of risks. Now risk is merely a measure of uncertainty (in terms of possibilities and outcomes).

During the conduct of business a firm has to deal with different risks. A firm in such a case can choose (or sometimes it is required by law) to disclose information on these risks. This is called risk disclosure. Risk disclosures are information items the management reports in their annual reports and other documents regarding risks in the firm. The content of risks disclosures is on the risks the companies are coming across while doing business. In the annual report risk disclosures can be found in the narratives (Lajili & Zéghal, 2009), which are the footnotes of the annual report, and the management discussion and analysis (MD&A). There is an increasing interest in reporting on risk disclosures (Amran, et al., 2009). Amran et al. (2009) acknowledge that the non-financial sections of the annual report can be used to provide additional information to the financial statement users, which would otherwise not be reported and are considered to be important for these users in their investment decisions. A trend of increasingly using these non-financial sections is detectable (Maines, et al., 2002). According to Maines et al. (2002) this is due to financial sections failing to meet the new information needs of financial statement users. Investors nowadays demand not only financial information, but also more information about the business environment and the business in general (Maines, et al., 2002). Merely financial information seems to be inadequate for an investment decision (Maines, et al., 2002).

The research on risk disclosures typically makes a distinction in financial and non-financial firms. This is because of the types of risks these companies usually face and report on (Linsley & Shrives, 2006). Linsley and Shrives (2006) created a framework for analyzing and categorizing risk disclosures of non-financial firms. The framework consists of five main categories, namely: financial risk, operations risk, empowerment risk, information processing and technology risk, integrity risk and strategic risk (Linsley & Shrives, 2006). Later research on non-financial firms uses similar frameworks with small alterations. For financial firms a *generally accepted* framework for analysing and categorizing risk disclosures does not yet exist. Therefore the framework used in this thesis is derived from multiple frameworks from prior literature. The details of the framework will be discussed later in chapter 5.

Usefulness to investors

The second major concept for this thesis is usefulness to investors. It is acknowledged that different stakeholders are involved in the different companies considered. In order to be a stakeholder, a group needs to have a certain stake in the company (Tullberg, 2013). This means that in case of a conflict between the stakeholder and the firm, both parties will be affected (Tullberg, 2013). Different stakeholders that can be identified are shareholders, customers, managers, employees, suppliers and the community (Tullberg, 2013). The focus of this thesis is on the stakeholders group of investors, since they are considered to be the major users of financial statement in their decision to engage in a firm (IASB, 2013). An employee is for example less likely to let his decision to accept a job at a company be affected by the risk disclosures the company reports. Investors are expected to take the information on risk into account when creating expectations on future firm value, which in turn affects the investment decision (Bozzolan, et al., 2009).

The concept is further specified as the *usefulness* for investors. The usefulness for investors is measured in terms of information asymmetry reduction. Following the research of Miihkinen (2013), information asymmetry is calculated via two proxies. These proxies are relative bid- ask spread and volume of trading. The bid-ask spread is the difference between the ask price of a stock and the bid price (Miihkinen, 2013). The difference between the prices is an indirect measure of information asymmetry. As the different parties (selling and buying party) possess different information about the firm, they assign different values to the stock (Miihkinen, 2013). In a perfect situation, all parties would have access to the same information. In such a case the bid-ask spread would be zero. Therefore the lower the bid-ask spread, the lower the information asymmetry (Miihkinen, 2013). The measure in this thesis is the *relative* bid-ask spread. The bid-ask spread is relative, because the spread is scaled at the stock price, which enables the comparison between firms with different stock prices.

The second proxy for information asymmetry is volume of trading (Miihkinen, 2013). The reasoning behind this proxy is the willingness to conduct business with transparent counterparties or counterparties that are reluctant in sharing information. In general the more transparent a company, the more investors would want to invest in the firm. If more investors want to invest in the firm, the volume of trading would increase. Therefore it is expected that information asymmetry and volume of trading are negatively correlated.

Insurance industry

The last concept that requires explanation is the industry in which the relation between risk disclosures and information asymmetry is measured. For this thesis firms from the financial sector are considered, namely insurance companies. Insurance companies are intermediaries which help market participants to find each other, share risks and perform transactions (Doff, 2006). Transferring risk can be seen as the core business of the insurance sector (Doff, 2006). An insurance company is bearing the risks and costs associated with finding, screening and monitoring market participants once an insurance package is sold (Doff, 2006). In return the insurer receives a premium from the insurance buyer. Information on the core business is important for investors in calculating the expected future value of the firm (Bozzolan, et al., 2009). In order to make an assessment of the value of an insurer, an investor would value information on the risks the insurer is facing. Regulators also seem to acknowledge the importance of risk (reporting) by insurance companies, as regulation regarding risk reporting for the insurance sector is increasingly further developing. Countries like Finland, Germany and the UK already have an advanced set of regulations regarding risk disclosures (Miihkinen, 2013). On the European level projects like Solvency II and Project Insurance Contracts are working towards risk disclosure regulation for the entire European Union (European Parliament, European Council, 2009).

Different types of insurers exist. Classification of insurers can either be on what kind of insurance they provide (primary insurers and reinsurance) or on what they provide insurance (health, life, property, casualty and accident insurance) (Insurance Europe, 2013). This is schematically displayed in the following figure.

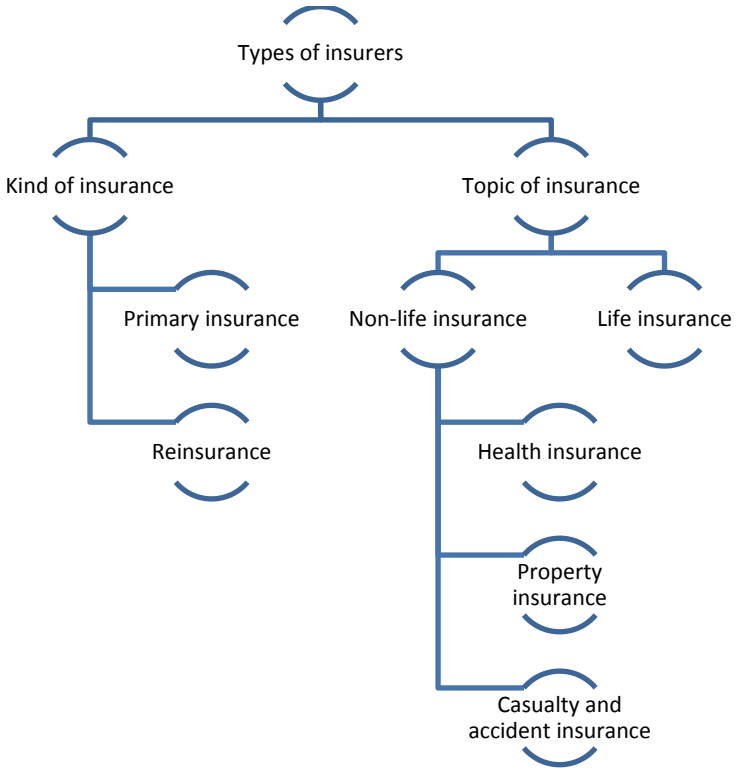

Figure 1 Types of insurers

Adapted from *Risk Management for Insurance Firms A Framework for Fair Value and Economic Capital*, by R. Doff, 2006, 's Hertogenbosch: NIBE-SVV. Copyright 2006 by NIBE-SVV.

For this thesis a distinction is made between life & non-life insurance and primary insurers & reinsurers. Primary insurance is the contract between the insurance company and the market participant (later policyholder) (Doff, 2006). Reinsurers on the other hand sell insurance packages to primary insurers (Doff, 2006). Reinsurance is therefore also called secondary insurance. The reinsurer in such a case takes over (a part of) the risks undertaken by the primary insurer. Basically the primary insurer insures its portfolio of insurance policies in the case of reinsurance. In return the reinsurer receives a premium from the primary insurer (Doff, 2006). Non-life insurance compensates the policyholder for events such as accidents and casualties (Doff, 2006). The compensation depends on what is covered in the insurance policy (for example a car). In the case of a life insurance, the insurance company provides payments at death or at a predetermined age of the policyholder (Doff, 2006). These payments are predetermined by the policy, which is the contract between the policyholder and the insurer (Doff, 2006). In return the policyholder pays premiums.

Insurance companies exist because they can economise the costs associated with searching for market participants willing to share risk, transaction costs, screening of the participants and monitoring the participants.

Searching costs are necessary because the insurer needs to make an effort to get to know about market participants' willingness to share risk (Doff, 2006). Screening costs involve reducing the costs of adverse selection and monitoring costs need to be incurred in order to reduce the moral hazard (Doff, 2006). Adverse selection costs are costs associated with information asymmetry prior to the transaction (Mülller & Brammertz, 1986). For clarification an example in the case of health insurance is given. The market participant who wants to buy insurance usually has more information about his or her health. Adverse selection in such a case refers to the fact that unhealthy market participants on average demand more insurance than healthy market participants. More unhealthy policyholders relative to healthy policyholders results in more claims and therefore higher costs. These costs are defined as the adverse selection costs (Mülller & Brammertz, 1986).Moral hazard costs on the other hand have to do with information asymmetry after the transaction took place (Mülller & Brammertz, 1986). In the case of health insurance an example of moral hazard could be that a policyholder claims certain treatments which have not been taken by the policyholder. The payment of false claims is an example of moral hazard costs.

As it would be too costly for each market participant to take all the previously mentioned costs individually, financial intermediaries (insurers) are necessary (Doff, 2006). Insurance companies sell insurance policies to the market participants for a premium. In return the insurance company offers the service of efficient information processing, monitoring the market participants and risk reduction through pooling (Doff, 2006). This construction makes clear that risks are carried by the insurance company. It can be concluded that risk management lies at the core of the insurer. An investor who considers to invest in an insurance company would therefore value information on the risks faced by the insurer. It is the duty of financial statement preparers to provide useful and reliable information for financial statements users (Arens, et al., 2013). It would therefore be logical that risk disclosures are an important part in the annual reports of insurers.

Now the concept of insurance companies and the different insurance companies have been explained. Next the different risks in the insurance sector are discussed. This will give insight on which risks insurance companies can possibly provide information in their financial statements. Figure 2 gives a visual presentation of the different risks an insurance company can incur. The risks an insurance company faces can be classified into seven broad categories. These categories are liquidity risk, operational risk, underwriting life risk, underwriting non-life risk, credit risk, market risk and other risks. These risks are the risks associated with running an insurance business. Please refer to appendix A for a list with the definitions of the identified risks.

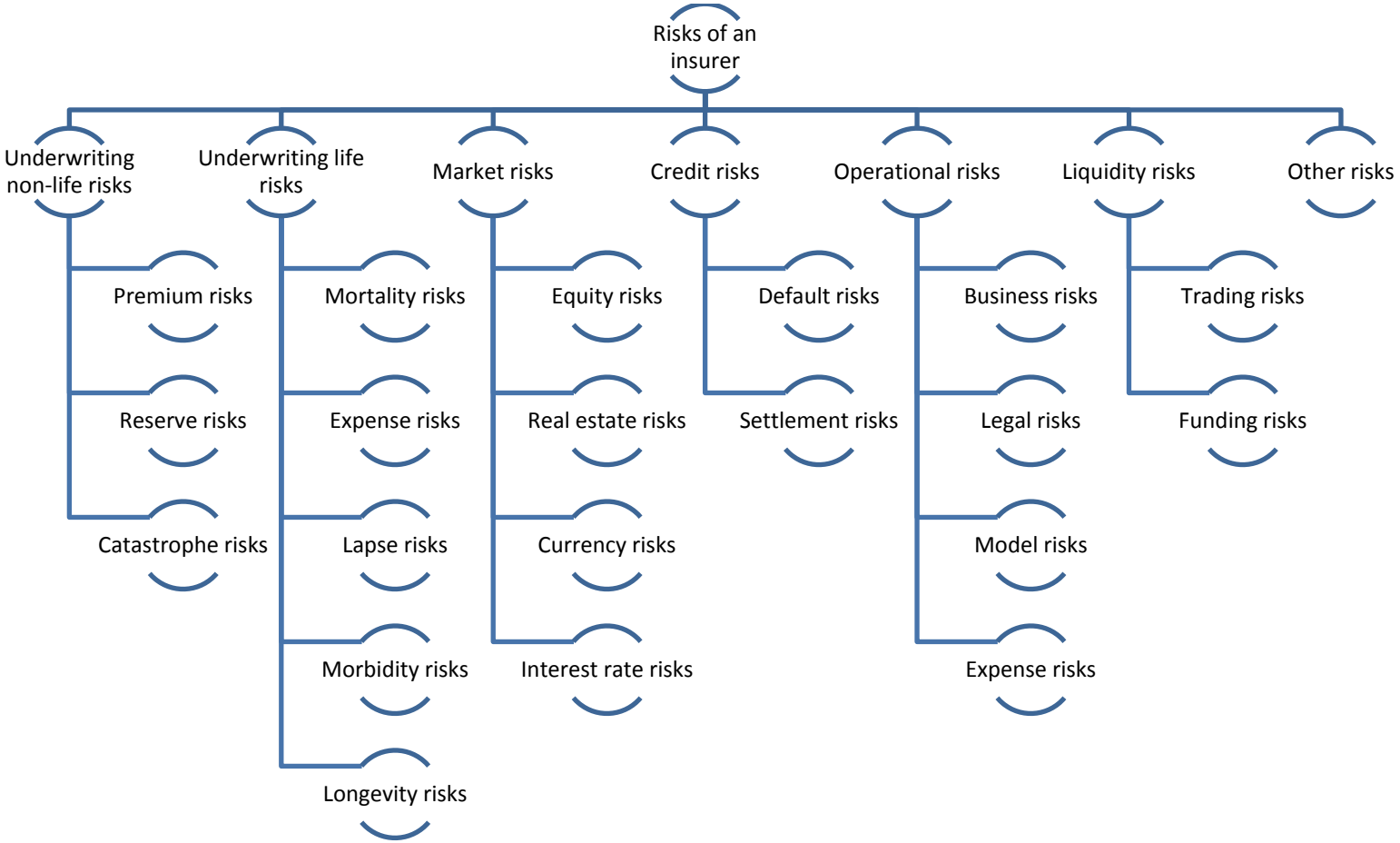

Figure 2 Risks in the insurance industry

Adapted from *Risk Management for Insurance Firms A Framework for Fair Value and Economic Capital (p.12)*, by R. Doff, 2006, 's Hertogenbosch: NIBE-SVV. Copyright 2006 by NIBE-SVV.

2.2 Institutional setting

In the following section the applicable regulation is discussed. This will give insight in what risk disclosure practices are expected from insurers by rules and regulation. The sample considered in this thesis consists of insurance companies listed on the Dow Jones STOXX Europe 600 Insurance Index. This has resulted in a sample of 27 European insurers based in Austria, Denmark, Finland, France, Germany, Italy, Netherlands, Switzerland, Sweden, Spain and the UK. All selected companies in the sample report under IFRS. Therefore the requirements of IFRS regarding risk disclosures are discussed. This involves IFRS 4 and IFRS 7. In addition the future regulation regarding risk disclosures which is currently being developed and is expected to be implemented in the near future is also discussed. This regulation involves Solvency II by EIOPA and Project Insurance Contracts by IASB.

International Financial Reporting Standards (IFRS)

The International Financial Reporting Standards foundation (IFRS) has the goal to provide, "promote and facilitate the adoption of globally accepted financial reporting standards" (IASB, 2014). These standards are developed by the IFRS standards setting body, the International Accounting Standards Board (IASB). In 2005 the EU adopted IFRS as the required reporting standard for listed companies in their member states (IASB, 2014). Therefore almost all the considered countries require reporting under IFRS. Only Switzerland requires either IFRS or US GAAP (PricewaterhouseCoopers LLP, 2013).

IFRS 7 Financial instruments: Disclosures

The regulation of IFRS regarding risk disclosures is not really extensive. A standard that does contain requirements for risk disclosures is IFRS 7. This standard focusses on financial instruments and their required risk disclosures (IASB, 2014). Its adaptation occurred in 2005 and application started as from January 2007 (IASB, 2014). In summary the risk disclosures requirements of IFRS 7 are:

- A company is required to disclose on risks exposures that identify the nature of the risks the entity is exposed to. This should be done in a qualitative way and for every individual financial instrument (IFRS 7.6).
- Also quantitative information is required. Quantitative disclosures expressing the extent to which the entity is exposed to the risk should be reported. This needs to be disclosed about every identified risk regarding financial instruments (IFRS 7.34).

- Special attention is paid to credit risk in IFRS 7. Risk of credit losses has been defined as the risk of counterparties failing to meet their contractual obligation (CEA – Group Consultatif, 2007). Credit risk in the case of a financial instrument is the risk that one party to the financial instrument fails to pay for its obligation and by doing so harms the other party (IASB, 2014). A firm is required to disclose the "maximum amount of exposure (before deducting the value of collateral), description of collateral, information about credit quality of financial assets that are neither past due or impaired, and information about credit quality of financial assets whose terms have been renegotiated" (IFRS 7.36).
- Also liquidity risk is important in IFRS 7. Liquidity is "the risk that in case of a required cash outflow, the company has not enough liquid assets to fulfill this requirement of the contract" (Doff, 2006). The insurer is required to conduct a maturity analysis of its financial liabilities (IFRS 7.39). Next to this information needs to be given on the risk management strategies regarding liquidity risk (IFRS 7.39).
- The lasts risk that receives special attention in IFRS 7 is market risk. Market risk is a risk that arises due to fluctuations in market prices (IASB, 2014). These fluctuations can have an effect on the cash flows or the fair value of a financial instrument. Factors that influence market risk are interest rate risk, currency risk and other price risks (IASB, 2014). A company should perform a sensitivity analysis of each type of market risk (IFRS 7.40-42). This analysis should be disclosed and additional information should be given if the sensitivity analysis does not reflect the entity's risk exposure well (IFRS 7.40-42).

It is important to keep in mind that these requirements are only related to financial instruments held by the company. The requirements seem extensive, but the scope remains limited. The requirements of IFRS do not include insurance contracts or risks arising from running a (insurance) company in general.

IFRS 4 Insurance contracts

IFRS 4 regards the accounting for insurance contracts. The adaptation of this standard occurred in 2005 and application started as from January 2007 (IASB, 2014). The scope of the standard involves all types of insurance contracts held by an entity (IFRS4.2). The scope does not cover the equity and liabilities of an insurer (IFRS4.3).

The standard requires the company to disclose information that are of value to financial statements users in the process of evaluating the "nature and extend of risks arising from insurance contracts" (IFRS 4.38-39). This involves:

a) "disclosure on the risk management objectives and policies" (IFRS 4.38-39) ;
b) "the terms and conditions of the insurance contract that have a material effect on the insurer's future cash flow" (IFRS 4.38-39);
c) "information about insurance risk, including:
    a. sensitivity analyses of the insurance risk
    b. concentrations of the insurance risk
    c. An analyses of the actual claims in the period and the amount that was expected" (IFRS 4.38-39).
d) "Information about credit risk, liquidity risk and market risk that IFRS 7 would require if the insurance contracts were within the scope of IFRS 7" (IFRS 4.38-39).

The current regulation (IFRS 4 and IFRS 7) remains rather limited in what risk disclosures are required. IFRS 7 is only about financial instruments and IFRS 4 on insurance contract. Regulators are currently working on ways to improve disclosure requirements. These regulations are Solvency II and Project Insurance Contracts, which will be discussed next.

Solvency II

Solvency II is a directive of the European Union (EU), which focusses on the harmonization of insurance regulation in the EU. It is developed by the European Insurance and Occupational Pensions Authority (EIOPA), which is located in Frankfurt am Main. Solvency II is the successor of the Solvency I regulation, which was already implemented in the 1970s. It is expected that Solvency II will be implemented on the 1st of January 2016 (European Parliament, European Council, 2009). Although it is not implemented yet, its implementation is anticipated by insurers, which makes it relevant for this thesis. A survey by Ernst & Young in January 2013 shows that 76% of the questioned insurers started or completed analyzing the gap between their reporting capabilities now and what will be required for Solvency II (Ernst & Young LLP, 2013).

As Solvency II will be implemented by the EU, it affects most of the countries considered in the sample. Only Switzerland does not adopt Solvency II regulation. However, the regulation in Switzerland is similar to Solvency II (PricewaterhouseCoopers LLP, 2013). Solvency II consists of three pillars. The structure of Solvency II is illustrated in the following figure.

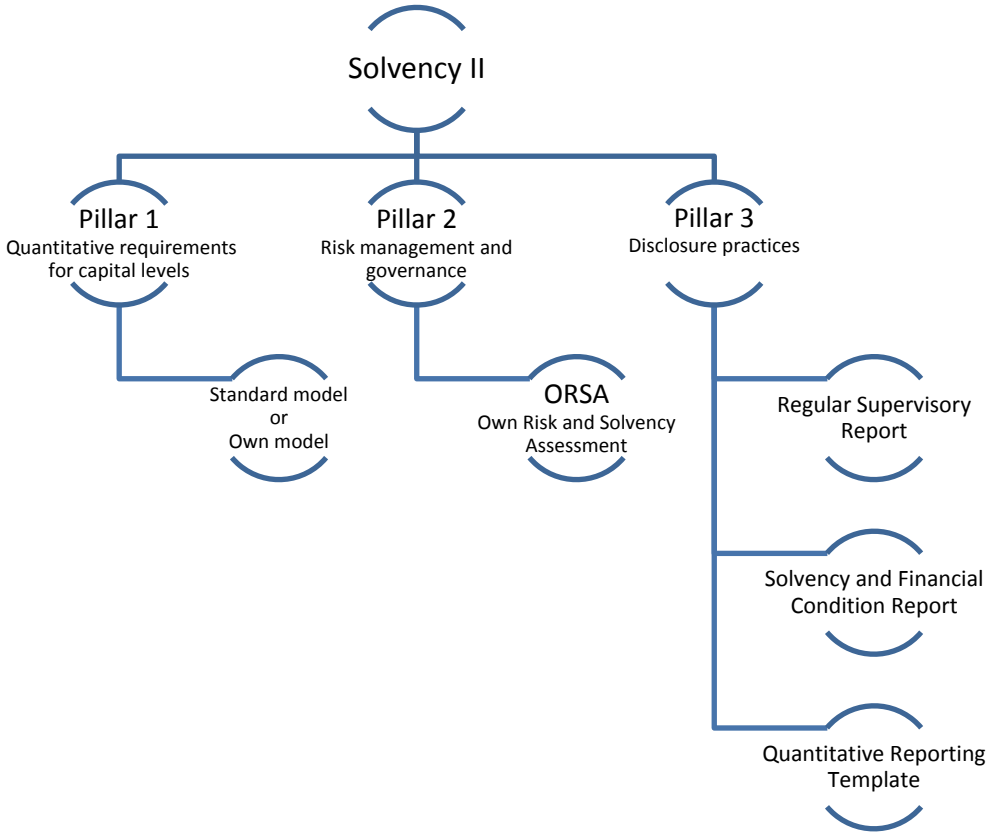

Figure 3 Structure of Solvency II

Adopted from "General rules on the taking-up and pursuit of direct insurance and reinsurance activities," European Parliament, European Council, 2009, *Journal of the European Union*. Copyright 2009 by European Parliament.

Pillar one focusses on quantitative requirements for insurers regarding their capital levels (European Parliament, European Council, 2009). It provides guidelines for risk-based capital levels. The guidelines provide a standard formula for calculating these levels of capital (European Parliament, European Council, 2009). However, firms are also allowed to use their own internal model for this calculation. This model should first be approved by the national supervisory body (European Parliament, European Council, 2009).

Pillar two regards the risk management and governance of the insurer. It includes the Own Risk and Solvency Assessment (ORSA), which is an assessment the insurer has to make on its own future risks, capital requirements and adequacy of capital resources (European Parliament, European Council, 2009).

The third pillar is the most relevant one for this thesis, as it provides guidelines for disclosure practices. Its aim is to improve transparency for supervisors and the public (European Parliament, European Council, 2009). The third pillar consists of three parts, namely the Regular Supervisory Report (RSR), the Solvency and Financial Condition Report (SFCR) and Quantitative Reporting Templates (QRT's) (European Parliament, European Council, 2009).

The Regular Supervisory Report (RSR) is a report which should be provided to the supervisory bodies. Every three years such a report should be provided, with an annual supplement (European Parliament, European Council, 2009). The Solvency and Financial Condition Report (SFCR) is a report which contains a self-assessment of capital requirements and financial condition of the insurer (European Parliament, European Council, 2009). It will be required annually and publicly reported. Lastly pillar three also provides templates for quantitative RSR analysis. These templates serve as an example for disclosure practices (European Parliament, European Council, 2009).

The required disclosures of the reports (RSR and SFCR) can be categorized into five main categories. These categories are business & performance, system of governance, risk profile, valuation for solvency purposes and capital management. For this thesis, the risk profile requirements are important. In summary, the relevant reporting requirements in the RSR and SFRC are:

- Qualitative and quantitative information on the company's risk profile (European Parliament, European Council, 2009).
- Reporting on underwriting risk (European Parliament, European Council, 2009). The EIOPA makes a distinction between life-underwriting risks and non-life-underwriting risks. Life-underwriting risk is defined as the risks arising from the underwriting of life insurance, which is the result of the parameters on which the life insurance is based and the business conduct (EIOPA, 2013). Life-insurance underwriting risk is typically influenced by mortality risk, longevity risk, disability/morbidity risk, lapse risk, expense risk, revision risk and catastrophe risk. Non-life insurance underwriting risk is defined as the risks resulting from underwriting non-life insurance (EIOPA, 2013). Non-life underwriting risk is influenced by premium & reserve risk, lapse risk and catastrophe risk.
- Elaboration on market risk (European Parliament, European Council, 2009). Market risk is defined as the risk of changing market prices or volatile market prices (CEA - Group Consultatif, 2007). Variables affecting market risks are stock prices, interest rates, real estate prices and exchange rates.
- Explanation of credit risk (European Parliament, European Council, 2009).

Next to the development of Solvency II which will be required for all European insurance companies, another new standard is being developed. This standard is called Project Insurance Contracts and will be discussed next.

Project Insurance Contracts

Project insurance contract is an initiative from the IASC. The goal of the project is to develop a standard for insurance contracts (IASC, 1997). The project was started in 1997 by the International Accounting Standard Committee (IASC), which is the predecessor of the IASB (IASC, 1997).

Currently the IASB is developing the standard. In the latest exposure draft (dated 25th of October 2013) the following disclosures regarding risk from insurance contracts were proposed:

- "The company should disclose information which enables the users of the financial statements to understand the nature, amount, timing and uncertainty of future cash flows that arise from contracts within the scope of this standard" (i.e. insurance contracts) (IASB ED.20, 2013). This includes "disclosures on the nature and extent of the risks that arise from contracts within the scope of this standard" (i.e. insurance contracts) (IASB ED.20, 2013).
- "An entity shall disclose:
  a) the exposure to risks and how they arise;
  b) its objectives, policies and processes for managing risks that arise from insurance contracts and the methods that are used to manage those risks; and
  c) any changes in a) or b) from the previous period" (IASB ED.20, 2013).
- "An entity shall disclose information about the effect of each of the regulatory frameworks in which the entity operates" (IASB ED.20, 2013).
- "An entity shall disclose information about insurance risks on a gross basis and a net basis, before and after risk mitigation" (IASB ED.20, 2013). This should involve:
  a) "sensitivity to the insurance risk in relation to its effect on profit or loss and equity" (IASB ED.20, 2013).
  b) "concentrations of insurance risks, including a description of how management determines the concentration and a description of the shared characteristics that identifies each concentration" (IASB ED.20, 2013).
- A comparison between expected claims and actual claims (IASB ED.20, 2013).
- "For each type of risk, other than insurance risk, that arises from insurance contracts, an entity shall disclose:
  a) summary quantitative information about its exposure to that risk at the end of the reporting period; and
  b) concentrations of risk" (IASB ED.20, 2013).
- "For credit risk that arises from insurance contracts issued and reinsurance contracts held, an entity shall disclose:

a) the amount that best represents its maximum exposure to credit risk at the end of the reporting period; and
b) information about the credit quality of reinsurance contract assets" (IASB ED.20, 2013)

- "With regard to liquidity risk, an entity shall disclose:
  a) a description of how it manages the liquidity risk that results from its insurance liabilities;
  b) the amounts that are payable on demand, in a way that highlights the relationship between such amounts and the carrying amount of the related contract; and
  c) a maturity analysis…" (IASB ED.20, 2013)

- "For market risk that arise from embedded derivatives that are contained in a host insurance contract and not separated, an entity shall disclose:
  a) a sensitivity analysis for each type of market risk, showing how profit or loss, other comprehensive income and equity would have been affected by changes in the relevant risk variable;
  b) an explanation of the methods and the main inputs that were used in preparing the sensitivity analysis… ; and
  c) changes from the previous period in the method and inputs that were used and the

The IASB has collected comments on the proposed draft explained above. The IASB expects to issue the new standard in 2015, which means the (improved) standard would become effective as of 2018.

2.3 Theoretical framework

Now it has become clear which risk disclosures insurance companies *have to* provide by regulation, an insight can be given into why insurance firm might *want to* engage in risk disclosure practices. An answer can be given in light of the agency theory, information asymmetry theory and information overload theory.

Information asymmetry theory

Information symmetry exists when different parties involved in a transaction possess different levels of information (Hall, 2011). The transaction which is central to this thesis is the investment in a company. The seller of the stock is the firm, represented by the management board and the buyer of the stock is the investor. Usually the seller (the management of the insurance company) has more and better information than the buyer (the investor) in a transaction. The fact that the investor has less information than the management leads to a disadvantage for the investor (Hall, 2011).

Problems associated with asymmetrical information are moral hazard and adverse selection. The problem of moral hazard is ex post, meaning that it arises after the investment decision is made (Hall, 2011). The problem arises because the incentives of the parties (investor and management) differ before and after the transaction (investment decision) (Mülller & Brammertz, 1986). After the investment, the management may engage in activities which do not result in a favorable outcome for the collective (Mülller & Brammertz, 1986). The management still possesses more information than the investor and they can benefit from it. The management may use its advantage by influencing business decisions which have favorable effects on their personal wealth and not on the wealth of shareholders (Mülller & Brammertz, 1986).

An example can be that the management choses to buy a plane for use of the board members, although the cheaper option would be to use the services of an airline company. The board members have more information about the existence and price of each option. The decision to buy a plane is in favor of the board as they enjoy the increase in status resulting from the company plane. The decision harms the investors as the overall expenses increase, leaving less profit to increase the company value or expected dividends.

Additionally the problem of adverse selection arises when information asymmetry exists. Adverse selection is an ex ante problem (Hall, 2011). This means that the problem arises prior to the investment. The management has more information about the true performance of the firm and is more likely to offer worse investment options as these bad investment options are usually overpriced (Mülller & Brammertz, 1986). As the investors cannot distinguish between the good and bad investment options, the investor treats all investment options as bad investment options (Akerlof, 1970). Therefore the good investment options on average do not receive the rewards they are worth, making them leave the market (Akerlof, 1970). On the other hand bad investments are on average overpriced, making it attractive to offer these investment options (on the seller side) (Akerlof, 1970). In this way the market is crowded out (Akerlof, 1970). An option to keep the market from collapsing is the introduction of information intermediaries (Akerlof, 1970). If sellers of stock are possible to provide relevant information to the possible buyers of the stock, investors will be able to distinguish between good and bad investment options. However, this information needs to be relevant and objective, otherwise the sellers of the investment can still exploit their information advantage.

The reasoning above can be used to create an expectation of what the answer to the research question will be. Are risk disclosures of insurance companies useful to investors? In the light of the information asymmetry theory one could argue that the risk disclosures are useful as they reduce information asymmetry. However, this is only true if an insurer provides relevant and accurate information about the risks.

If the risk disclosures contain not relevant or untrue information, they will not reduce information asymmetry. Providing inaccurate information can be a matter of mistakes or it could be done on purpose. The agency theory can explain why (the management of) a company would want to provide inaccurate information on purpose.

Agency theory

The agency theory is applicable to a situation in which one person or a group of persons delegates decision making authority to another person (Hill & Jones, 1992). This delegating (group of) persons is called the principal, the other the agent. The agent behaves and provides a service on behalf of the principal. A problem arises because the principal and agent have different goals (Hill & Jones, 1992). However, the agent is supposed to be acting on behalf of the principal.

A solution to this problem that is often explained is goal congruence (Hall, 2011). Goal congruence can be achieved through positive enforcement such as monetary compensation if the agent acts in line with the principal's goal (Hall, 2011). Also the actions of the agent can be limited, so that diversion of the principal's goal is simply impossible (for example limiting the possibility of theft) (Hall, 2011). An important note is that absolute goal congruence is not possible, there will always be a minimal difference in goals between the agent and the principal (Hill & Jones, 1992). The agency theory is applicable to many situations and in different perspectives. For this thesis the principal-agent relation between the investor and management of the insurance company is relevant.

The investors are a group of principals who delegated the decision making authority regarding the daily business decisions of their company to the management (Hall, 2011). The goal for the investor is to maximize firm value. However, the management may have other goals. Example of management goals are job security or personal wealth maximization. It is because of these other goals that management may want to provide inaccurate information. Often managers are evaluated and compensated based on the company's performance. This creates an incentive for the managers to provide a better image of the company's performance than the actual performance.

If a manager may want to present a more favorable image of the company's performance in the financial statements, could this person use the risk disclosures to do so? In previous sections of this chapter it was established that rules and regulation regarding risk reporting under IFRS remains limited. A limited set of rules and regulation leaves room for interpretations of how and which the risk disclosures will be given. This creates the opportunity of giving a better image than the actual performance. A manager may for example exclude information on risks to which the company is highly exposed to and include information on risks which were well managed. If the information on risks is not relevant or accurate information, then risk disclosures will not be useful for investors.

Information overload theory

Even in the case that managers would provide relevant and accurate information regarding the risks a company is facing, risk disclosures could still prove to be useless for investors in the decision making process. It might be the case that investors are exposed to so much information, that they cannot process (all) the information anymore. This concern was also raised by Mary Jo White, the chairwomen of the security exchange commission, in the United States in October 2013: "I am raising the question... as to whether investors need and are optimally served by the detailed and lengthy disclosures about all of the topics that companies currently provide in the reports they are required to prepare and file with us".

For the investor it is crucial to find and understand relevant and accurate information to base the investment decision on (Iannaconi, 2012). However, it becomes more difficult to screen the information on relevance and accurateness when the amount of information received increases (Iannaconi, 2012). An analysis of the required disclosure by rules and regulation between 2004 and 2010 reveals that the complexity and information content of annual reports increased significantly over the period (Iannaconi, 2012). In the previous section on institutional setting it was established that in the near future more disclosures on risks regarding insurance contracts and insurance firms will be required. This most likely will have an effect on the complexity and amount of information provided in the annual reports.

It might be the case that these increasing rules and regulations ultimately lead to an information overload (Iannaconi, 2012). If a potential investor in an insurance company is experiencing an information overload, it might be that investors choose not to consider risk disclosure information in their investment decision. In this situation the risk disclosures by insurance companies will not be considered useful to investors.

Each of the above theory can be used to explain and predict the usefulness of risk disclosures. Either risk disclosures are useful as they reduce information asymmetry, or they are useless because of the possibility of management to choose what information content they provide or the risk disclosures are not considered in the investment decision due to information overload experienced by investors. In order to research whether risk disclosures are useful or useless, an approach on how to investigate risk disclosures should be chosen. This will be discussed in the following section.

2.4 Relevant research approaches

The research on risk disclosures usually takes a positive accounting approach or a market based approach.

Positive accounting approach investigates the relationship between firm specific characteristics and accounting choices (Scott, 2012). This kind of research tries to find an explanation of certain accounting practices (for example risk reporting) in different firm characteristics (Scott, 2012). Firm specific characteristics are for example the level of risk, firm size, debt equity ratio of the firm and industry in which the firm operates (Scott, 2012). A positive accounting perspective in the field of risk disclosures would involve the investigation of the relationship between firm specific characteristics and risk disclosure practices. Researches in the area of risk reporting which takes a positive accounting approach are Höring & Gründl (2011), Lajili & Zéghal (2009) and Linsley & Shrives (2006).

On the other hand risk disclosure practices can be investigated using a market-based approach. This is the study of the aggregate of investor's response to certain accounting practices (Scott, 2012). Regarding risk disclosures the market-based approach investigates how the market reacts to different levels and qualities of risk disclosures. Examples of such research in the area of risk reporting are Kavet & Muslu (2013), Miihkinen (2013), Pérignon & Smith (2010), Deumes (2009), Sundmacher (2006) and Baumann & Nier (2004). All these papers will be discussed in more detail in chapter three.

The approach chosen for this thesis is the market-based approach. The usefulness of certain risk disclosures to investors is researched in this thesis. Therefore a direct study on the reaction of the aggregate investors on the different levels of risk disclosure quality is suited. The proxies for the reaction of the investors and therefore the usefulness of investors are relative bid-ask spread and trading volume. More information about the proxies for risk disclosure quality, usefulness to investors and other variables will be given in chapter five.

2.5 Summary

This section explained the main concepts, institutional setting, theoretical background and relevant research approaches. The main and sub concepts of this thesis are risk disclosures, usefulness to investors and the insurance industry. Risk disclosures are identified as information items in the annual reports which contain information on the risks faced by the business and which can be found in the narratives of the annual report. The concept of insurance companies is explained as insurers being financial intermediaries. Insurers bring together market participants, facilitate transactions and economise costs associated with the insurance. For this thesis a distinction is made between life & non-life insurance and primary & reinsurance companies. Usefulness to investors can be explained in different ways. This thesis focusses on usefulness to investors in terms of information asymmetry reduction between investors and the insurers.

Secondly relevant regulation is discussed. Relevant regulation regarding risk disclosures for the insurers in the sample are IFRS 7 and IFRS 4. IFRS 7 is applicable to financial instruments (insurance contracts are excluded). IFRS 4 regards insurance contracts. Also the future regulation of Solvency II is taken into account. Solvency II focusses on disclosures by insurance companies on a broad range of risks. These risks are liquidity risks, operational risks, underwriting risks, credit risks and market risks. Additionally future regulation of Project Insurance Contracts is discussed. This is a standard which the IASB is currently developing regarding the insurance contract accounting.

Thirdly the information asymmetry theory, the agency theory and information overload theory are explained. Information asymmetry exists when the different parties involved in a transaction possess different levels of information. One, usually the buyer, is in disadvantage because of less (qualitative) information. An agency problem arises when a principal hires an agent to act on the principal's behalf and the decision making authority is delegated to the agent. The goals of the agent and principal are not fully aligned. Information overload theory is concerned with the complexity and amount of information provided in the annual reports. These theories can be used to create a prediction of the research question. Risk disclosures are useful according to the information asymmetry theory if relevant and accurate information on the risks is provided. The agency theory stresses that due to the difference in goals by the management and the shareholders, risk disclosures might be useless as they are likely to be used in image management. Information overload theory predicts that risk disclosures might not be useful to investors, because investors receive too much information. In such a case an investor may chose not to consider risk disclosures in the investment decision.

Fourth, relevant research approaches for narratives of annual reports are discussed. These approaches are positive and market based approach. The latter is chosen in this thesis.

Chapter 3 Literature overview

This section explains the prior literature on which this thesis is based. The applicable literature can be divided according to two dimensions. These dimensions are the research approach (positive accounting approach, market based approach or descriptive approach) and the scope of the research (financial, non-financial firms and financial firms, and financial firms). The division of the considered literature is visualised in the following table.

Dimensions	Non-financial firms	Non-financial & Financial firms	Financial firms
Positive accounting approach	Linsley & Shrives (2006), Abraham & Cox (2007)	Lajili & Zéghal (2009)	Höring & Gründl (2011)
Market-based approach	Miihkinen (2013)	Deumes (2008), Kravet &Muslu (2013)	Bauman & Nier (2004), Pérignon & Smith (2010)
Descriptive approach	Kajüter & Winkler (2003)		

Table 1 Dimensions relevant literature

In the following sections the relevant literature is discussed. A division according to the two dimensions is made. An overview of the considered prior research with their findings can be found in Appendix B.

3.1 Prior research

Positive accounting approach on non-financial firms

First the literature that considers non-financial firms and takes a positive accounting approach is discussed. These articles are Linsley & Shrives (2006) and Abraham & Cox (2007).

The goal of Linsley and Shrives was to research the disclosure practices of firms in the UK (Linsley & Shrives, 2006). These authors investigated three features of risk disclosures and investigated what was more often disclosed by UK firms. The three features were monetary versus non-monetary (quantified/qualitative) disclosures, forward looking versus backward looking disclosures and good news disclosures versus bad news disclosures (Linsley & Shrives, 2006). In addition some firm specific characteristics, such as firm size and level of risk, were taken into account (Linsley & Shrives, 2006).

Linsley and Shrives used 79 non-financial British firms which were listed on the FTSE 100 Index at January 2000 to test their hypotheses (Linsley & Shrives, 2006). In the end 6168 risk disclosures were analyzed. Linsley and Shrives only considered the annual reports of 2000 (Linsley & Shrives, 2006).

The required data was hand-collected by content analysis of the annual report (Linsley & Shrives, 2006). The authors were only interested in the quantity of the risk disclosures and therefore used a semi-objective thematic analysis[1] (Linsley & Shrives, 2006). Prior to the data analysis the categorization of specific risk disclosures was decided on by the authors. In this way decision rules for risk disclosure categorization were established. One single coder reviewed all annual reports and coded all risk disclosures (Linsley & Shrives, 2006). The coding unit taken by Linsley and Shrives were sentences opposed to words or page count. This is done because according to the authors words need to be interpreted within the context of the sentence (Linsley & Shrives, 2006).

The authors conducted a Pearson correlation analysis in order to conclude on the relation between firm-specific characteristics and risk disclosure practices (Linsley & Shrives, 2006). Also Wilcoxon signed ranks were conducted as part of the analysis. These ranks were used to test for statistical significance of the results. In summary, the conclusions of Linsley and Shrives were:

- Firm size is positively related to number of risk disclosures (Linsley & Shrives, 2006).
- There is no association between level of risk and number of risk disclosures (Linsley & Shrives, 2006).
- Non-monetary risk disclosures are given more often than monetary disclosures (Linsley & Shrives, 2006).
- Past disclosures are not given more often than future oriented risk disclosures (Linsley & Shrives, 2006).
- More good news risk disclosures are given than bad news risk disclosures (Linsley & Shrives, 2006).

Another pair of researches that investigated risk disclosure practices by non-financial firms are Abraham and Cox (2007). These researchers also took a positive accounting approach like Linsley and Shrives (2006). Abraham and Cox did investigate risk disclosures from a different angle.

The main research question of Abraham and Cox (2007) was what ownership and governance characteristics of a firm determined the risk reporting behavior of UK FTSE 100 listed firms. Ownership and governance characteristics considered were number of executive directors on a firm's board, the independence of the executive directors on a firm's board, corporate ownership by life insurance funds, corporate ownership by in-house managed pension plans, corporate ownership by outside managed pension plans and dual listing in the US (Abraham & Cox, 2007).

[1] An extensive explanation of the different methods for content analysis, such as semi-objective thematic analysis, can be found in chapter five.

The sample used to investigate this matter consisted of 71 UK non-financial FTSE 100 companies in 2002 (Abraham & Cox, 2007). Data on the variation in the level of risk reporting among the sample companies was retrieved using content analysis (Abraham & Cox, 2007). The coding unit chosen by Abraham and Cox were sentences. In order to check the robustness of the results of sentences as a coding unit, word count as a coding unit was also considered (Abraham & Cox, 2007). Data on the ownership of the sample firms was retrieved from Computershare. Data on the directors in the board of the sample firms are gathered form the annual reports (Abraham & Cox, 2007).

Abraham and Cox used a regression model to test their hypotheses. Control variables in the regression were size, leverage, risk, resources, basic industries, cyclical & non-cyclical consumer goods, cyclical & non-cyclical services, information technology and utilities (Abraham & Cox, 2007). Dependent variables were total risk reporting, business risk reporting, financial risk reporting and internal control risk reporting (Abraham & Cox, 2007).
The main findings of Abraham and Cox are (Abraham & Cox, 2007):

- Corporate ownership by long-term institutions is negatively related to number of risk disclosures.
- Corporate ownership by short term institutions is positively related to number of risk disclosures.
- The presence of executive directors in the board has a positive relation with number of risk disclosures.
- The fact that directors in the board are independent has a positive relation with number of risk disclosures.
- The fact that firms are cross listed in the US has a positive relation with the number of risk disclosures in the UK.

Positive accounting approach on non-financial and financial firms

The previous mentioned papers investigated what kind of risk disclosures was given more often (Linsley & Shrives, 2006) and what firm specific characteristics influenced these risk disclosure practices (Abraham & Cox, 2007). Other researchers who took a positive accounting approach are Lajili and Zéghal (2009). However Lajili and Zeghál (2009) take the analysis of risk disclosures a step further as they wanted to "provide insights into the current risk disclosure environment, its characteristics, and the analytical usefulness of the information disclosed to the firm's stakeholders" (Lajili & Zéghal, 2009). Another feature which makes the research of Lajili and Zéghal more extensive than the previous mentioned articles is that these authors considered both financial as non-financial firms. Lajili and Zeghál (2009) used a sample of 228 Canadian Toronto Stock Exchange 300 listed companies as of December 1999. This sample included both financial as well as non-financial firms (Lajili & Zéghal, 2009).

Lajili and Zéghal (2009) also conducted content analysis. The coding unit is word count and sentences (Lajili & Zéghal, 2009). If a sentence or word is about a specific risk category, a value of 1 is assigned to that specific risk category. Therefore it can be concluded that for this research also the semi-objective approach of thematic analysis is used[2]. For the analysis of statistically relevant difference between mandatory and partially mandatory disclosure data Lajili and Zéghal conducted a regression (Lajili & Zéghal, 2009). In the model also total assets, sales, profit, beta, debt/equity ratio, and debt to total assets ratio as firm specific characteristics were considered (Lajili & Zéghal, 2009).

The main findings of the Lajili and Zéghal paper are:

- There is no difference between the quantity of strict mandatory disclosures and the quantity of partially voluntary disclosures reported (Lajili & Zéghal, 2009).
- Most risk disclosures were on financial, market and commodity risk (Lajili & Zéghal, 2009).
- Risk information can be found in the MD&A section and notes of the annual reports (Lajili & Zéghal, 2009). Mostly the disclosures are qualitative in nature.
- The risk disclosures on bad news were more extensive than risk disclosures on good-news (Lajili & Zéghal, 2009).
- No conclusion on whether quantified risk disclosures are better than non-quantified risk disclosures is provided (Lajili & Zéghal, 2009).

Positive accounting approach on financial firms

Other authors took a positive accounting approach to investigating risk disclosure practices by financial firms. These are Höring & Gründl (2011).The goal of the paper of Höring & Gründl (2011) was to investigate the relation between the extent of risk disclosures and insurance companies' characteristics (Höring & Gründl, 2011). The study is similar to this thesis, except that it takes a positive accounting perspective. This thesis takes a market-based perspective.

Höring and Gründl investigated the 37 largest European insurers listed at the Dow Jones STOXX 600 Insurance Index over a sample period of 2005 till 2009 (Höring & Gründl, 2011). Reinsurers and mutual insurance companies were excluded from the sample (Höring & Gründl, 2011).

The authors conducted a content analysis, using a risk disclosure index study[3]. A pre-specified list of risk disclosure items was established (Höring & Gründl, 2011). The narratives of the annual reports were analysed and based on the presence of the predetermined items a value was assigned.

[2] An extensive explanation of the different methods for content analysis, such as semi-objective thematic analysis, can be found in chapter five.

[3] An extensive explanation of the different methods for content analysis, such as disclosure index study, can be found in chapter five.

Höring and Gründl used an ordinal scoring scheme in which a value of 0 was assigned when on an item no risk disclosures where detected, a value of 1 if a basic risk disclosure was provided and a value of 2 if the risk disclosure was extensive (Höring & Gründl, 2011). The values of the sub-indices were added and normalised in order to come to the score on risk disclosure quality (Höring & Gründl, 2011).

Analysis of the data was done via a regression analysis (Höring & Gründl, 2011). The betas of the different insurance-specific characteristics are tested for statistical significance. The insurance specific characteristics which were considered were size, risk, profitability, ownership dispersion, US listing, banking activities and insurance type (Höring & Gründl, 2011).
In summary the findings of Höring and Gründl were:

- The importance of risk disclosures in the annual report increased over the sample period (Höring & Gründl, 2011).
- Risk disclosures by the European insurance industry remains moderate on average, but with strong variation among the sample insurers (Höring & Gründl, 2011).
- Insurer's size, risk, profitability, cross listing and ownership dispersion are factors influencing the extent of risk disclosures significantly (Höring & Gründl, 2011).

If the results of the first four papers are compared, a similarities and dissimilarities can be detected. Linsley and Shrives found that firms provided more risk information on good news or opportunities than on bad news or threats (Linsley & Shrives, 2006). The results of Lajili and Zéghal (2009) are the other way around. Additionally, Linsley and Shrives (2006) conclude that qualitative risk disclosures are given more often than quantified risk disclosures (Linsley & Shrives, 2006). However, Lajili and Zéghal (2009) were not able to provide a conclusion on whether quantified or qualitative risk disclosures are more useful analytically.

Similarities in the outcome between Abraham & Cox (2007) and Höring & Gründl (2011) can be detected. The significant influence of US cross-listing is found in both researches. Another finding that is confirmed by Höring & Gründl (2011) is that firm size is positively related to the extent of risk disclosure. This relationship was already found by Linsley and Shrives (2006) for non-financial firms. Höring & Gründl (2011) find the same relationship for financial firms. On the other hand, one finding of Höring & Gründl (2011) contradicts a finding of Linsley & Shrives (2006). Linsley & Shrives (2006) found that for non-financial firms there is no association between the level of risk in the firm and the number of risk disclosures. Höring &Gründl (2011) on the other hand do find a significant relationship between level of risk and the extent of risk disclosures.

Market-based approach on non-financial firms

Now that the positive accounting approach is discussed, the market based approach will be explained. This approach is taken by Miihkinen (2013). Miihkinen (2013) only considered non-financial firms.

The main focus of Miihkinen (2013) is on the quality of risk disclosures in annual reports of non-financial firms. Miihkinen investigated the effect of these risk disclosures on information asymmetry between management and investors (Miihkinen, 2013). Miihkinen (2013) uses relative bid-ask spread and volume of trading as proxies for information asymmetry. In addition the effect of contingent factors such as firm riskiness, investor interest, and market conditions on the relation is investigated (Miihkinen, 2013).

The sample used considered by Miihkinen consisted of 75 firms. Only non-financial Finnish firms listed on the Helsinki stock exchange (OMX) were considered (Miihkinen, 2013). The sample period covered the years 2006 till 2009. In order for firms to be included into the sample firms "needed to be non-financial, listed during the entire sample period, have a fiscal year-end in line with the rest of the sample and have all the required data available for running the regression". (Miihkinen, 2013).

The risk disclosure data was hand-collected using content analysis (Miihkinen, 2013). Sentences were used as a coding unit (Miihkinen, 2013). The amount of sentences regarding a specific risk category was counted (Miihkinen, 2013). Miihkinen used a semi-objective approach, namely thematic analysis. Prior to the data retrieval, the author established which specific risk disclosures should be categorized to which risk disclosure category (or theme). The analysis of the data was done via two regression models. In the first model the dependent variable was the relative bid-ask spread and in the second model was the dependent variable volume of trading. The models further included information on number of shares, market capitalization, whether a firm is a high tech firm, number of analysts following the firm, whether markets are in falling of recovering times, volatility of the stock, earnings quality, foreign ownership, media coverage, overall annual report disclosure and ownership concentration (Miihkinen, 2013).

The main findings of the study were:

- Miihkinen found evidence that annual risk disclosures are useful for investors. If a company discloses high-quality risk information, the information asymmetry is decreased (Miihkinen, 2013).
- The effect is stronger for firms with high inherent risk, such as high tech firms, and small risks. Risk disclosures are even more useful for these firms, because investors require more information from these firms (Miihkinen, 2013).

- The effect is stronger for firms with low analyst following (Miihkinen, 2013). This is because when firms are not followed by analysts that much, investors need to rely more heavily on information provided from the company. No additional information from the analysts is given. Because of this high reliance, investors' reaction on risk disclosure information is increased (Miihkinen, 2013).
- Risk disclosures are most useful for investors in recovering market conditions (Miihkinen, 2013). Also in stable economic times are risk disclosures useful, but not as much as in economic turndown (Miihkinen, 2013). Miihkinen expects that this effect is due to increased caution by investors in times of economic turndown.

Market-based approach on non-financial and financial firms

Research which also takes a market-based approach, but considers both financial and non-financial firms, is conducted by Deumes (2008) and Kravet & Muslu (2013).

The research question of Deumes (2008) was whether companies provide relevant risk information to prospective investors in their prospectuses (Deumes, 2008). Prospectuses in the case of "Initial Public Offering (IPO) of common stock, seasoned offerings of common stock and/or convertible bonds, and stock offerings related to a merger or demerger" were considered (Deumes, 2008). The sample on which this question was investigated consisted of 90 Dutch firms which issued securities on the Amsterdam Stock Exchange between 1997 and 2000. This included both financial as well as non-financial firms.

Deumes used content analysis to extract the risk disclosure information from the prospectuses (Deumes, 2008). For this a list of expected risk factors that can be disclosed in the risk section was predetermined (Deumes, 2008). After this the risk sections were coded in a nominal matter[4]. Therefore the method can be classified as a disclosure index study.
In summary, the findings of Deumes were:

- Risk disclosures predict the volatility of stock prices. Volatility is a measure of future total return risk (Deumes, 2008).
- Risk disclosures in prospectuses successfully predict future systematic risk. Future systematic risk is measured by the sensitivity of future stock prices to market-wide fluctuations (Deumes, 2008).
- Risk disclosures in prospectuses also predict the likelihood of severe declines of stock prices (Deumes, 2008). These declines followed in 30 months after the publication of the prospectus.

[4] An extensive explanation of the different methods for content analysis, such as a disclosure index study with a nominal scoring system, can be found in chapter five.

Another research which investigates both financial and non-financial firms, and takes a market-based approach, is conducted by Kravet and Muslu (2013). Kravet and Muslu (2013) regard the effect of changes in qualitative risk disclosures on the behaviour of investors and analysts around the date of the annual report release (Kravet & Muslu, 2013). Changes in qualitative risk disclosures are measured as the difference between the amount of risk disclosures provided in the annual report of this year (year t) and the amount of risk disclosures in the annual report of last year (year t-1) (Kravet & Muslu, 2013). The proxies of the behaviour of investors are stock return volatility and trading volume (Kravet & Muslu, 2013). The proxy for the behaviour of analysts is the volatility of analysts' forecasts revisions (Kravet & Muslu, 2013).

The authors investigate a sample of 4.315 firms (both financial as non-financial) in the period 1994 – 2007. Only American companies were considered, making it possible to use 10-K filings data to extract risk disclosure information (Kravet & Muslu, 2013). The analysis was done via a regression model. In summary the findings of the authors were: "changes in risk disclosures are significantly and positively associated with changes in daily stock return volatility, changes in relative volatility of negative daily returns, filing volume, changes in trading volume, and changes in volatility of forecast revisions" (Kravet & Muslu, 2013). This means that risk disclosures are indeed useful for investors and analysts.

Market-based approach financial firms

Another category of risk disclosure literature is the category of research taking a market-based approach and considering financial firms. This is done by Baumann & Nier (2004) and Pérignon & Smith (2010).

The goal of Baumann & Nier (2004) was to present empirical evidence on whether disclosing is beneficial for banks and whether these disclosures are beneficial for financial markets (Baumann & Nier, 2004). In order to find an answer to this question a sample was selected from 600 banks. These banks were located in 31 different countries. The considered sample period was from 1993 to 2000.
The authors used content analysis by means of a disclosure index study to extract disclosure information form the selected banks (Baumann & Nier, 2004). The indices were on interest rate risk, credit risk, liquidity risk, market risk and capital in the annual accounts of the banks (Baumann & Nier, 2004). The value of 1 was given when a bank included information on the information item identified in the disclosure index study. A value of 0 was given if the bank did not provide the information on the information item. Therefore the research method can be classified as a nominal disclosure index study.

Baumann and Nier (2004) found that:

- The stocks of banks that disclose more on key items of disclosures, have less volatile prices (Baumann & Nier, 2004). This suggests that disclosures are both useful for banks as well as for investors. Banks benefit from lower costs of capital and investors profit from stock prices that present the underlying performance of a company well (Baumann & Nier, 2004).
- It remains difficult to gather empirical evidence on the relative usefulness of specific disclosure items (Baumann & Nier, 2004).

Another research that considers financial firms and takes a market-based approach to investigating risk disclosure practices is conducted by Pérignon & Smith (2010). Pérignon and Smith investigate whether quantitative information on market risks is useful in predicting the volatility of future trading revenues (Pérignon & Smith, 2010). The data used to investigate this matter was consisting of 10 US and 60 international banks. The sample period was from 1996 to 2005.

Pérignon and Smith (2010) use a disclosure index study to extract the disclosure information from the annual reports (Pérignon & Smith, 2010). The index components consisted of information items which could be disclosed about the market risk (Pérignon & Smith, 2010). The authors used a nominal scoring system. A value of 1 was given if the bank provided information on the information item. A value of 0 was given if the bank did not provide information on the information item. The scores of the individual components were aggregated to come to the final score (Pérignon & Smith, 2010). The maximum score per bank was 15. After this the disclosure score was regressed on the volatility of future trading revenues.

In summary, the findings of this study were:

- Over the sample period an increase in the quantity of information provided by banks is measured (Pérignon & Smith, 2010).
- The quality of market risk disclosures valued-at-risk did not improve over the sample period (Pérignon & Smith, 2010).
- The ability of market risks disclosures in forecasting the volatility of future trading revenues is small (Pérignon & Smith, 2010).

The findings of the literature that takes a market-based approach are mainly coherent. According to Deumes (2008) risk disclosures successfully predict the volatility of stock. This finding is supported by Kravet and Muslu (2013). Baumann and Nier (2004) found that the stock prices of banks which disclosed more information on market risks were less volatile. However, Pérignon and Smith (2010) only found little evidence on the risk disclosure information predicting stock price volatility.

The results of prior literature can be interpreted to give an answer to the question whether risk disclosures are useful. Different answers and different interpretations to this question can be given. Miihkinen (2013) finds that risk disclosures are useful for investors in their investment decision, as risk disclosures reduce information asymmetry. Deumes (2008) finds that risk disclosures successfully predict stock price volatility, systematic risk and the likelihood of severe stock price declines. In such a case, the risk disclosures are useful to investors as well. Baumann and Nier (2004) found evidence that risk disclosures are useful for banks. More risk disclosures lead to less volatile stock prices, less volatile stock prices in turn lead to lower cost of capital (Baumann & Nier, 2004). In the same research evidence is found that risk disclosures are useful to investors as they profit from stock prices that present the underlying performance of a company well (Baumann & Nier, 2004).

Descriptive approach on non-financial firms

The last category of risk disclosure literature which is discussed in this thesis is the descriptive approach. This kind of research on risk disclosure is not looking for firm-specific characteristics that influence the level of risk disclosure (quality), nor does it want to investigate the effect of risk disclosures (quality) on the market. This kind of research merely wants to describe the risk disclosure practices. The research of Kajüter and Winkler (2003) can be categorised as a research that takes the descriptive approach.

Kajüter and Winkler (2003) analyse the development of risk disclosures in Germany from 1999 to 2001. All DAX100 companies except for banks and insurance companies were considered. This has resulted in a sample of 83 firms. The research method used by Kajüter & Winkler (2003) was content analysis (thematic analysis).

Kajüter & Winkler found a development that in the sample period the risk disclosures were published together with the annual report and a separate section in the annual report was devoted to risks (Kajüter & Winkler, 2003). Over the sample period, this section on risk became more often named “Risikobericht” or “Risikomanagement” (Kajüter & Winkler, 2003). An increase in referencing to other parts of the annual report or specific risk categories is detectable in the separate risk section. Mostly the references refer to interest risk and exchange risk (Kajüter & Winkler, 2003).
In the period from 1999 to 2001, an increase in sentences devoted to risk was found (Kajüter & Winkler, 2003). According to the German regulation DRS 5.17, a firm is required to categorise the risk information they provide in the annual report (Kajüter & Winkler, 2003). Kajüter & Winkler (2003) acknowledge that there is no standard framework for categorising these risks. In general mostly external risks are categorised in market risk, business risk, macroeconomic risk or sector risk, financial risk and legal risks (Kajüter & Winkler, 2003). Internal risks are usually categorised in reserve risk,

personnel risk and IT risk (Kajüter & Winkler, 2003). Also the amount of risk categories has increased during the sample period (Kajüter & Winkler, 2003).
In terms of how the risk disclosures are made, relatively larger increase in quantified risk disclosures is detected compared to qualitative risk disclosures (Kajüter & Winkler, 2003). However, the qualitative risk disclosures are still more often given than quantified risk disclosures (Kajüter & Winkler, 2003).

3.2 Relevance for this thesis

The discussed prior literature has implications for this thesis, as this thesis combines parts of the discussed literature. The implications are on the research method, regression model and expected outcomes of the hypotheses.

Research on risk disclosure typically uses content analysis for extracting the risk disclosure information from annual reports. The discussed literature uses either thematic analysis or disclosure index study as a research method[5]. Linsley & Shrives (2006), Lajili & Zéghal (2009) and Miihkinen (2013) use thematic analysis. Baumann & Nier (2004), Deumes (2008), Pérignon & Smith (2010) and Höring & Gründl (2011) use risk disclosure index studies. This thesis is focussing on not only the quantity of risk disclosures, but also on specific features of the risk disclosures. Thematic analysis only considers the amount of risk disclosures. In disclosure index studies the indices can be tailor made. This has the benefit that not only the quantity but also the quality of information disclosures can be measured. Therefore risk disclosure index study is chosen as a research method.

In the second step of the analysis in this thesis a linear regression model is run. This thesis takes a market-based approach on risk disclosures in the insurance sector. Therefore the models of Miihkinen (2013) and Höring & Gründl (2011) are taken into consideration. These studies found evidence of variables affecting both information asymmetry as well as risk disclosures (Miihkinen, 2013) and firm specific characteristics affecting the level of risk disclosed by insurance companies (Höring & Gründl, 2011).

Combining the findings of these studies a linear regression model is constructed in which the risk disclosure information is regressed on two measures of information asymmetry. These two measures of information asymmetry are volume of trading and relative bid-ask spread. These proxies for information asymmetry are also used by Miihkinen (2013).

[5] More information on different ways to conduct a content analysis can be found in chapter five.

The third implication of prior research is the expectation of the hypothesis used in this thesis. Hypothesis one considers the basic relation between risk disclosures and information asymmetry. The research of Pérignon & Smith (2010) found evidence that risk disclosures of banks are of little help in predicting trading revenues. Miihkinen (2013), Deumes (2008) and Baumann & Nier (2004) found convincing evidence that risk disclosures are useful to investors. However, Miihkinen investigated non-financial firms and Deumes did not distinguish between financial and non-financial firms. Baumann & Nier and Pérignon & Smith investigated banks. These last authors did not find solely convincing evidence on the usefulness of risk disclosures by companies. This stresses the importance of gathering evidence on risk disclosure usefulness for especially financial firms. As most of the prior literature is pointing in the direction that risk disclosures are indeed useful, this is the expected outcome for risk disclosures in the insurance sector. Especially the research of Kravet & Muslu (2013) contributes to the expectation of the volume model. These authors found that risk disclosures are positively correlated with the trading volume. Therefore it is expected that the trading volume of shares in insurance companies increases if the quality of the risk disclosures in the annual report of the insurance company increases.

The research of Baumann and Nier (2004) forms the basis of investigating the second hypothesis. This hypothesis focusses on the usefulness of different risk disclosure categories. It remains difficult to assess the usefulness of specific risk disclosure items (Baumann & Nier, 2004). Therefore, it is important to investigate this matter.

3.3 Summary

This section discussed the prior literature on risk disclosures. Prior literature can be divided into different categories according to two dimensions. These dimensions are the approach taken (positive accounting approach, market based approach or descriptive approach) and scope (financial firms, non-financial firms or both). A distinction between financial and non-financial firms is usually done because financial and non-financial firms disclose on different types of risks.

Most of the research found little evidence or convincing evidence that risk disclosures are indeed useful to investors. However, this is not investigated that often for financial firms and especially for insurers. The findings are taken into account in hypothesis one. In addition, prior literature indicates that it remains difficult to investigate the relative usefulness of risk disclosure items. This finding stresses the importance of investigating this matter in hypothesis two.

Lastly the research method, regression model and proxies for information asymmetry are taken from prior literature.

Chapter 4 Hypotheses development

4.1 Hypotheses

Hypothesis 1 concerns the primary relationship between risk disclosures and information asymmetry. The first hypothesis considers the *aggregate* of risk disclosure quality. As mentioned in chapter three, prior literature on non-financial firms suggests that there is a negative correlation between number of risk disclosures and information asymmetry (Miihkinen, 2013). Miihkinen (2013) considered that more extensive risk disclosures (a higher number of risk disclosures) leads to higher disclosure quality. In this thesis the quality of risk disclosures is considered as opposed to merely the amount of risk disclosures. The quality of risk disclosures is considered in two dimensions. These are the extensiveness of the risk disclosure and the provision of information on different aspects of the risk (such as identification, process of management, activities to mitigate the risk etc.) The relation between risk disclosure quality and information asymmetry has not yet been investigated as such for insurance companies and therefore this is investigated in the first hypothesis.

Another reason for investigating the relationship between risk disclosure quality and information asymmetry between insurer and investor is the outcome of prior literature. Prior literature investigating the effect of risk disclosures on other market variables representing usefulness to investors of financial firms does not generate solely convincing evidence. Baumann & Nier (2004) and Höring & Gründl (2011) provide evidence that risk disclosure quality is indeed useful to investors. However, Périgonon & Smith (2010) only generate little evidence on risk disclosures' ability to predict future stock returns. The findings of Pérignon & Smith's research suggest that risk disclosures are of little help for investors when making their investment decisions. It is necessary to provide more empirical evidence on the usefulness of risk disclosures. The available literature is pointing in the direction that high quality risk disclosures are useful for investors. Following the findings of Miihkinen (2013), it is expected that there is a negative correlation between the quality of risk disclosures and information asymmetry in the insurance sector. Therefore the first hypothesis is formulated as:

> *Hypothesis 1*. High quality risk disclosures reduce the information asymmetry between insurance companies and their investors.

Once the primary relation between the aggregate of risk disclosures quality and information asymmetry is established, the same relation can be tested for the disaggregated risk disclosures quality. In order to investigate this, hypothesis two distinguishes between different categories of risk disclosures an insurer can report on. Hypothesis two regards the degree of usefulness of these different categories.

Prior literature does not distinguish between different risk disclosure categories. This is because it is difficult to gather empirical evidence on the relative usefulness of specific disclosure items (Baumann & Nier, 2004). The risk disclosure practices by non-financial and financial firms have been investigated by Lajili & Zéghal (2009). They found that most risk disclosures were on financial, market and commodity risk (Lajili & Zéghal, 2009). The assumption could be made that firms mostly disclose on risks that they find useful to investors. However, this assumption does not have to be made if a market-based approach is taken and the relative effect of the different risk disclosure categories on the market is measured. Although it remains difficult to gather empirical evidence, knowing what kind of risk disclosures is useful to investors is still relevant information. As prior literature suggests that some risk categories are reported more heavily on, the expectation is that not all risk disclosure categories reported by insurance companies are equally useful to investors in their investment decisions. Following the research of Lajili & Zéghal (2009), it is expected that risk disclosures on market risk and credit risks are most useful to investors in their investment decision. Therefore the second hypothesis is formulated as:

> *Hypothesis 2*. Risk disclosures on market risk and credit risk are more important in reducing the information asymmetry between insurer and their investors than disclosures on other risk categories.

4.3 Summary

In this chapter the hypotheses development was discussed. The first hypothesis considers the relation between the main concepts of this thesis namely risk disclosure quality and information asymmetry. Based on prior literature it is expected that the aggregated risk disclosure quality is negatively correlated with information asymmetry between the investor and the insurance company. The first and main relation is visualised in the figure four.

The second hypothesis considers the disaggregated risk disclosure quality. It is expected that the different risk disclosure categories are not equally useful to investors. Following previous literature of Lajili & Zeghál (2009), it is expected that disclosures on market risk and credit risk are most useful in reducing information asymmetry between investors and insurance companies.

Chapter 5 Research method

In this chapter the research method is explained. This chapter consists of three parts, namely the gathering of data, the analysis of the data and attaching conclusions to the data. The gathering of data is done by content analysis and using databases. Different methods of content analysis are discussed in this section. These methods are subjective methods, semi-objective methods and disclosure index studies. The analysis of the data is done by using the linear regression model function in SPSS. The variables of the models used in this thesis are also discussed in this section. Lastly, the tests conducted on the outcomes of the regression models (the betas) are explained.

5.1 Sample

The sample considered in this thesis is obtained from the Dow Jones STOXX Europe 600 Insurance Index. The initial sample consisted of 40 European insurers. From this initial sample 16 companies were excluded. A company was excluded if:

1. The company is a reinsurance company. Reinsurance companies are excluded from the sample as their business model is significantly different from primary insurers (Höring & Gründl, 2011). Because of the different business model, the risk experienced by a reinsurer and a primary insurer are significantly different (Höring & Gründl, 2011). Therefore reinsurance firms need different risk disclosure indices to assess the risk disclosure quality than primary insurers; or
2. The company did not yet exist in 2007. These companies are excluded because both the annual reports of 2007 and 2013 of the sample companies are considered in this thesis; or
3. The company did not provide the annual report of 2013 at the 20th of June 2014. These companies are excluded because both the annual reports of 2007 and 2013 of the sample companies are considered in this thesis;
4. The company did not provide its annual report in English, Dutch or German at the 20th of June 2014. These companies are excluded, since the coder used in the coding process does not have sufficient knowledge of other languages than English, Dutch and German; or
5. The data necessary for running the regression is not available for the company. These companies are excluded because they cannot be examined by the models used in this thesis.

After excluding the above mentioned companies a sample of 24 companies remained. These insurance companies were home-based in Austria, Denmark, Finland, France, Germany, Italy, Netherlands, Norway, Spain, Switzerland or the UK. A complete list of the sample firms and the firms which were excluded can be found in Appendix C.

The years considered in this thesis are 2007 and 2013. The reason that these years are chosen is that in these years risk disclosures in the annual reports of insurance companies are expected to be significant. In 2007 IFRS 7 and IFRS 4 were introduced (IASB, 2014). This has led to increased risk reporting in financial instruments. For quite some time the expected introduction of Solvency II regulation has been on the first of January 2013 (Ernst & Young LLP, 2013). Although the regulation was not introduced in 2013 yet, the majority of the insurance companies in Europe have been preparing for implementation on this date (Ernst & Young LLP, 2013). It can be expected that, although the risk reporting field is a rather new one, there has been a learning effect as of 2007 regarding risk reporting by insurance companies. Because of this learning curve and the gap in years between introduction of IFRS 7 and expected introduction of Solvency II, the risk disclosure quantity and quality is expected to be different in 2007 and 2013. This enables the investigation of different levels in the quality of risk reporting.

5.2 Research method

From the sample mentioned above the necessary data should be retrieved and analysed. The data collection is done by content analysis and retrieving data from databases. The method and sources of this data gathering is explained in the following sections.

5.2.1 Data gathering

A good method for the analysis of narratives which is often used by social sciences is content analysis (Beattie, et al., 2004). Content analysis is the categorization of information items, meaning that text units in a text are analyzed and classified in a certain category (Beattie, et al., 2004). For this thesis the narratives considered are the management discussion & analysis (MD&A section) and the notes of the annual reports of the insurance companies. Content analysis can be done in three ways, namely by subjective analysis, semi-objective textual analysis and disclosure index studies (Beattie, et al., 2004). Each of these approaches will be discussed briefly. This is done to give insight in which research methods are possible for this thesis and why the chosen research method is the most appropriate one.

Subjective analysis approach

The subjective analysis approach to content analysis uses analysts disclosures scores (Beattie, et al., 2004). Analysts were asked to rate the disclosure quality of different companies, which resulted in disclosure scores. Up until 1997 the Association of Investment Management and Research (AIMR) provided these scores for US companies (Beattie, et al., 2004). It included an overall measure of disclosure quality from externally communicated reports (Beattie, et al., 2004). Annual, semi-annual and quarterly reports were analyzed. These scores are not available for years after 1997. A solution to receive the same data would be to approach analysts directly with the question to analyze reports on disclosure quality. However, this has a low chance of success because analysts might not take the request serious and bias their results (Beattie, et al., 2004). Results can be biased because analysts are economic agents and they benefit from increased trading. Therefore the analysts might have the incentive to assess the quality of risk disclosures more optimistically (Keung, et al., 2010). Currently another replacement of the AIMR scores are the Securities and Exchange Commission (SEC) ratings of MD&A compliance (Beattie, et al., 2004).

A major drawback of the use of these ratings is that it is restricted to American companies. This thesis focusses on Europe and there no comparable ratings are available. Therefore, this approach is not taken for this thesis.

Semi-objective approach

A semi-objective approach to content analysis is textual analysis. Textual analysis can be subdivided into thematic content analysis, readability studies and linguistic analysis (Beattie, et al., 2004). Thematic analysis includes analyzing the content of narratives on certain themes. Either words or sentences can be used as coding unit. Every word or sentence regarding a pre-specified theme is scored. This approach is used in risk disclosure studies by Linsley & Shrives (2006), Lajili & Zéghal (2009) and Miihkinen (2013). Since this method only investigates the amount of disclosures and does not take into account special features of risk disclosures, this method of thematic analysis is not taken.

Readability studies are studies that try to quantify the level of difficulty of a text (Beattie, et al., 2004). Usually a formula is used, which includes benchmarks for pieces of texts in order to assess the difficulty of a specific text. An example of a benchmark is for which target group the text is intended (Beattie, et al., 2004). A text intended for college students is usually more difficult than a text intended for high school students.

This method has three major drawbacks. Firstly, the interest and intentions of the reader are not taken into account (Beattie, et al., 2004). An investor has different incentives to read an annual report than an employee of that company has. Therefore, the difficulty of reading this type of text might differ between these two people.

Secondly, this method takes into account individual words or sentences, but ignores the impact of the entire piece of text (Beattie, et al., 2004). Lastly, the method for analyzing texts which are written by children, teens or adults might need different measurements (Beattie, et al., 2004). However, the method does not distinguish between those types of measurements. Because of these drawbacks the method of readability is not chosen for this thesis.

The last type of textual analysis in this context is linguistic analysis. This type of analysis focusses on texture of a text. A text is analyzed on different characteristics such as topicality[6], intertextuality[7], conjunction[8], connectivity[9], information category shift[10] and specificity[11] (Beattie, et al., 2004). The individual scores of the sub-indices are added up to come to a final score. This method makes the assumption that texts with more texture are of higher quality (Beattie, et al., 2004). Since this thesis focusses on risk disclosures content and not on the texture of the narratives, the method of linguistic analysis is not chosen.

Another semi-objective approach to content analysis is a disclosure index study. The disclosure index study approach is used in this thesis. In a disclosure index study a list of information items is pre-specified (Höring & Gründl, 2011). Narratives are analyzed and scores are awarded based on the presence of the pre-specified items (Höring & Gründl, 2011). This method assumes that the quantity of disclosures on specific items is a proxy for overall disclosure quality (Beattie, et al., 2004). Either a nominal scoring system or an ordinal score can be used to assign values to the information items (Beattie, et al., 2004). In a nominal system the value of 1 is assigned when the item is present in the narrative and a value of 0 when it is not. In an ordinal score different scores can be assigned to *how* on an item is disclosed in order to capture the degree of specificity (Beattie, et al., 2004) .

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[6] Topicality is defined as the "quality of being topical" (Sydserff & Weetman, 1999). This means that the quality of a text is evaluated by the fact that it is regarding a certain topic.

[7] Intertextuality is "the need for one text to be read in light of its allusions to and differences from the content or structure of other texts" (Sydserff & Weetman, 1999).

[8] Conjunction is defined as "the fact or condition of being conjoined" (Sydserff & Weetman, 1999). In the case of linguistic analysis, conjunction refers to the fact that the text is coherent, even though the text is a combination of separate paragraphs.

[9] Connectivity refers to "the characteristic, or order, or degree of being connected (Sydserff & Weetman, 1999). In the case of linguistic analysis this means that different parts of the text are connected to each other.

[10] Information category shift refers to how the text deals with shifting from one category of information to the other (Höring & Gründl, 2011).

[11] Specificity is defined as "the quality or fact of being specific (Sydserff & Weetman, 1999).

An example of an ordinal approach can be that the value 0 is assigned when no disclosure is present, a value of 1 when a qualitative disclosure is included and a value of 2 when a quantitative disclosure is detected. Eventually the scores are added up to a total score, which represents the quality of the disclosures. In the process of adding up, one can choose to let certain disclosures weigh more than others in the final value of the disclosure quality. Risk disclosure research that uses disclosure index studies are Baumann & Nier (2004), Deumes (2008), Pérignon & Smith (2010) and Höring & Gründl (2011). Known disadvantages of this approach is that it is limited to publicly available information such as annual reports, it is subjective in creating the indices and it is subjective in the scoring process (Höring & Gründl, 2011). Additionally one should be cautious for some problems which are present when using disclosure index study. These problems are the reliability and validity of the study, whether the study can be replicated by others and whether the index is measuring what the index should be measuring (Höring & Gründl, 2011).

Nevertheless, this method is taken for this thesis. Using disclosure indices enables the measurement of risk disclosure features and can be tailor-made to insurance companies. There is no index for insurance companies' risk disclosures available and therefore one will be constructed. The indices will be based on the risks apparent in the insurance sector and special features of risk disclosures. Next the indices used in this thesis will be discussed.

Disclosure indices

Eight sub-indices are developed for the analysis of the insurance companies' annual reports. Each sub-index represents a risk category identified by Höring & Gründl (2011). Additionally, the sub-indices are supplemented with risk aspects of the different risk categories as identified by Doff (2006). Please refer to appendix A for the definitions of all identified risks. The sub-indices are as follows:

1. The **risk overview** sub-index is focussing on the overall risk management strategy of the insurance company.
2. The **underwriting risk for non-life insurance** sub-index is addressing the underwriting risk for the non-life insurance part of the insurance company. Non-life insurance underwriting risk is defined as the risks resulting from underwriting non-life insurance (EIOPA, 2013). The components of non-life insurance underwriting risks are premium risk, reserve risk and catastrophe risk (Doff, 2006).
3. The **underwriting risks for life insurance** sub-index addresses the underwriting risk for the life insurance part of the insurer. Life-underwriting risk is defined as the risks arising from the underwriting of life insurance, which is the result of the parameters on which the life insurance is based and the business conduct (EIOPA, 2013). These parameters are mortality risk, expense risk, lapse risk and morbidity risk (Doff, 2006).

4. The **market risk** sub-index regards the risks that values are changing due to changing market prices or volatile market prices (Comité Européen des Assurances, Groupe Consultatif, 2007). Market risk comprises of equity risk, interest rate risk, real estate risk and currency risk (Doff, 2006).
5. The **credit risk** sub-index captures the risk disclosures associated with the risk of counterparties failing to meet their contractual obligations (Comité Européen des Assurances, Groupe Consultatif, 2007). The two components of credit risks are default risk and settlement risk (Doff, 2006).
6. The **operational risk** sub-index regards the risk of incurring losses in the daily operations due to internal factors or external events (Comité Européen des Assurances, Groupe Consultatif, 2007). The operational risk contains business risk, legal risk, model risk and expense risk (Doff, 2006).
7. The **liquidity risk** sub-index is about the liquidity of a company. Is includes the risk of having too little liquid assets to fulfil a cash outflow required to a policyholder (Comité Européen des Assurances, Groupe Consultatif, 2007). The components of this sub-index are trading risk and funding risk (Comité Européen des Assurances, Groupe Consultatif, 2007).
8. The sub-index **other risks** is included to code any remaining risk, which cannot be categorised into other sub-index.

In each of the sub-indices an insurance company can score on information items. These information items relate to the aspects that are identified to lead to a higher quality of risk disclosures. These information items are following the research of Höring & Gründl (2011). Additionally these information items are supplemented with information items regarding risk disclosure components which are identified by Doff (2006). In order to increase the validity of the disclosure index study, the disclosure index study is also discussed with an expert in reporting of insurance companies, Rob Gaillart. Mister Gaillart is a chartered public accountant at Ernst & Young Accountant LLP and has audited and advised several insurance companies. He has confirmed that the disclosure framework is complete and suitable for investigating the risk reporting of insurance companies.

In general the pre-specified information items are related to:

1. Provision of a definition of the risk (Höring & Gründl, 2011);
2. Provision of information on how the risk is identified (Höring & Gründl, 2011);
3. Elaboration on the strategy and principles implemented to manage the risk (Höring & Gründl, 2011);
4. Explanation of process, method and organisation to manage the risk (Höring & Gründl, 2011);
5. Quantification of the risk and capital management information (Linsley & Shrives, 2006);

6. Completeness of information: disclosed on all components of risk as identified by Doff (2006);

The sub-indices and information items in the disclosure index study of Höring and Gründl (2011) are based on the proposed Solvency II regulation. The disclosure index study incorporates the requirements regarding risk disclosures as required by IFRS 7, IFRS 4 and the Solvency II framework. These (proposed) requirements can be found in chapter two, where the current and future regulation regarding risk disclosures was discussed. The disclosure index study does not take into account all of the proposed requirements from the exposure draft on insurance contracts by the IASB. Two requirements not considered in the disclosure index study:

1. The discussion of the effect of different regulatory frameworks in which the entity operates;
2. The maximum exposure on credit risk.

The specific disclosure index items which are considered in each sub-index can be found in Appendix D. For the above mentioned information items an ordinal scoring system is used. A value of 0 is given in the case that a company does not provide information on the information item. In the case in which the company does provide information, but the information is limited, a value of 1 is assigned. Lastly, in cases in which the company provides extensive information on the information items, a value of 2 is assigned. For example in sub-index 'risk overview' does company X not "provide a list and definitions of the risk identified". Company X will receive a value of 0 on this specific information item. Company Y does provide a list and brief definition of risks identified. This company would receive a value of 1 on the information item. Lastly, company Z provides a list and extensive definitions of the risks identified. Company Z would receive a value of 2 on the information item.

After the MD&A section and the notes of the financial statements are analysed and values to the information items are assigned, the total value assigned is calculated by adding up all the values assigned to the individual information items. This total value is divided by the maximum total score. A maximum score can be achieved if the an insurer provides extensive information on all information items identified in the disclosure index study. The maximum total score for a company providing both life insurance and non-life insurance is 124. This is calculated by the number of information items on which such an insurer can score times the maximum score per information item (which is 2). The maximum total score for a company providing either life insurance or non-life insurance is 102. This results in a value of risk disclosure quality between 0 and 1. The results of the disclosure index study can be found in appendix F.

Next to data on risk disclosure quality, data on the other variables considered in the linear regression model should be gathered. For this information different databases are considered. The databases used are Datastream and Factset. Additionally the information regarding US cross-listing is obtained via NASDAQ and Dow Jones listing. An overview of the variables used in the linear regression model, along with their calculation and source, can be found in Appendix E.

5.2.2 Linear regression models

In this thesis four linear regression models are used to examine the data. The models are inspired by Miihkinen (2013) and Höring & Gründl (2011). Models with relative bid ask spread as independent variable are considered as well models with trading volume as independent variable. The dependent variables are the aggregated and disaggregated risk disclosure quality information as gathered by the disclosure index study. As explained in chapter four, the effect of the aggregated risk disclosure quality is of interest in the first hypothesis and the disaggregated risk disclosure quality is the variable of interest in hypothesis two. This has resulted in four models as displayed below.

	Relative bid-ask spread	*Trading volume*
Aggregated risk disclosure quality	Model A	Model B
Disaggregated risk disclosure quality	Model C	Model D

Table 2 Overview regression models

The linear regression models testing the effect of the aggregated risk disclosure quality on information asymmetry are:

Model A

$$Relative\ bid-ask\ spread = \beta_0 + \beta_1 RDQ_{iy} + \beta_2 Mcap + \beta_3 Volatility + \beta_4 ForOwn + \beta_5 DCros + \beta_6 Freefloat + \beta_7 LNL + \beta_8 Analystsfollowing + \beta_9 PageCount + \beta_{10} DBank + \beta_{11} DDen + \beta_{12} DFin + \beta_{13} DFra + \beta_{14} DGer + \beta_{15} DIta + \beta_{16} DNet + \beta_{17} DNor + \beta_{18} DSpa + \beta_{19} DSwi + \beta_{20} DUK + \varepsilon_i$$

Model B

$$Trading\ volume = \beta_0 + \beta_1 RDQ_{iy} + \beta_2 Mcap + \beta_3 Volatility + \beta_4 ForOwn + \beta_5 DCros + \beta_6 Freefloat + \beta_7 LNL + \beta_8 Analystsfollowing + \beta_9 PageCount + \beta_{10} DBank + \beta_{11} DDen + \beta_{12} DFin + \beta_{13} DFra + \beta_{14} DGer + \beta_{15} DIta + \beta_{16} DNet + \beta_{17} DNor + \beta_{18} DSpa + \beta_{19} DSwi + \beta_{20} DUK + \varepsilon_i$$

The models for researching the effect of disaggregated risk disclosure quality on information asymmetry are:

Model C

$$Relative\ bid-ask\ spread = \beta_0 + \beta_1 RDQ_{iyx} + \beta_2 Mcap + \beta_3 Volatility + \beta_4 ForOwn + \beta_5 DCros + \beta_6 Freefloat + \beta_7 LNL + \beta_8 Analystsfollowing + \beta_9 PageCount + \beta_{10} DBank + \beta_{11} DDen + \beta_{12} DFin + \beta_{13} DFra + \beta_{14} DGer + \beta_{15} DIta + \beta_{16} DNet + \beta_{17} DNor + \beta_{18} DSpa + \beta_{19} DSwi + \beta_{20} DUK + \varepsilon_i$$

Model D

$$Trading\ volume = \beta_0 + \beta_1 RDQ_{iyx} + \beta_2 Mcap + \beta_3 Volatility + \beta_4 ForOwn + \beta_5 DCros + \beta_6 Freefloat + \beta_7 LNL + \beta_8 Analystsfollowing + \beta_9 PageCount + \beta_{10} DBank + \beta_{11} DDen + \beta_{12} DFin + \beta_{13} DFra + \beta_{14} DGer + \beta_{15} DIta + \beta_{16} DNet + \beta_{17} DNor + \beta_{18} DSpa + \beta_{19} DSwi + \beta_{20} DUK + \varepsilon_i$$

In these models the β refers to the regression parameters that need to be estimated and ε to the residual of the regression. The subscription i and y represent the sample firm and the sample year, respectively. The subscription x refers to the different risk categories. The different variables will be discussed in the following paragraphs.

Dependent variables

The dependent variables considered in this thesis are relative bid-ask spread and trading volume. In model A and C three month average (centered to the report date) daily relative bid-ask spread is the dependent variable. The calculation of this number involves two steps. First the daily spread is calculated as: $Spread = \frac{\text{AskPrice}-\text{BidPrice}}{(\text{AskPrice}+\text{BidPrice})/2} * 100$

Where AskPrice refers to daily closing ask price in euros and BidPrice to daily closing bid price in euros. Next the three month average of the relative bid-ask spread centered to the report date is calculated. The calculation of this variable is done for both 2007 and 2013. The result is the three month average of the daily relative bid-ask spread centered to the report date of 2007 and 2013. The resulting value is used as the dependent variable in the Spread model, which is following the research of Miihkinen (2013). The three month period is considered suitable. If a smaller period would have been taken, the effect of the issuance of the report would be significant and the occurrence of a possible post-announcement drift may alter the results. A larger period might increasingly be affected by other events happening throughout the year. The same reasoning goes for the other variables for which the three-month average is taken.

The second independent variable is the three month average trading volume. This independent variable is used in model B and D. The calculation of this number involves two steps. First the daily volume of trading is calculated as:

$$Volume = \frac{\text{DailyTradingVolume}}{\text{NbrShares}} * 100$$

Where daily trading volume is measured as daily total euro amount traded in the shares of the considered company. The number of shares refers to the total number of shares issued by the considered company. Next the three month average of the daily trading volume is taken. This calculation is done for 2007 and 2013. The result is the three month average daily trading volume of 2007 and 2013. Using the three-month average daily trading volume as a dependent variable is following the research of Miihkinen (2013).

The above mentioned two dependent variables are both measures of information asymmetry. Two measures are taken, because it is necessary to measure information asymmetry in different perspectives (Miihkinen, 2013).

Independent variables

The relation between the quality of the risk disclosures in the annual report of an insurer and the information asymmetry between that insurer and its investor is the central topic of this thesis. Because of this, the independent variable is the risk disclosure quality. The effect of the quality of the risk disclosure in general (the aggregated score) on information asymmetry is tested in hypothesis one. The aggregated score on risk disclosure quality is represented by independent variable RDQ_{iy}:

$$RDQ_{iy} = total\ quality\ of\ risk\ disclosure$$

Where subscript i refers to the sample firm and subscript y to the sample year.

In order to test the second hypothesis, the effect of the risk disclosure quality in the different risk categories on information asymmetry is tested. The quality of risk disclosure on the different risk categories are represented by independent the variable RDQ_{iyx}:

$$RDQ_{iyx} = quality\ of\ the\ risk\ disclosure\ of\ risk\ category\ x$$

Where subscript i refers to the sample firm and subscript y to the sample year. X relates to the different risk categories, which are underwriting non-life insurance risk, underwriting life insurance risk, market risk, credit risk, operational risk and liquidity risk.

Control variables

In total ten control variables are included in the linear regression models. These are market capitalisation, volatility of the stock, US cross-listing, foreign ownership, ownership concentration, type of insurance, number of analysts following the firm, page count of the annual report, banking activity and dummies for different countries. Each variable will be explained briefly in the next few paragraphs.

Market capitalization is a proxy for the size of the firm. Linsley & Shrives (2006) found that the size of a firm significantly influences the risk disclosures in the annual report. Therefore this control variable (Mcap) is included in the model.

The **volatility of the stock** is a measure of overall market risk of the firm (Miihkinen, 2013). It is considered to influence the number of risk disclosures significantly, therefore a control variable (Volatility) is included in the linear regression model. The three month average of the volatility is used.

Foreign ownership is considered to influence the number of risk disclosures in the annual report. In order to account for the effect of foreign ownership, control variable ForOwn (foreign owned shares as a percentage of total shares) is included in the linear regression model. This is following the research of Miihkinen (2013).

Ownership by short-term investors increases the amount of risk disclosures in the annual report (Abraham & Cox, 2007). Whether investors are investing over a long horizon or in a shorter time window, is also likely to affect the amount of shares they possess (Abraham & Cox, 2007). Therefore **ownership dispersion** is included in the linear regression model as control variable FreeFloat. This proxy is calculated as percentage of free float relative to total number of shares. The free float of a company is the number of shares which are available for public trading (Höring & Gründl, 2011). The higher the free float, the shorter the ownership and the lower the amount of shares possessed per investor (Höring & Gründl, 2011). This would result in more extensive risk reporting according to Abraham & Cox (2007). Höring and Gründl (2011) also found that a higher percentage of free float results in more risk reporting.

The **page count of the annual report** is likely to affect the number of risk disclosures as well. If the annual report is bigger in general and the information content of the annual report is normally distributed, than it can be logically expected that the number of risk disclosures is also bigger. Because of this the number of pages in the annual report (PageCount) is included in the linear regression model as a control variable.

The **number of analyst following**, (Anfol) is also incorporated into the linear regression models. It is expected that the more attention a company is receiving from analysts, the more the company will feel the pressure to disclose more information (Miihkinen, 2013). This affects both the number of risk disclosures as well as the information asymmetry and should therefore be included as a control variable.

Prior literature already found that cross **listing in the US** alters the number of risk disclosures (Abraham & Cox, 2007); (Bozzolan, et al., 2009). Therefore a dummy variable for US listing (DCross) is included as a control variable. This is in line with Höring and Gründl (2011).

The **type of insurance** an insurer is providing also has effect on the risks they are facing. This influences the level and content of their risk disclosures (Höring & Gründl, 2011). Additionally the information asymmetry is considered to vary across types of insurers (Höring & Gründl, 2011). Therefore, a control variable for type of insurance if included, namely LNL. A distinction is made between insurers providing life insurance en those which provide non-life insurance. The control variable is a dummy variable with the value 1 if the company provides life insurance and non-life insurance. The variable has a value of 0 if the company only provides non-life insurance.

Höring and Gründl (2011) indicate that many insurers also engage in **banking activities**. This alters the insurers risk profile and would therefore result in different risk disclosures an insurer makes (Höring & Gründl, 2011). Different levels of transparency also exist across insurers and banks (Höring & Gründl, 2011). Because of these facts, a control variable DBank is included in the linear moxed model. The dummy variable has the value of 1 if the company also engages in banking activities and a value of 0 if the company does not engage in banking activities.

The risk reporting practices and normal levels of information asymmetry might differ across the **different countries** considered in the sample. If dummy variables for countries are used in a linear regression model, one country has to serve as a reference country (Nieuwenhuis, 2010). The choice of reference country does not influence the outcome of the model. In this thesis the reference country is Austria. Dummy variables for Denmark, Finland, France, Germany, Italy, Netherlands, Norway, Spain, Switzerland and UK are incorporated into the linear regression model.

The risk reporting practices and level of information asymmetry as measured by relative bid-ask spread and trading volume is also considered to vary across the different years considered in this thesis. Therefore a dummy variable **YEAR** is included in the regression models. The dummy has a value of 0 if the observation is from 2007 and a value of 1 if the observation is from 2013.

5.2.3 Statistical analysis

After running the linear regression model and obtaining the different estimates of betas, a statistical analysis of these betas can be done. Depending on the hypothesis that is tested, either a test on whether β is positive, whether β's are significantly different or whether a certain β is not equal to another β should be tested. The testing procedures for these three situations are explained in the next paragraphs.

Test for $\beta > 0$

This test should be done in order to find out whether the aggregated risk disclosure quality and the quality of the risk disclosures in different sub-indices is significantly positive or not. The appropriate steps to take are the following:

1. Specify the null and alternative hypothesis (Nieuwenhuis, 2010)

   In the case of the aggregate of risk disclosure quality the hypotheses are:

   H_0: $\beta_{RDQih} \leq 0$ H_1: $\beta_{RDQih} > 0$

   For the risk disclosure quality of the different sub-indices the hypotheses are:

   H_0: $\beta_{Xih} \leq 0$ H_1: $\beta_{Xih} > 0$

2. Specify the appropriate test statistic.

   The appropriate test statistic for testing of betas is t-test (Nieuwenhuis, 2010), for which the formula is:

   $$T = \frac{b_{ih} - \beta_{RDQih}}{s_{ih}}$$

   $$T = \frac{b_{ih} - \beta_{Xih}}{s_{ih}}$$

   Where b_{xi} is the estimate of the beta as a result of the linear regression model, β is the value of the beta to be tested (in this case 0) and s_{xi} is the estimate of the standard deviation of the beta as a result of the linear regression model (Nieuwenhuis, 2010). As prior in this thesis, subscript i and h refer to the firm and value of the risk disclosure quality, respectively.

3. Determine the rejection region.

   The rejection region is depending on the degrees of freedom (df) and considered probability of certainty (alpha, α) (Nieuwenhuis, 2010). In this thesis a α of 5% is considered. The degrees of freedom are a result of the number of observations minus one. As the number of observations is 54, the degrees of freedom become 53. The rejection region therefore becomes:

   $t > T_{\alpha;df}$ $t > -1{,}67412$

4. Compute the value of the test statistic.
   This step requires filling in the values retrieved from the regression model in the formula of the t-test (Nieuwenhuis, 2010).
5. Decide on whether to accept or reject the null hypothesis (Nieuwenhuis, 2010).
   Lastly the computed value of the 4th step is compared to the rejection region in the 3rd step.

Test for significantly different β's

For testing the significant difference between β's, the same procedure can be taken. However, the hypothesis is altered and the b_{ih} in step four becomes the difference of the two β's up for the test. In this way it is tested whether the difference between the β's is significantly bigger than 0. Procedure becomes:

1. H_0: $\beta_{Xia} - \beta_{Xib} \leq 0$ H_1: $\beta_{Xia} - \beta_{Xib} > 0$
2. Test statistic stays the same
3. Rejection region stays the same
4. Input of b_{ih} becomes the difference of the two β's up for the test.
5. Procedure to draw conclusion stays the same

5.3 Summary

This section explained the research method used in this thesis. This method consists of three parts, namely the gathering of data, the analysis of the data using a regression model and the statistical analysis of the regression estimates.

The first part is regarding the gathering of data. A sample of 39 European primary insurance companies, as listed in the Dow Jones STOXX European 600 Insurance index, was retrieved. From these companies the information regarding their risk disclosure quality is gathered using content analysis of their annual report. These annual reports were obtained from the company's website.
Content analysis of the narratives of the annual report can be done using a subjective approach, semi-objective approach or risk disclosure index study. The subjective approach uses analysts' perceptions of disclosure quality. The semi objective approach is a textual analysis, which includes the analysis of texts in terms of texture, readability or linguistics. The method of content analysis used in this thesis is risk disclosure index study. This means that annual reports are given scores based on the presence of information on different aspects of risks.

These scores can be obtained in different sub-indices, which each represent a risk an insurance company can face. The different aspects on which the annual report can receive a score are on providing a definition of the risk, elaboration on the principle on which risk is managed, elaborating on the policies which are used to manage the risk and whether complete information (bad/good risk, forward/backward looking risk and on all identified risks) are given. The specific sub-indices and aspects on which an insurance company can score can be found in Appendix D.

After the gathering of the data, the analysis can be done. This is done via a regression model. In this model the dependent variables are relative bid-ask spread and trading volume. The independent variables are the aggregated information on risk disclosure quality and the disaggregated information on risk disclosure quality (per sub-index). In addition ten control variables are included. These are market capitalisation, volatility of the stock, US cross-listing, foreign ownership, ownership concentration, type of insurance, number of analysts following the firm, page count of the annual report, banking activity and dummies for different countries. Running the regression model will result in estimates of the beta coefficients in of the different risk disclosure quality indexes.

The last step in the research method is drawing conclusions on the data. This is done via the statistical investigation of the estimates of the betas as resulted from the regression model. It includes testing the beta estimates for statistical significance, testing for statistical different beta estimates and for equality or non-equality of beta estimates.

Chapter 6 Results

In this section the results of the analyses are discussed. First the noteworthy remarks on the individual variables are discussed. Second, the variables are discussed in relation to each other, as the Pearson correlations are evaluated. Then the descriptive statistics of the models are elaborated on. After this the results of the regression analysis will be given. Special attention is paid to the betas and the significance of the betas. Lastly, the model assumptions are tested and the suitability of the linear regression model is discussed.

6.1 At first glance

The variables of interest for this thesis are aggregated risk disclosure quality, risk disclosure quality per risk category, relative bid-ask spread and trading volume. After the data gathering some preliminary remarks can be given on these variables.

Aggregated risk disclosure quality

After conducting the content analysis as discussed in chapter 5, the risk disclosure quality of the sample firms can be assessed. These results can be found in appendix F. Some remarks can be given on the risk disclosure practices of the sample firms. The following figure shows the aggregated quality of the risk disclosures.

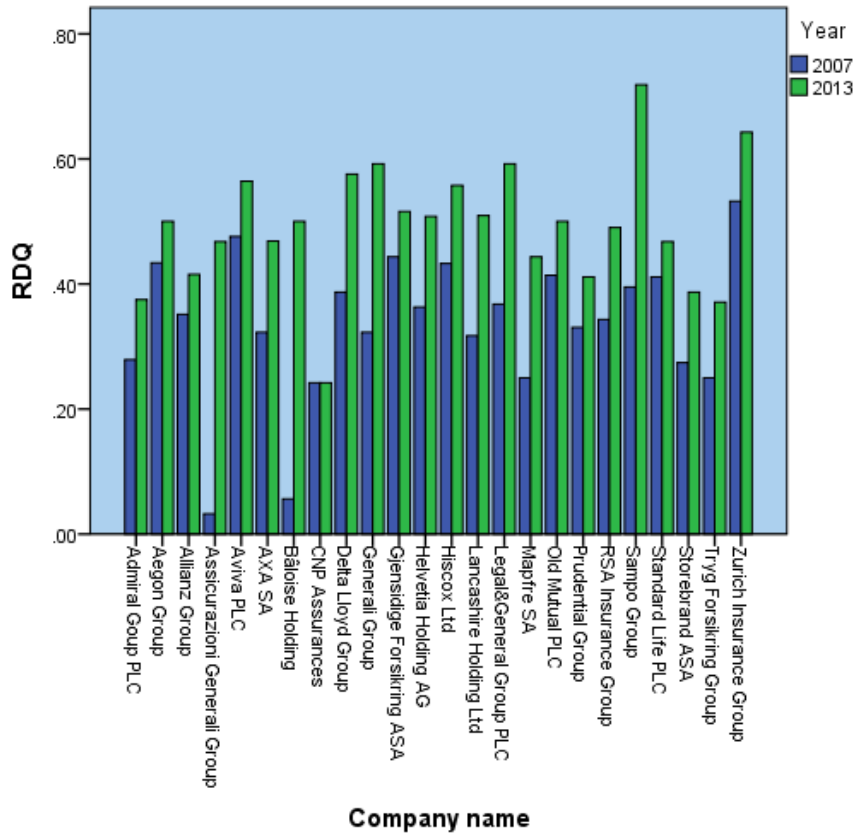


Figure 4 Aggregated risk disclosure quality per company

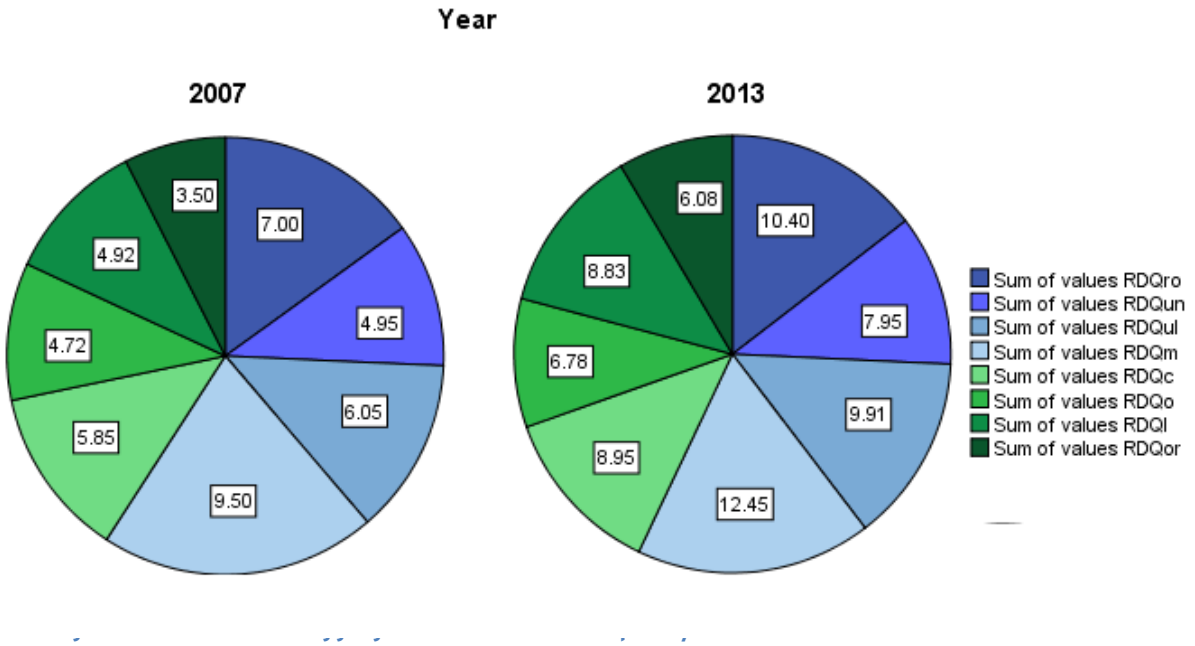
Where: RDQ refers to the aggregates quality of risk disclosures.

As can be seen in figure 4, all companies except for CNP Assurance have improved the quality of the risk disclosures in the annual report in 2013 compared to 2007 as measured by the risk disclosure index study.

As explained previously, this was expected because of the learning curve of the companies and the development of (future) regulation regarding risk reporting. The data on aggregated risk disclosure quality shows enough variation, which makes the data suitable for analysis.

Disaggregated risk disclosures

Also some remarks can be given on the data on the risk disclosure quality regarding the different risk categories. The following pie charts provide an overview of the quality of the risk disclosures per risk



Where RDQro, RDQun. RQDul. RDQm, RDQc, RDQo, RDQl and RDQor refer to the different risk disclosure indices as identified in the disclosure index study in appendix D.

The pie chart of 2007 and 2013 both reveal that the highest quality risk disclosures are regarding market risks. Lajili & Zéghal (2009) found that financial and non-financial firms provided most risk disclosures on market risks and commodity risks. The results of the disclosure index study, displayed in the pie charts show that insurance companies' highest quality risk disclosures are also regarding market risk.

Second best in terms of risk disclosure quality in both years are the risk disclosures in the sub-index of risk overview. This sub-index focuses on the general information provided on the risks of the insurer. It includes criteria such as whether the insurance company provided a list of the risks identified, the discussion of external ratings and capital adequacy.

In 2007 the third risk category on which the highest overall risk disclosure quality was given, was credit risk. In 2013 this was underwriting life risks.

Additionally some remarks on the nature of the risk disclosures provided by the insurance companies can be given. The risk disclosures are mainly qualitative in nature. Only on limited risk categories quantitative information is provided. Most risk disclosures are either neutral (explaining information about the procedure of risk management) or on bad risks (discussing what the effect and measures would be in case of a certain threat happens). Lastly, the orientation of the risk disclosures is mostly either neutral (explaining information about the procedure of risk management) or backward looking.

Relative bid-ask spread

One of the independent variables used in the regression models of this thesis is the relative bid-ask spread. The relative bid-ask spreads of 2007 and 2013 of the sample firms are displayed in the following figure.

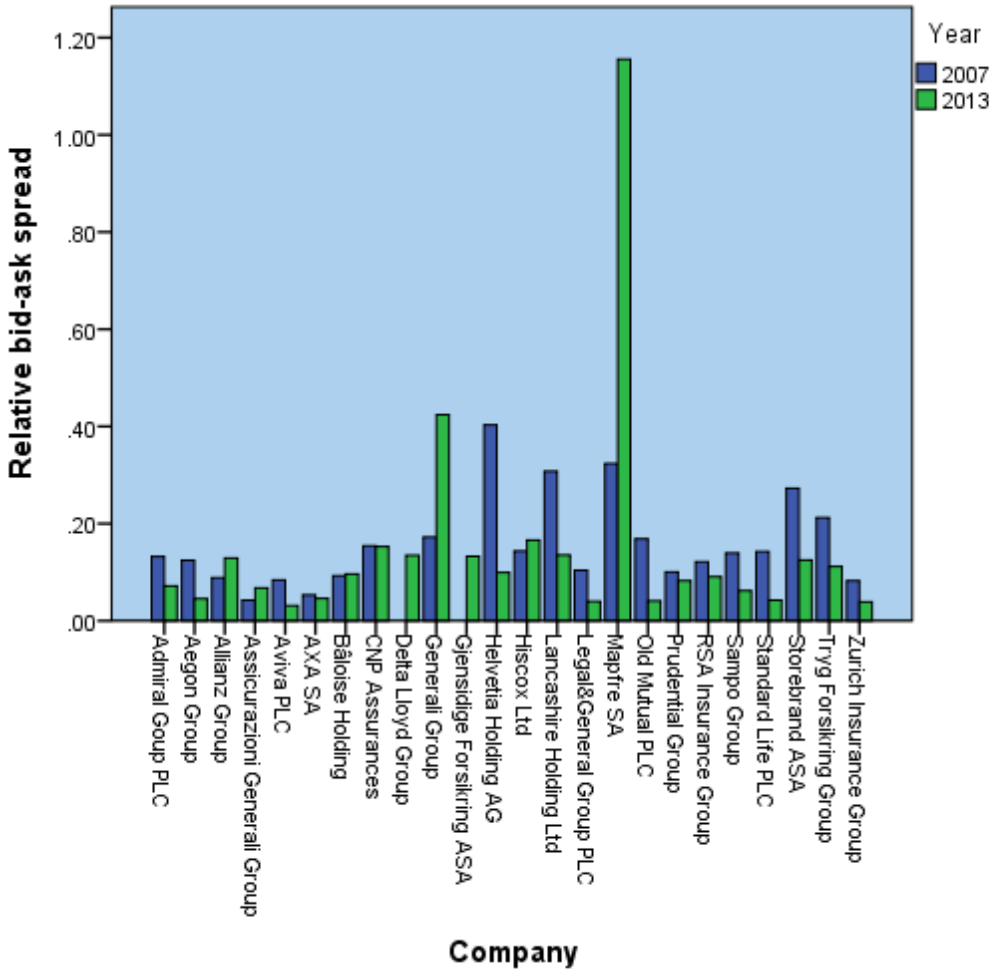


Figure 6 Three month average (centered to the report date) daily relative bid-ask spread per company

The relative bid-ask spread has decreased for most of the sample companies in 2013 compared to 2007. However, there are also quite some firms for which the relative bid-ask spread has increased in 2013 compared to 2007. Additionally, there are some companies for which the difference between the spread is extreme (Generali Group and Mapfre SA). Since the data does not show a clear cut development in the spread data, no expectations of the analysis can be given.

Trading volume

The last variable of interest in this thesis is trading volume. The following figure displays the three month average (centered to the report date) daily trading volume of the sample companies in 2007 and 2013.

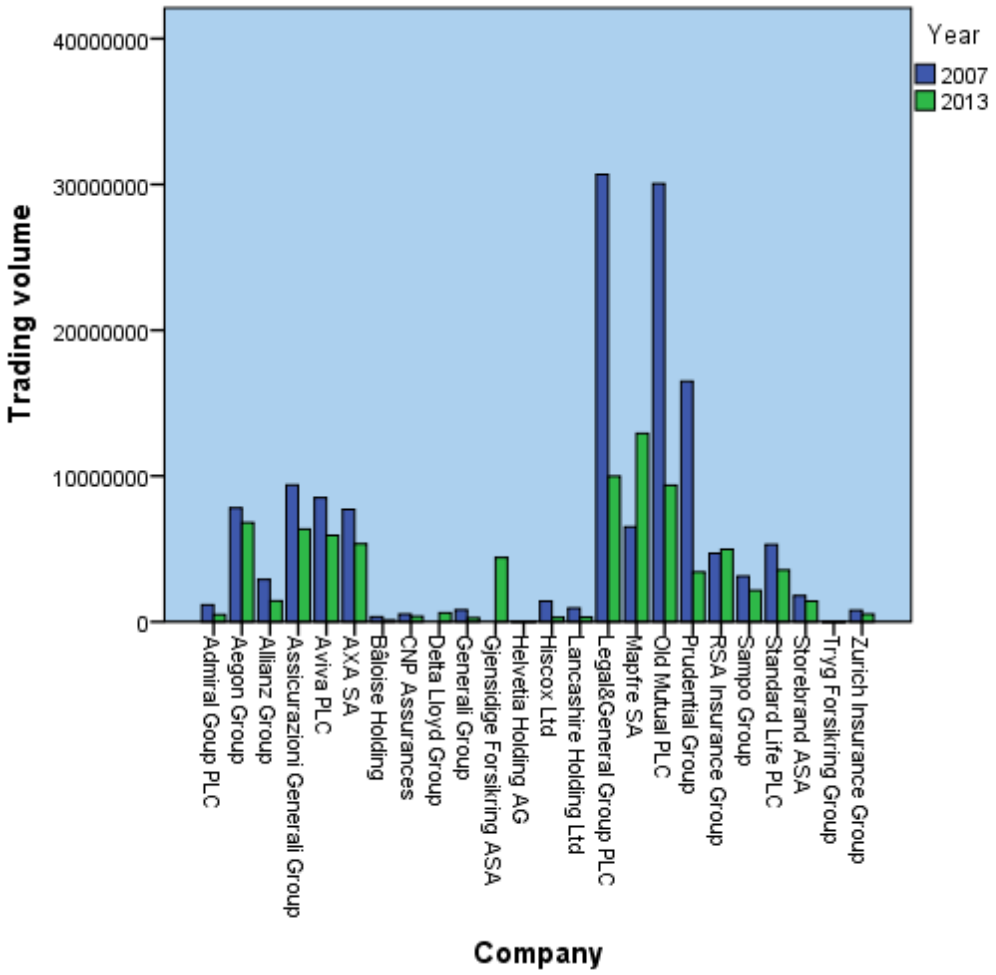


Figure 7 Three month average (centered to the report date) daily trading volume

For most of the firms, the three month average (centered to the report date) daily trading volume has decreased in 2013 compared to 2007. For only a few firms did the variable increase in 2013 compared to 2007. A possible explanation for the lower amounts of trading is the economic climate in 2013 compared to 2007. In 2007 the financial crisis was about to begin and investors were still optimistic. In 2013 the financial crisis has had its peak point, but investors are still pessimistic regarding the market. Therefore it could be the case that investors trade less in 2013 compared to 2007. The decrease is not in line with the expected values, as it was expected that the trading volume in 2013 would be higher than 2007. This also has implications for the expected outcome of the analysis.

The first glance of the risk disclosure quality revealed that the risk disclosure quality has increased in 2013 compared to 2007. If an increase in trading volume could have been observed in the figure above, the expectation that risk disclosures reduce information asymmetry as measured by trading volume, would have hold. However, a decrease in trading volume in 2013 compared to 2007 is detectable. Therefore the expectation as to whether increased risk disclosure quality would lead to more trading needs to be adjusted.

6.2 Correlation analysis

At this point the variables of interest in this thesis have been discussed individually. Now it is time to look at the relationship between all considered variables. The relation between the different variables considered is measured by the Pearson correlation. If two variables completely correlate, the Pearson correlation value is 1. If the two variables do not correlate at all, the Pearson correlation value is 0. In the table on the next page, the Pearson correlation matrix is given. In this thesis an α of 5% is used to determine whether variables significantly correlate with each other. In the correlation matrix, the significant correlations are indicated with a *.

The expectation was that the independent variables of the regression model (RDQ, RDQro, RDQun. RQDul. RDQm, RDQc, RDQo, RDQl and RDQor) would correlate with the dependent variables (spread and volume). However, as can be seen in the correlation matrix, this is not the case. Therefore, the expectation that risk disclosures reduce the information asymmetry in terms of relative bid-ask spread and trading volume will probably not hold.

Although no individual control variable or independent variable is significantly correlated with the dependent variables, none of the independent variables or control variables is left out. This has to do with the fact that although the variables might not be individually significant, it might be the case that the variables combined are significant. This will become apparent after the regression analysis is run. Additionally, extreme correlations would have been a reason to exclude a variable from the regression. However, no extreme values are detected in the correlation matrix. Therefore no variables are going to be left out in the regression analysis.

	Spread	Volume	RDQ	RDQro	RDQun	RDQul	RDQm	RDQc	RDQo	RDQl	RDQor	Mcap	Volatility	USListing	ForOwn	OwnCon	FreeFloat	LNL	AnalFol	PageCount	DBank	DDen	DFin	DFra	DGer	DIta	DNet	DNor	DSwi	DSpa	DUK	YEAR
Spread	1	.067	-.067	-.007	.090	-.195	-.003	-.146	-.052	.066	-.162	-.172	-.052	-.175	.052	.513**	.077	.015	-.237	-.159	-.195	.012	-.063	-.089	-.053	.044	-.076	.038	-.037	.721**	-.187	-.031
Volume	.067	1	-.039	.056	-.218	-.133	.085	-.021	.120	-.052	.195	-.066	-.287	.127	.287	-.184	-.240	.210	.119	.181	-.011	-.155	-.070	-.062	-.085	-.029	.010	-.091	-.264	.157	.340*	-.228
RDQ	-.067	-.039	1	.720**	.664**	.829**	.804**	.786**	.700**	.686**	.319*	-.020	-.014	.074	.015	-.246	.020	.001	.312*	.289*	.073	-.162	.226	-.216	-.047	-.136	.138	-.019	.058	-.105	.129	.597**
RDQro	-.007	.056	.720**	1	.351*	.576**	.640**	.440**	.470**	.550**	.019	-.013	.033	.283	-.051	-.124	-.031	.180	.269	.297*	.020	.048	.192	-.313*	.096	-.208	.139	-.104	.029	.144	.059	.403**
RDQun	.090	-.218	.664**	.351*	1	.599**	.375*	.440**	.397**	.376*	.131	.043	.000	-.222	.001	.145	.013	-.225	.040	-.106	-.071	.157	.208	-.342*	-.097	.099	-.177	.025	.009	.005	.111	.384**
RDQul	-.195	-.133	.829**	.576**	.599**	1	.611**	.620**	.536**	.666**	.096	-.094	-.043	.064	.025	-.246	-.001	b	.191	.236	.127	-.276	.113	-.281	-.054	.022	.002	.103	.087	-.276	.283	.515**
RDQm	-.003	.085	.804**	.640**	.375*	.611**	1	.577**	.692**	.452**	.174	-.006	.041	-.024	-.016	-.219	.113	.214	.145	.337*	.151	-.048	.218	-.048	-.107	-.262	.080	.016	.091	-.018	.041	.490**
RDQc	-.146	-.021	.786**	.440**	.440**	.620**	.577**	1	.463**	.463**	.329*	-.046	.126	.028	-.104	-.361*	.195	-.042	.277	.217	.233	-.364*	.116	-.154	.082	-.204	.242	-.006	.210	-.158	.060	.474**
RDQo	-.052	.120	.700**	.470**	.397**	.536**	.692**	.463**	1	.292*	.272	.048	-.226	.007	.227	-.287*	-.223	.015	.243	.350*	.030	-.122	.213	.096	-.038	-.146	-.025	-.146	-.171	-.080	.255	.401**
RDQl	.066	-.052	.686**	.550**	.376*	.666**	.452**	.463**	.292*	1	.278	-.236	-.128	.067	.099	-.221	-.076	-.138	.330*	.176	.043	-.321*	.207	-.210	-.101	-.146	.077	.045	-.023	.075	.207	.414**
RDQor	-.162	.195	.319*	.019	.131	.096	.174	.329*	.272	.278	1	.095	-.196	.007	.170	-.235	-.210	-.232	.409**	.169	.106	-.164	-.015	.157	.133	-.022	.192	-.130	-.297*	-.164	.177	.252
Mcap	-.172	-.066	-.020	-.013	.043	-.094	-.006	-.046	.048	-.236	.095	1	.296*	.286	-.296*	.123	-.211	.430**	.559**	.394**	.384**	.110	-.051	.216	.518**	.255	-.091	.205	-.051	-.135	-.479**	-.002
Volatility	-.052	-.287	-.014	.033	.000	-.043	.041	.126	-.226	-.128	-.196	.296*	1	.069	-1.000**	.036	.699**	.210	.170	.028	.220	.022	-.061	-.059	.412**	-.097	-.108	-.115	.715**	-.121	-.395**	-.139
USListing	-.175	.127	.074	.283	-.222	.064	-.024	.028	.007	.067	.007	.286	.069	1	-.081	-.256	-.143	.200	.430**	.295*	-.115	-.093	-.093	-.135	.466**	-.135	.270	-.135	-.169	-.093	.115	.000
ForOwn	.052	.287	.015	-.051	.001	.025	-.016	-.104	.227	.099	.170	-.296*	-1.000**	-.081	1	-.058	-.699**	-.196	-.204	-.035	-.176	-.028	.055	.050	-.414**	.088	.134	.140	-.717**	.115	.366*	.108
OwnCon	.513**	-.184	-.246	-.124	.145	-.246	-.219	-.361*	-.287*	-.221	-.235	.123	.036	-.256	-.058	1	.174	.217	-.301*	-.217	-.359*	.409**	-.004	.050	-.148	.337*	-.141	.104	-.033	.495**	-.487**	.025
FreeFloat	.077	-.240	.020	-.031	.013	-.001	.113	.195	-.223	-.076	-.210	-.211	.699**	-.143	-.699**	.174	1	.092	-.228	-.105	-.068	.002	-.060	-.099	-.048	-.101	-.061	-.071	.702**	-.076	-.225	.018
LNL	.015	.210	.001	.180	-.225	b	.214	-.042	.015	-.138	-.232	.430**	.210	.200	-.196	.217	.092	1	.129	.502**	.346*	.093	.093	.135	.093	.135	.135	.135	.169	.093	-.577**	0.000
AnalFol	-.237	.119	.312*	.269	.040	.191	.145	.277	.243	.330*	.409**	.559**	.170	.430**	-.204	-.301*	-.228	.129	1	.520**	.190	-.365*	-.026	.117	.402**	.045	.027	-.137	.014	-.051	-.023	.304*
PageCount	-.159	.181	.289*	.297*	-.106	.236	.337*	.217	.350*	.176	.169	.394**	.028	.295*	-.035	-.217	-.105	.502**	.520**	1	.269	-.289*	-.071	.328*	.048	.196	.216	-.208	.000	-.046	-.156	.186
DBank	-.195	-.011	.073	.020	-.071	.127	.151	.233	.030	.043	.106	.384**	.220	-.115	-.176	-.359*	-.068	.346*	.190	.269	1	-.162	-.162	.078	.269	-.234	.078	.389**	.228	-.162	-.244	0.000
DDen	.012	-.155	-.162	.048	.157	-.276	-.048	-.364*	-.122	-.321*	-.164	.110	.022	-.093	-.028	.409**	.002	.093	-.365*	-.289*	-.162	1	-.043	-.063	-.043	-.063	-.063	-.063	-.079	-.043	-.162	.000
DFin	-.063	-.070	.226	.192	.208	.113	.218	.116	.213	.207	-.015	-.051	-.061	-.093	.055	-.004	-.060	.093	-.026	-.071	-.162	-.043	1	-.063	-.043	-.063	-.063	-.063	-.079	-.043	-.162	.000
DFra	-.089	-.062	-.216	-.313*	-.342*	-.281	-.048	-.154	.096	-.210	.157	.216	-.059	-.135	.050	.050	-.099	.135	.117	.328*	.078	-.063	-.063	1	-.063	-.091	-.091	-.091	-.114	-.063	-.234	.000
DGer	-.053	-.085	-.047	.096	-.097	-.054	-.107	.082	-.038	-.101	.133	.518**	.412**	.466**	-.414**	-.148	-.048	.093	.402**	.048	.269	-.043	-.043	-.063	1	-.063	-.063	-.063	-.079	-.043	-.162	.000
DIta	.044	-.029	-.136	-.208	.099	.022	-.262	-.204	-.146	-.146	-.022	.255	-.097	-.135	.088	.337*	-.101	.135	.045	.196	-.234	-.063	-.063	-.091	-.063	1	-.091	-.091	-.114	-.063	-.234	.000
DNet	-.076	.010	.138	.139	-.177	.002	.080	.242	-.025	.077	.192	-.091	-.108	.270	.134	-.141	-.061	.135	.027	.216	.078	-.063	-.063	-.091	-.063	-.091	1	-.091	-.114	-.063	-.234	.000
DNor	.038	-.091	-.019	-.104	.025	.103	.016	-.006	-.146	.045	-.130	.205	-.115	-.135	.140	.104	-.071	.135	-.137	-.208	.389**	-.063	-.063	-.091	-.063	-.091	-.091	1	-.114	-.063	-.234	.000
DSwi	-.037	-.264	.058	.029	.009	.087	.091	.210	-.171	-.023	-.297*	-.051	.715**	-.169	-.717**	-.033	.702**	.169	.014	.000	.228	-.079	-.079	-.114	-.079	-.114	-.114	-.114	1	-.079	-.293*	0.000
DSpa	.721**	.157	-.105	.144	.005	-.276	-.018	-.158	-.080	.075	-.164	-.135	-.121	-.093	.115	.495**	-.076	.093	-.051	-.046	-.162	-.043	-.043	-.063	-.043	-.063	-.063	-.063	-.079	1	-.162	.000
DUK	-.187	.340*	.129	.059	.111	.283	.041	.060	.255	.207	.177	-.479**	-.395**	.115	.366*	-.487**	-.225	-.577**	-.023	-.156	-.244	-.162	-.162	-.234	-.162	-.234	-.234	-.234	-.293*	-.162	1	0.000
YEAR	-.031	-.228	.597**	.403**	.384**	.515**	.490**	.474**	.401**	.414**	.252	-.002	-.139	.000	.108	.025	.018	0.000	.304*	.186	0.000	.000	.000	.000	.000	.000	.000	.000	0.000	.000	0.000	1

Table 3 Correlation matrix

** refers to the correlation being significant at the 0.01 level (2-tailed); * refers to the correlation being significant at the 0.05 level (2-tailed); c refers to a not computed value because at least one of the variables is constant; RDQ refers to risk disclosure quality of the sum of all risk categories; RDQro refers to the risk disclosure quality in sub-index 'risk overview'; RDQun refers to the risk disclosure quality in sub-index 'underwriting non-life risk'; RDQul refers to the risk disclosure quality in sub-index 'underwriting life risk'; RDQm refers to the risk disclosure quality in sub-index 'market risk'; RDQc refers to the risk disclosure quality in sub-index 'credit risk'; RDQo refers to the risk disclosure quality in sub-index 'operational risk'; RDQl refers to the risk disclosure quality in sub-index 'liquidity risk'; RDQor refers to the risk disclosure quality in sub-index 'other risk'; MCap refers to market capitalization; Volatility refers to the volatility of the stock price; USListing refers to whether a company is cross listed in the United States; ForOwn refers to the percentage of shares owned by foreign investors.;OwnCon refers to the percentage of shares owned by insiders of the company; FreeFloat refers to the percentage of shares available for public trade; LNL refers to whether a company provides life insurance or not; AnalFol refers to the number of analysts following the firms; PageCount refers to the number of pages in the annual report of the firm; DBank refers to whether a company engages in banking activities or not; DDen refers to the whether a company is incorporated in Denmark; DFin refers to the whether a company is incorporated in Finland; DFra refers to the whether a company is incorporated in France; DGer refers to the whether a company is incorporated in Germany; DIta refers to the whether a company is incorporated in Italy; DNet refers to the whether a company is incorporated in Netherlands; DNor refers to the whether a company is incorporated in Norway; DSwi refers to the whether a company is incorporated in Switzerland; DSpa refers to the whether a company is incorporated in Spain; DUK refers to the whether a company is incorporated in the UK; DYear refers to whether the observation is from 2007 or 2013.

6.3 Descriptive statistics

After establishing that all variables will be included in the regression analyses, an overview of the descriptive statistics of the variables should be given. The descriptive statistics in which interest is taken are number of observations, minimum value, maximum value, mean value and standard deviation. The table on the next page provides an overview of the descriptive statistics.

The table shows that not all variables have 48 observations. This is due to missing values from the databases or the fact that some risk disclosure categories are not applicable to the sample firm. For example a firm which does not provide life insurance, will not report on underwriting life insurance risk.

The mean values reveal that on average the risk disclosure quality remains low. If the quality of risk disclosures increases, the value of the risk disclosure quality as measured by the disclosure index study, would approach 1. The average value of the quality of risk disclosure in the sample mostly remain below 0,50. Only the quality of market risk disclosures exceeds the 0,50. This shows that there is still a lot of improvement in risk disclosure quality possible for the sample firms.

When looking at the standard deviations of the considered variables, some extreme values can be detected. These are trading volume, market capitalization, ownership con centration of the shares and number of pages in the annual report. The standard deviations are large for volume and market capitalization as the values of these variables are high for most firms. The average of trading volume is almost five million and the average of the market capitalization is around 19 million. The high standard deviation of ownership concentration reveals that there is a large variation in the percentage of shares owned by insiders of the company. Especially the companies which are incorporated in the UK have a high percentage of shares owned by insiders. Companies incorporated in the Netherlands or Germany particularly have low percentages of shares owned by insiders. Lastly, the standard deviation of the control variable ‘pagecount’ shows a high value. This is due to the fact that the amount of pages in the annual report of European insurers is highly dispersed. This can also be seen in the minimum and maximum values of the variable.

Variable	*Number of observations*	*Minimum*	*Maximum*	*Mean*	*Standard deviation*
Relative bid/ask spread	46	0.03	1.16	0.15	0.18
Trading volume	46	0	30680582	4826223.93	6714990.90
RDQ	48	0.03	0.72	0.41	0.13
RDQro	48	0	0.90	0.45	0.22
RDQun	46	0	0.68	0.36	0.19
RDQu	40	0	0.77	0.43	0.19
RDQm	48	0.15	0.90	0.57	0.18
RDQc	48	0	0.65	0.39	0.15
RDQo	48	0	0.61	0.30	0.14
RDQl	48	0	0.83	0.39	0.20
RDQor	48	0	1.0	0.28	0.35
MCap	46	112561900	6647468900	1947381052	18035998.70
Volatility	46	0,05	11.23	1.74	2.79
US Listing	48	0	1	0.17	0.377
ForOwn	48	88.77	100.00	98.33	2.75
OwnCon	48	0	74.00	19.41	22.55
Freefloat	46	0.001	0.81	0,06	0.15
LNL	48	0	1	0.83	0.38
AnalFol	48	0	33	14.52	8.38
Pagecount	48	95	480	241.04	100.25
DBank	48	0	**1**	**0.38**	**0.49**
DDen	48	0	1	0.04	0.20
DFin	48	0	1	0.04	0.20
DFra	48	0	1	0.08	0.28
DGer	48	0	1	0.04	0.20
DIta	48	0	1	0.08	0.28
DNet	48	0	1	0.08	0.28
DNor	48	0	1	0.08	0.28
DSwi	48	0	1	0.13	0.33
DSpa	48	0	1	0.04	0.20
DUK	48	0	1	0.37	0.49
DYear	48	0	1	0.50	0.51

Table 4 Descriptive statistics

Where: RDQ refers to risk disclosure quality of the sum of all risk categories; RDQro refers to the risk disclosure quality in sub-index 'risk overview'; RDQun refers to the risk disclosure quality in sub-index 'underwriting non-life risk'; RDQul refers to the risk disclosure quality in sub-index 'underwriting life risk'; RDQm refers to the risk disclosure quality in sub-index 'market risk'; RDQc refers to the risk disclosure quality in sub-index 'credit risk'; RDQo refers to the risk disclosure quality in sub-index 'operational risk'; RDQl refers to the risk disclosure quality in sub-index 'liquidity risk'; RDQor refers to the risk disclosure quality in sub-index 'other risk'; MCap refers to market capitalization; Volatility refers to the volatility of the stock price; USListing refers to whether a company is cross listed in the United States; ForOwn refers to the percentage of shares owned by foreign investors.;OwnCon refers to the percentage of shares owned by insiders of the company; FreeFloat refers to the percentage of shares available for public trade; LNL refers to whether a company provides life insurance or not; AnalFol refers to the number of analysts following the firms; PageCount refers to the number of pages in the annual report of the firm; DBank refers to whether a company engages in banking activities or not; DDen refers to the whether a company is incorporated in Denmark; DFin refers to the whether a company is incorporated in Finland; DFra refers to the whether a company is incorporated in France; DGer refers to the whether a company is incorporated in Germany; DIta refers to the whether a company is incorporated in Italy; DNet refers to the whether a company is incorporated in Netherlands; DNor refers to the whether a company is incorporated in Norway; DSwi refers to the whether a company is incorporated in Switzerland; DSpa refers to the whether a company is incorporated in Spain; DUK refers to the whether a company is incorporated in the UK; DYear refers to whether the observation is from 2007 or 2013

6.4 Results regression models

As explained in chapter five there are in this thesis two dependent variables (relative bid-ask spread and trading volume) and two independent variables (aggregates risk disclosure quality and disaggregated risk disclosure quality) considered. This has resulted in four models.

	Relative bid-ask spread	*Trading volume*
Aggregated risk disclosure quality	Model A	Model B
Disaggregated risk disclosure quality	Model C	Model D

Model A and B provide an answer to hypothesis one, as they investigate the effect of the aggregated risk disclosure quality on the two measures of information asymmetry. Model C and D provide an analysis of hypothesis two, since they research the effect of the disaggregated risk disclosure quality on the two measures of information asymmetry. In the following section the results of the models will be discussed. For every model the model overview and the results on the model coefficients can be found in appendix G.

Analyses on hypothesis one

In model A, the aggregated risk disclosure quality is regressed on the relative bid-ask spread. The model is first performed with risk disclosure quality (RDQ) as only independent variable. As depicted in the model summary of model A in appendix G, this model has an R^2 of only 0,067. This value indicates that the model with only risk disclosure quality as independent variable is not a suitable model, as only 6,7% of the variation in spread is explained by the model. After adding the control variables (which can be found in appendix E), the R^2 is increased to 0.791. This means that model A explains 79,1% of the variation in the relative bid ask spread. Adding the selected control variables is therefore useful. Additionally, the model is a pretty very strong one, as a R^2 close to 1 is preferred. This is also confirmed by the ANOVA output of the model. The significance level of model A including the control variables is 0,041. For a strong model the significance level approaches zero, therefore it can be concluded that the model A is a strong model.

The variable of interest in the output of the regression model A is the beta estimate of risk disclosure quality. This estimated beta has the value of 0.285. This means that on average an increase in the risk disclosure quality as measured by the disclosure index study, leads to an increase of 0.285 in the relative bid-ask spread. This is opposite of what was expected in hypothesis one.

However, when looking at the statistical significance of this estimate, it becomes apparent that the beta estimate is not reliable. A significance, measured as the p- value, of 0,199 is revealed in the regression output. This means that the beta estimate is can be perceived as reliable with 80,1% certainty. In this thesis the percentage certainty required is 95% (as the α is 0,05). Therefore, it can be concluded that the coefficient of not significantly positive.

In model B the aggregated risk disclosure quality is regressed on trading volume. First the model is run in which only the aggregated risk disclosure quality is the independent variable. This model has an R^2 of 0,039. This value indicates that only 3,9% of the variation of trading volume is explained by the aggregated risk disclosure quality. If the control variables are added in the model, the R^2 is increased to 0,779. This means that the complete model B explains 77,9% of the variation in trading volume and therefore is quite a good model for explaining trading volume. The ANOVA output of model B confirms this remark. Model B including the control variables has a significance level of 0.06. As this value is quite close to zero, it can be concluded that the model is a strong one.

The coefficient estimate of interest in model B is the beta estimate of the aggregated risk disclosure quality. The estimates of the coefficients are provided in appendix G. The estimated value of the beta is 0,021. This value means that on average an increase in the risk disclosure quality of 1, leads to an increase in trading volume of 2,1%. This is what was expected in hypothesis one. However, looking at the significance of the estimate, it can be said that the estimate is not reliable. The significance of the estimate is 0,921, which means that with 7,1% certainty it can be said that the estimate is reliable. Therefore, it can be concluded that the beta estimate is not significantly positive.

Now that the output of the regression has been discussed, a conclusion on the first hypothesis can be given. The first hypothesis was formulated as:

> *Hypothesis 1*. High quality risk disclosures reduce the information asymmetry between insurance companies and their investors.

This hypothesis is **rejected**. As explained in chapter four, it was expected that the estimated beta of risk disclosure quality in model A was negative. In model B the expected value was positive. The estimated beta as calculated by model A turns out to be positive. The estimated beta in model B is also positive. Apparently, an increase in the quality of risk disclosures does not lead to a decrease in relative bid-ask spread, but does lead to an increase in trading volume. However, the estimated betas are not significant as the p-values are bigger than 0,05. In model A the p-value was 0,199 and in model B the p-value was 0,921. Since the betas are not statistically significant, the hypothesis cannot be accepted.

Analyses on hypothesis two

Model C and D are used to analyses the effect of the disaggregated risk disclosure quality on the measured of information asymmetry.

In model C the independent variables considered is disaggregated risk disclosure quality, the dependent variable is the relative bid-ask spread. First the model without control variables is run. This has resulted in a R^2 of 0,521. When the control variables are added, the R^2 increases to 0,910. This value of R^2 means that 91,0% of the variation in relative bid-ask spread is explained by the model.
The significance of the model, as displayed in the ANOVA output of the model, is 0.216. This value is not close to zero, therefore it can be concluded that this model is not a perfect model for explaining relative bid-ask spread.

It was expected that the estimated betas of the disaggregated risk disclosure qualities in model C were all negative. The estimated betas regarding risk overview, underwriting risk of life insurance and credit risk are all negative. However, the estimated betas of the risk disclosure qualities regarding underwriting non-life insurance risk, market risk, operational risk, liquidity risk and other risks were all positive. Additionally, it was expected that the betas of the risk disclosure quality regarding market risk and credit risks were the most negative of all betas. This expectation does not hold. The estimated beta on the quality of risk disclosures in the market risk category is positive. The estimates beta of risk disclosure quality in the credit risk category turns out to be the least negative of all negative estimates. When looking at the significance of all estimated betas, it becomes clear that no estimated beta is significant.

Lastly, in model D the disaggregated risk disclosure qualities were the independent variables and the dependent variable was trading volume. First the model was run with only the disaggregated risk disclosure quality as an independent variable and volume as dependent variable. This set-up resulted in an R^2 of 0,476. After adding the control variables, the R^2 increased to 0,902. Since the R^2 is close to 1, it could be concluded that the model including the control variables is useful in predicting the variation of trading volume. However, when looking at the ANOVA output of the model, a significance level of 0,262 is detected. The preferred value of the significance is zero. As the significance of model D is not close to zero, it is concluded that the model is not a strong model for analyzing trading volume.

When looking at the beta estimates of the individual variables, it becomes clear that the estimated betas of the risk disclosure qualities in the categories risk overview, underwriting non-life insurance, underwriting life insurance, market risk and liquidity risk are all positive. It was expected that all estimated betas of the disaggregated risk disclosure qualities were positive. However, the estimated betas of the qualities of risk disclosures in the categories credit risk disclosure quality, operational risk disclosure quality and disclosure quality on other risks. Again, all the estimates of the betas are not significant.

After the discussion on the model usefulness and the estimated betas, a conclusion on the second hypothesis can be given. Hypothesis two was formulated as:

> *Hypothesis 2*. Risk disclosures on market risk and credit risk are more important in reducing the information asymmetry between insurer and their investors than disclosures on other risk categories.

This hypothesis is **rejected**. It has become clear that in the model with relative bid-ask spread as a dependent variable, the estimated betas of market risk and credit risk are not the most negative. This is in line opposite to the expectation of the hypothesis. On the other hand, in the model with trading volume as dependent variable, the expectation does partially hold. In that model the estimated beta of risk disclosure quality regarding market risk was indeed the most positive one, but the estimated beta of risk disclosure quality regarding credit risk was negative. Therefore, the expectation of the hypothesis does not hold. On top of that are all of the estimated betas in both models statistically insignificant. The hypothesis cannot be accepted because of this fact and is thus rejected.

An overview of the expectations of the hypothesis, the results of the analysis and the conclusion on whether the hypothesis is accepted or not can be found in appendix H.

6.5 Testing model assumptions

In order for the interpretations of the regression output to be reasonable, the regression model assumptions should hold. If the model assumptions hold, then the linear regression is considered to be suitable for investigating the considered sample. The assumptions tested are normality, heteroskedasticity and multicollinearity. These assumptions will all be discussed briefly.

Normality

This model assumption is regarding the distribution of the residuals. The residuals should be normally distributed in order for the linear regression to be suitable for investigating the sample (Nieuwenhuis, 2010). The figure on the next page displays the distribution of the observations in the four models.

As can be seen in the figure, the models' residuals do not perfectly fulfill the normality requirement. Model A, B and C seem to be more or less normally distributed. The distribution of model B's residuals however is more skewed to the right. Model D's residuals does not seem to fit the normal distribution sufficiently. Therefore, some extra precaution should be taken when accepting the conclusions of model D.

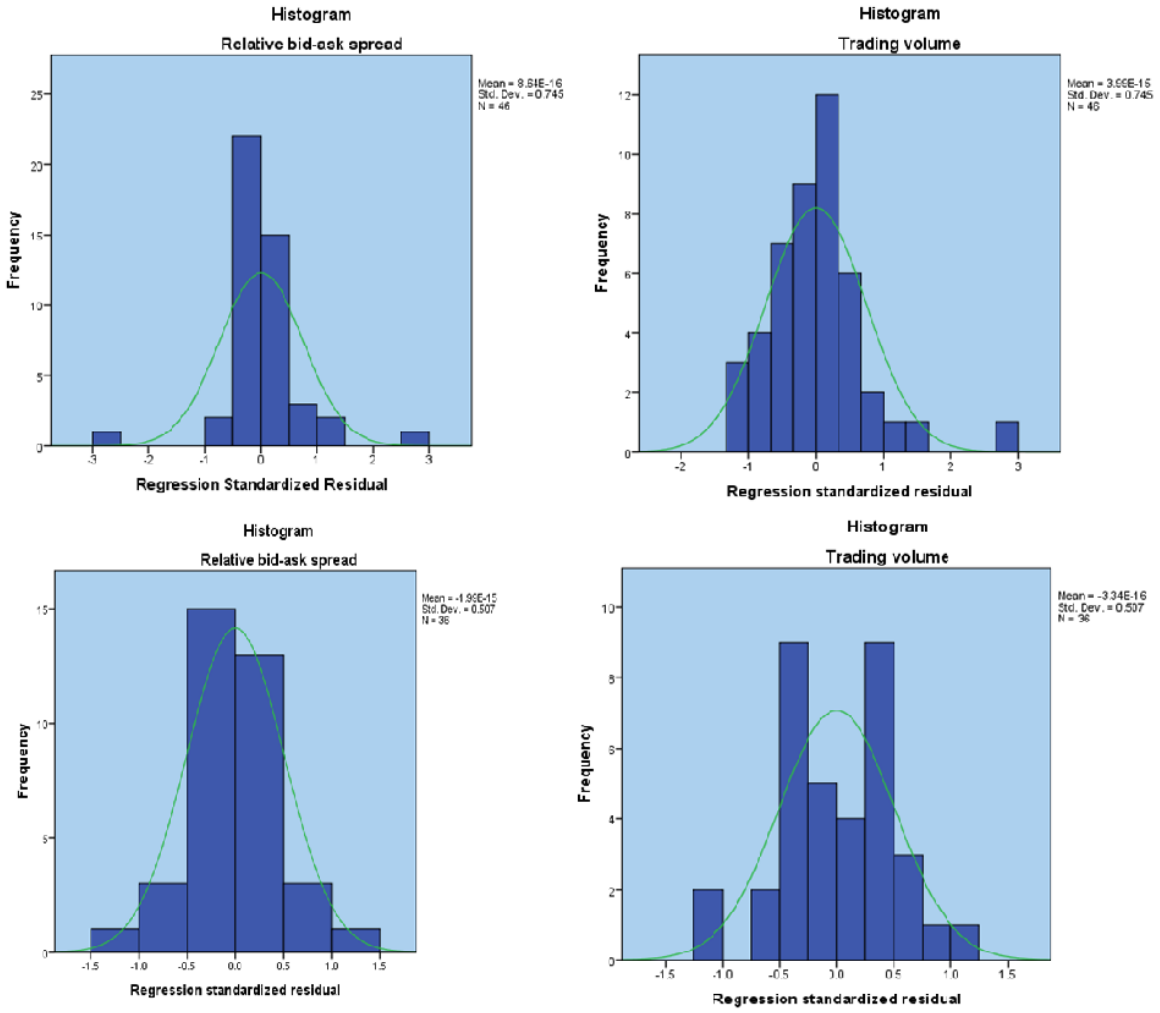


Figure 8 Residual analyses for testing normality

Where the histogram in the upper left corner represents model A, the histogram in the upper right corner represents model B, de histogram on the bottom left represents model C and the histogram on the bottom right represents model D.

Heteroskedasticity

The model assumption on heteroskedasticity has to do with the fact that the observations on which the tests are based should contain enough variation (Nieuwenhuis, 2010). If not enough variation in the sample exists, then this would alter the conclusions in the regression model. An answer to whether the heteroskedasticity assumption is met, can be found by looking at the scatter plots of the observations, which can be found in the following figure.

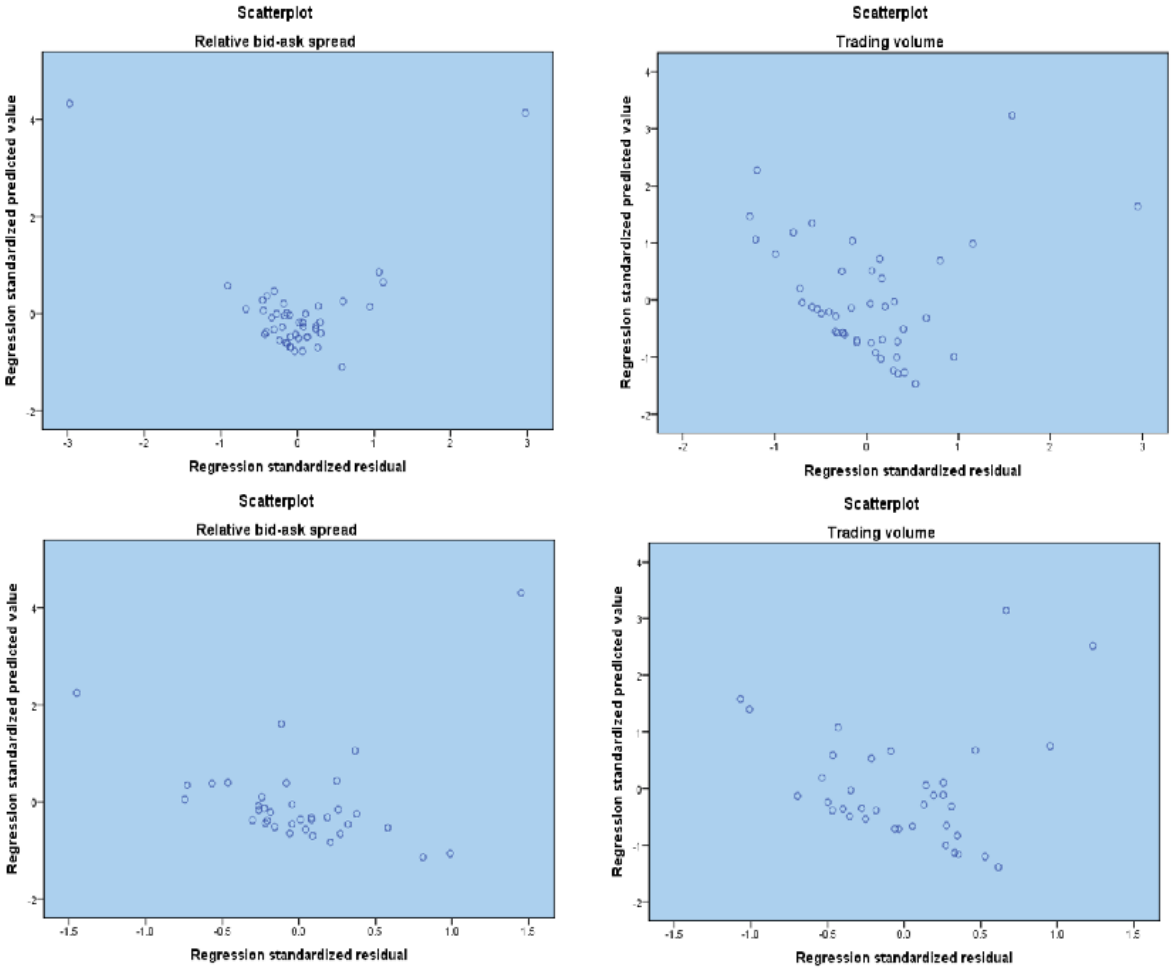


Figure 9 Scatterplots for testing heteroskedasticity

Where the scatterplot in the upper left corner represents model A, the scatterplot in the upper right corner represents model B, de scatterplot on the bottom left represents model C and the scatterplot on the bottom right represents model D.

The scatterplots each show a different pattern of the residuals. In the ideal situation the residuals would be clustered together, showing no real pattern. This is however not the case for all models considered in this thesis. The residuals in model A are indeed clustered in the scatterplot. However, the residuals of model B and D seem to indicate a negative linear relationship between the predicted value and standardized residual. For model C no pattern in the residuals is really apparent and the residuals are not clustered together. Since the residuals do show a pattern and are not particularly clustered together, it can be concluded that the heteroskedasity assumption is not met.

Multicollinearity

In order for the linear regression model to be suited for the analysis of the data, there should not be multicollinearity between the different variables in the model (Nieuwenhuis, 2010). Multicollinearity exists when two or more variables in the regression model are linearly related to each other (Nieuwenhuis, 2010). If this is the case, drawing conclusions on the betas becomes more difficult as the estimates of the betas become less reliable.

The matter of multicollinearity can be investigated by calculating the variance inflation factor (VIF), which is calculated as $1/1\text{-}R^2$. A value of VIF bigger than 10,00 is considered to flag the threat of multicollinearity. The multicollinearity analysis for the four models can be found in appendix I.

The preferred outcome of the multicollinearity test would be that all variance inflation factors are smaller than 10. However, as can be seen in appendix I, there is some threat of multicollinearity. The analysis for multicollinearity does not reveal a threat of multicollinearity in the models A and B. In models C and D, where the disaggregated risk disclosure quality is regressed on the measures of information asymmetry, is the threat of multicollinearity high. It is logical that a high threat of multicolinnearity between the risk disclosure qualities regarding the different risk categories exists. This is due to the fact that a high quality of risk disclosures in one category usually also means that risk disclosure quality in other categories is high. Besides this remark, there still remains a high threat of multicollinearity as quite some control variables also have a high variance inflation factor. Therefore, one should be cautious in drawing conclusions based on the estimated betas of the models.

Chapter 7 Conclusion and discussion

7.1 Summary

The aim of this thesis was to find a relationship between risk disclosure quality in the annual reports of European insurance companies and information asymmetry between the insurance company and its investor. Specifically, this thesis researched the possibility that risk disclosure quality would decrease the information asymmetry between an insurance company and its investor. The research question was formulated as:

'Do risk disclosures provided by insurance companies reduce the information asymmetry between the insurance company and its investor?'

Information asymmetry is measured in terms of relative bid-ask spread and trading volume. Relative bid-ask spread is proxy for information asymmetry because it represents the degree of congruence of the valuation of the firm by investors and the insurance company. If the investor would posses as much information about the firm as the company has, then these two parties would value the firm (represented by the stock price) equally. If the degree of information possessed by investors and the compny highly differs, then the valuation of the firm by investors and the company itself would differ. This results in a bid-ask spread. Trading volume is also a proxy for informaiton asymmetry. It is expected that the more transparent a company is (i.e. the more accurate and relevant information it provides), the higher the willingness of investors to invest in the firm. A lower information asymmetry in such a case would result in higher trading volumes.

The research question is narrowed down to the insurance industry. This is done because relatively little research on insurance firms is done. On top of that, the core business of the insurance sector is the transferral of risk. Therefore this industry is considered suitable for investigating risk disclosures. The specific sample used in this thesis consisted of 27 European primary insurers listed on the Dow Jones STOXX Europe 600 Insurance Index.

In the analysis three steps were identified. First the gathering of data was done. A disclosure index study was formulated for assessing the information on risk disclosure quality by the different insurance firms. This disclosure index study was taken from Höring & Gründl (2011) and supplemented with information items regarding risk components from Doff (2006). Also the disclosure index study was validated by an expert on insurance companies of EY Accountants LLP. Other data was gathered by using either the annual reports of the sample firms, Factset, Datastream and the listings of the US markets.

Secondly, the data was analysed by linear regression models. For the analysis four models where considered. The two dependent variables were relative bid-ask spread and trading volume. The two independent variables were aggregated risk disclosure quality and disaggregated risk disclosure quality. The aggregated risk disclousre quality refers to the risk disclosure quality of the entire annual report taken together. The disggregated risk disclosure quality regards the risk disclosure quality per risk category.

Thirdly conclusions were drawn on the output of the analyses. The output of the models show no significant results. Because of this fact are both hypotheses rejected. However, the estimated betas in the aggregated risk disclosure models did show the expected signs (in the spread model a negative beta and in the volume model a positive beta). In the models where disaggregated risk disclosure quality was used as an independent variable, are the result more mixed. Not all estimated betas of the risk disclousre quality per risk category show the expected results.

7.2 Conclusion

Based on the gathered data and the analysis via the regression models considered in this thesis, the answer to the research question is **no**. It appears that higher quality risk disclosures do not significantly influence the information asymmetry between the insurance company and its investor, as measured by relative bid-ask spread and trading volume.

This is different from previous literature. The most similar research to this thesis is the research of Miihkinen (2013), who found the risk disclosures do significantlt influence information asymmetry as measured by relative bid-ask spread and trading volume. The difference with this thesis is that Miihkinen (2013) investigated risk disclosures by thematic analysis, researched non-financial firms and only considered the Finnish market.

It is possible that because of these difference in the research method and sample a different outcome is found. Miihkinen (2013) used thematic analysis instead of disclosure index study. Therefore the amount of risk disclosures and the coverage of the risk disclosures are considered instead of risk disclosure quality. Perhaps the relationship between the amount of risk disclosures and information asymmetry is different than the quality of risk disclosures and information asymmetry.

Also the nature of the sample firms may alter the relationship between risk disclosure (quality or quantity) and information asymmetry. Miihkinen (2013) researched non-financial firms, while this thesis focusses on insurance companies (financial firms). Financial firms have differen risk reporting practices than non-financial firms. Because of this it might be possible that the relationship between risk reporting and information asymmetry is less strong (or even insignificant) for financial firms.

Also the research scope may be the reason for the different outcomes. Miihkinen (2013) only investigated Finnish firms, while this thesis researches the entire European insurance industry. The Finnish market is a unique market with respect to risk reporting (Miihkinen, 2013). Extensive rules and regulation with regard to risk reporting are in place in Finland (Miihkinen, 2013). This may lead to higher comparability and therefore higher usefulness of risk disclosures in terms of information asymmetry reduction. Local regulation regarding risk reporting is still pretty different across European companies. Because of this, the risk reporting practices and therefore the comparability of the risk reporting might be lower in the entirety of the European market than in the Finnish market. Perhaps this is the reason that the relationship between risk disclosure quality and information asymmetry is less strong (or even insignificant) in the Europen market then in the Finnish market.

Additionally the size of the sample can be the cause of different outcomes. In this thesis 27 companies and 54 firm-year observations are used to test the hypotheses. Miihkinen (2013) researched 97 firms over a period of three years. Perhaps, if the sample size of this thesis would have been bigger, a significnat result would have been detected.

7.3 Contribution

Although the regression models showed no significant results, this thesis does make a contribution to prior literature.

The first contribution is regarding the investigation of risk disclosures. In prior literature no distinction between risk disclosure quality in general and risk disclosure quality per risk category is made. This thesis does make this distinction. In the analysis of the model in chapter six it became clear that the explanatory power of the models which regard risk disclosure quality per risk category is higher than the models which only consider the overall risk disclosure quality. Therefore it can be concluded that it is worthwhile to investigate the risk disclosure quality per risk category instead of overall risk disclosure quality.

The second possible contribution is regarding the nature of the relationship between risk disclosure quality and information asymmetry. In the analysis of the model assumptions it became clear that the linear regression model is not suitable for analysing the gathered data. Perhaps the relationship between the information asymmetry and risk disclosure quality is not linear.

7.4 Limitations

This thesis does have some limitations. Limitations are mainly due to the research method and the sample chosen. The limitations of the content analysis are because of the nature of content analysis, how the content analysis is conducted and the scope of the content analysis.

Generally the *nature* of content analysis has two limitations. First the categorisation of risk disclosures is usually on one specific dimension (Beattie, et al., 2004). The presence of risk disclosures on specific information items is scored, but this does not include the specific content of the risk disclosure (Beattie, et al., 2004). The dimensions used in this thesis are regarding the information items identified in the disclosure index study and the extensiveness of the information. The investigation of multiple dimensions, such as for example forward/backward looking and monetary/non-monetary disclosures becomes difficult.

Another limitation resulting from the nature of disclosure studies is that it is focusing on certain parts of information (Beattie, et al., 2004). For example in the annual report the narratives are only considered. This is done because the disclosures are expected to be included in those parts. Also, content analysis is limited to public information (Höring & Gründl, 2011). Information such as conference calls and internal e-mails about risk disclosures cannot be investigated.

The limitations regarding *how* content analysis is conducted are threefold. As the categorisation of the information items in the annual reports is done by humans, higher risks of errors exist (Beattie, et al., 2004).

First the reliability of the coders is an issue. When multiple coders are used, the threat exists that the different coders categorise the information items different from each other (Beattie, et al., 2004). This threat is not apparent for this thesis, as only one coder is used.

Secondly, there is a threat that the categorisation differs across time (Beattie, et al., 2004). During the process of coding all the required annual reports a learning curve exists. However, in order to have objective observations the coder should categorise the narratives in later periods similar to the categorisation in earlier times.

Thirdly, the disclosure index study that is used is never completely objective, there always remains some subjectivity (Beattie, et al., 2004). In order to decrease the subjectivity in the risk disclosure index study as much as possible, two measures were taken. First the disclosure index study was taken from and supplemented with information academic articles (Höring & Gründl (2011) and Doff (2006)). Secondly the disclosure index study was reviewed by an expert on insurance companies of EY Accountants LLP. Although these measures were taken, there still remains some subjectivity in the risk disclosure index study.

The last limitation regarding content analysis is regarding the scope of the research. When content analysis is used, only a small sample of firms can be investigated. This is because the process of categorizing and analyzing the date retrieved from content analysis is extremely labor intensive (Beattie, et al., 2004). The sample in this thesis included 54 annual reports. Perhaps more convincing evidence would have been found if more annual reports were considered in this thesis.

7.5 Suggestions for further research

Based on the contribution made by this thesis and the discussed limitations of the thesis, the following suggestions for further research are given.

First conducting a similar research with more observations would be interesting. The beta estimates in this study were insignificant, but perhaps this is due to limited observations. The estimated values of the beta estimates were partially in line with the expected ones, so perhaps a conclusion on significant results can be given if more observations would be considered.

Secondly, the investigation of risk disclosure quality on information asymmetry in the future should also explore the possibility of a non-linear relationship between the variables. The model assumptions of a linear regression were not met with the dataset considered in this thesis. A possible explanation would be that the relationship between information asymmetry and risk disclosure quality is non-linear.

Appendix A Definitions of identified risks

Non-life insurance underwriting risk	The risk resulting from underwriting non-life insurance (EIOPA, 2013). The components of non-life insurance underwriting risks are premium risk, reserve risk and catastrophe risk (Doff, 2006).
Premium risk	The risk that the insurer has set the premium too low, "as the claims from current policies in the current year are exceeding the expected level of claims" (Doff, 2006).
Reserve risk	The risk that the actual claims are more than the expected level of claims from previous policies. Because of this the liability reserve runs off faster (Doff, 2006).
Catastrophe risk	"The risk of a catastrophe happening, which results in a significant discrepancy between actual and expected claims in a specific period" (EIOPA, 2013).
Life-underwriting risk	The risk arising from "the underwriting of life insurance, which is the result of the parameters on which the life insurance is based" which are mortality risk, expense risk, lapse risk, morbidity risk and longevity risk (EIOPA, 2013).
Mortality risk	The risk that the "actual mortality rate deviates from the expected mortality rate" (Doff, 2006)
Expense risk	The risk that "the expenses which are associated with the provision of lifelong payouts in case of a life insurance deviate from the expected ones, this can be due to different amount of payouts or different time periods of the payouts" (CEA - Group Consultatif, 2007).
Lapse risk	The risk that the actual lapse rate deviated from the expected lapse rate. "Lapse risk exists if a policyholder fails to comply with obligations as stated in the contract and all rights and obligations under the insurance contract expire" (CEA - Group Consultatif, 2007).
Morbidity risk	The risk that the expected morbidity rate deviates from the expected rate (EIOPA, 2013).
Longevity risk	The risk that "the actual life span of the average policyholder is longer than the life expectancy which the company anticipated" (Doff, 2006). This affects annuities which pay up until the death of the policyholder negatively.

Market risk	The risk that values are changing due to changing market prices or volatile market prices (CEA - Group Consultatif, 2007). Market risk comprises of equity risk, interest rate risk, real estate risk and currency risk (Doff, 2006).
Equity risk	The risk that actual values or incomes from equity deviate from their expected values (CEA - Group Consultatif, 2007).
Interest rate risk	The risk that a value in the firm decreases as a result of changing interest rate (Doff, 2006).
Real estate risk	"The risk that real values or real income from real estate items differs from the expected values" (CEA - Group Consultatif, 2007).
Currency risk	The risk arising from foreign exchange rates being different than expected (CEA - Group Consultatif, 2007). This risk is only apparent when a company has assets, liabilities or contracts in different currencies (CEA - Group Consultatif, 2007).
Credit risk	The risk of credit losses because counterparties fail to meet their contractual obligation (CEA – Group Consultatif, 2007). Credit risk consists of default risk and settlement risk.
Default risk	The risk associated with the interest and principle amounts not being paid because counterparts are in default. The actual amount of default deviates from the expected amounts (CEA - Group Consultatif, 2007).
Settlement risk	"The risk that the estimation of the change in value of a security transaction between the valuation date and the settlement date differs from the actual change in value" (CEA - Group Consultatif, 2007).
Operational risk	"The risk of incurring losses due to internal factors (inadequate systems for example) or external events" (Doff, 2006). Operational risks consist of business risks, legal risks and model risk and expense risk.
Business risk	The risk arising because the business environment changes differently from what was expected or the risk of the company not being able to adequately react to these changes (Doff, 2006).
Legal risk	The risks associated with legal issues. These can be "the threat of being sued, judgments of courts which are unfavorable for the firm or contracts which have a negative effect on the insurer" (CEA - Group Consultatif, 2007).
Model risk	The risk that the model which an insurer uses to calculate certain values (for example the required premium to be paid by its policyholders) is not giving the required output.

Expense risk	The risk that the expenses which are associated with running the operations of the insurance company deviate from the expected ones, this can be due to different amount of payouts or different time periods of the payouts (CEA - Group Consultatif, 2007).
Liquidity risk	"The risk that in case of a required cash outflow to a policyholder, the insurer has not enough liquid assets to fulfill this requirement of the contract" (Doff, 2006). Liquidity risk consists of trading risk and funding risk.
Trading risk	The risk that liquid assets of the firm turn out not to be as tradable as was expected (CEA - Group Consultatif, 2007). This results in a liquidity problem. Trading risk is therefore part of liquidity risk (CEA - Group Consultatif, 2007).
Funding risk	Part of the liquidity risk that is the result of "cash flow requirements that cannot be met because the firm possesses not enough assets to meet these requirements" (CEA - Group Consultatif, 2007).

Appendix B Overview relevant literature

Authors	*Object of study*	*Sample*	*Research methodology*	*Outcome*
Kavet & Muslu (2013)	Effect of risk disclosures on the behaviour of investors and analysts	4315 American listed firms, non-financial and financial firms, 1994 until 2007	Regression model, input for risk disclosures are 10-K filings	"Changes in risk disclosures are significantly and positively associated with changes in daily stock return volatility, changes in relative volatility of negative daily returns, filing volume, changes in trading volume, and changes in volatility of forecast revisions."
Miihkinen (2013)	Effect of risk disclosure quality on information asymmetry	97 Finnish listed companies, non-financial in 2006 until 2009	Content analysis, coding unit sentence, thematic analysis, regression analysis	Annual risk disclosures are useful for investors; risk disclosures are more useful for firms with high inherent risk, risk disclosures are more useful for firms with low investor interest; risk disclosures are useful in all market conditions, but more useful in times of economic downturn
Höring & Gründl (2011)	Relation between the extent of risk disclosures and insurance companies' characteristics.	37 European primary insurers in the Dow Jones Stoxx 600 Insurance Index, from 2005 - 2009	Content analysis, disclosure index study, correlation analysis, regression model	The importance of risk disclosures in the annual report increased over the sample period. Risk disclosures by the European insurance industry remains moderate on average, but with strong variation among the sample insurers. Insurer size, insurer risk, insurer profitability, cross listing and ownership dispersion are factors influencing the extent of risk disclosures significantly.
Pérignon & Smith (2010)	Usefulness of market risk disclosures on volatility of future trading revenues.	10 US and 60 international banks, time period 1996 to 2005	Content analysis, Disclosure index study	Over the sample period an increase in the quantity of information provided by banks is measured. The quality of market risk disclosures valued-at-risk did not improve over the sample period. The ability of market risk disclosures in forecasting the volatility of future trading revenues is little
Lajili & Zéghal (2009)	Characteristics and usefulness of risk disclosures	228 Canadian listed companies, financial and non-financial in 1999	Content analysis, coding unit words and sentences, thematic analysis, ANOVA	No difference between voluntary and mandatory disclosure practices; financial, market and commodity risk is mostly reported on; risk disclosures are located in notes and MD&A of the annual report; more bad-news risk is disclosed than good-news risk

Deumes (2008)	Are risk disclosures risk relevant information to prospective investors	90 prospectuses of Dutch firms raising capital at the Amsterdam Stock Exchange, from 1997-2000	Content analysis, coding unit words and sentences, disclosure index study, least squares optimal scaling	Mostly risk disclosures are on downside risk. In order of size, risk disclosures were mainly on general economic conditions, competition, regulation and acquisitions. Risk disclosures successfully predict: future total return risk, future systematic risk, the likelihood of severe declines in stock price to market-wide fluctuations, and the likelihood of severe declines in stock price in the 30-month period after publication of the prospectus.
Abraham and Cox (2007)	Ownership and governance characteristics influencing risk disclosures	71 UK listed companies, non-financial in 2002	Content analysis, coding unit words and sentences, thematic analysis	Corporate ownership by long-term (short term) institutions is negatively (positively) related to number of risk disclosures; presence of executive directors in the board has a positive relation with number of risk disclosures; independence of executive board member has positive relationship with number of risk disclosures; cross listing in the US increases the number of risk disclosures
Linsley & Shrives (2006)	Risk reporting practices and firm specific characteristics influencing that	79 UK listed companies, non-financial in 2000	Content analysis coding unit sentences, thematic analysis, Pearson correlation, Wilcoxon signed ranks	Firm size is positively correlated with number of risk disclosures; no association between level of risk and number of risk disclosures; non-monetary risk disclosures are given more often than monetary risk disclosures; past disclosures are not given more often than future oriented disclosures; more good news risk disclosures are given than bad news risk disclosures.
Bauman & Nier (2004)	Association of disclosures and volatility	600 listed banks from 31 countries over the period 1993-2000	Content analysis, disclosure index study, regression model, standard deviation analysis	Disclosures may be useful to both investors and banks. Banks that disclose more show less volatility in their stock.
Kajüter & Winkler (2003)	Descriptive analysis of the risk disclosure practices of German firms	83 German non-financial firms, listed on the DAX100 over the period 1999 to 2001	Content analysis, thematic analysis	Risk disclosure information is increasingly more often reported in a separate section within the annual report. An increase in the amount of risk disclosures and the amount of risk disclosure categories are detected. Qualitative disclosures are more often made than quantified disclosures.

Table 5 Overview relevant literature

Appendix C Overview sample

Company	*Country*	*Consolidated*	*Applicable regulation*
Admiral Goup PLC	UK	Yes	IFRS
Aegon Group	Netherlands	Yes	IFRS
Allianz Group	Germany	Yes	IFRS
Assicurazioni Generali Group	Italy	Yes	IFRS
Aviva PLC	UK	Yes	IFRS
AXA SA	France	Yes	IFRS
Bâloise Holding	Switzerland	Yes	IFRS/US GAAP. IFRS is used.
Catlin Insurance Company Ltd	UK	Yes	IFRS
CNP Assurances	France	Yes	IFRS
Delta Lloyd Group	Netherlands	Yes	IFRS
Generali Group	Italy	Yes	IFRS
Gjensidige Forsikring ASA	Norway	Yes	IFRS
Helvetia Holding AG	Switzerland	Yes	IFRS/US GAAP. IFRS is used.
Hiscox Ltd	UK	Yes	IFRS
Lancashire Holding Ltd	UK	Yes	IFRS
Legal&General Group PLC	UK	Yes	IFRS
Mapfre SA	Spain	Yes	IFRS
Old Mutual PLC	UK	Yes	IFRS
Prudential Group	UK	Yes	IFRS
RSA Insurance Group	UK	Yes	IFRS
Sampo Group	Finland	Yes	IFRS
Standard Life PLC	UK	Yes	IFRS
Storebrand ASA	Norway	Yes	IFRS
Tryg Forsikring Group	Denmark	Yes	IFRS
Zurich Insurance Group	Switzerland	Yes	IFRS/US GAAP. IFRS is used.

Table 6 Overview sample

Source: STOXX.com Dow Jones STOXX 600 Insurance Index (January 1st 2013)

Excluded from sample are reinsurance companies (Amlin PLC, Hannover Rückversicherungen AG, Münchener Rückversicherungen AG, Scor SE, Swiss Reinsurance Company Ltd, Catlin Insurance Company Ltd)

Excluded from sample are companies not reporting under IFRS (Resolution Group, St. James's PlaceWealth, Swiss Life Holding Ltd)

Excluded from sample are companies not existing in 2007 (Ageas, Brit Insurance Holdings BV, Direct Line insurance group PLC)

Excluded from sample are companies which do not provide the annual report (2007 or 2013) in the English, Dutch or German language (Fondaria SAI)

Exlcluded from the sample are companies which did not yet provide the annual report of 2013 at 20th of June (Gruppo Cattolica Assicurazioni, TopDanmark A/S).

Excluded from the sample are companies for which data necessary to run the regression is not available (ING Group, Irish Life & Permanent Holding Group plc and Vienna Insurance).

Appendix D Disclosure index study

Sub-index Risk overview

Criteria	Score
Provision of list and definition of risks identified	
Description of risk by the amount of diversified capital	
Description of diversification effect and sources	
Discussion of regulatory capital adequacy	
Discussion of external ratings	
Total score	/10

Sub-index Underwriting risk for non-life insurance

Criteria	Score
Definition of non-life (sub)risk	
Description of limits and escalation processes	
Description of risk mitigation activities	
VaR at specified confidence interval and period	
Description of stress test and/or sensitivity analyses	
Description of major risk concentrations	
Loss, expense and combined ratio (pricing adequacy)	
Disclosure of run-off result (provision adequacy)	
Definition and management of premium risk	
Definition and management of reserve risk	
Definition and management of catastrophe risk	
Total score	/22

Sub-index Underwriting risk for life insurance

Criteria	Score
Definition of life (sub)risk	
Description of limits and escalation process	
Description of risk mitigating activities	
VaR at specified confidence interval and period	
Description of stress test and/or sensitivity analyses	
Description of major risk concentrations	
Definition and management of mortality risk	
Definition and management of longevity risk	
Definition and management of expense risk	
Definition and management of lapse risk	
Definition and management of morbidity risk	
Total score	/22

Sub-index Market risk

Criteria	Score
Definition of market (sub)risk	
Description of limits and escalation process	
Description of risk mitigating activities	
VaR at specified confidence interval and period	
Description of stress test and/or sensitivity analyses	
Description of major risk concentrations	
Definition and management of equity risk	
Definition and management of interest rate risk	
Definition and management of real estate risk	
Definition and management of currency risk	
Total score	/20

Sub-index Credit risk

Criteria	Score
Definition of credit (sub)risk	
Description of limits and escalation process	
Description of risk mitigating activities	
VaR at specified confidence interval and period	
Description of stress test and/or sensitivity analyses	
Quality of financial and non-financial assets	
Maturity structure of financial and non-financial assets	
Disclosure of credit risk concentrations	
Definition and management of default risk	
Definition and management of settlement risk	
Total score	/20

Sub-index Operational risk

Criteria	Score
Definition of operational risk	
Description of policies, processes and standards to manage risks	
Description of operational risk capital assessment	
Description of risk mitigating activities	
VaR at specified confidence interval and period	
Definition and management of business risk	
Definition and management of legal risk	
Definition and management of model risk	
Definition and management of expense risk	
Total score	/18

Sub-index Liquidity risk

Criteria	Score
Definition of liquidity risk	
Description of policies, processes and standards to manage risks	
Description of financial and technical liabilities by maturity date	
Quantitative information on liquidity risk	
Definition and management of trading risk	
Definition and management of funding risk	
Total score	/12

Sub-index Other risks

Criteria	Score
Definition and management of other risks	
Total score	/2* number of other risks identified

Table 7 Disclosure index study

Adapted from "Investigating Risk Disclosure Practices in the Euopean Insurance Industry", by D. Höring, H. Gründl, 2011, *The Geneva papers*, 36, p.380-413. Copyright 2011 by The International Association for the Study of insurance Economics.
Sub-indices are supplemented with information items, adapted from *Risk Management for Insurance Firms A Framework for Fair Value and Economic Capital*, by R. Doff, 2006, 's Hertogenbosch: NIBE-SVV. Copyright 2006 by NIBE-SVV.

Appendix E Overview regression model variables

Variable	*Variable name*	*Acronym*	*Calculation*	*Data source*
DV	Relative bid ask spread	Spread	$Spread = \frac{\text{AskPrice} - \text{BidPrice}}{(\text{AskPrice} + \text{BidPrice})/2} * 100$	Datastream
DV	Trading volume	Volume	$Volume = \frac{\text{DailyTradingVolume}}{\text{NbrShares}} * 100$	Datastream, Factset
IV	Risk disclosure quality aggregated	RDQ_{ih}	Risk disclosure quality in the annual report measured by risk disclosure index study	Annual report
IV	Risk disclosure quality in risk category h	X_{ih}	Risk disclosure quality in the annual report regarding specific risk categories, measured by risk disclosure index study	Annual report
CV	Market capitalization	MCap	Share price * number of shares	Datastream
CV	Volatility of the stock	Volatility	Standard deviation of stock over three months centered to the annual report date	Datastream
CV	Foreign ownership of the shares	ForOwn	$\frac{Number\ of\ shares\ foreign\ owned}{Total\ number\ of\ shares} * 100$	Datastream, Factset
CV	Ownership dispersion	Freefloat	$\frac{Free\ float}{Total\ number\ of\ shares} * 100$	Datastream
CV	Page count	PageCount	Number pages in the annual report	Annual report
CV	Analyst following	AnFol	Number of analysts following	Factset
CV	US cross listing	Dcros	Dummy variable value 1 if company is cross listed in the US, value 0 if it is not	Dow Jones, Nasdaq listing
CV	Life or non-life insurance	DLife	Dummy variable value 1 if company provides life insurance, value 0 if it does not	Annual report
CV	Banking activity	DBank	Dummy variable value 1 if company also engages in banking activities, value 0 if it is not	Annual report
CV	Dummy variable Denmark	DDen	Dummy variable value 1 if company is incorporated in Denmark, value 0 if it is not	Company website
CV	Dummy variable Finland	DFin	Dummy variable value 1 if company is incorporated in Finland, value 0 if it is not	Company website
CV	Dummy variable France	DFra	Dummy variable value 1 if company is incorporated in France, value 0 if it is not	Company website
CV	Dummy variable Germany	DGer	Dummy variable value 1 if company is incorporated in Germany, value 0 if it is not	Company website
CV	Dummy variable Italy	DIta	Dummy variable value 1 if company is incorporated in Italy, value 0 if it is not	Company website
CV	Dummy variable Netherlands	DNet	Dummy variable value 1 if company is incorporated in Netherlands, value 0 if it is not	Company website
CV	Dummy variable Norway	DNor	Dummy variable value 1 if company is incorporated in Norway, value 0 if it is not	Company website
CV	Dummy variable Switzerland	DSwi	Dummy variable value 1 if company is incorporated in Switzerland, value 0 if it is not	Company website
CV	Dummy variable Spain	DSpa	Dummy variable value 1 if company is incorporated in Spain, value 0 if it is not	Company website
CV	Dummy variable UK	DUK	Dummy variable value 1 if company is incorporated in the UK, value 0 if it is not incorporated in the UK.	Company website
CV	Dummy variable year	YEAR	Dummy variable value 1 if observation if from 2013, value 0 if observation is from 2007	Annual report

Table 8 Overview regression model variables

Appendix F Overview results disclosure index study

Panel A: Sample year 2007

Companies	RDQ	RDQro	RDQun	RDQul	RDQm	RDQc	RDQo	RDQl	RDQor
Admiral Goup PLC	0,27907	0,10000	0,62500	NA	0,15000	0,43750	0,00000	0,25000	0,00000
Aegon Group	0,43396	0,60000	0,09091	0,45455	0,45000	0,40000	0,11111	0,50000	0,75000
Allianz Group	0,35156	0,60000	0,22727	0,31818	0,45000	0,35000	0,22222	0,41667	0,50000
Assicurazioni Generali Group	0,03225	0,00000	0,00000	0,00000	0,20000	0,00000	0,00000	0,00000	0,00000
Aviva PLC	0,47580	0,60000	0,50000	0,54545	0,55000	0,30000	0,44444	0,41667	0,00000
AXA SA	0,32258	0,10000	0,22727	0,13636	0,50000	0,35000	0,27778	0,41667	1,00000
Bâloise Holding	0,05645	0,10000	0,00000	0,04545	0,15000	0,10000	0,00000	0,00000	0,00000
CNP Assurances	0,24193	0,30000	0,00000	0,31818	0,50000	0,15000	0,33333	0,08333	0,00000
Delta Lloyd Group	0,38709	0,30000	0,31818	0,27273	0,70000	0,45000	0,44444	0,08333	0,00000
Generali Group	0,32258	0,10000	0,50000	0,50000	0,25000	0,30000	0,27778	0,08333	0,00000
Gjensidige Forsikring ASA	0,44354	0,30000	0,40909	0,40909	0,75000	0,55000	0,22222	0,33333	0,00000
Helvetia Holding AG	0,36290	0,40000	0,22727	0,27273	0,60000	0,50000	0,27778	0,25000	0,00000
Hiscox Ltd	0,43269	0,50000	0,40909	NA	0,55000	0,40000	0,22222	0,58333	0,50000
ING Group NV	0,43846	0,50000	0,13636	0,22727	0,65000	0,70000	0,50000	0,33333	0,66667
Irish Life & Permanent Group Holdings plc	0,38235	0,40000	NA	0,31818	0,70000	0,30000	0,16667	0,41667	0,00000
Lancashire Holding Ltd	0,31730	0,00000	0,31818	NA	0,40000	0,30000	0,33333	0,41667	0,50000
Legal&General Group PLC	0,36800	0,40000	0,13636	0,36364	0,65000	0,45000	0,38889	0,25000	0,50000
Mapfre SA	0,25000	0,60000	0,22727	0,18182	0,45000	0,20000	0,16667	0,33333	0,00000
Old Mutual PLC	0,41406	0,40000	0,36364	0,45455	0,60000	0,35000	0,27778	0,33333	0,75000
Prudential Group	0,33064	0,50000	0,09091	0,36364	0,60000	0,20000	0,38889	0,25000	0,00000
RSA Insurance Group	0,34313	0,40000	0,27273	NA	0,40000	0,40000	0,33333	0,41667	0,00000
Sampo Group	0,39516	0,40000	0,40909	0,36364	0,60000	0,35000	0,27778	0,33333	0,00000
Standard Life PLC	0,41129	0,70000	NA	0,63636	0,50000	0,25000	0,33333	0,75000	0,00000
Storebrand ASA	0,27419	0,20000	0,31818	0,36364	0,30000	0,25000	0,11111	0,33333	0,00000
Tryg Forsikring Group	0,25000	0,40000	0,36364	0,13636	0,50000	0,10000	0,22222	0,00000	0,00000
Vienna Insurance Group	0,29365	0,20000	0,31818	0,31818	0,50000	0,15000	0,27778	0,16667	0,50000
Zurich Insurance Group	0,53225	0,70000	0,54545	0,54545	0,70000	0,50000	0,27778	0,50000	0,00000

Panel B: sample year 2013

Companies	RDQ	RDQro	RDQun	RDQul	RDQm	RDQc	RDQo	RDQl	RDQor
Admiral Goup PLC	0,37500	0,10000	0,54545	NA	0,30000	0,40000	0,27778	0,41667	1,00000
Aegon Group	0,50000	0,70000	0,18182	0,36364	0,60000	0,55000	0,16667	0,66667	0,50000
Allianz Group	0,41538	0,50000	0,31818	0,45455	0,50000	0,55000	0,33333	0,16667	0,50000
Assicurazioni Generali Group	0,46774	0,50000	0,54545	0,50000	0,45000	0,45000	0,27778	0,50000	0,50000
Aviva PLC	0,56452	0,70000	0,54545	0,63636	0,60000	0,50000	0,44444	0,58333	0,00000
AXA SA	0,46875	0,50000	0,36364	0,27273	0,70000	0,50000	0,55556	0,16667	0,83333
Bâloise Holding	0,50000	0,50000	0,31818	0,59091	0,60000	0,65000	0,27778	0,58333	0,00000
CNP Assurances	0,24194	0,00000	0,00000	0,36364	0,45000	0,25000	0,22222	0,33333	0,00000
Delta Lloyd Group	0,57576	0,60000	0,40909	0,63636	0,70000	0,65000	0,44444	0,50000	0,75000
Generali Group	0,59231	0,60000	0,63636	0,77273	0,75000	0,40000	0,38889	0,58333	0,50000
Gjensidige Forsikring ASA	0,51587	0,40000	0,63636	0,63636	0,70000	0,50000	0,38889	0,41667	0,50000
Helvetia Holding AG	0,50806	0,50000	0,50000	0,59091	0,75000	0,55000	0,11111	0,41667	0,00000
Hiscox Ltd	0,55769	0,60000	0,54545	NA	0,80000	0,45000	0,44444	0,41667	1,00000
ING Group NV	0,63492	0,80000	0,18182	0,50000	0,90000	0,75000	0,72222	0,66667	1,00000
Irish Life & Permanent Group Holdings plc	0,38281	0,40000	0,00000	0,09091	0,55000	0,75000	0,27778	0,75000	0,75000
Lancashire Holding Ltd	0,50926	0,40000	0,50000	NA	0,70000	0,30000	0,38889	0,75000	0,66667
Legal&General Group PLC	0,59231	0,60000	0,50000	0,59091	0,75000	0,55000	0,61111	0,33333	0,50000
Mapfre SA	0,44355	0,60000	0,50000	0,22727	0,65000	0,35000	0,33333	0,58333	0,00000
Old Mutual PLC	0,50000	0,50000	0,27273	0,50000	0,70000	0,60000	0,33333	0,58333	1,00000
Prudential Group	0,41129	0,50000	0,18182	0,50000	0,70000	0,35000	0,33333	0,33333	0,00000
RSA Insurance Group	0,49020	0,80000	0,40909	NA	0,55000	0,55000	0,38889	0,33333	0,00000
Sampo Group	0,71875	0,90000	0,68182	0,68182	0,90000	0,60000	0,61111	0,83333	0,50000
Standard Life PLC	0,46774	0,60000	NA	0,63636	0,85000	0,45000	0,33333	0,50000	0,00000
Storebrand ASA	0,38710	0,60000	0,13636	0,54545	0,55000	0,25000	0,22222	0,58333	0,00000
Tryg Forsikring Group	0,37097	0,60000	0,63636	0,27273	0,55000	0,15000	0,22222	0,16667	0,00000
Vienna Insurance Group	0,41270	0,18182	0,45455	0,5	0,70000	0,13636	0,27778	0,41667	0,50000
Zurich Insurance Group	0,64286	0,60000	0,59091	0,77273	0,85000	0,55000	0,50000	0,50000	0,00000

Table 9 Results disclosure index study

RDQ refers to aggregate risk disclosure quality. Calculated as the sum of all values assigned to the applicable information items, divided by the sum of the maximum values assigned to the applicable risk categories. The maximum for a company providing both life and non-life insurance is 124. The maximum of a company which provides either of the two kinds of insurance is 102; **RDQro** refers to the quality of risk disclosures regarding risk overview. Calculated as the sum of all values assigned to the information items regarding risk overview, divided by 10 (the sum of the maximum values possible in the risk overview); **RDQun** refers to the quality of risk disclosures regarding underwriting non-life insurance risk. Calculated as the sum of all values assigned to the information items regarding underwriting non-life insurance risk, divided by 22 (the sum of the maximum values possible in the underwriting non-life insurance category); **RDQul** refers to the quality of risk disclosures regarding underwriting life insurance risk. Calculated as the sum of all values assigned to the information items regarding underwriting life insurance risk, divided by 22 (the sum of the maximum values possible in the underwriting life insurance category); **RDQm** refers to the quality of risk disclosures regarding market risk. Calculated as the sum of all values assigned to the information items regarding market risk, divided by 20 (the sum of the maximum values possible in the market risk category); **RDQc** refers to the quality of risk disclosures regarding credit risk. Calculated as the sum of all values assigned to the information items regarding credit risk, divided by 20 (the sum of the maximum values possible in the credit risk category); **RDQo** refers to the quality of risk disclosures regarding operational risk. Calculated as the sum of all values assigned to the information items regarding operational risk, divided by 18 (the sum of the maximum values possible in the operational category); **RDQl** refers to the quality of risk disclosures regarding liquidity risk. Calculated as the sum of all values assigned to the information items regarding liquidity risk, divided by 12 (the sum of the maximum values possible in the liquidity risk category); **RDQor** refers to the quality of risk disclosures regarding other risks. Calculated as the sum of all values assigned to the information items regarding other risk, divided by the sum of the maximum values assigned in the other risk category; **NA** refers to a value which is not applicable to specific firm.

Appendix G Regression analyses results

Model A

					Change statistics				
Model	*R*	*R Square*	*Adjusted R Square*	*Standard error of the estimate*	*R Square change*	*F Change*	*Degrees of freedom 1*	*Degrees of freedom 2*	*Significant F change*
1	0.067	0.004	-0.018	0.17732677	0.004	0.197	1	44	0.659
2	0.791	0.625	0.325	0.14433069	0.621	2.180	19	25	0.034

Table 10 Model A summary

Where model 1 refers to a model which only considers the independent variable (RDQ) on the dependent variable (relative bid-ask spread). Model two considers the same variables, but also adds the control variables as identified in appendix E.

Model		*Sum of squares*	*Degrees of freedom*	*Mean square*	*F*	*Significance*
1	Regression	0.006	1	0.006	0.197	0.659
	Residual	1.384	44	0.031		
	Total	1.390	45			
2	Regression	0.869	20	0.043	2.086	0.041
	Residual	0.521	25	0.021		
	Total	1.390	45			

Table 11 Model A ANOVA

Where model 1 refers to a model which only considers the independent variable (RDQ) on the dependent variable (relative bid-ask spread). Model two considers the same variables, but also adds the control variables as identified in appendix E.

Model		*Standardized Beta*	*Standard error*	*Value t-test*	*Significance*
1	Constant		0.084	2.226	0.031
	RDQ	-0.067	0.194	-0.444	0.659
2	Constant		2.344	-0.205	0.839
	RDQ	0.285	0.279	1.318	0.199
	MCap	-0.168	0.000	-0.454	0.654
	USListing	0.037	0.129	0.131	0.897
	ForOwn	0.087	0.023	0.237	0.815
	OwnCon	0.040	0.003	0.106	0.916
	FreeFloat	0.132	0.339	0.446	0.659
	LNL	-0.091	0.106	-0.391	0.699
	AnalFol	-0.142	0.006	-0.505	0.618
	PageCount	-0.023	0.000	-0.080	0.937
	DBank	-0.013	0.113	-0.043	0.966
	DDen	0.100	0.208	0.410	0.685
	DFin	-0.033	0.140	-0.199	0.844
	DFra	0.179	0.139	0.791	0.436
	DGer	0.237	0.242	0.836	0.411
	DIta	0.255	0.174	0.908	0.373
	DNet	0.023	0.111	0.145	0.886
	DNor	0.209	0.162	0.909	0.372
	DSwi	0.095	0.155	0.317	0.754
	DSpa	0.769	0.225	2.915	0.007
	DYear	-0.177	0.070	-0.880	0.387

Table 12 Model A Estimated betas

Where: model 1 only considers the effect of the independent variable (RDQ) on the dependent variable (relative bid-ask pread). model 2 considers the same relationship, but also includes the control variables which are defined in Appendix E; constant refers to β_0, the constant beta of the model.

Model B

					Change statistics				
Model	*R*	*R Square*	*Adjusted R Square*	*Standard error of the estimate*	*R Square change*	*F Change*	*Degrees of freedom 1*	*Degrees of freedom 2*	*Significant F change*
1	0.039	0.001	-0.021	6785833.253	0.001	0.065	1	44	0.799
2	0.779	0.607	0.293	5646176.305	0.606	2.029	19	25	0.049

Table 13 Model B summary

Where: model 1 only considers the effect of the independent variable (RDQ) on the dependent variable (trading volume). Model 2 considers the same relationship, but also considers the control variables as can be seen in Appendix E.

Model		*Sum of squares*	*Degrees of freedom*	*Mean square*	*F*	*Significance*
1	Regression	3.008E+12	1	3.008E+12	0.065	0.799
	Residual	2.026E+15	44	4.605E+13		
	Total	2.029E+15	45			
2	Regression	1.232E+15	20	6.161E+13	1.932	0.060
	Residual	7.970E+14	25	3.188E+13		
	Total	2.029E+15	45			

Table 14 Model B ANOVA

Where: model 1 only considers the effect of the independent variable (RDQ) on the dependent variable (trading volume). Model 2 considers the same relationship, but also considers the control variables as can be seen in Appendix E.

Model		*Standardized Beta*	*Standard error*	*Value t-test*	*Significance*
1	Constant		3223007.491	1.740	0.089
	RDQ	-0.039	7411759.706	-0.256	0.799
2	Constant		91687596.52	-0.968	0.342
	RDQ	0.021	10905717.37	0.093	0.927
	MCap	0.410	0.141	1.080	0.290
	USListing	-0.541	5029483.670	-1.884	0.071
	ForOwn	0.386	907991.151	1.022	0.316
	OwnCon	-0.407	115106.309	-1.047	0.305
	FreeFloat	0.269	13243128.51	0.888	0.383
	LNL	0.909	4159313.806	3.828	0.001
	AnalFol	0.188	241525.967	0.655	0.519
	PageCount	-0.211	19211.275	-0.723	0.477
	DBank	-0.396	4415284.399	-1.252	0.222
	DDen	-0.379	8144055.774	-1.5817	0.142
	DFin	-0.442	5478288.799	-2.630	0.014
	DFra	-0.467	5457115.524	-2.018	0.054
	DGer	-0.158	9465821.573	-0.544	0.591
	DIta	-0.487	6787458.864	-1.690	0.104
	DNet	-0.124	3443895.897	-0.768	0.450
	DNor	-0.368	6322536.019	-1.566	0.130
	DSwi	-0.580	6051387.099	-1.890	0.070
	DSpa	0.003	8791115.835	0.013	0.990
	DYear	-0.312	2746101.593	-1.509	0.144

Table 15 Model B Estimated betas

Where: model 1 only considers the effect of the independent variable (RDQ) on the dependent variable (trading volume). model 2 considers the same relationship, but also includes the control variables which are defined in Appendix E; constant refers to β_0, the constant beta of the model.

Model C

					Change statistics				
Model	*R*	*R Square*	*Adjusted R Square*	*Standard error of the estimate*	*R Square change*	*F Change*	*Degrees of freedom 1*	*Degrees of freedom 2*	*Significant F change*
1	0.521	0.271	0.055	0.19022503	0.271	1.256	8	27	0.307
2	0.910	0.828	0.329	0.16026684	0.556	1.613	18	9	0.235

Table 16 Model C summary

Where: Model 1 only considers the effect of the independent variables (RDQro, RDQun, RDQul, RDQm, RDQc, RDQo, RDQl and RDQor) on the dependent variable (relative bid-ask spread). Model 2 considers the same relationship, but also considers the control variables as can be seen in Appendix E.

Model		*Sum of squares*	*Degrees of freedom*	*Mean square*	*F*	*Significance*
1	Regression	0.364	8	0.045	1.256	0.307
	Residual	0.977	27	0.036		
	Total	1.341	35			
2	Regression	1.109	26	0.043	1.661	0.216
	Residual	0.231	9	0.026		
	Total	1.341	35			

Table 17 Model C ANOVA

Where: Model 1 only considers the effect of the independent variables (RDQro, RDQun, RDQul, RDQm, RDQc, RDQo, RDQl and RDQor) on the dependent variable (relative bid-ask spread). Model 2 considers the same relationship, but also considers the control variables as can be seen in Appendix E.

Model		*Standardized Beta*	*Standard error*	*Value t-test*	*Significance*
1	Constant		0.117	1.460	0.156
	RDQro	-0.171	0.248	-0.648	0.522
	RDQun	0.334	0.210	1.511	0.142
	RDQul	-0.680	0.294	-2.351	0.026
	RDQm	0.170	0.378	0.525	0.604
	RDQc	-0.071	0.339	-0.241	0.811
	RDQo	0.070	0.360	0.260	0.797
	RDQl	0.505	0.267	1.836	0.077
	RDQor	-0.293	0.116	-1.444	0.160
2	Constant		4.615	0.236	0.819
	RDQro	-0.916	0.423	-2.032	0.073
	RDQun	0.667	0.388	1.634	0.137
	RDQul	-1.026	0.511	-2.040	0.072
	RDQm	1.148	0.629	2.127	0.062
	RDQc	-0.194	0.631	-0.354	0.732
	RDQo	0.475	0.604	1.048	0.322
	RDQl	0.458	0.459	0.968	0.358
	RDQor	0.055	0.284	0.111	0.914
	MCap	-0.554	0.000	-0.795	0.447
	USListing	0.656	0.266	1.146	0.281
	ForOwn	-0.117	0.046	-0.163	0.874
	OwnCon	-0.294	0.007	-0.366	0.723
	FreeFloat	-0.330	0.770	-0.487	0.638
	AnalFol	-0.544	0.014	-0.927	0.378
	PageCount	-0.215	0.001	-0.583	0.574
	DBank	-0.135	0.250	-0.214	0.835
	DDen	-0.358	0.424	-0.711	0.495
	DFin	-0.601	0.339	-1.495	0.169
	DFra	-0.294	0.305	-0.591	0.569
	DGer	0.273	0.367	0.625	0.547
	DIta	-0.294	0.385	0.468	0.651
	DNet	-0.071	0.351	-0.141	0.891
	DNor	0.212	0.304	0.487	0.638
	DSpa	0.431	0.525	0.692	0.507
	DUK	-0.836	0.322	-1.207	0.258
	DYear	-0.159	0.109	-0.565	0.586

Table 18 Model C Estimated betas

Where: model 1 only considers the effect of the independent variable (RDQro, RDQun, RDQul, RDQm, RDQc, RDQo, RDQl and RDQor) on the dependent variable (relative bid-ask spread); model 2 considers the same relationship, but also includes the control variables which are defined in Appendix E; constant refers to β_0, the constant beta of the model; * refers to variables which are left out of the model, because of a high degree of covariation with another variable.

Model D

					Change statistics				
Model	*R*	*R Square*	*Adjusted R Square*	*Standard error of the estimate*	*R Square change*	*F Change*	*Degrees of freedom 1*	*Degrees of freedom 2*	*Significant F change*
1	0.476	0.227	-0.002	7395794.472	0.227	0.990	8	27	0.466
2	0.902	0.814	0.814	6275518.952	0.588	1.583	18	9	0.244

Table 19 Model D summary

Where: Model 1 only considers the effect of the independent variables (RDQro, RDQun, RDQul, RDQm, RDQc, RDQo, RDQl and RDQor) on the dependent variable (trading volume). Model 2 considers the same relationship, but also considers the control variables as can be seen in Appendix E.

Model		*Sum of squares*	*Degrees of freedom*	*Mean square*	*F*	*Significance*
1	Regression	4.331E+14	8	5.413E+13	0.990	0.466
	Residual	1.477E+15	27	5.470E+13		
	Total	1.910E+15	35			
2	Regression	1.555E+15	26	5.983E+13	1.519	0.262
	Residual	3.544E+14	9	3.938E+13		
	Total	1.910E+15	35			

Table 20 Model D ANOVA

Where: Model 1 only considers the effect of the independent variables (RDQro, RDQun, RDQul, RDQm, RDQc, RDQo, RDQl and RDQor) on the dependent variable (trading volume). Model 2 considers the same relationship, but also considers the control variables as can be seen in Appendix E.

Model		*Standardized Beta*	*Standard error*	*Value t-test*	*Significance*
1	Constant		4531873.418	0.907	0.372
	RDQro	0.002	9631487.265	0.007	0.995
	RDQun	-0.209	8169070.555	-0.919	0.366
	RDQul	-0.128	11423985.21	-0.431	0.670
	RDQm	0.205	14706792.58	0.613	0.545
	RDQc	-0.302	13186462.20	-0.994	0.329
	RDQo	0.193	13994060.57	-.692	0.495
	RDQl	0.058	10389852.62	0.204	0.840
	RDQor	0.383	4520078.615	1.833	0.078
2	Constant		180700686.1	-1.319	0.220
	RDQro	0.129	16582704.83	0.275	0.790
	RDQun	0.320	15190373.65	0.756	0.469
	RDQul	0.532	20009120.67	-1.021	0.334
	RDQm	0.950	24644854.40	1.697	0.124
	RDQc	-0.357	24704465.41	-0.628	0.546
	RDQo	-0.460	23636735.15	-0.978	0.354
	RDQl	0.125	17979072.00	0.255	0.804
	RDQor	-0.182	11138370.29	-0.353	0.732
	MCap	-0.247	0.296	-0.342	0.740
	USListing	-0.544	10407138.38	-0.915	0.384
	ForOwn	0.980	1789816.952	1.322	0.219
	OwnCon	0.405	257285.442	0.487	0.638
	FreeFloat	0.305	30149627.96	0.434	0.674
	AnalFol	0.669	529798.008	1.098	0.301
	PageCount	-0.247	28997.034	-0.647	0.534
	DBank	0.250	9777381.551	0.381	0.712
	DDen	-0.386	16594513.54	-0.739	0.479
	DFin	-0.258	13259563.44	-0.619	0.552
	DFra	0.030	11946361.16	0.059	0.954
	DGer	0.623	14376369.82	1.378	0.202
	DIta	0.072	15068874.93	0.111	0.914
	DNet	0.259	13734629.80	0.497	0.631
	DNor	-0.264	11888709.61	-0.585	0.573
	DSpa	-0.416	20564982.00	-0.644	0.536
	DUK	0.810	12596582.99	1.126	0.289
	DYear	-0.566	4258984.197	-1.940	0.084

Table 21 Model D Estimated betas

Where: model 1 only considers the effect of the independent variable (RDQro, RDQun, RDQul, RDQm, RDQc, RDQo, RDQl and RDQor) on the dependent variable (trading volume); model 2 considers the same relationship, but also includes the control variables which are defined in Appendix E; constant refers to β_0, the constant beta of the model; * refers to variables which are left out of the model, because of a high degree of covariation with another variable.

Appendix H Overview outcome of analyses

Hypothesis	*Dependent variable*	*Independent variable*	*Expectation*	*Reality*	*Significant*	*Rejected/accepted*
1	Relative bid-ask spread	RDQ	-	+	No	Rejected
	Trading volume	RDQ	+	+	No	
2	Relative bid-ask spread	RDQro	-	-	No	Rejected
		RDQun	-	+	No	
		RDQul	-	-	No	
		RDQm	-	+	No	
		RDQc	-	-	No	
		RDQo	-	+	No	
		RDQl	-	+	No	
		RDQor	-	+	No	
	Trading volume	RDQro	+	+	No	
		RDQun	+	+	No	
		RDQul	+	+	No	
		RDQm	+	+	No	
		RDQc	+	-	No	
		RDQo	+	-	No	
		RDQl	+	+	No	
		RDQor	+	-	No	

Table 22 Overview outcome analyses

Appendix I Multicollinearity tests

Model A

Model		*Tolerance*	*Variance Inflation Factor*	*Threat of multicollinearity*
1	Constant			
	RDQ	1.000	1.000	
2	Constant			
	RDQ	0.320	3.217	
	MCap	0.109	9.178	
	USListing	0.191	5.244	
	ForOwn	0.110	9.059	
	OwnCon	0.104	9.606	
	FreeFloat	0.172	5.819	
	LNL	0.279	3.586	
	AnalFol	0.191	5.233	
	PageCount	0.184	5.430	
	DBank	0.157	6.381	
	DDen	0.251	3.980	
	DFin	0.555	1.801	
	DFra	0.293	3.412	
	DGer	0.186	5.377	
	DIta	0.189	5.278	
	DNet	0.605	1.653	
	DNor	0.284	3.516	
	DSwi	0.167	5.993	
	DSpa	0.216	4.638	
	DYear	0.368	2.715	

Table 23 Model A multicollinearity test

Where: model 1 only considers the effect of the independent variable (RDQ) on the dependent variable (Spread). model 2 considers the same relationship, but also includes the control variables which are defined in Appendix E; constant refers to β_0, the constant beta of the model; threat of multicollinearity is established if VIF>10.00.

Model B

Model		*Tolerance*	*Variance Inflation Factor*	*Threat of multicollinearity*
1	Constant			
	RDQ	1.000	1.000	
2	Constant			
	RDQ	0.320	3.127	
	MCap	0.109	9.178	
	USListing	0.191	5.244	
	ForOwn	0.110	9.059	
	OwnCon	0.104	9.606	
	FreeFloat	0.172	5.819	
	LNL	0.279	3.586	
	AnalFol	0.191	5.233	
	PageCount	0.184	5.430	
	DBank	0.157	6.381	
	DDen	0.251	3.980	
	DFin	0.555	1.801	
	DFra	0.293	3.412	
	DGer	0.186	5.377	
	DIta	0.189	5.278	
	DNet	0.605	1.653	
	DNor	0.284	3.516	
	DSwi	0.167	5.993	
	DSpa	0.216	4.638	
	DYear	0.368	2.715	

Table 24 Model B multicollinearity test

Where: model 1 only considers the effect of the independent variable (RDQ) on the dependent variable (Spread). model 2 considers the same relationship, but also includes the control variables which are defined in Appendix E; constant refers to β_0, the constant beta of the model; threat of multicollinearity is established if VIF>10.00.

Model C

Model		*Tolerance*	*Variance Inflation Factor*	*Threat of multicollinearity*
1	Constant			
	RDQro	0.388	2.578	
	RDQun	0.552	1.812	
	RDQul	0.323	3.096	
	RDQm	0.256	3.900	
	RDQc	0.311	3.211	
	RDQo	0.370	2.705	
	RDQl	0.356	2.808	
	RDQor	0.656	1.524	
2	Constant			
	RDQro	0.094	10.613	Yes
	RDQun	0.115	8.703	
	RDQul	0.076	13.191	Yes
	RDQm	0.066	15.213	Yes
	RDQc	0.064	15.652	Yes
	RDQo	0.093	10.717	Yes
	RDQl	0.086	11.679	Yes
	RDQor	0.078	12.856	Yes
	MCap	0.039	25.342	Yes
	USListing	0.058	17.112	Yes
	ForOwn	0.038	26.645	Yes
	OwnCon	0.030	33.595	Yes
	FreeFloat	0.042	24.000	Yes
	AnalFol	0.056	17.996	Yes
	PageCount	0.141	7.090	
	DBank	0.048	20.768	Yes
	DDen	0.076	13.208	Yes
	DFin	0.119	8.433	
	DFra	0.078	12.885	Yes
	DGer	0.101	9.913	
	DIta	0.049	20.501	Yes
	DNet	0.076	13.172	Yes
	DNor	0.101	9.870	
	DSpa	0.049	20.284	Yes
	DUK	0.040	25.070	Yes
	DYear	0.242	4.132	

Table 25 Model C multicollinearity test

Where: model 1 only considers the effect of the independent variable (RDQro, RDQun, RDQul, RDQm, RDQc, RDQo, RDQl and RDQor) on the dependent variable (Spread); model 2 considers the same relationship, but also includes the control variables which are defined in Appendix E; constant refers to β_0, the constant beta of the model; * refers to variables which are left out of the model, because of a high degree of covariation with another variable; threat of multicollinearity is established if VIF>10.00.

Model D

Model		*Tolerance*	*Variance Inflation Factor*	*Threat of multicollinearity*
1	Constant			
	RDQro	0.388	2.578	
	RDQun	0.552	1.812	
	RDQul	0.323	3.096	
	RDQm	0.256	3.900	
	RDQc	0.311	3.211	
	RDQo	0.370	2.705	
	RDQl	0.356	2.808	
	RDQor	0.656	1.524	
2	Constant			
	RDQro	0.094	10.613	Yes
	RDQun	0.115	8.703	
	RDQul	0.076	13.191	Yes
	RDQm	0.066	15.213	Yes
	RDQc	0.064	15.652	Yes
	RDQo	0.093	10.717	Yes
	RDQl	0.086	11.679	Yes
	RDQor	0.078	12.856	Yes
	MCap	0.039	25.342	Yes
	USListing	0.058	17.112	Yes
	ForOwn	0.038	26.645	Yes
	OwnCon	0.030	33.595	Yes
	FreeFloat	0.042	24.000	Yes
	AnalFol	0.056	17.996	Yes
	PageCount	0.141	7.090	
	DBank	0.048	20.768	Yes
	DDen	0.076	13.208	Yes
	DFin	0.119	8.433	
	DFra	0.078	12.885	Yes
	DGer	0.101	9.913	
	DIta	0.049	20.501	Yes
	DNet	0.076	13.172	Yes
	DNor	0.101	9.870	
	DSpa	0.049	20.284	Yes
	DUK	0.040	25.070	Yes
	DYear	0.242	4.132	

Table 26 Model D multicollinaerity test

Where: model 1 only considers the effect of the independent variable (RDQro, RDQun, RDQul, RDQm, RDQc, RDQo, RDQl and RDQor) on the dependent variable (Volume); model 2 considers the same relationship, but also includes the control variables which are defined in Appendix E; constant refers to β_0, the constant beta of the model; * refers to variables which are left out of the model, because of a high degree of covariation with another variable; threat of multicollinearity is established if VIF>10.00.

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