Corporate Risk Disclosure: A Content Analysis of Swedish Interim Reports

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Abstract

The aim of this research is to examine the determinants of the level of corporate risk disclosure (CRD) in the interim reports of Swedish non-financial companies. A quantitative research approach is used, the sample data of which consist of 166 firms with 4,849 interim reports over a 10-year period. By utilizing the notion of risk and its definition, I have distinguished three categories of risk, namely risk as uncertainty, risk as threat and risk as opportunity. A systematic content analysis is conducted with the use of a software program, which is specifically designed for this purpose. The number of sentences that contain keywords related to the three risk categories is counted as the total CRD score, which is transformed to the disclosure index.

I have examined the impact of firms’ characteristics and corporate governance mechanisms on the level of CRD based on agency theory. The ordinary least squares regression method with control for fixed year effects is used to analyse the data, which show that firm size and audit committee have a positive relationship with the level of corporate risk disclosure. The result demonstrates also that there is a negative relationship between family ownership and the level of CRD, and an insignificant relationship between leverage and the level of CRD.
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1. Introduction

Corporate risk reporting is a cornerstone of accounting and investment practice (ICAEW, 1999a). Risk disclosure is information that describes firms' major risks and their expected economic impact on their current and future performance (Mihkinen, 2010). Managers use financial reporting and disclosure to transfer and communicate a firm’s performance and governance to the outside world (Armstrong et al., 2010). For investors, risk information can help to determine the risk profile of a company, the accuracy of security price forecasts and the estimation of its market value (Beretta and Bozzolan, 2004). Furthermore, risk information can help companies to manage change and lower the cost of capital (ICAEW, 1999a).

Companies' disclosures of risks and how these risks are identified, managed, analysed and evaluated, give the users of corporate reports the ability to understand business profiles and risk profiles. Corporate reports can enable users to make an accurate assessment of a company's financial conditions and performance (Solomon et al., 2000). Financial reporting and disclosure are potentially important, since they lead, among other things, to a reduction of information asymmetry and a reduction of capital costs (Khliﬁ and Bouri, 2010). Companies try to satisfy investors’ needs by disclosing more information about different risks and thereby mitigating monitoring costs associated with these (ibid).

According to Botosan (1997), from a shareholder perspective, disclosure will enable shareholders to better assess the financial performance of the company and to assure them that the managers are managing companies the best they can. Firms also have incentives to issue corporate risk disclosure (henceforth referred to as CRD). From the agents’ perspectives, disclosure provides significant messages about business performance and puts companies in direct contact with investors, which increases their confidence, and hence reduces the cost of capital. Thus, CRD creates benefits for both shareholders and companies (ibid).

According to Kanto and Schadewits (2000), the information content of interim reports is increasingly comprehensive and they have some benefits compared to annual reports. The main benefits of this kind of interim report include their timeliness (Elzahar and Hussainey, 2012), their usefulness for investors’ and analysts’ assessments for updating their prior expectations (Landsman and Maydew, 2002), and that they are a useful source of information for decision making (Mangena and Pike, 2005). Analysts can forecast annual earnings if
related information has been published in interim reports. Studies of share price movements
due to interim earnings demonstrate the importance of this kind of report for market actors.
Regulators have responded to this importance by introducing new requirements for improving
the quality of information disclosure. For example, the Accounting Standards Board (ASB,
1997) published a statement on interim reports and International Accounting Standards (IAS
34)\(^1\) were issued to improve the disclosure of interim reports.

In Sweden, interim reporting became mandatory for listed firms in 1998 and, according to
Swedish regulation, firms must disclose materially important risk factors in their interim
reports. Corporate interim reporting through regulation increases the quality of reporting,
since it provides investors with a more continuous measure of monitoring (ibid).

Alberti-Alhtaybat et al. (2012) confirm that in practice there are variations in the level of
CRD between companies. The level of risk disclosure that a firm demonstrates in its report is
one of the essential and most important decisions for managers. The effect of corporate
characteristics and corporate governance as two main factors on the level of CRD has been
the subject of scholarly investigation over the last half century (Khlifi and Bouri, 2010) in
different countries such as, the UK, the USA, Singapore, Australia, Portugal, Malaysia, New
Zealand, Egypt and Ghana. Prior studies have examined CRD determinants in annual reports
(e.g., Abraham and Cox, 2007; Rajab and Schachler, 2009; Beretta and Bozzolan, 2004) and
demonstrate that firms’ characteristics (e.g., activity, profitability, firm size, leverage and
liquidity) and corporate governance (e.g., audit committee, board composition and size,
institutional ownership, and family control) have a relationship with the level of risk
disclosure (Oliveira et al., 2011; Khalif and Souissi, 2010). However, to our knowledge, there
has been no extensive investigation into Swedish firms, which focuses on determinants of risk
disclosures included in interim reports. An investigation into this topic by Cooke (1989)
examines the disclosure analysis in Swedish companies, however, this study is limited to
annual reports. The extent of corporate disclosure in Sweden, as in other countries, may be
influenced by different firm factors including firm characteristics and corporate governance.
The results of previous studies as mentioned above indicate that the relationship between the
level of CRD and firm-specific attributes varies from country to country. In these studies,

\(^1\) http://www.ifrs.org/Pages/default.aspx
various factors have been investigated. These factors include but are not limited to firm size, leverage, ownership structure, industry type, existence of the audit committee (AC), the need for capital, size of auditing firm and listing status. According to Abraham and Cox (2007), some of these relationships are weak and not verified in the literature. As there has not been any previous investigation into this in Sweden, it will be interesting to find out how characteristics of Swedish companies influence the level of disclosure in interim reports by employing agency theory.

This thesis also examines the literature on corporate risk disclosure. The initial purpose of this study is to gain insight into the type, nature and level of risk information disclosed by firms in their interim reports. I will extend this by undertaking an empirical investigation into the CRD of Swedish non-financial companies for a 10-year period. Thus, the specific research question in this study is: to what extent do corporate characteristics and corporate governance affect risk disclosures in the interim reports of non-financial listed Swedish companies?

However, of the firm attributes available, I limit my study to firm size, leverage, AC and family ownership. Firm size and leverage are two important firm characteristics that have been investigated in other markets and settings and it is interesting to study how they affect CRD in the Swedish interim reports. AC (Mangena and Pike, 2005) and family ownership (Darmadi and Sodikin, 2013) are common phenomena in Swedish companies, encouraging me to examine these two corporate governance factors affecting CRD in the Swedish interim reports by drawing on agency theory.

The paper is structured as follows. I describe the theoretical framework in section 2 and define the hypotheses in section 3. In section 4, the methodology is discussed, and empirical results and analysis are presented in section 5. The conclusion is presented in section 6 and the references in section 7.

2. Theoretical framework

2.1. The Notion of Risk

When conducting a corporate risk disclosure study, one principle concern is the definition of risk as a key concept in this investigation.
According to Hamberg (2000), economists distinguish risk from uncertainty, as: “risk refers to all situations where future events and their probability can be established” while “uncertainty refers to situations where future events and their probability are unknown”. This precise definition of risk, reduces risk to a mathematical calculation of the expected outcomes. This definition illustrates that there is a positive relationship between risk and expected return in economically risky situations. By taking into consideration the definition of risk, markets in risky situations should be the perfect markets, which do not exist in real world. A risky environment provides little opportunity for business activity. However, the definition of risk as mentioned does not exactly match with the perspective of society, which uses a more broad definition of risk that even includes uncertainty (ibid).

The concept of risk is used also in a number of heterogeneous business situations (Hambery, 2000). There are different perspectives on risk from business and from economic theory, which are somewhat paradoxical (ibid). This study discusses and employs the definition of risk from the point of view of business, not economic theory. The International Federation of Accountants’ (IFAC, 1999) report defines risk as an uncertain future event, which can influence the achievement of an organization’s strategic, operational and financial objectives. The International Accounting Standards Board (IASB, 2005) presents a strong definition of risk in its professional report and defines risk as “... uncertainty as the amount of benefit. The term includes both potential for gain and exposure to loss”. Definitions about risk in business demonstrate that risk is not distinguished from uncertainty in this context.

The definition of risk used here is derived from a modernist view of risk (Linsley and Shrives, 2006). The definition demonstrates that risk as an important and significant context can have various effects both positive (upside) and negative (downside) on companies and therefore, it can be categorized in different manners. A range of uncertainties, which can have effects on firms’ future prospects, both upside and downside risks, are considered in these definitions. The consideration of risk is essential for companies to be able to enhance performance and create value (IFAC, 1999).

Thus, risk can be understood in a number of different ways (Collier, 2009): risk as threat, risk as uncertainty and risk as opportunity. Risk as threat refers to negative events (downside) when things go wrong. Risk in the context of opportunity refers to positive events (upside) and potential for gain (ibid). Finally, risk as uncertainty refers to either upside or downside
risk (Collier, 2009). I use this definition of risk in the content analysis (section 4) and define three categories, namely risk as uncertainty, risk as threat and risk as opportunity.

According to Dobler (2008), firms confront a variety of risks driven by various factors and sources either external or internal when performing their activities. These factors can be for example, political, economic, regulations, market, finance, business process and personnel, and can have a potential effect on the company's performance (ibid).

In modern businesses, the responsibility of risk managers is to identify different sources of risk related to their companies, and to analyse and evaluate their impact on future outcomes. Risk management is increasingly recognized as being concerned with both negative and positive aspects of risk (Dobler, 2008). Therefore, the potential opportunities disclosed will be taken into consideration when examining risk information (Rajab, 2009). Risk information is information that describes a company’s major risks and their expected economic impact on future performance (Miihkinen, 2010).

2.2. Corporate Risk Disclosure (CRD)

In accounting literature, several theories have been developed over the years to explain the phenomenon of disclosure and to explain the variation in disclosure between companies (Rajab, 2009). Agency theory, signalling theory, stakeholders theory, political cost theory and benefit-cost theory are the main theoretical frameworks that have been employed by scholars to explain the effects of different factors (e.g., corporate governance and firm characteristics) behind disclosure differences (ibid). Moreover, Linsley and Shrives (2005) state that some of these theories could be relevant for the discussion of the motivation of risk disclosure.

Agency theory, proposed by Jensen and Meckling (1976), has been the most prevailing theory in the field of accounting over the last thirty years (Khlifi and Bouri, 2010). Jensen and Meckling (1976) state that “Agency theory explains how information asymmetry between shareholders, managers and creditors can be reduced by monitoring the opportunistic attitudes of managers”. Agency theory conceives that there is an inherent moral hazard between shareholders (principals) and managers (agents) that gives rise to agency cost (ibid). Khlifi and Bouri (2010) state that “The unity of analysis of the agency theory is the relationship, which links the various partners of the firm”. The theory aids in understanding
problems, which agency theory addresses. The problems arise for two main reasons: when the goals of the principle and agent are in conflict, and when the principle and agent have different attitudes towards risk (Rajab, 2009).

In recent times, corporate reporting on risk has received considerable attention (ICAEW, 1999; Abraham and Cox, 2007). Agency theory posits disclosure as a mechanism, which decreases conflict costs (Jensen and Meckling, 1976), for instance by publishing financial reports and increasing the amount of information contained in these reports (Rajab, 2009). Thus, disclosure is a mechanism for persuading shareholders and other parties that the company is being managed and is accountable to them (ibid). Therefore, disclosure increases the confidence of shareholders and consequently reduces information asymmetry and agency cost, as well as investors' uncertainty (Jensen and Meckling, 1976).

CRD is the communication of information statements (Beretta and Bozzolan, 2004). The aim of risk disclosure for companies, according to Collier (2009), is to show how various kinds of risks are identified, managed, analysed and evaluated. The information includes firm’s strategies, characteristics, operations and other external factors. Moreover, Jensen and Meckling (1976) indicate that firms’ motivations, objectives and policies play an important role in disclosing information and communicating with the users of financial reports. Thus, financial reports should be an asset and enable users of corporate reports to evaluate the firm’s financial position and performance (ibid). Disclosure is influenced by a diverse range of supply and demand forces (Jensen and Meckling, 1976). These forces create “the information gap” between those who prepare financial reports (managers) and those who use the reports (investors) (ibid).

Disclosure is necessary in order to mitigate agency problems (Elhazar and Hussainey, 2012). From an agency perspective, disclosure benefits companies by increasing transparency and reducing information asymmetries, thus reducing the cost of capital (Botosan, 2005). However, to reduce agency problems managers have to present relevant information to prove that they are acting in the interests of the shareholders and debtholders (Healy and Palepu, 2001).

Investors demand information from companies in which they are interested due to the fact that management has a greater knowledge of both the firm's current and future performance,
certainly more than outside investors (Rajab and Schachler, 2009). Financial reports inherently provide an opportunity for investors to evaluate the information that is disclosed by a firm to distinguish levels of various risks that the firm will face in the future. Financial reporting is designed to meet the demand of various groups of users in order to enable them to make rational and accurate investment decisions (Elzahar and Hussainey, 2012). This gives investors the possibility to take decisions based on expected returns and risk considerations (ibid).

In summary, risk disclosure is the communication of information (Beretta and Bozzolan, 2004). Companies disclose information for a variety of reasons: for example to reduce agency costs, lower information asymmetry among market participants, reduce shareholder uncertainty, reduce a company's cost of capital and improve the market price of securities (ibid).

3. Research Hypotheses

3.1. Corporate Characteristics and Corporate Risk Disclosure

Information disclosure is influenced by internal and external factors (Khlifi and Bouri, 2010). Internal factors include the firm’s characteristics, such as firm size, industry type and listing status. External factors are related to the environmental context, such as culture and the legal system (ibid). Evidence from several empirical studies demonstrates that firm characteristics influence the level of CRD (Elzahar and Hussainey, 2012). The main corporate characteristics include the type of activity (Cooke, 1992; Mangena and Pike, 2005), firm size (Hossain et al., 1995; Watson et al., 2002), leverage (Ahmed and Courtis, 1999), profitability (Wallace et al., 1994; Hussainey and Al-Najjar, 2011), liquidity (Wallace et al., 1994; Mangena and Pike, 2005) and cross listing (Cooke, 1992; Wallace et al., 1994; Mangena and Pike, 2005).

The most important motive of corporate disclosure is to reduce the agency problem and, consequently, reduce information asymmetry between corporate management and shareholders (Khlifi and Bouri, 2010). Thus, this study utilizes agency theory in order to explain the kind of relationship that can exist between corporate characteristics and the level of CRD.
3.1.1. Firm Size

Size is an important determinant of the level of disclosure and has been used in various investigations. The association between disclosure and company size has been tested for different countries by researchers (e.g., Abraham and Cox, 2007; Lang and Lundholm, 1993; Watts and Zimmerman, 1983; Firth, 1979; Elzahar and Hussainey, 2012; Rajab and Schachler, 2009; Beretta and Bozzolan, 2004).

Large firms are likely to be more complex and have wider ownerships. Jensen and Meckling (1976) state that large firms have higher agency costs. Large firms have higher and sufficient resources to cover the costs of additional risk disclosure. They are in a better position to expend additional funds on reporting. Lang and Lundholm (1993) find a positive and significant association between disclosure and size, which is based on the possibility of economies of scale. Disclosure costs, such as the cost of accumulation and dissemination of information are also higher for smaller firms (Lang and Lundholm, 1993). According to Wallance and Naser (1995), the cost for large firms of producing and disseminating information is likely to decrease per unit of firm size to some fixed extent. According to Rajab (2009), firms disclose information because they wish to raise capital at the lowest possible cost. Thus, this can be an obstructive element for disclosing for smaller firms.

Moreover, according to Jensen and Meckling (1976), in large companies the proportion of outside capital tends to be higher and agency cost (monitoring costs) increases with the amount of outside capital. Thus, larger firms may have greater incentives to disclose more information in order to reduce agency cost and hence reduce information asymmetries between managers and shareholders. Moreover, the demand from analysts for information could be greater on larger firms (Firth, 1979).

On the other hand, larger firms have stronger incentives to disclose more information to improve their corporate reputation and public image, since non-disclosure may be interpreted as bad news that could affect a firm’s value (Rajab, 2009). Larger companies attract the interest of the public and governmental bodies. Disclosure could be a mechanism by which to alleviate public criticism or governmental intervention (Firth, 1979). Thus, I argue that large firms need to disclose risk related information to a wide range of investors and creditors to clarify their ability to manage the risks. Managers in larger firms can reduce the risk of dismissal by communicating more information. Therefore, this also gives them the ability to
reduce agency cost and information asymmetries between managers and shareholders. The discussion so far suggests the following hypothesis:

\textbf{H1:} The level of risk disclosure in interim reports is positively related to company size.

### 3.1.2. Financial Leverage

It has been proposed that the capital structure of a firm is related to agency cost (Jensen and Meckling, 1976). Agency costs (e. g., incurred by monitoring costs) are higher for firms with proportionally more debt in their capital structure because a large proportion of debt allows for greater potential wealth transfers from debtholders to shareholders and firms that are highly leveraged incur more monitoring costs (Jensen and Meckling, 1976). Firms attempt to reduce these costs by disclosing more information and, according to Leftwich et al., (1981), the agency problem is more likely to increase with the level of debt. Thus, agency theory predicts that corporate disclosure is expected to increase with leverage (Rajab, 2009).

I argue that disclosure in interim reports assists both lenders and firms. Lenders by employing interim reports can test compliance with loan conventions (Taylor et al., 2010). According to agency theory, by providing more risk management information firms attempt to satisfy their lenders and consequently demonstrate the firm’s ability to meet its obligations (Rajab, 2009). Thus, the level of disclosure in interim reports influences creditors in their future decision making. Highly geared firms have a wider obligation to satisfy the needs of their long-term creditors for information compared to lower geared firms (ibid). Thus, I argue that highly geared firms need to disclose more risk information compared to lower geared firms. Highly geared firms by disclosing more can decrease the information gap between creditors and managers and consequently agency cost.

Prior studies into this subject demonstrate different results for different countries. Deumes and Knechel (2008), Marshall and Weetman (2007), and Taylor et al. (2010) find a positive relationship between the two variables, while Abraham and Cox (2007), Linsley and Shrives (2006), and Rajab and Schachler (2009) find insignificant association between these two variables. I expect there to be a relationship between leverage ratio and the level of disclosure in Swedish interim reports. The above argument suggests the following hypothesis:

\textbf{H2:} There is a positive association between leverage and the level of corporate risk disclosure.
3.2. Corporate Governance and Corporate Risk Disclosure

Corporate governance is the system by which companies are directed and controlled (Collier, 2009). The shareholders’ role in governance is to appoint the directors and the auditors. Shareholders by doing so satisfy themselves that an appropriate governance structure is in place. Directors are responsible to their shareholders and have a stewardship function for the governance of the company. Setting the company’s strategic goals, providing the leadership to put those goals into effect, supervising the management of the business and reporting to shareholders are the main duties of directors. The management’s role in the company includes identifying and evaluating the risks faced by the company for consideration by the directors. They must implement the director’s policies on risk and control by designing, operating and monitoring a suitable system of internal controls (ibid).

The main responsibility for directors in firms is to manage and run the company in a way that maximizes the long-term returns to shareholders, for example: maximizing the company's profit and cash flow. The separation of ownership and control in corporations leads to agency relationships between shareholders (principals) and management (agents). However, there is a potential conflict of interest between principals (investors) and management (agents), arising from both the information and power imbalance (Rajab and Schachler, 2009). Corporate governance is defined as describing the rights and responsibilities of each group of shareholders and transparency is one major indicator of corporate governance (Ho and Wong, 2001). Chen and Jaggi (2000) state that a strong corporate governance structure could encourage more transparent information disclosure. Corporate governance quality is a determinant factor of informativeness in corporate disclosures (Beekes and Brown, 2006). The role of corporate governance is to ensure that all the interests of shareholders are protected through effective oversight of all aspects of financial reporting (Mangena and Pike, 2005). The quality of corporate governance is a determinant factor of informativeness in corporate disclosures (Beekes and Brown, 2006).

Institutional ownership (Mangena and Pike, 2005), duality role (Cooke, 2002; Ho and Wong, 2001), size of the board (Singh el al., 2004), board composition (Haniffa and Cooke, 2002) and size of the AC (Mangena and Pike, 2005) are the main characteristics of corporate governance, used in previous studies.
3.2.1. Audit Committee

According to Mangena and Pike (2005), the AC as a decision making body is an important element in the corporate governance process and it is expected to monitor and enhance the quality of the financial reporting process. The AC should review the important financial reporting issues and judgments made in connection with the preparation of the firm’s financial statements (Collier, 2009). Characteristics of the AC, for example, their knowledge of the business environment and their ability to read and understand fundamental financial statements (Mangena and Pike, 2005) as the ultimate monitor in the financial reporting process (ibid) can have significant effects on the level of risk information in the interim reports. I argue that the probability of appointing an AC increases with increasing agency conflicts between management and shareholders. The AC can reduce the information gap between these two parts by reviewing and monitoring the financial reporting. The AC presses managers to disclose sufficient and related risk information in financial reports to satisfy shareholders and hence, reduces the information gap. With the existence of an AC, managers attempt also to disclose risk related information and consequently they by doing so reduce agency costs arising from reviewing and monitoring more.

Forker (1992) and Ho and Wong (2001) show a positive relationship between the presence of an AC and the extent of disclosure. I argue that the existence of an AC that includes strong and diverse expertise may also influence and resolve potential problems in the financial reporting process. Thus, I state the following hypothesis:

**H3**: There is a positive relationship between the existence of the audit committee and the level of risk disclosure.

3.2.2. Family Ownership

Firms that are managed and controlled by founding families are referred to as family firms (Ali et al., 2007). Faccio and Lang (2002) have documented that family control appears to be the most common form of corporate control in most capital markets worldwide. The characteristics of family firms encourage me to examine how the agency problem across family firms influences the level of CRD. According to Ali et al. (2007), family firms tend to hold undiversified and concentrated equity positions in their firms. Family firms have good knowledge about their firms’ activities and they can provide superior monitoring of managers.
Having longer investment horizons is another characteristic of this type of ownership (ibid). Long-term survivability and good reputation are two more characteristics known to be associated with family owned corporations (Anderson et al., 2003). Family owners have better knowledge of the firms’ business, hence, the owners’ direct monitoring decreases managers’ opportunities to affect the earning of family firms (Ali et al., 2007). By considering these characteristics, I argue that family firms face less severe hidden actions and hidden information. It means that information asymmetry and agency cost, which arises from the separation of ownership and management, is lower in this type of ownership structure. Family-controlled firms have lower incentives to disclose more information. Thus, there is not a strong demand for disclosing more risk information from the perspective of agency theory to reduce the level of agency cost and the information gap.

**H4:** There is a negative relationship between family ownership and level of corporate risk disclosures.

4. Method

4.1. Research approach

The purpose of this study is to explore the relationship between levels of CRD and firm characteristics. The quantitative research approach is manifestly used in this investigation. I choose a deductive approach, which means that our assumptions are derived from established theory and previous research (Saunders et al., 2009). Among the benefits of using a quantitative approach is the possibility of using a larger sample, which makes it possible to draw more generalized conclusions (Bryman and Bell, 2011). The statistical analyses performed in this research include the use of ordinary least squares regression to examine the relationship between the level of risk disclosure of interim reports and the influencing factors, which are specified in the hypotheses.

To test the hypotheses, I use the following generic model:

\[
\text{corporate risk disclosure} = \text{firm characteristics} + \text{control variables} + \text{fixed effects} + \varepsilon
\]

In this setting, the firm characteristics include firm size, leverage, AC and family ownership. No control variable is considered in this study due to time limitations. However, I control for fixed year effects, since the sample data are extended over a 10 year time interval. The model captures the relationship between the firm characteristics and the level of disclosure. I
subsequently discuss in detail the measuring and quantifying of these variables in the corresponding sections (sections 4.2 and 4.4).

4.2. Measuring Corporate Risk Disclosure

Previous research has used content analysis to measure the level of CRD (e.g., Abraham and Cox, 2007; Beretta and Bozzolan, 2004; Linsley and Shrives, 2006). This study also adopts content analysis to measure the level of CRD.

4.2.1. Content Analysis

Employing the content analysis technique to measure CRD in the interim reports:

According to Krippendorff (2004), “content analysis is a research technique for making replicable and valid inferences from texts to the contexts of their use”. Bryman and Bell (2011) state that content analysis is an approach to the analysis of documents and texts, which seeks to identify content in terms of predetermined categories and in a systematic and replicable manner. This approach can be utilized for both qualitative and quantitative data and in an inductive or deductive way (Wolfe, 1991). Content analysis (e.g., Abraham and Cox, 2007; Linsley and Shrives, 2006) is used to determine the themes of risk disclosure and can be used to note either the presence or the absence of a theme in a written broadcast or other verbal material. It is a useful method as it allows for disclosure to be systematically classified and is also useful in comparing trends (Abraham and Cox, 2007).

This study also uses content analysis to measure CRD by using the frequency of the occurrence of items of risk, which is a multidimensional coding to quantify the level of risk disclosure. This approach has some intrinsic value but it involves more work and requires a richer data set (Rajab, 2009). The definition of risk introduced in section (2.1) plays an important role here in measuring CRD, which distributes risk information into three categories: risk as uncertainty, risk as threat and risk as opportunity. The definition of risk and its categories make it possible to study risk from a business perspective and find risk related information in interim reports separately for three different categories. By categorizing risk related information into three risk categories, I can calculate a score for each category. The CRD scores from the business perspective will be the sum of these three categories’ scores, which is used to calculate an index for CRD.
The categorization of risk also provides the ability to compare the level of these three risk categories with each other, however, this is not the objective of this study.

**Selecting sentences as a coding unit:**

An essential element of content analysis is the selection of the unit of analysis (unit of scale). The unit of analysis will determine 'how' to capture the data about a subject, which in this study is risk disclosure. Previous studies have employed different types of units of analysis, but the most common and preferred unit of analysis tends to be word, sentence, and page (Gray et al., 1995). I am inspired by methods that Abraham and Cox (2007) and Oliveria et al. (2011) used and formulate specific categories for measuring risks. Oliveria et al. (2010) utilize sentence as the recording unit. Oliveria et al., (2010) use the findings of Milne and Adler (1999) that indicate that using sentences instead of words is more reliable and meaningful. Thus, the sentence as a unit of analysis is used in this study. In the next step, I utilize three risk categories which I have defined previously. I employ these categories to find keywords related to each of these three categories. After finding keywords, I highlight each sentence if it contains keywords and ignore the sentence if it contains no keywords.

**Choosing specific keywords to recognize risk information sentences within three risk categories:**

As discussed in section (2.1), risk refers to the uncertainty of future earnings. This definition of uncertainty which is associated with both a potential gain and potential loss is employed here to measure the level of CRD. Therefore, for examining risk disclosure, negative and positive outcomes should be considered (Linsley and Shrives, 2005). This study adopts a broad concept of risks including downside and upside risk based on whether risk is perceived as a threat, as an opportunity or as an uncertainty. Table 1 shows risk categories and keywords related to each category. The keywords (risk related words) capture risk in the three mentioned categories. I use these contexts of risk because they are emphasized in the ICAEW’s (1999a) and Collier’s (2009) study and in previous research by Abraham and Cox (2006). I compile a comprehensive list of risk-related keywords to identify the final risk-word list. My list relies on three main sources: first, prior academic and professional research on risk (ICAEW, 1999a; Collier, 2009; Abraham and Cox, 2006; Linsley and Shrives, 2005;
Elzahar and Hussainey, 2012) and second by sourcing all the relevant synonyms for the words already identified. As I show in Table 1, all the derivatives of the keywords are also considered. For example, in the category of risk as uncertainty, I also add all the derivations of the word “change”, that is changes, changed, changing, changeful, changeless, changeable, changeableness and changeably. Third, other words indicative of risk are identified by reviewing the interim reports as presented in Table 1.

Each sentence of a firm’s interim report is scanned for keywords in Table 1. The counter for a category is increased by 1 if a sentence contains a keyword of that category. For example, to measure risk on an uncertainty scale, I count the number of sentences in interim reports which include the keywords related to this category in Table 1. Systematic content analysis is utilized in this investigation based on a computerized analysis of a large number of texts and by translating them into economic variables. This study employs a program, called Content Analysis Tool to analyse CRD, which is specially designed for counting the number of sentences containing specific keywords. The program was used to search for the risk-related keyword list that was previously generated. I count all the sentences containing at least one relevant keyword (risk related word). These sentences are used as a proxy for aggregated risk disclosures, with no distinction made between the three categories. The total numbers of the scores in the three categories create the CRD score and by using it I can calculate the CRD index.
<table>
<thead>
<tr>
<th>Risk as Uncertainty:</th>
<th>Keywords</th>
</tr>
</thead>
<tbody>
<tr>
<td>reverse, reversed, reverses, reversing</td>
<td>vary, varies, varying, varied, variation, variations, variative, variably, variance, variant, variants</td>
</tr>
<tr>
<td>vary, varies, varying, varied, variation, variations, variative, variably, variance, variant, variants</td>
<td>variate, variability, against</td>
</tr>
<tr>
<td>change, changes, changing, changeful, changeless, changeable, changeableness, changeably</td>
<td>changefully, changelessness, alternative, alternatives, alternatively, alter, altering, altered, alters, differ, differs, differing, differed, difference, differentiated, differentiates, differentiating</td>
</tr>
<tr>
<td>changefully, changelessness, alternative, alternatives, alternatively, alter, altering, altered, alters, differ, differs, differing, differed, difference, differentiated, differentiates, differentiating differences, different, differentiate</td>
<td>deviate, deviates, deviating, deviated, deviation, deviations, deviator</td>
</tr>
<tr>
<td>deviate, deviates, deviating, deviated, deviation, deviations, deviator</td>
<td>alternative, alter, alters, altering, altered, alterability, alterable, alterant, alteration</td>
</tr>
<tr>
<td>alternative, alter, alters, altering, altered, alterability, alterable, alterant, alteration</td>
<td>fluctuate, fluctuates, fluctuating, fluctuated, fluctuability, fluctuable, fluctuant, fluctuation, fluctuation volatility, volatile, volatileness</td>
</tr>
<tr>
<td>fluctuate, fluctuates, fluctuating, fluctuated, fluctuability, fluctuable, fluctuant, fluctuation, fluctuation volatility, volatile, volatileness</td>
<td>oscillation, oscillate, oscillates, oscillating, oscillated, oscillations, oscillatory, uncertain, uncertainty, uncertainty, uncertainties</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Risk as Threat:</th>
<th>Keywords</th>
</tr>
</thead>
<tbody>
<tr>
<td>significant, significantly, significance</td>
<td>probable, probability, probably, probabilities, probabilistic</td>
</tr>
<tr>
<td>probable, probability, probably, probabilities, probabilistic</td>
<td>threat, threats, threaten, threatens, threatening, threatened, threatener, threateningly risk, risked, riskful, riskier, riskiest, riskily, riskiness, risking, risks, loss, losses, lost, lossy decline, declined, declining, declines, decrease, decreases, decreasing, decreased, decreasingly catastrophe, catastrophes, catastrophic, shortage, shortages, unable</td>
</tr>
<tr>
<td>risk, risked, riskful, riskier, riskiest, riskily, riskiness, risking, risks, loss, losses, lost, lossy decline, declined, declining, declines, decrease, decreases, decreasing, decreased, decreasingly catastrophe, catastrophes, catastrophic, shortage, shortages, unable</td>
<td>challenge, challenges, challenged, challenging, challengeable, challenger, challengers</td>
</tr>
<tr>
<td>challenge, challenges, challenged, challenging, challengeable, challenger, challengers</td>
<td>hazard, hazards, hazarding, hazardous, hazardous</td>
</tr>
<tr>
<td>hazard, hazards, hazarding, hazardous, hazardous</td>
<td>unexpected, unexpectedly, disappeared, disappear, disappearing, low, lower, lowest, lows, lowers contingency, contingencies, contingent, contingents, fail, fails, failing, failed, failure, failures unexpected, unexpectedly, disappeared, disappear, disappearing, low, lower, lowest, lows, lowers contingency, contingencies, contingent, contingents, fail, fails, failing, failed, failure, failures</td>
</tr>
<tr>
<td>contingency, contingencies, contingent, contingents, fail, fails, failing, failed, failure, failures</td>
<td>surprise, surprises, surprising, surprised, surprisingly, surpriser, surprisingly, surpriser, surprisingly, surpriser, surprisingly</td>
</tr>
<tr>
<td>surprise, surprises, surprising, surprised, surprisingly, surpriser, surprisingly, surpriser, surprisingly</td>
<td>shock, shocks, shocking, shocked, shocker, shockers</td>
</tr>
<tr>
<td>shock, shocks, shocking, shocked, shocker, shockers</td>
<td>downside, lose, little, losses, lossy, lost, loss, vanish, vanishes, vanishing, vanished, harm, harms, harming, harmed, harmful, danger, dangers, dangerously, dangerous</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Risk as Opportunity:</th>
<th>Keywords</th>
</tr>
</thead>
<tbody>
<tr>
<td>opportunity, opportunities, opportune, opportunely, opportuneness, opportunism</td>
<td>prospect, prospects, prospecting, prospected, prospective, prospectively, prospectiveness</td>
</tr>
<tr>
<td>prospect, prospects, prospecting, prospected, prospective, prospectively, prospectiveness</td>
<td>potential, potentially, potentiate, potentiation</td>
</tr>
<tr>
<td>potential, potentially, potentiate, potentiation</td>
<td>upside, viable, viability, peak, peaks, peaking, peaked</td>
</tr>
<tr>
<td>upside, viable, viability, peak, peaks, peaking, peaked</td>
<td>advantage, advantages, advance, advancing, advanced, advancement, advances, advanced advantage, advantages, advance, advancing, advanced, advancement, advances, advanced</td>
</tr>
<tr>
<td>advantage, advantages, advance, advancing, advanced, advancement, advances, advanced advantage, advantages, advance, advancing, advanced, advancement, advances, advanced</td>
<td>likelier, likeliest, likelihood, likely</td>
</tr>
<tr>
<td>likelier, likeliest, likelihood, likely</td>
<td>gain, gains, gaining, gained, gainful, gainfully, gainfulness, chance, chances, chance, chances, chance, chance, chance, chance, changeful increase, increas, increased, increasing, increasable, increaser, increasingly increase, increas, increased, increasing, increasable, increaser, increasingly</td>
</tr>
<tr>
<td>gain, gains, gaining, gained, gainful, gainfully, gainfulness, chance, chances, chance, chances, changeful, increase, increas, increased, increasing, increasable, increaser, increasingly</td>
<td>amplify, amplifies, amplifying, amplified, amplitude</td>
</tr>
</tbody>
</table>

List of words used in the content analysis based on risk categories
**Measuring CRD Score and CRD Index:**

Calculating the CRD score involves two steps.

First step: calculating the risk as threat (RaT) score, risk as uncertainty (RaU) score and risk as opportunity (RaO) score, separately. These three categories of risk are calculated according to the following.

I denote the set of keywords in the category of risk as threat given in Table 1 by TH, the set of keywords in the category of risk given in Table 1 as uncertainty by UN and the set of keywords in the category of risk as opportunity given in Table 1 by OP. To calculate the risk scores for each category, I count the number of sentences (s) in a company’s interim reports of (i) for every year (t), which contains one of the corresponding keywords demonstrated in Table 1. For example, the RaT score of a company for a year is calculated by:

\[
RaT_{it} = \left| \{ s \in \text{available interim reports } t_i \mid s \text{ contains a word } e \text{ TH} \} \right|
\]

where RaT is risk as threat for company (i) in year (t) and is calculated as the number of sentences (s), which contain a word in the set TH. The values for RaU and RaO are calculated in the same manner:

\[
RaU_{it} = \left| \{ s \in \text{available interim reports } t_i \mid s \text{ contains a word } e \text{ UN} \} \right|
\]

\[
RaO_{it} = \left| \{ s \in \text{available interim reports } t_i \mid s \text{ contains a word } e \text{ OP} \} \right|
\]

Second step: calculating the CRD score of a company (i) for year (t) as the sum of the scores for the three risk categories.

\[
\text{CRD}_{it} \text{ score} = RaT_{it} + RaU_{it} + RaO_{it} \quad \text{(equation 1)}
\]

The following is a summary of the notations used here:

- RaT = risk as threat
- RaO = risk as opportunity
- RaU = risk as uncertainty
- i = name of company
- TH = collection of words in the category of risk as threat, given in Table 1.
- UN = collection of words in the category of risk as uncertainty, given in Table 1.
- OP = collection of words in the category of risk as opportunity, given in Table 1.
As I will discuss in the next section, the sample of this study contains 166 companies and the study period consists of 10 years, from 2001 to 2010. I have calculated the CRD score for each company and each year, presenting the results in a 166 by 10 matrix, where elements in row i (name of company) and column t (2001 to 2010) are the CRD score for company i in year t. For example, the element in row 5 and column 1 is the CRD score for company number 5 in the year 2001.

In order to make it easier to compare and analyse CRD scores, I use the disclosure index (DI), defined as:

\[
\text{Disclosure index}_t = 100 \times \frac{(\text{CRD}_t \text{ score} - \text{min}_t \text{ score})}{(\text{max}_t \text{ score} - \text{min}_t \text{ score})}
\]  

(equation 2)

where min_t score and max_t score refer to the minimum and maximum CRD scores for year t. By utilizing this index the values will be bounded between 0 and 100, where a value close to 0 means a lower amount of disclosure while a value close to 100 indicates a higher amount of disclosure. Values 0 and 100 are obtained for the minimum and maximum CRD respectively. Since the CRD index is in the interval [0,100], it is easier to interpret this value and compare the level of risk disclosure in different companies. The result of this calculation also yields a 166 by 10 matrix, the elements of which are in the range 0 to 100.

### 4.3. Sample and Data

Taking into consideration the research question, the sample comprises non-financial listed Swedish companies’ English interim reports over a 10-year period, from 2001 to 2010. The interim reports and related data were obtained from Uppsala University, School of Business Department. Data are collected from multiple sources, including DataStream, Compustat Global and a manual collection from each firm’s annual reports.

The activities of financial companies (e.g., banks and insurance companies) are not quite comparable with other firms (manufacturing, retail etc.) and they have specific characteristics and different frameworks for disclosure (Abraham and Cox, 2007). Thus, I remove these companies from the sample because their legislation differs from that of other companies. Table 2 summarizes the sample size, where the initial number of firms, 297, is reduced to 166 after excluding 32 financial firms and 99 companies that have their interim reports only in Swedish. Thus, the final sample consists of 166 non-financial listed Swedish companies.
Table 3 demonstrates the number of interim reports that are included in the sample. The sample firms include 166 companies, which means 664 interim reports if all the reports are available and written in English. However, that is not always the case, and one or several interim reports may be missing or written in Swedish. Table 3 summarizes the number of interim reports in the sample. The number of interim reports, which are written in Swedish and excluded from the sample and the number of missing reports are also given. The total number of interim reports for the 10-year period is 4,849.

<table>
<thead>
<tr>
<th>Year</th>
<th>Expected number of interim reports</th>
<th>Number of interim reports in Swedish which are excluded</th>
<th>Number of interim reports which are missed</th>
<th>Total number of interim reports in English</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>664</td>
<td>57</td>
<td>246</td>
<td>341</td>
</tr>
<tr>
<td>2002</td>
<td>664</td>
<td>52</td>
<td>211</td>
<td>381</td>
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<td>2003</td>
<td>664</td>
<td>49</td>
<td>194</td>
<td>401</td>
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<td>2004</td>
<td>664</td>
<td>48</td>
<td>165</td>
<td>431</td>
</tr>
<tr>
<td>2005</td>
<td>664</td>
<td>26</td>
<td>140</td>
<td>478</td>
</tr>
<tr>
<td>2006</td>
<td>664</td>
<td>17</td>
<td>111</td>
<td>516</td>
</tr>
<tr>
<td>2007</td>
<td>664</td>
<td>18</td>
<td>75</td>
<td>551</td>
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<tr>
<td>2008</td>
<td>664</td>
<td>21</td>
<td>61</td>
<td>562</td>
</tr>
<tr>
<td>2009</td>
<td>664</td>
<td>11</td>
<td>46</td>
<td>587</td>
</tr>
<tr>
<td>2010</td>
<td>664</td>
<td>15</td>
<td>28</td>
<td>601</td>
</tr>
<tr>
<td>Total</td>
<td>6640</td>
<td>314</td>
<td>1277</td>
<td>4849</td>
</tr>
</tbody>
</table>

4.4. Corporate Characteristics

4.4.1. Model Used to Test Hypotheses

I use the ordinary least squares (OLS) regression model with fixed year effects to examine the relationship between CRD in the interim reports and both the firm characteristics and corporate governance mechanisms. The general equation for OLS with fixed effects is

\[ Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_n X_n + \text{fixed effects}. \]
Applying this model to the current problem yields

\[ DI = \alpha + \beta_1 (\text{Log of total assets}) + \beta_2 (\text{ratio of total debt to total equity}) + \beta_3 (\text{audit committee}) + \beta_4 (\text{family ownership}) + \text{fixed year effects} \]

(equation 3)

In this equation, DI is the risk disclosure index, \( \beta_1 \) to \( \beta_4 \) are the regression coefficients and the parameter \( \alpha \) (intercept) is the value of DI when all the regressors are equal to zero. The sample consists of data over a 10-year period, which allows me to perform a regression analysis with control for fixed year effects. Fixed year effects remove the impact of time trends that may influence variables so that I can assess the independent variables’ net effect. An example of such factors is changes in regulations (e.g., IFRS) that may affect the level of risk disclosure in the same way for all firms. Adding control for fixed year effects is practically achieved by combining data for the years 2001 to 2010 in a single table, adding nine dummy variables for the years 2002-2010.

Table 4 shows the definitions and measurements used for corporate characteristics. To measure firm size, I utilize a proxy, which is the natural logarithm of the total asset: \( X_1 = \log \) (total asset). For measuring leverage, I use the total debt divided by total equity: \( X_2 = \text{total debt} / \text{total equity} \) (leverage ratio). Table 4 also shows that I employ dummy variables to measure two other characteristics, namely AC and family ownership: \( X_3 = \text{dummy variable} \) (1 if company has AC and 0 otherwise), \( X_4 = \text{dummy variable} \) (1 if company is family and 0 otherwise). Signs (+) and (-) in Table 4 illustrate the expected positive and negative correlation mentioned in the hypotheses.

<table>
<thead>
<tr>
<th>Definition</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Firm characteristics:</strong></td>
<td></td>
</tr>
<tr>
<td>Firm Size</td>
<td>(+) Logarithm of total assets</td>
</tr>
<tr>
<td>Gearing</td>
<td>(+) Total debt/ Total equity</td>
</tr>
<tr>
<td><strong>Corporate Governance:</strong></td>
<td></td>
</tr>
<tr>
<td>Audit Committee (AC)</td>
<td>(+) 1 if company has AC, 0 otherwise</td>
</tr>
<tr>
<td>Family ownership</td>
<td>(-)1 if company is family, 0 otherwise</td>
</tr>
</tbody>
</table>

Table 4. Corporate Characteristics

Definition and measurement of independent variables
5. Results and Discussion

5.1 Overall Trends in Risk Disclosure

According to Rajab (2009), the demand for corporate information is increasing and companies are under pressure to make greater disclosures of corporate information, especially those related to risks and uncertainties (ibid). Table 5 illustrates the results of the content analysis. The results show the ratio of the number of risk disclosure sentences to the number of interim reports for each category of risk, for a 10-year period. As Table 5 displays, the ratio has steadily increased across this period. Table 5 provides an in-depth analysis of risk disclosure sentence characteristics and an analysis of the form and type of the information disclosed.

The result provides evidence that there is an upward trend in the amount of risk disclosure which is published by the sample of companies over the period from 2001 to 2010. Table 5 illustrates that the ratio of the sum of sentences to the number of interim reports in the category of risk as threat is more than in the two other categories.

However, the ratio of sentences to interim reports has increased regardless of the type of the risk category and consequently also the ratio of the total CRD to the number of interim reports has increased.

| Table 5. The overall trend in risk reporting |
|-------------------------------|-------------------|-----------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
|                               |                   | 2001            | 2002            | 2003            | 2004            | 2005            | 2006            | 2007            | 2008            | 2009            | 2010            |                   |                   |                   |                   |                   |                   |                   |                   |                   |
| Panel A: Risk categories:     |                   |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |
| Risk as Uncertainty           | Number of sentences | 3757           | 4408           | 5284           | 6435           | 8610           | 7471           | 9350           | 11095          | 13249          | 13486          |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |
| Sum / Interim reports         |                   | 11.02          | 11.57          | 13.18          | 14.93          | 18.01          | 14.48          | 16.97          | 19.74          | 22.57          | 22.44          |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |
| Risk as Threat                | Number of sentences | 7658           | 9359           | 10683          | 11418          | 14164          | 14130          | 18539          | 23398          | 30119          | 28379          |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |
| Sum / Interim reports         |                   | 22.46          | 24.56          | 26.64          | 26.49          | 29.63          | 27.38          | 33.65          | 41.63          | 51.31          | 47.22          |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |
| Risk as opportunity           | Number of sentences | 5660           | 6311           | 6939           | 9633           | 11211          | 12451          | 13553          | 13303          | 11247          | 14714          |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |
| Sum / Interim reports         |                   | 16.60          | 16.56          | 17.30          | 22.35          | 23.45          | 24.13          | 24.60          | 23.67          | 19.16          | 24.48          |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |
| Total of three risk categories sentences |                   | 17075          | 20078          | 22906          | 27486          | 33985          | 34052          | 41442          | 47796          | 54615          | 56579          |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |
| Sum / Interim reports         |                   | 50.07          | 52.70          | 57.12          | 63.77          | 71.10          | 65.99          | 75.21          | 85.05          | 93.04          | 94.14          |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |
| Panel B: Reports:             |                   |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |
| Number of interim reports     |                   | 341            | 381            | 401            | 431            | 478            | 516            | 551            | 562            | 587            | 601            |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |

The figures included in the table refer to the average number of risk disclosure sentences per reports.
5.2. Descriptive Statistics

In order to describe the main features of the data, the descriptive statistics of the dependent and independent variables are given in Table 6.

Panel A in Table 6 summarizes the descriptive statistics (number of firms, minimum, maximum, mean and standard deviation) of the independent variables (firm size, leverage, AC and family ownership) over 10 years, in sequence from 2001 through to 2010. The unit by which to measure these variables is also specified. The size is measured by the natural logarithm of the total asset and the leverage is measured by the ratio of the total debt to total equity. AC and family ownership are dummy variables and can only take the values 0 and 1. AC takes the value 1 if the audit committee exists and 0 otherwise, and the variable family ownership takes a value of 1 if the firm has a family ownership and 0 otherwise.

Firms, for which data for an independent or dependent variable are missing for a year, are filtered out from the sample of that year. That is, the number of firms in each year refers to those firms for which all required data are available. As Table 6 shows, the number of firms increases continuously from 90 in 2001 to 150 in 2010. These numbers should be compared with 166, which is the total number of firms in the data pool.

Panel A shows the minimum, maximum, mean and standard deviation (SD) of the variable firm size (measured by the natural logarithm of the total asset), for different years. For instance, in 2001, the minimum, maximum, mean and SD of this variable are 3.40, 12.43, 7.51 and 2.08, respectively. Comparing the values of firm size across time, I observe that this variable does not show major differences. For instance, the lowest mean is 7.38 observed in 2003 and the highest value, 7.89, is observed in 2008. Even though the values are logarithmically scaled, I cannot say that there are major fluctuations in the 10-year period.

The mean of the leverage ratio exhibits the same level of variation across time and varies from 1.22 in 2010 to 1.62 in 2002. However, the size of the SD for the leverage ratio shows more variability with time and changes from 0.85 in 2010 to 2.39 in 2002, where the minimum for the leverage ratio is 0.04 and the maximum is 24.76.

Table 6 also demonstrates the descriptive statistics for the variables AC and family ownership. As these variables are dummy variables and can only take values of 0 and 1, the minimum
and maximum of these variables are often 0 and 1, respectively. One exception is the year 2010 where both the minimum and maximum of the variable AC are 1, due to the existence of an audit committee for all firms in the sample. It is worth noting that the mean value of AC (family ownership) can be interpreted as the ratio of firms that have an audit committee (family ownership).

Panel B in Table 6 provides information about the CRD variable, which is measured by the disclosure index (DI) defined by equation (2). As Table 6 shows, the minimum and maximum of the DI are 0 and 100 respectively. Even though values of CRD are scaled between 0 and 100 within each year, they show a rather large variation across time, from 19.89 in 2003 to almost double this measure, 38.61 in 2009. According to Panel B, one can conclude that a general trend is that in later years (after 2007) a greater number of firms disclosed more risks.

Table 6. Descriptive sample statistics

<table>
<thead>
<tr>
<th>Unit of measurement</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel A: Independent Variables</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firm Size</td>
<td>Log of million SEK total assets</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of firms</td>
<td>117</td>
<td>123</td>
<td>125</td>
<td>129</td>
<td>134</td>
<td>141</td>
<td>144</td>
<td>150</td>
<td>152</td>
<td>155</td>
</tr>
<tr>
<td>Min</td>
<td>3.40</td>
<td>3.99</td>
<td>3.41</td>
<td>3.74</td>
<td>3.41</td>
<td>3.34</td>
<td>3.53</td>
<td>3.42</td>
<td>3.85</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>7.51</td>
<td>7.46</td>
<td>7.38</td>
<td>7.39</td>
<td>7.61</td>
<td>7.69</td>
<td>7.83</td>
<td>7.89</td>
<td>7.84</td>
<td>7.82</td>
</tr>
<tr>
<td>SD</td>
<td>2.08</td>
<td>2.16</td>
<td>2.10</td>
<td>2.07</td>
<td>1.98</td>
<td>1.93</td>
<td>1.92</td>
<td>1.94</td>
<td>1.95</td>
<td>1.88</td>
</tr>
<tr>
<td>Leverage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of firms</td>
<td>117</td>
<td>123</td>
<td>122</td>
<td>127</td>
<td>132</td>
<td>134</td>
<td>141</td>
<td>144</td>
<td>150</td>
<td>152</td>
</tr>
<tr>
<td>Min</td>
<td>0.04</td>
<td>0.08</td>
<td>0.09</td>
<td>0.04</td>
<td>0.04</td>
<td>0.05</td>
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<td>9.05</td>
<td>7.74</td>
<td>7.55</td>
<td>8.11</td>
<td>21.74</td>
<td>12.30</td>
<td>17.09</td>
<td>5.23</td>
</tr>
<tr>
<td>Mean</td>
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<td>1.62</td>
<td>1.44</td>
<td>1.35</td>
<td>1.40</td>
<td>1.48</td>
<td>1.58</td>
<td>1.60</td>
<td>1.40</td>
<td>1.22</td>
</tr>
<tr>
<td>SD</td>
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<td>2.39</td>
<td>1.40</td>
<td>1.21</td>
<td>1.25</td>
<td>1.34</td>
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<td>17.20</td>
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5.3. Correlation between Variables

First, a bivariate analysis is performed to establish the relationships between the variables of the study, that is, the Pearson linear correlation matrix is calculated. Table 7 demonstrates the numerical results of the linear correlation between all the variables and their level of significance. The elements of the correlation matrix are values between -1 to +1, where a 0 means that there is no correlation between corresponding variables, while a positive (negative) value indicates a positive (negative) correlation between the variables. Values closer to either -1 or +1 indicate a stronger correlation between the variables. In Table 7, the asterisk characters (*), (***) and (****) indicate the results are statistically significant at a level of 10, five and one percent, respectively.

As Table 7 shows, the correlation coefficients between the dependent variable DI and the independent variables firm size, leverage and AC are 0.561, 0.131, and 0.378, indicating a positive correlation. The correlation coefficient between the DI and the independent variable family ownership is -0.143, showing a negative correlation between these two variables. All the correlations are statistically significant at the level of 1%.

The existence of a pairwise correlation between the dependent and an independent variable does not necessarily imply that the dependent variable can also be explained by that variable in a multivariate context. Pairwise analysis may lead to incorrect conclusions about correlations among variables and one should perform a regression analysis to further identify the underlying relationship between the variables.

Table 7 also shows that there exist pairwise correlations between the variables firm size, leverage and AC, all at a level of 1% significance. There is also a negative significant (at the level of 1%) correlation between the variables AC and family ownership. The existence of a correlation between independent variables raises the possibility of multicollinearity, which can lead to misleading or inaccurate results. However, the usual threshold indicating possible multicollinearity is correlation coefficients higher than 0.5 among the independent variables. None of the pairwise correlations among the variables firm size, leverage, AC and family ownership is above this threshold value.
5.4. Regression Analysis and Results

As the data sample is extended over a period of 10 years and different factors such as changes in regulations, for example IFRS, may affect the level of risk disclosure over the years, the regression analysis should control for year effects. I have used the disclosure index, which is calculated based on the minimum and maximum of the disclosure score in each year (equation 2). This scales the dependent variable to a value between 0 and 100 and mitigates the effects of time-dependent factors (compare Table 5 and 6), however, as Table 6 indicates, the variation in the disclosure index is not negligible.

I perform an ordinary least squares regression with control for fixed year effects. This is achieved by introducing dummy variables that capture the year effects common to all firms (year fixed effects) for the years 2002 to 2010. No dummy variable is added for the year 2001 since it serves as the reference year. The coefficient retrieved from the regression for each dummy variable should then be added to the model, in order to yield the value of the DI for the corresponding year. In other words, years as fixed effects allow the intercept of the regression to vary by year. The year fixed effects can be interpreted as unmeasured factors common to all firms that influence the DI to the same degree. Examples of these unobserved factors that change over time are effects of the changes in regulations that are not represented by the factors in the model.

The results for the OLS regression are summarized in Table 8, where the intercept and coefficients for each independent variable are given. The corresponding p-values are given in parentheses beneath each value. The significance levels are marked with asterisks. For the sake of brevity, I have omitted values for fixed year effects from the table. However, it is notable to mention that the fixed year effects for the years 2007, 2008, 2009 and 2010 are

| Table 7. Correlation matrix of research variables for 10 years period |
|-----------------|-----------------|-----------------|-----------------|-----------------|
|                 | log(TA)         | Leverage        | AC              | Family          | CRD Index       |
| log(TA)         | 1.000           |                 |                 |                 |                 |
| Leverage        | 0.311***        | 1.000           |                 |                 |                 |
| AC              | 0.329***        | 0.133***        | 1.000           |                 |                 |
| Family          | 0.003           | 0.030           | -0.086***       | 1.000           |                 |
| CRD Index       | 0.561***        | 0.131***        | 0.378***        | -0.143***       | 1.000           |

Notes: Asterisk signs (*), (***) and (***) indicate the results are statistically significant at 10, 5 and 1 percent levels respectively.
significant and have positive values, which are consistent with the expectation that firms disclosed more in recent years. Differences in the year fixed effects over time suggest that there are unobserved changes in factors other than those represented among the set of factors included in the model.

The total number of observations in the regression analysis is 1,177. This is the number of firm-years for which data for dependent and all independent variables are available. Different linear regression models are tested. Model 1 uses only intercept and fixed year effects. In models 2, 3, 4 and 5 the independent variables firm size, family ownership, AC and leverage are incrementally added to the model. As Table 8 demonstrates, by adding each predictor variable, the values for R-squared and adjusted R-squared are increased. R-squared is a statistical measure the value of which ranges from 0 to 1 and shows how well a regression model approximates the real data. A value close to 0 means that the regression model does not fit the data and value 1 shows that the model perfectly fits the data. However, a drawback of using R-squared in OLS to compare models is that R-squared spuriously increases as new explanatory variables are added to the model. Adjusted R-squared does not suffer from this limitation. Adjusted R-squared is a modification of the R-squared, which is changed from the original by penalizing the statistic as extra variables are included in the model. Thus, adjusted R-squared is a better measure for comparisons between different linear models.

Starting with the constant model (Model 1), in each step a regressor that improves the model the most (i.e., increases the adjusted R-squared by the highest value) is chosen and added to build the new model. This process is repeated until either all the explanatory variables are added to the model or none of the remaining variables increase the adjusted R-squared. Using this approach ensures that variables that have no explanatory power are not added to the model.

As Table 8 demonstrates, all four independent variables firm size, family ownership, AC and leverage increase the adjusted R-squared and are added to the constant model stepwise. The adjusted R-squared value of Model 5, which includes all four independent variables, is 0.455 and shows an increase of 0.333, compared with the constant model whose adjusted R-squared is 0.122. Thus, I can conclude that significant factors that explain the variation of risk disclosure are captured by the model and the model fits the data sufficiently well.
In the following, the results of the regression analysis for each independent variable are discussed and conclusions about the hypotheses are presented.

Table 8. Regression result, the association between total risk disclosure and corporate characteristics

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<th>Model (2)</th>
<th>Model (3)</th>
<th>Model (4)</th>
<th>Model (5)</th>
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<td>4.994***</td>
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<td>(0.000)</td>
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<tr>
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<td>yes</td>
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</table>

Notes: Asterisk signs (*), (***) indicate the results are statistically significant at 10%, 5% and 1% percent levels respectively. Year dummies are used to control for fixed effects.

The empirical evidence based on correlations between variables and multiple linear regression indicates that firm size is statistically related to the level of risk information disclosed by the sampled Swedish companies in their interim reports. Firm size has a significant correlation with the level of CRD in both the correlation matrix and multiple linear regression. This finding provides support for the theoretical argument, agency theory, which I have discussed in section 3. This finding is also consistent with previous disclosure studies (e.g., Beretta and Bozzolan, 2004; Abraham and Cox, 2007; Linsley and Shrives, 2006; Rajab and Handley-Schachler, 2009; Elzahar and Hussainey, 2012).

In hypothesis H1, I argue that there is a positive relationship between firm size and level of CRD. Table 8, Model 5 shows that the coefficient of firm size is 4.812 with a p-value < 0.01. This means that there is a positive relationship between disclosure level and firm size. The statistical analyses indicate that disclosure helps firms to reduce the information gap and
consequently reduce agency costs and other opportunities costs, which can grow with the size of the firm in Sweden. Table 8 shows that if I reject the correlation between firm size and the level of CRD, the probability that I am wrong is 99% (P-value < 0.01). Thus, H1 is strongly supported.

Although the correlation coefficient between the variables leverage and DI shown in Table 7 is 0.131 (with 1% significance level), which suggests a positive correlation between these two variables, the regression (Model 5) estimates a (non-significant) negative coefficient for leverage (-0.475). Pairwise correlation does not take into the account the effect of other variables that may affect both variables, while the regression estimate provides a more accurate model of which independent variables explain the dependent variable. The coefficient of an independent variable explains how a change in the variable influences the dependent variable, given all other independent variables remain unchanged. Therefore, I conclude that there is no significant relationship between leverage and DI.

The theory in hypothesis H2 suggests that highly leveraged firms incur a monitoring cost. Additional disclosure would be made for more monitoring purposes and firms would seek to decrease these monitoring costs by disclosing more information. The empirical result from the regression analysis shown in Table 8 does not support the expectation. Prior research into the relationship between leverage and the level of CRD is not conclusive and there are mixed results. This finding is consistent with previous disclosure studies (e.g., Oliveira et al., 2006; Abraham et al., 2007; Cooke, 2005), which found that leverage has an insignificant association with the level of disclosure.

In hypothesis H2, I have argued that there is a positive relationship between leverage and the level of CRD. By considering the result in Table 8, I cannot sate that I have found any support for the hypothesis with a reasonable level of significance. Thus, hypothesis H2 is rejected in favour of the null hypothesis.

The result of the regression is consistent with the theoretical argument about a positive relationship between the existence of AC and the level of CRD. According to H3, the probability of appointing an AC increases with increasing agency conflicts between management and shareholders. The existence of an AC in a company presses managers to disclose sufficient and related risk information in financial reports to satisfy shareholders. As
the results in Table 8 show, the existence of an AC has a positive and significant correlation with the level of CRD in Swedish companies’ interim reports. Companies, which have an AC, disclose more risk information in interim reports in comparison with those which lack an AC. This finding is also in line with previous disclosure studies, for instance Forker (1992) and Ho and Wong (2001), which show a positive relationship between the existence of an AC and the level of risk disclosure.

Hypothesis H3 states that there is a positive relationship between the existence of an AC and the level of CRD, which is confirmed by the result of the regression. As Model 5 in Table 8 demonstrates, the coefficient for AC is 3.743 at a level of 1% significance. Thus, hypothesis H3 is strongly confirmed.

The result of the regression demonstrates that there is a negative correlation between family ownership and the level of CRD. As I have argued in hypothesis H4, family owners have a better knowledge of the firms’ business and the owners’ direct monitoring decreases managers’ opportunities to affect the earning of family firms and consequently family firms face less severe hidden action and hidden information. Information asymmetry and agency costs, which arise from the separation of ownership and management are lower in this type of ownership and there is no incentive for companies to issue risk related information disclosure in the interim reports.

As Model 5 in Table 8 illustrates, there is a negative correlation between family ownership and the level of CRD (-5.759). The p-value for this correlation is very high (0.000). Thus, I can state that there is a significant negative relationship between family ownership and the level of CRD and hypothesis H4 is strongly supported.

6. Conclusion

This study has focused on the topic of corporate risk disclosure. I have discussed the notion of risk, which plays an important role in this study. I examine the degree to which firm characteristics (firm size and leverage) and corporate governance mechanisms (audit committee and family ownership) affect firms’ decision to disclose risk information in their interim reports based on agency theory. I have employed a content analysis to count the number of risk information sentences in a sample of 4,849 interim reports over a 10-year
period. To capture related sentences based on the definition of risk, I have distinguished three categories of risk; namely risk as uncertainty, risk as threat and risk as opportunity. The number of sentences containing keywords in the three categories yields a risk disclosure score that is used to calculate a disclosure index.

The ordinary least squares regression method with control for fixed year effects is used for the empirical analysis. The dependent variable is the disclosure index while the independent variables are the set of firm characteristics (firm size and leverage) and corporate governance mechanisms (audit committee and family ownership).

From the perspective of agency theory, big companies have greater incentives to disclose more information, such as having wider ownerships, having higher and sufficient resources to cover the costs, having a higher proportion of outside capital, and improving their corporate reputation and public image. The empirical analysis shows that company size is positively associated with the level of CRD. However, no significant correlation between the variables leverage and level of CRD is found in the interim reports. Whilst from an agency perspective, I argue that there is a positive relationship, the result of the empirical analysis does not show this. In addition, from the perspective of agency theory, the existence of an AC as a decision making body is an important element in the corporate governance process and can enhance the quality of the financial reporting process. The results support this argument and demonstrate that the existence of an AC is positively associated with the level of CRD. In establishing the last hypothesis, based on agency theory, I argued that there should be a negative relationship between family ownership and the level of CRD. Family ownership, because of specific characteristics such as having a good knowledge about the owned firms’ activities, ability to provide superior monitoring of managers, having a longer investment horizon and a good reputation have a negative relationship with the level of CRD. The results support that there is a negative relationship between family ownership and the level of CRD in interim reports.

The results of this research might be useful for regulators, companies, investors and other stakeholders interested in corporate risk disclosure in different ways. It provides insight into factors that affect the level of risk disclosure and might help investors to analyse the level of risk disclosure in a more objective manner and consider these factors when comparing different companies’ risk disclosure levels. A deeper knowledge of the mechanisms governing
the level of risk disclosure might help regulators to establish required reporting regulations to encourage firms to increase the quality of risk disclosure in their financial reports.

Nevertheless, this research has some limitations that should be addressed. The research examines the quantity of disclosure by using a risk disclosure index, which cannot capture the quality of the disclosure. The model used for the content analysis to capture the level of risk disclosure is a rather simplified model based on the number of sentences containing keywords. This approach ignores the fact that the content of the disclosures can vary from sentence to sentence. A better approach for instance may be to give a weighting to keywords in order to obtain a more precise model for measuring the level of risk disclosure and gain some sense of quality.

A further limitation of this research is that the study is based on data from a single market (Sweden) and the results cannot be used for other countries and markets. One natural extension of this research would be to conduct a comparative study between different countries.

This study can also suggest a number of other avenues for future research for example, examining the economic consequences of risk reporting in interim reports (e.g., the cost of capital). Timeliness as a specific characteristic of interim reports can be utilized to examine the effect of risk reporting in interim reports on prices leading earnings.

Accounting regulations and rules together with other proposals issued by accounting organizations have influenced the increases in the level of risk information disclosed (Rajab, 2009). Future research can be conducted to examine the effect of new regulations, such as IFRS after the year 2005 on the interim reports.
7. Reference


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