Aalto University
School of Business

The impact of credit ratings on the information content of earnings announcements: Evidence from the US stock market

Finance

Master's thesis

Samuli Leppänen

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Aalto University, P.O. BOX 11000, 00076 AALTO
www.aalto.fi

Abstract of master's thesis

Author Samuli Leppänen

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OBJECTIVES OF THE STUDY

In this thesis, I study how the credit rating of a company affects the information content, i.e., the stock price and trading volume reaction, of its earnings announcements in stock markets. I also examine how this impact differs between positive and negative earnings news as well as analyzing the effects of preceding rating changes. Finally, the study looks into how the relationship between ratings and informativeness of earnings announcements is affected by the level of information asymmetry surrounding firms and disclosure regulation changes. According to my knowledge, this is the first study to provide a more comprehensive view on the informational role of ratings around earnings announcements in stock markets.

DATA AND METHODOLOGY

The empirical analysis of this study is based on 81,990 earnings announcements (from 2,765 unique firms) made in the US stock market by S&P rated firms in the period from February 1986 to December 2013. The methodology of this paper consists of traditional event study methods employing both univariate analysis and multivariate regressions where the information content of earnings releases is measured with cumulative abnormal returns and trading volumes over the [-1, +1] and [-2, +2] announcement windows. The impact of credit ratings is analyzed with different rating specifications.

RESULTS

I find that the stock price and trading volume reactions around earnings disclosures are more pronounced for firms with lower ratings. For example, in the event of a negative earnings surprise, a one notch decrease in a company's credit rating is associated with a 0.25% more negative stock price reaction to earnings releases. Furthermore, a one notch lower credit rating results in 0.15% more of the outstanding shares being traded in the market around an earnings announcement. These findings indicate that lower ratings increase the information content of earnings releases and are in line with the univariate results of Greatrex (2009) but do not support the results of Leventis et al. (2014) who argue that higher ratings increase the informativeness of earnings announcements. Additional findings include that lower ratings are associated with even larger market reactions in the case of negative earnings surprises, when firms are characterized by more information asymmetry and when disclosure regulation changes increase the informational advantage of rating agencies. Preceding rating changes also increase the information content of earnings releases in some cases. Overall, my results are consistent with the hypothesis that better credit ratings reduce information asymmetry in financial markets.

Keywords credit rating, earnings announcement, information content, stock market reaction, information asymmetry

Aalto University
School of Business

Aalto-yliopisto, PL 11000, 00076 AALTO
www.aalto.fi

Pro gradu -tutkielman tiivistelmä

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TUTKIELMAN TAVOITTEET

Tämän pro gradu -tutkielman tavoite on tutkia, kuinka yrityksen luottoluokitus vaikuttaa tulosjulkistuksen informaatiosisältöön (ts. julkistuksen aiheuttama osakkeen hinnan ja volyymin muutos) osakemarkkinoilla. Selvitän myös, kuinka tämä vaikutus eroaa hyvien ja huonojen tulosuutisten välillä, jonka lisäksi tarkastelen edeltävien luottoluokitusmuutoksien vaikutusta. Lopuksi tutkin, miten yhteys luottoluokitusten ja tulosjulkistuksien informaatiosisällön välillä riippuu informaation epäsymmetrisyydestä yritysten ympärillä sekä tiedottamissäännöksien muuttumisesta. Minun tietääkseni tämä on ensimmäinen kokonaisvaltainen tutkimus luottoluokitusten informaatioroolista osakemarkkinoiden tulosjulkistusten yhteydessä.

AINEISTO JA MENETELMÄT

Tutkimuksen aineisto koostuu S&P:n luokittelemien yritysten 81 990 tulosjulkistuksesta (2 765 eri yritykseltä) Yhdysvaltain osakemarkkinoilla ajanjaksolta 1986-2013. Tutkimusmenetelmänä käytetään perinteistä tapahtumatutkimusta hyödyntäen sekä yhden muuttujan analyysiä että usean muuttujan regressiota, joissa tulosjulkistusten informaatiosisältö mitataan epänormaaleilla osaketuotoilla ja -volyymeilla tapahtumaikkunoissa [-1, +1] ja [-2, +2]. Luottoluokitusten vaikutusta tarkastellaan erilaisilla luottoluokitusmäärittelyillä.

TULOKSET

Tulokset osoittavat, että muutokset osakkeen hinnassa ja volyymissa tulosjulkistuksen ympärillä ovat voimakkaampia, kun yrityksen luottoluokitus on alhaisempi. Esimerkiksi negatiivisen tulosyllätyksen tapauksessa, yhden pykälän alempi luottoluokitus aiheuttaa 0.25 prosenttia enemmän negatiivisen osakehintareaktion. Yhtä pykälää heikompi luottoluokitus johtaa myös siihen, että ulkona olevia osakkeita vaihdetaan 0.15 prosenttia enemmän tulosjulkistuksen yhteydessä. Nämä löydökset osoittavat, että heikommat luottoluokitukset lisäävät tulosjulkistusten informaatiosisältöä ja tämä on linjassa Greatrexin (2009) yhden muuttujan tulosten kanssa. Leventis et al. (2014) väittävät, että paremmat luottoluokitukset lisäävät tulosjulkistusten informatiivisuutta, mutta löydökseni eivät tue tätä näkemystä. Lisäksi tulokseni näyttävät, että alhaisemmat luottoluokitukset aiheuttavat suurimmat markkinareaktiot, kun tulosyllätys on negatiivinen, kun yritysten ympärillä on enemmän epäsymmetristä informaatiota ja kun tiedottamissäännösten muuttuminen lisää luottoluokittajan informaatioetua. Edeltävät luottoluokitusmuutokset lisäävät myös joskus tulosjulkistusten informaatiosisältöä. Tutkimustulokset tukevat hypoteesia, jonka mukaan paremmat luottoluokitukset vähentävät epäsymmetristä informaatiota rahoitusmarkkinoilla.

Avainsanat luottoluokitus, tulosjulkistus, informaatiosisältö, osakemarkkinoiden reaktio, epäsymmetrinen informaatio

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1. Introduction

1.1. Motivation

> ”Credit ratings can help reduce the knowledge gap, or ‘information asymmetry’, between borrowers (issuers) and lenders (investors) … Credit rating symbols convey information … they convey forward-looking, summary opinions about a borrower’s or security’s creditworthiness.” – (Standard & Poor’s, 2012)

> “A day after GoPro reported quarterly results and its stock slumped, Chief Executive Nick Woodman emphasized the action video camera maker's long-term growth strategy … The stock drop ‘doesn't affect us because we have such a strong vision for the future. I have so much faith in what we're doing here’, Woodman told CNBC.” – (CNBC, 1 August 2014[1])

Credit rating agencies have an important role as intermediaries in financial markets and their ratings have informational value (Baghai et al., 2014). The agencies aim to mitigate uncertainty in security markets, especially in debt markets, by assigning credit ratings to companies and their debt instruments. These ratings are meant to reduce information asymmetry between companies and investors as they provide forward-looking opinions about a firm’s financial performance in the market and ability to pay back debt obligations. As these ratings are first and foremost directed towards borrowers, questions still remain whether the information provided by credit ratings can be useful to other economic actors, namely shareholders and managers. Despite higher credit ratings yielding several potential benefits to a company, many companies have nevertheless decided to pursue increased shareholder value by lowering or abandoning corporate credit rating targets (Kisgen, 2007).

As is the case with the value of credit ratings to shareholders, questions have also been raised regarding the informational content of earnings announcements, i.e., the announcement stock price/volume reaction. The impact of earnings disclosures has been examined in many studies but the topic remains of great interest as the information content of these disclosures has varied over the years. Several explanations have been proposed to account for this, including accounting standards’ inability to keep up with the shift to an economy increasingly based on intangible assets, opportunistic earnings management and the adoption of IFRS accounting standards (see, e.g., Landsman and Maydew, 2002; Jorion et al., 2009; Landsman et al., 2012). Despite the extensive research on the determinants of earnings releases’ information content, only a few papers have used the corporate credit rating as an explanatory variable.

[1] Retrieved February 6, 2015, from http://www.cnbc.com/id/101887325.

Companies' earnings announcements and equity investors' reactions to them provide an excellent avenue for testing whether a corporation's credit rating can be beneficial information even in the eyes of shareholders. More specifically, it is interesting to know if a corporation's credit rating can predict the magnitude of the information content of earnings announcements in stock markets and thus act as a proxy for information asymmetry. This would also provide more insight regarding what drives the information content of earnings announcements after controlling for earnings surprise, among other things.

Earnings announcements are crucial events for investors as they reveal new information about companies' performance and thus affect future expectations. Valuation theory states that there is a distinct relationship between earnings and stock prices (Beaver, 1968). Consequently, stock prices and trading volumes react to reflect this new information content. This presents a problem for shareholders as well as managers. Shareholders are uncertain as to how this new information will change the value of their holdings and whether the new information is likely to alter their perception of the company. In other words, shareholders need more guidance in order to understand when the information provided by earnings announcements might be more important and whether the information content differs between companies.

At the same time, managers also face uncertainty as to how the markets will react to the information content of earnings announcements. After all, earnings announcements reveal how the management has performed and therefore, managers are very keen to improve their understanding of how investors interpret the content of earnings announcements. If considerable information asymmetries exist between managers and shareholders, it is in the interest of both parties to resort to other signals in order to reduce this asymmetry. For example, if the management takes actions to focus on long-term performance at the expense of short-term profitability, negative reactions from shareholders are probable if information asymmetry is present. The fact that managers have strong incentives to avoid negative earnings surprises and associated negative stock price revisions is well documented (see, e.g., Fudenberg and Tirole, 1995; Matsumoto, 2002). Consequently, additional objective information would be needed in the marketplace to signal the ability and intentions of the management.

As a solution to these informational issues faced by shareholders and managers during earnings announcement periods, corporate credit ratings might act as valuable signals. Kisgen (2006) does find that managers seem to view credit ratings as signals of firm quality as

evidenced by their actions, survey results and comments in the press; yet, we have little knowledge how these signals help shareholders process the information of earnings releases. Since credit rating agencies strive to decrease information asymmetry between companies and investors as well as providing their views on the future financial performance of the companies, the assigned credit ratings should have an impact on the market reactions around earnings announcements. Although there are plenty of papers on the stock market reaction to earnings announcements and the impact of credit rating announcements on asset prices, very few studies have looked thoroughly into the effect credit ratings might have on the information content of earnings releases. More importantly, this research has not reached consensus.

The latest research on credit ratings has focused on the significant conflicts of interest present in the business of credit ratings. The conflicts of interest are based on the issuer-pays revenue model in which credit rating agencies get their fees from the companies whose securities they rate. In line with this agency problem, Alp (2013) finds that speculative-grade rating standards were relaxed during years 1985-2002 and inflated ratings made mortgage-backed securities more marketable and attractive to investors post-2002. Thus criticism aimed at rating agencies following the dot-com crash and 2008 financial crisis was warranted. Even increased competition among the three credit rating agencies does not seem to improve the quality of ratings as this can result in ratings shopping, i.e., agencies have incentives to inflate ratings to gain more business (Bolton et al., 2012). Xia (2014) also confirms these agency problems by showing that a rating agency's rating quality and information content improve after the entry of an investor-paid rating agency. Similarly, Cornaggia and Cornaggia (2013) conclude that independent rating agencies are significantly quicker to identify default risk compared with issuer-paid raters.

Other interesting explanations for conflicts of interest have also been introduced. The fact that credit analysts often leave rating agencies to work for companies which they rate is a source of concern (Cornaggia, Cornaggia, and Xia, 2014). As a result of this conflict of interest, transitioning analysts provide ratings that are inflated and less responsive to changes in credit risk in the period prior to changing employers. In addition, home bias appears to play a role in assigned credit ratings as well when studying the municipal bond market (Cornaggia, Cornaggia, and Israelsen, 2014). Compared with ratings assigned by analysts who grew up in a different state, analysts who grew up in the same state as the issuer of a municipal bond give

significantly more favorable ratings to the issuer. As this effect is not driven by the residence of the analyst at the time of giving the rating, the paper concludes that this phenomenon is a result of home bias rather than superior information.

Despite concerns related to conflicts of interest, it is widely accepted in literature that credit rating agencies and their ratings do have informational value. This is because rating agencies have access to firms' inside information (see, e.g., Ederington and Yawitz, 1987; Goh and Ederington, 1993; Jorion et al., 2005). They have private discussions with managers and are provided with valuable information such as projected financial statements, detailed business segment data, minutes of board meetings, new product plans as well as plans concerning acquisitions, expansion and debt issuance.

As a result of this informational advantage, in spite of some mixed findings, the importance of the information conveyed by credit ratings can be seen in various settings. Naturally, rating information has significant informational effects in debt markets. Ederington et al. (1987) and Yi and Mullineaux (2006) show that ratings are arguably the most significant determinant of the cost of debt. Moreover, in bond and CDS markets, rating announcements convey significant information although content seems to be greater in the case of negative news (see, e.g., Hand et al., 1992; Kliger and Sarig, 2000; Finnerty et al., 2013). There is a similar reaction in the stock market as well; most papers document a significant stock price reaction to downgrades but not to upgrades (see, e.g., Holthausen and Leftwich, 1986; Goh and Ederington, 1993; Norden and Weber, 2004). However, some papers find a stock price response to upgrades as well when increasing the sample size or considering new explanatory variables such as disclosure regulation changes or the rating prior to the announcement (Dichev and Piotroski, 2001; Jorion et al., 2005; Jorion and Zhang, 2007). Interestingly, the consensus seems to be that non-investment-grade firms have greater reactions to new rating information as there is more uncertainty surrounding these entities (see, e.g., Boot et al., 2006; Avramov et al., 2009; De Franco et al., 2009).

In addition, many phenomena in equity markets imply that credit ratings are able to mitigate information asymmetry problems. Liu and Malatesta (2006), An and Chan (2008) and Poon et al. (2013) demonstrate that having a credit rating, and in some instances a higher rating, can reduce the magnitude of underpricing in equity offerings. Chou and Cheng (2012) find that the market values diversified firms and diversifying mergers more when the firm's credit rating is better. Rating agencies also seem to have an information advantage over stock

analysts (Ederington and Goh, 1998). Thus ratings help equity investors evaluate firms' prospects better.

Even though the informational effects of ratings have been investigated in various ways, only a few papers have used them as variables to help explain the information content of earnings releases. Starting from the seminal papers by Ball and Brown (1968) and Beaver (1968), the majority of empirical papers point out the considerable relevance of earnings disclosures to investors (as proxied by price and volume reactions). However, this topic remains an area of interest as new research is continuously conducted in order to improve our understanding of what drives the information content of earnings announcements. Thus far, several factors have been shown to affect the informativeness of earnings releases including magnitude of earnings surprise, firm size, changes in reporting standards and timeliness of reporting (see, e.g., Bamber, 1986; Chen et al., 2005; Landsman et al., 2012). Many studies also indicate that bad news have greater informational value compared with good news (see, e.g., Conrad et al., 2002; Heflin et al., 2003; Kothari et al., 2009).

The relationship between credit ratings and the information content of earnings announcements, especially in stock markets, is a relatively novel topic in finance literature. Findings from bond and CDS markets show that earnings news are more relevant for firms with lower ratings (see, e.g., Callen et al., 2009; Easton et al., 2009). In stock markets, downgraded firms experience significant negative abnormal returns around subsequent earnings announcement dates (Dichev and Piotroski, 2001). The papers by Greatrex (2009) and Leventis et al. (2014) are the closest studies to this thesis. They examine the impact of credit ratings on the stock price reaction around earnings releases with different data and they arrive at different conclusions; Greatrex argues that lower ratings are associated with greater stock price responses while Leventis et al. state that higher ratings increase the informativeness of earnings announcements. Compared with these papers, my study will further investigate this topic using an improved and more robust research design as well as a new and larger data set.

1.2. Background information

Before proceeding with the study, it is important to review the major players in the credit rating industry as well as the ratings they provide. Although there are a number of creditworthiness advisory services, the credit rating industry is dominated by the "big three"

rating agencies: Standard and Poor's (S&P), Moody's Investors Service (Moody's) and Fitch Ratings (Fitch). In 2011, S&P, Moody's and Fitch accounted for 45%, 38% and 13%, and 35%, 34% and 23% of total global ratings and total credit analysts employed, respectively (White, 2013). Many of the smaller rating agencies rely solely on quantitative analysis to determine the creditworthiness of companies but the analysts of the three major rating agencies use a mix of quantitative and qualitative models to arrive at a rating (Frost, 2007). As Frost explains, both business risk (industry characteristics, company's competitive position and management expertise) as well as financial risk (financial characteristics, financial policy, capital structure, cash flow stability and financial flexibility) are taken into account in order to produce superior information.

In addition to an increasing amount of issued credit ratings, rating information provided by rating agencies has grown in other forms as well (Bannier and Hirsch, 2010). The three biggest rating agencies assign ratings to companies and issued financial securities but they also offer additional information through rating outlooks and rating reviews ("watchlists"). While rating outlooks provide an opinion on the development of the credit rating in the medium term, watchlists focus on the expected rating changes in the short run. Bannier and Hirsch state that ratings are usually put under review as a result of discrete corporate events such as, e.g., the announcement of a merger or a share buyback, or by trends in a company's operations or financial performance.

The major credit rating agencies assess the creditworthiness and probability of default by assigning ratings to corporations and their securities using an alphabet-oriented rating scale (White, 2013). For example, S&P uses a scale from AAA, AA, A, BBB, BB, etc., down to CCC and then D. In addition, pluses and minuses can be given to all grades from AA to CCC. An important distinction can be made between investment-grade or "safe" ratings and speculative-grade or "high-risk/junk" ratings. Ratings that are BBB- or higher are considered investment-grade while ratings below BBB- are speculative-grade. Different types of credit ratings are assigned based on the time horizon and subject of analysis, e.g., short-term and long-term issue and issuer ratings. Table 1 provides a general summary of S&P's letter ratings and what they indicate.

Rating agencies have attracted criticism but the fact remains that they have a huge role to play

Table 1 – Credit rating categories and definitions

This table presents the main rating categories used by S&P as well as their general definitions. The threshold for an investment-grade rating is also indicated. Ratings from AA to CCC may be accompanied by a plus (+) or minus (-) sign. Source: Standard & Poor's Credit Ratings Definitions & FAQs; retrieved from http://www.standardandpoors.com/ratings/definitions-and-faqs/en/us#def_1.

Category	Definition
AAA	Extremely strong capacity to meet financial commitments. Highest Rating.
AA	Very strong capacity to meet financial commitments.
A	Strong capacity to meet financial commitments, but somewhat susceptible to adverse economic conditions and changes in circumstances.
BBB	Adequate capacity to meet financial commitments, but more subject to adverse economic conditions.
BBB-	Considered lowest investment grade by market participants.
BB+	Considered highest speculative grade by market participants.
BB	Less vulnerable in the near-term but faces major ongoing uncertainties to adverse business, financial and economic conditions.
B	More vulnerable to adverse business, financial and economic conditions but currently has the capacity to meet financial commitments.
CCC	Currently vulnerable and dependent on favorable business, financial and economic conditions to meet financial commitments.
CC	Currently highly vulnerable.
C	Currently highly vulnerable obligations and other defined circumstances.
D	Payment default on financial commitments.

in today's financial markets as evidenced by the booming nature of the credit rating industry.[2] Revenues from all the three major credit rating agencies, Moody's, S&P and Fitch, have surpassed pre-crisis levels after the financial crisis decreased the industry's revenues by a third. With Moody's and S&P achieving record high profits or nearing them it is safe to say that the credit rating industry is indeed thriving again. Despite widespread criticism following the financial crisis and the emergence of a number of smaller ratings service providers, the big three still control about 95% of the global ratings market implying that they provide superior information in the eyes of the market.

[2] Rating agencies: Credit where credit's due (2014, April 19). The Economist. Retrieved February 12, 2015, from http://www.economist.com/news/finance-and-economics/21601020-ratings-industry-has-bounced-back-financial-crisis-credit-where.

1.3. Research question and contribution to the literature

This study examines how a firm's credit rating affects the information content of its earnings announcements in the stock market. More specifically, to address the main research question, I analyze how different credit ratings assigned by S&P, i.e., higher/lower ratings, impact the stock price and volume reaction to earnings releases, controlling for the earnings surprise, in the US stock market. The paper also looks into the role of preceding rating downgrades. In addition, the study will attempt to identify the specific circumstances which render the effect of credit ratings more pronounced. Thus I will look into how the relationship between credit ratings and information content of earnings disclosures depends on the nature of the earnings surprise (positive or negative), amount of information asymmetry surrounding the firm and disclosure regulations. To summarize, the research questions of this thesis are the following:

1. *How does the credit rating of a firm affect the information content of its earnings announcements in stock markets?*

2. *Do credit ratings have a more significant impact on the information content of earnings releases when the reported earnings are below expectations?*

3. *Is the information content of an earnings disclosure greater when a credit rating downgrade occurs after the previous earnings announcement?*

4. *Do credit ratings have a more significant impact on the information content of earnings releases when firms are characterized by more information asymmetry?*

5. *Is the impact of credit ratings on the information content of earnings releases larger during the period when rating agencies have an exemption from Regulation Fair Disclosure?*

According to my knowledge, this is the first study to provide a more comprehensive view on the informational role of ratings around earnings announcements in stock markets. The relationship between credit ratings and the informational value of earnings disclosures, particularly in stock markets, is a relatively novel topic in finance literature. The most similar studies to this thesis are the papers by Greatrex (2009) and Leventis et al. (2014). Interestingly, these papers provide different findings. Greatrex finds that lower ratings are

associated with greater stock price responses while Leventis et al. suggest that higher ratings increase the informativeness of earnings announcements. Greatrex investigates the CDS and stock market reaction to quarterly earnings announcements and she examines if the reactions differ according to the firm's credit rating. The study uses US data from the period 2001-2006 and shows the mean cumulative abnormal stock returns around earnings announcement dates for firms categorized by their credit rating from S&P. Greatrex also divides the sample based on whether the announcement is a positive, negative or neutral earnings surprise. However, the paper does not present regression analysis to further understand the impact of ratings. Leventis et al. (2014) look at the effect of credit ratings and timeliness on the information content of annual earnings releases based on a sample of Greek firms. Taking into account the sign of the earnings surprise and the rating of the firm, they demonstrate the mean abnormal stock returns during the earnings announcement period. In addition, they conduct multivariate regression analysis to improve the validity of the results although the number of explanatory variables employed is quite small. Unfortunately, some factors reduce the robustness of the findings; first of all, the study's credit rating data are not based on ratings assigned by S&P, Moody's or Fitch and secondly, no analyst forecasts are available for Greek firms in order to produce the best possible earnings benchmark.

Compared with the studies by Greatrex (2009) and Leventis et al. (2014), this thesis will benefit from an improved and more robust research design as well as a new and larger data sample. In addition to analyzing the stock price reaction to earnings announcements, my study is the first to examine how the volume response to earning disclosures depends on credit ratings. Moreover, I will be the first to pay attention to preceding rating downgrades and the overall information environment in order to gain a more complete picture on the informational role of credit ratings around earnings announcements. The empirical work is based on a larger body of data than previously spanning the period 1986-2013 in the US stock market. This paper will also introduce an improved multivariate regression model to answer the question: If ratings have informational value, do they derive their value from summarizing existing information or conveying additional information?

Overall, this thesis aims to contribute to the literature related to the value and relevance of credit rating agencies and the ratings they assign. More precisely, my study will explore if credit ratings can help predict the behaviour of stocks around earnings announcements. Consequently, the results should be of interest to investors as well as managers of public

corporations as they provide additional insights into the informational effects of earnings releases.

1.4. Main findings

Based on 81,990 earnings announcements made in the US stock market by S&P rated firms in the period from February 1986 to December 2013, I find that credit ratings have a significant impact on the information content of earnings announcements. Consistent with the main hypothesis of this study, my results show that the information content of earnings releases (i.e., the cumulative abnormal return and/or trading volume reactions around earnings announcements) increases for firms with lower credit ratings. My findings are in line with the univariate results of Greatrex (2009). However, the findings do not support the results of Leventis et al. (2014) who argue that higher ratings increase the informativeness of earnings announcements. Nevertheless, due to a larger sample and more robust methodology, I believe that my results are more likely to represent the true impact of credit ratings. The findings of this thesis are in line with the notion that better credit ratings decrease the information asymmetry and uncertainty surrounding a firm; the earnings releases of lower rated firms are more informative as there is less visibility on the financial performance of these riskier firms prior to the announcement.

The empirical analysis of this thesis demonstrates that the stock price and trading volume reactions around earnings disclosures are more pronounced for firms with lower ratings. The univariate results present evidence that when firms report good earnings news, mean cumulative abnormal returns and trading volumes around the earnings announcement increase as ratings become lower. In the case of bad news, lower ratings are associated with more negative abnormal returns and higher trading volumes. The regression results show that, in the event of a negative earnings surprise, a one notch decrease in a company's credit rating is associated with a 0.25% more negative stock price reaction to earnings releases. The implication is that if a firm's reported earnings are below expectations, with a market cap of $2B (approximate median of my sample), a one notch lower rating would result in the firm's shareholders experiencing additional total losses of $5M, all else being equal. Furthermore, the regression coefficients indicate that, for both good and bad earnings news, a one notch lower credit rating results in 0.15%/0.17% more of the outstanding shares being traded in the market around an earnings announcement. Additional findings include that lower ratings are

associated with even greater market reactions in the case of negative earnings surprises, when firms are characterized by a greater amount of information asymmetry and when disclosure regulation changes increase the informational advantage of rating agencies. I also find that, in some cases, preceding rating changes result in larger market reactions to earnings releases.

1.5. Limitations of the study

My research uses a large data sample and a lot of effort has been put into making the methods as robust as possible but there are still some limitations which should be considered when reading and interpreting the results. First of all, my findings indicate the effect of rating levels and thus I do not discuss whether the information content of earnings announcements is different between firms with an existing credit rating and those with no assigned rating. In addition, due to the nature of the chosen sample, my results are limited to the US stock market. It should also be noted that I use ratings assigned by S&P and therefore further research would be needed to confirm that the results are similar for ratings from Moody's and Fitch. Finally, the findings of this thesis are based on the chosen methodology. As it is virtually impossible to predict the market reactions to earnings announcements, my methods might omit some necessary independent variables. With regard to the dependent variables which represent the information content of earnings releases, an alternative way to measure abnormal returns and trading volumes could also impact the results. Furthermore, confounding news during earnings announcement periods might distort my results as I do not control for these simultaneous news (e.g., news regarding dividends and management forecasts).

1.6. Structure of the thesis

The remaining parts of this paper are organized as follows. Section 2 presents previous studies pertaining to the research problem and their main findings. This literature will provide an empirical background for this thesis and together with theoretical considerations helps formulate the hypotheses, which are presented in section 3. Next, section 4 presents the data used in this thesis and its descriptive statistics as well as the methods to be employed. The main findings of this paper are discussed in section 5 where empirical results are presented and analyzed. Finally, section 6 gives the conclusions and suggestions for further research.

2. Literature review

In this section, I will present relevant previous studies in order to provide further background information and a foundation for the formulation of my hypotheses for this thesis. Firstly, the informational effects of credit ratings in debt markets will be reviewed. Next, I will go through the results when similar studies are extended to stock markets. It is also important to summarize what we know about the relevance of earnings releases to investors in general. The findings regarding whether credit ratings reduce information asymmetry in financial markets are stated as well. Finally, I will review the most relevant literature as far as this study is concerned, that is, papers discussing the relationship between credit ratings and the informativeness of earnings announcements.

All in all, despite some mixed findings, credit ratings appear to have a strong informational role in various settings. The information advantage of rating agencies seems to be based on their access to firms' inside information (see, e.g., Ederington and Yawitz, 1987; Goh and Ederington, 1993; Jorion et al., 2005). In bond and CDS markets, negative rating announcements convey more information than positive rating news (see, e.g., Hand et al., 1992; Kliger and Sarig, 2000; Finnerty et al., 2013). Most stock market studies document a significant stock price reaction to downgrades but not to upgrades (see, e.g., Holthausen and Leftwich, 1986; Goh and Ederington, 1993; Norden and Weber, 2004). However, later papers show that, when taking into account disclosure regulation changes and the existing rating level, upgrades do appear to provide new information to stock markets (Jorion et al., 2005; Jorion and Zhang, 2007). It is also well documented that speculative-grade firms have greater reactions to new rating information (see, e.g., Yi and Mullineaux, 2006; Avramov et al., 2009; De Franco et al., 2009). Moreover, moves into or out of investment-grade are associated with larger information content (see, e.g., Holthausen and Leftwich, 1986; Jorion et al., 2005). The investment-grade effect comes as no surprise as many institutional investors face restrictions to hold only investment-grade securities (see, e.g., Boot et al., 2006; Jorion and Zhang, 2007; Kisgen, 2007; Avramov et al., 2009; Finnerty et al., 2013). In addition, higher ratings improve stock liquidity, decrease underpricing in equity offerings and increase valuations of diversified firms implying that ratings reduce information asymmetry (Liu and Malatesta, 2006; Odders-White and Ready, 2006; Chou and Cheng, 2012).

Even though the informational effects of ratings have been studied quite extensively, more understanding is still needed regarding their impact on the information content of earnings in

the stock market. In general, earnings announcements are significant informational events; after all, earnings is likely the most relevant investment variable (Dichev and Piotroski, 2001). Nevertheless, credit ratings could give investors an indication of when earnings disclosures are most valuable. Bond and CDS market studies show that earnings news are more relevant for lower rated firms (see, e.g., Callen et al., 2009; Easton et al., 2009). Greatrex (2009) and Leventis et al. (2014) conduct similar event studies in the stock market but achieve differing results; the former finds earnings announcements of lower rated firms to have greater informational value while the latter argue that better credit ratings improve the informativeness of earnings disclosures. Further research is thus required to shed more light on this topic.

2.1. Informational value of credit ratings in debt markets

As the information provided by credit ratings is mainly directed towards creditors, it is not surprising that many papers have studied the informational value of these announcements in debt markets. Many studies revolve around the impact of credit ratings and rating announcements on bond prices and yields in corporate bond markets (see, e.g., Ederington et al., 1987; Hand et al., 1992; Kliger and Sarig, 2000; Steiner and Heinke, 2001) and sovereign debt markets (see, e.g., Cantor and Packer, 1996). The latest literature has focused on the impact of rating announcements in CDS markets (see, e.g., Hull et al., 2004; Norden and Weber, 2004; Finnerty et al., 2013) and the superior information credit analysts provide to bond markets compared with equity analysts (see, e.g., De Franco et al., 2009).

Credit ratings should contain pricing-relevant information as corporations provide rating agencies with inside information during the rating process (Kliger and Sarig, 2000). As there is an abundance of publicly available financial information regarding firms, Ederington et al. (1987) test whether credit rating agencies add informational value. They examine the market yields on industrial bonds and investigate whether market participants price bonds based on credit ratings or publicly available creditworthiness metrics such as coverage and leverage. Ederington et al. conclude that ratings from S&P and Moody's contain information beyond that provided by financial accounting variables. A later study on the relationship between syndicated loan rates and credit ratings achieves similar results (Yi and Mullineaux, 2006).

In order to more directly explore the informational value of credit ratings, event studies have to be conducted around rating announcement days. Hand et al. (1992) were the first to use

daily bond prices in order to achieve better empirical results regarding the information content of rating announcements. The data sample for the study was based on S&P's and Moody's bond rating change announcements as well as S&P's Watch List additions during the period 1977-1982. The overall conclusion of the paper is that the bond market clearly reacts to announcements of rating changes as well as Watch List additions although the results indicate an asymmetric response in the case of rating changes. Significantly negative excess bond returns are observed for downgrades (-1.27%) but the positive returns associated with upgrades are much weaker (0.35%). Moreover, below investment-grade bonds face a considerably larger reaction in the market.

Steiner and Heinke (2001) also examine the price effects of rating announcements in the German eurobond market. The main findings are that downgrade announcements as well as negative watchlistings result in significant negative abnormal returns on the announcement day. However, upgrades and positive watchlistings have insignificant effects. Steiner and Heinke propose two explanations for this asymmetric behaviour of bond prices to downgrades and upgrades. Firstly, credit rating agencies focus their research on finding negative credit information and thus downgrades have more informational value. Secondly, investors place more importance on bad news as opposed to good news.

Kliger and Sarig (2000) adopt a novel approach to study the relevance of rating information. Instead of looking at rating changes that reflect fundamental changes in issuers' risk profiles, the paper focuses on the price reactions surrounding Moody's rating system refinement in April, 1982, which introduced finer rating classifications. No effect on total firm value is found, but consistent with asset-substitution theory[3], bond and stock price reactions are in opposite directions. Bondholders benefit from better-than-expected ratings while shareholders lose wealth. The effects on both the abnormal returns of bonds as well as yield spread changes provide a clear indication that rating information is valuable. Furthermore, the impact of finer rating information on bond prices is more significant for firms with higher leverage.

The market implications of sovereign credit ratings have also been studied (Cantor and Packer, 1996). The analysis shows that the impact of rating announcements is highly significant. Relative spreads increase 0.9 percentage points as a result of downgrades while

[3] The asset-substitution theory states that value is transferred from bondholders to shareholders when a company substitutes its low-risk assets for high-risk investments. The potential for added profits only benefits shareholders as bondholders only require a fixed return. In addition, the riskier asset base increases the probability of the company defaulting on its debt.

upgrades cause a 1.3 percentage point decline. Further analysis reveals that the effect of a rating change is much stronger for speculative-grade sovereigns than it is for investment-grade sovereigns. In addition, sovereign credit ratings explain 92% of the variation in spreads. The authors conclude that sovereign ratings appear to provide additional information to the market beyond publicly available macroeconomic country statistics, especially in the case of below investment-grade bonds.

Due to the significance and size of today's credit default swap markets, several papers look into the information content of credit rating announcements in this distinct debt market setting. Zhang (2009), for instance, finds that bond rating downgrades are among the adverse credit events that cause the greatest reactions in credit default swap markets. Using a data sample of 233,620 individual credit default swap (CDS) spread quotes together with Moody's rating actions between 1998 and 2002, Hull et al. (2004) find evidence of significant increases in CDS spreads on announcement days of reviews for downgrade. Norden and Weber (2004) analyze the information content of rating announcements by all three major rating agencies (S&P, Moody's and Fitch). Once again the CDS market does not respond to positive rating events but negative rating actions by S&P and Moody's generate positive CDS spread changes. A more recent paper presents additional insights on the informational effects of credit rating announcements in CDS markets (Finnerty et al., 2013). With the help of a more extensive sample from January 2001 to May 2009, Finnerty et al. show that positive credit rating events also significantly affect CDS spreads. In general, the information content of rating changes is higher for pre-event non-investment-grade CDS contracts.

The informational value of credit ratings can be studied indirectly by examining the reaction to reports by credit analysts who ultimately are behind credit rating decisions. Accordingly, the informational effects of bond analyst reports have also been studied (De Franco et al., 2009). The authors collect a sample of 15,918 analyst reports for 633 firms over the years 2002 to 2006 and analyze the impact of bond analysts' reports on volumes and prices in bond markets. They find larger reactions to bond analysts' recommendations than they do for those of equity analysts. Furthermore, the bond market reaction is greater for bonds with lower credit ratings, which is consistent with greater information demand when a firm is closer to default. With these results, De Franco et al. provide additional support for the notion that bond/credit analysts, who are responsible for credit ratings as well, provide valuable information to debt market investors.

2.2. Stock market reaction to credit rating announcements

The research on the effects of credit ratings in stock markets is even more relevant for the purposes of this study. Motivated by the question whether rating agencies provide information to the capital markets in general, a vast amount of research has looked into the impact of rating information on stock prices. The majority of the papers conduct event studies and look into the impact of credit rating announcements on stock prices and abnormal returns (see, e.g., Griffin and Sanvicente, 1982; Holthausen and Leftwich, 1986; Yi and Mullineax, 2006; Avramov et al., 2009). Boot et al. (2006) take a different approach and present a theoretical model which can explain the above empirical findings. Goh and Ederington (1993) elaborate and investigate whether the effects depend on the rationale of the rating revision. Some studies focus more on variables that could explain the magnitude of the stock market reaction such as changes in disclosure regulations (Jorion et al., 2005) and the role of the rating prior to the announcement (Jorion and Zhang, 2007). There is also research examining the influence of rating agencies' decisions on future stock volatility (see, e.g., Hubler et al., 2014). In addition, Behr and Güttler (2008) study if rating agencies have superior skills in processing public information in addition to having access to inside information of firms.

Griffin and Sanvicente (1982) employ three different measures of abnormal security return to examine stock price changes around S&P's and Moody's bond rating changes in the period from 1960 to 1975. The main finding of the paper is that the stock price adjustment in the month of the rating announcements is significant for downgrades and this is robust to several different methodologies. However, while downgrades seem to convey information to stockholders, bond upgrades do not appear to have an influence. Nevertheless, Griffin and Sanvicente are the first to show the relevance of rating information in stock markets.

Later research aimed at conducting more powerful tests regarding the information content of credit ratings in stock markets by investigating the daily price reactions to new credit rating information (Holthausen and Leftwich, 1986). Overall, the evidence suggests that downgrades across rating classes (e.g., from AA- to A+) made by S&P and Moody's result in negative abnormal returns whereas no positive reaction is associated with upgrades. The event study conducted by Holthausen and Leftwich yields significant abnormal returns for across-the-class downgrades of -4.77% and -0.96% for the contaminated and non-contaminated sample, respectively. S&P's Credit Watch List also conveys information to the market. While potential downgrades are associated with negative abnormal performance, in this case,

potential upgrades also result in some positive abnormal returns. Additional cross-sectional analysis shows that the number of rating grades changed as well as a move into or out of investment-grade affect the magnitude of abnormal performance in the case of downgrades.

Goh and Ederington (1993) argue that the information content of downgrades depends on the rationale for the downgrade. To be more precise, the hypothesis is that downgrades should result in a negative reaction when the reason for the downgrade is a projected decline in sales or earnings; if the stated reason is a foreseen increase in leverage, Goh and Ederington predict a positive reaction as it would transfer wealth from bondholders to stockholders. The findings conclude that the stock market has a negative response when the credit rating downgrade is due to a deterioration in the financial prospects of the firm or industry. The cumulative abnormal return for days 0 and 1 is a significant -1.18%. On the other hand, other reasons for downgrades do not lead to significant stock price effects.

Zhang (2009) also finds that bond rating downgrades result in significant share price losses on the announcement date and research by Yi and Mullineaux (2006) provides further evidence that only downgrades convey information to equity investors. Yi and Mullineaux analyze syndicated bank loan ratings and demonstrate that excess returns are only associated with downgrades but not with upgrades or initial rating announcements. Speculative-grade loans face larger stock price reactions when downgraded partly due to information problems.

Empirical research exhibits a negative cross-sectional correlation between credit risk and future stock price performance and a recent study argues that this relationship is mainly due to the poor performance of low-rated companies around rating downgrades (Avramov et al., 2009). As Avramov et al. point out, in theory, since distress risk is primarily driven by idiosyncratic forces, the stock returns of low credit risk stocks and those of high credit risk stock should be similar. However, their results confirm that the abovementioned anomaly does exist in the period of three months before and after credit rating downgrades. On the other hand, during non-downgrade periods, the puzzling relation between credit risk and stock returns is nonexistent. In line with these results, Dichev and Piotroski (2001) document a more significant underperformance of stocks of small sized and lower rated firms in the first year following downgrades. This phenomenon is further proof of the informational content of credit ratings in stock markets. Avramov et al. also present other driving factors behind the observed behaviour around rating downgrades including strong institutional selling, initial mispricing generated by retail investors and short sale constraints of lower rated stocks.

The pervasive empirical finding seems to be that stock prices react negatively to rating downgrades but in the case of upgrades, there is no evidence of a significant response; Hand et al. (1992), Ederington and Goh (1998) as well as Norden and Weber (2004) also achieve similar results and Kliger and Sarig (2000) even show that shareholders can lose wealth when assigned ratings are better than expected since higher ratings mainly benefit bondholders. Boot et al. (2006) offer an explanation and argue that only downgrades are truly informative events, especially after a credit watch, as they signal that the company has not been able to restore its credit quality despite its efforts. These arguments are in line with the thoughts of Ederington and Goh (1998) who state that rating agencies expend more resources to focus on deterioration rather than improvement in credit quality. There is also a bias toward negative information content since companies seem to practice voluntary disclosure in the case of good news but they are reluctant to release unfavourable information (Ederington and Goh, 1998). Boot et al. also predict that the lower the credit rating, the larger the stock price drop will be after a bad signal since the firm is less likely to be able to undertake a recovery effort.

Recent post-2000 evidence shows that changes in the disclosure regulations for public companies in the US seem to have increased the information content of credit ratings (Jorion et al., 2005). Even more interestingly, this paper provides exciting evidence that upgrades can also be associated with significant abnormal returns. Jorion et al. find that after the Securities and Exchange Commission implemented Regulation Fair Disclosure (Reg FD) in October, 2000, the impact of rating changes on stock prices has increased. The introduction of Reg FD meant that US public companies could no longer practice selective disclose to a few privileged parties (e.g., equity analysts, institutional investors) and instead all material information should be disclosed simultaneously to the public. However, Reg FD was not targeted at rating agencies.[4] The rationale was that rating agencies should continue to receive selective disclosure as they are not selectively disseminating the information. The empirical evidence suggests that credit rating agencies gained an informational advantage following the new regulations. The effect of downgrades on stock prices is stronger post-FD with a -6.93% reaction in the three-day window around the event. In addition, the mean cumulative abnormal return for upgrades in the post-FD period is 1.42% which is significant at the 1% level; due to a large sample size, Dichev and Piotroski (2001) also find a significant response to upgrades but only of the magnitude of 0.5%. With their multivariate analysis, Jorion et al.

[4] This exemption granted to rating agencies was later removed in October 2010 as a result of the Dodd-Frank Act (https://www.sec.gov/rules/final/2010/33-9146.pdf; retrieved April 2, 2014).

confirm that the size of the stock market reaction is influenced by the FD regulations for both downgrades and upgrades.

Jorion and Zhang (2007) also demonstrate that credit rating upgrades can have informational value in stock markets. The authors specifically point out the importance of the credit rating prior to the rating change announcement. They argue that lower prior ratings cause stronger stock price effects both for downgrades and upgrades. The idea is that a rating change for a lower rated firm will induce a much greater change in default probability compared with a higher rated firm. The paper confirms these theoretical predictions with its empirical evidence from a sample of 1,195 rating upgrades and 361 upgrades between 1996 and 2002. Jorion and Zhang find that firms with a rating of BB or below before a rating change experience significant positive stock price changes after an upgrade. The difference between reactions to downgrades and upgrades is also insignificant in these rating categories meaning that upgrades can have as much informational value as downgrades. Overall, while upgrades result in a price effect which is 14 times smaller than the effect of downgrades for the unconditional sample, the impact of downgrades is only twice as large as far as lower rated companies are concerned. In addition, the study shows that the existing rating before the rating change announcement is the single most significant explanatory variable when analyzing the cross-sections of stock returns following a rating change.

Behr and Güttler (2008) take a different viewpoint and focus on the effects of unsolicited credit ratings, i.e., ratings that are not requested or paid for by the rated companies. They find that changes of unsolicited ratings result in negative reactions in the stock market irrespective of the direction of the rating change. Furthermore, initial unsolicited credit ratings seem to convey new information to investors as the stock price reactions are negative and trading volumes increase. Since S&P's unsolicited ratings are said to be based solely on publicly available information regarding the rated entity, these results imply that rating agencies possess superior information processing skills.

Instead of looking into the impact of credit rating announcements on abnormal returns or volumes, research has also been conducted regarding how rating agencies' decisions affect stock risks (see, e.g., Hubler et al., 2014). All in all, the evidence on this front is mixed and conclusive findings are still missing on how credit ratings influence both systematic and unsystematic risks. Hubler et al. do, however, show that the certification role played by rating agencies is visible in stock risks as well; when a firm has its rating affirmed, its stock

experiences a decline in volatility. The implication is that by confirming a rating, the rating agency allows investors' different expectations to converge.

2.3. The information content of earnings announcements

As this thesis will analyze the impact of credit ratings on the information content of earnings announcements, I will next look at what kind of results previous research has been able to produce regarding the informational value of earnings disclosures. The seminal papers by Ball and Brown (1968) and Beaver (1968) were the first to have a closer look at how earnings announcements affect stock prices. Aharony and Swary (1980) investigate if the information content of earnings disclosures is robust to contemporaneous dividend announcements. Later studies also control for explanatory variables, such as magnitude of earnings surprise, firm size and changes in reporting standards to see if they might influence the reaction to earnings releases (see, e.g., Bamber, 1986; Landsman and Maydew, 2002; Landsman et al., 2012; Crabtree and Kubick, 2014). Moreover, an interesting question is whether there is an asymmetric reaction to good and bad news (see, e.g., Conrad et al., 2002; Jorion et al., 2005; Kothari et al., 2009). Many recent studies look into the relationship between the timing and value of an earnings announcement (see, e.g., Chen et al., 2005; Doyle and Magilke, 2009) and Zhang (2009) also studies the effects of these announcements in CDS markets.

In their paper on the usefulness of annual income reports, Ball and Brown (1968) provide a good explanation of why the behaviour of stock prices is important when analyzing the value of earnings releases. Since capital markets should be efficient in incorporating relevant information into asset prices, changes in these prices reflect the flow of new and relevant information into the market. Consequently, stock price movements around earnings announcements are likely to indicate the usefulness of these disclosures. Ball and Brown also present empirical findings on the stock market effects of earnings releases based on data from 1957 to 1965. The results derived from an analysis of monthly stock returns demonstrate that earnings announcements do possess information content; better-than-expected (worse-than-expected) earnings are associated with positive (negative) stock market reactions.

The seminal paper by Beaver (1968) studies the information content of earnings announcements in the weeks surrounding the earnings release. The magnitude of the information content is examined by the price and volume reactions of common stocks. The rationale for the choice of volume as a variable is based on the fact that relevant information

provided by a firm should affect the number of shares an investor wants to hold in that firm. Beaver's findings support the notion that earnings announcements possess informational value. Mean volume and mean abnormal volume are 33% and 30% larger, respectively, during the announcement week when compared with the mean figures for the non-report period. This means that earnings reports alter the expectations of individual investors. Likewise, the abnormal stock price reaction, irrespective of the sign, is 67% higher in the week of the earnings announcement implying that the information content of earnings changes the market's expectations as a whole.

Further support for the relevance of earnings disclosures is provided by considering daily abnormal returns as well as taking into account possible contamination due to contemporaneous dividend announcements (Aharony and Swary, 1980). By examining only announcements that occurred on different dates within a quarter, Aharony and Swary show that both earnings releases and dividend announcements provide valuable information to capital markets. Empirical results indicate that when earnings and dividends are above expectations, the corresponding stock experiences positive abnormal returns on earnings dates regardless of whether the dividend announcement precedes or follows the earnings release.

Bamber (1986) focuses solely on the volume reaction to earnings announcements and demonstrates that trading volume is significantly higher around annual earnings announcements. She also finds that the magnitude of the abnormal volume reaction is influenced by unexpected earnings and firm size; the trading reaction is greater for larger earnings surprises and smaller firms. In addition, the results support the notion that the information content of an earnings release increases when fewer alternative information sources exist for the firm in question.

Landsman and Maydew (2002) investigate whether the information content of earnings has changed in later decades by analyzing abnormal trading volume and abnormal return volatility, that is, the same metrics as Beaver (1968) used, although in a slightly modified form. The motivation for the study stems from the concerns regarding the usefulness of accounting information as there are doubts regarding the ability of accounting practices to keep up with the changing economy. Landsman and Maydew examine the three-day earnings announcement event window of quarterly earnings releases over a long period spanning almost three decades from 1972 to 1998. The results from the study do not support a decline in earnings' informational value and instead suggest that the information content has

increased over time; this is demonstrated by the significantly positive time trend coefficient in both abnormal volume and abnormal return volatility regressions.

There is also compelling evidence that the stock price response to earnings information depends on the sign of the earnings surprise as well as the overall level of the market (Conrad et al., 2002). Conrad et al. demonstrate that when the market price-to-earnings (P/E) ratio is higher excess returns become stronger for negative earnings shocks. The results are also consistent with the hypothesis that stock prices exhibit stronger sensitivity to bad news compared with good news when market prices are rising in general. One way of looking at it is that poor earnings performance shocks the market and its overoptimistic expectations. Overall, the magnitude of unexpected earnings drives excess stock returns around earnings announcements. Kothari et al. (2009) also provide similar findings to those of Conrad et al. (2002). They find that stock price reactions to disclosures of bad news exceed those of good news. Kothari et al. argue that while good news are quickly revealed to the market, managers tend to withhold bad news meaning that the eventual release of bad news is associated with a greater amount of information.

In the same way as Jorion et al. (2005) examine the impact of Regulation Fair Disclosure (Reg FD) on the informativeness of credit rating changes, Heflin et al. (2003) conduct a study on the financial information environment around quarterly earnings announcements following the introduction of Reg FD. Despite concerns that the new regulations would reduce the level of information in capital markets due to the resulting lack of communication between analysts and firms, Heflin et al. show that the information asymmetry or gap during earnings announcement periods has decreased after FD implementation. Their event study exhibits an approximate decrease of one percent in the absolute cumulative abnormal return during the event period. In other words, the information content of earnings announcements has declined as the market seems to have more information available after FD was introduced. Regression results also demonstrate that the information content is slightly greater in general when a company reports a loss.

A recent study analyzes how the adoption of International Financial Reporting Standards (IFRS) has affected the information content of earnings (Landsman et al., 2012). The paper compares countries that mandated the adoption of IFRS to those that retained domestic accounting standards. The hypothesis is that IFRS should improve the informational value of earnings due to the better accounting quality and greater comparability associated with IFRS.

The research is conducted with a sample of 20,517 annual earnings announcements from 27 countries. Landsman et al. present results which clearly show that IFRS-adopting countries experienced a significant increase in the information content of earnings announcements.

In addition, plenty of other theories have been presented regarding what might drive the information content of earnings announcements; one area of interest is the timing of these announcements. Chen et al. (2005) assess the relationship between the timeliness of an earnings announcement and its information content (abnormal trading volume and abnormal return) based on data from the Chinese stock market. Chen et al. conclude that earlier disclosures are associated with higher abnormal volume and excess return reactions. The reasoning is that earlier announcements generate greater surprises as they are less easily predicted. Leventis et al. (2014) also look at the informational impact of timeliness and present evidence supporting the "good news early, bad news late" hypothesis; good news have significant positive information content only if they are released relatively early and bad news drive stock prices down especially when they are announced with a delay. Continuing with the timing literature, a study on strategic disclosure timing and its effect on the informational value of earnings releases reveals that firms' stocks experience higher abnormal trading volumes around earnings reports when the announcements are made after the market closes rather than before it opens (Doyle and Magilke, 2009). Firms that usually disclose their earnings after market closing have lower earnings and are more complex and thus it is sensible to expect that their earnings news will have relatively more information content.

The recent paper by Crabtree and Kubick (2014) introduces another element that seems to influence the value-relevance of earnings releases: tax avoidance. The findings indicate a lower earnings response coefficient (change in abnormal return for one unit of unexpected earnings) for firms which exhibit greater than moderate tax avoidance. Thus the information content of earnings releases is lower for these firms; Crabtree and Kubick suggest that this arises from the difficulty investors have in evaluating firms that practice more tax avoidance.

Earnings announcements also convey information to debt markets (see, e.g., Jiang, 2008; Callen et al., 2009; Easton et al., 2009; Zhang, 2009). Zhang (2009) looks for adverse credit events in the period 2001-2005 by identifying events that increase daily CDS spreads by more than 20 percent and finds that announcements of declining earnings are well represented in the final sample. When comparing the informational flows in CDS and stock markets Zhang demonstrates that, while share prices drop significantly around news of declining earnings,

the (positive) effect on CDS spreads is even stronger. Jiang (2008) shows that rating upgrade probability increases and initial bond yield spreads as well as existing bond spreads decrease after positive earnings surprises. Easton et al. (2009) document higher bond trade and short-window returns following earnings releases. Overall, these studies provide further evidence of the informational value of earnings announcements in financial markets.

2.4. Credit ratings and information asymmetry

This thesis aims to determine whether better credit ratings reduce the informational impact of earnings announcements as there should be less uncertainty surrounding these firms. Although this particular hypothesis is fairly novel, related literature has studied the informational characteristics of credit ratings and how they can mitigate information asymmetry in financial markets. The discussion on the potential informational advantage of rating agencies and their ratings is often based on whether or not rating agencies receive inside information from the firms they rate (see, e.g., Holthausen and Leftwich, 1986; Ederington and Yawitz, 1987; Wakeman, 1990; Goh and Ederington, 1993; Jorion et al., 2005). Sufi (2007) and Bosch and Steffen (2011) examine whether the certification effect of having a credit rating reduces information asymmetry in debt markets; Tang (2009) also considers whether the level of the rating has an influence. De Boskey and Gillett (2013) analyze credit ratings from a purely informational perspective to see if higher ratings are associated with more transparent firms. The informational impact of ratings in equity markets is studied by Ederington and Goh (1998) and Odders-White and Ready (2006); the former investigate if rating agencies have an informational advantage over equity analysts while the latter examine how ratings are related to adverse selection risk and stock liquidity. As an analogy to the potential third-party certification role played by rating agencies, Megginson and Weiss (1991) analyze the informational role of venture capitalists. Information asymmetry is a well-documented phenomenon in equity issues and a few studies explore credit ratings' ability to mitigate problems associated with it (see, e.g., Liu and Malatesta, 2006; An and Chan, 2008; Poon et al., 2013). Diversification strategies are also often associated with information asymmetry in stock markets and Chou and Cheng (2012) research if credit ratings can reduce these informational problems. In addition, an interesting paper studies if rating levels are related to historical earnings uncertainty (Crabtree and Maher, 2005).

As previous literature on debt and stock market reactions to rating information indicates, credit ratings appear to have informational value in financial markets. Nevertheless, the presence of mixed findings makes the topic a subject of debate. Wakeman (1990) argues that rating agencies lower information costs instead of providing new information and thus ratings only summarize existing public information. The main argument in support of the informational content of credit ratings and their ability to reduce information asymmetry is based on the fact that rating agencies claim to have access to inside information not available to other market participants. According to Moody's and S&P, in addition to having private discussions with the management of a firm, they are provided with projected financial statements and detailed business segment data (Holthausen and Leftwich, 1986). There seems to exist a "Chinese wall" which prevents even the firm's equity analysts from having access to certain information which is available to rating agencies including minutes of board meetings and new product plans (Ederington and Yawitz, 1987). Rating agencies also seem to have access to inside information regarding acquisition, expansion and debt issuance plans (Goh and Ederington, 1993). In addition, the introduction of Regulation Fair Disclosure looks to have increased the informational advantage of credit rating agencies even more (Jorion et al., 2005). However, Goh and Ederington (1993) state that, at the end of the day, it is still difficult to ascertain whether the agencies really receive a huge amount of valuable inside information. In any case, rating agencies have advanced skills in evaluating firms and can thus provide investors more visibility regarding future performance (Chou, 2013).

Evidence indicates that the certification effect of credit ratings is considerably important in reducing information asymmetry in debt markets. A study on syndicated loans extended in the UK in 1996-2007 shows that firms rated by Moody's or S&P attract a greater number of uninformed investors (Bosch and Steffen, 2011). Bosch and Steffen add that the impact of a credit rating is larger than that of a stock exchange listing in mitigating information asymmetry as the former has a more significant effect in attracting more domestic and uninformed foreign investors. These findings are in line with the empirical results provided by Sufi (2007). When analyzing the structures of syndicated loans in the US he constructs an information asymmetry proxy for a firm based on whether it has an existing rating from S&P or not. The results are consistent with the notion that credit ratings help reduce information asymmetry between the lead arranger and the participant lenders. More specifically, when the borrowing firm does not have a credit rating, Sufi shows that the lead bank has to retain a larger share of the loan. In addition, the lack of a rating results in the lead arranger choosing

participant lenders that have previous lending relationships with the borrowing firm and are geographically closer to it.

While the studies by Sufi (2007) and Bosch and Steffen (2011) focus on the informational effects of having a credit rating, Tang (2009) shows that the level of the rating impacts the amount of information asymmetry as well. He examines Moody's rating system refinement in 1982 to determine whether a sudden release of new rating information regarding a firm, without an accompanying change in the rated firm's risk profile, affects the firm's real outcomes. Consistent with the idea that better credit ratings reduce information asymmetry, Tang shows that compared with downgrades, firms with refinement upgrades face lower borrowing costs, issue more debt and increase their capital expenditures following the new information from Moody's.

De Boskey and Gillett (2013) also present evidence to support higher ratings' ability to mitigate information asymmetry. The results of the above study by Tang (2009) imply that a higher credit rating reduces information asymmetry as it signals to investors that firm prospects are better and there is less uncertainty surrounding the firm; De Boskey and Gillett show that higher ratings are also associated with larger amounts of actual information regarding the present state of the firm. They find that higher credit ratings are positively related to corporate transparency in the form of public disclosure and quality of earnings information. For example, when ranking firms into quintiles based on corporate transparency metrics, De Boskey and Gillett report a 1.2 credit rating grade increase, controlling for other factors, between firms in the highest and lowest quintile.

Regarding the informational role of credit ratings in stock markets, Ederington and Goh (1998) provide convincing evidence that rating agencies have an information advantage over stock analysts as the latter appear to obtain new information from the actions of the former. Controlling for earlier negative information and earnings figures announced at the same time, Ederington and Goh show that in the first month following a downgrade, there is an abnormal downward earnings forecast revision of approximately 5.1% on average. Furthermore, rating downgrades also seem to predict declines in actual earnings; Dichev and Piotroski (2001) also demonstrate the predictive power of downgrades regarding the deterioration of future earnings. Although the effect is not as strong, Ederington and Goh find that upgrades are also followed by abnormal upward earnings forecast revisions.

In addition, research shows that there is a strong relationship between the uncertainty regarding firm value and credit ratings in equity markets (Odders-White and Ready, 2006). The paper by Odders-White and Ready investigates the impact of credit rating levels on stock liquidity. When asset-value uncertainty is higher, adverse selection risk increases and therefore liquidity decreases due to greater information asymmetry. Odders-White and Ready explain that adverse selection risk is greater when new information events are more likely or when this new information content is expected to be more extreme. The study hypothesizes that lower credit ratings should be associated with higher adverse selection costs and poorer liquidity. The results support this hypothesis and offer new insights regarding the important informational role of credit ratings in the stock market.

The potential ability of credit rating agencies to certify the quality of firms and securities can also be compared to the certification role played by venture capitalists. The certification role of third-party specialists has attracted much academic interest and in their study, Megginson and Weiss (1991) provide compelling evidence that venture capitalists are able to reduce the asymmetry of information between all stakeholders. They explain that third-party certification is valuable when insiders of the firm and external investors have differing amounts of information regarding the value of the firm. Megginson and Weiss examine how the presence of a venture capitalist, which has invested its financial and reputational capital in a firm, affects the costs of an initial public offering (IPO) for the listing firm. The conclusion is that initial public offerings backed by venture capitalists are associated with numerous benefits: lower underpricing, smaller underwriter compensation, higher quality auditors and larger institutional following.

To gain more insight into the certification role of rating agencies outside of debt markets, An and Chan (2008) conduct a similar study to Megginson and Weiss (1991) but, suited to the purposes of this thesis, turn their attention to the effect of credit ratings in initial public offerings. The empirical analysis is based on a sample of 5,141 initial public offerings (161 in which the listing firm has a credit rating prior to going public) in the US during the years 1986 to 2004. The main finding is that firms that have credit ratings experience significantly lower underpricing compared with firms without credit ratings. An and Chan explain that theoretically higher underpricing is a consequence of higher information asymmetry since investors need to be compensated as they are less informed about the quality of the issuing firm. Although the existence of a credit rating does reduce the value uncertainty and

information asymmetry related to issuing firms in IPO markets, An and Chan find that credit rating levels do not have a significant impact on underpricing (investment-grade ratings have a negative effect on underpricing but the coefficient in the model is not significant). Additional results, consistent with the ability of credit ratings to mitigate uncertainty and information asymmetry, show that the degree of price revision during bookbuilding and post-IPO stock volatility are also reduced by credit ratings.

The first study to examine the impact of credit ratings from S&P on the pricing of equity issues focuses on seasoned equity offerings (SEOs) instead (Liu and Malatesta, 2006). The paper gives a thorough analysis on the effect of credit ratings on SEO underpricing and announcement-period abnormal stock returns based on 3,243 US SEOs made in years 1990 to 2002. Liu and Malatesta find that the underpricing and negative announcement-period abnormal returns associated with SEOs are lower for firms with credit ratings indicating that ratings reduce information asymmetry in equity offerings. For example, while firms without a credit rating assigned are underpriced 3.8% on average in SEOs, the corresponding figure drops to 1.9% for rated companies. Furthermore, although not as significant as the impact of having a credit rating, the results show that higher credit ratings lower information asymmetries (lower underpricing and lower negative announcement-period abnormal returns).

The findings by Liu and Malatesta (2006) on the ability of credit ratings to mitigate information asymmetry are also confirmed by Poon et al. (2013) who study credit ratings and Chinese SEOs during 2002-2009. Depending on the model employed, Poon et al. present results which show that the existence of a credit rating decreases SEO underpricing by 11.89% to 14.33%. These results are very interesting considering that the study uses ratings issued by a Chinese rating agency as one could assume that the informational content of "big three" ratings is even greater. Overall, the abovementioned studies on returning issuers (Liu and Malatesta, 2006; Poon et al., 2013) provide strong evidence of third-party credit ratings' informational role in equity markets especially considering that information asymmetry problems are less severe in SEOs compared with IPOs since the SEO firms are already well known to the market (An and Chan, 2008).

Chou and Cheng (2012) also contribute to the literature on the informational role of credit ratings in equity markets and how they affect the market pricing of listed firms. The study revolves around the premise that information asymmetry issues lead to lower valuations for diversified public firms. The results, based on 45,140 firm-year observations during the

period 1985-2008, suggest that both the existence of a rating as well as a higher rating level decrease the diversification discount. Moreover, the beneficial impact of credit ratings is more pronounced for firms associated with greater information asymmetry. The ability of credit ratings to reduce information asymmetry is also highlighted when Chou and Cheng examine the stock market response to diversifying mergers; once again the market reaction is less unfavourable if the firm has a credit rating or a higher rating.

Crabtree and Maher (2005) investigate further whether credit ratings decrease uncertainty in financial markets by examining the relationship between ratings and earnings predictability. As considerable information asymmetry regarding the latest financial figures is often present before eventual earnings announcements, credit rating levels should be associated with the level of uncertainty surrounding earnings releases if indeed ratings help reduce information asymmetry. Results from the study by Crabtree and Maher support this theory. They use the mean earnings surprise (compared with consensus estimate) and dispersion of analysts' forecasts as proxies for earnings predictability. Crabtree and Maher demonstrate that higher ratings are associated with historically more predictable earnings, i.e., lower proxy values. It appears, then, that credit rating levels could have some predictive power with regard to the amount of information asymmetry around earnings announcements.

2.5. The role of credit ratings in the information content of earnings releases

The main research question of this thesis addresses how credit ratings affect the information content of earnings releases. In line with the objectives of this thesis, this section of the literature review focuses on what we know regarding the informational effects of credit ratings around companies' earnings announcements. Firstly, it is an interesting question whether a firm's credit rating affects the extent of managers' earnings management (Jung et al., 2013). A few studies have looked into the informational role of credit ratings in earnings releases in bond and CDS markets (Jiang, 2008; Callen et al., 2009; Easton et al., 2009; Greatrex, 2009). Depending on the paper, they examine how the credit rating of a company influences initial bond yields, existing bond spreads, bond trade, bond prices and CDS spreads around earnings announcements. Greatrex (2009) is also the first to analyze how credit ratings impact the stock price reaction to earnings disclosures. Leventis et al. (2014) conduct a similar study on Greek firms. In addition, Dichev and Piotroski, (2001) investigate whether preceding rating changes have an effect on the information content of earnings releases.

Recent studies also focus on the role of credit ratings in the pricing of future earnings in stock markets and if ratings can help explain the post-earnings-announcement drift anomaly (Chou, 2013; He, 2013).

Before discussing how credit ratings affect the information conveyed by earnings disclosures in financial markets, it is an interesting question whether a company's rating might change the way managers approach earnings reporting. Indeed it does seem that managers realize the informational implications of credit ratings and according to Jung et al. (2013) this affects their actions around earnings announcements. More specifically, Jung et al. find that managers appear to practice earnings smoothing to influence rating agencies' perception of the company as earnings volatility is an important rating factor. The paper hypothesizes that rating changes across broad rating classes (e.g., from BBB+ to A-) are more valuable to a company and thus companies with a plus or minus attached to their rating have greater incentives to engage in earnings smoothing. Jung et al. analyze a sample of companies from 1990 to 2008 and conclude that plus-notch firms smooth earnings more compared with firms with a middle-notch rating. However, this effect is only significant among investment-grade firms; according to Jung et al., one reason for this is that speculative-grade firms are more likely to experience multiple-notch rating changes. In addition, earnings smoothing activity appears to increase the probability of a subsequent rating upgrade for plus-notch firms. The study also finds that minus-notch firms do not have higher earnings smoothing and Jung et al. argue that this is due to the increased scrutiny they face from rating agencies.

A couple of papers look into how the informational content of earnings releases is affected by credit ratings in the debt market. Jiang (2008) examines the impact of beating earnings benchmarks on initial bond yields and how this effect depends on the bond's rating; the benchmarks used are zero earnings, previous year's earnings and analysts' forecasts. Since lower rated firms have greater default risk and uncertainty, the hypothesis is that lower rated firms experience greater changes in their cost of debt after reporting benchmark-beating earnings, i.e., the information content of earnings is greater for high-risk firms. The sample of the study consists of 1,798 fixed-rate bonds issued by US firms during 1983-2002. Jiang finds that, in general, the effect of a prior year's earnings surprise on initial bond spreads is much stronger for lower rated bonds. For example, regression coefficients show that increasing earnings year-on-year reduces spreads approximately 25 basis points more for speculative-grade firms compared with investment-grade firms. The paper also examines the changes in

yield spreads for existing bonds around earnings disclosures. The results show that, if the full sample is divided into two equal-sized low and high credit rating subsamples, the impact of reporting a positive profit is more pronounced for companies with a low credit rating.

Easton et al. (2009) arrive at similar conclusions regarding the information content of earnings in the bond market. They also state that earnings news should be more relevant to firms with higher risk of default. Moreover, Easton et al. argue that due to the limited upside associated with bonds, negative earnings surprises should carry more weight. The empirical research is based on secondary-market corporate bond transactions in 1994-2006 and it examines the bond trade and return consequences of earnings announcements. Consistent with Jiang (2008), the results show that, regardless of the sign of earnings, speculative-grade bonds have a larger reaction to earnings news. Moreover, the information content is greater when unexpected earnings are negative.

Evidence from the CDS market is also consistent with the hypothesis that the informational value of earnings news is higher for lower rated companies (Callen et al., 2009). Based on a final sample of 9,109 CDS contracts from 383 firms and an event study centered on earnings announcements, the study finds that earnings are significantly more highly associated with CDS spreads for firms with credit ratings of BBB and below. More specifically, Callen et al. report regression results which exhibit a non-significant CDS spread reaction to earnings surprises as far as higher rated firms are concerned.

Greatrex (2009) examines the CDS market's reactions to earnings announcements as well but she also compares them with the informational effects of earnings releases in the stock market. Greatrex investigates the CDS and stock price reactions to earnings disclosures made by firms between January 2001 and April 2006. The findings regarding the role of credit ratings in the CDS market response are in line with the other similar studies mentioned above; firms with lower credit ratings are more sensitive to earnings news. In fact, mean cumulative abnormal spread changes appear to decrease (increase) monotonically for positive earnings surprises (negative earnings surprises) as creditworthiness declines. For instance, non-investment grade firms reporting below-expected earnings are responsible for the largest event window reaction with an abnormal spread increase of 15.5 basis points. Moreover, negative earnings surprises have a larger impact on abnormal spread changes compared with positive news. Additional regression analysis, controlling for firm size and industry, reveals that the magnitude of the earnings surprise is the most significant explanatory variable of

abnormal CDS spread changes while only the magnitude effect but not the statistical significance remain for the credit rating variable. More interestingly, considering the focus of this thesis, Greatrex also presents mean cumulative abnormal stock returns around earnings releases and categorizes them according to the firm's credit rating. She finds that excess returns do vary by credit quality. To be more precise, as in the CDS market event study, lower rated firms experience greater reactions around earnings announcements regardless of whether they contain good, bad or no news. In the case of a positive earnings surprise, speculative-grade firms exhibit positive abnormal returns of 1.75%-1.85% while AAA/AA rated firms have excess returns of 0.57%-0.70% depending on the model employed. Overall, these results are consistent with the notion that higher credit ratings reduce information asymmetry in stock markets and thus earnings news are less relevant for firms with better ratings.

Based on a sample of listed Greek firms from 2001 to 2008, Leventis et al. (2014) examine the impact of credit ratings on the information content of earnings announcements as well. Leventis et al. categorize firms as "healthy", "balanced", "vulnerable" or "risky" based on their credit rating obtained from Amadeus. The study arrives at a somewhat surprising conclusion as the results indicate that higher credit ratings enhance the informativeness of earnings releases. Firms with higher ratings have significant positive (negative) abnormal share price reactions to positive (negative) earnings surprises. On the other hand, lower rated firms have mainly non-significant negative reactions regardless of the sign of the earnings surprise. However, Leventis et al. find that when earnings announcements are associated with rating changes, downgrades lead to significant negative reactions for below-expected earnings. All in all, Leventis et al. explain the results by arguing that the reduced information asymmetry associated with better credit ratings allows investors to appreciate the information content of earnings disclosures more.

Credit rating changes preceding earnings announcements also appear to influence the informativeness of earnings releases in the US stock market (Dichev and Piotroski, 2001). Dichev and Piotroski examine subsequent earnings announcement returns following upgrades and downgrades of US firms made by Moody's during 1970-1997. The entire sample exhibits significant negative abnormal performance in the announcement window around the first quarterly earnings release following a downgrade. Upgrades, meanwhile, do not have a meaningful impact. Furthermore, Dichev and Piotroski show that negative abnormal earnings

announcement returns after downgrades are more pronounced for small non-investment grade firms and that the effect is observed both in the first and second subsequent quarter. Controlling for potential survivorship bias in the sample, the study also demonstrates that the underperformance is even greater when only considering firms with at least one subsequent earnings announcement missing.

The study by He (2013) presents a different view on the informational role of credit ratings around earnings announcements. Based on a sample of US firms from 1985 to 2009, the paper examines the link between credit ratings and post-earnings-announcement drift (PEAD)[5]. Findings show that PEAD is much stronger for lower rated firms and consequently the payoffs from PEAD trading strategies (long on stocks with most positive earnings surprise and short on stocks with most negative earnings surprise) are highest when applied to firms in the poorest rating categories. He argues that this evidence is consistent with the idea that initially, earnings releases by lower rated firms have little information content; the higher long-term uncertainty indicated by a lower credit rating means that investors do not value the signal of new earnings news as much. The findings also imply that the reaction to earnings disclosures of more risky firms is delayed; either investors wait for additional information or the processing of new information takes longer.

Lastly, Chou (2013) offers exciting new evidence regarding the benefits of higher credit ratings in stock markets. He finds that the stock prices of higher rated firms reflect more future earnings. Specifically, when employing the future earnings response coefficient model, current returns of higher rated firms incorporate a larger amount of future earnings. Chou argues that more forward-looking information is conveyed through higher ratings. The results remain significant after controlling for potential earnings smoothing, market liquidity and default risk factors associated with credit ratings. Chou concludes that better credit ratings help mitigate information asymmetry and uncertainty regarding the firm's prospects among investors as the ratings disseminate valuable private information.

[5] "PEAD refers to the tendency of stocks to continue to earn positive (negative) average abnormal returns after positive (negative) earnings surprises." He (2013)

3. Hypotheses

This section will go through the research questions and hypotheses of this thesis. The literature review showed that, although plenty of studies examine the role of credit ratings in stock markets, the relationship between ratings and the information content of earnings announcements in equity markets is a considerably less understood topic. The limited empirical findings on this topic thus far are mixed and even the hypotheses of these papers diverge (Greatrex, 2009; He, 2013; Leventis et al., 2014). Due to these considerations, I will study the effect of credit ratings on the information content of earnings releases in stock markets, that is, how the stock prices and volumes of firms with different credit ratings react to earnings disclosures. According to my knowledge, this is the first academic study to provide a more comprehensive view on the informational role of ratings around earnings announcements in stock markets.

3.1. Main hypotheses

The main research question of this thesis revolves around how the information content of earnings releases is influenced by credit ratings in the stock market. I will define an earnings release as having information content if it results in an abnormal change in the current stock price and/or trading volume around the earnings announcement date; these measures have been employed in many other papers related to the informational value of earnings announcements (see, e.g., Bamber, 1986; MacKinlay, 1997; Chen et al., 2005; Crabtree and Kubick, 2014). It is important to consider both of these aspects of information content. While a price reaction reflects changes in expectations of the market as a whole, a volume reaction means that the expectations of individual investors have been altered and there is diversity in opinion among investors (Beaver, 1968; Landsman et al., 2012). Consequently, if investors' risk preferences differ, it is possible that an earnings release might not cause a price change but a volume reaction would be observed as many individual investors would find the announcement informative. In addition, the nature of the earnings surprise has to be taken into account when examining the information content of earnings announcements. If firms report a positive earnings surprise, the information content is greater when the stock price and trading volume reaction are more positive. In the case of a negative earnings surprise, the information content is greater when the trading volume reaction is more positive but the stock price reaction is more negative.

The first hypothesis is related to the influence of rating levels on the information content of earnings disclosures. In general, the empirical evidence presented before indicates that, thanks to their access to inside information and information-processing abilities, credit ratings provide investors with valuable information and better ratings reduce information asymmetry in equity markets (see, e.g., Liu and Malatesta, 2006; Odders-White and Ready, 2006; Chou and Cheng, 2012). By assigning a higher rating, the rating agency gives investors a more positive signal about the firm's future prospects and thus there should be less uncertainty and more visibility regarding long-term firm value among investors. On the other hand, lower ratings increase information asymmetry because without this positive signal investors have a harder time forecasting the financial performance of the firm. As a result, I hypothesize that higher credit ratings are associated with less information asymmetry in stock markets and thus higher rated firms' earnings releases, controlling for the earnings surprise, provide less information regarding the value of the firm. Therefore, earnings news provide more new information to shareholders of lower rated firms. Since lower rated firms are closer to default and surrounded by more uncertainty, the information conveyed by earnings disclosures has greater implications on firm value.

To provide more support for this prediction, I will provide arguments in favour of it despite two previous studies yielding findings which are not entirely in line with this hypothesis. He (2013) finds that the post-earnings-announcement drift is observed mainly for lower rated stocks. The author argues that this result is consistent with the idea that earnings released by lower rated firms have lower informational value initially because investors don't value the signal of current earnings as much due to the long-term uncertainty associated with lower rated firms. However, when analyzing the results more closely, the (negative) drift exists primarily for firms that report the worst earnings and have a CCC+ rating or lower. In my view, it is questionable to make conclusions based on firms which are very near bankruptcy and are thus associated with significant informational problems. Moreover, the drift is based on a period of two months after the earnings announcement during which other information is likely to flow to the market. Based on these two arguments, I believe that the findings by He do not contradict my hypothesis that the information content of earnings is higher for lower rated firms. Leventis et al., (2014) arrive at a similar conclusion to that of He (2013) with Greek data. They state that higher credit ratings enhance the informativeness of earnings releases. However, in my opinion, three key reasons render the study's findings insignificant and thus they do not interfere with my hypothesis. Firstly, the sample size is very small and

extremely skewed towards higher rated firms. Secondly, the credit rating data are not based on ratings assigned by S&P, Moody's or Fitch. Finally, the earnings surprise metric used (annual change in earnings) is not very robust; analyst forecasts could not be used as benchmarks due to their limited availability for Greek firms.

The evidence provided by several empirical papers is consistent with my first hypothesis. To begin with, higher ratings are positively related to corporate transparency and thus a higher rating incorporates more actual information (De Boskey and Gillett, 2013). Jiang (2008) and Easton et al. (2009) show that bond prices and yields of speculative-grade firms are much more sensitive to earnings news compared with investment-grade bonds. Callen et al., (2009) and Greatrex (2009) document the same relationship in the CDS market. In addition, Greatrex (2009) analyzes the stock market reaction around earnings announcements and finds that for both positive and negative earnings news, the cumulative abnormal returns are larger in absolute value when moving from higher rated firms to those with lower ratings. Empirical results also demonstrate that stock prices of higher rated firms reflect a greater amount of future earnings (Chou, 2013). Therefore, less future earnings are incorporated into the stock price of lower rated firms meaning that current earnings have a larger impact on total firm value. As a result, earnings releases should have greater information content for firms with lower ratings because the announcements drive the value of the firm. All things considered, the evidence and theoretical considerations imply that credit ratings have a significant informational role in earnings announcements and thus the first hypothesis is the following:

> **H1**: *The credit rating of a firm affects the information content of its earnings announcement in stock markets.*
>
> > **H1a**: *The share price reaction to earnings releases increases when the firm's rating is lower, ceteris paribus.*
> >
> > **H1b**: *The volume reaction to earnings releases increases when the firm's rating is lower, ceteris paribus.*

In other words, my first hypothesis argues that lower credit ratings result in more pronounced market reactions to earnings announcements controlling for the earnings surprise, among other things. For good earnings news, lower rated firms are expected to be associated with more positive share price and trading volume reactions. In the event of bad earnings news,

lower rated companies are expected to be associated with more negative share price reactions as well as more positive trading volume reactions.

The second hypothesis combines the first hypothesis and the asymmetric market reaction to good and bad news. The first hypothesis states that, in general, lower rated companies will experience a greater reaction to earnings news regardless of whether the reported figures are above or below expectations. In addition, I predict that credit rating levels will have a greater impact on the informational value of earnings news when the firm reports a negative earnings surprise compared with a positive surprise. Numerically, this means that a lower credit rating should be associated with a more pronounced price and/or volume reaction after an earnings disappointment.

If investors value the information content of credit ratings, lower rated firms should have a pronounced reaction to bad news. As better rated firms have their long-term health certified by a rating agency and their stock prices incorporate more future earnings, current earnings disclosures have less implications on firm value. Positive earnings surprises will have a relatively small impact on market expectations as more of these expectations are already reflected in the current value of the firm. Likewise, negative earnings surprises should yield only a relatively small amount of information because rating agencies have provided a positive signal regarding the future of the firm. On the other hand, I hypothesize that the reactions for lower rated firms are of more asymmetric nature. While positive news may be associated with some amount of hesitation due to the long-term uncertainty surrounding the firm, bad news should have a significant impact and deflate expectations in the stock market.

An asymmetric reaction among investors implies that the market punishes underachievers more than it rewards overachievers. Many studies confirm this notion that bad news convey more information than good news. For instance, the majority of stock market studies document a significant stock price reaction to downgrades but not to upgrades (see, e.g., Holthausen and Leftwich, 1986; Goh and Ederington, 1993; Norden and Weber, 2004). Many papers also indicate that negative earnings surprises have greater informational value compared with positive ones in the stock market (see, e.g., Conrad et al., 2002; Skinner and Sloan, 2002; Heflin et al., 2003). Kothari et al. (2009) argue that the eventual release of bad news is associated with a greater amount of information as managers tend to withhold bad news. Consequently, if negative news convey more information, higher ratings are even more effective in mitigating information asymmetry issues. Furthermore, Kothari et al. predict that,

due to career concerns, managers have greater incentives to delay the release of bad news when the firm is in financial distress implying that negative news from lower rated firms convey an even greater amount of information. Overall, these considerations allow me to formulate my second hypothesis:

H2: *Credit ratings have a more significant impact on the information content of earnings releases when the reported earnings are below expectations.*

H2a: *Lower credit ratings have a more pronounced impact on stock prices when earnings are below expectations, ceteris paribus.*

H2b: *Lower credit ratings have a more pronounced impact on volumes when earnings are below expectations, ceteris paribus.*

Next, I turn my focus to the influence of credit rating changes preceding the earnings report. Dichev and Piotroski (2001) show that in the announcement window around the first quarterly earnings release following downgrades, firms' stocks experience significant negative abnormal performance. Upgrades, meanwhile, do not have a meaningful impact. This evidence is in line with the notion that downgrades increase information asymmetry in the market. The prediction is that, holding all other things equal including the rating level at the time of the earnings release, a rating downgrade after the previous earnings announcement will result in more uncertainty and information asymmetry around the firm. For example, a firm with a BB rating for many years should be associated with less informational issues in the market place compared with a firm that was downgraded to BB in the previous month as investors might fear a further downgrade. The implication is that a more stable credit rating reduces information asymmetry. Therefore, I hypothesize that the informativeness of earnings announcements will increase for firms with preceding downgrades. The third hypothesis is formalized as:

H3: *The information content of earnings disclosures is greater when a credit rating downgrade occurs after the previous earnings announcement.*

H3a: *The stock price response to an earnings release is larger when the announcement is preceded by a rating downgrade, ceteris paribus.*

H3b: *The volume reaction to an earnings release is larger when the announcement is preceded by a rating downgrade, ceteris paribus.*

3.2. Additional hypotheses

As I propose in my previous hypotheses, better credit ratings reduce information asymmetry. Empirical evidence from equity markets is also consistent with this theory (see, e.g., Liu and Malatesta, 2006; Odders-White and Ready, 2006; Chou and Cheng, 2012). If this is the case, one would expect the level of the credit rating to have a greater impact on the information content of earnings announcements for firms that face more severe information asymmetry problems (e.g., firms with a lower size, more volatile stock, less tangible assets, larger research and development expenses, higher leverage, etc.). Chou and Cheng (2012) demonstrate that the existence of a credit rating reduces diversification discounts especially when firms are surrounded with information asymmetry. I will take this finding one step further. In addition to higher credit ratings mitigating information asymmetry around earnings announcements (i.e., higher ratings decrease the information content of earnings news) as predicted earlier, I hypothesize that this effect is more pronounced among firms associated with a greater amount of information asymmetry. Thus I arrive at my fourth hypothesis:

H4: *Credit ratings have a more significant impact on the information content of earnings releases when more information asymmetry is present.*

H4a: *Lower credit ratings have an even larger impact on stock prices when earnings are reported by firms characterized by more information asymmetry, ceteris paribus.*

H4b: *Lower credit ratings have an even larger impact on volumes when earnings are reported by firms characterized by more information asymmetry, ceteris paribus.*

The final hypothesis of this study takes into account the overall information environment around earnings announcements. In October 2000, Regulation Fair Disclosure was implemented. Regulation Fair Disclosure prohibits selective and non-public disclosures to privileged parties such as security analysts and institutional investors. However, rating agencies were initially granted an exemption and would continue to have access to non-public information about firms. Empirical evidence indicates that the information advantage of rating

agencies increased after Reg FD as the information content of rating upgrades and downgrades increased in equity markets (Jorion et al., 2005). In September 2010, as a result of the Dodd-Frank Act, the Securities and Exchange Commission removed this exemption from credit rating agencies. Nevertheless, it is debatable whether this has actually decreased the information advantage of rating agencies in any way as other types of exemptions could likely maintain rating agencies' access to non-public information.[6] If indeed the informational value of ratings increased during the period when rating agencies had an exemption from Regulation FD, then one could predict that this had an impact on the informational effects of credit ratings around earnings announcements as well during that same period. Therefore, I hypothesize that the ability of higher credit ratings to mitigate information asymmetry around earnings announcements is even greater during this period and lower rated firms' announcements should convey a larger amount of information. Due to the implementation of Regulation FD, I predict that investors give more weight to the signal provided by ratings and therefore, lower ratings are associated with even more uncertainty and information asymmetry. The fifth and final hypothesis is as follows:

H5: *Credit ratings have a larger impact on the information content of earnings releases during the period when rating agencies have an exemption from Regulation Fair Disclosure.*

H5a: *Lower credit ratings have a more pronounced impact on stock prices when earnings are reported during the period when rating agencies have an exemption from Reg FD, ceteris paribus.*

H5b: *Lower credit ratings have a more pronounced impact on volumes when earnings are reported during the period when rating agencies have an exemption from Reg FD, ceteris paribus.*

All in all, testing these five hypotheses will provide insights into how credit ratings affect the information content of earnings announcements in the stock market, both in terms of a stock price and volume reaction. Moreover, they will help determine if the magnitude and significance of the effect depend on the nature of the earnings surprise and the information environment surrounding the announcement.

[6] See, e.g., http://www.skadden.com/insights/sec-issues-final-rule-release-removal-regulation-fd-exemption-credit-rating-agencies, http://ftalphaville.ft.com//2010/07/19/290701/fitch-to-debt-issuers-dont-cite-us-thank-you-very-much, http://www.kirkland.com/siteFiles/Publications/Alert_102810.pdf; retrieved April 2, 2015.

4. Data and methodology

Now that the hypotheses have been presented, this section will provide an overview of the data and methods to be used in this study. I will first describe how the sample of quarterly earnings announcements was constructed. Next, I will go through the methods which will be employed to test the hypotheses and address the research questions as well as provide the exact definitions for the different variables to be utilized in the empirical analysis. Finally, the descriptive statistics of the sample will be presented.

4.1. Sample formation

This empirical study is based on data gathered from three sources: S&P Capital IQ's Compustat (Compustat), Institutional Brokers' Estimate System (I/B/E/S) and Center for Research in Security Prices (CRSP). Together, these databases provide information regarding firms' credit ratings, earnings announcement dates, reported earnings, analysts' earnings forecasts, stock price and volume data as well as firm fundamentals. The final sample comprises earnings announcements made by rated firms listed in the US in the period from February 1986 to December 2013.

The sample formation begins by extracting an initial sample of firms with an S&P Long-Term Domestic Issuer Credit Rating in the period 1986-2013 from Compustat's monthly update file for North America. Compustat began reporting these ratings from the second quarter of 1985 onwards and so my sample begins in 1986 in order to have full-year data. After removing observations without suitable rating information and/or unique firm identifiers, this initial sample yields 526,726 monthly ratings for 4,775 unique firms.

Next, using the unique CUSIP firm identifiers from the above Compustat file, data related to earnings announcements and analyst estimates is obtained from the I/B/E/S summary history file for the forecast period from 1986 to 2013. Variables of interest include the earnings announcement date, actual earnings per share (EPS), mean consensus analyst estimate, number of estimates and standard deviation of earnings forecasts. Only the latest monthly forecast data before each earnings announcement is considered; this ensures that, in general, the monthly summary forecast data is no more than 30 days old. After deleting data with missing announcement dates and/or actual EPS, the I/B/E/S sample provides data for 124,449 quarterly earnings announcements and 3,161 unique firms.

With the same unique CUSIPs which were used to obtain the I/B/E/S report, I extract daily NYSE, AMEX, and NASDAQ stock market data for these firms from CRSP for the period Jan 1985 – Jan 2014. This sample is from a longer period as more data is required for abnormal return and volume calculations (explained later). I obtain information regarding daily stock prices, holding period returns, share volume, number of shares outstanding as well as value-weighted market index returns from CRSP. The daily stock market information from CRSP yields data for 3,147 unique firms.

Now, I am able to combine the I/B/E/S and CRSP samples. For each earnings announcement date identified by I/B/E/S, I create abnormal return, abnormal volume and stock volatility variables based on CRSP data. The combined sample represents 115,988 firm-quarter observations (quarterly earnings announcement dates) and 3,039 unique firms.

Finally, the above observations can be matched with the initial credit rating sample from Compustat to construct the full sample for this study. After matching unique CUSIPs and dates, credit rating data (rating and possible upgrade/downgrade before announcement) for each observation at the beginning of the earnings announcement month are obtained. Earnings announcements without rating information are removed from the dataset and the final full sample consists of 81,990 firm-quarter observations and 2,765 unique firms.

In addition, more detailed samples with information regarding firm fundamentals and other characteristics are formed especially for the purposes of regression analysis. This data for each unique firm from the above final full sample is extracted from Compustat's quarterly fundamental file from January 1983 to December 2013. This longer period is required to estimate some of the variables relevant for this study. Compustat provides data for firm characteristics such as industry, size, leverage, profitability, earnings predictability and asset tangibility. The final detailed sample has 62,788 observations for 2,324 unique firms. When preceding rating changes are taken into account the sample size is 62,495 observations and 2,313 unique firms.

The entire sample selection process is summarized in Table 2. All continuous variables are winsorized at the 1% and 99% level to mitigate the influence of extreme observations.

Table 2 – Sample selection process

The table below shows the different stages of the sample selection process as well as the sources of the data. The number of observations and unique firms associated with each stage are also presented.

Criteria	Number of unique firms	Number of observations
Initial monthly rating sample identified from Compustat for years 1986 to 2013	4,775	526,726
Quarterly earnings announcement history and analyst information obtained for above unique firms from I/B/E/S for forecast period 1986 - 2013	3,161	124,449
I/B/E/S sample combined with stock market data requirements from CRSP	3,039	115,988
Above dataset matched with initial credit rating information from Compustat to contruct final full sample	2,765	81,990
FINAL FULL SAMPLE	2,765	81,990
Additional firm characteristics obtained from Compustat to arrive at final detailed sample	2,313 / 2,324	62,495 / 62,788
FINAL DETAILED SAMPLE	2,313 / 2,324	62,495 / 62,788

4.2. Event study methodology

To assess the impact of credit ratings on the information content of earnings announcements, the market reactions to earnings releases made by firms with different ratings need to be measured. Furthermore, to isolate the effect of credit ratings, the reactions have to be controlled for other variables such as the nature of the earnings surprise, industry, size and other firm characteristics. This is all done with traditional event study methodology employing both univariate and multivariate analysis. As MacKinlay (1997) states, the procedures for an event study are: (1) Identify the precise date of the event of interest. (2) Define the event window around the event. (3) Measure abnormal reactions during the event window. (4) Additionally, run a cross-sectional regression of the abnormal reactions on characteristics of interest to determine the source of the reactions. (5) Present empirical results and arrive at conclusions.

4.2.1. Measurement of information content

The stock market's abnormal reaction to earnings announcements, or the information content, is measured both in terms of abnormal return and abnormal trading volume. Both of these

metrics are commonly used in literature to quantify the information content of earnings disclosures (see, e.g., Bamber, 1986; Chen et al., 2005; Landsman et al., 2012; Crabtree and Kubick, 2014). Abnormal returns and volumes are measured for each day during an event window, that is, a chosen amount of days surrounding each earnings announcement date. More precisely, the event date for an earnings release (t=0), provided by I/B/ES, is the day on which actual earnings figures are announced. As shown in Figure 1, the event window includes the 10 days preceding the earnings announcement date and the 10 days following it for a total of 21 trading days. Consequently, following Aharony and Swary (1980) and Landsman et al. (2012), the event window is the interval [-10, +10] where zero is the earnings announcement date.

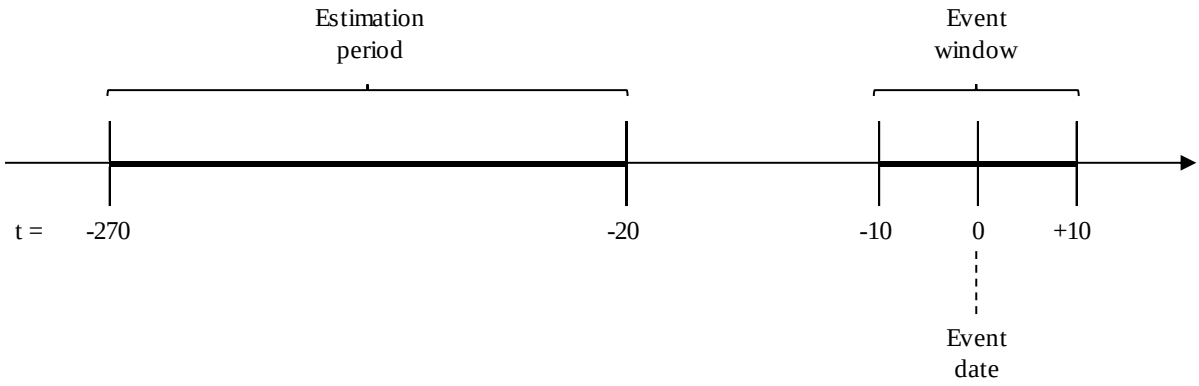
In order to detect abnormal reactions around the event date, expected or normal stock return and volume reactions need to be estimated. As far as stock returns are concerned, the standard method for this in stock market event studies is to employ the market model which relates the return of any security to the relevant market portfolio return. Thus the following market model, based on the estimation period of 250 trading days preceding the event window, is used to estimate the expected or normal return of a stock for each day in the event window:

$$r_{it} = \alpha_i + \beta_i r_{mt} + \varepsilon_{it} \tag{1}$$

where r_{it} is the daily stock return adjusted for splits and dividends for firm *i* on day *t* during the estimation period, r_{mt} is the corresponding day *t* return on the CRSP value-weighted index and ε_{it} is the zero mean disturbance term. α_i and β_i are the ordinary least squares parameters of the market model for each event observation and will help determine the expected return for each event window day. Following MacKinlay (1997) and Greatrex (2009), the market model is calculated over the estimation period [-270, -21]. Chen et al. (2005) also use the preceding 250 trading days to estimate the model. A time gap between the end of the estimation period and the start of the event window, from day -20 to day -11, is imposed so that unusual stock market data, due to possible information leakage, does not distort model estimation. For an earnings announcement to be included in the sample, I require the event to have return history for the entire estimation period in order to calculate the market model. The CRSP value-weighted index is a popular choice to act as a proxy for the market portfolio and has been used in many other studies (see, e.g., Conrad et al., 2002 Liu and Malatesta, 2006; Kothari et al., 2009).

Figure 1 – Event study timeline

This figure provides a visual presentation of the event windows and estimation periods used in this study. Abnormal market reactions are obtained from the event window while the estimation window is used to estimate a normal daily reaction, both return and volume wise, in the stock market.



Abnormal returns for each day in the event window [-10, +10] can then be calculated as:

$$AR_{it} = r_{it} - (\alpha_i + \beta_i r_{mt}) \tag{2}$$

where AR_{it} is the abnormal stock return for firm *i* on day *t* during the event window, r_{it} is the daily stock return adjusted for splits and dividends for firm *i* on day *t* during the event window and r_{mt} is the corresponding day *t* return on the CRSP value-weighted index. α_i and β_i are the parameters of the market model estimated above in Equation (1).

For the abnormal trading volume metric, the expected or normal daily volume benchmark is based on the average percentage trading volume over the estimation period. This is similar to the approach used by Landsman and Maydew (2002), Doyle and Magilke (2009) and Landsman et al. (2012). The expected daily trading volume of each stock for each day in the event window is as follows:

$$\overline{TV_i} = \frac{\sum TV_{it}}{250} = \left(\sum_{t=-21}^{-270} \frac{V_{it}}{NSO_{it}} \right) \Big/ 250 \tag{3}$$

where $\overline{TV_i}$ is the average daily percentage trading volume for firm *i* during the estimation period of 250 trading days preceding the earnings announcement, TV_{it} is percentage trading volume for firm *i* on day *t* during the estimation period, V_{it} is the number of firm *i*'s shares traded on day *t* during the estimation period and NSO_{it} is the number of shares outstanding of firm *i* on day *t* during the estimation window. As is the case with the expected stock return benchmark, the expected trading volume metric is also estimated over the same estimation

period [-271, -21] and the event is required to have volume history for the entire estimation window in order to be included in the sample.

Abnormal trading volumes for each day in the event window [-10, +10] can then be calculated as:

$$ATV_{it} = TV_{it} - \overline{TV}_i = \frac{V_{it}}{NSO_{it}} - \overline{TV}_i \quad (4)$$

where ATV_{it} is the abnormal trading volume for firm *i* on day *t* during the event window, TV_{it} is percentage trading volume for firm *i* on day *t* during the event window, V_{it} is the number of firm *i*'s shares traded on day *t* during the event period, NSO_{it} is the number of shares outstanding of firm *i* on day *t* during the event window and $\overline{TV}_i$ is the expected or normal daily percentage trading volume for firm *i* as estimated in Equation (3).

In order to measure the information content of earnings announcements more accurately, the announcement effects are captured in shorter windows. Following Goh and Ederington (1993), I divide the event window into different windows: (1) pre-announcement: [-10, -2], (2) announcement: [-1, +1] and [-2, +2], and (3) post-announcement: [+2, +10]. In this thesis, the focus will be on the announcement window effects as the market reaction to earnings disclosures in efficient financial markets should occur over a short period. The three-day period [-1, +1] is the standard window in event studies to capture announcement effects and it controls for potential uncertainty regarding the exact timing of the event. The five-day announcement window [-2, +2] is also often used in related literature (see, e.g., Heflin et al., 2003; Chen et al., 2005; Kothari et al., 2009). This slightly longer window takes into account, to some extent, possible information leakage and/or a delayed reaction to earnings news.

As a result, the information content of earnings releases, both stock return and volume wise, is measured by aggregating the daily abnormal reactions across the announcement windows:

$$CAR_i(-1,+1) = \sum_{t=-1}^{+1} AR_{it} \quad (5a)$$

$$CAR_i(-2,+2) = \sum_{t=-2}^{+2} AR_{it} \quad (5b)$$

$$CATV_i(-1,+1) = \sum_{t=-1}^{+1} ATV_{it} \quad (6a)$$

$$CATV_i(-2,+2) = \sum_{t=-2}^{+2} ATV_{it} \quad (6b)$$

where CAR_i is the cumulative abnormal return for firm *i* around an earnings announcement date measured across windows [-1, +1] and [-2, +2], AR_{it} is as defined in Equation (2), $CATV_i$ is the cumulative abnormal trading volume for firm *i* around an earnings announcement calculated across windows [-1, +1] and [-2, +2], and ATV_{it} is as specified in Equation (4). These four cumulative abnormal reactions will be the dependent variables of this study.

4.2.2. Univariate analysis

The univariate results will present the mean CARs and CATVs around quarterly earnings announcements for firms with different credit ratings. Two-tailed t-statistics are used to test whether mean CARs and CATVs are significantly different from zero. The mean CAR and CATV for firms belonging to a specific rating category are as follows:

$$\overline{CAR}(t_1,t_2) = \frac{\sum_{i=1}^{N} CAR_i(t_1,t_2)}{N} \quad (7)$$

$$\overline{CATV}(t_1,t_2) = \frac{\sum_{i=1}^{N} CATV_i(t_1,t_2)}{N} \quad (8)$$

where $\overline{CAR_i}$ and $\overline{CATV_i}$ are the mean cumulative abnormal returns and trading volumes around earnings disclosures measured across windows [-1, +1] and [-2, +2] for firms belonging to the same rating category and N is the amount of observations belonging to the same rating category.

The rating categories are specified in two ways: by the actual credit rating and by rating class. The first categorization assigns each observation its actual rating such as BBB+ or BB- and thus it considers the possible plus and minus signs associated with a rating. For statistical purposes, i.e., to increase the number of observations for a rating category, AAA and AA+ are combined into one category; the same is done for ratings CCC+, CCC, CCC-, CC, SD (selective default) and D. This adjustment is justified theoretically as the former combines

very low risk firms and the latter brings together firms which are all either in default or very near it. The complete list of ratings based on the first categorization consists of 16 rating categories: AAA/AA+, AA, AA-, A+, A, A-, BBB+, BBB, BBB-, BB+, BB, BB-, B+, B, B- and CCC+ − D. The second categorization consists of six broader rating classes: AAA/AA, A, BBB, BB, B and CCC − D. In this case, the plus and minus signs associated with credit ratings are disregarded and observations are given a rating based on the broader rating class (e.g., BBB+ → BBB).

In addition to being grouped by credit ratings as explained above, the nature of the earnings surprise is also taken into account in the univariate analysis of abnormal reactions. I divide the observations into a "good news" and "bad news" sample following the approach of Jiang (2008). Earnings announcements are categorized as good news if the reported earnings per share meets or beats the latest mean consensus analyst estimate and bad news if the consensus estimate is missed. By taking into account the rating and the earnings surprise, I am able to perform a univariate analysis related to the first two hypotheses and examine if ratings impact the price and volume reactions to earnings releases and whether this effect differs for good and bad news.

In order to investigate the remaining hypotheses, the univariate analyses are based on additional sample partitions; this enables comparisons across different subsamples regarding the impact that ratings have on abnormal reactions. For hypothesis 3, I analyze the impact of preceding rating changes by partitioning the observations into three subsamples: no preceding rating change, preceding downgrade and preceding upgrade. An observation has a preceding downgrade (upgrade) if its rating has been downgraded (upgraded) in the last three months before the earnings announcement date.[7]

In order to examine the impact of credit ratings on the information content of earnings releases when more information asymmetry is present (hypothesis 4), the earnings announcement observations are partitioned into low and high information asymmetry subsamples based on three information asymmetry proxies. The information asymmetry proxies used in this thesis are stock volatility, asset tangibility and market-to-book ratio. Firms with a more volatile stock are more risky and thus investors have less visibility on future performance. Low asset tangibility firms are more likely to have greater amounts of

[7] The influence of the magnitude of the rating change (i.e., how many notches) is not studied as the winsorized notch change variables have a minimum value of -1 and a maximum value of +1.

intangible assets whose benefits are better understood by management only. Firms with a higher market-to-book ratio are likely to be growth firms with more uncertain prospects. Stock volatility for each observation is calculated as the standard deviation of daily stock returns over the event study estimation period [-270, -21]. Asset tangibility is the firm observation's ratio of property, plant and equipment to total assets at the end of the previous fiscal quarter[8]. The market-to-book ratio is measured as market value of equity to book value of equity at the end of the previous fiscal quarter. Many previous studies have also used these variables as proxies for information asymmetry (see, e.g., Jorion et al., 2005; Liu and Malatesta, 2006; Kothari et al., 2009; Tang, 2009). I follow the method of Chou and Cheng (2012) and use median value of each information asymmetry proxy to split the sample into two subsamples.

Finally, the full sample is partitioned into three subsamples based on the time period of the earnings announcement in order to study whether ratings had a stronger impact when rating agencies had an exemption from Regulation Fair Disclosure. The focus will be on the period from November 2000 to August 2010 as this was the period when rating agencies were given the exemption from Regulation Fair Disclosure. Comparisons will be made with the period before November 2000 (i.e., February 1986 to October 2000). In addition, I will examine whether the impact of ratings on the reaction to earnings announcements has changed from September 2010 onwards, that is, after the Reg FD exemption was removed.

4.2.3. Variable definitions

Additional multivariate regression analyses will also control for other variables identified by prior research as potentially affecting the price and trading volume reactions to earnings announcements. These include independent variables related to earnings and level of information asymmetry surrounding the firm. In addition, I will take into account variables known to be correlated with credit ratings in order to test whether ratings convey additional information.

Table 3 presents a summary of all the variables to be used in the analyses of this thesis and their definitions. Unexpected earnings, or earnings surprise, is the main explanatory variable

[8] The previous fiscal quarter's financial figures are the last figures available to investors before the earnings announcement for the latest fiscal quarter.

Table 3 – Variable definitions

This table presents all the variables to be used in the analyses of this study as well as their definitions. Information regarding the source of each variable is also included in the table.

Variable	Definition	Source
	Panel A: Dependent variables	
CAR (-1,+1)	Three-day cumulative abnormal return around an earnings announcement for an observation. See section 4.2.1.	CRSP & I/B/E/S
CAR (-2,+2)	Five-day cumulative abnormal return around an earnings announcement date. See section 4.2.1. for calculation.	CRSP & I/B/E/S
CATV (-1,+1)	Three-day cumulative abnormal trading volume around an earnings announcement date. See section 4.2.1. for calculation.	CRSP & I/B/E/S
CATV (-2,+2)	Five-day cumulative abnormal trading volume around an earnings announcement date. See section 4.2.1. for calculation.	CRSP & I/B/E/S
	Panel B: Independent variables	
Earnings variables:		
UE	Unexpected earnings for an observation, defined as announced earnings per share minus mean consensus analyst estimate (scaled by stock price at the beginning of announcement month).	Compustat & I/B/E/S
BAD	Indicator variable that equals 1 when actual earnings are below mean consensus analyst estimate, zero otherwise.	I/B/ES
Linear rating variable:		
RATING	Cardinal variable for credit ratings; ratings converted into a number using a 22-point scale (AAA=1, D=22). The rating associated with each earnings announcement date equals the rating of the firm at the beginning of the announcement month.	Compustat
Rating dummies:		
AAA/AA+	Indicator variable that equals 1 if observation's rating is AAA or AA+, zero otherwise.	Compustat
AA	Indicator variable that equals 1 if rating is AA, zero otherwise.	Compustat
AA-	Indicator variable that equals 1 if rating is AA-, zero otherwise.	Compustat
A+	Indicator variable that equals 1 if rating is A+, zero otherwise.	Compustat
A	Indicator variable that equals 1 if rating is A, zero otherwise.	Compustat
A-	Indicator variable that equals 1 if rating is A-, zero otherwise.	Compustat
BBB+	Indicator variable that equals 1 if rating is BBB+, zero otherwise.	Compustat
BBB	Indicator variable that equals 1 if rating is BBB, zero otherwise.	Compustat
BBB-	Indicator variable that equals 1 if rating is BBB-, zero otherwise.	Compustat
BB+	Indicator variable that equals 1 if rating is BB+, zero otherwise.	Compustat
BB	Indicator variable that equals 1 if rating is BB, zero otherwise.	Compustat
BB-	Indicator variable that equals 1 if rating is BB-, zero otherwise.	Compustat
B+	Indicator variable that equals 1 if rating is B+, zero otherwise.	Compustat
B	Indicator variable that equals 1 if rating is B, zero otherwise.	Compustat
B-	Indicator variable that equals 1 if rating is B-, zero otherwise.	Compustat

(Continued)

Table 3 – *Continued*

Variable	Definition	Source
	Panel B: Independent variables	
CCC+ − D	Indicator variable that equals 1 if rating is CCC+, CCC, CCC-, CC, SD or D, zero otherwise.	Compustat
Rating class dummies:		
AAA/AA	Indicator variable that equals 1 if rating is AAA, AA+, AA or AA-, zero otherwise.	Compustat
A	Indicator variable that equals 1 if rating is A+, A or A-, zero otherwise.	Compustat
BBB	Indicator variable that equals 1 if rating is BBB+, BBB or BBB-, zero otherwise.	Compustat
BB	Indicator variable that equals 1 if rating is BB+, BB or BB-, zero otherwise.	Compustat
B	Indicator variable that equals 1 if rating is B+, B or B-, zero otherwise.	Compustat
CCC − D	Indicator variable that equals 1 if rating is CCC+, CCC, CCC-, CC, SD or D, zero otherwise.	Compustat
Rating change variables:		
DOWNGRADE	Indicator variable that equals 1 if rating has been downgraded in the last three months before the earnings announcement date, zero otherwise.	Compustat
UPGRADE	Indicator variable that equals 1 if rating has been upgraded in the last three months before the earnings announcement date, zero otherwise.	Compustat
High information asymmetry dummies:		
IA_VOL	Indicator variable that equals 1 if observation's stock volatility is above sample median, zero otherwise.	CRSP
IA_TAN	Indicator variable that equals 1 if observation's asset tangibility is below sample median, zero otherwise.	Compustat
IA_MB	Indicator variable that equals 1 if observation's market-to-book ratio is above sample median, zero otherwise.	Compustat
Reg FD dummies:		
FD	Indicator variable that equals 1 if earnings announcement is during period November 2000 - August 2010, zero otherwise.	I/B/E/S
POSTFD	Indicator variable that equals 1 if earnings announcement takes place after August 2010, zero otherwise.	I/B/E/S
Control variables:		
ANALYST#	Natural logarithm of number of analysts following a firm.	I/B/E/S
SIZE	Natural logarithm of observation's market value of equity (in millions of dollars) at the end of the previous fiscal quarter.	Compustat

(Continued)

Table 3 – *Continued*

Variable	Definition	Source
	Panel B: Independent variables	
TIMELINESS	Difference in calendar days between the earnings release date and the end date for the reported fiscal period.	I/B/E/S
FOREDISP	Analyst forecast dispersion, calculated as the standard deviation of earnings forecasts scaled by stock price at the beginning of announcement month.	Compustat & I/B/E/S
VOL	Stock volatility, calculated as the standard deviation of daily stock returns over the event study estimation period [-270, -21].	CRSP
LEV	Leverage, measured as long-term debt scaled by total assets (based on previous fiscal quarter's figures).	Compustat
EARNVOL	Earnings volatility, calculated as the standard deviation of the previous 12 earnings per share figures (scaled by the average of those earnings per share figures).	Compustat
PROFIT	Profitability, defined as operating income before depreciation & amortization scaled by total assets (based on previous fiscal quarter's figures).	Compustat
TAN	Asset tangibility, calculated as ratio of property, plant & equipment to total assets (based on previous fiscal quarter's figures).	Compustat
MB	Market-to-book ratio, measured as market value of equity to book value of equity (based on previous fiscal quarter's figures).	Compustat
Industry variables:		
IND10	Indicator variable that equals 1 if firm's industry sector is Energy (GICS sector classification = 10), zero otherwise.	Compustat
IND15	Indicator variable that equals 1 if firm's industry sector is Materials (GICS sector classification = 15), zero otherwise.	Compustat
IND20	Indicator variable that equals 1 if firm's industry sector is Industrials (GICS sector classification = 20), zero otherwise.	Compustat
IND25	Indicator variable that equals 1 if firm's industry sector is Consumer Discretionary (GICS sector classification = 25), zero otherwise.	Compustat
IND30	Indicator variable that equals 1 if firm's industry sector is Consumer Staples (GICS sector classification = 30), zero otherwise.	Compustat
IND35	Indicator variable that equals 1 if firm's industry sector is Health Care (GICS sector classification = 35), zero otherwise.	Compustat
IND40	Indicator variable that equals 1 if firm's industry sector is Financials (GICS sector classification = 40), zero otherwise.	Compustat
IND45	Indicator variable that equals 1 if firm's industry sector is Information Technology (GICS sector classification = 45), zero otherwise.	Compustat

(Continued)

Table 3 – *Continued*

Variable	Definition	Source
	Panel B: Independent variables	
IND50	Indicator variable that equals 1 if firm's industry sector is Telecommunication Services (GICS sector classification = 50), zero otherwise.	Compustat
IND55	Indicator variable that equals 1 if firm's industry sector is Utilities (GICS sector classification = 55), zero otherwise.	Compustat
Year variables:		
YEARyyyy	Indicator variable that equals 1 if earnings announcement date is in year yyyy (yyyy = 1986, 1987,…, 2012, 2013), zero otherwise.	I/B/E/S

in earnings announcement studies and its definition in this thesis follows other papers as well (see, e.g., Conrad et al., 2002; Skinner and Sloan, 2002; Landsman et al., 2012). The variable of most interest, as far as this study is concerned, is the variable that accounts for an observation's credit rating. The ratings are based on S&P's Long-Term Domestic Issuer Credit Rating. I define three alternative variable specifications for ratings. First, ratings are converted into a cardinal variable measured on 22-point scale (see, e.g., Hand et al., 1992; Jorion and Zhang, 2007; Chou, 2013). Second, each rating is assigned a dummy variable to allow for more flexible non-linear effects. And third, a dummy variable is assigned for each broader rating class (see, e.g., Ederington et al., 1987; Jorion and Zhang, 2007; Jung et al., 2013). Prior research also identifies other variables that impact the information content of earnings releases such as analyst following, firm size, timeliness of the announcement, analyst forecast dispersion, stock volatility, leverage, earnings volatility, profitability, asset tangibility and the market-to-book ratio of the firm (see, e.g., Landsman and Maydew, 2002; Chen et al., 2005; Landsman et al., 2012; He, 2013; Crabtree and Kubick, 2014).[9] These variables are referred to as "control variables" in this study. Many of these variables act as proxies for information asymmetry or general uncertainty surrounding a firm and thus potentially affect the informativeness of earnings disclosures. In addition, lower leverage, larger firm size, lower earnings volatility and higher profitability should all be correlated with better credit ratings (see, e.g., Crabtree and Maher, 2005; Yi and Mullineaux, 2006; An and Chan, 2008; Jiang, 2008). Controlling for all of these factors enables me to examine whether ratings have additional informational impact in the setting of earnings announcements. Finally, variables for industry and year effects are also incorporated in the analyses.

[9] The following independent variables were also tested but did not improve the fit of regression models: interest coverage, operating cash flow volatility, R&D intensity, recession year and fiscal Q4 announcement.

4.2.4. Multivariate cross-sectional regression analysis

The second methodology of this study is to run cross-sectional regressions of the abnormal reactions on characteristics of interest to determine the source of the reactions. While univariate analysis shows the correlation of credit ratings with the abnormal reactions to earnings announcements, the regression equations will help determine whether credit ratings summarize existing market information or if they convey additional valuable information. This is done by taking into account other variables (presented in the previous section) which might have an effect on the stock price and volume reactions to earnings releases. Multivariate cross-sectional regression models are the standard approach when analyzing the different sources of abnormal returns and volumes (see, e.g., MacKinlay, 1997; Skinner and Sloan, 2002; Chen et al., 2005; Landsman et al., 2012).

To test the hypotheses, I estimate three different regression equations for each research question: a linear rating model, a rating dummy model and a rating class dummy model. These models differ with regard to the nature of the rating variable. Table 3 provides definitions for all the variables used in the regression equations.

The linear rating specification of the regression model for the first and second hypothesis (i.e., how ratings affect the information content of earnings releases and whether this impact is different based on the sign of unexpected earnings) is the following:

$$
\begin{aligned}
&CAR_i \ (or\ CATV_i) \\
&= \beta_0 + \beta_1 UE_i + \beta_2 BAD_i + \beta_3 (UE * BAD)_i + \beta_4 RATING_i \\
&+ \beta_5 (RATING * BAD)_i + \sum_{k=6}^{15} \beta_k Controls_i + \sum_{k=16}^{25} \beta_k (Controls * BAD)_i \\
&+ \sum_{k=26}^{34} \beta_k Industries_i + \sum_{k=35}^{43} \beta_k (Industries * BAD)_i + \sum_{k=44}^{70} \beta_k Years_i
\end{aligned}
\tag{9}
$$

where CAR_i and $CATV_i$ are the dependent variables (cumulative abnormal return and cumulative abnormal trading volume, respectively) measuring information content over the two announcement windows [-1, +1] and [-2, +2] for observation i. The independent variables UE_i, BAD_i and $RATING_i$ are as described in Table 3. $Controls_i$ consist of the ten control variables listed in Table 3. $Industries_i$ represent the industry variables presented in Table 3. $Years_i$ are the year variables (year fixed effects) as defined in Table 3. β_0 is the constant.

Coefficients β_1-β_{70} capture the effect that each explanatory variable has on the dependent variable. The reference (omitted) categories are good earnings news (announcement meets or beats mean consensus analyst estimate), Consumer Discretionary industry sector and year 2013. Every independent variable, excluding year effects, also has an interaction term with the dummy variable for bad earnings news to allow for the coefficient to be different for good and bad earnings surprises.[10] As a result, the total effect of control variables is made up of their main effects and interactions with the bad news dummy variable. Likewise, industry main effects and interactions constitute the industry fixed effects.

The rating dummy specification for the first two hypotheses is as follows:

$$
\begin{aligned}
&CAR_i \ (or\ CATV_i) \\
&= \beta_0 + \beta_1 UE_i + \beta_2 BAD_i + \beta_3 (UE * BAD)_i + \sum_{k=4}^{18} \beta_k RatingDummies_i \\
&+ \sum_{k=19}^{33} \beta_k (RatingDummies * BAD)_i + \sum_{k=34}^{43} \beta_k Controls_i \\
&+ \sum_{k=44}^{53} \beta_k (Controls * BAD)_i + \sum_{k=54}^{62} \beta_k Industries_i \\
&+ \sum_{k=63}^{71} \beta_k (Industries * BAD)_i + \sum_{k=72}^{98} \beta_k Years_i
\end{aligned}
\tag{10}
$$

where $RatingDummies_i$ are the rating dummy variables as defined in Table 3. The reference category for the rating dummy variables is AAA/AA+ rated observations. All other variables are as described in connection with Equation (9).

The rating class dummy specification of the regression model for hypotheses 1 and 2 is estimated with the following equation:

[10] The inclusion of these interaction terms is very important since the explanatory variables, if indeed proxies for information asymmetry, potentially exhibit opposite effects for good and bad news when the dependent variable is the abnormal price reaction. For good earnings news, the information content is greater when the abnormal stock return is higher whereas for negative news, information content increases when the abnormal stock price reaction is more negative.

$$
\begin{aligned}
&CAR_i \ (or\ CATV_i) \\
&= \beta_0 + \beta_1 UE_i + \beta_2 BAD_i + \beta_3 (UE * BAD)_i + \sum_{k=4}^{8} \beta_k RatingclassDummies_i \\
&+ \sum_{k=9}^{13} \beta_k (RatingclassDummies * BAD)_i + \sum_{k=14}^{23} \beta_k Controls_i \\
&+ \sum_{k=24}^{33} \beta_k (Controls * BAD)_i + \sum_{k=34}^{42} \beta_k Industries_i \\
&+ \sum_{k=43}^{51} \beta_k (Industries * BAD)_i + \sum_{k=52}^{78} \beta_k Years_i
\end{aligned}
\tag{11}
$$

where $RatingclassDummies_i$ are the rating class dummy variables as defined in Table 3. The reference category for the rating class dummy variables is firms with a rating from AAA to AA-. All other variables are as described in connection with Equation (9).

Hypothesis 3 addresses the impact of preceding rating changes, downgrades specifically, on the abnormal reactions to earnings releases. In order to test this hypothesis, I add rating change variables to the previous regression models. For brevity, only the regression model with the linear rating variable is presented as the other two equations differ only with regard to the rating specification. The regression equation with the linear rating specification for the third hypothesis is:

$$
\begin{aligned}
&CAR_i \ (or\ CATV_i) \\
&= \beta_0 + \beta_1 UE_i + \beta_2 BAD_i + \beta_3 (UE * BAD)_i + \beta_4 RATING_i \\
&+ \beta_5 (RATING * BAD)_i + \beta_6 DOWNGRADE_i + \beta_7 UPGRADE_i \\
&+ \beta_8 (DOWNGRADE * BAD)_i + \beta_9 (UPGRADE * BAD)_i + \sum_{k=10}^{19} \beta_k Controls_i \\
&+ \sum_{k=20}^{29} \beta_k (Controls * BAD)_i + \sum_{k=30}^{38} \beta_k Industries_i \\
&+ \sum_{k=39}^{47} \beta_k (Industries * BAD)_i + \sum_{k=48}^{74} \beta_k Years_i
\end{aligned}
\tag{12}
$$

where $DOWNGRADE_i$ and $UPGRADE_i$ are the rating change variables as defined in Table 3. An interaction with bad earnings news is also included for the rating change variables. The

reference category for the rating change indicator variables is observations with no preceding rating change. All other variables are as described in connection with Equation (9).

The influence of information asymmetry on the informational effect of credit ratings is discussed in the fourth hypothesis. Therefore, the new regression models incorporate information asymmetry dummy variables which control for high information asymmetry firms. For brevity, only the regression model with the linear rating variable is presented. The regression equation with the linear rating specification for hypothesis 4 is the following:

$$
\begin{aligned}
&CAR_i \ (or\ CATV_i) \\
&= \beta_0 + \beta_1 UE_i + \beta_2 BAD_i + \beta_3 (UE * BAD)_i + \beta_4 RATING_i \\
&+ \beta_5 (RATING * BAD)_i + \beta_6 DOWNGRADE_i + \beta_7 UPGRADE_i \\
&+ \beta_8 (DOWNGRADE * BAD)_i + \beta_9 (UPGRADE * BAD)_i \\
&+ \beta_{10} IA\_VOL_i (or\ IA\_TAN_i\ or\ IA\_MB_i) \\
&+ \beta_{11} [IA\_VOL (or\ IA\_TAN\ or\ IA\_MB) * BAD]_i \\
&+ \beta_{12} [RATING * IA\_VOL (or\ IA\_TAN\ or\ IA\_MB)]_i \\
&+ \beta_{13} [RATING * IA\_VOL (or\ IA\_TAN\ or\ IA\_MB) * BAD]_i \\
&+ \sum_{k=14}^{23} \beta_k Controls_i + \sum_{k=24}^{33} \beta_k (Controls * BAD)_i + \sum_{k=34}^{42} \beta_k Industries_i \\
&+ \sum_{k=43}^{51} \beta_k (Industries * BAD)_i + \sum_{k=52}^{78} \beta_k Years_i
\end{aligned}
\tag{13}
$$

where IA_VOL_i, IA_TAN_i and IA_MB_i are dummy variables for high information asymmetry as defined in Table 3. The reference category for the information asymmetry indicator variable is observations with low information asymmetry (below or above sample median depending on variable). The focus in this model is on the two-way interaction between the rating variable and the information asymmetry dummy variable as well as the three-way interaction between the rating variable, information asymmetry dummy variable and bad earnings news dummy variable. The two-way interaction coefficient indicates the incremental effect that ratings have in the case of high information asymmetry firms. The coefficient of the three-way interaction term points out whether the two-way interaction above is different for observations with negative earnings news. All other variables are as described in connection with Equation (9) or Equation (12).

The last hypothesis takes into account the time period of quarterly earnings announcements to study whether rating agencies' exemption from Regulation Fair Disclosure increased the impact of ratings on the information content of earnings disclosures. Consequently, the last regression models also include time period dummy variables. For brevity, only the regression model with the linear rating variable is presented. The regression equation with the linear rating specification for hypothesis 5 is as follows:

$$
\begin{aligned}
&CAR_i \ (or\ CATV_i) \\
&= \beta_0 + \beta_1 UE_i + \beta_2 BAD_i + \beta_3 (UE * BAD)_i + \beta_4 RATING_i \\
&+ \beta_5 (RATING * BAD)_i + \beta_6 DOWNGRADE_i + \beta_7 UPGRADE_i \\
&+ \beta_8 (DOWNGRADE * BAD)_i + \beta_9 (UPGRADE * BAD)_i + \beta_{10} IA\_VOL_i \\
&+ \beta_{11} (IA\_VOL * BAD)_i + \beta_{12} (RATING * IA\_VOL)_i \\
&+ \beta_{13} (RATING * IA\_VOL * BAD)_i + \beta_{14} FD_i + \beta_{15} (FD * BAD)_i \\
&+ \beta_{16} (RATING * FD)_i + \beta_{17} (RATING * FD * BAD)_i + \beta_{18} POSTFD_i \\
&+ \beta_{19} (POSTFD * BAD)_i + \beta_{20} (RATING * POSTFD)_i \\
&+ \beta_{21} (RATING * POSTFD * BAD)_i + \sum_{k=22}^{31} \beta_k Controls_i \\
&+ \sum_{k=32}^{41} \beta_k (Controls * BAD)_i + \sum_{k=42}^{50} \beta_k Industries_i \\
&+ \sum_{k=51}^{59} \beta_k (Industries * BAD)_i
\end{aligned}
\tag{14}
$$

where FD_i and $POSTFD_i$ are as defined in Table 3. While the former refers to the period when rating agencies had an exemption from Regulation Fair Disclosure, I also investigate if the impact of ratings has changed after the removal of the exemption with the latter variable. The reference category for the time period indicator variable is observations before November 2000. The interpretations of the additional interaction terms are similar to those in Equation (13). For brevity, only IA_VOL_i is used as the high information asymmetry dummy variable.[11] In addition, year fixed effects are excluded as the Reg FD dummy variables control for time effects. All other variables are as described in connection with Equation (9), Equation (12) or Equation (13).

[11] Subsequent results are qualitatively similar regardless of the information asymmetry dummy variable used.

Table 4 – Distribution of credit ratings and preceding rating changes

Panel A presents the distribution of firms' credit ratings at the time of earnings announcements. The cardinal measure associated with each rating which is used to construct the linear rating variable is also shown. Panel B presents the distribution of possible rating changes in the last three months before earnings announcements.

Panel A: Distribution of credit ratings for firms announcing earnings

S&P credit rating	Cardinal scale	Number of observations	Percentage (%)
AAA	1	943	1.15
AA+	2	516	0.63
AA	3	1,808	2.21
AA-	4	2,117	2.58
A+	5	4,201	5.12
A	6	7,695	9.39
A-	7	6,279	7.66
BBB+	8	7,303	8.91
BBB	9	10,404	12.69
BBB-	10	8,016	9.78
BB+	11	4,924	6.01
BB	12	6,590	8.04
BB-	13	8,147	9.94
B+	14	6,964	8.49
B	15	3,575	4.36
B-	16	1,726	2.11
CCC+	17	452	0.55
CCC	18	189	0.23
CCC-	19	41	0.05
CC	20	32	0.04
SD or D	22	68	0.08
Total		81,990	100.00

Panel B: Distribution of rating changes before an earnings announcement

Preceding rating change	Number of observations	Percentage (%)
No rating change	76,681	94.04
Downgrade	2,681	3.29
Upgrade	2,180	2.67
Total	81,542	100.00

Two-tailed t-statistics are used to test the significance of the coefficients of the regression models presented in this section. To control for potential concerns related to heteroscedasticity and serial correlation, all t-statistics are based on robust Huber-White standard errors clustered at the firm level.

4.3. Descriptive statistics of data

Before proceeding to the univariate and multivariate analyses in the next section, I will present the summary statistics of the data sample which is based on 81,990 quarterly earnings announcements made by US listed firms with existing credit ratings.

The distribution of credit ratings for the full sample period of Feb 1986 – Dec 2013 is presented in Table 4. Since I study the impact of ratings on the information content of earnings releases, these ratings represent firms' ratings at the time of earnings announcements, or at the beginning of the announcement month, to be more exact. The predictor variables related to ratings are the focus of this study. The ratings are the Long-Term Domestic Issuer Credit Rating issued by S&P. This represents a current opinion of an issuer's overall creditworthiness and focuses on the obligor's capacity and willingness to meet its long-term financial commitments. Ratings vary from AAA (lowest risk) to default ratings D or SD (selective default). Only observations from rating category C are missing. The majority of observations fall within levels from A to B+ with BBB accounting for the highest percentage (12.69%). Overall, speculative-grade (rating below BBB-) firms are well represented but the number of observations is considerably lower for ratings CCC+ and below. Therefore, excluding analyses with the linear rating variable, these high-risk/default ratings are combined into one group. AAA ratings are also combined with adjacent rating levels for statistical purposes. In total, the sample consists of 81,990 earnings releases made by firms with credit ratings. Table 4 also shows the amount of rating changes that took place in the three months preceding an earnings announcement. Rating agencies aim to avoid making an excessive amount of rating revisions and rather focus on stable long-term rating changes. Thus it is no surprise that the 94% of earnings announcements are not preceded by a rating change. 3.29% and 2.67% of observations are associated with a preceding downgrade and upgrade, respectively. The number of rating change observations is lower because some earnings announcements are missing rating information from prior months.

Table 5 exhibits the sample composition for each year, fiscal quarter and industry. Panel A shows that the total earnings announcements are evenly distributed between fiscal quarters with each quarter accounting for over 20,000 observations and approximately 25% of the sample. All years from 1986 to 2013 provide a decent number of observations. The increasing trend of quarterly earnings announcements across time is expected as the number of rated

Table 5 – Sample composition by year, fiscal quarter and industry

Panel A presents the distribution of earnings announcements by year and fiscal quarter. Panel B shows the sample composition by industry based on GICS (Global Industry Classification Standard) codes.

Panel A: Distribution of earnings announcements per year and fiscal quarter

Year	Fiscal Q1	Fiscal Q2	Fiscal Q3	Fiscal Q4	Total	Percentage (%)
1986	289	284	301	85	959	1.17
1987	339	343	333	336	1,351	1.65
1988	285	291	314	305	1,195	1.46
1989	376	411	425	380	1,592	1.94
1990	368	356	331	391	1,446	1.76
1991	369	390	447	413	1,619	1.97
1992	355	398	420	432	1,605	1.96
1993	493	510	536	491	2,030	2.48
1994	552	585	592	574	2,303	2.81
1995	607	619	631	611	2,468	3.01
1996	653	680	692	676	2,701	3.29
1997	705	739	733	719	2,896	3.53
1998	763	785	819	808	3,175	3.87
1999	819	851	851	844	3,365	4.10
2000	807	855	777	832	3,271	3.99
2001	802	857	852	833	3,344	4.08
2002	849	862	882	851	3,444	4.20
2003	877	899	923	885	3,584	4.37
2004	937	947	950	938	3,772	4.60
2005	948	949	946	958	3,801	4.64
2006	959	968	962	959	3,848	4.69
2007	973	985	975	962	3,895	4.75
2008	972	963	968	995	3,898	4.75
2009	955	966	969	962	3,852	4.70
2010	990	996	1,008	986	3,980	4.85
2011	1,012	1,028	1,040	1,010	4,090	4.99
2012	1,035	1,057	997	1,046	4,135	5.04
2013	1,081	1,106	1,114	1,070	4,371	5.33
Total	20,170	20,680	20,788	20,352	81,990	100.00
Percentage (%)	24.60	25.22	25.35	24.82	100.00	

Panel B: Sample composition by industry

Industry sector	2-digit GICS	Number of observations	Percentage (%)
Consumer Discretionary	25	15,062	18.37
Consumer Staples	30	5,502	6.71
Energy	10	7,513	9.16
Financials	40	14,849	18.11
Health Care	35	6,277	7.66
Industrials	20	12,041	14.69
Information Technology	45	6,426	7.84
Materials	15	7,754	9.46
Telecommunication Services	50	1,712	2.09
Utilities	55	4,854	5.92
Total		81,990	100.00

Table 6 – Descriptive statistics for continuous variables

Below are the descriptive statistics for the continuous variables employed in this study. The first four variables represent the dependent variables of this study while the rest are independent variables. The definitions for the variables can be found in Table 3. All of the below variables are winsorized at the 1% and 99% level.

Variable	*N*	Mean	Std. Dev.	25th Pctl.	Median	75th Pctl.
CAR (-1,+1)	81,990	0.002	0.063	-0.027	0.001	0.032
CAR (-2,+2)	81,990	0.002	0.072	-0.032	0.001	0.037
CATV (-1,+1)	81,990	0.013	0.027	-0.001	0.004	0.017
CATV (-2,+2)	81,990	0.016	0.035	-0.002	0.005	0.021
UE	81,862	-0.001	0.013	-0.001	0.000	0.001
ANALYST#	81,990	1.959	0.842	1.386	2.079	2.565
SIZE	81,604	7.670	1.592	6.596	7.628	8.710
TIMELINESS	81,990	28.923	11.312	21.000	27.000	35.000
FOREDISP	76,714	0.002	0.005	0.000	0.001	0.002
VOL	81,990	0.025	0.013	0.016	0.021	0.030
LEV	81,555	0.280	0.192	0.136	0.255	0.385
EARNVOL	75,516	2.378	5.916	0.314	0.640	1.784
PROFIT	73,443	0.032	0.022	0.018	0.031	0.045
TAN	77,854	0.324	0.260	0.098	0.267	0.526
MB	81,146	2.581	3.434	1.293	1.944	3.090

firms and firms in general have increased over time. Panel B reports the sample distribution by industry. Firms operating in the consumer discretionary, financial and industrial sector have the highest amount of observations. All other industries are also well represented with telecommunication services perhaps being an exception. All in all, the industry breakdown is consistent with the overall representation of industries on US stock exchanges.

Table 6 summarizes the remaining variables used in the analyses. The average (median) cumulative abnormal return around earnings announcements is 0.2% (0.1%) for both windows while the figure for cumulative abnormal trading volume is 1.3% or 1.6% (0.4% or 0.5%). These figures imply that while there is always information content in earnings releases based on the volume metric, the price reaction depends on whether the announcement conveys good or bad news. It seems that in the long run, positive and negative earnings announcements are quite evenly distributed and news are as expected as the average and median cumulative abnormal return are both close to zero. The statistics for the explanatory variable related to unexpected earnings confirm this; the median earnings surprise is zero percent. Based on the median, the typical firm in my sample has a market cap of slightly over \$2B ($e^{7.682}$). The number of observations varies depending on the availability of information regarding an explanatory variable.

5. Results and analysis

This section will go through the results of this thesis based on the data and methodology presented in the previous section. I will first review the univariate results for each hypothesis to see if a relationship exists between credit ratings and the information content of earnings announcements. In order to increase the robustness of the results, multivariate regression analyses will follow and provide additional evidence on whether credit ratings are able to explain the differing market reactions to earnings releases.

5.1. Univariate evidence

5.1.1. Impact of credit rating levels on the market reaction to earnings releases

Figure 2 shows the mean daily abnormal reactions around earnings announcements for each credit rating class. In general, we see that there are spikes in abnormal returns and trading volumes at the time of earnings releases across all rating classes. However, the key takeaway is that lower (and riskier) ratings are associated with greater reactions around earnings disclosures. This is true in the cases of positive and negative earnings surprises for both abnormal returns and trading volumes. When a company reports good earnings news, companies with worse credit ratings experience greater market reactions. The reaction is similar with bad earnings news as firms with lower ratings see larger share price declines as well as greater increases in the stock's trading volume. This evidence seems to indicate that the information content of earnings announcements increases when the credit rating of a company is lower. Excluding the lowest rating class, i.e., CCC – D, there seem to be no significant reactions in the pre- and post-announcement periods. Since firms with the lowest ratings are generally considered the most risky firms, it is no surprise to see the more volatile nature of these stocks.

These findings are confirmed in Tables 7, 8, 9 and 10 which give a more comprehensive view on the relationship between credit rating levels and the information content of earnings announcements. They aim to provide insights into how the three- and five-day abnormal returns and trading volumes, i.e., the information content of earnings releases, might be affected by firms' credit rating levels. The results take into account the nature of the earnings surprise, that is, whether the reported earnings are considered good or bad news. In addition, two different ways to categorize ratings are considered.

Figure 2 – Daily abnormal reactions around earnings announcements by credit rating

These figures present the mean daily (percentage) abnormal returns and trading volumes around earnings releases per each rating class, in the case of good and bad earnings news, over the [-10,+10] time interval (t=0 signifies announcement date). Abnormal return and trading volume are as defined in section 4.2.1. while good and bad news as well as rating categories are defined in section 4.2.2.

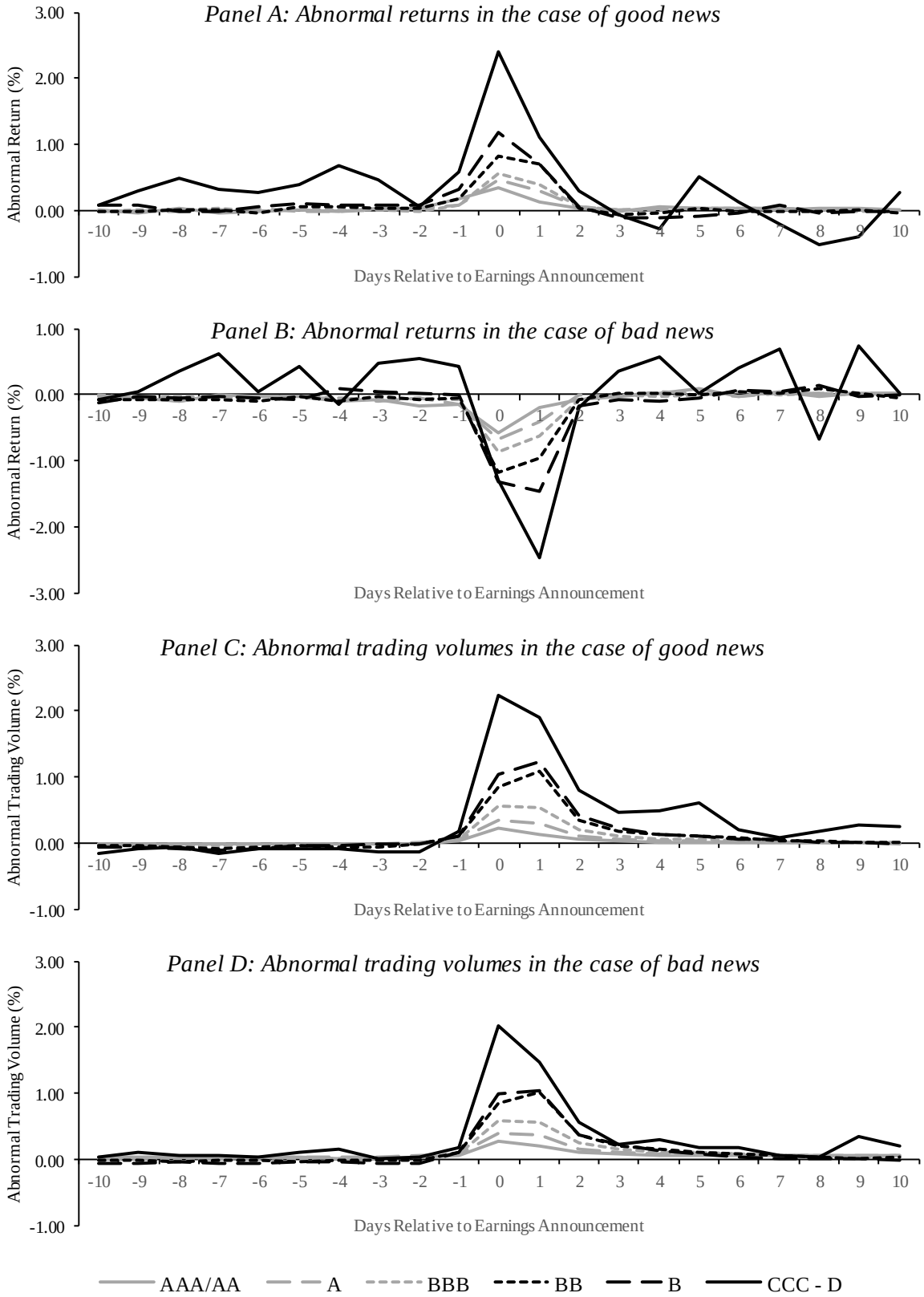


Table 7 – Cumulative abnormal returns around earnings announcements for good news

This table provides the mean percentage cumulative abnormal returns (CARs) around earnings releases per rating category over the [-10,-2], [-1,+1], [-2,+2], [+2,+10] time intervals (t=0 signifies announcement date) in the case of good earnings news. CAR is as defined in section 4.2.1. while good news and rating categories are defined in section 4.2.2. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively, based on (untabulated) two-tailed t-statistics.

		Mean cumulative abnormal return (*CAR*) (%)			
	N	*(-10,-2)*	*(-1,+1)*	*(-2,+2)*	*(+2,+10)*
Panel A: By credit rating					
All	53,866	0.126***	1.227***	1.310***	0.087***
AAA/AA+	972	0.124	0.651***	0.740***	0.146
AA	1,195	0.148	0.679***	0.753***	0.080
AA-	1,397	-0.137	0.628***	0.668***	0.440***
A+	2,919	0.163**	0.718***	0.872***	0.247***
A	5,336	0.020	0.866***	0.967***	0.317***
A-	4,240	-0.022	0.851***	0.921***	0.211***
BBB+	4,948	0.026	0.892***	0.982***	0.221***
BBB	6,971	0.130**	1.055***	1.086***	0.173***
BBB-	5,419	0.000	1.108***	1.150***	0.200***
BB+	3,285	0.135	1.402***	1.519***	-0.114
BB	4,425	0.138	1.688***	1.741***	0.058
BB-	5,269	0.017*	1.726***	1.788***	-0.122
B+	4,250	0.447***	1.795***	2.013***	-0.190
B	1,984	0.336*	2.074***	1.994***	-0.330
B-	927	0.201	2.190***	2.426***	-0.664**
CCC+ – D	329	1.484**	2.285***	2.652***	0.028
Panel B: By credit rating class					
All	53,866	0.126***	1.227***	1.310***	0.087***
AAA/AA	3,564	0.030	0.652***	0.716***	0.239***
A	12,495	0.039	0.826***	0.929***	0.265***
BBB	17,338	0.060	1.025***	1.077***	0.195***
BB	12,979	0.150**	1.631***	1.704***	-0.059
B	7,161	0.385***	1.923***	2.061***	-0.290***
CCC – D	329	1.484**	2.285***	2.652***	0.028

Table 7 exhibits evidence that, in the case of good earnings news, announcement window mean cumulative abnormal returns have a tendency to increase when the credit rating of the company is lower. This is true for both the [-1, +1] and [-2, +2] announcement windows. With the rating class categorization, the relationship is strictly monotonic. As far as the three-day announcement window is concerned, the mean abnormal reactions range from 0.628% (AA- rating) to 2.285% (CCC+ - D rating). All three- and five-day mean cumulative abnormal

Table 8 – Cumulative abnormal returns around earnings announcements for bad news

This table reports the mean percentage cumulative abnormal returns (CARs) around earnings releases per rating category over the [-10,-2], [-1,+1], [-2,+2], [+2,+10] time intervals (t=0 signifies announcement date) in the case of bad earnings news. CAR is as defined in section 4.2.1. while bad news and rating categories are defined in section 4.2.2. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively, based on (untabulated) two-tailed t-statistics.

		Mean cumulative abnormal return (*CAR*) (%)			
	N	*(-10,-2)*	*(-1,+1)*	*(-2,+2)*	*(+2,+10)*
Panel A: By credit rating					
All	28,124	-0.409***	-1.730***	-1.857***	-0.036
AAA/AA+	487	-0.560***	-1.006***	-1.111***	0.310
AA	613	-0.756***	-0.999***	-1.243***	-0.135
AA-	720	-0.463**	-0.760***	-1.027***	0.053
A+	1,282	-0.657***	-1.189***	-1.227***	0.202
A	2,359	-0.445***	-1.193***	-1.294***	0.183*
A-	2,039	-0.313***	-1.153***	-1.166***	-0.042
BBB+	2,355	-0.509***	-1.195***	-1.309***	-0.083
BBB	3,433	-0.401***	-1.575***	-1.690***	-0.037
BBB-	2,597	-0.073	-1.732***	-1.890***	-0.094
BB+	1,639	-0.435***	-1.809***	-2.090***	-0.146
BB	2,165	-0.784***	-1.956***	-2.143***	-0.042
BB-	2,878	-0.467***	-2.261***	-2.298***	0.185
B+	2,714	-0.161	-2.381***	-2.565***	-0.251
B	1,591	-0.737***	-2.334***	-2.495***	-0.291
B-	799	0.007	-3.013***	-3.034***	-0.411
CCC+ – D	453	0.480	-2.880***	-3.000***	0.285
Panel B: By credit rating class					
All	28,124	-0.409***	-1.730***	-1.857***	-0.036
AAA/AA	1,820	-0.588***	-0.907***	-1.123***	0.059
A	5,680	-0.445***	-1.178***	-1.233***	0.106
BBB	8,385	-0.330***	-1.517***	-1.645***	-0.068
BB	6,682	-0.562***	-2.051***	-2.197***	0.030
B	5,104	-0.314**	-2.468***	-2.616***	-0.288**
CCC – D	453	0.480	-2.880***	-3.000***	0.285

returns are statistically significant at the 1% level. For good earnings news, the three-day mean cumulative abnormal return for the entire sample is 1.227%.

The influence of credit ratings appears to be as hypothesized also in the case of bad earnings news based on Table 8. The share price reaction more or less increases when the rating is lower and the relationship is strictly monotonic when looking at rating classes. The information content of negative earnings surprises is greater for lower rated firms and thus

Table 9 – Cumulative abnormal trading volume around earnings releases for good news

This table presents the mean percentage cumulative abnormal trading volumes (CATVs) around earnings releases per rating category over the [-10,-2], [-1,+1], [-2,+2], [+2,+10] time intervals (t=0 signifies announcement date) in the case of good earnings news. CATV is as defined in section 4.2.1. while good news and rating categories are defined in section 4.2.2. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively, based on (untabulated) two-tailed t-statistics.

		Mean cumulative abnormal trading volume (*CATV*) (%)			
	N	*(-10,-2)*	*(-1,+1)*	*(-2,+2)*	*(+2,+10)*
Panel A: By credit rating					
All	53,866	-0.338***	1.333***	1.549***	0.562***
AAA/AA+	972	-0.090*	0.372***	0.423***	0.099**
AA	1,195	-0.071	0.334***	0.394***	0.143***
AA-	1,397	-0.044	0.432***	0.494***	0.181***
A+	2,919	-0.072**	0.633***	0.741***	0.224***
A	5,336	-0.078***	0.717***	0.838***	0.290***
A-	4,240	-0.184***	0.735***	0.839***	0.289***
BBB+	4,948	-0.171***	0.922***	1.088***	0.453***
BBB	6,971	-0.247***	1.067***	1.246***	0.480***
BBB-	5,419	-0.365***	1.458***	1.685***	0.617***
BB+	3,285	-0.590***	1.638***	1.876***	0.715***
BB	4,425	-0.536***	1.868***	2.157***	0.785***
BB-	5,269	-0.533***	2.135***	2.474***	0.930***
B+	4,250	-0.481***	2.148***	2.531***	0.906***
B	1,984	-0.856***	2.256***	2.615***	0.849***
B-	927	-0.848***	2.430***	2.859***	0.737***
CCC+ – D	329	-1.100***	3.080***	3.438***	1.323***
Panel B: By credit rating class					
All	53,866	-0.338***	1.333***	1.549***	0.562***
AAA/AA	3,564	-0.066***	0.383***	0.441***	0.146***
A	12,495	-0.112***	0.703***	0.816***	0.274***
BBB	17,338	-0.263***	1.148***	1.338***	0.515***
BB	12,979	-0.549***	1.918***	2.214***	0.826***
B	7,161	-0.632***	2.214***	2.597***	0.868***
CCC – D	329	-1.100***	3.080***	3.438***	1.323***

they experience larger share price declines. For the [-1, +1] window, the mean cumulative abnormal returns range from -0.760% (AA- rating) to -3.013% (B- rating). All three- and five-day abnormal reactions are statistically significant at the 1% level. For bad earnings news, the three-day mean cumulative abnormal return for the entire sample is -1.730%.

The results are qualitatively similar when looking at trading volume reactions. Table 9 demonstrates that good earnings news result in greater increases in trading volume when the

Table 10 – Cumulative abnormal trading volume around earnings releases for bad news

This table shows the mean percentage cumulative abnormal trading volumes (CATVs) around earnings releases per rating category over the [-10,-2], [-1,+1], [-2,+2], [+2,+10] time intervals (t=0 signifies announcement date) in the case of bad earnings news. CATV is as defined in section 4.2.1. while bad news and rating categories are defined in section 4.2.2. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively, based on (untabulated) two-tailed t-statistics.

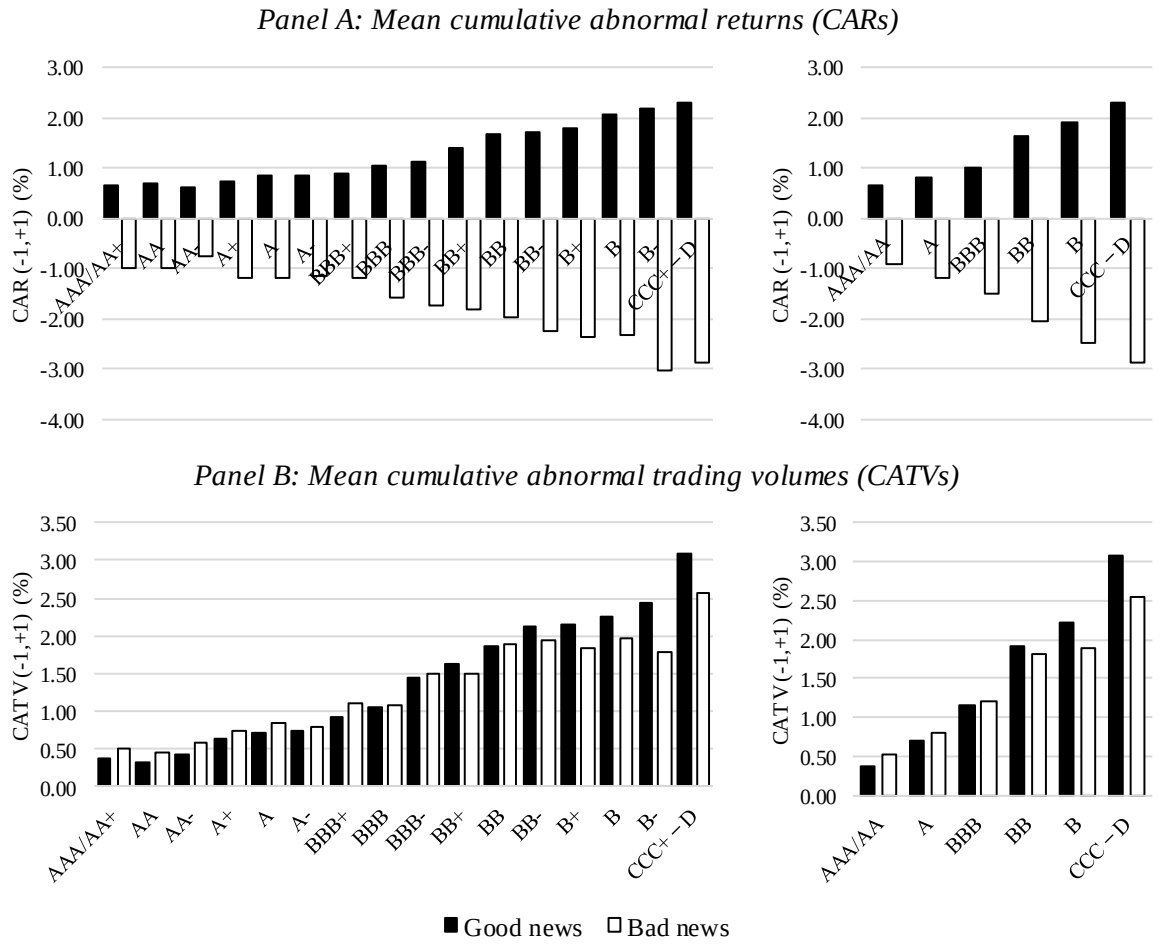
		Mean cumulative abnormal trading volume (*CATV*) (%)			
	N	*(-10,-2)*	*(-1,+1)*	*(-2,+2)*	*(+2,+10)*
Panel A: By credit rating					
All	28,124	-0.161***	1.370***	1.625***	0.774***
AAA/AA+	487	0.122	0.519***	0.618***	0.414***
AA	613	0.179***	0.457***	0.575***	0.531***
AA-	720	0.253***	0.578***	0.718***	0.505***
A+	1,282	0.225***	0.742***	0.917***	0.658***
A	2,359	0.236***	0.846***	1.053***	0.631***
A-	2,039	0.110*	0.800***	0.992***	0.616***
BBB+	2,355	0.221***	1.099***	1.344***	0.923***
BBB	3,433	-0.087*	1.073***	1.306***	0.794***
BBB-	2,597	-0.261***	1.487***	1.776***	0.866***
BB+	1,639	-0.296***	1.489***	1.756***	0.826***
BB	2,165	-0.183**	1.888***	2.243***	1.081***
BB-	2,878	-0.314***	1.949***	2.289***	0.881***
B+	2,714	-0.510***	1.847***	2.169***	0.866***
B	1,591	-0.531***	1.975***	2.278***	0.712***
B-	799	-1.427***	1.781***	1.922***	0.215
CCC+ – D	453	-0.756**	2.554***	2.663***	0.572
Panel B: By credit rating class					
All	28,124	-0.161***	1.370***	1.625***	0.774***
AAA/AA	1,820	0.193***	0.521***	0.643***	0.489***
A	5,680	0.188***	0.806***	1.000***	0.632***
BBB	8,385	-0.054	1.208***	1.462***	0.853***
BB	6,682	-0.267***	1.817***	2.143***	0.932***
B	5,104	-0.660***	1.877***	2.165***	0.716***
CCC – D	453	-0.756**	2.554***	2.663***	0.572

credit rating is lower and the relationship is strictly monotonic when considering the rating class categorization. For the [-1, +1] window, the mean cumulative abnormal trading volumes range from 0.334% (AA rating) to 3.080% (CCC+ - D rating). All abnormal reactions are statistically significant at the 1% level. The three-day mean cumulative abnormal trading volume for the entire sample is 1.333%.

Table 10 provides further evidence that the information content of earnings releases increases

Figure 3 – Information content of earnings releases per rating category

These figures show the mean percentage cumulative abnormal returns (CARs) and trading volumes (CATVs) around earnings announcements per rating category, in the case of good and bad earnings news, over the [-1,+1] time interval (t=0 signifies announcement date). CAR and CATV are as defined in section 4.2.1. while good and bad news as well as rating categories are defined in section 4.2.2. The figures are based on the results of Tables 7, 8, 9 and 10.



when a company has a lower credit rating. In the case of bad earnings news, trading volume reactions increase as the rating comes down. For the three-day window, the mean cumulative abnormal trading volumes range from 0.457% (AA rating) to 2.554% (CCC+ - D rating) while 1.370% is the figure for the entire sample when considering bad news.

The previous results are summarized in Figure 3 which points out the increasing amount of information content of earnings releases as credit ratings become lower. In the case of good and bad news, both abnormal returns and trading volumes tend to have a more significant reaction when credit ratings are worse. All in all, these results are consistent with the first hypothesis of this thesis.

5.1.2. Role of ratings in the case of good and bad earnings news

The second hypothesis states that better credit ratings decrease information asymmetry especially in the case of negative news. Thus lower ratings should have a stronger effect on the market reaction to earnings announcements when negative earnings surprises are reported. However, as shown in Figure 3, the univariate results do not provide support to this hypothesis. When looking at cumulative abnormal returns, the market reaction differences between higher and lower ratings appear similar for good and bad earnings news. Furthermore, when abnormal trading volumes are analyzed, it seems as if the market reactions are more pronounced for lower ratings in the case of good news. The inferences are also the same when market reactions for the [-2, +2] announcement window are considered.

5.1.3. Influence of preceding rating changes

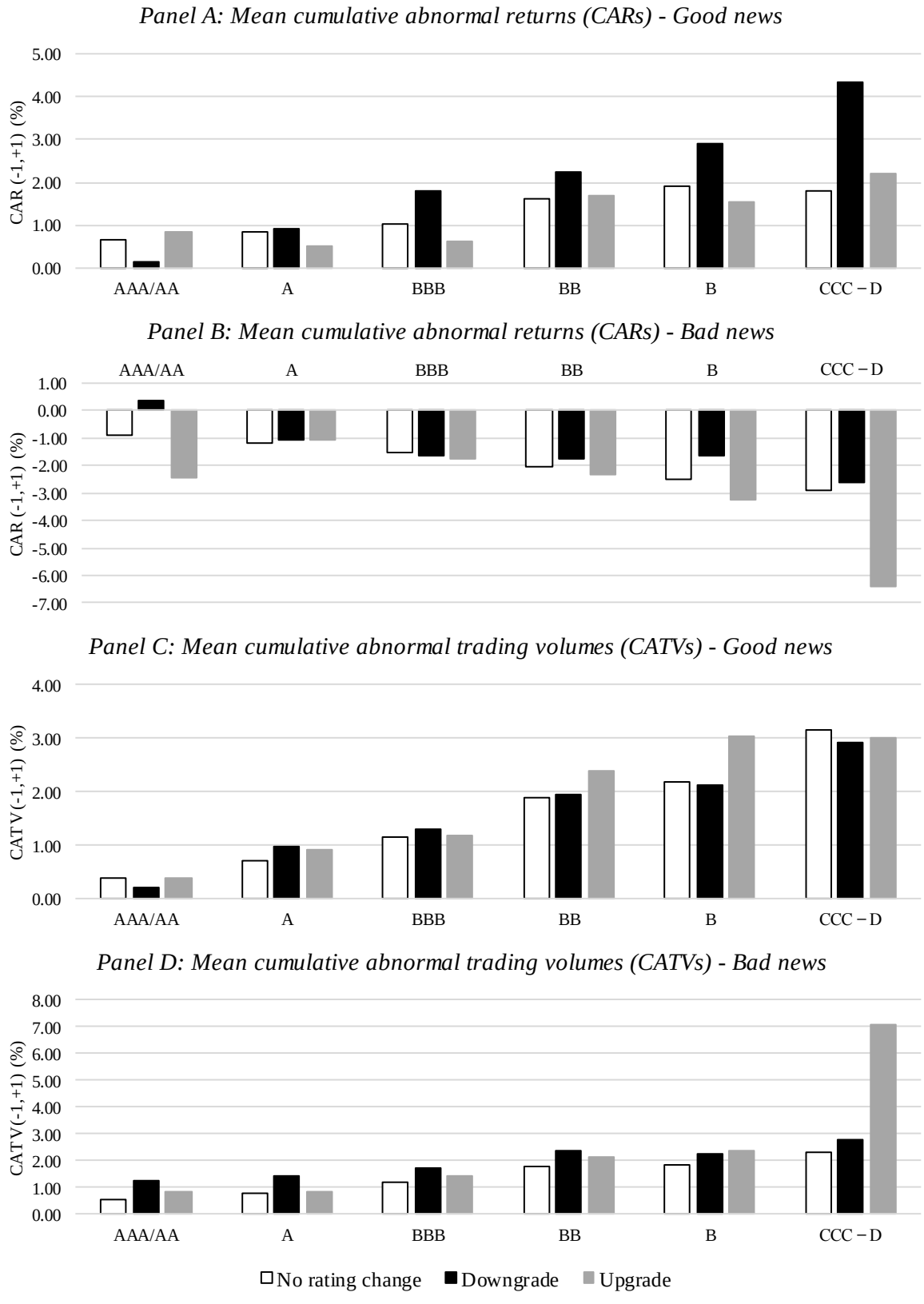
Unreported tables[12] exhibit results for different subsamples (no rating change, downgrade, upgrade) in order to analyze the impact that preceding rating changes might have on the information content of earnings releases. The main results are summarized in Figure 4 which shows the three-day mean cumulative abnormal returns and trading volumes per rating class for the abovementioned subsamples. The focus is on the possible effect of preceding downgrades.

The results offer mixed findings regarding the third hypothesis of this thesis which establishes that the market reaction to earnings announcements should be stronger when the announcements are preceded by credit rating downgrades. Panel A of Figure 4 does, for the most part, provide consistent results in the case of good earnings news. Excluding the highest rating class AAA/AA, all other rating classes are associated with more pronounced mean cumulative abnormal returns when earnings releases are preceded by rating downgrades. For example, within the BBB rating class, the three-day mean cumulative abnormal return is 1.799% when there is a preceding downgrade while the reactions are 1.021% and 0.619% in the case of no rating change and preceding upgrades, respectively. On the other hand, Panel B suggests that, instead of downgrades, preceding upgrades tend to produce more negative returns for each rating class. A possible explanation for this is that the market is surprised by a negative earnings surprise from a company that has just been upgraded by a rating agency. This, in turn, means that the market also seems to value the signal provided by credit rating

[12] All the unreported results of this study are available from the author upon request.

Figure 4 – Preceding rating changes and the information content of earnings disclosures

These figures present the mean percentage cumulative abnormal returns (CARs) and trading volumes (CATVs) around earnings announcements per rating class, in the case of good and bad earnings news, over the [-1,+1] time interval (t=0 signifies announcement date) for the no rating change, downgrade and upgrade subsamples. CAR and CATV are as defined in section 4.2.1. while good and bad news as well as rating categories and preceding rating changes are defined in section 4.2.2.



upgrades. As far as abnormal trading volume reactions are concerned, there seem to be no clear patterns although rating classes AAA/AA, A, BBB and BB are associated with higher increases in trading volume when earnings releases are preceded by downgrades in the event of bad news. The mean abnormal reactions for observations preceded by rating downgrades in Figure 4 are all statistically significant except for the abnormal returns of the AAA/AA rating class (low amount of observations).

5.1.4. Sample partition by information asymmetry

The fourth research question of this study hypothesizes that credit ratings should have a more significant impact on the information content of earnings announcements when firms are characterized by more information asymmetry. Unreported tables present results for low and high information asymmetry subsamples in order to examine whether the impact of credit ratings on the information content of earnings releases differs between low and high information asymmetry firms. The main results are summarized in Figure 5 which shows the three-day market reactions per rating class for the abovementioned subsamples when the information asymmetry proxies used are stock volatility and asset tangibility.

Overall, the univariate results provide a good degree of support to the fourth hypothesis. Panels A and B of Figure 5 demonstrate that mean cumulative abnormal returns increase (decrease) monotonically in the event of good (bad) news as ratings become lower among high information asymmetry firms while the influence of ratings is much less significant among firms characterized by low information asymmetry. For instance, when observations are partitioned based on stock volatility, abnormal returns are more pronounced for high information asymmetry firms when ratings are lower whereas the relationship appears to be nowhere near linear for low information asymmetry firms. When looking at trading volume reactions, although the differences between low and high information asymmetry firms are not as distinct, the fact remains that lower ratings are associated with stronger market reactions. Unreported results indicate that the evidence is more mixed when the market-to-book ratio is used as the information asymmetry proxy.

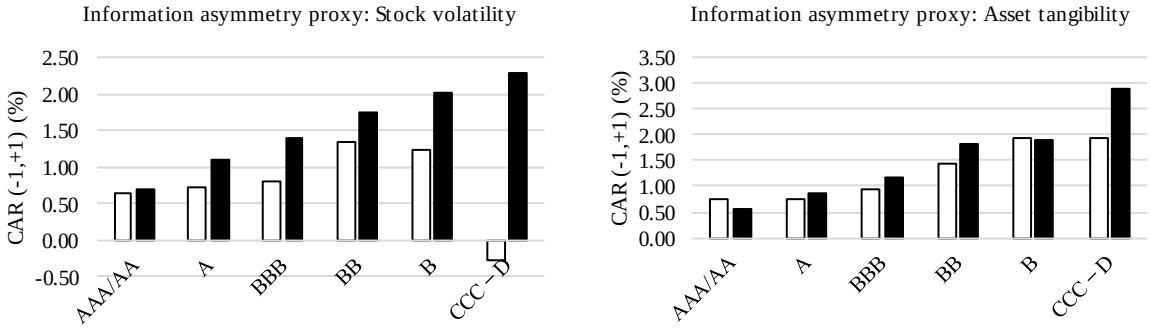
5.1.5. Subsamples for Regulation Fair Disclosure hypothesis

Unreported univariate results address the fifth research question which investigates whether the impact of ratings on the informativeness of earnings disclosures has changed over time.

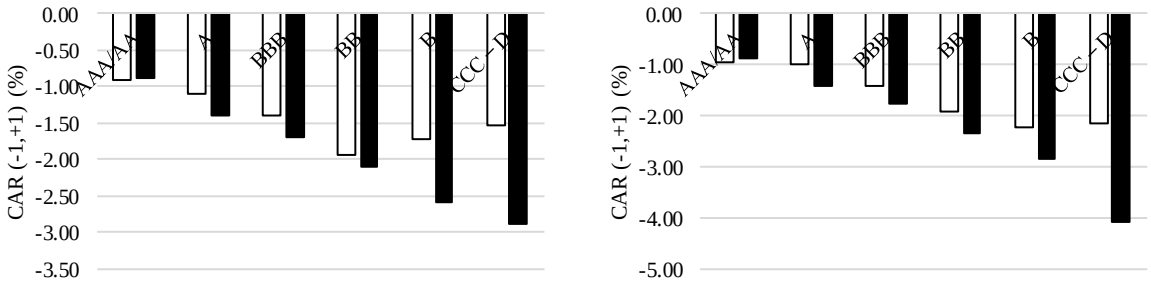
Figure 5 – The influence of credit ratings on the market reactions to earnings announcements for low and high information asymmetry firms

These figures show the mean percentage cumulative abnormal returns (CARs) and trading volumes (CATVs) around earnings announcements per rating class, in the case of good and bad earnings news, over the [-1,+1] time interval (t=0 signifies announcement date) for the low and high information asymmetry subsamples. The information asymmetry proxy is stock volatility on the left side and asset tangibility on the right side. CAR and CATV are as defined in section 4.2.1. while good and bad news as well as rating categories and information asymmetry subsamples are defined in section 4.2.2.

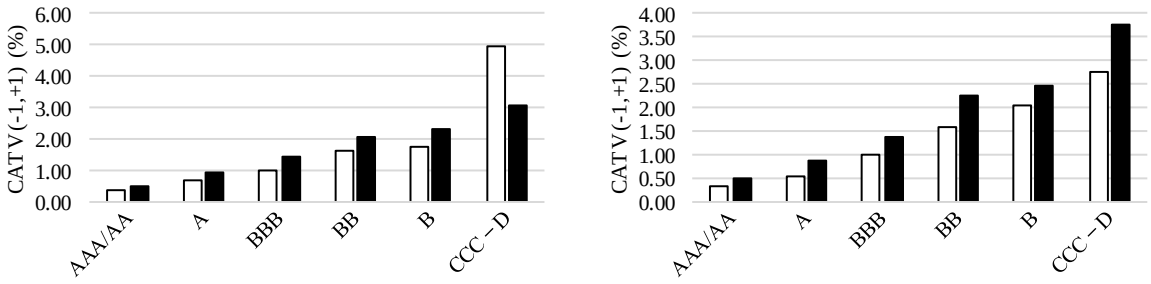
Panel A: Mean cumulative abnormal returns (CARs) - Good news



Panel B: Mean cumulative abnormal returns (CARs) - Bad news



Panel C: Mean cumulative abnormal trading volumes (CATVs) - Good news



Panel D: Mean cumulative abnormal trading volumes (CATVs) - Bad news

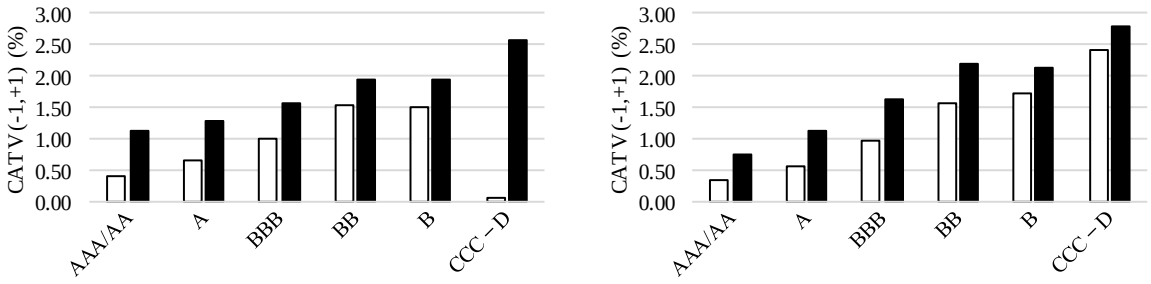
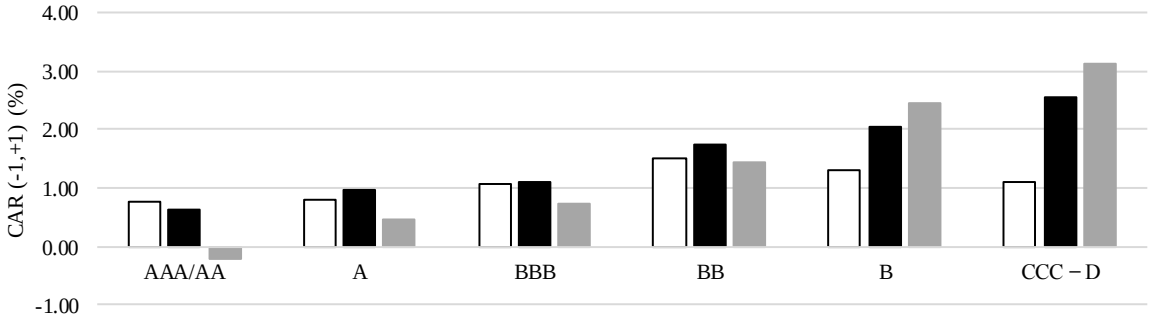


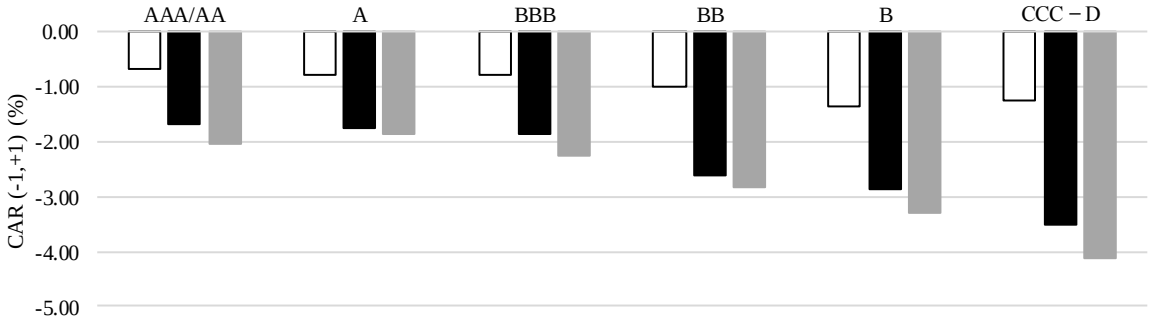
Figure 6 – Information content of earnings releases by rating for different time periods

These figures provide the mean percentage cumulative abnormal returns (CARs) and trading volumes (CATVs) around earnings announcements per rating class, in the case of good and bad earnings news, over the [-1,+1] time interval (t=0 signifies announcement date) for different time periods. CAR and CATV are as defined in section 4.2.1. while good and bad news as well as rating categories and time periods are defined in section 4.2.2.

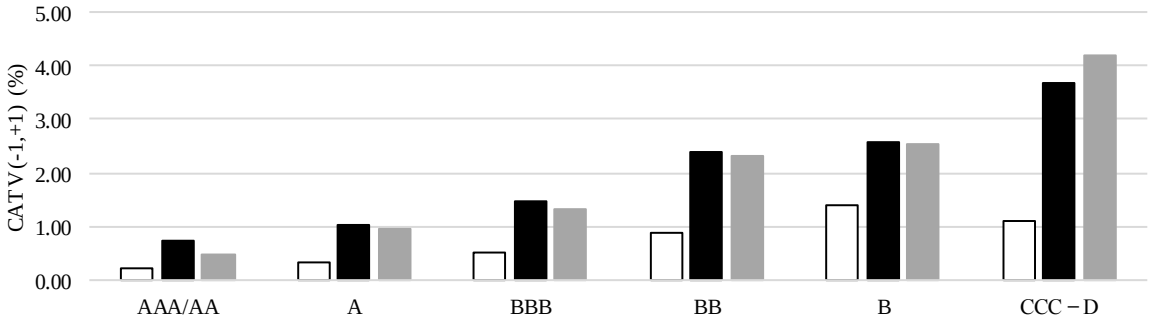
Panel A: Mean cumulative abnormal returns (CARs) - Good news



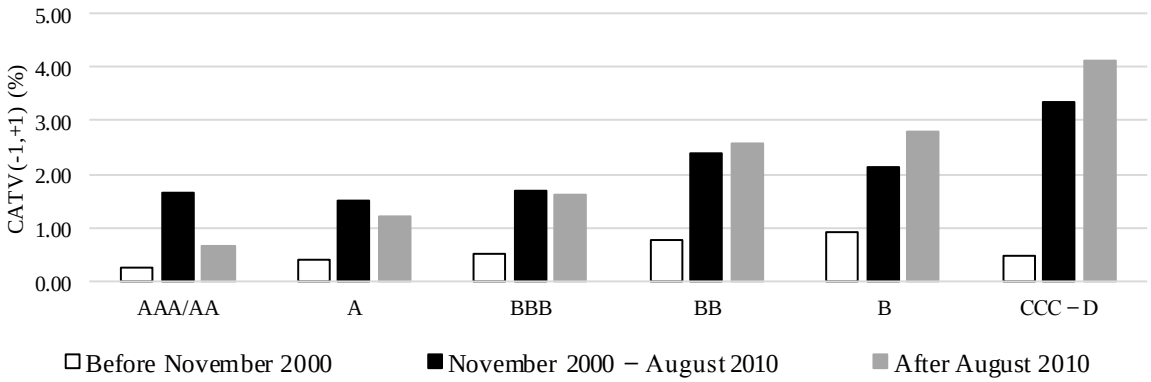
Panel B: Mean cumulative abnormal returns (CARs) - Bad news



Panel C: Mean cumulative abnormal trading volumes (CATVs) - Good news



Panel D: Mean cumulative abnormal trading volumes (CATVs) - Bad news



More precisely, the focus is on the period when rating agencies had an exemption from Regulation Fair Disclosure. Figure 6 exhibits the main findings from the unreported results for three different time periods: before November 2000, November 2000 to August 2010 and September 2010 onwards.

The conclusions from Figure 6 are consistent with the fifth hypothesis of this paper. Compared with the period before November 2000, mean cumulative abnormal returns are more pronounced when credit ratings deteriorate during the period when rating agencies had an exemption from Regulation Fair Disclosure, that is, from November 2000 to August 2010. Furthermore, this phenomenon is also visible for mean cumulative abnormal trading volumes in the event of good earnings news. Overall, the evidence from the unreported results thus implies that better credit ratings seem to have improved their ability to decrease information asymmetry after Regulation Fair Disclosure was implemented. The findings are similar if information content is measured using five-day abnormal reactions.

Another interesting finding is that credit ratings have continued to affect the information content of earnings announcements after August 2010 as the market reactions increase when credit ratings worsen. For example, in the case of bad news, mean cumulative abnormal trading volumes range from 0.647% of rating class AAA/AA to 4.139% of rating class CCC - D. These results are in line with the notion that, despite the removal of the exemption, rating agencies have retained their information advantage.

5.2. Results of multivariate cross-sectional regressions

5.2.1. Effect of rating levels on the information content of earnings announcements

Regression analysis provides more colour on the impact that ratings might have as we can control for other variables (e.g., the amount of unexpected earnings) which are also expected to affect the information content of earnings releases. While the univariate analysis shows the correlation of credit ratings with the abnormal reactions to earnings announcements, the regression equations will help determine whether credit ratings summarize existing market information or if they convey additional valuable information to the market.

Table 11 presents regression results regarding the first and second hypotheses of this thesis. Despite some differences with the univariate evidence, the regression results based on the

Table 11 – Regression analysis: The effect of rating levels on the information content of earnings announcements

This table presents the regression results based on equations (9), (10) and (11). The dependent variables are the cumulative abnormal return (CAR) and trading volume (CATV) around earnings announcements over the [-1,+1] and [-2,+2] time intervals (t=0 signifies announcement date). The independent variables are in the first column. The definitions for the variables can be found in Table 3. All continuous variables are winsorized at the 1% and 99% level. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively, based on two-tailed t-statistics. All t-statistics are based on robust Huber-White standard errors clustered at the firm level.

	Cumulative abnormal return (*CAR*)				Cumulative abnormal trading volume (*CATV*)			
	(-1,+1)		*(-2,+2)*		*(-1,+1)*		*(-2,+2)*	
	Coef.	t-Stat.	Coef.	t-Stat.	Coef.	t-Stat.	Coef.	t-Stat.
Panel A: Linear rating specification								
Constant	0.0280***	6.23	0.0366***	7.18	-0.0049	-1.45	-0.0027	-0.68
UE	2.9048***	20.87	3.2573***	20.53	0.6318***	9.97	0.7767***	9.63
BAD	-0.0118*	-1.91	-0.0218***	-3.11	-0.0086***	-3.04	-0.0119***	-3.31
*UE * BAD*	-2.4197***	-16.26	-2.7720***	-16.06	-0.8216***	-11.46	-1.0295***	-11.42
RATING	0.0000	0.02	-0.0004**	-1.98	0.0015***	11.10	0.0017***	10.68
*RATING * BAD*	-0.0025***	-8.71	-0.0024***	-7.38	0.0001	0.42	0.0001	0.79
Control variables:								
ANALYST#	0.0027***	3.61	0.0037***	4.39	0.0071***	13.31	0.0077***	12.41
SIZE	-0.0024***	-5.93	-0.0034***	-7.22	-0.0011***	-3.75	-0.0016***	-4.70
TIMELINESS	-0.0000	-1.16	-0.0000	-0.94	-0.0001***	-4.06	-0.0001***	-3.88
FOREDISP	-1.1027***	-5.78	-1.1461***	-5.25	-0.3140***	-3.55	-0.3172***	-2.72
VOL	-0.1134**	-2.16	-0.1470**	-2.48	0.2517***	8.22	0.2069***	5.52
LEV	-0.0025	-1.00	-0.0013	-0.44	-0.0087***	-4.45	-0.0089***	-3.86
EARNVOL	0.0001	1.13	0.0001	1.04	0.0000	0.52	0.0000	0.24
PROFIT	-0.0424**	-2.28	-0.0490**	-2.35	0.0694***	4.91	0.0899***	5.34
TAN	-0.0058***	-2.98	-0.0053**	-2.45	-0.0040***	-2.86	-0.0041**	-2.53
MB	-0.0000	-0.13	-0.0001	-0.54	0.0002***	3.64	0.0003***	4.10
*ANALYST# * BAD*	-0.0036***	-2.87	-0.0045***	-3.11	0.0011*	1.77	0.0016**	2.08
*SIZE * BAD*	0.0006	0.86	0.0015*	1.96	0.0014***	4.72	0.0019***	4.89
*TIMELINESS * BAD*	0.0001	1.21	0.0001*	1.83	0.0000*	1.70	0.0001	1.56
*FOREDISP * BAD*	2.5146***	9.48	2.7713***	9.22	0.0689	0.64	0.0286	0.20
*VOL * BAD*	-0.0551	-0.72	-0.0139	-0.16	-0.0362	-1.14	-0.0511	-1.24
*LEV * BAD*	0.0159***	3.45	0.0135**	2.54	-0.0015	-0.71	-0.0027	-1.05
*EARNVOL * BAD*	-0.0001	-0.52	-0.0001	-0.57	-0.0001*	-1.65	-0.0001	-1.51
*PROFIT * BAD*	-0.0420	-1.27	-0.0350	-0.94	-0.0322*	-1.84	-0.0408*	-1.81
*TAN * BAD*	0.0162***	4.56	0.0161***	4.05	-0.0038**	-2.36	-0.0049**	-2.33
*MB * BAD*	0.0001	0.39	0.0001	0.43	-0.0001	-1.24	-0.0002	-1.44
Industry fixed effects	Yes		Yes		Yes		Yes	
Year fixed effects	Yes		Yes		Yes		Yes	

(Continued)

Table 11 – *Continued*

	Cumulative abnormal return (*CAR*)				Cumulative abnormal trading volume (*CATV*)			
	(-1,+1)		*(-2,+2)*		*(-1,+1)*		*(-2,+2)*	
	Coef.	t-Stat.	Coef.	t-Stat.	Coef.	t-Stat.	Coef.	t-Stat.
Panel A: Linear rating specification								
Observations	62,788		62,788		62,788		62,788	
Number of firms	2,324		2,324		2,324		2,324	
R^2	0.0871		0.0802		0.1754		0.1421	
F-stat. p-value	< 0.0001		< 0.0001		< 0.0001		< 0.0001	
Panel B: Rating dummy specification								
Constant	0.0264***	5.51	0.0329***	6.07	0.0015	0.45	0.0047	1.18
UE	2.9331***	21.11	3.2959***	20.81	0.6309***	10.04	0.7733***	9.63
BAD	-0.0211***	-3.10	-0.0301***	-3.83	-0.0137***	-4.70	-0.0184***	-4.95
*UE * BAD*	-2.4473***	-16.48	-2.8136***	-16.34	-0.8247***	-11.62	-1.0344***	-11.55
AA	-0.0008	-0.30	-0.0009	-0.31	0.0010	0.67	0.0013	0.74
AA-	-0.0016	-0.67	-0.0020	-0.81	0.0022	1.37	0.0023	1.25
A+	-0.0006	-0.29	-0.0005	-0.22	0.0019	1.31	0.0022	1.30
A	-0.0006	-0.25	-0.0010	-0.43	0.0034**	2.28	0.0037**	2.12
A-	-0.0010	-0.45	-0.0023	-0.94	0.0037**	2.40	0.0038**	2.13
BBB+	-0.0000	-0.02	-0.0013	-0.54	0.0056***	3.61	0.0063***	3.48
BBB	0.0006	0.27	-0.0012	-0.46	0.0070***	4.35	0.0077***	4.12
BBB-	-0.0006	-0.27	-0.0030	-1.14	0.0102***	5.95	0.0114***	5.72
BB+	0.0011	0.42	-0.0005	-0.18	0.0116***	5.97	0.0126***	5.54
BB	0.0031	1.17	-0.0002	-0.05	0.0136***	7.30	0.0150***	6.97
BB-	0.0003	0.11	-0.0032	-1.04	0.0156***	7.57	0.0176***	7.31
B+	-0.0015	-0.51	-0.0046	-1.35	0.0167***	7.60	0.0190***	7.41
B	-0.0044	-1.20	-0.0107**	-2.56	0.0159***	5.70	0.0182***	5.49
B-	-0.0044	-0.97	-0.0085*	-1.68	0.0196***	6.16	0.0230***	6.12
CCC+ – D	-0.0177**	-2.31	-0.0271***	-3.22	0.0276***	5.40	0.0295***	4.82
*AA * BAD*	-0.0013	-0.27	-0.0038	-0.68	0.0032**	2.07	0.0040**	2.05
*AA- * BAD*	0.0016	0.37	-0.0012	-0.25	0.0032**	2.05	0.0040**	2.13
*A+ * BAD*	-0.0038	-0.95	-0.0036	-0.77	0.0045***	3.07	0.0056***	3.10
*A * BAD*	-0.0059	-1.53	-0.0067	-1.43	0.0048***	3.30	0.0064***	3.60
*A- * BAD*	-0.0065*	-1.72	-0.0057	-1.24	0.0047***	3.26	0.0064***	3.53
*BBB+ * BAD*	-0.0075*	-1.90	-0.0079	-1.64	0.0061***	4.03	0.0076***	4.06
*BBB * BAD*	-0.0136***	-3.51	-0.0132***	-2.81	0.0044***	2.98	0.0060***	3.30
*BBB- * BAD*	-0.0157***	-3.76	-0.0155***	-3.13	0.0053***	3.09	0.0067***	3.22
*BB+ * BAD*	-0.0174***	-3.97	-0.0190***	-3.60	0.0040**	2.03	0.0060**	2.46
*BB * BAD*	-0.0234***	-5.21	-0.0236***	-4.43	0.0062***	3.29	0.0090***	3.81
*BB- * BAD*	-0.0261***	-5.59	-0.0246***	-4.49	0.0053***	2.68	0.0077***	3.12
*B+ * BAD*	-0.0274***	-5.25	-0.0278***	-4.52	0.0053**	2.39	0.0074***	2.68
*B * BAD*	-0.0241***	-3.77	-0.0204***	-2.75	0.0056**	2.11	0.0078**	2.32

(Continued)

Table 11 – *Continued*

	Cumulative abnormal return (*CAR*)				Cumulative abnormal trading volume (*CATV*)			
	(-1,+1)		*(-2,+2)*		*(-1,+1)*		*(-2,+2)*	
	Coef.	t-Stat.	Coef.	t-Stat.	Coef.	t-Stat.	Coef.	t-Stat.
Panel B: Rating dummy specification								
*B- * BAD*	-0.0312***	-4.12	-0.0303***	-3.40	-0.0043	-1.21	-0.0057	-1.30
*CCC+ – D * BAD*	-0.0196*	-1.81	-0.0185	-1.44	0.0002	0.04	0.0003	0.04
Control variables	Yes		Yes		Yes		Yes	
Industry fixed effects	Yes		Yes		Yes		Yes	
Year fixed effects	Yes		Yes		Yes		Yes	
Observations	62,788		62,788		62,788		62,788	
Number of firms	2,324		2,324		2,324		2,324	
R^2	0.0879		0.0810		0.1779		0.1442	
F-stat. p-value	< 0.0001		< 0.0001		< 0.0001		< 0.0001	
Panel C: Rating class dummy specification								
Constant	0.0239***	5.71	0.0293***	6.15	0.0059**	1.98	0.0096***	2.75
UE	2.9289***	21.06	3.2817***	20.69	0.6338***	10.00	0.7773***	9.62
BAD	-0.0229***	-3.89	-0.0336***	-4.99	-0.0112***	-4.29	-0.0152***	-4.51
*UE * BAD*	-2.4500***	-16.47	-2.8069***	-16.25	-0.8220***	-11.52	-1.0314***	-11.47
A	0.0004	0.38	0.0002	0.13	0.0015**	1.99	0.0015*	1.69
BBB	0.0014	1.16	0.0001	0.10	0.0055***	6.11	0.0061***	5.70
BB	0.0032**	2.04	0.0011	0.63	0.0111***	8.86	0.0123***	8.33
B	-0.0006	-0.27	-0.0036	-1.47	0.0134***	7.98	0.0154***	7.74
CCC – D	-0.0149**	-2.05	-0.0228***	-2.84	0.0236***	4.90	0.0249***	4.28
*A * BAD*	-0.0055***	-2.66	-0.0036	-1.49	0.0023***	2.92	0.0032***	3.10
*BBB * BAD*	-0.0121***	-5.40	-0.0101***	-3.93	0.0028***	3.16	0.0037***	3.26
*BB * BAD*	-0.0219***	-8.01	-0.0201***	-6.45	0.0032**	2.57	0.0050***	3.20
*B * BAD*	-0.0252***	-6.55	-0.0229***	-5.20	0.0021	1.22	0.0032	1.48
*CCC – D * BAD*	-0.0174*	-1.70	-0.0154	-1.28	-0.0009	-0.17	-0.0010	-0.15
Control variables	Yes		Yes		Yes		Yes	
Industry fixed effects	Yes		Yes		Yes		Yes	
Year fixed effects	Yes		Yes		Yes		Yes	
Observations	62,788		62,788		62,788		62,788	
Number of firms	2,324		2,324		2,324		2,324	
R^2	0.0871		0.0804		0.1750		0.1417	
F-stat. p-value	< 0.0001		< 0.0001		< 0.0001		< 0.0001	

linear rating model in Panel A show that credit ratings have an impact on the information content of earnings announcements. The first column of results shows that, as far as three-day cumulative abnormal returns are concerned, ratings have a significant effect only in the case of bad earnings news. As the coefficient for the rating variable is zero, the coefficient of

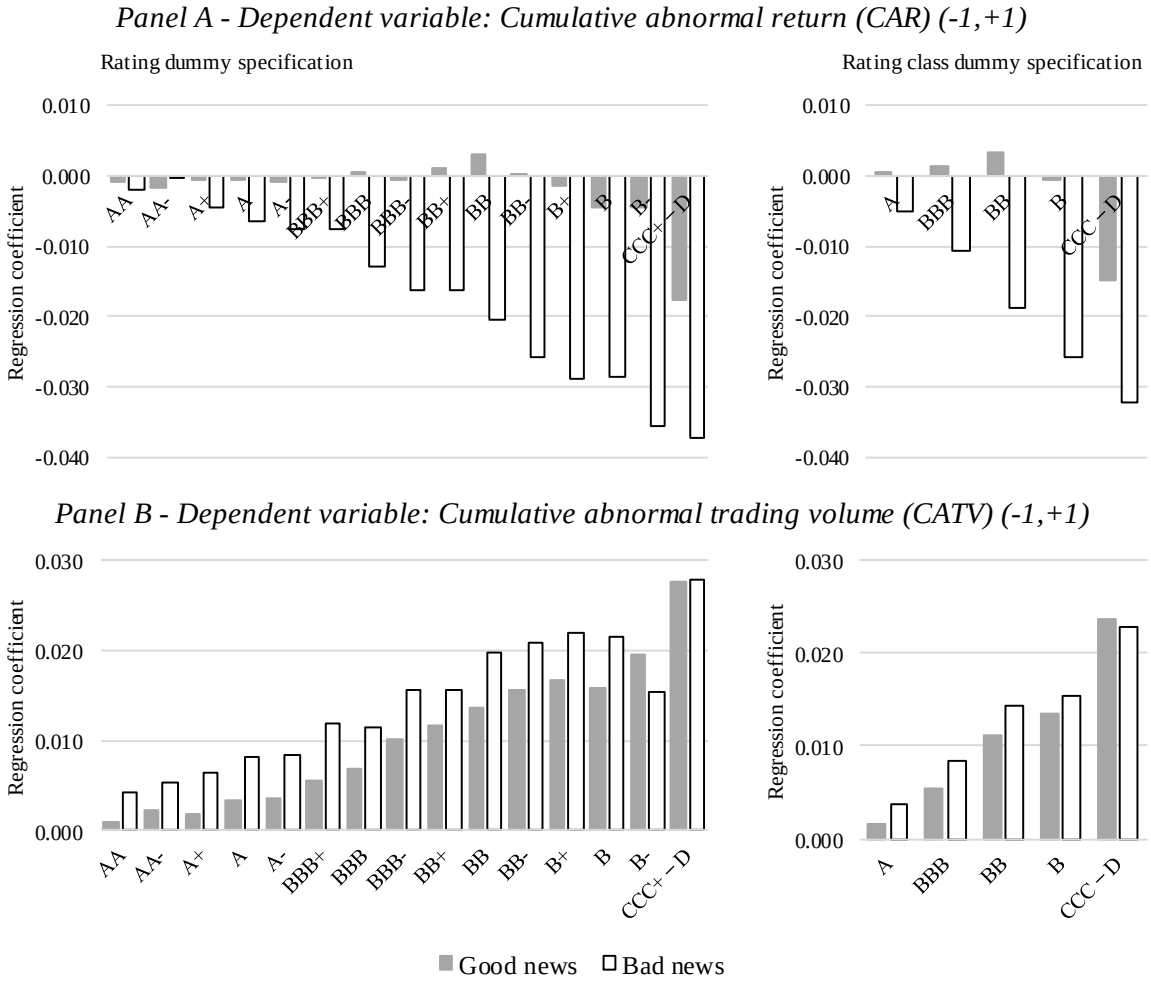
-0.0025 for the interaction between ratings and bad news, which is significant at the 1% level, implies that a one notch decrease in a company's credit rating is associated with a 0.25% more negative stock market reaction to earnings releases in the event of bad earnings news. However, contrary to my hypothesis, the findings for the [-2, +2] announcement window suggest that abnormal returns are lower for worse credit ratings also in the event of good news (coefficient = -0.0004) although the effect is very small in magnitude. When information content is measured through abnormal trading volume reactions, the coefficients for the rating variable are 0.0015 and 0.0017 for the three- and five-day windows, respectively, with both being significant at the 1% level. The impact of ratings is the same for good and bad news as the coefficients for the interaction between rating and bad news are not significant. Therefore, a one notch lower credit rating results in 0.15%/0.17% more of the outstanding shares being traded in the market around an earnings announcement. This further supports the notion that lower ratings increase the information content of earnings releases as there is more information asymmetry surrounding these firms.

The alternative rating specifications of the regression model yield similar results. Figure 7 provides a summary of the findings of Panel B and Panel C in Table 11. Panel A of Figure 7 demonstrates that, in the case of bad earnings news, the regression coefficient of credit ratings tends to decrease as ratings become lower. In the rating class dummy specification model, the impact of ratings is strictly monotonic. For example, a one notch lower rating class results in an approximately 0.65% more negative cumulative abnormal return on average. However, no clear relationship exists in the case of good news. When measuring information content through abnormal trading volume reactions, the coefficients exhibit an increase in trading volume as ratings deteriorate; the relationship is strictly monotonic when rating classes are the independent variables. For the rating dummy specification, the coefficients range from 0.001 (0.004) for rating AA to 0.028 (0.028) for rating CCC+ - D in the case of good (bad) news. Coefficients based on models where the dependent variable (CAR/CATV) is measured over the five-day announcement window offer qualitatively equivalent findings.

The regression results in Table 11 are in line with the first hypothesis of this study. Apart from abnormal returns in the case of good earnings news, lower credit ratings are associated with more pronounced market reactions meaning that the information content of earnings releases is higher for lower rated companies. Since the abnormal trading volumes increase as ratings become lower in the case of good news as well, I also conclude that the information

Figure 7 – Regression coefficients: The effect of rating levels on the information content of earnings announcements

These figures present the regression coefficients related to rating variables from the rating dummy and rating class dummy models of Table 11 where the dependent variables are the cumulative abnormal return and trading volume over the [-1,+1] time interval. The coefficient for good news equals the stand-alone coefficient of each rating variable. The coefficient for bad news equals the sum of the stand-alone coefficient of each rating variable and the interaction of the same rating variable with the bad news dummy. The reference categories are rating categories AAA/AA+ (rating dummy specification) and AAA/AA (rating class dummy specification).



content of earnings announcements increases with lower ratings when there is positive earnings surprise. As explained in section 3.1., this scenario, where lower rated companies' stock prices are not affected whereas trading volumes are, indicates that the earnings report is informative to individual investors although the overall market ultimately sees no financial value in the announcement. All in all, higher credit ratings appear to reduce to the information asymmetry surrounding firms and thus better rated firms' earnings disclosures have less informational value in the stock market.

5.2.2. Role of ratings depending on the sign of unexpected earnings

The regression results provide new insights regarding the second hypothesis of this paper. They are consistent with the notion that lower ratings result in stronger market reactions to earnings announcements in the event of negative earnings surprises. As mentioned earlier, Panel A of Table 11 shows that ratings have a significant impact on the stock price reactions of earnings disclosures only in the case of bad earnings news. In addition, the two other rating specifications of the regression model yield the same results. Panel A of Figure 7 demonstrates how cumulative abnormal returns decrease as credit ratings deteriorate when there is a negative earnings surprise while ratings do not consistently affect the informativeness of earnings releases when good news are reported. With regard to trading volume reactions, the regression results for all model specifications arrive at the same conclusion: lower ratings increase the cumulative abnormal trading volumes as hypothesized but the effect is the same for positive and negative news.

Overall, this evidence supports the notion that lower rated firms' earnings announcements have more informational value in the case of negative earnings news compared to positive news. While the information content of earnings disclosures increases with lower credit ratings for both good and bad news based on trading volume reactions, the stock price effects are more pronounced for lower ratings only when negative earnings surprises are announced. Thus it appears that, due to the long-term uncertainty associated with poorly rated firms, investors see good earnings news from them as less informative.

5.2.3. Credit rating changes before earnings announcements

Table 12 exhibits the regression analysis for the linear rating model of hypothesis 3 in order to analyze the influence of preceding rating changes on the informational value of earnings releases. Like the univariate evidence earlier, the regression results provide mixed findings regarding the role of preceding downgrades. When abnormal return reactions are used to represent information content, the only significant coefficient related to preceding rating changes belongs to the downgrade variable (coefficient of 0.0044; significant at the 10% level). The interpretation is that a preceding downgrade increases cumulative abnormal returns by 0.44% in the case of both positive and negative earnings shocks. Therefore, the hypothesized effect exists for positive news only as I expected preceding downgrades to be

Table 12 – Regression analysis: The role of credit rating changes before earnings announcements

This table reports the regression results based on equation (12) (linear rating model). The dependent variables are the cumulative abnormal return (CAR) and trading volume (CATV) around earnings announcements over the [-1,+1] and [-2,+2] time intervals (t=0 signifies announcement date). The independent variables are in the first column. The definitions for the variables can be found in Table 3. All continuous variables are winsorized at the 1% and 99% level. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively, based on two-tailed t-statistics. All t-statistics are based on robust Huber-White standard errors clustered at the firm level.

	Cumulative abnormal return (*CAR*)				Cumulative abnormal trading volume (*CATV*)			
	(-1,+1)		*(-2,+2)*		*(-1,+1)*		*(-2,+2)*	
	Coef.	t-Stat.	Coef.	t-Stat.	Coef.	t-Stat.	Coef.	t-Stat.
Constant	0.0283***	6.31	0.0371***	7.29	-0.0048	-1.40	-0.0025	-0.64
UE	2.9021***	20.78	3.2530***	20.45	0.6347***	10.00	0.7798***	9.65
BAD	-0.0119*	-1.93	-0.0220***	-3.15	-0.0085***	-3.02	-0.0117***	-3.26
*UE * BAD*	-2.4091***	-16.12	-2.7581***	-15.92	-0.8204***	-11.43	-1.0262***	-11.37
RATING	-0.0000	-0.04	-0.0004**	-2.01	0.0015***	11.12	0.0017***	10.68
*RATING * BAD*	-0.0026***	-8.69	-0.0024***	-7.42	0.0000	0.35	0.0001	0.70
DOWNGRADE	0.0030	1.31	0.0044*	1.66	0.0006	0.67	0.0016	1.24
UPGRADE	-0.0000	-0.01	-0.0030	-1.52	0.0016**	2.17	0.0023**	2.34
*DOWNGRADE * BAD*	-0.0006	-0.16	0.0003	0.07	0.0007	0.45	0.0014	0.66
*UPGRADE * BAD*	-0.0026	-0.69	-0.0005	-0.13	0.0014	0.82	0.0015	0.67
Control variables	Yes		Yes		Yes		Yes	
Industry fixed effects	Yes		Yes		Yes		Yes	
Year fixed effects	Yes		Yes		Yes		Yes	
Observations	62,495		62,495		62,495		62,495	
Number of firms	2,313		2,313		2,313		2,313	
R^2	0.0875		0.0808		0.1759		0.1426	
F-stat. p-value	< 0.0001		< 0.0001		< 0.0001		< 0.0001	

associated with more information content, and thus more extreme share price declines, in the case of bad news. However, the regression result could mean that investors lower their expectations after downgrades which would result in negative earnings surprises having less information content. This, in turn, would be consistent with the idea that credit rating downgrades are valuable information to stock market investors.

The evidence from abnormal trading volume reactions shows that, instead of downgrades, preceding upgrades appear to increase the informational value of earnings announcements. The coefficients for the upgrade variable are 0.0016 and 0.0023 for the three- and five-day windows, respectively, with both being significant at the 5% level. Therefore, a preceding upgrade results in 0.16%/0.23% more of the outstanding shares being traded in the market around an earnings release. It is possible that, during an earnings announcement period, the

market shows more interest towards the stock of a company that has been recently upgraded by a rating agency. Although the findings regarding preceding rating changes are not all as expected, the evidence does indicate that preceding rating changes, be it downgrades or upgrades, appear to impact the informational properties of earnings releases.

Unreported results show that the findings are similar for the rating dummy and rating class dummy specifications of the regression model. In addition, in these models, when looking at the cumulative abnormal returns over the [-2, +2] window, the upgrade variable has a negative coefficient (-0.0034/-0.0033) which is significant at the 10% level. This indicates that preceding upgrades decrease (increase) the information content of earnings releases in the case of good (bad) news. Apparently investors trust the signal provided by upgrades since subsequent positive earnings news have less informational value while negative shocks convey considerable new information to the market.

The results in Table 12 also show that the inferences regarding the impact of credit ratings on the information content of earnings announcements stay the same (as described in sections 5.2.1. and 5.2.2.) even when the additional variables for preceding downgrades and upgrades are included in the model.

5.2.4. Results for high and low information asymmetry firms

The regression results for the fourth hypothesis, based on the linear rating specification, are shown in Table 13. In order to examine whether the effect of credit ratings on the information content of earnings releases is stronger for firms characterized by more information asymmetry, the attention is on how the regression coefficients related to ratings differ for high information asymmetry firms; this is achieved in the models by including interactions with information asymmetry dummy variables. In line with the univariate evidence, the regression results based on the linear rating model provide support to the fourth hypothesis.

When stock volatility is used to determine the amount of information asymmetry surrounding firms Table 13 shows that the effect of ratings on the informativeness of earnings releases tends to increase. In the first column, the significant coefficient of -0.0005 for the interaction between ratings and the information asymmetry dummy means that a one notch lower rating has a more negative effect on abnormal returns for high information asymmetry firms. In other words (since the same coefficient for bad news is not significant), when firms report

Table 13 – Regression analysis: Results for high and low information asymmetry firms

This table provides the regression results based on equation (13) (linear rating model). The dependent variables are the cumulative abnormal return (CAR) and trading volume (CATV) around earnings announcements over the [-1,+1] time interval (t=0 signifies announcement date). The independent variables are in the first column. The definitions for the variables can be found in Table 3. All continuous variables are winsorized at the 1% and 99% level. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively, based on (untabulated) two-tailed t-statistics. All t-statistics are based on robust Huber-White standard errors clustered at the firm level.

	Information asymmetry variable: *VOL*		Information asymmetry variable: *TAN*		Information asymmetry variable: *MB*	
	(-1,+1)		*(-1,+1)*		*(-1,+1)*	
	CAR	*CATV*	*CAR*	*CATV*	*CAR*	*CATV*
Constant	0.0272***	-0.0020	0.0274***	-0.0041	0.0289***	0.0024
UE	2.9173***	0.6304***	2.9072***	0.6368***	2.8999***	0.6715***
BAD	-0.0150**	-0.0102***	-0.0119*	-0.0108***	-0.0099	-0.0091***
*UE * BAD*	-2.4231***	-0.8252***	-2.4160***	-0.8226***	-2.4098***	-0.8640***
RATING	0.0001	0.0013***	-0.0002	0.0014***	-0.0001	0.0008***
*RATING * BAD*	-0.0022***	0.0002*	-0.0022***	0.0002	-0.0027***	0.0001
DOWNGRADE	0.0031	0.0008	0.0030	0.0006	0.0030	0.0008
UPGRADE	-0.0001	0.0016**	0.0000	0.0017**	-0.0000	0.0014*
*DOWNGRADE * BAD*	-0.0008	0.0007	-0.0006	0.0007	-0.0005	0.0008
*UPGRADE * BAD*	-0.0025	0.0015	-0.0026	0.0014	-0.0026	0.0016
IA_VOL	0.0086***	-0.0000				
*IA_VOL * BAD*	-0.0011	0.0056***				
*RATING * IA_VOL*	-0.0005**	0.0004***				
*RATING * IA_VOL * BAD*	-0.0005	-0.0005**				
IA_TAN			-0.0010	-0.0025*		
*IA_TAN * BAD*			0.0054	0.0048***		
*RATING * IA_TAN*			0.0003	0.0003*		
*RATING * IA_TAN * BAD*			-0.0008***	-0.0003*		
IA_MB					-0.0016	-0.0084***
*IA_MB * BAD*					-0.0023	-0.0016
*RATING * IA_MB*					0.0001	0.0011***
*RATING * IA_MB * BAD*					0.0004	0.0001
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	62,495	62,495	62,495	62,495	62,495	62,495
Number of firms	2,313	2,313	2,313	2,313	2,313	2,313
R^2	0.0881	0.1784	0.0876	0.1761	0.0876	0.1800
F-stat. p-value	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001

negative earnings surprises the impact of ratings is more significant for high information asymmetry firms. When examining abnormal volume reactions the significant positive

regression coefficient of 0.0004 for the same interaction term implies that ratings have a greater impact on trading volumes for high information asymmetry firms; however, this is only true in the event of good earnings news as the bad news interaction term cancels the effect of the first interaction term.

The findings are similar when asset tangibility and market-to-book ratio are assumed as proxies for information asymmetry. With the former as the proxy, the results in Table 13 show that, when earnings announcements convey bad news, the ratings have a more pronounced effect on abnormal returns when firms are characterized by more information asymmetry. Furthermore, the conclusion is the same for cumulative abnormal trading volumes in the event of a positive earnings surprise. When market-to-book ratios are used to determine the level of information asymmetry surrounding companies, only the impacts on abnormal trading volume reactions provide meaningful results. The coefficient of 0.0011 (significant at the 1% level) implies that a one notch lower rating has a 0.11% greater effect on the information content of earnings announcements when firms are characterized by a higher amount of information asymmetry.

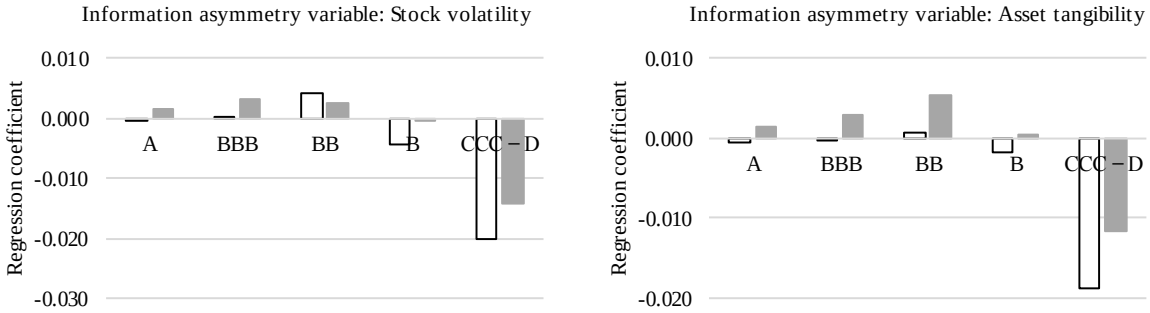
Unreported tables also provide the regression coefficients for the rating dummy and rating class dummy specifications of the regression model presented in Table 13. The main findings are shown in Figure 8 which exhibits the coefficients related to rating variables based on the rating class dummy model. These results also indicate that, in general, the impact of credit ratings on the market reactions to earnings releases appears to stronger when firms are characterized by more information asymmetry. Panel B of Figure 8 provides evidence that, when reported earnings are below expectations, the influence of lower ratings on negative abnormal returns is more pronounced for high information asymmetry firms. In addition, as demonstrated by Panels C and D, the phenomenon that trading volume reactions increase strictly monotonically as ratings become lower is more consistent among high information asymmetry firms. All in all, the results presented in this section are in line with the notion that better credit ratings decrease information asymmetry in financial markets especially when firms are otherwise associated with more information asymmetry problems.

The results in Table 13 (i.e., regression coefficients for the rating variables without the interactions with information asymmetry dummies) also show that the hypothesized relationship between ratings and the information content of earnings releases holds true for low information asymmetry firms as well. The rating variable coefficients for firms

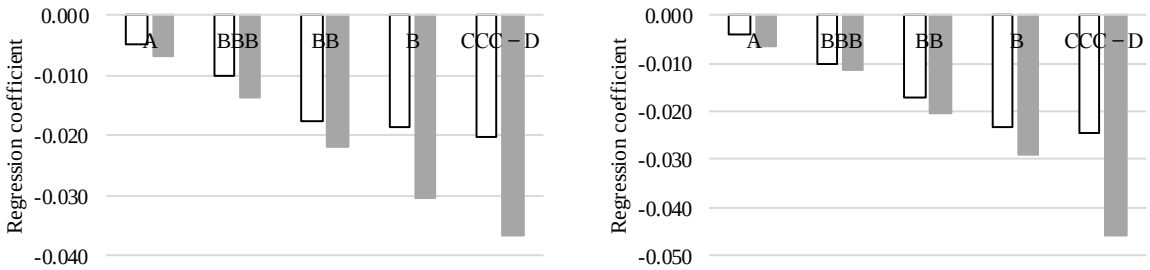
Figure 8 – Regression coefficients: High and low information asymmetry firms

These figures present the regression coefficients related to rating variables based on the rating class dummy specification of Equation (13) when the information asymmetry proxy used in the model is either stock volatility or asset tangibility. In the case of good earnings news, the coefficient for low information asymmetry firms equals the stand-alone coefficient of each rating variable while the coefficient for high information asymmetry firms equals the sum of the stand-alone coefficient of each rating variable and the interaction of the same rating variable with the information asymmetry dummy. In the case of bad earnings news, the coefficient for low information asymmetry firms is the sum of the stand-alone coefficient of each rating variable and the interaction of the same rating variable with the bad news dummy while the coefficient for high information asymmetry firms is the sum of the stand-alone coefficient of each rating variable, its interaction with the bad news dummy, its interaction with the information asymmetry dummy and its three-way interaction with both the bad news dummy and the information asymmetry dummy. The reference category is rating category AAA/AA.

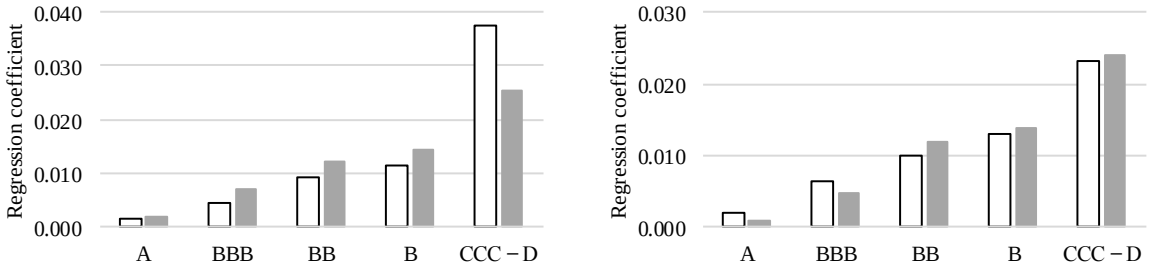
Panel A: Cumulative abnormal return (CAR) (-1,+1) as dependent variable - Good news



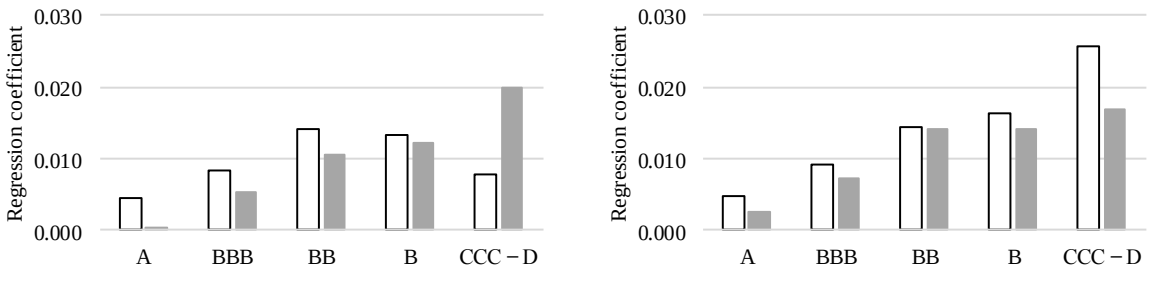
Panel B: Cumulative abnormal return (CAR) (-1,+1) as dependent variable - Bad news



Panel C: Cumulative abnormal trading volume (CATV) (-1,+1) as dependent variable - Good news



Panel D: Cumulative abnormal trading volume (CATV) (-1,+1) as dependent variable - Bad news



characterized by a lower amount of information asymmetry are similar to the ones presented in Table 11. Therefore, even though I find the impact of ratings to be more significant for high information asymmetry firms, credit ratings also have a significant effect on the informativeness of earnings announcements when only low information asymmetry firms are considered.

5.2.5. Impact of rating agencies' exemption from Regulation Fair Disclosure

The fifth and final research question of this paper examines how the effect of ratings on the information content of earnings releases has changed over time. The regression results (linear rating specification) are presented in Table 14. The findings based on the regression coefficients support the hypothesis that credit ratings had a larger impact on the informational value of earnings announcements during the period when rating agencies had an exemption from Regulation Fair Disclosure. Moreover, the results also imply that the informational advantage of rating agencies has continued, if not increased, after the exemption was removed. Unreported results also show that the findings are qualitatively similar when the regression analysis is done using the rating dummy and rating class dummy specifications.

When looking at the results in Table 14, we see that the impact of ratings on the informativeness of earnings releases increases in the period between November 2000 and August 2010 (exemption from Reg FD) compared with the period before that. When cumulative abnormal return is the dependent variable, the coefficients for the interaction of the rating variable with the Reg FD and bad earnings news dummy are -0.0010 and -0.0009 for the [-1, +1] and [-2, +2] announcement windows, respectively. These coefficients, both significant at the 5% level, imply that credit ratings had a stronger effect, in the case of bad news, during the period when rating agencies had an exemption from Reg FD. Numerically, a one notch worse rating has an approximately -0.1% more negative impact on earnings announcement returns in the event of bad news during this time period. Contrary to the hypothesis of this study, abnormal returns once again do not increase as ratings deteriorate when there is a positive earnings surprise; the coefficient for the stand-alone rating variable is negative and the interaction with the Reg FD dummy is not significant. However, when cumulative abnormal trading volumes are analyzed, the positive significant coefficients for the interaction (0.0009/0.0011) indicate that the impact of ratings on the information content of earnings disclosures is stronger for good news as well in the period from November 2000 to August 2010 compared with the time period prior to that.

Table 14 – Regression analysis: The impact of rating agencies' exemption from Regulation Fair Disclosure

This table shows the regression results based on equation (14) (linear rating model). The dependent variables are the cumulative abnormal return (CAR) and trading volume (CATV) around earnings announcements over the [-1,+1] and [-2,+2] time intervals (t=0 signifies announcement date). The independent variables are in the first column. The definitions for the variables can be found in Table 3. All continuous variables are winsorized at the 1% and 99% level. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively, based on two-tailed t-statistics. All t-statistics are based on robust Huber-White standard errors clustered at the firm level.

	Cumulative abnormal return (*CAR*)				Cumulative abnormal trading volume (*CATV*)			
	(-1,+1)		*(-2,+2)*		*(-1,+1)*		*(-2,+2)*	
	Coef.	t-Stat.	Coef.	t-Stat.	Coef.	t-Stat.	Coef.	t-Stat.
Constant	0.0420***	10.34	0.0509***	10.88	-0.0164***	-5.73	-0.0163***	-4.82
UE	2.8349***	20.51	3.1771***	20.12	0.6905***	10.83	0.8429***	10.38
BAD	-0.0508***	-7.52	-0.0634***	-8.09	-0.0038	-1.22	-0.0055	-1.39
*UE * BAD*	-2.3498***	-15.88	-2.6880***	-15.62	-0.8951***	-12.36	-1.1143***	-12.20
RATING	-0.0005**	-2.41	-0.0008***	-3.20	0.0013***	8.96	0.0015***	8.87
*RATING * BAD*	-0.0000	-0.11	0.0001	0.32	0.0001	0.70	0.0002	0.80
DOWNGRADE	0.0035	1.53	0.0049*	1.85	0.0008	0.83	0.0018	1.43
UPGRADE	-0.0002	-0.09	-0.0031	-1.61	0.0021***	2.77	0.0029***	2.85
*DOWNGRADE * BAD*	-0.0011	-0.29	-0.0001	-0.02	0.0004	0.28	0.0010	0.45
*UPGRADE * BAD*	-0.0028	-0.75	-0.0008	-0.19	0.0008	0.48	0.0008	0.34
IA_VOL	0.0080***	3.89	0.0094***	4.10	-0.0027**	-2.44	-0.0023*	-1.74
*IA_VOL * BAD*	0.0001	0.03	-0.0014	-0.32	0.0062***	3.44	0.0079***	3.50
*RATING * IA_VOL*	-0.0005**	-2.25	-0.0006**	-2.49	0.0005***	4.46	0.0006***	3.83
*RATING * IA_VOL * BAD*	-0.0006*	-1.73	-0.0006	-1.28	-0.0005***	-2.85	-0.0007***	-2.92
FD	0.0020	1.02	0.0032	1.46	-0.0008	-0.67	-0.0007	-0.50
*FD * BAD*	-0.0083**	-2.21	-0.0107**	-2.51	0.0086***	4.85	0.0110***	4.92
*RATING * FD*	0.0002	0.78	0.0001	0.24	0.0009***	6.51	0.0011***	6.46
*RATING * FD * BAD*	-0.0010**	-2.43	-0.0009**	-1.97	-0.0006***	-2.99	-0.0007***	-2.80
POSTFD	-0.0088***	-3.50	-0.0083***	-2.94	-0.0055***	-3.22	-0.0078***	-3.82
*POSTFD * BAD*	0.0033	0.68	0.0052	0.95	0.0004	0.18	-0.0007	-0.22
*RATING * POSTFD*	0.0010***	3.65	0.0009***	2.90	0.0011***	6.00	0.0013***	5.79
*RATING * POSTFD * BAD*	-0.0023***	-4.40	-0.0024***	-4.21	0.0004	1.53	0.0006*	1.84
Control variables	Yes		Yes		Yes		Yes	
Industry fixed effects	Yes		Yes		Yes		Yes	
Year fixed effects	No		No		No		No	
Observations	62,495		62,495		62,495		62,495	
Number of firms	2,313		2,313		2,313		2,313	
R^2	0.0897		0.0825		0.1630		0.1281	
F-stat. p-value	< 0.0001		< 0.0001		< 0.0001		< 0.0001	

The regression coefficients in Table 14 also offer interesting evidence that the effect of ratings has increased even after the Regulation Fair Disclosure exemption was removed from credit rating agencies. Regardless of the dependent variable, all relevant rating variable interactions are more significant in magnitude for the time period after August 2010. For instance, the

hypothesized role of credit ratings exists also in the case of good news for abnormal stock returns; the sum of the coefficients for the stand-alone rating variable (-0.0005/-0.0008) and interaction with post-FD dummy (0.0010/0.0009) is positive implying that lower ratings increase cumulative abnormal returns when there is a positive earnings surprise. In addition, the three-way interaction between the rating variable, post-FD dummy and bad news dummy is more negative and thus the impact of ratings on abnormal returns in the case of bad earnings news is also more pronounced in the period after August 2010 compared with earlier periods. When examining trading volume reactions, the regression coefficients for the interactions are slightly larger as well compared with the corresponding coefficients for the Reg FD period. All in all, these findings indicate that the impact of credit ratings on the information content of earnings announcements seems to have increased over time.

The findings related to the previous research questions are also confirmed in Table 14 as its regression model incorporates all the variables relevant to the hypotheses of this study. The values of the regression coefficients for these variables are similar in magnitude compared to the previous models.

5.2.6. Robustness of regression analyses

Several robustness checks were conducted to increase the reliability of the results. In order to control for potential concerns related to heteroscedasticity and serial correlation in the regression analyses, all t-statistics are based on robust Huber-White standard errors clustered at the firm level. In addition, other explanatory variables were tested but they did not improve the fit of the models. These variables included interest coverage, operating cash flow volatility, research & development intensity as well as dummies for a fourth quarter earnings announcement and recession year. The results of the regressions remained the same when their robustness with regard to the earnings variables was examined. For example, removing the most extreme earnings surprises (top and bottom 10%) had no impact on the results. Another robustness check which had no effect on results was to use the absolute value of the mean consensus analyst estimate instead of the stock price as the denominator in the unexpected earnings variable. Finally, the findings were identical when dummies for earnings surprise deciles were chosen to represent earnings variables in the regression analyses.

6. Conclusions

In this thesis, I examine how the credit rating of a company affects the information content, i.e., the stock price and/or trading volume reaction, of its earnings announcements in stock markets. I also study how this impact differs between positive and negative earnings news as well as analyzing the effects of preceding rating changes. Finally, the empirical analysis examines how the relationship between ratings and informativeness of earnings announcements is affected by the level of information asymmetry surrounding firms and disclosure regulation changes. The main underlying notion behind the hypotheses of this study is that better credit ratings decrease the information asymmetry and uncertainty surrounding a firm and thus the earnings announcements of lower rated firms should possess more information content as there is less visibility regarding the future financial performance of these riskier firms.

Although many papers look into the different drivers of earnings releases' information content, according to my knowledge, this is the first study to provide a comprehensive view on the impact that credit ratings have in this context. As there is still some uncertainty regarding the benefits of credit ratings in stock markets, the findings of this study should provide more colour on the informational role of ratings in equity markets. Furthermore, the results should be of interest to equity investors as well as managers of public corporations who aim to improve their understanding of the reactions to earnings news. The topic of this thesis is also timely given the recent criticism of rating agencies due to concerns related to conflicts of interest.

The empirical analysis of this study is based on 81,990 earnings announcements made in the US stock market by S&P rated firms in the period from February 1986 to December 2013. The methodology of this paper consists of traditional event study methods employing both univariate analysis and multivariate regressions where the information content of earnings releases is measured over the [-1, +1] and [-2, +2] announcement windows.

Consistent with the first hypothesis of this study, my results show that lower credit ratings increase the information content of earnings announcements. The univariate evidence demonstrates that the stock price and trading volume reactions around earnings disclosures are more pronounced for firms with lower ratings. When firms report good earnings news, mean cumulative abnormal returns and trading volumes around the earnings announcement

increase as ratings become lower. In the case of bad news, lower ratings are associated with more negative abnormal returns and higher trading volumes. These univariate results are in line with the previous findings by Greatrex (2009). The regression results of my thesis provide further evidence that credit ratings are a significant driver of earnings releases' information content as market reactions tend to be larger for lower rated companies. In the event of a negative earnings surprise, a one notch decrease in a company's credit rating is associated with a 0.25% more negative stock price reaction to earnings announcements. The implication is that if a firm's reported earnings are below expectations, with a market cap of $2B (approximate median of my sample), a one notch lower rating would result in the firm's shareholders experiencing additional total losses of $5M, all else being equal. In addition, the regression coefficients indicate that, for both good and bad earnings news, a one notch lower credit rating results in 0.15%/0.17% more of the outstanding shares being traded in the market around an earnings announcement. Overall, my findings do not support the results of Leventis et al. (2014) who argue that higher ratings increase the informativeness of earnings announcements. As mentioned earlier in this paper, their study lacks robust methodology and thus I have confidence that my results provide a better picture regarding the impact of ratings on the information content of earnings releases.

While all the results demonstrate that market reactions around earnings announcements increase for lower rated companies in the event of bad news, the regression analysis does not provide consistent results indicating that abnormal returns are higher for companies with worse ratings when positive earnings news are announced. This implies that the impact of ratings on the information content of earnings announcements is not as strong in the case of positive earnings shock. Nevertheless, since the regression analysis shows that trading volumes increase for lower ratings in the event of good news, I conclude that earnings announcements of lower rated companies provide more information also when good news are reported. However, based on the inconclusive results related to the stock price reactions this additional information content is not always enough to generate a similar increase in the value of these lower rated firms. Thus, in the case of positive earnings news, there appears to be some truth to the idea that, as argued by Leventis et al. (2014), the stock market seems to find information provided by lower rated entities less credible. Overall, the evidence supports the second hypothesis of this paper as credit ratings seem to have a more significant impact on the information content of earnings releases when the reported earnings are below expectations. As mentioned before, lower rated firms experience larger stock price declines after an

earnings disappointment implying that the positive signal provided by a better rating results in a below-expectations earnings announcement having less significance for higher rated firms.

Additional univariate and multivariate analyses identify the specific circumstances in which the impact of credit ratings on the information content of earnings announcements is more pronounced. Firstly, the effect of credit ratings is more significant when firms are characterized by more information asymmetry problems. Lower ratings are associated with even stronger market reactions when focusing on high information asymmetry firms. Secondly, the impact of credit ratings on the informational value of earnings announcements increased when rating agencies were given an exemption from Regulation Fair Disclosure. Moreover, cumulative abnormal returns and trading volumes around earnings releases have continued to be even more pronounced for lower ratings over time despite the removal of the exemption in September 2010. These findings regarding high information asymmetry firms and disclosure regulation changes are both in line with my hypotheses and provide further evidence that better credit ratings decrease information asymmetry in financial markets.

I also find that preceding rating changes play a role in the informativeness of earnings releases although the results are not entirely as hypothesized or as statistically significant. Even though I hypothesize that only preceding downgrades impact the informational value of earnings disclosures, the findings indicate that upgrades affect the informational properties of earnings releases as well. The regression results reveal that a preceding downgrade (upgrade) increases (decreases) cumulative abnormal returns by 0.44% (0.34%) in the case of both positive and negative earnings shocks. Thus preceding rating changes appear to magnify information content only when the nature of the earnings surprise does not reflect the signal provided by the rating change. In other words, if earnings announcements convey good news following a rating downgrade, announcement returns increase. Likewise, in the case of bad news, abnormal returns are more negative if earnings releases are preceded by an upgrade. In addition, it seems that the stock market shows more interest towards the stock of a company that has been recently upgraded by a rating agency since preceding upgrades increase the trading volume reaction to earnings announcements.

To summarize, the main finding of this thesis is that the information content of a firm's earnings announcement increases when the firm's credit rating is lower. This is consistent with the idea that higher credit ratings reduce the information asymmetry and uncertainty surrounding a firm. Earnings releases by lower rated firms provide more information

regarding a firm's financial prospects as they lack the positive signal of a better rating. While the literature review of this paper presents findings from financial markets which indicate that better credit ratings reduce information asymmetry, this study is the first to properly show that the same phenomenon exists in the context of earnings announcements in stock markets as well. The results of this study should provide useful information to stock market investors and managers of public companies. Based on my results, holding all other things constant, investors can expect lower rated firms to have larger market reactions to earnings announcements. The impact of credit ratings is especially significant in the case of negative earnings surprises as stocks of lower rated firms tend to experience considerably greater market value losses. For managers, the main takeaway is that the stock market finds earnings announcements of lower rated firms more relevant and thus the earnings reports of riskier firms are more important. Furthermore, as lower rated firms are surrounded by greater information asymmetry due to lacking the certification effect of higher ratings, the earnings releases of firms with lower credit ratings tend to generate a less favourable stock market reaction. All else being equal, positive earnings news have a hard time increasing the value of lower rated firms while negative earnings surprises for these firms result in greater stock price declines.

This thesis also prompts suggestions for further research. As my study finds a meaningful relationship between credit ratings and earnings announcements, it would be interesting to know more about the impact of ratings on the information content of other types of announcements in stock markets. Examples of announcements which could be influenced by a firm's rating include news regarding mergers, dividends, restructurings and financing decisions as these usually generate stock market reactions and are associated with informational problems. My study could also be extended by examining whether there is a difference between the effects of different rating agencies' credit ratings. While my paper's results are based on S&P's ratings, future studies could also consider ratings issued by Moody's and Fitch. Finally, since my findings are based on US stock market data, future research could test if my results apply to stock markets of other countries as well. It might be the case that the importance of rating agencies and the informational role of ratings around earnings announcements might be even more significant in countries where equity markets are less transparent.

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