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The information content of credit rating announcements on the Dutch Euro corporate bond market

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ABSTRACT

The aim of this research is to examine the effect of the Global Financial Crisis and the Dot-com bubble on information content of credit rating changes and reviews. We investigated whether this effect decreased after both crises for the Dutch Euro corporate bond market. With a sample of 347 credit rating changes and 225 reviews of Dutch Euro corporate bonds, abnormal and cumulative average returns are calculated on a daily basis and in three different periods. The findings present insignificant results for upgrades, significant results for downgrades and multiple significant results for reviews. Overall, the effects did not decrease after the Dot-com bubble and only partially decreased after the Global Financial Crisis. Furthermore, across-class and without preceding review ratings did not contribute to larger effects.

Keywords:
Credit Rating Agencies, Bonds, Information Content, Global financial crisis, Dot-com bubble

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CHAPTER 1 – Introduction

In 2007, the Global Financial Crisis started with the subprime mortgage crisis, and peaked on the 15th of September 2008 after Lehman Brothers declared bankruptcy. The Global Financial Crisis has ended, but the financial world had difficulties recovering from it. Prior to the Global Financial Crisis another financial challenge occurred; the Dot-com bubble also known as the Internet bubble. This crisis was a speculative bubble of the World Wide Web, which took place during the years 1995 until 2001, and it collapsed at the end of 1999 until 2001.

The start of the Global Financial Crisis created a negative period for Credit Rating Agencies (CRAs), with some people arguing that these CRAs where one of the causes of this financial crisis. They were argued to be so because of their wrongfully rating of companies and being too late recovering for these wrongful ratings (White, 2010). Just like some argue that CRAs caused the East Asian Crisis due to downgrading too late and too much (Ferri, Liu and Stiglitz, 1999). CRAs are independent intermediaries that provide credit risk information to corporations and sovereign bonds. The three biggest and most well-known CRAs are Standard and Poor's (S&P), Moody's and Fitch. Credit ratings provide information about the risks associated with investing into countries and/or corporate entities. Companies that can trade higher rated bonds can often pursue better financing terms because of the weight attached to the credit ratings (Blume, Lim and Mackinlay, 1998). The countries and corporations are rated on their economic environment. Because of the crisis one might think that the credibility of the CRAs has reduced, and in turn, also the effect of the CRAs' actions on the financial market. Therefore, the aim of this research is to examine the effect of CRAs' actions on the Dutch Eurobond market, the research question therefore is:

Has the Global Financial Crisis decreased the information content of credit rating announcements on the Dutch Euro corporate bond market?

The existing academic literature has done little research on how downward and upward changes of credit ratings affect prices of bonds. Prior research that used bond price data to analyse the effect of rating changes have used different time periods as compared to this research. For example, Weinstein (1977) finds no price reaction due to credit rating changes; other researchers do find significant price reactions due to credit rating fluctuations

((e.g. Katz (1974); Ingram, Brooks and Copeland (1983)). But, these studies have used monthly bond prices and by doing so they did not isolate the announcement effect on bond prices (Hand et al., 1992). This event study is based on daily bond prices, since the use of daily bond prices is crucial in explaining the market reaction to rating actions. Steiner and Heinke (2001) also used daily bond prices, however this research uses a more recent and broader time period. On top of that, this study tests the effect of credit rating actions on bond prices by analysing the effect on the Dutch Euro corporate bond market, instead of the German Eurobond market. Besides, this research compares these effects before and after the Global Financial Crisis and the Dot-com bubble.

The Dutch Euro corporate bond market consists of corporate bonds of Dutch firms that are issued in Euros. Furthermore, in the years 1999 until 2016 both the Dot-com bubble and the Global Financial Crisis occurred. To our knowledge little research has been done on whether these crises affect the relationship between credit rating actions and bond prices. On top of that, there has never been any research done on the effect of credit rating actions on the Dutch corporate Euro bond market. Thus, with this research there will be a contribution to the existing literature and to the Dutch corporate Euro bond market, and investors dealing with bonds in this market. Furthermore, the results of this research can contribute to portfolio managers in the international bond markets who are using credit ratings as an investment tool, especially in the Dutch corporate Euro bond market. The results will show these investors what the effects of an upgrade or downgrade of credit ratings are to the Dutch corporate Euro bond market, which may prevent them from buying or selling bonds too soon/too late. From our univariate analysis, we might conclude that a selling decision or buying decision should be postponed or advanced.

In order to answer the research question, we will test multiple hypotheses. First of all, we investigate whether the credit rating announcements of the total sample (both credit ratings and reviews) contribute information content to the market and therefore have a significant effect on Dutch Euro corporate bonds. Then we look at whether this effect has decreased after the Global Financial Crisis, and we separately look at the effects of credit ratings and reviews. Next, we compare the effects and changes in effect after the Global Financial Crisis to the effects after and before the Dot-com bubble. Lastly, we look into the effect for both credit rating changes across classes and credit rating changes that had a preceding review in a similar direction.

This research is organized in the following manner; chapter 2 gives an explanation of both credit ratings and CRAs, a description of the role of credit ratings in both the Global Financial Crisis and the Dot-com bubble and a review of all the related and relevant literature. Chapter 3 discusses the methodology of this research, first the hypotheses that are tested are reviewed, followed by an explanation of the event study methodology, the data sample and sources used in this research and the statistical model. In chapter 4 the results are deliberated, first the total sample results are discussed followed by the results of all the sub-samples. Lastly, chapter 5 provides a conclusion of this research with some limitations of the work done and recommendations for further research.

CHAPTER 2 – Literature Review

The literature review starts with section 2.1; a brief explanation of the role of credit rating agencies and how they work. Sections 2.1.1 and 2.1.2 provide a brief summary of the Global Financial Crisis, the Dot-com bubble and the role that credit rating agencies played in both crises. Section 2.2 will cover the literature regarding the credit ratings and market reaction for bonds, stocks and credit default swaps. This research focuses on the effect of credit ratings and the bond market reaction. Lastly, section 2.3 discusses the role of information content and multiple hypotheses about information content and credit ratings. At the end, table 2 provides a summary of all the literature.

2.1 Credit rating agencies

Credit rating agencies (CRAs) are independent intermediaries that provide credit risk information to corporations and governments. CRAs play an important role in both the stock and bond market, their ratings are a means to decrease the information asymmetry by offering opinions and ratings on the credit quality of bonds issued by corporations and governments (White, 2010). The CRAs play two key roles in capital markets; they have a valuation role, by giving information to market participants, and they have a facilitating role; because the credit ratings are seen as reliable credit benchmarks (Frost, 2007). A positive rating of one of the three biggest CRAs has shown to be of grave importance to corporations and the bond rating assigned by the CRAs are meant to indicate the likelihood of default of the security (Cantor and Packer, 1994). Companies that can trade higher rated bonds can often pursue better terms because of the weight attached to the credit ratings. Furthermore, some companies are, by law, only capable to purchase bonds with an investment-grade rating (Blume, Lim and Mackinlay, 1998). The adoption of Basel II has increased the importance of highly rated securities by the CRAs by tying bank's capital requirements to credit ratings (Hau, Langfield and Marquez-Ibanez, 2013). The CRAs are able to make an upgrade, an affirmation, a downgrade or a withdrawal of their current rating.

Often corporations and regulators treat the credit ratings of different CRAs in a similar way. But in fact, the different credit ratings are not equivalents of each other. Moody's and S&P assign lower corporate bond ratings on average than their competitors. This could be due to Moody's and S&P automatically assigning ratings to all corporate bonds, whereas their competitors do this only when they are requested to do so (Cantor and Packer, 1997).

Table 1 shows the different credit ratings of the three biggest CRAs: S&P, Moody's and Fitch. S&P and Fitch's ratings are mainly similar and Moody's ratings differ from them. S&P varies from the highest grade, AAA, to the lowest grade D. Fitch also rates from AAA to D, only Fitch's lowest rating corresponds to the second-lowest S&P's rating, Moody rates from Aaa to C. These ratings are grouped in terms of grade and linked to a numerical scale to perform an empirical analysis.

Table 1: Numerical scale of credit ratings
Numerical scale of credit ratings of Standard and Poor's, Fitch and Moody's. Ranging from 1 to 24 and subdivided into groups, ranging from Supreme to Default.

S&P	Fitch	Moody's	Explanation	Numerical Scale
AAA	AAA	Aaa	Supreme	1
AA+	AA+	Aa1	High grade	2
AA	AA	Aa2		3
AA-	AA-	Aa3		4
A+	A+	A1	Upper medium grade	5
A	A	A2		6
A-	A-	A3		7
BBB+	BBB+	Baa1	Lower medium grade	8
BBB	BBB	Baa2		9
BBB-	BBB-	Baa3		10
BB+	BB+	Ba1	Speculative grade	11
BB	BB	Ba2		12
BB-	BB-	Ba3		13
B+	B+	B1	Highly speculative grade	14
B	B	B2		15
B-	B-	B3		16
CCC+	CCC+	Caa1	Risky grade	17
CCC	CCC	Caa2	Highly speculative	18
CCC-	CCC-	Caa3	Lowest grade	19
CC	CC	-		20
C	C	-	Default	21
DDD	SD	Ca		22
DD	D	C		23
D	-	-		24

2.1.1 Credit ratings and the Global Financial Crisis

There has been criticism about the value of the CRAs shown by academic literature. Some argue that the CRAs have taken a reactive role instead of a proactive role (Partnoy, 1999). They are also accused of providing inaccurate ratings and that they restore these ratings too late. Furthermore, these late actions of the CRAs were not only seen with the ratings of Enron and the Dot-com bubble, but also during the Global Financial Crisis, with the major CRAs still having an investment grade of Lehman Brothers on the day of their bankruptcy, and the CRAs are also accused of overrating government bonds (White, 2010).

During the Global Financial Crisis, the CRAs started to act in a field they had not much experience in; namely the underlying financing of subprime mortgage loans. These loans were grouped into mortgage-related securities, which then were split up in both more- and less-senior tranches. They were split up in such a way that the lesser senior tranches would bear all the future losses without the senior tranches getting any losses. In the end, lots of financial institutions owned most of the mortgage-related securities. In this process, these financial institutions also designed "structured investment vehicles". These vehicles would then, in their turn, borrow funds by "issuing short-term asset-backed commercial papers". With these borrowings, the financial institutions bought more tranches backed by subprime mortgages. By creating this circle, when the mortgage-backed securities would receive a high credit rating, the asset-backed commercial paper would also receive this high credit rating. By doing so this made it much cheaper to borrow. The total securitization of the subprime mortgages could only happen because of these high credit ratings of the tranches. This resulted in the CRAs playing a vital role in the creation of these mortgage-related securities (White, 2010).

By doing so, the CRAs were intensively communicating with the issuers of these securities about which type of rating and mortgage should be linked to what type of tranches of these securities (Mason and Rosner, 2007). If there would be higher ratings of these securities, these issuers made much higher profits. It is therefore not strange that these issuers started to pressure the CRAs to write out higher ratings. The market for mortgage-related securities involved only little financial institutions with very high volumes and the profit margins on these volumes were exceptionally high (White, 2010). These financial institutions could financially threaten a CRA to transfer their whole portfolio to another CRA. Thus, by creating and rating the mortgage-related securities, via the structured investment vehicles and short-term asset-backed commercial papers, the CRAs where acting in an environment where they had no prior experience and where they were under considerable financial pressure to give out higher ratings (Mathis, McAndrews, and Rochet, 2009).

White (2009) argues that the high credit ratings of the three major CRAs (S&P, Moody's and Fitch) played an important role in the creation of the subprime mortgage bubble. These high ratings were crucial for the securitization of subprime mortgages for three reasons; firstly, the trustworthy and high reputation of the CRAs lead to many bond buyers to trust their rating to be correct, so also their ratings about subprime mortgage-backed bonds. Secondly, for some investors high rated bonds where legally important or even compulsory. Lastly, banks could diminish the part of capital needed to provide when they traded a

portfolio of mortgage securities instead of mortgages, if these mortgage securities where rated AA or higher (White, 2009).

Utzig (2010) researched all the major European reports written about the global financial crisis and the role of the CRAs. In his research, he finds that the quality of the CRAs work was influenced by a couple of elements; firstly, the CRAs over relied on their mathematical and statistical methodologies based on inaccurate data. Second, CRAs made insufficient consideration of market and macroeconomic developments as factors influencing their ratings. Third, the CRAs failed to account for interdependencies and disregarded conflicts of interests. Lastly, the use of inaccurate models and models' assumptions led to a decrease of the quality of work of CRAs.

Two other possible determinants of the role of the CRAs ratings are discussed by Benmelech and Dlugosz (2009). The first theory is based on the principle of "rating shopping", rating shoppers will 'shop' at the CRAs for the highest rating for the lowest price. Rating shopping will most likely occur when CRAs have soft and lenient rating criteria. They find moderate evidence of rating shopping; tranches that have more than one rater are less likely to be downgraded in comparison to tranches rated by only one CRA. Furthermore, the chance of a rating downgrade significantly reduces with the number of raters increasing. The second theory is model error, different CRAs use different estimation models to define credit risk. Competition between CRAs could lead to a "race to the bottom", here the CRAs will compete to construct an estimation model which gives the highest ratings at the lowest cost. This competition could lead to the misuse of proper valuation models and in the end to inaccurate ratings.

Bolton et al. (2012) discuss three conflicts of interest in CRAs. They first discuss the CRAs conflict of interest between attracting new businesses and remaining an independent CRA. The CRAs could understate risks to try and attract new businesses. Secondly, the issue of "rating shopping" as discussed by Benmelech and Dlugosz (2009) is mentioned as a conflict of interest. Lastly, there is a conflict of interest when investors blindly trust the CRAs ratings. This trust seems to be higher in times of booms, when there is a bigger sum of investors believing ratings to be correct.

The link to the Global Financial Crisis is not the first time the CRAs actions are linked to a financial crisis. Ferri, Liu and Stiglitz (1999) argue that the CRAs were one of the causes of the East Asian Crisis due to them being too conservative. The East Asian countries were downgraded more than they were performing economically. By doing so, this created higher

cost of international borrowing and reduced the amount of international sales. They then argue that, at least for some part and time, the CRAs contributed to the East Asian Crisis.

2.1.2 Credit ratings and the Dot-com bubble

DeLong and Magin (2006) tried to find the exact beginning of the Dot-com bubble. They state that is wasn't the initial public offering of Netscape Communications in 1995 or the dialogue of Alan Greenspan in 1996, but that there was no significant sign of a bubble until 1998. This bubble kept on growing till the NASDAQ reached a peak in both the end of 1999, and even a higher peak in the winter of 2000, when eventually the bubble popped. During this bubble, many firms started implementing the ".com" to their firm name. Cooper et al. (2005) discover in their event study that the addition of the ".com" resulted in an increase of cumulative abnormal returns of 6.5% to 74% in the period prior to 2000.

Another factor causing the Dot-com bubble to burst is the part played by the CEOs and institutional investors of the new ".com" firms. In the period of the Dot-com bubble a lot of technical firms had an initial public offering (IPO). Most of the times when a company undergoes an IPO, the CEO and other important employees are paid in stocks of the firm. In the Dot-com period the CEOs and institutional investors were not allowed to trade their stocks until a certain time period. The CEOs and institutional investors all knew their firms were overvalued, so when they finally could sell their shares this resulted in a massive sell of shares and a huge negative signal to the market. Shortly after the sale of the CEOs' (and major employees') shares, other investors followed them and started to sell their shares as well. This eventually resulted in a massive drop of the price of these shares (Ljungqvist and Wilhelm, 2003). There are also a lot of technological companies that are not paying dividends, are relatively small and have no credit ratings. For these firms the investments in, and the valuation of, these firms are not in the hands of CRAs, but of the market valuation of their equity (Campello and Graham, 2013).

Some researchers and economists are arguing that we are currently at the beginning of a new technology bubble. On the 9th of June 2017 tech stocks took a fall (NASDAQ 2% drop) after Robert Boroujerdi (Goldman Sachs analyst) challenged the performance of the five biggest tech firms in the United States (Facebook, Amazon, Apple, Microsoft and Google). Again, the technology industry is in a boost and companies are valuated very highly, or are highly overrated if we believe some analysts. This is seen after the drop of the 9th of June, when the performance of the five biggest tech firms was challenged. These firms do make high profit but other big technology firms like Snap Inc. do not make high profits and are still

valued very highly. Snap Inc. was valued at 16 billion US dollars before it went public, while it had no high revenues or profits. As is argued by economist this might be the start of a new technology bubble.

2.2 Credit rating changes and market reactions

In this chapter, the relevant literature regarding the market reactions of the credit rating changes is discussed. The impact of a credit rating change on the market will be examined by looking at the impact on bonds, stocks and Credit Default Swaps (CDS). This research focuses on the effect on bonds, therefore the focus will be on the literature regarding bonds. The effect on the stock market and CDS will be discussed briefly.

2.2.1 Credit rating and bond price reactions

Two of the first academics dealing with the effect of credit ratings on corporate bonds were Katz (1974) and Grier and Katz (1976). Both tried to investigate whether credit ratings contained information valuable for the estimation of bond prices. Katz investigated the effect of credit rating changes on monthly bond yields, whereas Grier and Katz considered the effect of credit rating changes on average monthly bond prices. Both Katz and Grier and Katz found a significant positive price effect of the credit rating changes on corporate bonds. Katz found a modest effect of bond price changes after a credit rating change.

Following these two researches, Hettenhouse and Sartori (1976) and Weinstein (1977) both investigated the effect of credit rating changes on monthly bond returns. But, instead of a significant effect, they found no effect. Shortly after, Wakeman (1978) investigated the effect on monthly and weekly bond returns. Wakeman also found no significant effect on both the monthly and weekly bond returns. Ingram et al. (1983) examine the effect of credit rating changes of Moody's on the monthly changes of municipal bond yields. They find a significant effect after both an upgrade and a downgrade on the municipal bond yields. Hand et al. (1992) investigate both stock and bond price reactions, they find asymmetrical results regarding rating upgrades and downgrades. Despite these asymmetrical results, they conclude that there are both effects for the bond and stock prices after credit rating changes. Wansley et al. (1992) were one of the first to examine the effect of credit changes and CreditWatch placement on weekly bond returns instead of monthly bond returns. They find that there is a significant effect in the first seven days of a downgrade credit announcement, but after these first seven days they find no effect. Furthermore, they discover that there is no additional value of a placement on the CreditWatch and they found that the dependence of abnormal

bond returns is linked with the degree of rating change.

In the research of Hite and Warga (1997) a long event window is taken (one year prior and one year after credit rating announcement) to evaluate the effect of the credit rating changes on a longer period. Their sample consists of industrial bonds and S&P and Moody's credit changes. They used Lehman Brothers quotes to calculate the abnormal returns and this resulted in significant effects in the month of announcement of a downgrade and the period thereafter. Of the effect of upgrade announcements little evidence was found.

Steiner and Heinke (2001) were one of the first to investigate the effect of credit rating changes on daily bond prices. They investigated the effect on a big German-based sample and discovered significant bond price reactions to credit rating downgrades and negative watchlistings and found no effect of credit rating upgrades and positive watchlistings. Furthermore, they find that the issuer nationality also plays a significant role in the effect of credit rating changes on bond prices. They investigated this by examining the effect for US and non-US issuers; they find that there is a stronger reaction of US issuers after downgrades but for upgrades and reviews the results are the same. Gropp and Richards (2001) examine the effect of credit rating changes on bond and equity prices with a sample containing only European banks. They find no significant effect on bond prices credit rating changes, but do contain a significant effect on equity prices.

More recent research is done by May (2010), he investigates the effect of credit changes on bond prices from September 2002 until March 2009. He compares this effect with a sample of daily bond price returns and a sample with monthly abnormal returns. He finds significant effect on daily abnormal bond returns after both a downgrade and an upgrade, but the bond market reaction of an upgrade is "economically small". He then investigates the effect on the monthly abnormal bond returns and finds statistically significant effects in the month of announcement for both upgrades and downgrades. Because of the potential harmful interventions of non-rating actions in the month of the rating changes, the monthly abnormal bond returns tend to overemphasize the effect of credit rating changes in comparison to daily abnormal bond returns.

2.2.2 Credit rating and stock reactions

Pinches and Singleton (1978) were one of the first to investigate the effect of credit rating changes on equity prices. With a sample of Moody's bond credit ratings from 1950 until 1972 and monthly abnormal returns, they tried to find an announcement effect. They found that when bond credit ratings increase (decrease), this would result in a high (low) abnormal stock

return. Furthermore, they argue that reliance on bond rating changes as a financial warning mechanism is an ambiguous investment strategy due to the CRAs reacting after the investors already discounted for (negative) changing financial surroundings. Not much later, Griffin and Sanvicente (1982) measured the effect of a credit rating change announcement, for both Moody's and S&P, eleven months before and one month after the announcement on monthly stock prices returns. Bond downgrades have a significant effect on the stock prices both before and after the announcement, upgrade effects however are insignificant for the period after announcement but are significant for the eleven months prior to the announcement.

Holthausen and Leftwich (1986) found an asymmetric effect in their sample of credit changes of Moody's and S&P from 1977 until 1982 on daily stock returns. This asymmetric effect consisted of a significant effect on daily returns after a downgrade but no effect after an upgrade. Furthermore, they find that the degree and size of a rating change influences the reaction of the market. If a rating would change from BBB to BB this would result in a bigger reaction of the market, than a change from BBB+ to BBB-. Hand et al. (1992) and Matolcsy and Lianto (1995) find a similar asymmetrical effect, with significant effects after downgrades and no statistically significant effects after upgrades. In later research done by Dichev and Piotroski (2001), this asymmetrical effect is found again, they find that in the first twelve months after a downgrade announcement the (both daily and monthly) abnormal stock returns decrease by ten to fourteen percent. They also find no evidence for an effect after upgrade announcements. Furthermore, the negative effect is biggest for "small, low-credit-quality firms" and they find that the low abnormal stock returns come from a lower reaction of the downgrades rather than from smaller systematic risk.

Jorion and Zhang (2007) also look into the effect of credit rating changes on daily stock returns and find a significant effect. Furthermore, they find that the rating preceding the announcement of rating changes is one of the most important variables in contributing to changes in stock returns. If these preceding ratings were lower than the stock price effect will be larger.

2.2.3 Credit ratings and CDS reactions

Hull et al. (2004) look into the effect of credit rating changes on CDS. They find an asymmetrical effect with significant effects for downgrades and reviews of downgrades (whilst negative outlooks convey no significant effect) while there is little evidence for an effect after an upgrade. In line with this research Norden and Weber (2004) also find an anticipating effect of the CDS spreads for the downgrades. They find that this anticipating

effect starts around 90 to 60 days prior to the announcement. Furthermore, they find that the reviews for downgrades for both S&P and Moody's result in a significant effect on the CDS, whereas actual downgrades show no significant effect. Credit ratings from Fitch do not have any significant effect on reviews and actual downgrades. Daniels and Jensen (2005) investigate the effect of credit rating on both the bond and CDS market and find similar results, they find significant effect on CDS prices after a downgrade but no significant effects after an upgrade. Besides, they find that CDS markets anticipate much more rapidly and significantly to credit rating changes than bond markets.

Micu et al. (2006) find that there is a significant effect of outlook, reviews and actual rating changes for both upgrades and downgrades on CDS. They also find that the results are consistent whether there were other rating changes announcements prior to the actual rating announcement. The effect is greatest for downgrades when there is a chance of declining to a speculative grade, and the effect is greatest for upgrades when there is a possibility of getting an investment grade.

2.3 Information content of credit rating changes

For a couple of decades researchers have investigated whether credit ratings contain information content for the market. These researchers have investigated whether markets react to credit rating changes, and therefore, if these rating changes still contain information to the market's participants. There are four major hypotheses involving the information content of credit ratings: 1) No new information hypothesis, 2) The information content hypothesis, 3) The wealth redistribution hypothesis, and 4) The signalling hypothesis. These hypotheses will be elaborated in the following section.

2.3.1 No new information hypothesis

The first hypothesis states that credit ratings merely contain publicly available information and therefore fall behind the market anticipation of these credit ratings. In this hypothesis, the information concerning the credit ratings is merely a summary of information that was already available to the public. Following this hypothesis, the market prices would not change after a credit rating change due to the public already having conveyed the information of a firm going to perform better or worse. Therefore, there would be no abnormal returns after a credit rating change.

One of the first academics to follow this hypothesis was Weinstein (1977), as mentioned before Weinstein investigated the effect of credit rating changes on monthly bond

data. He found no effect of the credit rating change half a year prior and after the actual rating change. Weinstein concluded that the credit ratings contain no new information for the market, the information resulting from a credit rating change will always fall behind the market information. The only way for CRAs to provide information would be to daily (or on a more continuous basis) rate the firms they are working with (Weinstein, 1977). Following this study, Pinches and Singleton (1978) support the work of Weinstein. They state that the credit ratings fall behind the market reaction for about 18 months. They find abnormal return in the period shortly before the actual credit rating event (for both upgrades and downgrades), which in their opinion, shows that the credit ratings follow the market and therefore the information content to the market is minimal. Wakeman (1981) follows the same reasoning, he also argues that CRAs only provide information that is already available and thus already echoed into the market. If the CRAs do not provide more ratings that are not only fed by publicly available information, there will be no information content for the market after a rating change.

Glascock, Davidson and Henderson (1987) test three hypotheses in their research to confirm the no new information hypothesis; firstly, they test whether there is a decrease (increase) in the returns of the market just before a decrease (increase) in a bond rating. This hypothesis is supported by their data and therefore results in the same conclusion as Pinches and Singleton (1978) that all the information content is already absorbed by the market and there is no new information content. Their second hypothesis is where abnormally low (or high) returns were expected before the rating change, normal returns were expected after the month of the credit rating change. This hypothesis is also supported and therefore shows that there is a lag of the information content of the credit rating changes. The results also show that the information content of the credit rating changes had fully diminished a month after the credit rating change. Thirdly, they try to find out what the length of the lag of the credit rating changes was. They find that for upgrades the lag was around 18 months and for downgrades they find a lag of 15 months.

2.3.2 Information content hypothesis

The second hypothesis is called the information content hypothesis (Steiner and Heinke, 2001). Following this hypothesis, it is argued that CRAs have access to a proper amount of extra information that is not already available to the public. In an efficient market, all prices should be reflected by all the available information to the market. If the bond market is efficient in a semi-strong matter, any new information available to the market should result in a change of prices. Therefore, if credit ratings contain new information to the public then

there should be a bond price reaction to these rating changes.

Katz (1974) was one of the first to follow the idea of credit ratings offering information content to the market. He argues that there is information content to the market but that this bond market is not efficient in anticipating to any new information available. Holthausen and Leftwich (1986) also confirm that the rating changes provide information to the market. Using a data sample of daily bond prices (deleting events that could have been contaminated by other stories, using the Wall Street Journal), they find a significant abnormal price effect confirming the information content hypothesis.

Ingram et al. (1983) investigate the effect of credit rating changes on municipal bond prices, corresponding to the information content hypothesis, they find that in the market of municipal bonds there is indeed information content in the credit rating changes. They give multiple explanations why there is information content in the municipal bond market; due to significant lags separating events and financial information acknowledgements, rating changes happen simultaneously with the release of new information to the market, and because there is a substantial cost in collecting and inspecting information in the municipal bond market.

Tang (2009) investigated the effect of the 1982 Moody's credit rating refinement. In equal rating classes the refinements 1, 2 and 3 were added, in such a way to produce classes within-classes, ranging from best (1) to worst (3) with 2 being the average of the class. The paper shows that the Moody's refinement has diminished the information asymmetry in the credit market. This is because the refinement publishing has released more new information (classes within a rating, rather than one class) to the public. By doing so, Tang also shows that the credit ratings indeed have information content for the market.

2.3.3 Wealth redistribution hypothesis

The third hypothesis is the wealth redistribution hypothesis (Zaima and McCarthy, 1988), following this hypothesis the authors argue that there is an ongoing clash between the bondholders and stockholders of a firm. This clash could evolve in such a way that the stockholders would construct an optimal financial situation for themselves at the expense of the bondholders. They could increase (decrease) the amount of risky investment to increase (decrease) their own optimal returns, but by doing so, increase (decrease) the default risk. This would then contribute to a negative (positive) image of the firm's bonds and could potentially decrease (increase) the bond ratings. If this would be the case, the bond value would decrease (increase) after a downgrade (upgrade) rating and the stock value would

increase (decrease). Therefore, the wealth of the stockholders is redistributed from the bondholders to the stockholders. Zaima and McCarthy find that downgrades contribute information content to the market, whereas upgrades contribute to little new information. They find that there are signs of wealth redistribution after upgrades, but there are no signs of wealth redistribution after downgrades. Their results entail that "bad news" overrules the effect of information content for downgrades and the wealth distribution event overshadows upgrades. Furthermore, they argue that the lack of information content of upgrades is reduced due to the wealth redistribution effect.

2.3.4 Signalling hypothesis

The fourth hypothesis is called the signalling hypothesis, Akhigbe et al. (1997) argue that a credit rating change gives of a signal to the public about the performance of a firm. There are multiple studies looking into the effect of credit ratings on bond prices and studies researching the effect of a firm's specific information (earnings forecasts, stock offerings and bankruptcies) signals to the corresponding firm's industry. Akhigbe et al. (1997) combine these two types of researches and investigate whether a credit rating change of a firm will not only embody information about that firm, but also about the industry the firm is located in. They find that credit rating downgrades contain information not only about the firm but also about the industry it is acting in. Furthermore, they find that specific "intra-industry" characteristics will result in a bigger effect after a credit rating downgrade. The effect is larger when the firm has a bigger share price reaction to the credit rating downgrade, the downgraded firm is a prominent player in the industry, the downgraded firm is closely linked to its competitors in its industry, and the downgrade is a reaction to the firm's decline of financial performance.

Table 2: Summary of the literature
On the left the author of the article and the year of publication is shown. Then the study of either bonds, stocks or CDS and the data used in the research followed by a brief summary of the results.

Author (Publication year)	Study of bonds/stock/CDS	Data	Results
Katz (1974)	Monthly bond prices	Standard and Poor's, 1966 – 1972	No anticipation exists prior to the announcement of rating change; 100% adjustment prevails after 6-10 weeks after rating change
Grier and Katz (1976)	Average monthly bond prices	Standard and Poor's, 1966 – 1972	There is anticipation of industrial bonds but

			not of utility bonds
Hettenhouse and Sartori (1976)	Monthly bond prices	Standard and Poor's, 1962 – 1974	Little effect of anticipation of downgrades, no effect for upgrades
Weinstein (1977)	Monthly bond prices	Moody's, 1962 – 1974	Some evidence of price change in period 18 to 7 months prior to credit rating change, no reaction in the 6-month period after credit rating
Wakeman (1978)	Monthly and weekly bond and stock prices	Moody's, 1962 – 1974	No anticipation effect after downgrades and upgrades
Pinches and Singleton (1978)	Monthly stock prices	Moody's 1950 – 1972	When bond ratings decrease (increase), low (high) stock returns occur before the announcement and normal returns in the month after rating change
Griffin and Sanvicente (1982)	Monthly stock prices	Standard and Poor's and Moody's, 1960 - 1975	Bond downgrades are statistically significant, upgrades statistically insignificant
Ingram et al. (1983)	Monthly bond yields	Moody's 1977 – 1978	Significant yield premiums of the appropriate sign are found in the month of rating change for both upgraded and downgraded municipal bonds
Holthausen and Leftwich (1986)	Daily stock prices	Standard and Poor's and Moody's, 1977 - 1982	Downgrades are linked to negative stock returns in the two-day window, and size of rating change influences the market reaction
Hand et al. (1992)	Daily bond and stock prices	Standard and Poor's, 1981 – 1983	Downgrades have a significant effect on bond prices while upgrades have no significant effect
Wansley et al. (1992)	Monthly bond prices	Standard and Poor's 1982 – 1984	Rating downgrades affect bond prices, especially when they cross grades. No reaction to placement on CreditWatch.
Matolcsy and Lianto (1995)	Weekly bond prices	Standard and Poor's, 1982 – 1991	Only the announcement of downgrades has significant information content.
Hite and Warga (1997)	Daily and monthly	Standard and Poor's	Rating downgrades

	bond prices	and Moody's, 1985 – 1995	result in a significant effect on bond prices in announcement month and in pre-announcement period. No significant effect of rating upgrades.
Steiner and Heinke (2001)	Daily bond prices	Standard and Poor's and Moody's, 1985 – 1996	Downgrades and negative watchlistings have significant effect on bond prices, while upgrades and positive watchlistings do not have a significant effect
Gropp and Richards (2001)	Daily bond and stock prices	Moody's and Fitch, 1989 – 2000	No evidence of announcement effect on bond prices of a sample of European banks.
Dichev and Piotroski (2001)	Daily and monthly stock prices	Moody's, 1970 – 1997	Negative returns of 10-14% first year after downgrades, no effect after upgrades
Hull et al. (2004)	Credit Default Swaps	Moody's, 1998 – 2002	Reviews for downgrades contain information but upgrades, downgrades and outlook contain no information.
Norden and Weber (2004)	Credit Default Swaps spreads and corresponding stock prices	Standard and Poor's, Moody's and Fitch, 2000 – 2002	Significant effect of downgrades and downgrade reviews
Daniels and Jensen (2005)	Credit Default Swaps and bond prices	Standard and Poor's, 2000 – 2002	Significant effect on CDS prices downgrade, no significant effects after upgrade
Jorion and Zhang (2007)	Daily stock prices	Standard and Poor's and Moody's, 1996 – 2002	Rating prior to the rating change announcement is most valuable variable in explaining market returns, lower prior ratings are associated with larger effects
Micu et al. (2006)	Credit Default Swap spreads	Standard and Poor's, Moody's and Fitch, 2001 – 2005	All types of credit ratings have an effect of CDS spreads
May (2010)	Daily and monthly bond prices	Standard and Poor's, Moody's and Fitch, 2002 – 2009	Downgrades are negative statistically significant; upgrades are significant but economically small

CHAPTER 3 – Methodology

In this research, we are investigating the effect of credit rating changes on the Dutch Euro corporate bond prices. As mentioned above, there is not a clear answer to whether credit rating changes contribute any new information content to the market and result into an effect on the market prices. Moreover, there has been a lot of research regarding American bond samples, yet there has not been any research on the effect of Dutch bonds and there hasn't been much research about the effect of both the Dot-com bubble and the Global Financial Crisis on the effect of credit rating changes. In the following section, the hypotheses are introduced to test the above-mentioned effect of credit rating changes on the Dutch Euro corporate bond prices, after which the event study methodology, the data sample and sources, and the model will be discussed.

3.1 Hypotheses

This chapter gives a review of the hypotheses used to determine the effect of credit rating changes on Dutch Euro corporate bonds and whether this effect has changed after the Global Financial Crisis and the Dot-com bubble. As seen in the literature review there is no clear conclusion about the effect of credit rating changes on bond prices and therefore, this research tries to add a conclusion to the existing literature. We have also seen multiple hypotheses about the information content of credit ratings. We hypothesize that the credit ratings do possess valuable new information to the public and therefore influence the Dutch Euro corporate bond prices. The first hypothesis to be tested to answer the main research question of this paper is:

H1: *Credit rating announcements contribute to information content to the market and therefore have a significant effect on Dutch Euro corporate bonds.*

To answer this hypothesis, the effect of both credit rating changes and reviews on the Dutch Euro corporate bonds are investigated. As seen in the literature review there could be differences between an effect of a review and an actual rating change. In this research, we expect an effect for both reviews and actual rating changes:

H1a: *Rating changes have valuable information content and lead to abnormal Dutch Euro corporate bond price reactions.*

H1b: *Rating reviews have valuable information content and lead to abnormal Dutch Euro corporate bond price reactions.*

We have seen that there has been a decline of trust in the CRAs after the Global Financial Crisis. They were argued to have rated incorrectly and adjusted these mistakes too late. Therefore, we hypothesize that this decline in trust results in a declining effect of credit rating changes and reviews on the Dutch Euro corporate bonds:

H2: *The effect of credit rating agencies actions on the Dutch Euro corporate bonds has decreased after the Global Financial Crisis.*

H2a: *The effect of rating changes leads to smaller abnormal bond price reactions after the Global Financial Crisis.*

H2b: *The effect of rating reviews leads to smaller abnormal bond price reactions after the Global Financial Crisis.*

To test whether there is a similar response of the market to another crisis, this research will also investigate the effect on the Dot-com bubble. The same lack of trust is expected as after the Global Financial Crisis:

H3: *The effect of credit rating agencies actions on the Dutch Euro corporate bonds has decreased after the Dot-com bubble*

H3a: *The effect of rating changes leads to smaller abnormal bond price reactions after the Dot-com bubble*

H3b: *The effect of rating reviews leads to smaller abnormal bond price reactions after the Dot-com bubble*

Holthausen and Leftwich (1986) argue that the size of the rating change influences the market reaction. In such a way that larger rating changes (BBB to BB, compared to BBB+ to BBB-) would result in a larger reaction of the market. Therefore, we expect the effect of across class rating changes to be bigger than those of within-class rating changes:

H4: *The effect of a credit rating change across-classes will be larger than that of credit rating changes within-classes*

We also want to investigate whether there is a different effect of credit rating changes when there are preceding reviews as compared to the credit changes without a preceding review. We hypothesize that there is an effect of a review on the Dutch Euro corporate bond prices, we could conclude that the credit rating reviews announce a potential credit rating change. Therefore, the effect of an unannounced credit rating without a preceding review should be larger than of an announced one with a preceding review:

H5: *The effect of a credit rating change without a preceding review is larger than that of a credit rating change with a preceding review*

Often corporations and regulators treat the credit ratings of different CRAs in a similar way. But in fact, the different credit ratings are not equivalents of each other. Moody's and S&P assign lower corporate bond ratings on average than their competitors (Cantor and Packer, 1997). Therefore, we will investigate whether the effect of different credit rating agencies (S&P, Moody's and Fitch) are, in fact, not equivalents:

H6: *The effect of credit rating changes and reviews differs from the different credit rating agencies in such a way than one credit rating agency contributes to more information to the market than another*

Table 3: Summary of hypotheses

H1: *Credit rating announcements contribute to information content to the market and therefore have a significant effect on Dutch Euro corporate bonds.*
H1a: *Rating changes have valuable information content and lead to abnormal Dutch Euro corporate bond price reactions.*
H1b: *Rating reviews have valuable information content and lead to abnormal Dutch Euro corporate bond price reactions.*
H2: *The effect of credit rating agencies actions on the Dutch Euro corporate bonds has decreased after the Global Financial Crisis.*
H2a: *The effect of rating changes leads to smaller abnormal bond price reactions after the Global Financial Crisis.*
H2b: *The effect of rating reviews leads to smaller abnormal bond price reactions after the Global Financial Crisis.*
H3: *The effect of credit rating agencies actions on the Dutch Euro corporate bonds has decreased after the Dot-com bubble*
H3a: *The effect of rating changes leads to smaller abnormal bond price reactions after the Dot-com bubble*
H3b: *The effect of rating reviews leads to smaller abnormal bond price reactions after the Dot-com bubble*
H4: *The effect of a credit rating change across-classes will be larger than that of a credit rating change within-classes*
H5: *The effect of a credit rating change without a preceding review is larger than that of a credit rating change with a preceding review*
H6: *The effect of credit rating changes and reviews differs from the different credit rating agencies in such a way than one credit rating agency contributes to more information to the market than another*

3.2 Event Study Methodology

One of the most accepted methods to analyze the abnormal returns following a certain development is an event study. The first academics to use this event study method were Dolley (1933), Ball and Brown (1968) and Fama, Fisher, Jensen and Roll (1969). These first practices of the event study methodology have led to two different typologies, information impact event studies (where one looks at the effect of an event on the shareholders' wealth) and market efficient event studies (where one looks at the pattern of stock and bond prices adjusting to new information) (Constantin et al., 2015).

In this research, the development (or event) is the announcement of a credit rating change/review and this event will be analyzed by an event study. Furthermore, the event window must be chosen, an event window is the period in which the event is presumed to influence the dependent variable. Several studies use different event windows, Steiner and Heinke (2001) examine the 2-day (0, +1) and 6-day (0, +5) event window. Hand et al. (1992) use a one-day event window (0, 0) and Gropp and Richards (2001), Jorion and Zhang (2007) and Hirsch and Bannier (2007) use a three-day event window, ranging from one day prior to the event to one day after the event (-1, +1). Others investigate a larger event window, Goh and Erdington (1993) take an event window of 61 days (-30, +30), Norden and Weber (2004) have an event window of 181 days (-90, +90) and Barron et al. (1997) takes an event window of 31 days (0, +30). Following the study of Gropp and Richards (2001) we identify the credit rating change, as the event, on day 0. The event window is broader than just one day and therefore is defined as day -1 till +1, we do so because we have no access to information on the exact time of the announcement. This could be before, after or during the trading day, therefore taking this into account we broaden our event window from a single-day to a three-day window. Furthermore, the pre- and post-announcement effect will be examined in 29-day event window ranging from (-30, -2) for the pre-announcement effect and (+2, +30) for the post-announcement effect.

Moreover, an estimation window is needed to estimate the parameters of the market-adjusted model. Most researchers use an estimation window prior to the actual event; Jorion and Zhang (2007) use an estimation window of 201 days ranging from -250 to -50, Creighton et al. (2004) and Hirsch and Bannier (2007) use a 101-day window from -120 to -20. Hand et al. (1992) use an estimation window after the actual event, ranging from 62 days after the event (+62) to 361 days after the event (+361). For the estimation period, we follow the example Jorion and Zhang (2007), a 201-days estimation window ranging from 250 days prior to the event (-250) to fifty days prior to the event (-50).

This results in a dataset of 340 days or roughly eleven months, because we have a sample consisting of data prior and after the event so that we can investigate both the information content of credit rating changes and the after-announcement effect of bonds. It is important that the estimation window does not overlap any of the event windows. If this does happen there could potentially be bias in the results, therefore the 201-day estimation window before the three event windows is taken.

Figure 1: Time frame of estimation- and event window

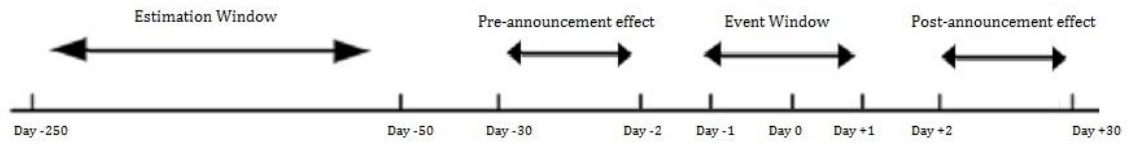

Table 4: Summary of all the models

On the left the author of the article and the year of publication are shown. Then the estimation window used, event window used, the model that the authors used and lastly the statistical test performed by the authors.

Author (publication date)	Estimation Window	Event Window	Model	Statistical test
Ball and Brown (1968)	All months since January 1946 for which data was available	12 months prior to the event date (month of annual report) till the end or arbitrary period 6 months after event date	Linear regression model	Chi-square
Fama, Fisher, Jensen and Roll (1969)	All months in period 1926 - 1960	29 months before the event date (m=0) is the month of the event	Linear regression model	Mean absolute deviation
Hand et al. (1992)	100 days period from day +62 until day +362 (day 0 being the event day)	Last transaction price in period -11 to -1 to the first transaction price after day +1. (If there are more than 20 days between both transaction prices, the observation is deleted)	Expectations model of bond rating changes based on yield-to-maturity	Cross-sectional standard deviation of window-spanning excess returns
Goh and Erdington (1993)	254 days period from day -154 to day -31 and day +31 to day +154	Three event windows: 1) *preannouncement*, (-30 to -11 and -10 to -1). 2)	Market model	Patell (1976) z- and t-statistics

		*announcement, (*0 to +1) and 3) *post-announcement,* (+2 to +11 and +12 to +30)		
Barron et al. (1997)	100 days period from day +61 to days +160	Particularly look at (0, +1) window, but present result till day +30	Market model	Variance of individual or portfolio average prediction errors
Gropp and Richards (2001)	95 days period from day -100 to -6	Day -1 to day 1, with day 0 being the event date	Market model	Standard deviation of the average abnormal return in the estimation window
Steiner and Heinke (2001)	360 days period from day -180 to day +180	Two event windows: 0 to +1 and 0 to +5. For speculative grade test they also look at windows +15 to +45 and +1 to +90	Market model	Simple t-test, Wilcoxon's sign rank test, *t*-test of Brown and Warner (1985) and rank sum test of Corrado (1989).
Creighton et al. (2004)	100 days period from -120 until -20	Days -20 to +20, with t=0 being the event date	Market model	Standard deviation of the average abnormal return in the estimation window
Norden and Weber (2004)	180 days period from -90 to +90	Several event windows: (-90, -61), (-60, -31), (-30, -2), (-1, +1), (+2, +30), (+31, +60) and (+61, +90)	Market model	Cross-sectional t-test, non-parametric Wilcoxon sign test and Wilcoxon sign rank test
Hirsch and Bannier (2007)	100 days estimation window from -120 to -20	Event window of -1 till +1	Market model	One-sided t-test and Wilcoxon t-test
Jorion and Zhang (2007)	200 days period from -250 to -50	Event window of -1 to +1	Market model	Simple t-test

3.3 Data sample and sources

To test the effect of both the Global Financial Crisis (2007-2009) and the Dot-com bubble (2000-2001) on the reaction of rating actions on prices of bonds, the sample period of this research will be 1994 up and until 2015. For both crises, three periods will be created: crisis period, pre- and post-crisis period. For the Global Financial Crisis, the prior period will be 1st of November 2001 up and until the 1st of November 2007 (one month after the crash of the Lehman Brothers). The crisis period will be the 1st of November 2007 up and until the 1st of January 2009 and the post period will be 1st of January 2009 up and until

1st of January 2015. Both crises events will contain a six-year prior and post period. To test whether the change in effect is the same for a different crisis, a similar six-year period test will be done for the Dot-com bubble. The prior-period will be the 1st of January 1994 up and until the 1st of January 2000; the crisis period will be the 1st of January 2000 up and until the 1st of January 2002 and the post-period will be 1st of January 2002 up and until 1st of January 2008.

For this research, we are examining companies that are based in the Netherlands. The credit rating changes for these companies were collected from the Bloomberg database. Only actual ratings for the three CRAs are considered, therefore all the ratings that had a withdrawn rating and issues that have not been rated are deleted from the sample. Furthermore, we will look at the long-term debt rating as we are interested in the effect of the long-term default probability. We will not take the outlook announcements into account while these announcements are under attention of individual rating analysts, and so these announcements are only the opinion of an individual analyst (Norden and Weber, 2009). Norden and Weber (2004) prioritize the different rating changes based on their creditworthiness. In this research, we follow Norden and Weber's priorities, resulting in a sample of Long-Term Foreign Issuer Credit (S&P), Issuer Rating (Moody) and Long-Term Issuer Default Rating (Fitch). This sample contains a total of 1230 different credit rating changes, with 204 rating changes from Fitch, 177 rating changes from Moody's and 849 rating changes from S&P's. Furthermore, the sample contained 38 rating changes prior to the Dot-com bubble, 249 credit rating changes after the Dot-com bubble, 395 rating changes prior to the Global Financial Crisis and finally 548 rating changes after the Global Financial Crisis.

Of course, it is of outmost importance that the selected sample is not biased. Several methods are used in event studies to prevent a potential bias in the event study sample. Steiner and Heinke (2001) delete all the credit rating changes that occurred on the same date. Hull et al. (2004) omit all events that occur within 90 trading days of a previous event. In a similar matter, Daniels and Jensen (2005), Micu et al. (2006) and Cathcart et al. (2010) delete all the events that occur in the same event window, within 10 days and within 21 days. In order to maintain a large enough sample, in this study we deleted all credit rating changes within the event window of three (trading) days from the sample. If we would have followed the example of Hull et al. (2004) we would not have a large enough sample to run our tests.

The daily corporate bond data was collected from the Datastream database. For every credit rating event, a corporate bond was manually checked and linked. These were fixed

debt bonds excluding floating, zero coupon and convertible debt (May, 2010). The bonds needed to come from companies listed in the Netherlands with a maturity of at least five years. Furthermore, the bonds needed to be issued in Euros, if the bonds are issued in another currency there could be a potential currency denomination difference. The Dutch financial markets are integrated with other European financial markets; therefore, the bonds could be issued in one of the European financial markets. All the bonds needed to have a window of 250 days prior to and up and till 30 days after the announcement event. If they did not have enough days in their window the bonds were deleted from the sample. After linking the credit rating events with a bond containing the previously mentioned requirements, a sample of 347 actual credit ratings changes and 225 reviews was left. As can be seen in table four, the most credit ratings and reviews are from CRA S&P (394). Fitch contributes to a total of 95 rating changes and reviews and Moody's has 83 rating changes and reviews.

Table 5: Credit ratings and reviews per Credit Rating Agency

Table consisting of total sample actual credit ratings (347) and credit watch additions/reviews (225) of Dutch Euro corporate bonds subdivided into three groups of the largest Credit Rating Agencies; Fitch, Moody's and Standard & Poor's. Sample ranges from the 1st of January 1994 till the 1st of January 2015.

Agency	Upgrades	Downgrades	Pos. review	Neg. review	Total
Fitch	16	48	11	20	95
Moody's	7	39	2	35	83
S&P	83	154	95	62	394
Total	106	241	108	117	572

The credit ratings are distributed into both prior and after crises periods as described in the beginning of this section. This results into a broader total group due the overlap of a part of the sample of the Dot-Com bubble post period and the Global Financial Crisis prior period in 2007. Consequently, this results into a sample of 20 rating changes and reviews in the Dot-Com bubble prior period and 74 changes and reviews in the post Dot-com period. The Global Financial Crisis has a sample of 63 rating changes and reviews in the prior sample and 463 changes and additions in the post period. Moreover, there are nine reviews and rating changes during the Dot-com bubble and two changes and additions during the Global Financial Crisis.

Table 6: Credit ratings per period

Table consisting of total sample actual credit ratings (347) and credit watch additions/reviews (225) of Dutch Euro corporate bonds announced by Standard and Poor's, Moody's and Fitch subdivided into pre- and post-crises periods. Dot-com bubble pre-period ranges from 1st of January 1994 till the 1st of January 2000, Dot-com bubble crisis period ranges from the 1st of January 2000 till the 1st of 2002 and Dot-com bubble post-period ranges from 1st of 2002 till the 1st of January 2008. Global Financial Crisis pre-period ranges from 1st of November 2001 till the 1st of November 2007, Global Financial Crisis crisis-period ranges from the 1st of November 2007 till the 1st of January 2009 and Global Financial Crisis post-period ranges from 1st of January 2009 till the 1st of January 2015.

Period	Upgrades	Downgrades	Pos. reviews	Neg. reviews	Total
DCB-Pre	2	8	3	7	20
DCB-Post	21	30	9	14	74
GFC-Pre	17	30	5	11	63
GFC-Post	83	193	93	94	463
Crisis (DCB)	0	5	3	1	9
Crisis (GFC)	0	1	0	1	2
Total	123	267	113	128	631

Furthermore, we want to investigate whether the degree of the rating change plays any role in the effect on the bond prices. We make a distinction between within-class rating changes, ratings that stay in the same class but change their grade (e.g. B+ to B-), and across-class rating changes, changes that do change from class (e.g. B- to CCC+). We also want to investigate whether announced ratings have a smaller effect on the bond prices than those that are not announced. The sample is divided into an announced group; the rating changes that have a preceded Credit Watch addition in the same direction as the actual rating change (e.g. positive Credit Watch Addition A+ to A+) and an unannounced group; the actual rating changes that do not have a preceding Credit Watch addition in the same direction. Table 7 summarizes all the different groups mentioned above.

Lastly, in table 8 a transition matrix is given of all the 347 actual rating changes. On the left, we see the prior ratings and on the right, we see the revised rating changes. A distinction is made between the rating changes that are within- and across-class. The numbers in black correspond to the 248 rating changes that are within the same class (e.g. B+ to B-), on the right side of the table we see the percentage of these within-class rating changes that are a downgrade. The numbers in green represent the 34 across-class upgrades (e.g. BBB+ to A-) numbers in red represent the 85 across-class downgrades (e.g. A- to BBB+).

Table 7: Credit ratings summary

Table consisting of total sample actual credit ratings (347) and credit watch additions/reviews (225) of Dutch Euro corporate bonds announced by Standard and Poor's, Moody's and Fitch from the first of January 1994 till the 1st of January 2015. Within-class changes are those that are within the same class (e.g. B+ to B-), across class changes are those changes across class (e.g. BBB+ to A-). Announced rating changes are actual rating changes that are preceded by a Credit Watch addition in the same direction (e.g. positive watch addition A*+ to A+), unannounced rating changes are those that are not preceded by a Credit Watch addition in the same direction. Change investment grade are rating changes that either loss or gain investment grade (e.g. BBB- to BB+), no change investment grades are those changes that do not result in a change in investment grade.

Sample	Upgrades	Downgrades	Total
Total Sample	106	241	347
Within-class rating changes	73	155	248
Across-class rating changes	33	86	119
Announced	19	69	118
Unannounced	87	172	259

Table 8: Rating changes transition matrix

Transition matrix of rating changes, sample of 347 actual rating changes of Dutch Euro corporate bonds announced by Standard and Poor's, Moody's and Fitch from the 1st of January 1994 till the 1st of January 2015 representing all the within- and across-class credit rating changes. The black numbers represent all the 248 within-class credit rating changes (e.g. B+ to B-), numbers in green represent all the across-class credit rating upgrades (e.g. BBB+ to A-) and the numbers in red represent all the across-class rating downgrades (e.g. A- to BBB+). The % downgrades within-class represent the percentage of downgrades within the same class (e.g. A to A-).

	Revised Rating											
Prior Rating	AAA	AA	A	BBB	BB	B	CCC	CC	C	D	Total	% downgrades within-class
AAA		5									5	
AA		20	44								64	(80,00 %)
A		10	124	20							154	(61,29 %)
BBB			1	59	9						69	(89,83 %)
BB				4	15	5					24	(33,33 %)
B					11	9	2				22	(33,33 %)
CCC						2	1	1			4	(100,00 %)
CC							2				2	
C								1			1	
D								2			2	
Total		35	169	83	35	15	5	5			347	

3.4 Model

To test the effect of credit ratings on bond prices we use the standard market model. The market model is a statistical model that disclosed the connection between the return of a variable (in our case bonds) to the return of the market portfolio (MacKinlay, 1997). For

every separate event (i) the daily bond price (R_{it}) is regressed with the analogous market return (R_{mt}):

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \quad (1)$$

here R_{it} is the rate of return on security i for day t. The market return (R_{mt}) on the corresponding European Stock Exchange (Swiss Exchange, Euronext Amsterdam, Deutsche Boerse, Euronext Paris and Luxembourg Stock Exchange) and ε_{it} is the error term, the α_i and β_i are the parameters that need to be predicted.

The abnormal return (AR_{it}) associated with the rating action of interest is calculated as the difference between the actual bond's return and the return predicted by the market model using the parameters from the estimation window (Creighton et al., 2004):

$$AR_{it} = R_{it} - (\alpha_i + \beta_i R_{mt}) \quad (2)$$

The abnormal returns (AR_{it}) will be summed over an event window period to get the cumulative abnormal returns (CAR_t). The concept of a cumulative abnormal return is needed to work with a multiple period event window (MacKinlay, 1997).

$$CAR_{\tau 1,\tau 2} = \sum_{i=\tau 1}^{\tau 2} \mathrm{AR}_{it} \quad (3)$$

where CAR_t is the cumulative abnormal return of security i from day τ_1 to τ_2. Furthermore, we need to calculate averages of multiple firms within the sample. Therefore, the abnormal returns (AR_{it}) are averaged by the number of events N to get the average abnormal returns:

$$AAR_t = \frac{1}{N} \sum_{n=1}^{N} \mathrm{AR}_{it} \quad (4)$$

Then when we sum the average abnormal returns for any time frame τ_1 to τ_2 we get the cumulative average abnormal returns, calculated by:

$$CAAR_{\tau 1,\tau 2} = \sum_{i=\tau 1}^{\tau 2} \mathrm{AAR}_t \quad (5)$$

3.4.1 Test statistics

To receive any statistical significance, we follow the example of Gropp and Richards (2001) and use the standard deviation (σ_{AAR}) of the abnormal average return (AAR_t):

$$\sigma_{AAR} = \sqrt{\frac{1}{200}\sum_{t=-50}^{t=-250}(\mathrm{AAR}_t - \overline{AAR})^2} \qquad (6)$$

under the assumption of i.i.d. normally distributed abnormal returns, the ratio of the average abnormal returns ($\overline{AAR}$) to the standard deviation (σ_{AAR}) is dispersed as a student's t with n degrees of freedom. Here the $\overline{AAR}$ is the mean average abnormal return of the 200 days estimation window (-250 to -50). The standard deviation of CAAR is calculated by (σ_{AAR}) times the square root of the number of periods in the accumulated return (Gropp and Richards, 2001). Significant tests are performed for both the CAAR (with event window t, t+T) and the AAR_t, they are tested by performing the following significance tests:

$$t_{AAR} = \frac{AAR_t}{\sigma_{AARt}} \qquad (7)$$

$$t_{CAAR} = \frac{CAAR_{t,t+T}}{\sigma_{AARt}\sqrt{T}} \qquad (8)$$

Furthermore, we follow the example of Boehmer et al. (1991) and define the notations used by them:

- *N*: number of firms in the sample;
- AR_{ie}: abnormal return of firm *i* on event date *e*;
- AR_{it}: abnormal return of firm *i* on day *t*;
- *T*: number of days within the estimation period;
- *TE*: number of days within the event period;
- $\bar{R}_m$: average return on the market portfolio in the estimation period
- $R_{m,E}$: market return of market index on event date E
- $\hat{S}_i$: standard deviation of firm *i* during the estimation window
- SR_{ie}: standardized abnormal return of firm *i* on the event date *e*, calculated by:

$$SR_{ie} = AR_{ie} \,/\, [\hat{S}_i \sqrt{1 + \frac{1}{T} + \frac{(R_{m,E} - \bar{R}_m)^2}{\sum_{t=1}^{T}(R_{m,t} - \bar{R}_m)^2}}\,] \qquad (9)$$

In the significance test called BMP by Boehmer et al. (1991) an estimation of the cross-sectional variance of the abnormal returns is made. This estimation takes the event-induced increase in the return volatility (Aktas, de Bodt and Cousin, 2007). The BMP is calculated by:

$$Z_{BMP} = \frac{\frac{1}{N}\sum_{i=1}^{N} SR_{iE}}{\sqrt{\frac{1}{N(N-1)}\sum_{i=1}^{N}(SR_{iE} - \sum_{i=1}^{N}\frac{SR_{iE}}{N})^2}} \quad (10)$$

The last test used to test the significance is the Corrado Rank test. This test was first introduced by Charles Corrado in 1989 and ranks the abnormal returns. The abnormal returns are arranged and a rank is linked to each day.

$$T_{Corrado} = \frac{\frac{1}{N}\sum_{i=1}^{N}(K_{iE} - \bar{K})}{S(K)} \quad (11)$$

where K_{iE} is the rank linked to firm *i*'s abnormal return on day *t* and $\bar{K}$ is the average rank. Furthermore, the standard error (S(K)) is calculated by

$$S(K) = \sqrt{\frac{1}{T+TE}\sum_{t=1}^{T+TE}(\frac{1}{N}\sum_{i=1}^{N}(K_{it} - \bar{K}))^2} \quad (12)$$

For testing the significance for the cumulative average abnormal returns another Rank significance test needs to be used (Campell and Wasley, 1993):

$$T_{Corrado} = \sqrt{\mathrm{TE}} * \frac{\frac{1}{N}\sum_{i=1}^{N}(K_{T1,T2} - \bar{K})}{S(K)} \quad (13)$$

where $K_{T1,\,T2}$ is calculated by:

$$K_{\mathrm{T1,T2}} = \frac{1}{TE}\sum_{t=T1}^{\mathrm{T2}} K_t \quad (14)$$

By using the Corrado Rank test the impact of the shape of the abnormal return distribution is counterbalanced. The Corrado Rank test also helps to resolve misspecifications caused by an event-date excess-return variance increase (Aktas, de Bodt and Cousin, 2007; Corrado, 1989).

CHAPTER 4 – Results

In this chapter, we will describe the results of the tests discussed. Firstly, the results of the full sample of actual credit rating changes are discussed followed by the results for both the separate Dot-com bubble sample and the Global Financial Crisis sample. Secondly, the results of the rating reviews are discussed. Lastly, we will look at the results for the within- and across-sample, the announced and unannounced changes and the different credit rating agencies. Following the results, we will examine whether the hypotheses tested in this research can be confirmed or rejected.

4.1 Credit rating changes

In order to answer hypothesis 1, we will first look at hypothesis 1a; *Rating changes have valuable information content and lead to abnormal Dutch Euro corporate bond price reactions.* The results of the total sample are shown in table 9. The upgrades show some significant results (for the BMP and Rank test), but for the cumulative abnormal returns (CAAR) in all the three periods, we examine no significant results. Overall, the upgrades do result in a positive (insignificant) effect after the upgrade announcement. These results are in line with most of the literature regarding the statistical significance of actual rating upgrades effect on bond prices. Hettenhouse and Sartori (1976), Griffin and Sanvincente (1982), Hand et al. (1992), Matolcsy and Lianto (1995), Hite and Warga (1997), Steiner and Heinke (2001), Dichev and Piotroski (2001) and Daniels and Jensen (2005) all find no statistical significant effect of actual rating upgrades, the results of the upgrades as shown in table 9 are in line with these studies. For some individual AAR, we did find significant effects, but for the CAAR we did not find any significant results. These results are somewhat in line with May (2010), who did find a significant effect after upgrades but stated that this effect was economically very small.

As expected we see a negative effect on both the abnormal average return (AAR) and the CAAR both before and after the downgrade announcement. We see a negative CAAR of -0.30% in the period before the downgrade, an (insignificant) negative CAAR of -0.28% in the period one-day prior to till one-day after the downgrade announcement and a negative CAAR of -0.12% in the period after the announcement effect. The only disappointing fact is that the significance is only shown in the Rank-test. As mentioned before, Hettenhouse and Sartori (1976), Griffin and Sanvincente (1982), Hand et al. (1992), Matolcsy and Lianto (1995), Hite and Warga (1997), Steiner and Heinke (2001), Dichev and Piotroski (2001) and Daniels and Jensen (2005) all found no statistical effect after an upgrade and they did find a significant

effect after a downgrade. Furthermore, Holthausen and Leftwich (1986), Wansley et al. (1992) and Norden and Weber (2004) all found a similar significant effect after downgrades and no statistical effect after upgrades.

Following these results, we can conclude that for the total sample hypothesis 1a can partly be confirmed; rating downgrades do have valuable information content and do lead to abnormal Dutch Euro corporate bond price reactions in the total sample, but there is not enough statistical evidence that rating upgrades lead to abnormal Dutch Euro corporate bond price reactions. Therefore, we can confirm the no new information hypothesis for the upgrades in the total sample and confirm the information hypothesis for the downgrades in the total sample. There could be different results when looking at the sub-samples, therefore we will look at the results of all the different sub-samples.

Table 9: Results credit rating changes

Test result of rating changes, sample of 347 actual rating changes of Dutch Euro corporate bonds announced by Standard and Poor's, Moody's and Fitch from the 1st of January 1994 till the 1st of January 2015 representing all the within- and across-class credit rating changes. Average Abnormal Returns (AAR) for ten days prior to ten days after the credit rating announcement and Cumulative Average Abnormal Returns (CAAR) for periods -30 to -2, -1 to +1 and +2 to +30 days for both upgrades and downgrades are shown. T-statistic results are given for three different significant tests; t-value (Gropp and Richards, 2001), Corrado Rank (Corrado, 1989) and BMP (Boehmer et al., 1991).

Day	Upgrades	t-value	Rank	BMP	Downgrades	t-value	Rank	BMP
	N= 106				N= 241			
AAR_{-10}	-0.20%	-0.139	-1.144	**-2.252****	-0.17%	-0.116	0.066	**-1.605***
AAR_{-9}	-0.06%	-0.042	-0.221	**-1.323***	-0.03%	-0.024	-1.042	-0.386
AAR_{-8}	-0.01%	-0.001	1.033	-0.055	0.08%	0.054	0.350	1.007
AAR_{-7}	-0.02%	-0.013	0.683	-0.538	**-0.14%**	-0.096	**-1.647****	**-1.977****
AAR_{-6}	0.14%	0.021	**1.464***	0.498	0.01%	0.002	0.433	0.057
AAR_{-5}	0.13%	0.087	1.360	**2.317****	0.02%	0.017	0.557	0.551
AAR_{-4}	0.09%	0.060	0.677	**1.519***	-0.27%	-0.188	-1.006	-1.436
AAR_{-3}	0.18%	0.124	0.879	1.181	-0.22%	-0.154	-0.497	**-1.360***
AAR_{-2}	-0.05%	-0.034	**-1.441***	-0.898	**0.22%**	-0.154	**-2.215****	**-2.753*****
AAR_{-1}	0.01%	0.008	0.292	0.212	-0.05%	-0.031	-0.390	-0.605
AAR_{0}	0.02%	0.015	-0.350	0.588	0.08%	-0.055	-0.596	-0.523
AAR_{+1}	0.02%	0.012	0.961	0.743	-0.32%	-0.220	-0.160	**-2.333****
AAR_{+2}	-0.01%	-0.004	-0.114	-0.167	0.08%	0.052	-1.430	0.595
AAR_{+3}	-0.03%	-0.022	0.386	-1.003	0.11%	0.076	**-2.395*****	0.860
AAR_{+4}	0.04%	0.028	-0.346	1.087	-0.09%	-0.061	-0.407	-0.757
AAR_{+5}	0.06%	0.043	0.869	**1.561***	0.06%	0.030	-0.161	0.882
AAR_{+6}	0.05%	0.034	0.895	**1.889****	0.04%	-0.001	0.535	0.783
AAR_{+7}	-0.01%	-0.002	0.191	-0.075	-0.01%	-0.014	-0.733	-0.028
AAR_{+8}	-0.05%	-0.032	0.389	-0.056	-0.02%	-0.002	0.270	-0.301
AAR_{+9}	**-0.10%**	-0.070	**-1.334***	**-1.801****	-0.01%	-0.012	0.040	-0.034
AAR_{+10}	0.08%	0.057	1.006	**1.514***	-0.02%	0.041	0.581	-0.246
$CAAR_{-1, +1}$	0.05%	0.021	0.521	0.735	-0.28%	-0.113	-0.624	-1.020
$CAAR_{-30, -2}$	-0.18%	-0.023	-0.630	-0.716	-0.30%	-0.170	**-2.868*****	-0.783
$CAAR_{+2, +30}$	0.30%	0.038	-0.083	-0.947	-0.12%	-0.016	**-1.650****	-0.007

* Significant at 90% level ** Significant at 95% level *** Significant at 99% level

4.1.1 Dot-com pre-sample

We will now discuss the results of the sample prior to the Dot-com bubble. Almost all results (both upgrades and downgrades) are statistically insignificant. There is only one significant result after an upgrade and only three significant AARs after a downgrade. For both the upgrades and downgrades the CAARs are not statistically significant. We can conclude that for the prior to the Dot-com bubble sample the rating changes do not have valuable information content and do not lead to abnormal Dutch Euro corporate bond price reactions, therefore hypothesis 1a is rejected for this sample. The no new information hypothesis can be confirmed for the Dot-com pre-sample.

Table 10: Results credit rating changes Dot-com pre-sample

Test result of rating changes, Dot-com pre-sample of 10 actual rating changes of Dutch Euro corporate bonds announced by Standard and Poor's, Moody's and Fitch from the 1st of January 1994 till the 1st of January 2000 representing all the within- and across-class credit rating changes. Average Abnormal Returns (AAR) for ten days prior to ten days after the credit rating announcement and Cumulative Average Abnormal Returns (CAAR) for periods -30 to -2, -1 to +1 and +2 to +30 days for both upgrades and downgrades are shown. T-statistic results are given for three different significant tests; t-value (Gropp and Richards, 2001), Corrado Rank (Corrado, 1989) and BMP (Boehmer et al., 1991).

Day	Upgrades	t-value	Rank	BMP	Downgrades	t-value	Rank	BMP
	N= 2				N=8			
AAR_{-10}	-0.11%	-0.077	-1.395	-1.263	-0.06%	-0.038	-0.065	-0.409
AAR_{-9}	0.08%	0,058	1.404	1.217	0.10%	0.068	0.441	1.380
AAR_{-8}	0.14%	0.103	1.309	1.097	-0.02%	-0.013	-1.071	-0.579
AAR_{-7}	0.09%	0.064	0.920	0.874	-0.18%	-0.125	-1.045	-1.184
AAR_{-6}	-0.19%	-0.133	-0.935	-1.015	0.07%	0.051	0.525	**1.652***
AAR_{-5}	0.39%	0.271	**1.898***	1.227	-0.07%	-0.45	0.411	-0.639
AAR_{-4}	-0.13%	-0.093	-1.547	-1.262	-0.05%	-0.036	-1.372	-0.673
AAR_{-3}	0.25%	0.170	0.844	0.895	-0.14%	-0.098	-0.270	-0.877
AAR_{-2}	0.18%	0.124	0.038	0.486	0.19%	0.130	0.597	0.955
AAR_{-1}	-0.15%	-0.104	-0.740	-0.755	-0.01%	-0.09	-0.867	-0.269
AAR_{0}	-0.09%	-0.067	-1.499	-1.414	0.00%	0.001	-0.346	-0.006
AAR_{+1}	0.14%	0.097	0.844	0.855	0.18%	0.130	1.224	1.284
AAR_{+2}	0.19%	0.133	0.493	0.712	-0.38%	-0.264	-0.163	-1.108
AAR_{+3}	-0.24%	-0.167	-1.764	-1.222	-0.10%	-0.068	-0.939	-0.345
AAR_{+4}	0.02%	0.015	-0.360	0.241	**-0.56%**	-0.389	**-2.626****	**-2.192****
AAR_{+5}	0.10%	0.075	1.309	1.280	**-0.57%**	-0.397	**-2.018****	**-1.550***
AAR_{+6}	0.06%	0.040	1.176	1.295	-0.01%	-0.005	-0.156	-0.172
AAR_{+7}	0.16%	0.110	1.613	1.418	0.57%	0.395	0.190	0.991
AAR_{+8}	0.00%	0.001	0.251	0.160	-0.04%	-0.024	0.114	-0.333
AAR_{+9}	0.32%	0.219	1.537	1.086	-0.06%	-0.040	-0.015	-0.742
AAR_{+10}	-0.06%	-0.047	-1.176	-1.304	0.01%	0.007	-0.338	0.063
$CAAR_{-1, +1}$	-0,10%	-0.043	-0.805	-1.234	0.17%	0.070	-0.345	0.083
$CAAR_{-30, -2}$	1.20%	0.157	1.722	0234	-0.67%	-0.087	-0.239	-0.637
$CAAR_{+2, +30}$	1.19%	0.160	0.655	0.563	-1.99%	-0.261	-0.649	-0.254

* Significant at 90% level ** Significant at 95% level *** Significant at 99% level

4.1.2 Dot-com post-sample results

The Dot-com post sample shows somewhat similar insignificant results regarding the upgrades, just as the total sample and the prior Dot-com bubble sample. There are a couple of statistical significant AARs, on the announcement day the AAR is 0.11%, seven- and four-days prior to the announcement the AARs are 0.07% and 0.09%. These are positive effects one could expect for a credit rating upgrade. Strangely, the CAAR in the period after the announcement resulted in a negative effect of -0.20%. This contradicts the positive effect one might expect, but is only supported by one statistical test. As discussed before, the majority of insignificant upgrade results are in line with most of the literature.

The results of the effect of downgrades show significance on multiple of the CAARs and AARs results. Four-days prior AAR to the downgrade announcement shows a significant effect of -1.03%, three- and two-days prior AARs also show -1.60% and -0.71% effect, furthermore over the period -30 to -2 days prior to the announcement the effect of the downgrade is -1.59%. These significant negative effects are in line with the literature (Hettenhouse and Sartori (1976), Griffin and Sanvicente (1982), Hand et al. (1992), Wansley et al. (1992), Matolcsy and Lianto (1995), Steiner and Heinke (2001), Norden and Weber (2004), May (2010)) but the significant positive effect on the announcement day of 1.06% contradicts the literature just like the negative effect in the period after the upgrade announcement. This is also the case for the significant positive effect of the interval one-day prior to the announcement effect until one day after the announcement effect, this results in an effect of 1.43%. This contradicts the research of Holthausen and Leftwich (1986) who find a significant negative return in this window. This difference could be due to Holthausen and Leftwich having a United States sample and our sample being from a European market country, the Netherlands. Taking these results into account we can state that for the Dot-com post-sample, both upgrade and downgrade rating changes do have some valuable information content and lead to abnormal Dutch Euro corporate bond price reactions. We can therefore state that for the Dot-com post-sample the information content hypothesis can be confirmed.

We can also answer hypothesis 3a: *the effect of rating changes leads to smaller abnormal price reactions after the Dot-com bubble.* The CAAR effects after an upgrade before the Dot-com bubble were -0.10% (one-day prior to one-day after the announcement), 1.20% (period prior to the announcement) and 1.19% (period after the announcement. After the Dot-com bubble these results were 0.06%, -0.07% and -0.20%. For the upgrades, it seems the effect has indeed decreased after the Dot-com bubble and even turned into a negative effect. But because most results were insignificant we cannot draw any conclusions and

therefore cannot confirm hypothesis 3a for the upgrades. The CAAR effect after a downgrade were 0.17%, -0.67% and -1.99% before and 1.43%, -1.59 and 0.20% after the Dot-com bubble. The prior to the Dot-com bubble did not result in any significant results as shown before, and therefore we should draw the same conclusion as for the upgrades and cannot confirm hypothesis 3a. We should take into account that the effects of the sample prior to the Dot-com bubble might not represent a full picture due to the sample being very small.

Table 11: Results credit rating changes Dot-com post-sample

Test result of rating changes, Dot-com pre-sample of 51 actual rating changes of Dutch Euro corporate bonds announced by Standard and Poor's, Moody's and Fitch from the 1st of 2002 till the 1st of January 2008 representing all the within- and across-class credit rating changes. Average Abnormal Returns (AAR) for ten days prior to ten days after the credit rating announcement and Cumulative Average Abnormal Returns (CAAR) for periods -30 to -2. -1 to +1 and +2 to +30 days for both upgrades and downgrades are shown. T-statistic results are given for three different significant tests; t-value (Gropp and Richards, 2001), Corrado Rank (Corrado, 1989) and BMP (Boehmer et al., 1991).

Day	Upgrades	t-value	Rank	BMP	Downgrades	t-value	Rank	BMP
	N= 21				N=30			
AAR_{-10}	0.02%	0.270	0.258	0.940	0.16%	0.836	1.315	**1.572***
AAR_{-9}	-0.01%	-0.083	-0.091	-0.328	0.18%	0.937	1.323	**1.445***
AAR_{-8}	-0.01%	-0.166	-0.779	-0.441	0.20%	1.036	1.093	**1.613***
AAR_{-7}	**0.07%**	0.810	**1.485***	**1.467***	0.14%	0.750	0.236	1.268
AAR_{-6}	-0.01%	-0.027	0.255	-0.080	0.14%	0.722	1.055	**2.162****
AAR_{-5}	-0.02%	-0.311	-0.171	-1.096	0.05%	0.249	-0.035	1.111
AAR_{-4}	**0.09%**	1.087	**1.909****	**1.512***	-1.03%	**-5.372*****	-1.189	-0.793
AAR_{-3}	-0.01%	-0.072	-0.042	-0.187	**-1.60%**	**-8.354*****	**-2.007****	**-1.310***
AAR_{-2}	-0.07%	-0.778	-0.864	**-1.600***	-0.71%	**-3.674*****	-0.406	-1.288
AAR_{-1}	-0.07%	-0.814	-0.735	-1.231	0.13%	0.675	0.729	**1.551***
AAR_{0}	**0.11%**	**1.334***	**1.566***	**1.699***	**1.06%**	**5.537*****	**-1.442***	**1.441***
AAR_{+1}	0.02%	0.172	0.456	0.296	0.24%	1.243	-0.563	1.282
AAR_{+2}	-0.02%	-0.289	-0.304	-0.675	-0.05%	-0.247	-0.882	-0.395
AAR_{+3}	-0.01%	-0.145	-0.221	-0.247	-0.01%	0.488	-0.605	0.500
AAR_{+4}	0.03%	0.384	1.019	**1.551***	0.09%	0.720	-0.194	**1.409***
AAR_{+5}	0.02%	0.272	-0.693	0.496	0.14%	-0.379	0.591	-0.578
AAR_{+6}	0.01%	0.158	0.498	0.286	-0.07%	0.712	0.785	0.681
AAR_{+7}	0.03%	0.340	0.341	0.625	0.14%	-0.371	-0.370	-0.686
AAR_{+8}	0.01%	0.023	-0.984	0.052	-0.07%	-0.508	0.026	-1.005
AAR_{+9}	-0.04%	-0.458	-1.037	**-1.376***	0.05%	0.246	0.456	0.669
AAR_{+10}	0.03%	0.323	0.497	0.592	**0.29%**	**1.513***	-0.641	1.377
$CAAR_{-1, +1}$	0.06%	0.400	0.745	0.835	**1.43%**	**4.304 *****	-0.736	**1.500***
$CAAR_{-30, -2}$	-0.07%	-0.154	-0.002	-0.717	**-1.59%**	**-1.570***	**-1.534***	-0.783
$CAAR_{+2, +30}$	-0.20%	-0.458	**-3.196*****	-0.946	0.20%	0.195	**1.335***	0.006

* Significant at 90% level ** Significant at 95% level *** Significant at 99% level

4.1.3 Global Financial Crisis pre-sample results

The results regarding the upgrades show a somewhat similar result as was shown in the previous samples. There are only some significant AARs, which are positive and in line with expectations. But there is only one significant CAAR and the significance is only shown in

one statistical test. This negative effect (-0.33%) is in line with the effect shown in the Dot-com post-sample, but as mentioned before it is only supported by one statistical test.

The effect of downgrades shows significant results, day four, three and two prior to the announcement of the downgrade demonstrate significant negative effects (-1.03%, -1.61% and -0.71%) and a negative effect in the 29-days prior to the announcement (-1.39%), these results are in line with the literature as is mentioned in the paragraphs above. Again, we see a contradiction to the current literature with a significant positive effect on the announcement day (1.08%), one-day prior to the announcement day (0.16%) and ten-days after the announcement (0.29%), in the period one-day prior to and one-day after the announcement effect (1.46%) and (although small) in the 29-days after the announcement (0.09%). We may conclude that for downgrades in the sample prior to the Global Financial Crisis, we can confirm hypothesis 1a, rating changes have valuable information content and lead to abnormal Dutch Euro corporate bond price reactions. The information content hypothesis can also be confirmed for downgrades in the Global Financial Crisis pre-sample. For upgrades, there is some support but we cannot fully confirm hypothesis 1a due to lack of statistical support.

Table 12: Results credit rating changes Global Financial Crisis pre-sample

Test result of rating changes, Dot-com pre-sample of 47 actual rating changes of Dutch Euro corporate bonds announced by Standard and Poor's, Moody's and Fitch from the 1st of November 2001 till the 1st of November 2007 representing all the within- and across-class credit rating changes. Average Abnormal Returns (AAR) for ten days prior to ten days after the credit rating announcement and Cumulative Average Abnormal Returns (CAAR) for periods -30 to -2, -1 to +1 and +2 to +30 days for both upgrades and downgrades are shown. T-statistic results are given for three different significant tests; t-value (Gropp and Richards, 2001), Corrado Rank (Corrado, 1989) and BMP (Boehmer et al., 1991).

Day	Upgrades	t-value	Rank	BMP	Downgrades	t-value	Rank	BMP
	N= 17				N= 30			
AAR_{-10}	0.02%	0.168	-0.058	0.751	0.18%	0.934	1.431	**1.716****
AAR_{-9}	-0.01%	-0.053	-0.269	-0.274	0.19%	0.994	1.635	**1.531***
AAR_{-8}	-0.01%	-0.055	-0.519	-0.195	0.21%	1.109	1.417	**1.716****
AAR_{-7}	**0.11%**	0.819	**2.220****	**2.062****	0.14%	0.739	0.121	1.236
AAR_{-6}	-0.03%	-0.241	-0.590	-1.153	0.13%	0.689	0.881	**2.027****
AAR_{-5}	-0.02%	-0.179	0.109	-0.949	0.04%	0.206	-0.302	0.917
AAR_{-4}	0.09%	0.675	**1.403***	1.224	-1.03%	**-5.385*****	-1.202	-0.790
AAR_{-3}	0.01%	0.068	0.621	0.236	**-1.61%**	**-8.455*****	**-1.874****	**-1.319***
AAR_{-2}	-0.03%	-0.255	-0.117	-0.895	-0.71%	**-3.721*****	-0.157	-1.297
AAR_{-1}	-0.05%	-0.385	-0.937	-1.112	**0.16%**	0.822	**1.377***	**1.830****
AAR_{0}	**0.08%**	0.598	**1.463***	**1.391***	**1.08%**	**5.662*****	-1.007	**1.467***
AAR_{+1}	0.02%	0.167	0.581	0.369	0.22%	1.140	-0.202	1.155
AAR_{+2}	-0.04%	-0.264	-0.444	-0.822	-0.04%	-0.1941	-0.462	-0.310
AAR_{+3}	0.04%	0.278	0.392	0.836	0.12%	0.610	-0.595	0.623
AAR_{+4}	0.01%	0.109	0.653	0.984	0.13%	0.694	-0.251	**1.353***
AAR_{+5}	0.00%	0.002	-0.593	0.006	-0.12%	-0.611	-0.154	-0.927
AAR_{+6}	-0.02%	-0.172	-0.427	-0.451	0.12%	0.681	0.570	0.580
AAR_{+7}	0.02%	0.124	0.470	0.320	-0.05%	-0.255	0.404	-0.474
AAR_{+8}	-0.03%	-0.234	**-1.398***	-0.987	-0.11%	-0.593	-0.035	-1.131

AAR_{+9}	-0.01%	-0.100	-0.418	-0.607	0.07%	0.379	0.420	0.935
AAR_{+10}	0.04%	0.273	0.599	1.017	**0.29%**	**1.548***	-0.338	**1.402***
$CAAR_{-1, +1}$	0.05%	0.220	0.640	0.602	**1.46%**	**4.401*****	0.097	**1.527***
$CAAR_{-30, -2}$	-0.20%	-0.283	-0.392	-1.041	-1.39%	**-1.379***	-0.842	-0.716
$CAAR_{+2, +30}$	-0.33%	-0.461	**-3.226*****	-1.150	0.09%	**4.402 *****	0.873	0.034

* Significant at 90% level ** Significant at 95% level *** Significant at 99% level

4.1.4 Global Financial Crisis post-sample results

In the sample after the Global Financial Crisis we see multiple significant AARs, but most of these were only supported by one significant test. Furthermore, the CAAR after the upgrade announcement resulted in a (only supported by one significant test) significant effect of 0.40% which is in line with the expectation of a positive effect after an upgrade. The downgrades resulted in multiple significant AARs and CAARs. Most of these results were supported by two significant tests and were negative effects. All the three CAARs showed significant results, before the announcement the negative effect was -1.28%, during the announcement the effect was -0.56% and after the announcement the effect remained negative (-0.15%). Overall, we do see positive effects after an upgrade and negative effects after a downgrade in this sample. We can conclude that the rating changes do have valuable information content, especially the downgrades, and lead to abnormal Dutch Euro corporate bond price reactions, and therefore we should confirm hypothesis 1a for this sample.

Furthermore, we want to answer hypothesis 2a; *The effect of rating changes leads to smaller abnormal bond price reactions after the Global Financial Crisis.* In the Global Financial Crisis post-sample, we can see that in the period one-day prior to till one-day after the announcement, the CAAR of the upgrades are similar but the CAAR of downgrades is 1.46% before the Global Financial Crisis and -0,56% after the crisis, the CAAR of a downgrade decreased and turned into a negative CAAR. When we look at the period 30-days prior until two-days prior to the announcement we see increase in the (negative) CAAR of upgrades (-0.20% to -0.24%) and a decrease in the CAAR of downgrades (-1.39% to -1.28%). In the period two-days to 30-days after the announcement the CAAR of upgrades changes from a positive CAAR of 0.40% to a negative CAAR of -1.02% and the CAAR of downgrades changed from a positive 0.09% to a negative CAAR of -0.15%. The effects of the rating changes clearly changed for the pre- and post-samples but we cannot fully confirm hypothesis 2a, for the period 30-days prior until two days prior to the announcement we indeed see a smaller reaction but for the other two periods we cannot confirm the hypothesis.

Table 13: Results credit rating changes Global Financial Crisis post-sample

Test result of rating changes, Dot-com pre-sample of 276 actual rating changes of Dutch Euro corporate bonds announced by Standard and Poor's, Moody's and Fitch from the 1st of January 2009 till the 1st of January 2015 representing all the within- and across-class credit rating changes. Average Abnormal Returns (AAR) for ten days prior to ten days after the credit rating announcement and Cumulative Average Abnormal Returns (CAAR) for periods -30 to -2, -1 to +1 and +2 to +30 days for both upgrades and downgrades are shown. T-statistic results are given for three different significant tests; t-value (Gropp and Richards, 2001), Corrado Rank (Corrado, 1989) and BMP (Boehmer et al., 1991).

Day	Upgrades	t-value	Rank	BMP	Downgrades	t-value	Rank	BMP
	N= 83				N= 193			
AAR_{-10}	**-0.26%**	**-1.523***	-1.157	**-2.284****	-0.08%	-0.046	-0.225	**-1.585***
AAR_{-9}	-0.08%	-0.460	-0.299	-0.133	-0.06%	-0.019	-1.369	-0.709
AAR_{-8}	-0.01%	-0.014	1.171	-0.055	0.07%	0.005	0.150	0.260
AAR_{-7}	-0.04%	-0.255	0.297	-1.023	**-0.09%**	-0.045	**-1.638***	**-2.217****
AAR_{-6}	0.04%	0.260	**1.519***	0.572	-0.08%	-0.006	-0.834	-0.402
AAR_{-5}	**0.16%**	0.930	**1.328***	**2.300****	-0.06%	-0.006	0.527	0.491
AAR_{-4}	0.09%	0.537	0.351	1.273	-0.07%	-0.043	-0.728	**-1.486***
AAR_{-3}	0.22%	**1.324***	0.867	1.161	-0.16%	-0.005	0.039	-0.261
AAR_{-2}	-0.05%	-0.301	**-1.294***	-0.737	**0.04%**	0.041	**-2.244****	**-3.235*****
AAR_{-1}	0.04%	0.214	0.525	0.513	-0.05%	-0.019	-0.521	-0.869
AAR_{0}	0.01%	0.013	-0.636	0.049	-0.04%	-0.016	-0.323	-0.436
AAR_{+1}	0.01%	0.088	0.833	0.561	-0.11%	-0.098	-0.134	**-2.496*****
AAR_{+2}	-0.01%	-0.035	-0.078	-0.136	0.11%	0.026	**1.385***	0.710
AAR_{+3}	-0.03%	-0.188	0.568	-0.830	0.12%	0.029	**2.276****	0.793
AAR_{+4}	0.04%	0.249	-0.567	0.908	-0.11%	-0.027	-0.049	-0.792
AAR_{+5}	0.07%	0.421	0.981	**1.435***	0.11%	0.026	0.097	1.205
AAR_{+6}	0.06%	0.339	0.734	**1.868****	0.11%	0.009	0.437	0.629
AAR_{+7}	-0.01%	-0.084	0.013	-0.362	-0.02%	-0.005	-0.861	-0.352
AAR_{+8}	-0.06%	-0.355	0.620	**-2.156****	-0.01%	-0.001	0.226	-0.055
AAR_{+9}	-0.13%	-0.751	-1.238	**-1.788****	0.11%	-0.003	-0.105	-0.160
AAR_{+10}	0.10%	0.589	1.009	**1.459***	-0.01%	-0.016	0.802	-0.807
$CAAR_{-1, +1}$	0.05%	0.182	0.417	0.611	-0.56%	-0.077	-0.565	**-1.811****
$CAAR_{-30, -2}$	-0.24%	-0.262	-0.767	-0.680	**-1.28%**	-0.057	**-2.540*****	**-1.364***
$CAAR_{+2, +30}$	0.40%	0.450	0.801	**1.427***	-0.15%	-0.007	**-1.883****	-0.254

* Significant at 90% level ** Significant at 95% level *** Significant at 99% level

4.2 Credit rating review changes

In the following sections we will discuss the results of the effects of credit rating review changes on the Dutch Euro corporate bonds and will try to answer hypothesis 1b; *Rating changes have valuable information content and lead to abnormal Dutch Euro corporate bond price reactions.* These rating review changes are split into four different groups: the first group consists of the companies that had no review and received a positive review (Positive), the second group are those companies that had no review and received a negative review (Negative), the third group consists of the companies that had a negative review and returned to a neutral/no review (Negative to no) and lastly there are those companies that had a positive review and were downgraded to a neutral/no review (Positive to no).

First, we will discuss the results of the first two groups for the total sample (table 14). For the positive reviews, we see a positive effect in the cumulative average abnormal return in

the period one-day prior to till one-day after the announcement and see negative effects for both periods before and after the announcement. The result of the CAAR before the positive review announcement is not statistically significant which is in line with the literature. Wansley et al. (1992), Steiner and Heinke (2001), Hull et al. (2004) and Norden and Weber (2004) all look into the effect of credit reviews (watchlist additions) and find no effect for reviews for upgrades. The period after the positive review announcement results in a significant negative effect of -1.02%, this negative effect after a positive review is not what we expected but in line with the research of Micu et al. (2006), although they look into the effect of rating and review changes on CDS. They find that positive reviews result into both significant positive and negative effects.

In line with the findings of the positive reviews we find both negative and positive effects surrounding the negative review announcement. These significant effects of downgrade reviews are in line with the literature (Steiner and Heinke (2001), Hull et al. (2004) and Norden and Weber (2004), but the fact that these effects are positive instead of negative contradicts the result of these researches. Most of these researches do use a United States sample. Micu et al. (2006) also find significant positive effects after negative review announcement, the results found are in line with this research.

Secondly, we will look at the third and fourth group. In the third group, we see multiple significant results. Five days prior to the announcement of the negative review returning to a no/neutral review we see AAR of 0.17%, three and seven days after the announcement we see an AAR of 0.25%. It seems that the change from a negative review to no/neutral review contains information and has a positive effect. For the fourth group, there are also multiple significant effects. We see a negative CAAR both before (-0.82%) and after (-0.26%) the announcement of a positive to no/neutral review. It seems that the downgrade of a positive review to no/neutral review results in a significant negative effect. These are in line with other literature finding significant results after review downgrades (Steiner and Heinke, 2001; Hull et al., 2004; Norden and Weber, 2004). Overall, we can conclude that both negative and positive reviews and the changes from negative/positive reviews to no review contain information that lead to abnormal Dutch Euro corporate bond price reaction. Therefore, we can confirm hypothesis 1b and the information content hypothesis for credit rating reviews in the total sample.

4.2.1 Dot-com pre-sample results

Now we will examine the results of review changes in the prior to the Dot-com bubble sample (tables 15). In the first group, we see that most results are not significant (or only backed by one statistical test) after receiving a positive review, as discussed above this is in line with the current literature. There is one significant CAAR of -1.02% after the announcement, this is not in line with what we would expect, but is supported by the results from the research of Micu et al. (2006) as discussed before.

When we review the second group we see there is a significant effect in the CAAR after the announcement (period that ranges from two days after till thirty days after the announcement), the CAAR is -2.09%. This effect is in line with the findings of the existing literature (Steiner and Heinke (2001), Hull et al. (2004) and Norden and Weber (2004). Furthermore, there is a significant positive CAAR in the period before the announcement which is in line with the results of Micu et al. (2006).

This sample did not contain any reviews that belong to group three and therefore we cannot conclude anything about this group of reviews for the Dot-com pre-sample. For the fourth group, we observe multiple significant results. For both the CAAR before and after the announcement of a positive review to no/neutral review, there is a significant negative effect (-0.82% and -0.26%). This is in line with the expectations and the existing literature as mentioned above. Overall, for the Dot-com pre-sample, we can conclude that for the three groups there is indeed (some) contribution of information to the market and confirm the information content hypothesis.

Table 14: Results review rating changes total sample

Test result of review changes, total sample of 225 review changes of Dutch Euro corporate bonds announced by Standard and Poor's, Moody's and Fitch from the 1st of January 1994 till the 1st of January 2015 representing the companies that had a positive review, a negative review, no review and received a positive review and the companies that had no review and received a negative review. Average Abnormal Returns (AAR) for ten days prior to ten days after the credit rating announcement and Cumulative Average Abnormal Returns (CAAR) for periods -30 to -2, -1 to +1 and +2 to +30 days for both upgrades and downgrades are shown. T-statistic results are given for three different significant tests; t-value (Gropp and Richards, 2001), Corrado Rank (Corrado, 1989) and BMP (Boehmer et al., 1991).

Day	Positive	t-value	Rank	BMP	Negative	t-value	Rank	BMP	Neg. to no	t-value	Rank	BMP	Pos. to no	t-value	Rank	BMP
	N= 43				N= 97				N= 65				N= 20			
AAR_{-10}	-0.09%	-0.221	-0.100	-1.150	**0.09%**	**1.119**	**2.076****	3.009	-0.03%	-0.212	-0.478	-0.863	-0.06%	-0.206	-0.278	-1.297
AAR_{-9}	-0.13%	-0.323	-0.284	**-1.600***	-0.05%	-0.606	-0.129	-1.176	0.05%	0.341	1.209	**1.718****	-0.02%	-0.069	-0.752	-0.291
AAR_{-8}	-0.03%	-0.079	0.111	-0.737	0.02%	0.264	0.369	0.720	-0.02%	-0.120	0.127	-0.434	-0.06%	-0.205	-0.745	-1.221
AAR_{-7}	-0.09%	-0.242	-1.180	**-2.058****	0.03%	0.395	1.164	**1.341***	0.07%	0.508	0.861	**1.594***	-0.08%	-0.260	-0.978	**-1.469***
AAR_{-6}	-0.20%	-0.506	-0.377	-1.222	-0.03%	-0.385	-0.250	-1.051	0.01%	0.026	**1.525***	0.034	0.02%	0.050	0.425	0.313
AAR_{-5}	0.22%	0.557	0.125	1.178	-0.08%	-0.986	-1.089	**-2.139****	**0.17%**	**1.248***	0.105	**1.609***	-0.12%	-0.382	-0.611	-1.084
AAR_{-4}	0.11%	0.286	1.022	1.161	**-0.05%**	-0.605	**-1.321***	**-1.791****	-0.04%	-0.316	-0.410	-0.779	0.01%	0.027	0.238	0.111
AAR_{-3}	**-0.08%**	-0.217	**-1.348***	**-1.630***	0.03%	0.375	0.098	1.003	-0.02%	-0.151	-0.398	-0.572	**-0.09%**	-0.294	**-1.669***	**-1.976****
AAR_{-2}	-0.03%	-0.073	-1.033	-0.457	0.01%	0.018	0.397	0.063	0.06%	0.484	0.572	**1.454***	-0.06%	-0.179	0.586	-0.684
AAR_{-1}	0.20%	0.508	0.927	**1.711****	-0.02%	-0.218	-0.401	-0.477	-0.10%	-0.768	-0.401	**-2.275****	-0.10%	-0.334	-1.700	-1.216
AAR_{0}	0.38%	0.986	-0.049	**1.319***	0.01%	0.088	-0.341	0.273	0.02%	0.118	0.035	0.343	0.06%	0.186	0.436	1.198
AAR_{+1}	-0.01%	-0.007	-0.014	-0.074	-0.06%	-0.722	-0.547	**-2.179****	-0.02%	-0.113	-0.495	-0.457	0.08%	0.256	1.128	**1.460***
AAR_{+2}	-0.14%	-0.370	-1.151	**-1.920****	-0.05%	-0.583	-0.995	**-1.609***	-0.08%	-0.607	-0.275	-1.627	**-0.11%**	-0.370	**-1.576***	**-2.108****
AAR_{+3}	-0.10%	-0.251	-0.849	**-1.325***	-0.03%	-0.343	0.040	-0.976	**0.25%**	**1.901****	**2.229****	**2.962*****	0.05%	0.158	0.803	1.115
AAR_{+4}	-0.04%	-0.116	-0.861	**-1.488***	-0.03%	-0.390	0.843	-0.977	0.05%	0.391	0.057	0.983	-0.09%	-0.289	-0.780	**-1.821****
AAR_{+5}	-0.09%	-0.241	-0.114	-1.266	-0.07%	-0.790	-0.097	-0.991	0.04%	0.323	-0.022	**1.367***	0.13%	0.429	0.990	**1.916****
AAR_{+6}	0.03%	0.079	-0.911	0.408	**0.11%**	**1.349***	0.394	**1.719****	-0.09%	-0.636	0.914	-1.087	0.00%	0.003	-0.283	0.015
AAR_{+7}	-0.06%	-0.145	-0.478	**-1.602***	0.01%	0.014	0.460	0.025	**0.25%**	**1.875****	**2.742*****	**3.850*****	**-0.07%**	-0.252	**-1.481***	**2.318****
AAR_{+8}	-0.01%	-0.030	0.032	-0.441	**0.09%**	**1.042**	**1.435***	**3.228*****	0.02%	0.177	-0.041	0.690	0.01%	0.015	0.863	0.149
AAR_{+9}	-0.02%	-0.058	-0.238	-1.086	0.05%	0.552	0.786	1.044	-0.01%	-0.044	-0.470	-0.088	0.01%	0.029	0.159	0.261
AAR_{+10}	-0.06%	-0.156	0.077	-0.949	-0.01%	-0.019	0.171	-0.074	0.08%	0.608	1.011	**2.572*****	-0.12%	-0.391	-0.367	**-1.717***
$CAAR_{-1, +1}$	0.58%	0.890	0.499	**1.826****	-0.07%	-0.491	-0.744	-1.281	-0.10%	-0.441	-0.496	-1.250	0.03%	-0.008	-0.079	0.334
$CAAR_{-30, -2}$	-0.37%	-0.181	-0.381	-0.977	0.39%	0.880	0.966	**1.509***	**0.59%**	0.831	**1.357***	**2.574*****	**-0.82%**	0.501	**-1.763****	**-2.436****
$CAAR_{+2, +30}$	**-1.02%**	-0.494	**-2.614*****	**-3.068*****	0.33%	0.753	-0.469	**1.742****	0.78%	1.100	0.467	**2.384****	**-0.26%**	-0.156	**-2.112****	**-2.059****

* Significant at 90% level ** Significant at 95% level *** Significant at 99% level

Table 15: Results review rating changes Dot-com pre-sample

Test result of review changes, total sample of 10 review changes of Dutch Euro corporate bonds announced by Standard and Poor's, Moody's and Fitch from the 1st of January 1994 till the 1st of January 2000 representing the companies that had a positive review, a negative review and no review and received a positive review. Average Abnormal Returns (AAR) for ten days prior to ten days after the credit rating announcement and Cumulative Average Abnormal Returns (CAAR) for periods -30 to -2, -1 to +1 and +2 to +30 days for both upgrades and downgrades are shown. T-statistic results are given for three different significant tests; t-value (Gropp and Richards, 2001), Corrado Rank (Corrado, 1989) and BMP (Boehmer et al., 1991).

Day	Positive	t-value	Rank	BMP	Negative	t-value	Rank	BMP	Positive to no	t-value	Rank	BMP
	N= 3				N=4				N= 3			
AAR_{-10}	-0.08%	-0.261	-0.808	-1.227	0.09%	0.462	0.612	1.378	-0.06%	-0.213	-0.639	-1.114
AAR_{-9}	0.04%	0.138	0.780	0.925	-0.01%	-0.038	-0.113	-0.253	-0.01%	-0.008	-0.12	-0.630
AAR_{-8}	0.03%	0.084	0.449	0.268	-0.04%	-0.221	-0.386	-0.815	0.21%	0.787	1.045	1.389
AAR_{-7}	0.12%	0.401	1.447	**1.682***	0.01%	0.075	0.541	0.726	-0.09%	-0.337	-1.243	-1.726
AAR_{-6}	**-0.20%**	-0.646	**-1.789***	**-1.723***	-0.03%	-0.166	0.048	-0.245	-0.25%	-0.950	**-1.756***	-1.544
AAR_{-5}	0.11%	0.356	1.328	1.599	0.02%	0.082	0.315	0.211	**-0.27%**	-1.034	**-1.858***	**-1.739***
AAR_{-4}	-0.12%	-0.393	-0.667	-1.255	0.22%	1.132	0.208	0.971	**-0.49%**	**-1.849***	**-2.025***	-1.539
AAR_{3}	0.04%	0.130	0.923	1.274	0.10%	0.501	0.689	0.785	-0.10%	-0.366	-0.705	-1.108
AAR_{-2}	-0.24%	-0.791	-1.921	**-1.689***	**0.24%**	1.219	**2.038***	**1.899***	-0.03%	-0.101	-0.358	-1.543
AAR_{-1}	0.10%	0.313	1.041	1.289	0.00%	0.004	0.137	-0.015	-0.21%	-0.819	-1.189	-1.340
AAR_{0}	-0.01%	-0.024	-0.075	-0.465	-0.18%	-0.929	-1.521	-1.133	0.08%	0.316	0.591	0.984
AAR_{+1}	-0.05%	-0.164	-0.536	-1.373	0.06%	0.290	0.440	0.879	0.08%	0.305	0.633	0.880
AAR_{+2}	-0.16%	-0.515	-0.736	-1.161	-0.04%	-0.199	-0.464	-0.864	0.03%	0.097	0.352	0.697
AAR_{+3}	0.07%	0.220	0.985	1.034	-0.10%	-0.512	-0.309	-0.346	0.13%	0.491	0.711	0.922
AAR_{+4}	0.10%	0.321	1.303	1.507	-0.17%	-0.875	-1.313	-1.201	-0.01%	-0.016	-0.042	-1.236
AAR_{+5}	-0.02%	-0.070	-0.259	-1.631	-0.26%	-1.337	-1.094	-0.881	0.10%	0.386	0.460	0.581
AAR_{+6}	0.31%	1.024	**1.827***	1.475	-0.06%	-0.291	-0.838	-0.765	-0.02%	-0.091	-0.096	-0.474
AAR_{+7}	-0.18%	-0.576	-0.680	-1.159	0.16%	0.796	1.313	1.418	-0.01%	-0.015	0.066	-0.726
AAR_{+8}	0.10%	0.312	1.079	0.989	-0.03%	-0.127	-0.478	-0.177	0.06%	0.221	0.771	1.090
AAR_{+9}	0.02%	0.067	0.200	0.502	-0.17%	-0.871	-1.432	-1.349	0.01%	0.037	0.227	0.498
AAR_{+10}	-0.18%	-0.588	-1.271	-1.208	-0.11%	-0.579	-0.755	-0.680	0.00%	0.002	0.054	0.099
$CAAR_{-1, +1}$	0.04%	0.073	0.248	0.654	-0.11%	-0.371	-0.546	-0.802	-0.05%	-0.080	0.021	-0.685
$CAAR_{-30, -2}$	**-1.25%**	-0.766	**-2.032***	**-1.679***	**1.46%**	1.394	**1.879***	**1.697***	**-1.92%**	-0.149	**-2.638****	**-1.638***
$CAAR_{+2, +30}$	0.24%	0.146	0.130	1.419	**-2.09%**	**-1.998***	**-2.384****	**-1.880***	1.04%	-0.171	0.244	1.567

* Significant at 90% level ** Significant at 95% level *** Significant at 99% level

4.2.2 Dot-com post-sample results

Next, we will review the results from the sample after the Dot-com bubble. When we glance at all the groups we see little significant results. The results after a positive review show a significant CAAR after the announcement of -0.97%, which still contradicts the expectation, but is in line with the findings discussed before. There are multiple significant (negative) AARs in the group of negative reviews, but only the CAAR surrounding the review results in a significant effect of 0.15%, and there seems to be some contribution of information to the market. The third group, consisting of a change from a negative review to no/neutral review results in nearly no significant effects. On the other hand, we do find statistical significant results in group four. Similar to the total sample we find negative effects after a downgrade from a positive review to no/neutral review.

For this sample, we can reject hypothesis 1b for the positive reviews and the review changes from negative to no/neutral review and conclude that there is no information content in the Dot-com post-sample in these groups (thereby confirming the no new information hypothesis). Hypothesis 1b can be confirmed for the negative reviews and the fourth group, there is (some) information content in the Dot-com post-sample for the change from a positive review to no/neutral review.

We will now answer hypothesis 3b; *The effect of rating reviews leads to smaller abnormal bond price reactions after the Dot-com bubble.* When we look at the first group of positive reviews we indeed see a decline (although small) of effect from 0.04% to 0.01% in the period one-day prior to and until one-day after the announcement. In the period 30-days prior until two-days prior to the announcement we see a decline from -1.25% to -0.56% and for the period that ranges from two-days after until 30-days after the announcement we see a change of effect from a positive 0.24% to a negative -0.97%. The second group, of negative reviews, contributes to a decline of -2.09% before to -0.02% after the Dot-com bubble in the period after the announcement. The third group we cannot compare because there are no results in the sample prior to the Dot-com bubble. In the last group, we identify a decline in the period after the announcement from -1.92% to -0.72%, but after the announcement we do not see any decline. The other periods show a change from a negative (positive) effect to a positive (negative) effect. Overall, there seems to be a smaller effect for parts of the reviews but there is no clear decline for all the results. Therefore, we cannot confirm hypothesis 3b.

Table 16: Results review rating changes Dot-com post-sample

Test result of review changes, total sample of 23 review changes of Dutch Euro corporate bonds announced by Standard and Poor's, Moody's and Fitch from the 1st of 2002 till the 1st of January 2008 representing the companies that had a positive review, a negative review, no review and received a positive review and the companies that had no review and received a negative review. Average Abnormal Returns (AAR) for ten days prior to ten days after the credit rating announcement and Cumulative Average Abnormal Returns (CAAR) for periods -30 to -2, -1 to +1 and +2 to +30 days for both upgrades and downgrades are shown. T-statistic results are given for three different significant tests; t-value (Gropp and Richards, 2001), Corrado Rank (Corrado, 1989) and BMP (Boehmer et al., 1991).

Day	Positive	t-value	Rank	BMP	Negative	t-value	Rank	BMP	Neg. to no	t-value	Rank	BMP	Pos. to no	t-value	Rank	BMP
	N= 7				N=8				N= 2				N= 6			
AAR_{-10}	0.02%	0.014	-0.537	0.236	**0.10%**	0.507	**2.095****	**2.150****	0.10%	0.151	0.866	1.212	**-0.30%**	-0.324	**-1.636***	**-1.957****
AAR_{-9}	-0.20%	-0.186	-0.764	**-1.814***	0.05%	0.255	0.489	1.001	-0.14%	-0.217	-1.102	-1.055	0.23%	0.248	0.755	1.311
AAR_{-8}	0.15%	0.140	-0.227	1.044	-0.05%	-0.267	-0.562	**-1.401***	0.01%	0.004	0.039	0.176	-0.19%	-0.207	-0.543	**-1.447***
AAR_{-7}	-0.05%	-0.049	-0.427	-0.350	**-0.08%**	-0.442	**-1.620***	**-1.695***	0.10%	0.156	0.453	0.483	-0.15%	-0.159	-0.197	-1.164
AAR_{-6}	-0.07%	-0.063	-0.206	-0.565	0.01%	0.035	0.576	0.136	0.21%	0.323	1.388	1.108	0.15%	0.161	1.056	1.227
AAR_{-5}	-0.07%	-0.067	-0.712	-0.593	-0.08%	-0.430	-0.277	-0.946	0.11%	0.176	0.276	0.434	**-0.41%**	-0.449	**-2.063****	**-1.880***
AAR_{-4}	-0.19%	-0.177	0.162	-1.061	**-0.08%**	-0.437	**-1.969****	**-2.161****	0.16%	0.251	1.427	1.381	0.15%	0.163	0.517	1.126
AAR_{3}	-0.04%	-0.040	-0.633	-0.287	**-0.10%**	-0.563	**-1.804***	**-1.602***	-0.20%	-0.312	-1.594	-1.332	0.08%	0.089	0.361	0.940
AAR_{-2}	0.12%	0.109	0.475	**1.440***	-0.01%	-0.018	0.157	-0.055	0.01%	0.003	-0.098	0.015	0.05%	0.051	0.959	0.557
AAR_{-1}	-0.03%	-0.024	-0.024	-0.398	0.01%	0.044	0.985	0.148	-0.08%	-0.128	-0.423	-0.399	-0.09%	-0.097	0.089	-0.447
AAR_{0}	-0.10%	-0.100	-1.035	-0.654	0.10%	0.532	0.497	1.034	-0.02%	-0.024	-0.069	-1.167	0.21%	0.231	1.424	**1.452***
AAR_{+1}	0.14%	0.125	0.079	1.078	0.04%	0.216	0.945	1.334	0.02%	0.033	0.355	0.224	0.01%	0.004	-0.253	0.046
AAR_{+2}	-0.08%	-0.069	-0.829	-0.953	-0.01%	-0.072	0.175	-0.300	-0.19%	-0.313	-1.299	-1.066	0.02%	0.018	-0.435	0.258
AAR_{+3}	0.02%	0.001	-0.815	0.167	0.01%	0.012	0.348	0.046	-0.17%	-0.271	-1.525	-1.404	0.03%	0.036	0.751	0.281
AAR_{+4}	0.02%	0.001	0.719	0.260	-0.03%	-0.148	-0.147	-0.846	-0.17%	-0.263	-1.427	-1.363	**-0.26%**	-0.287	**-1.465***	**-1.662***
AAR_{+5}	-0.12%	-0.001	0.172	-0.954	0.01%	0.054	-0.079	0.156	-0.05%	-0.080	-0.325	-0.573	0.23%	0.251	0.004	1.160
AAR_{+6}	0.28%	0.003	1.121	**1.682***	0.05%	0.263	0.985	1.071	0.01%	0.006	0.079	1.096	-0.15%	-0.159	-1.149	-1.000
AAR_{+7}	-0.14%	-0.001	-1.183	-1.126	**-0.11%**	-0.571	**-1.506***	**-1.708***	0.13%	0.200	1.043	1.027	-0.10%	-0.107	-1.194	-1.502
AAR_{+8}	-0.01%	-0.001	-0.086	-0.123	0.05%	0.257	0.910	1.215	-0.31%	-0.483	**-2.263***	-1.418	-0.01%	-0.013	0.464	-0.154
AAR_{+9}	-0.07%	-0.007	0.282	-0.812	-0.04%	-0.220	-0.316	-0.531	-0.01%	-0.006	0.148	-0.065	0.14%	0.154	1.183	**1.483***
AAR_{+10}	-0.04%	-0.001	0.107	-0.587	-0.04%	-0.206	0.049	-0.632	0.05%	0.072	0.266	0.260	-0.33%	-0.358	-0.878	**-1.489***
$CAAR_{-1, +1}$	0.01%	0.001	-0.566	0.008	**0.15%**	**1.457***	**1.401***	**1.487***	-0.08%	-0.069	-0.080	-0.652	0.13%	0.080	0.728	0.522
$CAAR_{-30, -2}$	-0.56%	-0.098	-0.497	-0.986	-0.29%	-0.291	0.006	-0.764	1.67%	0.496	**1.992***	1.411	-0.72%	-0.149	-0.975	**-1.401***
$CAAR_{+2, +30}$	**-0.97%**	-0.168	**-1.724***	**-1.905****	-0.02%	-0.017	-0.191	-0.019	-0.59%	-0.174	-1.568	-0.594	**-0.82%**	-0.170	**-1.523***	**-1.748***

* Significant at 90% level ** Significant at 95% level *** Significant at 99% level

4.2.3 Global Financial Crisis pre-sample results

In order to answer hypothesis 2b; *The effect of rating reviews leads to smaller abnormal bond price reactions after the Global Financial Crisis*, we will first examine the results of the review changes in the sample prior to the Global Financial Crisis and then examine the sample after the Global Financial Crisis. In the pre-sample, we almost only see insignificant results, as disappointing these results are, they are in line with part of the literature (Wakeman (1978) and Gropp and Richards (2001). The only significant CAAR (-0.82%) is after the announcement of a positive review to no/neutral review, this result is in line with expectations and the previous results found in this research. We can conclude that before the Global Financial Crisis the rating reviews only contain (some) valuable information content for the group of review changes from a positive review to no/neutral review.

Table 17: Results review rating changes Global Financial Crisis pre-sample

Test result of review changes, total sample of 16 review changes of Dutch Euro corporate bonds announced by Standard and Poor's, Moody's and Fitch from the 1st of November 2001 till the 1st of November 2007 representing the companies that had a positive review, a negative review, no review and received a positive review and the companies that had no review and received a negative review. Average Abnormal Returns (AAR) for ten days prior to ten days after the credit rating announcement and Cumulative Average Abnormal Returns (CAAR) for periods -30 to -2, -1 to +1 and +2 to +30 days for both upgrades and downgrades are shown. T-statistic results are given for three different significant tests; t-value (Gropp and Richards, 2001), Corrado Rank (Corrado, 1989) and BMP (Boehmer et al., 1991).

Day	**Pos.**	**t-value**	**Rank**	**BMP**	**Neg.**	**t-value**	**Rank**	**BMP**	**Neg. to no**	**t-value**	**Rank**	**BMP**	**Pos. to no**	**t-value**	**Rank**	**BMP**
	N= 4				N= 5				N= 1				N= 6			
AAR_{-10}	0.12%	0.061	0.240	0.378	**0.11%**	0.384	**1.660***	**1.632***	0.15%	0.169	0.863	1.008	**-0.30%**	-0.325	**-1.636***	**-1.957****
AAR_{-9}	-0.33%	-0.177	-1.107	-0.963	0.09%	0.303	1.364	**1.568***	-0.01%	-0.016	0.012	-1.009	0.22%	0.248	0.755	1.311
AAR_{-8}	0.35%	0.185	0.761	0.889	-0.08%	-0.300	-1.050	-1.514	0.02%	0.027	0.173	1.008	-0.19%	-0.207	-0.543	**-1.447***
AAR_{-7}	-0.06%	-0.032	-0.245	-0.476	-0.07%	-0.254	-0.782	-1.031	-0.17%	-0.191	-0.995	-1.009	-0.15%	-0.159	-0.197	-1.164
AAR_{-6}	-0.11%	-0.056	-0.309	-0.676	0.01%	0.022	0.142	0.102	0.37%	0.406	1.553	1.008	0.15%	0.161	1.056	1.227
AAR_{-5}	-0.04%	-0.021	-0.202	-0.332	-0.13%	-0.454	-0.453	-0.935	-0.24%	-0.258	-1.301	-1.009	**-0.41%**	-0.449	**-2.064****	**-1.880***
AAR_{-4}	-0.44%	-0.231	-1.091	-0.990	0.05%	-0.180	-1.026	**-1.543***	0.20%	0.215	1.115	1.008	0.15%	0.163	0.517	1.126
AAR_{3}	-0.01%	-0.002	-0.165	-0.067	-0.11%	-0.408	-1.137	-1.243	-0.13%	-0.139	-0.637	-1.009	0.08%	0.089	0.361	0.940
AAR_{-2}	0.21%	0.108	0.548	0.453	-0.10%	-0.370	-1.387	-1.320	0.20%	0.213	1.075	1.008	0.05%	0.051	0.959	0.557
AAR_{-1}	-0.04%	-0.023	-0.224	-0.032	-0.06%	-0.199	-0.087	-0.708	0.20%	0.213	1.101	1.008	-0.09%	-0.097	0.089	-0.447
AAR_{0}	-0.07%	-0.036	-0.154	-0.045	0.13%	0.457	0.499	0.855	-0.03%	-0.028	-0.066	-1.009	0.21%	0.231	1.424	**1.452***
AAR_{+1}	0.29%	0.149	0.665	0.871	0.01%	0.012	0.036	0.140	-0.10%	-0.109	-0.411	-1.009	0.01%	0.004	-0.253	0.046
AAR_{+2}	-0.04%	-0.020	-0.186	-0.143	-0.09%	-0.308	-1.075	**-1.574***	-0.03%	-0.027	-0.053	-1.009	0.02%	0.018	-0.435	0.258
AAR_{+3}	0.18%	0.096	0.393	0.248	-0.09%	-0.304	-1.042	**-1.507***	-0.15%	-0.162	-0.796	-1.009	0.03%	0.036	0.751	0.281
AAR_{+4}	-0.08%	-0.040	-0.271	-0.657	-0.02%	-0.064	-0.113	-0.411	-0.12%	-0.131	-0.571	-1.009	**-0.26%**	-0.288	**-1.465***	**-1.662***
AAR_{+5}	-0.29%	-0.151	-0.767	-0.958	0.04%	0.159	0.167	0.470	-0.17%	-0.182	-0.929	-1.009	0.23%	0.251	0.004	1.160
AAR_{+6}	0.42%	0.220	0.910	1.003	0.04%	0.135	0.237	0.727	0.00%	0.001	0.040	1.008	-0.15%	-0.159	-1.149	-1.000
AAR_{+7}	-0.11%	-0.056	-0.341	-0.597	-0.05%	-0.168	-0.489	-0.887	0.01%	0.007	0.053	1.008	-0.10%	-0.107	-1.193	-1.503
AAR_{+8}	0.12%	0.006	-0.075	0.416	0.01%	0.053	0.203	0.318	-0.30%	-0.379	-1.473	-1.009	-0.01%	-0.013	0.465	-0.154
AAR_{+9}	-0.20%	-0.106	-0.735	-0.491	-0.13%	-0.451	-0.816	-1.200	-0.09%	-0.97	-0.358	-1.009	0.14%	0.154	1.183	1.438
AAR_{+10}	-0.10%	-0.052	-0.364	-0.311	-0.08%	-0.274	-0.643	-1.145	-0.20%	-0.218	-1.128	-1.009	-0.33%	-0.358	-0.878	**-1.489***
$CAAR_{-1, +1}$	0.17%	0.052	0.166	0.224	0.08%	0.155	0.259	0.637	0.07%	0.044	0.360	1.008	0.13%	0.080	0.728	0.522
$CAAR_{-30, -2}$	-0.67%	-0.066	-0.624	-0.447	-0.27%	-0.182	-0.098	-0.650	1.64%	0.339	1.397	1.008	-0.72%	-0.149	-0.975	-1.401
$CAAR_{+2, +30}$	-1.21%	-0.119	-1.286	-1.211	-0.38%	-0.247	-0.898	-0.775	-2.31%	-0.477	-2.030	-1.009	**-0.82%**	-0.170	**-1.523***	**-1.748***

* Significant at 90% level ** Significant at 95% level *** Significant at 99% level

4.2.4 Global Financial Crisis post-sample results

Contrary to the results from the sample before the Global Financial Crisis, the sample after the Global Financial Crisis does show significant results. In the first group, there are multiple significant AARs and a significant negative CAAR of -1.13% after the announcement of a positive review. These results are in line with the previous findings. The second group contains multiple significant AARS (only supported by the BMP-test) and positive significant CAARs before and after the announcement of a negative review. Because these results are only supported by one significance test we do not want to draw too many conclusions based on these results.

The third group contains multiple significant results, we find an AAR of 0.19%, 0.29% and 0.27% for respectively five-days prior to announcement and three- and seven-days after the announcement of the change of a negative review to no/neutral review. These results are in line with what one could expect after such an announcement, the fact that the negative review is dropped could be expected to result into a positive effect for the bond price. Furthermore, the CAAR of 0.84% in the 29-day period after the announcement and the CAAR of 0.61% prior to the announcement are in line with expectations and previous literature. In the fourth group, we again find a significant negative CAAR (-0.30%) after the announcement of the review change from positive to no/neutral.

The effects of the positive reviews have decreased for both the CAAR periods prior and after the announcement (-0.67% to -0.25% and -1.21% to -1.13%), for the negative reviews there is a change in all three CAAR periods (before, during and after the announcement) from a negative (positive) effect to a positive (negative) effect. In the third group, there is a decrease in CAAR before the announcement of 1.64% to 0.61% and in the fourth group all the CAARs have decreased in the post-sample (0.13% to 0.01%, -0.72% to -0.08% and -0.82% to 0.30%). Taking these results into consideration we can partly confirm hypothesis 2b and state that for most review changes the effects have led to smaller abnormal bond price reactions after the Global Financial Crisis.

Table 18: Results review rating changes Global Financial Crisis post-sample

Test result of review changes, total sample of 187 review changes of Dutch Euro corporate bonds announced by Standard and Poor's, Moody's and Fitch from the 1st of January 2009 till the 1st of January 2015 representing the companies that had a positive review, a negative review, no review and received a positive review and the companies that had no review and received a negative review. Average Abnormal Returns (AAR) for ten days prior to ten days after the credit rating announcement and Cumulative Average Abnormal Returns (CAAR) for periods -30 to -2, -1 to +1 and +2 to +30 days for both upgrades and downgrades are shown. T-statistic results are given for three different significant tests; t-value (Gropp and Richards, 2001), Corrado Rank (Corrado, 1989) and BMP (Boehmer et al., 1991).

Day	Positive	t-value	Rank	BMP	Negative	t-value	Rank	BMP	Neg. to no	t-value	Rank	BMP	Pos. to no	t-value	Rank	BMP
	N= 33				N= 83				N= 60				N= 11			
AAR_{-10}	0.11%	-0.238	0.271	-1.121	**0.09%**	0.820	**1.600***	**2.513*****	-0.03%	-0.244	-0.494	-0.921	0.06%	0.243	0.847	**2.029****
AAR_{-9}	-0.12%	-0.273	-0.181	-1.251	-0.07%	-0.650	-0.313	**-1.445***	0.05%	0.365	1.174	**1.843****	**-0.16%**	-0.644	**-1.377***	**-1.737***
AAR_{-8}	-0.07%	-0.164	0.114	**-1.729****	0.04%	0.321	0.584	1.014	0.00%	0.007	0.352	0.026	-0.07%	-0.273	-0.993	**-1.490***
AAR_{-7}	**-0.12%**	-0.269	**-1.434***	**-2.464*****	0.04%	0.349	1.265	**1.389***	0.08%	0.564	0.851	**1.680****	-0.04%	-0.173	-0.650	-0.603
AAR_{-6}	-0.22%	-0.491	0.050	-1.075	-0.04%	-0.333	-0.357	-1.047	-0.02%	-0.126	**1.345***	-0.160	0.02%	0.062	0.552	0.379
AAR_{-5}	0.29%	0.632	0.129	1.210	-0.08%	-0.751	-1.082	**-1.916****	**0.19%**	**1.394***	0.293	**1.670***	0.08%	0.326	1.128	0.534
AAR_{-4}	0.20%	0.432	1.198	**1.669***	-0.06%	-0.572	-1.029	**-2.067****	-0.05%	-0.397	-0.501	-0.912	0.07%	0.264	0.733	0.846
AAR_{3}	**-0.10%**	-0.230	**-1.427***	**-1.761****	0.05%	0.442	0.412	**1.391***	-0.01%	-0.101	-0.178	-0.362	**-0.18%**	-0.733	**-2.037****	**-2.826*****
AAR_{-2}	-0.04%	-0.087	-0.905	-0.513	-0.01%	-0.027	0.232	-0.109	0.08%	0.613	0.754	**1.767****	-0.12%	-0.474	0.299	-0.489
AAR_{-1}	0.25%	0.558	0.802	**1.697****	-0.02%	-0.194	-0.526	-0.484	-0.11%	-0.845	-0.543	**-2.342****	-0.08%	-0.323	**-1.740***	-0.796
AAR_{0}	**0.52%**	**1.149**	0.363	**1.388***	0.02%	0.168	-0.106	0.646	0.01%	0.049	-0.188	0.134	-0.03%	-0.133	-0.509	-1.202
AAR_{+1}	-0.03%	-0.061	0.069	-0.712	-0.07%	-0.656	-0.669	**-2.274****	-0.01%	-0.037	-0.449	-0.146	0.12%	0.479	1.325	**1.387***
AAR_{+2}	-0.16%	-0.344	-0.781	**-1.651***	-0.04%	-0.383	-0.927	-1.289	-0.05%	-0.404	0.065	-1.107	**-0.22%**	-0.894	**-1.840****	**-2.446****
AAR_{+3}	-0.14%	-0.305	-0.824	**-1.478***	-0.03%	-0.264	0.058	-0.943	**0.29%**	**2.144****	**2.341****	**2.831*****	0.04%	0.142	0.301	1.273
AAR_{+4}	**-0.07%**	-0.158	**-1.498***	**-2.044****	-0.03%	-0.300	-0.797	-0.989	0.05%	0.360	-0.068	0.853	-0.02%	-0.072	-0.098	-0.769
AAR_{+5}	-0.09%	-0.205	-0.136	-1.013	-0.05%	-0.496	0.142	-0.716	0.04%	0.335	0.001	**1.323***	0.09%	0.356	1.065	**1.903***
AAR_{+6}	-0.05%	-0.106	**-1.856****	-0.535	**0.12%**	**1.138**	0.242	**1.640***	-0.07%	-0.553	1.141	-0.891	0.09%	0.348	0.356	1.221
AAR_{+7}	-0.03%	-0.062	0.081	-0.799	0.01%	0.079	0.582	0.174	**0.27%**	**1.979****	**2.580*****	**3.761*****	-0.09%	-0.350	-1.172	**-1.743***
AAR_{+8}	-0.02%	-0.051	-0.162	-0.716	0.09%	0.834	1.256	**3.050*****	0.02%	0.139	-0.117	0.545	0.00%	-0.003	0.522	-0.019
AAR_{+9}	-0.02%	-0.036	-0.413	-0.837	0.05%	0.460	0.852	**1.516***	-0.02%	-0.115	-0.541	-0.217	-0.06%	-0.253	-0.578	**-1.987****
AAR_{+10}	-0.05%	-0.118	0.314	-0.665	0.01%	0.096	0.337	0.455	0.07%	0.556	0.762	**2.266****	-0.04	-0.170	0.037	-0.899
$CAAR_{-1,+1}$	0.75%	0.950	0.712	**1.827****	-0.07%	-0.395	-0.751	-1.202	-0.11%	-0.481	-0.535	-1.267	0.01%	0.013	-0.533	0.048
$CAAR_{-30,-2}$	-0.25%	-0.104	0.209	-0.559	0.39%	0.678	0.728	**1.319***	**0.61%**	0.865	**1.399***	**2.573*****	-0.58%	-0.433	-0.664	**-1.367***
$CAAR_{+2,+30}$	**-1.13%**	-0.472	**2.220****	**-2.697*****	0.45%	0.784	-0.309	**2.029****	**0.84%**	**1.191**	0.536	**2.363****	**-0.30%**	-0.225	**-1.830****	**-2.071****

* Significant at 90% level ** Significant at 95% level *** Significant at 99% level

4.3 Within- and across-class results

In this section, we will discuss the results from the rating changes of across- and within-class upgrades and downgrades and answer hypothesis 4; *The effect of a credit rating change across-classes will be larger than that of credit rating changes within-classes.*

Unfortunately, for the across- and within-class upgrades most of the CAARs and AARs are not statistically significant or are only backed by one statistical test. Furthermore, there does not seem to be a larger effect for the across-class upgrades. All the CAARs changed from a positive (negative) effect to a negative (positive) effect. We must reject hypothesis 4 for the within- and across-class upgrades.

For both the across- and within-class downgrades the results for the CAARs are mostly insignificant. For the period one-day prior to and one-day after the downgrade announcement we see a bigger effect of across-class downgrades in CAAR from -0.44% compared to -0.20%. In the period prior to the announcement the CAAR is bigger for the within-class downgrades (-1.86% compared to -0.29%). After the announcement, there is a positive CAAR (2.34%) across-class and a negative CAAR (-1.45%) within-class. This last result might not seem what we expected, we would also expect a negative effect for downgrades across-classes. The effect of downgrades does not seem bigger for across class downgrades than within-class downgrades. Overall, the effect of across-class credit rating changes does not seem to be larger than those of within-class credit rating changes and we have to reject hypothesis 4.

Table 19: Results rating within- and across-class

Test result of rating changes of across class upgrades and downgrades, total sample of 119 across-class rating changes and 228 within-class rating changes of Dutch Euro corporate bonds announced by Standard and Poor's, Moody's and Fitch from the 1st of January 1994 till the 1st of January 2015. Average Abnormal Returns (AAR) for ten days prior to ten days after the credit rating announcement and Cumulative Average Abnormal Returns (CAAR) for periods -30 to -2, -1 to +1 and +2 to +30 days for both upgrades and downgrades are shown. T-statistic results are given for three different significant tests; t-value (Gropp and Richards, 2001), Corrado Rank (Corrado, 1989) and BMP (Boehmer et al., 1991).

Day	Across-class upgrade	t-value	Rank	BMP	Across-class down	t-value	Rank	BMP	Within-class upgrade	t-value	Rank	BMP	Within-class down	t-value	Rank	BMP
	N= 33				N= 86				N= 73				N= 155			
AAR_{-10}	0.01%	0.007	**1.401***	0.053	-0.19%	-0.379	-0.526	-0.837	**-0.28%**	**-2.633*****	**-1.573***	**-2.327****	-0.16%	-0.028	0.515	**-1.483***
AAR_{-9}	-0.01%	-0.010	-0.823	-0.074	-0.01%	-0.006	-0.349	-0.014	-0.07%	-0.676	0.085	-1.232	-0.05%	-0.010	-1.111	-0.777
AAR_{-8}	0.03%	0.056	0.045	0.376	0.15%	0.316	-0.143	0.938	-0.01%	-0.161	1.049	-0.380	0.04%	0.006	0.584	0.451
AAR_{-7}	0.03%	0.064	**1.707****	0.862	**-0.25%**	-0.515	**-1.658***	**-1.723****	-0.04%	-0.332	0.263	-0.772	-0.08%	-0.014	-0.859	-1.034
AAR_{-6}	-0.03%	-0.054	-0.301	-0.741	0.06%	0.117	-0.315	0.510	**0.05%**	0.581	**1.636***	**2.115****	-0.03%	-0.005	-0.322	-0.504
AAR_{-5}	0.07%	0.136	**1.666***	1.153	0.03%	0.062	0.625	0.321	**0.15%**	**1.428***	0.902	**1.504***	0.02%	0.004	0.239	0.463
AAR_{-4}	0.16%	0.325	0.902	1.075	-0.38%	-0.784	-0.564	**-1.518***	0.09%	0.796	0.493	0.348	-0.21%	-0.038	0.888	-0.809
AAR_{3}	**0.53%**	**1.091**	0.468	1.112	**-0.14%**	-0.282	**-1.778****	**-1.308***	0.02%	0.157	0.808	-0.606	-0.27%	-0.049	0.776	-1.087
AAR_{-2}	-0.06%	-0.117	-1.006	-0.952	**-0.24%**	-0.490	**-2.228****	**-2.615*****	-0.04%	-0.415	-1.248	0.983	-0.21%	-0.038	-1.156	**-1.842****
AAR_{-1}	0.02%	0.428	-0.536	0.122	-0.12%	-0.249	0.059	-0.722	0.07%	0.663	0.510	**2.092****	-0.01%	-0.004	-0.569	-0.038
AAR_{0}	-0.08%	-0.160	**-1.813****	-0.832	0.19%	0.384	0.900	0.720	0.01%	0.863	0.258	0.929	0.02%	0.037	**-1.529***	0.107
AAR_{+1}	-0.08%	-0.169	0.745	-0.839	-0.50%	-1.025	1.075	**-1.568***	0.02%	0.209	0.755	0.341	-0.22%	-0.390	-1.085	**-1.835****
AAR_{+2}	0.12%	0.246	1.191	**1.556***	0.26%	0.524	**1.431***	0.790	-0.04%	-0.332	-0.355	-0.814	-0.02%	-0.004	-0.752	-0.291
AAR_{+3}	-0.07%	-0.133	1.141	-0.669	0.37%	0.755	**1.560***	1.106	0.01%	0.013	0.055	0.067	-0.03%	-0.006	**-1.939****	-0.485
AAR_{+4}	-0.06%	-0.130	-0.727	-1.231	0.01%	0.016	0.064	0.031	0.09%	0.875	-0.047	2.009	-0.14%	-0.025	-0.597	-1.252
AAR_{+5}	**-0.07%**	-0.134	**-1.933****	**-1.322***	0.13%	0.258	-0.249	1.050	**0.11%**	1.063	**1.435***	**2.206****	0.02%	0.005	-0.013	0.286
AAR_{+6}	-0.06%	-0.121	-1.220	**-1.843****	0.21%	0.436	0.927	**2.246****	0.09%	0.873	1.201	**2.678*****	-0.05%	-0.009	-0.035	-0.704
AAR_{+7}	-0.07%	-0.132	-0.220	-1.245	0.06%	0.135	-0.615	0.634	0.03%	0.317	0.262	0.902	-0.04%	-0.007	-0.482	-0.660
AAR_{+8}	-0.15%	-0.314	0.624	-0.653	0.07%	0.146	-0.790	0.491	-0.05%	-0.453	0.178	**-2.108****	-0.07%	-0.012	1.001	-1.114
AAR_{+9}	-0.06%	-0.111	**-1.800****	-0.687	0.12%	0.251	-0.260	1.060	-0.10%	-0.994	-0.825	**-1.378***	-0.07%	-0.013	0.259	-0.783
AAR_{+10}	0.07%	0.151	0.570	0.969	-0.08%	-0.157	0.166	-0.539	0.11%	0.983	0.850	**1.450***	0.01%	0.003	0.624	0.191
$CAAR_{-1, +1}$	-0.14%	-0.165	0.808	-0.517	-0.44%	-0.514	1.236	-0.794	0.19%	1.001	0.880	**2.379****	-0.20%	-0.021	-1.837	-0.649
$CAAR_{-30, -2}$	0.88%	0.339	1.085	0.793	-0.29%	-0.111	**-1.764****	-0.660	-0.43%	-0.754	-0.874	**-2.669*****	**-1.86%**	-0.064	**-2.406*****	**-1.504***
$CAAR_{+2, +30}$	-1.18%	-0.453	**-3.546*****	-1.164	2.34%	0.904	0.335	**2.080****	0.51%	0.904	1.055	**2.339****	-1.45%	-0.050	**-2.478*****	-0.958

* Significant at 90% level ** Significant at 95% level *** Significant at 99% level

4.4 Announced and unannounced results

In order to answer hypothesis 5; *The effect of a credit rating change without a preceding review is larger than that of a credit rating change with a preceding review*. We will look at the different results of the announced and unannounced rating changes (table 20). The announced upgrades show a significant AAR on the announcement day of -0.24%. The rest of the results are insignificant or only backed by one test statistic, but overall the effect on announced upgrades seems to be negative. Ten-days prior to the announcement the unannounced upgrades display a significant negative AAR of -0.25%, three-days prior to the announcement the AAR is positive 0.22%. The CAAR of the unannounced upgrades are only larger in the period prior to the announcement, and this is only a small difference (-0.18% instead of -0.15%). For the unannounced upgrades the effect of credit rating upgrades are not larger than the announced upgrades.

Both the announced and unannounced downgrades show multiple AARs but only one statistical significant CAAR. The CAARs in the period prior to, and one-day before until one-day after the announcement are larger for the unannounced downgrades than the announced downgrades (0.01% and -0.27% compared to -0.40% and -1.71%), but the CAAR in the period after the announcement is bigger (and positive) for the announced downgrades (1.58%) compared to the unannounced downgrades (-0.80%).

Taking into regard the results for both the announced and unannounced upgrades and downgrades we cannot fully confirm hypothesis 5, and therefore conclude that the effect of a credit rating change without a preceding review is not larger than that of a credit rating change with a preceding review.

Table 20: Results rating announced and unannounced rating changes

Test result of rating changes that were announced by a rating review, total sample of 88 announced and 259 unannounced rating changes of Dutch Euro corporate bonds announced by Standard and Poor's, Moody's and Fitch from the 1st of January 1994 till the 1st of January 2015. Average Abnormal Returns (AAR) for ten days prior to ten days after the credit rating announcement and Cumulative Average Abnormal Returns (CAAR) for periods -30 to -2, -1 to +1 and +2 to +30 days for both upgrades and downgrades are shown. T-statistic results are given for three different significant tests; t-value (Gropp and Richards, 2001), Corrado Rank (Corrado, 1989) and BMP (Boehmer et al., 1991).

Day	An. Up.	t-value	Rank	BMP	An. Down.	t-value	Rank	BMP	Unan. Up.	t-value	Rank	BMP	Unan. Down.	t-value	Rank	BMP
	N= 19				N= 69				N= 87				N= 172			
AAR_{-10}	0.04%	0.193	0.635	0.779	-0.10%	-0.229	-1.021	-0.633	**-0.25%**	**-1.551***	**-1.329***	**-2.351****	-0.19%	-0.042	-0.912	**-1.477***
AAR_{-9}	-0.02%	-0.072	0.717	-0.144	0.13%	0.289	**-1.341***	0.719	-0.07%	-0.437	-0.408	**-1.393**	-0.10%	-0.022	-0.299	-0.951
AAR_{-8}	-0.09%	-0.405	-0.450	-1.305	0.14%	0.306	-0.150	0.965	0.02%	0.103	1.169	0.357	0.05%	0.012	0.586	0.582
AAR_{-7}	-0.04%	-0.172	-0.393	-1.152	**-0.33%**	-0.734	**-2.602*****	**-1.897****	-0.01%	-0.089	0.797	-0.350	-0.06%	-0.014	-0.083	-0.899
AAR_{-6}	-0.12%	-0.542	-0.810	-1.861	-0.01%	-0.026	-1.217	-0.124	0.06%	0.384	1.700	0.872	0.01%	0.002	0.411	0.140
AAR_{-5}	0.08%	0.354	0.254	0.887	**0.25%**	0.559	**1.908****	**2.643****	**0.14%**	0.838	**1.452***	**2.151****	-0.07%	-0.014	-0.804	**-1.306***
AAR_{-4}	-0.08%	-0.375	**-1.376***	-0.097	0.01%	0.011	0.123	0.114	0.12%	0.759	1.041	1.803	**-0.38%**	-0.083	**-1.435***	**-1.448***
AAR_{3}	-0.01%	-0.016	-0.691	**-2.872*****	-0.12%	-0.314	-1.058	**-1.340***	0.22%	**1.346***	0.720	1.187	-0.26%	-0.058	0.195	-1.164
AAR_{-2}	-0.17%	-0.783	**-2.124****	-1.141	**-0.14%**	-0.678	**-1.999****	**-2.420****	-0.02%	-0.146	-0.929	-0.358	**-0.25%**	-0.055	**-1.324***	**-2.297****
AAR_{-1}	-0.08%	-0.384	-0.414	-2.562	-0.11%	-0.239	-0.837	**-1.626***	0.03%	0.200	0.403	0.485	-0.02%	-0.004	0.160	-0.200
AAR_{0}	**-0.24%**	**-1.101**	**-2.458****	0.941	**0.22%**	0.497	**1.784****	**2.329****	0.08%	0.485	0.269	**1.921***	0.02%	0.050	0.715	0.110
AAR_{+1}	0.04%	0.196	1.043	0.893	-0.10%	-0.224	0.622	-1.092	0.01%	0.072	0.714	0.444	-0.41%	-0.089	**-2.233****	**-2.160****
AAR_{+2}	-0.01%	-0.014	-0.333	-0.030	-0.07%	-0.158	-1.240	**-1.373***	-0.01%	-0.040	-0.215	-0.175	0.13%	0.029	-0.895	0.761
AAR_{+3}	-0.01%	-0.024	-0.542	-0.152	**-0.11%**	-0.237	**-2.125****	**-1.481***	-0.04%	-0.231	0.256	-0.993	0.20%	0.043	**-1.426***	1.116
AAR_{+4}	-0.06%	-0.274	-1.081	**-2.090****	0.10%	0.227	0.910	**1.928****	0.06%	0.378	-0.077	**1.391***	-0.16%	-0.036	-1.276	-1.018
AAR_{+5}	-0.03%	-0.159	-0.357	-0.507	0.03%	0.081	0.114	0.547	0.08%	0.513	0.796	1.801	0.07%	0.016	-0.306	0.712
AAR_{+6}	**-0.10%**	-0.480	**-1.593***	**-2.231****	0.11%	0.247	0.990	**1.857****	**0.08%**	0.503	**1.319***	**2.765*****	0.02%	0.004	-0.089	0.231
AAR_{+7}	0.02%	0.073	1.064	0.339	0.03%	0.076	-0.830	0.498	-0.01%	-0.039	-0.076	-0.169	-0.02%	-0.003	-0.303	-0.228
AAR_{+8}	-0.04%	-0.179	-0.108	-1.087	-0.04%	-0.082	-0.780	-1.134	-0.05%	-0.299	0.369	**-1.800****	-0.01%	-0.003	0.989	-0.140
AAR_{+9}	-0.05%	-0.211	-0.541	**-1.401***	0.17%	0.347	0.705	1.288	-0.11%	-0.699	-1.222	**-1.665****	-0.07%	-0.015	-0.522	-0.824
AAR_{+10}	0.01%	0.062	0.610	0.169	-0.02%	-0.053	0.599	-0.647	0.10%	0.598	1.182	**1.523***	-0.01%	-0.003	0.287	-0.152
CAAR -1, +1	-0.28%	-0.744	-1.055	**-2.199****	0.01%	0.019	0.906	0.119	0.12%	0.437	0.801	**1.538***	-0.40%	-0.051	**-1.561***	-1.048
CAAR -30, -2	-0.15%	-0.131	**-1.602***	-0.513	-0.27%	-0.116	0.736	-1.108	-0.18%	-0.210	-0.234	-0.535	**-1.71%**	-0.070	**-2.062****	**-1.517***
CAAR +2, +30	-0.62%	-0.544	0.714	**-1.417***	**1.58%**	0.669	**-2.159****	**2.937*****	**0.50%**	0.580	**1.600***	**1.875****	-0.80%	-0.033	-0.452	-0.251

* Significant at 90% level ** Significant at 95% level *** Significant at 99% level

4.5 – Different Credit Rating Agencies results

We will discuss the different credit rating agencies results and look whether there is one credit rating agency that results in bigger effects to the market. By doing so we will try to answer hypothesis 6; *The effect of credit rating changes and reviews differs from the different credit rating agencies in such a way than one credit rating agency contributes to more information to the market than another*. The downgrades (table 21) result in multiple significant AARs for all three CRAs. When comparing the different CAARs we see that for the CAAR during the announcement, only S&P and Moody's have a significant effect. During this period Moody's has the biggest effect, and thus contribution of information content to the market (-0.40% against 0.26%). In the period prior to the announcement, Fitch has the biggest effect (-2.97% against -0.40% and -0.99%). For the last period only Fitch's results were significant and therefore we cannot truly compare them.

Following the downgrades, we will now look into the results of the upgrades. We find less statistical significant results than with the downgrades, which is in line with most of the existing literature (Hettenhouse and Sartori, 1976; Griffin and Sanvincente, 1982; Hand et al., 1992; Matolcsy and Lianto, 1995; Hite and Warga, 1997; Steiner and Heinke, 2001; Dichev and Piotroski, 2001; and Daniels and Jensen, 2005). For the CAARs before and during the upgrade announcement we only see significant results for Fitch (although only supported by one statistical test). Therefore, we can't compare the results of the different CRAs. After the upgrade announcement, we find significant CAARs for booth S&P and Moody, where S&P has a positive effect of 0.46% and Moody has a negative effect of -0.37%. Just as the sample of downgrades the ratings clearly differ in effect, but we cannot clearly state that one CRA contributes to more information to the market than another.

When looking at the effects after a negative review, we can come to a similar result as mentioned above. The CRAs contribute to (different) significant AARs and CAARs and when we compare the CAARs the only significant CAAR for all three CRAs is the one prior to the announcement. S&P results in a CAAR of -0.41%, Moody in 1.31% and Fitch in 0.21%. The ratings clearly result in different effects to the market, but because the effect of S&P is negative and Moody and Fitch are positive, it is difficult to state which CRA contributes to the most information to the market. In the last three groups of reviews (positive, positive to no review and negative to no review) only S&P's effects were significant for the different CAARs, therefore we cannot compare the effects of these groups. Overall, we can conclude that the effect of the CRAs clearly differ, but not in such a way that

one contributes to more information to the market than another. We therefore have to reject hypothesis 6.

Table 21: Results different Credit Rating Agencies downgrades

Test result of rating changes total sample of 241 downgrades of Dutch Euro corporate bonds announced by Standard and Poor's (154), Moody's (39) and Fitch (48) from the 1st of January 1994 till the 1st of January 2015. Average Abnormal Returns (AAR) for ten days prior to ten days after the credit rating announcement and Cumulative Average Abnormal Returns (CAAR) for periods -30 to -2, -1 to +1 and +2 to +30 days for both upgrades and downgrades are shown. T-statistic results are given for three different significant tests; t-value (Gropp and Richards, 2001), Corrado Rank (Corrado, 1989) and BMP (Boehmer et al., 1991).

Day	S&P	t-value	Rank	BMP	Moody's	t-value	Rank	BMP	Fitch	t-value	Rank	BMP
	N=154				N=39				N=48			
AAR_{-10}	0.25%	-0.174	-0.064	**-1.684****	-0.14%	-0.095	-0.529	-0.959	0.08%	0.053	1.173	0.407
AAR_{-9}	0.09%	0.067	0.034	1.029	-0.32%	-0.223	-1.301	**-1.777****	-0.22%	-0.156	-1.023	-0.715
AAR_{-8}	-0.01%	-0.008	-0.537	-0.137	0.09%	0.069	0.220	1.078	-0.13%	-0.241	**1.811****	1.256
AAR_{-7}	-0.15%	-0.106	-0.666	**-1.523***	-0.09%	-0.065	**-1.572***	-0.657	-0.10%	-0.091	-0.858	**-1.462***
AAR_{-6}	0.06%	0.040	0.183	0.885	**-0.21%**	-0.143	**-1.373***	**-2.411****	-0.01%	-0.004	0.546	-0.044
AAR_{-5}	-0.01%	-0.002	-0.330	-0.042	**0.22%**	0.152	**1.594***	**3.347*****	-0.04%	-0.031	-0.221	-0.596
AAR_{-4}	-0.01%	-0.003	-1.037	-0.024	0.02%	0.010	0.091	0.201	-1.36%	-0.943	-0.858	**-1.732***
AAR_{3}	-0.01%	-0.006	0.663	-0.101	**-0.29%**	-0.199	**-1.931****	**-3.511*****	-0.86%	-0.595	0.222	-1.108
AAR_{-2}	-0.07%	-0.053	-0.913	**-1.417***	**-0.14%**	-0.099	**-1.973****	**-2.251****	**-0.75%**	-0.521	**-1.341***	**-2.067****
AAR_{-1}	-0.02%	-0.014	-0.098	-0.277	0.04%	0.031	-0.121	0.801	-0.20%	-0.136	-0.730	-0.688
AAR_{0}	-0.01%	-0.006	**-2.197****	-0.060	-0.23%	-0.161	**-1.807****	-0.507	0.62%	0.429	0.068	1.256
AAR_{+1}	-0.23%	-0.159	-0.855	**-2.681*****	-0.21%	-0.148	1.092	-0.661	-0.68%	-0.437	-0.384	-1.199
AAR_{+2}	-0.07%	-0.047	-0.992	-1.064	-0.05%	-0.033	**-1.564***	-0.219	0.63%	0.440	0.456	1.117
AAR_{+3}	**-0.10%**	-0.069	**-2.244****	**-1.636****	-0.11%	-0.073	**-2.008****	-0.715	0.95%	0.695	1.026	**1.618****
AAR_{+4}	**-0.17%**	-0.116	**-1.370***	**-1.401***	-0.29%	-0.204	0.582	-0.801	0.33%	0.231	0.809	1.050
AAR_{+5}	0.01%	0.002	0.208	0.048	0.17%	0.116	-0.556	0.501	0.17%	0.117	-0.025	0.834
AAR_{+6}	0.06%	0.043	0.887	0.916	-0.06%	-0.004	0.437	-0.056	0.02%	0.017	-1.032	0.163
AAR_{+7}	0.06%	0.039	0.613	-1.091	-0.19%	-0.132	**-1.471***	-1.053	0.20%	-0.025	-1.092	-0.208
AAR_{+8}	-0.06%	-0.044	0.972	-0.826	-0.12%	-0.081	-0.608	**-1.421***	0.10%	0.137	-0.318	0.780
AAR_{+9}	0.03%	0.023	-0.414	0.460	-0.28%	-0.194	0.362	-0.850	0.11%	0.072	0.409	1.255
AAR_{+10}	-0.02%	-0.017	0.072	-0.415	-0.16%	-0.108	0.266	-1.163	0.12%	0.080	1.111	0.411
$CAAR_{-1, +1}$	-0.26%	-0.104	**-1.768****	-1.156	-0.40%	-0.160	**1.604***	-0.549	-0.26%	-0.104	-0.342	-0.251
$CAAR_{-30, -2}$	-0.99%	-0.131	**-1.811****	-0.815	**-0.40%**	-0.052	**-1.907****	**-2.546*****	**-2.97%**	-0.390	**-1.434***	**-1.804****
$CAAR_{+2, +30}$	-1.34%	-0.176	0.217	-0.389	0.71%	0.093	0.844	1.282	3.09%	0.404	0.994	**1.630***

* Significant at 90% level ** Significant at 95% level *** Significant at 99% level

Table 22: Results different Credit Rating Agencies upgrades

Test result of rating changes that were across class, total sample of 106 review upgrades of Dutch Euro corporate bonds announced by Standard and Poor's (83), Moody's (7) and Fitch (16) from the 1st of January 1994 till the 1st of January 2015. Average Abnormal Returns (AAR) for ten days prior to ten days after the credit rating announcement and Cumulative Average Abnormal Returns (CAAR) for periods -30 to -2, -1 to +1 and +2 to +30 days for both upgrades and downgrades are shown. T-statistic results are given for three different significant tests; t-value (Gropp and Richards, 2001), Corrado Rank (Corrado, 1989) and BMP (Boehmer et al., 1991).

Day	S&P	t-value	Rank	BMP	Moody's	t-value	Rank	BMP	Fitch	t-value	Rank	BMP
	N=83				N=7				N=16			
AAR_{-10}	-0.27%	-0.187	**-1.418***	**-2.388*****	0.10%	0.068	1.070	**1.475***	0.03%	0.023	0.541	**1.825****
AAR_{-9}	-0.07%	-0.051	0.038	-1.271	-0.02%	-0.014	-0.051	-0.659	-0.01%	-0.007	**-1.362***	-0.403
AAR_{-8}	0.01%	0.003	1.110	0.076	0.04%	0.026	0.757	0.435	-0.05%	-0.035	-0.892	**-1.852****
AAR_{-7}	-0.03%	-0.020	0.389	-0.663	0.03%	0.017	0.694	1.389	0.02%	0.010	1.101	0.392
AAR_{-6}	0.04%	0.033	**1.564***	0.615	-0.07%	-0.047	-1.023	**-2.305****	-0.01%	-0.009	0.380	-0.367
AAR_{-5}	0.17%	0.115	1.223	2.418	-0.07%	-0.045	-0.681	-1.277	-0.01%	-0.002	**1.371***	-0.202
AAR_{-4}	0.09%	0.065	0.169	**1.294***	0.01%	0.009	0.533	0.295	**0.08%**	0.060	**2.357****	**1.440***
AAR_{3}	0.24%	0.165	1.097	1.238	-0.02%	-0.011	-0.068	-0.224	-0.05%	-0.032	-1.027	-0.991
AAR_{-2}	-0.05%	-0.038	**-1.526***	-0.781	0.06%	0.041	1.150	0.856	-0.07%	-0.050	-0.552	**-1.515***
AAR_{-1}	0.03%	0.021	0.399	0.433	-0.03%	-0.018	-0.406	-1.372	-0.07%	-0.048	-0.238	-1.010
AAR_{0}	0.02%	0.012	-0.536	0.401	-0.10%	-0.069	-1.031	-1.288	0.10%	0.071	**1.745****	0.939
AAR_{+1}	0.02%	0.015	0.974	0.805	0.05%	0.038	-0.148	0.448	-0.02%	-0.014	0.129	-0.526
AAR_{+2}	-0.01%	-0.002	-0.068	-0.051	0.05%	0.035	0.642	1.045	-0.05%	-0.034	-0.747	-1.284
AAR_{+3}	-0.04%	-0.027	0.139	-1.003	0.06%	0.038	1.031	**1.809***	-0.03%	-0.025	0.563	-0.545
AAR_{+4}	0.04%	0.028	-0.515	0.874	0.09%	0.065	0.977	1.375	0.01%	0.010	0.129	0.442
AAR_{+5}	0.08%	0.058	1.165	**1.677***	-0.02%	-0.014	0.008	-0.631	-0.01%	-0.009	**-1.500***	-0.269
AAR_{+6}	0.06%	0.042	0.898	**1.980****	-0.01%	-0.064	-1.066	-0.905	0.05%	0.034	0.872	1.077
AAR_{+7}	-0.01%	-0.006	0.166	-0.247	-0.04%	-0.027	0.009	-0.564	0.05%	0.034	0.145	0.614
AAR_{+8}	-0.07%	-0.045	0.422	**-2.376*****	0.04%	0.025	-0.013	0.510	0.01%	0.009	-0.132	0.273
AAR_{+9}	-0.11%	-0.078	-0.881	**-1.570***	-0.09%	-0.066	-1.264	**-2.184****	**-0.05%**	-0.033	**-1.568***	**-1.502***
AAR_{+10}	0.11%	0.076	0.969	**1.615***	-0.08%	-0.058	-0.901	-0.892	0.01%	0.008	0.975	0.199
$CAAR_{-1, +1}$	0.07%	0.028	0.484	0.811	-0.07%	-0.029	-0.916	-0.437	0.01%	0.005	**1.877****	0.111
$CAAR_{-30, -2}$	-0.25%	-0.032	-1.014	-0.709	0.06%	0.008	0.322	0.511	0.08%	0.011	**1.742****	0.034
$CAAR_{+2, +30}$	**0.46%**	0.060	**-2.103****	**1.575***	-0.37%	-0.049	-0.686	**-2.111****	-0.24%	-0.031	-1.216	-0.626

* Significant at 90% level ** Significant at 95% level *** Significant at 99% level

Table 23: Results different Credit Rating Agencies Negative Review

Test result of rating changes that were across class, total sample of 97 negative reviews of Dutch Euro corporate bonds announced by Standard and Poor's (47), Moody's (32) and Fitch (18) from the 1st of January 1994 till the 1st of January 2015. Average Abnormal Returns (AAR) for ten days prior to ten days after the credit rating announcement and Cumulative Average Abnormal Returns (CAAR) for periods -30 to -2, -1 to +1 and +2 to +30 days for both upgrades and downgrades are shown. T-statistic results are given for three different significant tests; t-value (Gropp and Richards, 2001), Corrado Rank (Corrado, 1989) and BMP (Boehmer et al., 1991).

Day	S&P	t-value	Rank	BMP	Moody's	t-value	Rank	BMP	Fitch	t-value	Rank	BMP
	N=47				N=32				N=18			
AAR_{-10}	-0.01%	-0.157	0.159	-0.321	0.22%	0.870	**1.818****	**3.637*****	-0.19%	-0.516	**1.723***	**2.204****
AAR_{-9}	-0.08%	-0.946	-0.320	**-1.656***	0.05%	0.215	0.175	0.816	0.16%	0.419	-0.397	-1.020
AAR_{-8}	0.07%	0.832	0.876	**2.114****	-0.14%	-0.560	-0.735	**-2.392****	-0.05%	-0.125	**1.814****	**2.237****
AAR_{-7}	-0.03%	-0.382	0.445	-0.835	0.11%	0.453	0.926	**2.802*****	0.02%	0.042	0.660	**1.538***
AAR_{-6}	0.01%	0.143	0.629	0.236	-0.05%	-0.208	-0.455	**-1.567***	-0.07%	-0.181	-0.590	**-1.526***
AAR_{-5}	-0.08%	-0.949	-0.904	-1.153	-0.13%	-0.527	-0.913	**-2.791*****	0.11%	0.295	0.265	0.172
AAR_{-4}	**-0.05%**	-0.581	**-1.857****	**-2.055****	-0.05%	-0.190	-0.256	-0.750	0.08%	0.214	-0.764	-0.716
AAR_{3}	0.05%	0.611	0.607	1.097	0.07%	0.285	0.116	**1.528***	-0.09%	-0.245	-0.935	-1.277
AAR_{-2}	-0.07%	-0.853	-0.739	**-1.790****	0.12%	0.478	1.170	**3.615*****	-0.01%	-0.021	-0.669	-0.308
AAR_{-1}	-0.05%	-0.590	-1.300	-0.821	0.06%	0.254	0.460	1.197	-0.13%	-0.335	-0.521	-1.007
AAR_{0}	**-**0.01%	-0.113	-0.900	-0.234	0.08%	0.323	0.500	**1.600***	0.19%	0.492	-1.054	**-1.888****
AAR_{+1}	-0.04%	-0.434	0.268	-0.953	-0.09%	-0.353	-0.674	**-1.943****	0.16%	0.428	-0.417	-0.935
AAR_{+2}	-0.03%	-0.317	-0.629	-0.589	-0.04%	-0.141	-0.299	-1.020	-0.17%	-0.452	**-1.494***	**-1.395***
AAR_{+3}	**-0.13%**	**-1.530***	**-1.303***	**-2.633*****	0.09%	0.388	0.721	**2.207****	0.62%	**1.645***	0.236	0.430
AAR_{+4}	-0.03%	-0.355	-0.996	-0.563	-0.02%	-0.060	-0.251	-0.819	0.02%	0.045	-0.547	-1.021
AAR_{+5}	-0.13%	**-1.522***	0.271	-0.988	0.04%	0.139	-0.140	1.282	0.03%	0.074	-0.368	-0.975
AAR_{+6}	0.14%	**1.635***	-0.640	1.077	0.11%	0.470	0.601	**3.166*****	-0.24%	-0.637	0.688	0.383
AAR_{+7}	-0.08%	-0.976	-0.709	-1.054	0.13%	0.498	1.147	**2.393****	0.58%	**1.546***	-0.445	0.025
AAR_{+8}	0.06%	0.748	0.965	**1.649***	0.16%	0.614	1.030	**2.846*****	0.18%	0.486	0.462	0.597
AAR_{+9}	0.05%	0.589	1.025	0.998	0.02%	0.097	0.256	0.560	0.03%	0.073	0.299	1.029
AAR_{+10}	0.01%	0.070	0.599	0.209	0.01%	0.001	0.367	0.003	0.13%	0.351	-0.372	-0.483
$CAAR_{-1,+1}$	-0.10%	-0.657	-1.115	-1.087	0.05%	0.129	0.165	0.752	0.22%	0.338	-1.150	**-1.800****
$CAAR_{-30,-2}$	**-0.41%**	-0.911	**-2.023****	**-1.675***	**1.31%**	0.977	**1.807****	**3.053*****	0.21%	0.107	**1.502***	1.002
$CAAR_{+2,+30}$	0.29%	0.644	0.016	0.747	0.65%	0.489	0.964	**2.834*****	0.51%	0.257	-0.457	-0.399

* Significant at 90% level ** Significant at 95% level *** Significant at 99% level

Table 24: Results different Credit Rating Agencies Positive Review

Test result of positive review changes, total sample of 43 positive reviews of Dutch Euro corporate bonds announced by Standard and Poor's (39), Moody's (2) and Fitch (2) from the 1st of January 1994 till the 1st of January 2015. Average Abnormal Returns (AAR) for ten days prior to ten days after the credit rating announcement and Cumulative Average Abnormal Returns (CAAR) for periods -30 to -2, -1 to +1 and +2 to +30 days for both upgrades and downgrades are shown. T-statistic results are given for three different significant tests; t-value (Gropp and Richards, 2001), Corrado Rank (Corrado, 1989) and BMP (Boehmer et al., 1991).

Day	S&P	t-value	Rank	BMP	Moody's	t-value	Rank	BMP	Fitch	t-value	Rank	BMP
	N=39				N=2				N=2			
AAR_{-10}	0.01%	0.005	0.137	0.083	0.02%	0.090	0.498	0.365	-2.13%	-1.432	**-1.971***	-1.399
AAR_{-9}	-0.12%	-0.325	-0.179	**-1.398***	-0.21%	-0.078	-0.559	-0.257	-0.14%	-0.095	-0.139	-1.416
AAR_{-8}	-0.03%	-0.069	0.124	-0.567	0.01%	0.001	-0.038	0.031	-0.17%	-0.113	-0.012	-0.876
AAR_{-7}	**-0.10%**	-0.266	**-1.315***	**-3.255*****	0.43%	0.158	0.758	0.602	-0.53%	-0.354	-0.200	-0.756
AAR_{-6}	-0.24%	-0.651	-0.515	**-1.370***	0.25%	0.091	0.545	0.224	0.22%	0.151	0.212	0.616
AAR_{-5}	0.16%	0.439	0.018	0.889	-0.44%	-0.164	-1.018	-0.977	1.92%	1.295	1.709	1.151
AAR_{-4}	0.13%	0.362	1.156	1.276	-0.07%	-0.024	-0.230	-0.311	-0.16%	-0.110	-0.362	-1.417
AAR_{3}	-0.03%	-0.082	-1.005	-0.709	-0.47%	-0.176	-1.056	-0.882	-0.74%	-0.503	-1.328	-1.137
AAR_{-2}	-0.04%	-0.106	-1.230	-0.578	0.18%	0.068	0.406	0.699	-0.03%	-0.019	0.558	-0.964
AAR_{-1}	0.05%	0.137	0.662	1.094	-0.02%	-0.006	-0.100	-0.411	**3.26%**	**2.197***	**1.925***	1.414
AAR_{0}	0.41%	1.110	-0.144	1.285	0.06%	0.022	0.069	0.323	0.16%	0.108	0.500	0.542
AAR_{+1}	-0.01%	-0.023	-0.130	-0.217	0.22%	0.080	0.505	0.232	-0.11%	-0.075	0.196	-1.073
AAR_{+2}	-0.05%	-0.137	-0.840	**-1.954****	-0.09%	-0.034	-0.257	-0.444	-2.00%	-1.345	**-1.902***	-1.326
AAR_{+3}	-0.13%	-0.345	-1.097	**-1.594***	0.17%	0.063	0.222	0.311	0.19%	0.131	1.101	1.116
AAR_{+4}	-0.04%	-0.117	-0.848	**-1.324***	0.04%	0.016	0.084	0.020	-0.16%	-0.111	-0.358	-1.409
AAR_{+5}	-0.09%	-0.256	-0.062	-1.168	-0.01%	-0.002	0.015	-0.021	-0.16%	-0.108	-0.354	-1.417
AAR_{+6}	0.01%	0.039	-1.120	0.178	0.04%	0.014	0.031	0.330	0.34%	0.231	1.039	0.971
AAR_{+7}	-0.05%	-0.133	-0.344	-1.299	-0.03%	-0.010	-0.122	-0.113	-0.22%	-0.149	-0.797	-1.414
AAR_{+8}	-0.01%	-0.036	-0.107	-0.470	-0.03%	-0.011	-0.122	-0.223	0.04%	0.029	0.982	0.996
AAR_{+9}	-0.01%	-0.031	-0.221	-0.568	-0.25%	-0.094	-0.689	-0.778	-0.01%	-0.002	0.535	-0.032
AAR_{+10}	-0.06%	-0.171	-0.021	-0.923	-0.19%	-0.069	-0.421	-0.331	0.12%	0.079	0.785	0.622
$CAAR_{-1,+1}$	0.45%	0.707	0.224	**1.381***	0.26%	0.056	0.274	0.525	3.31%	1.288	1.513	1.414
$CAAR_{-30,-2}$	0.02%	0.010	0.009	0.055	-1.59%	-0.111	-0.734	-0.686	-6.72%	-0.856	-1.729	-1.418
$CAAR_{+2,+30}$	-0.81%	-0.414	-1.252	**-2.619*****	-0.55%	-0.038	-0.790	-0.816	-5.43%	-0.692	-0.033	-1.416

* Significant at 90% level ** Significant at 95% level *** Significant at 99% level

Table 25: Results different Credit Rating Agencies Positive to No Review

Test result of positive review changes, total sample of 20 positive to no reviews of Dutch Euro corporate bonds announced by Standard and Poor's (15), Moody's (3) and Fitch (2) from the 1st of January 1994 till the 1st of January 2015. Average Abnormal Returns (AAR) for ten days prior to ten days after the credit rating announcement and Cumulative Average Abnormal Returns (CAAR) for periods -30 to -2, -1 to +1 and +2 to +30 days for both upgrades and downgrades are shown. T-statistic results are given for three different significant tests; t-value (Gropp and Richards, 2001), Corrado Rank (Corrado, 1989) and BMP (Boehmer et al., 1991).

Day	S&P	t-value	Rank	BMP	Fitch	t-value	Rank	BMP	Fitch	t-value	Rank	BMP
	N=15				N=3				N=2			
AAR_{-10}	0.01%	0.060	-0.002	0.327	**-0.49%**	-0.274	**-1.722***	**-1.641***	0.02%	0.013	0.783	0.876
AAR_{-9}	-0.01%	-0.073	-0.509	-0.735	0.39%	0.219	0.367	1.131	-0.72%	-0.388	-1.676	-1.416
AAR_{-8}	-0.01%	-0.099	-0.656	-0.335	-0.41%	-0.231	-1.408	-1.580	0.09%	0.050	1.049	1.244
AAR_{-7}	-0.05%	-0.339	-0.892	**-1.388***	-0.28%	-0.160	-0.540	-1.141	0.01%	0.001	-0.023	0.003
AAR_{-6}	0.02%	0.151	0.584	0.522	0.12%	0.065	-0.120	0.536	-0.19%	-0.103	-0.392	-1.089
AAR_{-5}	0.01%	0.014	-0.120	0.036	-0.67%	-0.379	**-1.948***	-1.573	-0.19%	-0.103	0.055	-0.245
AAR_{-4}	-0.02%	-0.128	-0.243	-0.234	0.32%	0.178	0.854	1.204	-0.25%	-0.134	-0.947	-1.285
AAR_{3}	**-0.13%**	-0.858	**-1.927****	**-3.271*****	0.19%	0.109	0.761	1.127	-0.24%	-0.130	-0.329	-0.975
AAR_{-2}	-0.06%	-0.406	-0.661	-0.589	-0.04%	-0.020	0.047	-0.241	-0.04%	-0.024	-0.188	-0.509
AAR_{-1}	-0.13%	-0.874	**-1.627***	**-2.364****	-0.26%	-0.145	-1.008	-0.656	0.34%	0.183	0.352	0.749
AAR_{0}	0.03%	0.206	0.254	0.977	0.24%	0.138	0.573	0.904	-0.02%	-0.013	0.219	-0.237
AAR_{+1}	0.08%	0.558	0.821	1.254	0.09%	0.051	0.667	0.655	0.03%	0.015	0.846	1.412
AAR_{+2}	**-0.14%**	-0.902	**-1.423***	**-2.221****	0.13%	0.071	0.280	1.103	-0.32%	-0.174	-1.449	-1.341
AAR_{+3}	0.08%	0.547	0.847	**1.851****	-0.20%	-0.114	-0.994	-1.211	0.18%	0.095	1.229	1.311
AAR_{+4}	-0.06%	-0.406	-0.913	**2.165****	-0.33%	-0.187	-0.467	-1.131	0.06%	0.032	0.861	0.860
AAR_{+5}	0.07%	0.438	0.629	1.277	0.60%	0.340	**1.708***	1.572	-0.07%	-0.037	-0.196	-1.136
AAR_{+6}	-0.04%	-0.251	-0.688	-0.947	-0.09%	-0.052	0.047	-0.353	0.43%	0.234	1.542	1.328
AAR_{+7}	**-0.08%**	-0.558	**-1.407***	**-2.618****	-0.07%	-0.037	-0.674	-0.636	-0.05%	-0.029	0.023	-0.296
AAR_{+8}	0.03%	0.176	0.825	0.876	-0.06%	-0.035	0.120	-0.409	-0.06%	-0.031	0.282	-1.137
AAR_{+9}	0.04%	0.240	0.325	0.858	-0.03%	-0.017	-0.340	-1.386	-0.14%	-0.075	-0.247	-1.183
AAR_{+10}	0.01%	0.001	0.359	0.002	-0.64%	-0.360	-1.615	-1.455	-0.26%	-0.139	-1.245	-1.410
$CAAR_{-1, +1}$	-0.02%	-0.063	-0.319	-0.279	0.07%	0.025	0.135	0.164	0.35%	0.106	0.818	0.636
$CAAR_{-30, -2}$	**-0.67%**	-0.841	**-1.701***	**-1.983****	-0.20%	-0.021	-0.309	-0.356	-2.90%	-0.297	-0.441	-1.389
$CAAR_{+2, +30}$	-0.01%	-0.013	-0.914	**-1.417***	-1.92%	-0.204	-1.484	-1.438	0.40%	0.041	0.909	1.369

* Significant at 90% level ** Significant at 95% level *** Significant at 99% level

Table 26: Results different Credit Rating Agencies Negative to No Review

Test result of positive review changes, total sample of 65 negative to no reviews of Dutch Euro corporate bonds announced by Standard and Poor's (56), Moody's (0) and Fitch (9) from the 1st of January 1994 till the 1st of January 2015. Average Abnormal Returns (AAR) for ten days prior to ten days after the credit rating announcement and Cumulative Average Abnormal Returns (CAAR) for periods -30 to -2, -1 to +1 and +2 to +30 days for both upgrades and downgrades are shown. T-statistic results are given for three different significant tests; t-value (Gropp and Richards, 2001), Corrado Rank (Corrado, 1989) and BMP (Boehmer et al., 1991).

Day	S&P	t-value	Rank	BMP	Moody's	t-value	Rank	BMP	Fitch	t-value	Rank	BMP
	N=56				N=0				N=9			
AAR_{-10}	-0.01%	-0.015	-0.093	-0.053					**-0.19%**	-0.516	**-1.726***	**-1.516***
AAR_{-9}	0.03%	0.240	0.954	1.059					0.16%	0.419	1.299	**1.745***
AAR_{-8}	-0.01%	-0.096	0.308	-0.260					-0.05%	-0.125	-0.747	-1.355
AAR_{-7}	0.07%	0.664	0.878	**1.592***					0.02%	0.042	0.124	0.206
AAR_{-6}	0.01%	0.130	**1.685****	0.130					-0.07%	-0.181	-0.411	-0.776
AAR_{-5}	**0.18%**	**1.531***	0.128	**1.476***					0.11%	0.295	-0.069	0.989
AAR_{-4}	-0.06%	-0.539	-0.578	-1.007					0.08%	0.214	0.643	1.016
AAR_{3}	-0.01%	-0.075	-0.240	-0.229					-0.09%	-0.245	-0.744	-0.914
AAR_{-2}	0.08%	0.666	0.576	1.553					-0.01%	-0.021	0.085	-0.080
AAR_{-1}	-0.10%	-0.862	-0.178	**-1.941****					-0.13%	-0.335	-1.015	**-1.598***
AAR_{0}	-0.01%	-0.101	0.250	-0.390					0.19%	0.492	-0.907	0.679
AAR_{+1}	-0.04%	-0.378	-0.810	-1.252					0.16%	0.428	1.254	**1.642***
AAR_{+2}	-0.07%	-0.582	-0.027	-1.217					-0.17%	-0.452	-1.103	**-1.474***
AAR_{+3}	**0.20%**	**1.702****	**1.978****	**2.132****					**0.62%**	**1.645***	**1.463***	**1.632***
AAR_{+4}	0.06%	0.505	0.142	0.997					0.02%	0.045	-0.352	0.133
AAR_{+5}	0.05%	0.398	0.080	1.299					0.03%	0.074	-0.436	0.421
AAR_{+6}	-0.06%	-0.524	1.158	-0.784					-0.24%	-0.637	-0.878	-0.792
AAR_{+7}	**0.20%**	**1.719****	**2.414*****	**3.502*****					**0.58%**	**1.546***	**1.882****	**1.816***
AAR_{+8}	-0.01%	-0.017	-0.249	-0.057					0.18%	0.486	0.881	**1.528***
AAR_{+9}	-0.01%	-0.098	-0.529	-0.148					0.03%	0.073	0.166	0.353
AAR_{+10}	0.07%	0.636	1.003	2.341					0.13%	0.351	0.215	1.088
$CAAR_{-1,+1}$	-0.15%	-0.774	-0.427	-1.776					0.22%	0.338	0.385	0.931
$CAAR_{-30,-2}$	**0.65%**	1.066	**1.571***	**2.513*****					0.21%	0.107	0.673	0.547
$CAAR_{+2,+30}$	**0.82%**	**1.351***	**1.682****	**2.353****					0.52%	0.257	0.458	0.446

* Significant at 90% level ** Significant at 95% level *** Significant at 99% level

4.6 Hypotheses testing results

In this section, we will briefly discuss the results of the hypotheses tested in this research. To answer hypothesis 1, we will first look at hypotheses 1a and 1b. Hypothesis 1a is partly confirmed for the total sample, the downgrades did contribute to information to the market and the upgrades did not. This hypothesis is rejected for the Dot-com pre-sample and partly confirmed for the Dot-com post-sample. In the Global Financial Crisis pre-sample the hypothesis is confirmed for downgrades and for the post-sample it is confirmed for both upgrades and downgrades. In these samples (except the Dot-com pre-sample), the credit rating announcement did contribute to some information content and therefore did have a significant effect on the Dutch Euro corporate bonds. For the total sample and the Global Financial Crisis pre-sample we found that downgrades did contain some information to the content, whereas upgrades did not contribute to information content to the market, these results are in line with the existing literature regarding the significance of downgrades and the insignificance of upgrades (Hettenhouse and Sartori (1976), Griffin and Sanvicente (1982), Hand et al. (1992), Wansley et al. (1992), Matolcsy and Lianto (1995), Steiner and Heinke (2001), Norden and Weber (2004), May (2010)). All together, we can conclude that hypothesis 1a can be confirmed for the downgrades.

Hypothesis 1b had to be rejected for the Global Financial Crisis pre-sample, there was only a very small effect after a positive review to no/neutral review. The total and Global Financial Crisis post-sample resulted in significant effects for all four groups and we can confirm hypothesis 1b for these samples. In the Dot-com pre-sample there were no results for the negative review to no/neutral review group, but the other three groups did contribute to some information to the market. The Dot-com post-sample had significant results for only the negative reviews group and the positive to no/neutral review group. Taking these results into consideration we can partly confirm hypothesis 1b.

Taking the answers to hypotheses 1a and 1b into account we can partly confirm hypothesis 1; credit rating announcements contribute to information content to the market and therefore have a significant effect on Dutch Euro corporate bonds. The downgrades had a significant effect on the market and some of the rating review changes contributed to information content, but this was not enough to fully confirm hypothesis 1.

To answer hypothesis 2, we will first answer hypotheses 2a and 2b. Hypothesis 2a had to be rejected, there only seemed to be a smaller reaction in the period 30-days to two-days prior to the announcement, but this was not enough to confirm the hypothesis. Hypothesis 2b

could partly be confirmed, but not fully. Most review changes did lead to a smaller effect after the Global Financial Crisis, so we can partly confirm hypothesis 2a. Taking this into account we cannot fully confirm hypothesis 2 and therefore must reject hypothesis 2, because hypothesis 2a is rejected and 2b is only partly confirmed we have to reject hypothesis 2.

We will observe hypotheses 3a and 3b to answer hypothesis 3. Hypothesis 3a had to be rejected, most of the effects were not significant and therefore we cannot clearly compare the results of both periods. Hypothesis 3b could not be fully confirmed nor rejected, some of the review changes contributed in smaller effects after the Global Financial Crisis (in the group of positive reviews to no/neutral review, all the effects decreased) and so hypothesis 3b can only be partly confirmed. Considering these results, we cannot fully confirm hypothesis 3 due to only a partly confirmation of hypothesis 3b and a rejection of 3a, we have to reject hypothesis 3.

Hypothesis 4 had to be rejected due to the majority of the effects of across-class not being larger than the within-class effects. Also, hypothesis 5 could not be confirmed, and therefore we can conclude that the effect of credit rating changes with preceding reviews do not lead to larger effect than those credit rating changes without preceding reviews. Lastly, the different CRAs resulted in different effects to the market but there was not one CRA which contributed to a significant larger effect than one of the other CRAs. We therefore have to reject hypothesis 6.

Table 28: Summary of hypotheses results

H1: *Credit rating announcements contribute to information content to the market and therefore have a significant effect on Dutch Euro corporate bonds.*	Partly confirmed; only confirmed for downgrade rating changes and some review changes
H1a: *Rating changes have valuable information content and lead to abnormal Dutch Euro corporate bond price reactions.*	Partly confirmed; only confirmed for downgrades, rejected in the Dot-com pre-sample
H1b: *Rating reviews have valuable information content and lead to abnormal Dutch Euro corporate bond price reactions.*	Partly confirmed; partly confirmed in all periods except the GFC pre-sample
H2: *The effect of credit rating agencies actions on the Dutch Euro corporate bonds has decreased after the Global Financial Crisis.*	Rejected; only partly confirmed for credit rating reviews
H2a: *The effect of rating changes leads to smaller abnormal bond price reactions after the Global Financial Crisis.*	Rejected; only a smaller reaction in period prior to announcement
H2b: *The effect of rating reviews leads to smaller abnormal bond price reactions after the Global Financial Crisis.*	Partly confirmed; most review changes did lead to a smaller effect after the Global Financial

	Crisis
H3: *The effect of credit rating agencies actions on the Dutch Euro corporate bonds has decreased after the Dot-com bubble*	Rejected; only partly confirmed for some review changes
H3a: *The effect of rating changes leads to smaller abnormal bond price reactions after the Dot-com bubble*	Rejected
H3b: *The effect of rating reviews leads to smaller abnormal bond price reactions after the Dot-com bubble*	Partly confirmed; positive review to no/neutral review decreased in effect
H4: *The effect of a credit rating change across-classes will be larger than that of a credit rating change within-classes*	Rejected
H5: *The effect of a credit rating change without a preceding review is larger than that of a credit rating change with a preceding review*	Rejected
H6: *The effect of credit rating changes and reviews of differs from the different credit rating agencies*	Rejected

CHAPTER 5 – Conclusion

The last chapter of this research summarizes the results found and gives a brief conclusion of the results and implication of these results. Furthermore, the limitations of the research are discussed followed by the recommendations and further research.

5.1 – Summary and conclusion

In this research, we have examined the effect of the Global Financial Crisis and the Dot-com bubble on the information content of credit rating changes and reviews on the Dutch Euro corporate bond market and we tried to answer the research question; *has the Global Financial Crisis decreased the effect of Credit Rating Agencies action on the Dutch corporate Euro bond market?* A sample of 347 credit ratings and 225 credit reviews from the three major CRAs was used and this was divided into a sample before and after both the Global Financial Crisis and the Dot-com bubble.

We first studied the effects of credit rating changes and reviews in the Dutch Euro corporate bond market and then looked at the periods prior to and after the Dot-com bubble and Global Financial Crisis. We found that for the total sample there were no significant results after upgrades and significant results after downgrades, which was in line with most of the literature (Hettenhouse and Sartori (1976), Griffin and Sanvicente (1982), Hand et al. (1992), Wansley et al. (1992), Matolcsy and Lianto (1995), Steiner and Heinke (2001), Norden and Weber (2004), May (2010)). For the total sample, we can conclude there was information content to the market for downgrades. Both the total sample and the Global Financial Crisis post-sample resulted in all review groups having valuable information content. In the Dot-com pre-sample there were no results for the negative review to no/neutral review group, but the other three groups did contribute to some information to the market. The Dot-com post-sample had significant results for only the negative reviews group and the positive to no/neutral review group. Hypothesis 1b; *Rating reviews have valuable information content and lead to abnormal Dutch Euro corporate bond price reactions,* was therefore partly confirmed.

Taking these results into consideration, we can partly confirm hypothesis one; *Credit rating announcements contribute to information content to the market and therefore have a significant effect on Dutch Euro corporate bonds*. Although there were some significant effects, especially for the credit rating reviews, we cannot fully support the hypotheses two; *The effect of credit rating agencies actions on the Dutch Euro corporate bonds has decreased*

after the Global Financial Crisis, and three; *The effect of credit rating agencies actions on the Dutch Euro corporate bonds has decreased after the Dot-com bubble*. Therefore, the main research question of this research should also be answered negatively. In both the credit ratings and part of the reviews we saw no significant decrease in effect after the Global Financial Crisis. Only part of the credit rating reviews showed significant decreases, both after the Global Financial Crisis as after the Dot-com bubble. But there wasn't enough statistical evidence to confirm the hypotheses. Furthermore, hypotheses four; *The effect of a credit rating change across-classes will be larger than that of a credit rating change within-classes,* and five; *The effect of a credit rating change without a preceding review is larger than that of a credit rating change with a preceding review,* were rejected and we may conclude that there was no bigger effect in credit rating changes across classes and credit rating changes that did not had a preceding review. We could conclude that the different CRAs have a different effect on the market and therefore different results, but there was not one CRA that outperformed another. We also had to reject hypothesis six; *The effect of credit rating changes and reviews differs from the different credit rating agencies in such a way than one credit rating agency contributes to more information to the market than another*.

5.2 – Limitations

The most distinct limitation of this research is that we have used a sample of only Dutch corporate Euro bonds. Therefore, we cannot conclude that any of the results found in this research are also applicable to other countries in Europe or countries in any other part of the world. Some of the sub-samples contained only very few observations, which could have had an influence on the total results. Future research might want to increase the total sample by looking at bigger or more countries. Furthermore, the results might also be different for Dutch based firms that use other bonds than Eurobonds. Moreover, we have looked at the effects of rating changes from the three major Credit Rating Agencies (Standard and Poor's, Moody's and Fitch), but of course there could be different results when we look at other Credit Rating Agencies. We have also only looked at a time frame from 1994 until 2015, there might be different results before 1994 and after 2015, this could also be seen as a limitation.

Another limitation in this research may be that there has not been a clear distinction between "contaminated" and "uncontaminated" observations as is done by Hirsch and Bannier (2007). They looked at whether there was any information released in the Wall Street Journal within a three-day window of the credit change announcement. In this research, we did not take these contaminations into account and this could also have had an effect on our

results. This research did not take previous ratings of other CRAs into account. There could have been a rating one year prior to another credit rating. We did not take this effect into account, but this could have had an effect on the information content contribution.

Lastly, some of the cumulative abnormal return windows were spread over multiple days. The windows ranging from 30-days to two-days prior to the credit rating event and two-days till 30-days after the event may have been contaminated by other factors. Therefore, we cannot be fully certain that the impact of information content to the market is only caused by the credit rating event and not by any other events. We have examined the effect of single day average abnormal returns and a smaller event window (-1, +1) that are less vulnerable to contamination by other effects. Future research could examine more, smaller event windows or investigate a wider range of abnormal average returns. Or as mentioned before, in future research one might want to look at an only uncontaminated sample.

5.3 – Recommendations and further research

Further research could be conducted in other (European) countries or research of the whole European Union. By doing so, this might identify whether the results found in this research are in line with other (European) countries or the European Union as a whole. There could be more research done with respect to the current technological period we are in, which in turn could be compared to the Dot-com bubble. One could also replicate the research done and take the (potential) contamination of the observations into account and investigate whether these contaminations have had an effect on the total sample.

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APPENDIX A

List of companies of the corporate Dutch Euro bonds that were used in this research and the amount of bonds of that company that were used.

Company Name	Amount of bonds	Percentage of total bonds
ABN AMRO Bank NV	154	26.92%
Achmea Bank NV	7	1.22%
Aegon Bank NV	7	1.22%
Aegon NV	5	0.87%
Agseas NV	7	1.22%
Akzo Nobel NV	4	0.70%
Alliander NV	17	2.97%
Constellium NV	2	0.35%
Cooperatieve Rabobank	19	3.32%
Delta NV	1	0.17%
EDP Finance BV	51	8.92%
Enterprise Oil Finance BV	5	0.87%
GMAC International Finance BV	1	0.17%
Heineken NV	2	0.35%
IFCO Systems NV	2	0.35%
ING Bank NV	13	2.27%
ING Groep NV	5	0.87%
ING Verzekeringen NV	11	1.92%
Intergen NV	3	0.52%
Koninklijke Ahold Delaize NV	33	5.77%
Koninklijke DSM NV	1	0.17%
Koninklijke KPN NV	58	1.,14%
Koninklijke Philips NV	9	1.57%
LeasePlan Corp NV	9	1.57%
Linde Finance BV	5	0.87%
Magyar Telecom BV	6	1.05%
NIBC Bank NV	11	1.92%
NN Group BV	2	0.35%
NV Luchthaven Schiphol	2	0.35%
NXP BV	5	0.87%
Nederlandse Gasunie NV	8	1.40%
Nederlandse Waterschapsbank NV	6	1.05%
New World Resources NV	7	1.22%
Telecom International Finance NV	6	1.05%
PostNL NV	6	1.05%
Refresco Group NV	1	0.17%
Rodamco Netherlands Europe NV	6	1.05%
Royal Bank of Scotland NV	7	1.22%
Schaeffler Holding Finance BV	1	0.17%
Schiphol Nederland BV	12	2.10%
Stork Technical Services Holdings BV	2	0.35%
TenneT Holding BV	5	0.87%
UPC Holding BV	8	1.40%
Wolters Kluwer NV	14	2.45%
Ziggo Group Holding BV	2	0.35%