Anticipation of an Investor-Paid Credit Rating Agency's Rating Changes by the CDS Market.

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Abstract: This thesis examines whether credit rating changes of EJR, an investor-paid credit rating agency (INCRA), are anticipated by the credit default swap (CDS) markets. An event study on public companies listed in the United States finds that EJR downgrades are anticipated, but EJR upgrades are not. This asymmetry is in line with existing literature on the anticipation of issuer-paid credit rating agencies (ISCRAs) by the CDS market. While it is known that rating changes of INCRAs are more timely than those of ISCRAs, this thesis shows that this does not necessarily imply that INCRA rating changes have a substantially higher informational content. Lastly, I argue that the cause of the asymmetric anticipation of the CDS market is likely due to market structure, and not to CRA characteristics.

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Introduction

The 2008 financial crisis brought to prominence a credit rating discussion that usually reared its head only every decade or so. While issues such as payment models and the official licensing of credit rating agencies (CRAs) were discussed academically, CRAs appeared to blunder only occasionally. And while the CRA failures to recognise the poor financial conditions of for example Penn Central, Orange County, Enron, and WorldCom until shortly before their bankruptcies were highly embarrassing and did lead to widespread criticism, the fallout of those bankruptcies was not systemic. Besides, accounting fraud was involved in the latter two scandals which gave the CRAs an out, even though public information had already indicated the worsening financial conditions of Enron and Worldcom (Partnoy 2009). However, the fall-out of the 2008 financial crisis was systemic and much more severe, and the downgrade of swathes of subprime tranches of structured asset-backed loans and mortgages (in some cases of half of the rated tranches) lead to much more scrutiny on the role and performance of CRAs. Giving the triple A-rating to structured financial products of which the actual quality was far lower drew attention to the payment model of CRAs and kindled suspicions of deliberate rating inflation.

While it is important to remember that the 2008 ratings scandal involved highly complex structured products that (in hindsight) were poorly understood by all but a few market participants, the reputational damage to the CRAs was enormous. And while it could be argued that the failure to correctly grade CMOs and CDOs does not mean that corporate bond ratings are inflated as well (e.g. Hill 2010), CRAs and their role began to be much more scrutinised.

The payment models of CRAs are a central aspect of those discussions. There are two types of CRAs: those who get payed by the investors in securities, and those payed by issuers of those securities. The first are referred to as investor-paid credit rating agencies (INCRAs) and the latter as issuer-paid credit rating agencies (ISCRAs). A brief overview of the evolution of both payment models will be given later, but for now it suffices to say that the 'Big Three' (Moody's, Standard & Poor's, and Fitch) are all ISCRAs. Since the early aughts, a few INCRAs (notably the Egan-Jones Ratings Company, or EJR) have increased in popularity, which provided an excellent academic opportunity to compare INCRAs to ISCRAs. As we will see in the literature review, the results are generally in favour of INCRAs.

There is another strain of research into CRAs, which is the comparison of CRA ratings to the market. This research dates back to the papers of Hettenhouse and Santoris (1976) and Pinches and Singleton (1978). The general conclusion is that rating changes are anticipated by the market. This has been a challenge to the 'standard' view that CRAs add substantial information to the market (e.g. Triantis and Daniels 1995). As of yet, there doesn't seem to be a clear consensus on the cause of the anticipation: some scholars blaming the regulatory capture of credit ratings (most notably Frank Partnoy, e.g. 2002, 2006, 2009), others blaming the payment structure of ISCRAs for the difference (e.g. Beaver, Shakespeare, and Soliman 2006). Crucially though, this research has only been done on ISCRAs, and not on INCRAs.

In short, it is clear from the literature that INCRAs outperform ISCRAs and that ISCRA rating changes do not add significant information to the market. It is precisely the intersection of these results that is interesting to me. We know that INCRAs perform better than ISCRAs, and that the market 'performs' better than ISCRAs; but we do not know how INCRAs perform relative to the market. Do they add significant information, and do they have superior analytical skill compared to the market? Or does the market anticipate INCRA ratings just like it anticipates ISCRA ratings? To avoid the debate about the origin of the tardiness of ISCRAs (regulatory capture or payment model), I will analyse an INCRA, EJR, which (in theory at least) is about as much subject to regulatory capture as the Big Three are, as like the Big Three it is a Nationally Recognized Statistical Rating Organization (NRSRO). This means that its ratings are recognised by the United States Securities and Exchange Committee (SEC) and can be used to comply with financial regulation.

If INCRAs do indeed have an edge over the market, it would not only be a feather in the cap of INCRAs, it would show that INCRAs do indeed add information to the market. This would mean that INCRA ratings have value to investors beyond mere regulatory 'rubber stamps', and would indicate that there is indeed a disincentive for the ISCRAs caused by their payment structure.

If, on the other hand, the market does anticipate rating changes, this would indicate that INCRAs too are trend followers rather than trend setters, and do not conceptually differ much from ISCRAs regarding the informational aspect. The value of INCRAs for smaller and less sophisticated investors could then still be substantial (as shown by e.g. Bhattacharya et al., 2019), but their value for sophisticated investors would be dubitable, and it would cast doubt on the claim that an investor-paid credit rating model would be a better policy instrument than the current ratings system.

To find out, I will look at the United States credit default swap (CDS) market and see whether it anticipates the rating changes of EJR, one of the prominent US INCRAs.

The research question of this paper is therefore: "Does the CDS market anticipate EJR's rating changes?"

Note on the Term 'Anticipation'

Throughout this paper, I will use the term 'anticipation' freely. This could imply that market participants keep an eagle's eye on the actions of EJR, because EJR ratings have a large causal effect on the credit markets. 'Anticipation' of an EJR rating change would then be analogous to the 'anticipation' of an interest rate change by the Federal Reserve by the credit markets. But while INCRAs have stolen some of the thunder of the 'Big Three' recently, we don't seem to be at that stage of INCRA market influence yet. Therefore, I use the term 'anticipation' without any implication of causality. To say that a rating change is 'anticipated' in this sense means no more than to say that the market has recognised a firm's changing credit circumstances and that prices have adjusted to them before EJR has issued a rating change.

Literature Review & Contextualisation

The History of Credit Rating Agencies

Credit Rating Agencies have their roots in the early 20th century, when Moody's, Fitch, and Standard & Poor's started rating utility- and industrial bonds, in the vein of the already existing mercantile credit agencies, which analysed merchants' creditworthiness. They are still the three major players in the credit ratings market, although there are a host of agencies specialising in specific sectors, such as banking and insurance. Initially, investors were charged for the service provided by the CRAs. However, the information in their publications was easily copied, especially when photocopiers became commercially available. Hence, CRAs did not earn enough to satisfy the increasing demand for faster and more comprehensive ratings, and began charging issuers for this service (Cantor & Packer, 1995). Cantor and Packer see the 1976 default of household name Penn Central and the ensuing liquidity issues in the commercial paper market as a catalyst for CRAs. Firms started requesting ratings to convince cautious investors, and requesting a rating for new issues became standard practice. White suggests that this trend could have convinced the CRAs that the real money to be earned was not with investors, but issuers (White 2010).

Credit ratings were quickly adopted as a tool by the Federal Reserve as well. In 1930 the Fed designed a system to analyse and control banks' bond portfolios (Jeon & Lovo 2013). Furthermore, the Office of the Comptroller of the Currency (OCC), the US Federal supervisor of licensed banks, created banking legislation introducing the Investment Grade / Speculative Grade dichotomy. The 1935 legislation proscribed that national banks could only purchase bonds deemed "investment securities" by the OCC. In its definition of "investment securities", the OCC explicitly referred to "recognized rating manuals" (United States Comptroller of the Currency 1936, cited in Partnoy 2002). The Securities and Exchange Commission (SEC) followed suit in 1975 when it revised Rule 15c3-1, which compelled broker-dealers to take write-downs on loans deemed risky. Credit ratings were written into the regulation to define the risk (and associated write-down) of a certain bond. To guarantee this system, the SEC designated (and thus institutionalised) NRSROs (Nationally Recognized Statistical Ratings Organizations): Fitch, Moody's, Duff & Phelps, and Standard & Poor's. While this NRSRO designation is a significant entry barrier, the number of NRSROs has

risen and fallen through new entrants[1] and M&A activity, currently there are nine NRSROs (SEC 2019; Jeon & Lovo 2013, 644-645).

This institutionalisation of credit ratings was a fundamental shift to the industry. While the investor-issuer-CRA-triangle always had a potential conflict of interest, there now were two types of investors whose interests the CRAs had to keep in mind: small-time investors, and institutional investors who were bound by charters and financial regulation. Rating changes potentially oblige institutional investors to do a lot of portfolio rebalancing – which in itself is not a problem. However, frequent rating changes and corrections (e.g. an upgrade shortly after a downgrade) would be very cumbersome (and costly!) for institutional investors and could cause problems for market-making, which in the corporate bond-market is already difficult at times due to low-liquidity bond issues. Besides, rating changes have large consequences for companies' cost of capital. Therefore, institutional investors and issuers alike benefit from rating stability. The large ISCRAs explicitly state that rating stability is one of their core objectives, as they strive to take the long-term view, and are 'rating through the cycle' (White 2010; Jeon & Lovo 2013). Put charitably, they have to perform a delicate balancing act between rating accuracy and rating stability. Put less charitably, they only serve a subset of investors: namely those (mostly institutional) investors who prefer rating stability over accuracy.

Due to the market structure and low market power of INCRAs, they should be less affected by this issue. It is therefore not entirely surprising that Bhattacharya, Wei, and Xia (2019) find that there is a set of smaller investors that consistently outperform larger funds by following EJR ratings. Beaver, Shakespeare, and Soliman (2006) call this the clientele effect.

Up until now we have treated the debate around CRAs as one issue, however, we can make a distinction between two aspects of ratings: their accuracy and their speediness.

Two Rating Discussions: Accuracy and Timeliness

While there is of course some overlap between these terms in practice (a rating that was changed too late was of course inaccurate for the time leading up to the change), the academic literature is such that making this distinction gives a lot of clarity. With the term

[1] Particularly following the Credit Rating Agency Reform Act of 2006, which allowed smaller rating agencies to register with the SEC. As such

'accuracy' I mean the degree with which the given rating corresponds with the real circumstances. This is of course a very broad definition and doesn't take into account important distinctions such as the relativity or absoluteness of credit ratings (Cantor & Packer 1995, 19), but for this paper it gets the job done. It allows us to ignore the (important) discussions and literature about rating inflation (e.g. Fulghieri, Strobl, & Xia 2013) and unsolicited ratings (Byoun 2014); the oligopolistic nature of the CRA market and related theoretical models (Jeon & Lovo 2013; Bolton, Freixas, & Shapiro 2012; Partnoy 2002, 2006); and the question whether ISCRAs give higher ratings than INCRAs (Jiang, Stanford, & Xie 2012).

Because we are concerned with the degree to which the market anticipates rating changes, timeliness is the only relevant aspect of rating changes. While we have to keep in mind that many INCRAs are *also* concerned with the long-term perspective, timely rating changes are paramount to the usefulness of CRAs. Indeed, one of the main criticisms of the CRAs behaviour in the Enron scandal was that Enron was only downgraded from investment grade five days before it filed for Chapter 11 bankruptcy protection (Frost 2007). This was a full six weeks after Enron announced that it had to restate four years of earnings due to accounting violations, and five weeks after the SEC had opened multiple investigations. Again, it could be argued that the Enron scandal involved fraud on an extraordinary scale, which could not have been anticipated by the CRAs, but it goes to illustrate the importance of timeliness. Conceptually, the central issue is the *informational content* of credit ratings. According to the strong and semi-strong forms of the Efficient Market Hypothesis, asset prices reflect all the publicly available information at any given time. Therefore, under these forms the only edge CRAs have over the market is through access to non-public information, as could be the case in credit hearings. If we don't assume these hypotheses however, CRAs could still contribute information to the market via superior credit analysis. In that case, would still, in a way, add information to the market. In other words, if rating changes contain information that is not yet priced in by the market, they have positive informational content.

As mentioned in the introduction, this is the standard view many people have of CRAs. The alternative view is that CRAs exist mostly as a 'rubber stamp' for compliance purposes – fund managers are all trying to wrangle some alpha out of the bond market, they trust their own research, but need to adhere to their investment mandate – and therefore need a CRA to confirm that these bonds are indeed investment grade. Crucially, the actual content of the rating plays a subordinated role to the market's research. Therefore, institutional investors are not pressuring CRAs for timely rating changes, and as the large CRAs are all

issuer-paid, would have little opportunity to enforce such demands via market mechanisms. INCRAs on the other hand get paid by investors who want to outsource their credit research or get a credible second opinion. In this view, it's no surprise that the literature shows that both INCRAs and the market outperform ISCRAs on timeliness. Beaver, Shakespeare, and Soliman (2006) call this the clientele effect: the hypothesis that INCRAs and ISCRAs have a distinctly different set of clients, who use their respective CRAs for different ends.

Literature on the Market's Anticipation of ISCRA Rating Changes

As mentioned earlier, research on the market anticipation and asset pricing effects of rating changes has roots in the 1970s. Market anticipation of ISCRA rating changes is a fairly standard result across various markets, though the degree of anticipation and the direction of the rating change differs. Pinches and Singleton (1978) found significant anticipation of rating changes (both upgrades and downgrades) in the equity market, for up to 18 months in advance. Around the same time, Katz (1974) and Grier and Katz (1976) investigated bond markets, and while Katz (1974) did not find any anticipation for utilities, Grier and Katz (1976) found anticipation of downgrades up to a few months in advance in industrial bonds, but not in utilities. Using daily stock prices instead of monthly data, Holthausen and Leftwich (1986) also find anticipation of both upgrades and downgrades, a result echoed by Glascock, Davidson, and Henderson (1987). Wansley, Glascock, and Clauretie (1992) do not study the anticipation of rating changes, but find that downgrades are fully priced in during the week of the announcement, underscoring the information efficiency of the bond market, and implying that the effects of a rating change should be sought in a short rating change announcement window, while leaving open the possibility of anticipation. They also do not find a significant market reaction to rating upgrades. Hite and Warga (1997) study bond prices over a ten-year period and find evidence of anticipation up to six months before a rating event, and a price reaction lasting for one month. For downgrades this result was significant and consistent for both Moody's and S&P ratings, while for upgrades they only found a marginally significant event for Moody's rating changes. Steiner and Heinke (2001) studied German Eurobonds and find evidence of anticipation of both down- and upgrades. While the anticipation pattern they find is symmetric, they do find asymmetry in the announcement window period, with downgrades being followed by much more volatile trading. Dynkin, Hyman, and

Konstantinovksy (2002) only studied downgrades of investment grade bonds, but found significant underperformance in the quarters leading up to the downgrade.

The literature on anticipation using credit default swap (CDS) data is much more sparse, as CDS are a relatively novel financial instrument (more on the use of CDS later this chapter). The seminal paper here is by Hull, Predescu, and White (2004). They found significant anticipation of downgrades and reviews for downgrade, but no anticipation for upgrades. Downgrades were also fully priced in by the day after the downgrade announcement. However, the study suffers from a small sample size. Given the time of publication, this is of course not surprising – Norden and Weber's study from the same time period has exactly the same issue, though to a slightly lesser extent. Their results, based on a larger sample than that of Hull et al., do confirm the former's findings of CDS market anticipation of downgrades but not of upgrades (Norden & Weber 2004). Both studies find that the anticipation starts from 90 days ahead of the credit event. Daniels and Jensen (2005) also find anticipation of downgrades in the corporate bond and CDS markets, but not of upgrades.

Finnerty, Miller, and Chen (2013) were able to obtain data on many more firms, as the CDS market was much more developed by that time. Therefore, the research could be expanded from just investment grade securities to speculative grade securities. Their findings on downgrades confirm the earlier research on CDS, but they do find some evidence of anticipation of rating upgrades. Nevertheless, they confirm the earlier findings that watch announcements (e.g. a 'review for downgrade') do contain significant information.

Lastly, Kiesel (2016) looks at the CDS market's reaction and anticipation of rating changes specifically during the financial crisis, and concludes that CRAs merely follow the market in downgrade decisions, but that rating upgrades can be positive information during a financial crisis.

It is interesting to note that many of the studies finding anticipation, also find price effects after the rating changes (Steiner & Heinke 2001; Daniels & Jensen 2005). Other studies that did not look at anticipation, also found significant underperformance following downgrades (e.g. Dichev & Piotroski 2001). This supports the hypothesis of a stratified market, where some participants are 'early movers' who anticipate rating changes, but where the trades of others follow CRA announcements. Of course, these groups do not have to be the same for each security.

Authors	Year	Anticipation of downgrades	Anticipation of upgrades	Data used
Pinches and Singleton	1978	Yes	Yes	Equities
Holthausen and Leftwich	1986	Yes	Yes	Equities
Glascock et al.	1987	Yes	Yes	Equities
Katz	1974	No	No	Bonds
Grier and Katz	1976	Yes	-	Bonds
Hite and Warga	1992	Yes	Some	Bonds
Steiner and Heinke	2001	Yes	Yes	Eurobonds
Dynkin et al.	2002	Yes	-	Bonds
Hull et al.	2004	Yes	No	CDS
Norden and Weber	2004	Yes	No[2]	CDS
Daniels and Jensen	2005	Yes	No	CDS & Bonds
Finnerty et al.	2013	Yes	Some	CDS
Kiesel	2016	Yes	No	CDS

Figure 1. An overview of the literature on ISCRA rating change anticipation by the (a)symmetry of anticipation and data source.

Literature on the Timeliness of ISCRAs and INCRAs

As mentioned before, academic interest in the different behaviour of INCRAs and ISCRAs is relatively recent. One of the seminal papers on this topic is by Beaver et al. (2006), which compared EJR with Moody's. They find that EJR was much more active in changing ratings than Moody's, and that EJR rating changes Granger cause Moody's ratings. Furthermore, they find that EJR ratings reacted symmetrically to new information, while Moody's ratings seem to react quicker for downgrades than for upgrades. Beaver et al. conclude that this is caused by Moody's status as an NRSRO rather than by its payment model, as the investment grade-barrier is much more pronounced for Moody's than for EJR, which implies that a downgrade from investment grade is a decision Moody's does not take lightly. According to

[2] The authors attribute the insignificance of the results to the small number of ratings upgrades in the sample (Norden & Weber 2004, 2323).

Beaver et al., this is consistent with the hypothesis that discrepancies between ISCRAs and INCRAs are caused by the formers' status as oligopolistic, regulation-enshrined CRAs, which would lead them to prioritise stability, which primarily benefits issuers and mandate-constrained institutional investors. Of course, as both these groups benefit from stability and a distinct investment-grade barrier, it's hard to pinpoint exactly *why* CRAs behave like this; *prima facie* both the clientele argument and the payment model argument seem plausible, and they could of course both have an effect. And while some INCRAs (including EJR) are NRSROs, their market power is by no means equivalent to that of the Big Three, which makes a direct comparison of NRSRO INCRAs and ISCRAs tricky. Until INCRA ratings will be widely used for regulatory purposes, the *ceteris paribus* condition is not fulfilled. That market power in itself could also be a reason for Moody's relative slowness, according to Beaver et al., as the oligopolistic nature of the credit rating market does not place competitive pressure on CRAs. This sentiment is echoed by Partnoy (2002, 2006), who argues that the NRSRO designation creates an oligopoly that leads to rent-seeking behaviour and decouples performance from income. As long as it keep its license, the revenues of a NRSRO are not in danger.

To contrast this though, Bruno, Cornaggia, and Cornaggia (2011 & 2016) study EJR's ratings around the time it obtained the NRSRO designation, in 2007. They find little difference in EJR's rating behaviour: both before and after 2007, EJR's ratings were more timely and symmetric than Moody's. This suggests that it is payment structure, rather than legislative use of ratings, that causes the discrepancy between INCRAs and ISCRAs.

The market power argument could still hold after those results, though interestingly Xia (2014) finds that S&P ratings become more informative after EJR initiates coverage on a firm. This implies that market power aside, new INCRA entrants into the NRSRO-designated marketplace can still have a beneficial effect on ISCRA ratings. This in turn implies that the market power argument cannot be dismissed out of hand: S&P's payment structure did not change, yet the reputational threat of a new entrant (or possibly a learning channel) did lead to an altered credit ratings environment. The question remains however, whether long-term changes can be effected solely through the existence of NRSRO-certified INCRAs, or whether real market power shifts will have to take place to diminish the oligopoly.

Another indication that the informational content of INCRA ratings is higher than that of ISCRA ratings is the abnormal returns to be made by following INCRA ratings. Chan, Edwards, and Walter (2009) study the equity returns to be made by following the ratings of Moody's and the Corporate Scorecard Group (an Australian INCRA). They conclude that

while portfolios based on credit downgrades have no abnormal excess return for neither CRA, portfolios based on INCRA upgrades showed significant abnormal excess returns. Chan et al. also find significant anticipation of Moody's rating changes, both down- and upgrades, and some evidence for the anticipation of the INCRA's rating. By studying institutional equity trades, Bhattacharya, Wei, and Xia (2019) identify a set of small institutional investors realising significant abnormal returns by following EJR ratings.[3] Not only did EJR followers outperform non-EJR followers by up to 7% over a 12-montb period, a difference-in-difference analysis of EJR followers showed an outperformance compared to their past trading, and that the newfound outperformance is mostly attributable to EJR ratings. This is a strong indication that EJR possesses credit analysis ability that is superior to at least a portion of the market. It also means that EJR ratings are a source of information in an inefficient market. Nevertheless, the fact that the EJR followers in Bhattacharya et al. are smaller institutional investors means that larger institutional investors do not follow EJR. This brings us back to the clientele effect posited by Beaver et al., and implies that larger institutions use credit ratings for compliance rather than information, and do inhouse credit research.

Lastly, Berwart, Guidolin, and Milidonis (2019) compare EJR to the Big Three over a 17-year period, and using various causality tests, confirm the finding of Beaver et al. that EJR ratings lead Big Three ratings both for upgrades and downgrades. They also find abnormal returns from INCRA rating changes that are larger than those resulting from ISCRA rating changes. However, Berwart et al. do find that the lead of INCRAs over ISCRAs has diminished over time. Also, the lead is reduced (but still significantly present) when incorporating ISCRA outlook changes, which are more informative than ISCRA rating changes. Although the latter is a common result in the literature (e.g. Hull et al. 2004; Finnerty et al. 2013) and EJR does offer "watch" assignments analogous to the watchlists of the Big Three CRAs. Unfortunately, using EJR watch assignments proved infeasible in this research.

[3] This result does not mean that EJRs clients are mostly institutional investors, but as institutional trades are publicly tracked, they are easily studied.

Credit Default Swaps (CDS) are a late 1990s invention. The market for CDS grew tremendously in the early 2000s, and currently hovers around $10 trillion notional outstanding (ISDA 2019). The unique feature of a CDS is that it protects solely against default risk. While it is conceptually similar to other credit derivatives such as interest rate swaps in that it is an instrument to transfer a specific risk for a negotiated price; credit risk is a very binary form of risk. Either a credit event happens or it doesn't – the payoff structure for CDS is therefore more akin to an insurance contract. The buyer of a CDS spread pays a negotiated 'CDS spread' to the seller each term, which is a percentage of the notional principal quoted in basis points. The seller assumes the credit risk of the underlying: if it's a bond that goes into default, the seller pays the difference between the recoverable amount and the notional amount to the CDS buyer.[4]

This means that the value of a CDS is determined by two variables: the probability of default and the recovery rate. The mid-market fair value of a CDS can then be calculated by equating the present value of the total expected premium payments to the present value of the expected CDS pay-out. While early CDS pricing models generally assumed the recovery rate to be a constant (often about 40%, a long-term US average), more sophisticated models allow for a stochastic or derived recovery rate (cf. Altman et al. 2002). Nevertheless, there is a potential information asymmetry problem in CDS markets, that also manifests in the recovery rate calculations. As CDS sellers are mostly large institutional players, it's not unthinkable that the seller has more information about the financial state of a company that the CDS buyer has – if that company is one of the bank's clients, for example. This knowledge could give the seller a more accurate view of default probabilities, but also of recovery rates. However, Hull (2006, 513) argues that CDS spreads are much less sensitive to recovery rates than to default probabilities. Therefore, if we assume more-or-less homogeneous assumptions about recovery rates in the market, the sole determinant of CDS spreads is the default probability (Hull 2006, 507-525). This is a very useful property for studying the impact of credit rating changes, as estimating the credit risk (which boils down to default probability) is the primary function of credit ratings.

[4] The method of settlement generally happens by auction, which poses its own problems, but is not relevant for this paper. For more on CDS settlements, cf. Levine (2020) and Haworth (2011).

This decoupling of credit risk from other factors influencing bond pricing, such as interest rate movements and structure-specific factors such as duration and optionality, means that in theory CDS spreads should give a less noisy view of credit risk than bond price movements or yield spreads. Perhaps counterintuitively, the CDS market could also prove to be more liquid than the corporate bond market, leading to more accurate quotes. Amato and Gyntelberg (2005) argue that the CDS market is often more liquid than the corporate debt market. This is partly due to advantages both on the long and short side of the trade. Being long a CDS is a less cumbersome way to be short credit risk than shorting a bond, and doesn't require as much margin. The credit event and settlement method are also standardised, which gives more pay-out predictability. On the other side of the trade, selling a CDS doesn't require an upfront cash payment in order to go long credit risk, and it is not necessary to hedge the interest rate risk in case the seller just wants exposure to the credit risk. Nashikkar et al. (2011) echo this sentiment and show that CDS market liquidity is a factor in the pricing of corporate bonds. Lastly, CDS issues can be more liquid than bond issues because CDS can be written on an entire company, while that same company can have dozens of outstanding bond issues, each with their own tenor and structure.

However, while liquidity might be less of an issue than perhaps expected, the CDS investment universe is much smaller than the corporate bond investment universe. So while the accuracy of data might be as good (or better) than a study based on bond data, a study based on CDS will have fewer available data points. This can make interpretation of the results tricky. Therefore, while some have argued that CDS spreads could in theory be used in policy-making, this seems unlikely to happen in the near future (Flannery, Houston, & Partnoy 2010).

Data

EJR publishes two types of credit ratings: "Commercial Paper" or short-term credit ratings, and "Senior Unsecured" or long-term ratings (EJR 2020, 4). The Commercial Paper ratings concern short-term liabilities (defined under US GAAP as maturing in fewer than 365 days), while the Senior Unsecured ratings consider the credit quality of long-term obligations over the next 6 to 12 months. As CDS generally have a time-frame of more than a year, I only looked at EJR's Senior Unsecured rating changes. The sample was obtained from Bloomberg, and contained all corporate rating changes from 2011 to 2018. As only rating changes are the relevant factor of the research, companies that had no prior EJR rating were excluded from the sample. All ratings were of US-based, publicly traded companies.

However, the limiting factor of this research was the amount of CDS available. As discussed earlier, the advantages of using CDS in this kind of research are that the link between credit quality and CDS is clear, and that the parties in a CDS transaction are sophisticated investors. The latter presumably minimises market distortions. The disadvantage is that CDS are not as widely traded as equities. In total, I was able to obtain CDS quotes for 440 companies in the EJR rating change sample. Over the entire sample period, these 440 companies had 4537 rating changes (Figure 3). The CDS quotes were dollar-denominated mid spreads obtained from Datastream.[5]

While it was not feasible to do a market cap analysis, it is probable that this sample consists mostly of large- and mid-caps rather than small- and microcaps, as we would expect the demand for CDS on thinly traded companies to be lower than for bigger, better-known companies – and if CDS trades on the small- and microcaps occur, they are more likely to be non-published. Therefore, it should be kept in mind that this is not necessarily a study of the market in its entirety.

CDS can have a large variation of contract terms. Generally, they are written either on companies or on specific bond issues. As EJR rates companies rather than single bond issues, I obtained CDS spreads for companies as well. Secondly, the timespan of CDS contracts can vary from months to decades. As 5-year contracts are most liquid (ISDA 2019), I chose to use them, considering that a 5-year term should be sufficient to represent long-term credit obligations. Lastly, there is the issue of the so-called 'doc clauses'. As CDS protect against

[5] Due to the corona crisis, this turned out to be the only feasible solution.

credit events, the definition of a credit event is of paramount importance, with the most central question being whether restructuring is a credit event, and to what degree. Throughout the years, the industry has developed several different standards, each having a different relation toward restructuring. In 2014, the International Swaps and Derivatives Association (ISDA) standardised the common industry doc clauses:

Doc clause	Restructuring type	ISDA 2014 Identifier Designation
XR	No restructuring	XR14
MM	Modified modified restructuring	MM14
MR	Modified restructuring	MR14
CR	Full restructuring	CR14

Figure 2. Doc clauses and their abbreviations. After International Swaps and Derivatives Association (2014, 8-9).

While the precise restructuring definitions are not important here, it is important to note that the doc clauses are listed in ascending order of broadness of definition.[6] Full restructuring covers more credit events than modified restructuring, et cetera. Hence, there is a corresponding increase in the risk premium demanded by the CDS seller. Generally (but not always) spreads are therefore higher the more restructuring events are covered. In the sample, this difference ranged anywhere from 0 to 50 basis points, or about 0 to 8% relative difference. As MR14 was the most common doc clause, I tried to use only this doc clause in the research. However, for about 20 companies a MR14 contract was not quoted, and in these cases I chose the doc clause nearest to MR14. While this may have led to a small distortion in the data, the number of occurrences was low enough to be negligible.

Another potential issue is watch announcements. While EJR does issue watch announcements (EJR 2020, 4), their use proved infeasible in this research. However, Hull et al. (2004) and Finnerty et al. (2013) show that watch announcements can have a significant effect on credit markets. While that research was done on watch announcements of the major

[6] Packer and Zhu (2005) provide an in-depth exposition of the different doc clauses and their implications for the pricing of contracts.

ISCRAs, it is possible that controlling for watch announcements, or performing research like this on watch announcements instead of rating changes, paints a very different picture.

	5	3	2	1	0	-1	-2	-3	-4	-6	*Total*
AA+					57	3					*60*
AA				2	83	11	2				*98*
AA-				5	148	24	3				*180*
A+				26	351	62	7	2			*448*
A				34	237	78	8	1			*358*
A-			1	64	390	92	12	2			*561*
BBB+		1	2	82	382	102	5		1		*575*
BBB			2	107	348	91	4	1		1	*554*
BBB-			4	104	222	63	2	2			*397*
BB+			2	82	247	42	1				*374*
BB	1		4	50	161	49	2				*267*
BB-		1	3	48	75	35	2				*164*
B+	1		3	38	152	26	2				*222*
B			5	25	80	28	2	1			*141*
B-	1		2	21	59	12	3		1		*99*
CCC+			2	2	24	3		1			*32*
CCC		1	3		3						*7*
Total	*3*	*3*	*33*	*690*	*3019*	*721*	*55*	*10*	*2*	*1*	4537

Figure 3. Frequency table: rating changes by last rating and step size.

EJR issues ratings corresponding with the ratings scale used by Standard & Poor's and Fitch. In descending order of creditworthiness, the scale runs as follows: AAA, AA, A, BBB, BB, B, CCC, CC, C, D. Pluses and minuses indicate relative standing within the rating category (EJR 2020, 48-50). In this research I treated pluses and minuses as one step: e.g. a downgrade from BBB+ to BBB has a step size of -1, while an upgrade from A to AA- has a step size of 2. The largest upgrade in the sample had a step size of 5, while the largest downgrade had a step size of -6.

Methodology

In this study I followed the methodology of Hull, Predescu, and White (2004), which is also used by Finnerty et al. (2013) and Norden and Weber (2004). As CDS are derivatives rather than equity, a linear model (e.g. a factor-expanded CAPM model) is not suitable to study abnormal returns. Furthermore, as CDS spreads are more akin to insurance premiums than to equity prices, a returns-based model does not capture the dynamics of CDS well. Therefore, Hull et al. use an event study methodology where changes before and after a rating event are studied. The values found are averaged out and are tested for statistical significance. As Hull et al. had far fewer observations than I was able to obtain and could not satisfy the Central Limit Theorem in a large number of categories (the CDS market was not as developed in 2004), they use a statistical bootstrap technique, which was not necessary in this study.

While CDS are well-suited to studying a firm's change in credit circumstances, macro-economic factors and market-wide trends could lead to spurious results. Hence, rather than using the CDS spread, Hull et al. use an adjusted CDS spread, which is constructed from the sample data itself. Another approach could be to use the CDS spread over an index, but there are two problems with that: the first being that there are few CDS indices and that the existing ones are broad Investment Grade- and Junk Bond-indices[7], which would lead to unrepresentative adjusted spreads; the second problem being that a narrower index would not be based on EJR ratings, and could therefore 'contaminate' a study on INCRAs by introducing ISCRA ratings via the backdoor. Therefore, I followed Hull et al. in creating indices based on the sample itself. To that end, I constructed a 'ratings array' from the lists of rating changes, so that for each date and for each company I would have a rating. The indices were then constructed by averaging across all companies with a certain rating for any given rating and date. To guarantee the accuracy of the indices, only rating categories with 5 companies or more would be indexed, if a rating category had fewer than 5 companies, these companies would be eliminated from the sample. In practice, this meant that the categories below CCC were eliminated from the sample, because only a few companies had such a low rating at any time. Batching the low-quality companies would not be defensible, because

[7] For example, the most widely used indices are the iTraxx Europe and iTraxx Crossover for European securities and the CDX IG and CDX HY in the US, both of which respectively track investment grade and speculative grade. Together, they account for over 90% of CDS index activity (ISDA 2019).

CDS spreads were very volatile in this range and the difference in basis points between companies ranged from the hundreds to low thousands.

With these indices constructed, the adjusted spread samples could be generated from the raw CDS quotes. The sample period was from 90 business days before the rating event to 30 business days after. The adjusted spread for any date *t* is equal to the spread of company *p* at time *t* minus the relevant index spread *q* at time *t*. Most studies use the Cumulative Adjusted Spread (CAR) to gauge price changes before the rating event, where the CAR over any time period *i* to *i+t* is calculated as

$$CAR_{p;t,i} = \sum_{t}^{i} (\Delta CDS\ spread_p - \Delta index_q)$$

for any company *p* and relevant index *q.* However, as summing all the changes yields the same result as simply subtracting the adjusted spread at time *t* from the adjusted spread at time *t+i,* I have used the latter method. So for example, I calculated the change in adjusted spread for company *p* for the interval -90 to -61 as

$$\Delta AS_{p;-90,-61} = (CDS\ spread_p - index_q)_{-90} - (CDS\ spread_p - index_q)_{-61}$$

and so on for all the intervals in the study. The chosen intervals were three months, two months, and one month before the rating event; an adjustment period consisting of the day of the announcement plus one day after (to allow for price discovery for changes published after-hours); and one month after the rating change. As a check, I also included the entire 3-month period leading up to the rating change.

I tested the statistical significance of the adjusted spread changes for each interval with a standard t-test. As mentioned, Hull et al. use a bootstrapped t-test as the number of observations they had access to was rather low. However, for the large majority of categories I had sample sizes of over 30 observations, meaning that normality can be assumed under the Central Limit Theorem. Hence, a standard t-test should lead to accurate results. However, this means that the results for categories with low sample size should be regarded with some reserve.

Results

The results of the pooled analysis, are shown in Figure 4:

	N	-90 to -61	-60 to -31	-30 to -1	0;1	+2 to +30	-90 to -1
Upgrade	729	-6,772	2,874	-8,979*	-11,173***	6,039	-13,766
Downgrade	789	3,394	12,956**	17,622***	0,35	2,389	33,227***
Unchanged	3019	-1,59	1,559	-1,64	0,206	-4,167**	-2,466

**** signifies p<0,01, ** signifies p<0,05, * signifies p<0,1*

Figure 4. Average adjusted abnormal CDS spread changes in basis points per time interval.

The pooled analysis paints a mixed picture. The adjusted spread for downgrades is significantly larger than zero in the two months before the rating change. This leads to the rejection of the null hypothesis that the adjusted spread change is zero before the rating change date. Furthermore, for both the adjustment interval and the month after the rating change the adjusted spread was not significantly different from zero, although the spreads were positive (with p-values of 0,386 and 0,369 respectively). This means that the CDS market not only priced in negative information quicker than EJR, but that by the time EJR issued a rating downgrade the information was already fully priced in. Put differently, the downgrades did not add additional information to the market.

However, the upgrades show a very different pattern. While the -30 to -1 interval shows a weakly significant average adjusted spread decrease, the three-month interval is not significant (p = 0,130), although it was negative. Also, the adjustment interval here is highly significant, suggesting that the pricing in of positive information happened quickly.

Lastly, adjusted spreads were not significantly different from zero in the months preceding, and the day after a rating reiteration, which is conform expectations. Curiously though, average adjusted spreads decreased significantly in the month after the rating affirmations, implying that EJR on average had a slightly more bearish view than the CDS market and was reluctant to upgrade.

The large caveat to the pooled analysis is of course that it is an average: it does not take either the magnitude of the rating change or the credit quality into account. As CDS

spreads between the higher and lower categories can differ several hundred basis points, a further decomposition is needed.

Steps	N	-90 to -61	-60 to -31	-30 to -1	0;1	+2 to +30	-90 to -1
2	33	14,792*	-28,549	-34,338**	-69,823*	4,998	-51,012
1	690	-8,249	4,678	-6,918	-8,497***	6,003	-11,243
0	3019	-1,59	1,559	-1,64	0,206	-4,167**	-2,466
-1	721	3,84	12,869**	17,498***	0,265	3,951	33,34***
-2	55	-2,194	13,985	10,845	4,931*	-7,182	24,003
-3	10	11,125	10,847	77,439	-14,445	-32,578	96,533

**** signifies p<0,01, ** signifies p<0,05, * signifies p<0,1*

Figure 5. Average adjusted credit spread changes in basis points conditional on the size of the rating change. For step sizes other than the ones shown here, the sample size was too small to be of statistical significance.

As the largest part of rating changes consists of one-step changes, the results are largely similar to the pooled analysis. Interestingly, for the two-step upgrade the -30 to -1 interval the average adjusted spread is now significantly negative, while for the downgrades we see the reverse, with neither the two- nor three-step downgrades showing significance. For the upgrades, we also see much higher average adjusted spread changes, which suggests that the companies in this bracket had a below-investment grade credit rating; similarly for the three-step downgrade bracket. On further analysis the standard deviations of the downgrades are roughly similar across step sizes, which implies that the differences in significance arise mostly from the difference in the number of observations. This is not the case for the upgrades, however, so we could take the result of the two-step upgrade as weak evidence that upgrades too are anticipated by the market. Too see whether this is just because of some low credit quality outliers, however, we should do a further analysis and look at the adjusted spread changes conditional on the last rating.

Upgrade	N	-90 to -61	-60 to -31	-30 to -1	0;1	+2 to +30	-90 to -1
AA+	0						
AA	2	4,762*	6,683	-0,732	-3,621*	-10,711	10,501
AA-	5	-6,108*	0,099	6,651**	-0,854	-0,469	0,52
A+	26	-0,264	-0,882	-1,423	-0,038	-0,139	-2,52
A	34	0,457	-2,03	-0,413	-0,38	0,502	-2,118
A-	65	0,306	-16,859	0,497	-2,817**	3,961	-27,517**
BBB+	85	5,24**	6,6	2,406	-2,546**	-3,024	17,477
BBB	109	-11,108	-8,743	-8,382	-1,369***	-4,856	-28,996*
BBB-	108	-3,302	3,031	5,85	1,525	12,46	5,174
BB+	84	-41,186	-1,848	-11,793***	-3,422	-7,505	-54,52
BB	55	-2,812	0,557	-7,251	-6,214***	-11,526*	-8,224
BB-	52	-2,441	11,168	-11,343	-5,72**	3,075	-3,048
B+	42	-10,143	6,981	10,312	-5,112**	8,44	9,262
B	30	-63,761*	43,285	-43,359	-136,847**	52,888	-66,764
B-	24	99,198**	44,945	-104,375	11,998	103,071	40,465
CCC+	4	-61,175**	72,674*	-58,814**	-655,721**	104,99	-56,949**
CCC	4	30,367	-20,762	-223,684**	-38,442	-33,504	-239,027**

**** signifies p<0,01, ** signifies p<0,05, * signifies p<0,1*

Figure 6. Average adjusted credit spread changes for rating upgrades conditional on last rating

The overall picture here is more or less similar to the earlier, pooled analysis. The changes in adjusted credit spreads during the adjustment period are mostly significant and negative, which indicates that the CDS market and EJR were in accordance. And while there is some evidence of anticipation (the -30 to -1 interval for BB+, for example), the CCC+ and CCC tranches are both significant and the adjusted spread changes are large, which confirms the suspicion that a few outliers were responsible for the results shown if Figures 4 and 5. As both the CCC+ and CCC tranches only have a sample size of 4, the significance of these results should not be relied upon. Similarly, the significant adjusted spread increase in the -30 to -1 interval for the AA- tranche (p=0,028), which has a different sign than expected, has a sample size of 5, which makes it an unreliable result. Over the entire -90 to -1 period there are only two mildly significant results in rating categories with sufficient sample size, which implies that rating upgrades are anticipated only to a very small extent.

Overall, it is clear that the anticipation that showed up in the pooled and step-size analysis is due mostly to the CCC+ and CCC outliers. For the other rating categories, there is very little evidence of anticipation. Moreover, this evidence is not consistent and not equivocal, so the bottom line is that there is no reliable evidence in favour of anticipation of rating upgrades.

Downgrade	**N**	**-90 to -61**	**-60 to -31**	**-30 to -1**	**0;1**	**+2 to +30**	**-90 to -1**
AA+	3	3,712**	0,034	5,018**	0,598	-2,208	8,866**
AA	13	2,707	1,885	2,915	1,746*	-3,107	6,766**
AA-	27	5,92*	-0,767	1,301	0,334	-6,745	5,894*
A+	71	1,348	3,479	2,396	0,727	-1,485	7,191
A	87	-1,904	5,151**	4,169	0,734	2,879**	8,252
A-	106	-3,388	-11,189	6,105	-1,786	-27,887**	-9,269
BBB+	108	16,725***	38,332**	38,995*	1,697	34,268	94,704**
BBB	97	15,176	28,147	8,393	4,674	-10,2	54,023
BBB-	67	3,106	6,809	19,885*	1,66	15,466*	30,259**
BB+	43	9,886	27,609***	40,488**	8,342*	-18,646	85,431***
BB	51	10,25	8,512	21,291*	6,073*	2,77	44,581*
BB-	37	-15,592	35,271**	3,153	6,61	41,156**	25,314
B+	28	30,135**	21,16	22,966	9,343	58,673	80,362**
B	31	-58,014*	-71,572*	48,03	-49,389*	-5,529	-131,971*
B-	16	14,957	110,995**	43,792	-0,874	14,804	165,108*
CCC+	4	-60,335**	76,726	125,412	-15,203	-348,269	129,031
CCC	0						

**** signifies p<0,01, ** signifies p<0,05, * signifies p<0,1*

Figure 7. Average adjusted credit spread changes for rating downgrades conditional on last rating

Contrary to the upgrade analysis, the downgrade analysis confirms the findings of both the pooled and step-size analyses, with the -90 to -1 interval showing several significant increases in the adjusted average spread. What stands out here is that significant results are

nicely spread out over the whole range of credit ratings – though again we should keep sample size in mind (AA+ and AA being the tricky tranches here). Therefore, the problem that outliers caused significance in the pooled analyses is much less likely to be at play here. Overall, this analysis confirms the results of the pooled and step-wise analysis, and therefore serves as additional evidence for the thesis that EJR downgrades are anticipated by the CDS market. Especially interesting is the highly significant result for the [-90, -61] interval for the BBB+ tranche, which shows that the market anticipates the downgrade from quite a long way out. Hull et al. (2004) get similar results while studying ISCRAs, and it's interesting to see that the same pattern shows up for ICNRA ratings.

Unchanged	**N**	**-90 to -61**	**-60 to -31**	**-30 to -1**	**0;1**	**+2 to +30**	**-90 to -1**
AA+	57	-1,647*	0,574	-0,708	0,220	0,184	-1,573
AA	83	-0,628	-0,024	0,427	-0,026	1,319*	-0,300
AA-	148	1,106	1,431*	2,294***	-0,420	-0,284	4,523***
A+	351	1,497**	1,642**	2,229**	-0,377	1,556**	5,433***
A	237	-0,037	0,210	1,480*	0,127	1,895*	1,755
A-	390	0,951	0,338	-2,493*	-0,101	1,102	-1,198
BBB+	382	-0,693	-3,650	-13,348***	1,309*	-5,830	-19,386***
BBB	348	1,855	-3,332	-2,848	-0,345	-1,288	-3,959
BBB-	222	4,155	13,129***	4,513	-2,332	-8,062	22,630***
BB+	247	6,596	-6,977*	4,839	0,666	-1,139	5,260
BB	161	7,594	8,585	-3,615	-1,565	11,473**	11,180
BB-	75	-9,313	23,205*	18,035	0,882	5,234	30,569*
B+	152	-15,247*	2,198	1,049	1,025	-4,006	-12,824
B	80	-81,812	-26,762	-4,334	6,311	-104,193**	-139,848*
B-	59	-4,940	53,743**	-33,284	3,470*	-8,937	17,605
CCC+	24	-5,781	28,608	2,887	4,860	-74,790	39,692
CCC	3	42,943	-34,759	-81,419*	-2,218	-103,246	-114,868**

**** signifies p<0,01, ** signifies p<0,05, * signifies p<0,1*

Figure 8. Average adjusted credit spread changes for rating reaffirmations conditional on last rating

On first glance, this is a rather puzzling result. The pooled analysis of Figure 4 showed no significant adjusted spread changes prior to a rating reiteration, and the average adjusted spread hovered within two basis points from zero, which is an extremely tight spread. Therefore, it is very surprising to find several highly significant adjusted average spreads, across all intervals, ratings categories, and sample sizes. As we are dealing with adjusted average spreads instead of just average spreads, macro-economic conditions and secular CDS trends should not influence the adjusted average spreads. It is somewhat reassuring that the +2 to +30 interval also has some significant results, which could indicate that there is a divergence between EJR ratings and market consensus. As the signs of the abnormal adjusted spread changes is not consistent, we could tentatively conclude that the CDS market showed strongly divergent opinions on the credit quality of the firms in question. The high significances are explicable as statistical noise resulting from stratification into many subsamples. The overall picture then becomes one of market noise around rating reiterations, with signs of active and volatile price discovery both before and after EJR rating reiterations. While on average this price discovery cancels out (Figure 4), this is an indication that the pricing in of information for individual securities by the CDS market can be volatile when this information is not clearly negative.

This underlines the importance of looking at both the pooled and stratified analyses in making conclusions from this type of study. It seems clear that the pooled analysis should be the leading result. The stratified analyses can be used to confirm and give additional insight to the result of the pooled analysis, but by dividing up the sample into a large number of subsamples, the door is opened for statistical noise.

Overall, the picture of this analysis is quite clear. Downgrades are clearly anticipated by the CDS market across the spectrum of rating categories. While there is some weak evidence of anticipation of upgrades, on further analysis this seems to result primarily from some junk bond outliers. And as expected, in aggregate rating reiterations show neither anticipation nor significant results, although there are indications of active price discovery for individual securities.

Interlude: Why are downgrades anticipated, but updates not?

A curious result from the event study analysis is that EJR downgrades are anticipated by the CDS market up to two months in advance of the rating event, but upgrades don't seem to be anticipated at all. As Figure 1 shows, this is a consistent result in the literature. It appears in studies on bond- and CDS spreads. However, few authors give any explanation for this result. Holthausen and Leftwich (1986) cite an asymmetric loss-function for CRAs and the reluctance of management to disclose negative information as possible causes. The loss function of CRAs is presumed asymmetric because while a CRA has little to fear from a late upgrade, the consequences (especially for the CRA's reputation) of late downgrades are much more severe. In their treatment of asymmetric bond price *reactions* to rating changes, Steiner and Heinke also cite the asymmetric loss function of CRAs. They also offer an alternative hypothesis centred around price pressure: while upgrades have little consequences for institutional holders, downgrades frequently trigger forced selling transactions. As an extension of that, we could speculate that the risk of forced selling is known, and that some investors sell early to avoid that risk, thereby leading to anticipation. For most of the other authors, this asymmetry is worth little more than a by-line, usually in line with the asymmetric loss-function argument of Holthausen and Leftwich. The implication here is that the asymmetry is explicable by a structural feature of CRAs: as CRAs are used to mitigate downward risk, they are more attenuated to deteriorating rather than improving conditions. However, this is not intuitive: in such a case we would expect *more* anticipation of upgrades rather than less. That is, unless we assume upgrades to be flimsy and unsubstantiated.

In the absence of such a bad-faith assumption, the question arises whether it's the structure of the CDS market rather than the structure of the CRAs that causes the asymmetry. This line of thinking is further bolstered when we take into account the finding of Beaver et al. (2006) that EJR reacts to negative and positive information in a symmetric way – and yet the finding of my research is that the asymmetry persists in the anticipation by the CDS market.

Prima facie, the hypothesis that the asymmetry arises from the market rather than the CRA seems like a plausible explanation from both sides of the CDS trade. A CDS buyer looks to mitigate credit risk or speculate on a security's worsening credit conditions. If the buyer anticipates improving credit conditions, there is less need for downside protection, and no reason to speculate by buying CDS. Hence, the demand for CDS on risky securities is

almost per definition higher. Not only is the demand pressure likely to push the spread up, increasing demand for a certain CDS could be seen as a distress signal in itself, which could lead to sellers raising prices.

On the other side of the trade, CDS sellers have an asymmetric payoff profile that requires them to price default risks properly to avoid large losses. It could be argued that avoiding undercharging for risky CDS is more important for sellers than offering competitive prices on less-risky securities. In other words: raising the ask on CDS deemed to be risky is more important than lowering the ask on non-risky securities. In the first case the risk is that a potential loss is not adequately covered, in the second case it is a CDS buyer overpaying for the protection, with being undercut and missing out on revenue as the worst case. CDS sellers therefore have less of an incentive to pay attention to securities doing well, and are better off focussing on securities doing poorly.

Combining the incentives from both the buy- and sell-side of CDS trades, it seems plausible that price discovery is more accurate for securities on a downgrade trajectory than for securities performing well. This could explain the CDS market anticipating downgrades, but not upgrades. It should also be noted that while the event study showed no anticipation of upgrades, there was also no significant reaction following upgrades. This suggests that it's misleading to conclude that EJR leads the markets with regard to upgrades, but rather that the CDS market pays little attention to positive information.

However, this is not the only possible explanation. It is possible that there are firm-specific factors that affect whether or not a rating event is anticipated. Therefore, I do two additional tests to find out why rating upgrades are not anticipated by the CDS market. The first one concerns the market structure and applies the methodology of the main research question to equity data. The second concerns firm-specific factors and is a regression of various factors on the three-month cumulative abnormal adjusted CDS spread. Because it is important for these tests to be based on *ceteris paribus* conditions, the samples on which these tests were performed are a subset of the original sample.

Test of Market Structure

For the first test, I repeated the earlier test with equity data instead of CDS data. The stock price data was obtained from Datastream. A negligible amount of data loss occurred: whereas the main test had data for 4537 rating changes, this test had data for 4489. Because the data is

equity data, I first converted the stock price data to daily returns. To find the abnormal return, I used the same methodology as above: indices were calculated on the basis of the EJR rating, and the abnormal return is the spread of the stock's return over its index. The cumulative abnormal return (CAR) had to be calculated differently: instead of the sum of changes or the spread difference between to dates, the CAR of a stock *j* for a period of *t* days is the product of daily abnormal returns:

$$CAR_{t;j} = \prod_{i=0}^{t}(1 + AR_{ij})$$

where AR_{ij} is the abnormal return for a certain date.

The hypothesis to be tested is that the equity markets show greater anticipation of rating upgrades than the CDS markets; in other words, that the cumulative abnormal returns before an upgrade are positive and show greater significance than the negative cumulative abnormal CDS spreads, which showed very little significance.

The results of the analysis are shown below:

	N	**-90 to -61**	**-60 to -31**	**-30 to -1**	**0;1**	**+2 to +30**	**-90 to -1**
Upgrade	705	0,006**	0,009***	0,013***	0,005***	0,000	0,030***
Downgrade	782	-0,017***	-0,027***	-0,027***	-0,001	-0,004	-0,070***
Unchanged	3002	-0,0014	-0,0026*	-0,0016	0,0015**	-0,0033**	-0,0057**

**** signifies p<0,01, ** signifies p<0,05, * signifies p<0,1*

Figure 9. Cumulative abnormal equity returns in the period preceding a rating event.

Comparing this table to Figure 4 it is striking that the equities show greater significance across the board. Not only are upgrades better anticipated than in the CDS market, downgrades are also anticipated earlier and with as great a significance as in the CDS market. Nevertheless, these results should be treated with caution. Here too we have to think of the market structure. We see that the equity market has a significant negative reaction both before and after EJR rating reiterations. Given that equity-holders have the most junior claim, it should not be entirely surprising that news that has no impact on (senior) credit quality, can has significant effects on the quality of subordinated claims. In a similar vein, and confirming the hypothesis, the upside for equity investors in larger than the upside of CDS market

participants, and the results from this second event study are in line with the hypothesis that market structure is the primary cause for the asymmetric anticipation of EJR.

Test of Firm Characteristics

The aim of the second test is to see whether it's not market structure, but firm or CRA characteristics that explains why CDS markets fail to anticipate rating upgrades. I tested this with a cross-sectional regression of several variables on the cumulative abnormal CDS spreads. The additional data was obtained via WRDS. For all variables except *DAYS*, the value used is the one on the day of the rating change. Some data loss occurred, and the sample consisted of 3945 rating events.

The first variable, *DAYS*, applies to CRAs, rather than the firms themselves: it concerns the number of days between the release of the last quarterly or annual report (SEC form 10-Q and 10-K filings) and the rating change.[8] The intuition behind this that this measure could reveal patterns in CRA "attentiveness". For example, if a CRA were to consistently issue its upgrades shortly after financial statement releases, but its downgrades intermittently, this could be evidence that the CRA payed more attention to firms on a downward trajectory than to firms doing well. As quarterly and annual reports are public, regularly scheduled, and tracked closely by analysts, I expect the information contained in them to be absorbed quickly by the market. Rating changes published shortly after the financial statement release would then add little to the priced-in information. Because a high number of days since the last earnings release could indicate anticipation of the next earnings releases, and to prevent outliers from having undue influence on the results, *DAYS* is defined as the inverse of the days since last financial statements release. In this way, *DAYS* is only high when a rating change follows the financial statement release closely, and we do not presume anything else about the timing of rating changes. Rating changes on the same day as and the day after the financial statements release are taken as the same event window to account for pre- and post-market releases.

The other variables are firm-level and are indicators of the creditworthiness of a firm. Following Fabozzi (2013, 436-447), are related to the solvency and leverage of a firm. The

[8] This measure is rather crude and far from perfect. Companies also make material statements in 8-K filings, for example, although not all 8-K contain relevant information. Nevertheless, as an indicator of CRA behaviour it could be useful.

first, *DC*, is the debt/capital-ratio: a high leverage implies that the firm's debt is relatively risky and volatile. The second variable, *IC*, is the interest coverage ratio, or the ratio between earnings and interest payable, a measure of the sustainability of the debt burden. It is calculated as EBIT divided by interest payable. The third variable, *CR*, is a measure of solvency, the current ratio, calculated as current assets over current liabilities. It indicates whether a company has the liquidity to meet its current obligations.

Lastly, I included several control variables. *LR* is a numerical indicator of the last rating (starting from 1, defined as sample high AA+, increasing to 21, corresponding to D, with +/- ratings being treated as one step). As CDR spreads decrease with ratings, *LR* should correct for that. The second control variable, *BM*, is the book-to-market value. While this is an equity variable not directly relevant to creditworthiness, I included it as a proxy for the market expectation of future performance, in line with Fama and French (1992). A low *BM* indicates that the market has high future earnings expectations, while a high *BM* indicates a low return on assets, which could be a distress signal. Lastly, for the pooled analysis, *DIRCHG* indicates the direction of the rating change: -1 for a downgrade, 1 for an upgrade, and 0 for a reiterated rating.

The results of the regression are shown in Figure 10. With the adjusted R^2 struggling to get over 0,01, it is clear that none of the model specifications captures the dynamics of the anticipation of rating changes well. Within some of the models though, there are some significant variables that are mostly in accordance with the theoretical expectations. Within the pooled analysis, the adjusted abnormal spread seems to vary with the debt/capital-ratio, with a low leverage correlating with lower adjusted abnormal spreads. For upgrades, the debt/capital-ratio has the same sign and a similar magnitude as in the pooled analysis, but is less significant. Interestingly, a high book-to-market ratio is associated with negative abnormal adjusted spreads, which could indicate that the credit markets pay little heed to equity earnings expectations and favours the relative stability of high book-to-market ('value') firms.

Lastly, the results of the analysis on rating reiterations could potentially tell us something about the dynamics of the CDS market. With the debt/capital-ratio being similar in sign, magnitude, and significance to the pooled analysis, it seems clear that leverage is a major determinant of CDS spreads, as expected. The variable *DAYS* being significant and positive underlines the role of earnings releases for rating reiterations. While the construction of the variable as an inverse makes interpretation somewhat difficult, it is clear that rating reiterations that closely follow an earnings release are associated with increasing adjusted

	N	Constant	DAYS	DC	IR	CR	LR	BM	DIRCHG	Adj. R2
Pooled	3945	10,67	13,84	-32,38	-0,02	3,13	0,97	-7,52	-30,79	0,010
		0,353	*0,243*	*0,003***	*0,742*	*0,347*	*0,349*	*0,219*	*0,000****	
		10,71	13,24	-26,34	-0,03	4,35	0,09	-3,47		0,001
		0,353	*0,266*	*0,015***	*0,634*	*0,201*	*0,931*	*0,570*		
Upgrade	613	11,29	14,65	-44,92	-0,31	14,49	-2,14	-42,37		0,012
		0,247	*0,759*	*0,084**	*0,558*	*0,278*	*0,536*	*0,014***		
Downgrade	707	30,75	-44,66	-15,12	0,31	-13,03	4,72	-0,69		-0,003
		0,707	*0,324*	*0,646*	*0,800*	*0,231*	*0,214*	*0,970*		
Unchanged	2625	3,36	25,29	-31,10	-0,03	6,01	0,33	-3,21		0,006
		0,771	*0,028***	*0,004****	*0,635*	*0,093**	*0,758*	*0,623*		

*** signifies p<0,01, ** signifies p<0,05, * signifies p<0,1*

Figure 10. Results of the multiple regression on the abnormal adjusted CDS spread. P-values in italics.

abnormal spreads. However, there is no clear implication of this. It could mean that the CDS market expected worse financial statements than released or that EJR is reluctant to downgrade (relative to the CDS market), but it could also imply that CDS are used to speculate on earnings. A counterpoint to the last point is that *DAYS* is not significant at all in the other analyses.

Overall, the conclusion of this test seems to be that firm- or CRA-specific variables other than the debt/capital-ratio have little bearing on the anticipation of a rating change by the CDS market.

Interlude Conclusion

Contrary to most studies that ascribe the asymmetry in rating anticipation to a structural feature of CRAs, the tests in this section indicate that the asymmetry is not a result of CRA structure, but of market structure. It is not the asymmetric loss function of a CRA that is relevant here, but the asymmetric loss function of market participants. While neither counterparty to a CDS trade has a strong incentive to act on the anticipation of a credit quality increase, equity investors do. Equity generally has a much larger upside than credit instruments, which strongly incentivises equity market participants on both sides of a transaction to price equities correctly. Looking back at Figure 1, this is in line with literature finding as well: while asymmetric anticipation of rating changes by the CDS markets is a common result in the literature, the studies done on equity anticipation of rating changes consistently show symmetric anticipation. The bond markets paint a less clear picture, though it should be noted that the studies finding asymmetric anticipation date back at least 30 years. Furthermore, it is in line with the tests done in the CDS event study that showed neither anticipation of nor reaction to EJR upgrades. The right conclusion does not seem to be that the CDS market is slow in incorporating positive information, but rather that it is mostly apathetic to positive information altogether.

We can therefore conclude with reasonable confidence that the (a)symmetric rating change anticipation can be fully explained by looking at the market structure of the studied instrument.

Discussion & Conclusion

The existing literature has shown that INCRAs are generally more timely than ISCRAs, and that the markets anticipate ISCRA downgrades well in advance. This paper shows that INCRA downgrades are also anticipated by the CDS market. This means that even though INCRAs are more timely than ISCRAs, their downgrades generally do not contain information that has not already been priced in by the CDS market. While this finding does not invalidate the discussion around the payment models of CRAs, it does put it in perspective. Of course, it cannot be ruled out that the differing payment models are the cause of the timeliness gap between INCRAs and ISCRAs, yet clearly an investor-paid model is not a panacea. This research suggests that while payment models are indubitably a part of the equation, they are not the sole reason that the markets outperform CRAs with regards to the incorporation of information. Rather, some degree of market anticipation seems to originate in the nature of CRAs. This raises two conceptual questions. The first is whether it is fair to expect a single 'centralised' agent to lead the market in the continuous evaluation of securities in which the agent is not invested. This is mostly a question of resources: as the market consists of a large amount of agents, many of whom have good credit evaluation capacities, we could not reasonably expect a single agent to beat the all other agents all the time.[9] The second question is more conceptual, and regards the role of CRAs in general: are they expected to fulfil the role of first mover? In other words: how important is the timeliness aspect for CRAs? While in the light of Bhattacharya et al. (2019) it might be inaccurate to state that CRAs are mere 'rubber stamps' (e.g. Partnoy 2009), CRAs will always have to walk a tightrope between publishing timely rating changes and having sufficient confidence in the rating change. This is not just an issue of a commitment to rating stability, but also an attribute of the loss-function of CRAs: presumably it is worse for the reputation of a CRA to retract a rating change quickly than to publish it a bit late.

From that point of view, it is unfortunate that it was not feasible to incorporate EJR watchlist announcements into this study. Finnerty et al. (2013) showed that ISCRA watchlist announcements are much more informative than the actual rating changes, and it is very likely that this holds true for EJR's watchlist announcements too. This would also fit in the

[9] Of course we have to keep the clientele effect of Beaver et al. (2006) in mind here – nevertheless there are a sufficiently large number of large institutional investors that the point holds.

narrative about CRA reputation: as a watchlist announcement is not as much of a commitment and not as definitive as a rating change, it would be very interesting to see whether EJR's watchlist announcements are anticipated as well. This would be a good topic for future research.

Furthermore, the results of this paper are not just about INCRAs, but also about the CDS market. In line with the earlier literature (Hull et al. 2004; Norden & Weber 2004; Finnerty et al. 2013), the CDS market appeared to anticipate rating downgrades. In contrast to studies on the effect of rating changes on bond prices there was no significant abnormal spread movement in the month following the downgrade, which supports the theory of Steiner and Heinke (2001) that the abnormal bond price movements observed after rating changes result from forced selling. This observation also implies that the spread changes in anticipation of a rating downgrade are 'true' price discovery, and not driven by speculation on forced selling. This is a good example of how the CDS market can be less noisy than other markets. Nevertheless, some of the findings in this paper cast doubt on the usefulness of the CDS market for research and policy. The first is that the CDS market seemed indifferent to positive information. Not only was there no significant anticipation of credit upgrades, there also was no significant adjusted spread decrease in the month following the rating change. This is not to say that the CDS market is at all apathetic to positive information – maybe EJR leads the market by more than a month for upgrades. More research is needed to be able to say whether the CDS market really is indifferent to positive information, or just very slow, and future studies should therefore use a post-rating change period of more than one month. Nevertheless, there is a real possibility that an asymmetric reaction of the CDS market to new information is a structural feature. This would presumably result from the payoff profiles of both CDS buyers and sellers. It is telling that the event study on equity data showed significant anticipation to both upgrades and downgrades, as the payoff profiles of equity market participants are much more symmetric with regard to positive and negative information. The caveat of course is that the downside of equity investors is more severe than that of credit investors, which showed in the negative reaction to information deemed to have no effect on credit quality by EJR. Furthermore, while there might be little reason to worry about CDS market liquidity (as opposed to bond market liquidity), CDS market breadth is a very real issue.

The academic implication of this is that there is no perfect market to study when looking at credit ratings. The equity markets have tremendous breadth and liquidity, but are noisy and are not necessarily aligned with credit investors. The bond markets are even

broader (perhaps too broad), but less liquid, and can also be noisy. The CDS market is liquid and barely has any noise, but its breadth is lacking and it seems structurally unaligned to positive information. The narrowness of the CDS market is also an obstacle for the implementation of CDS-related measures in policy (as suggested by e.g. Flannery et al. 2010). Nevertheless, as CDS are directly linked to credit quality, it is a very attractive space for both research and policy, which should increase with improved market breadth.

Lastly, a potential future area of study is related to INCRA-based trading strategies. Although Bhattacharya et al. (2019) identify a cohort of small institutional bond investors that outperform by trading on EJR information, the equity event study implies that in the equity markets, the information is fully priced in by the time EJR issues a rating change. Research into this could also give more clarity about the role and functioning of INCRAs.

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Appendix – Overview of Abbreviations Used

CDS	Credit Default Swap
CRA	Credit Rating Agency
INCRA	Investor-paid Credit Rating Agency
ISCRA	Issuer-paid Credit Rating Agency
ISDA	International Swaps and Derivatives Organization
NRSRO	Nationally Recognized Statistical Rating Organization
SEC	Securities and Exchange Commission