Do S&P's Corporate Ratings Reflect Credit Shocks?

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Abstract

This study examines empirically whether corporate ratings by the credit rating agency Standard & Poor's reflect fundamental and publicly observable shocks to the credit quality of companies. This serves to assess the degree of information sensitivity of external ratings, and the timeliness of their adjustments.

Our evidence on a large sample of European companies from 2000-2008 clearly indicates that external ratings frequently do not reflect fundamental changes in the credit quality of companies. This lack of information sensitivity seems neither attributable to private information from monitoring nor the rating-through-the-cycle approach employed by S&P.

The intended regulation of rating agencies thus not only needs to validate the process of rating generation but needs to define the purpose and desirable characteristics of ratings in the first place. The proposed methodology in this study, which is based on publicly observable capital market information, can help investors and regulators to validate external ratings.

JEL classification: G14, G28, G33

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"There are two superpowers in the world – the United States and Moody's bond-rating service."
(T. Friedman, 1996)

1 Introduction

The recent subprime crisis in financial markets has raised severe doubts regarding the reliability of ratings provided by credit rating agencies (CRA) like Moody's, Standard & Poor's, or Fitch. Since credit rating agencies are pivotal,[3] sometimes even described as the "gatekeepers of financial markets", this has triggered strong moves towards an international and more strict regulation of these financial intermediaries.

This study contributes to the discussion regarding the quality of rating agencies assessments by providing the first systematic empirical analysis, whether external corporate ratings are adjusted if they should be from an economic perspective. We define a set of publicly observable and severe shocks to the credit quality of exchange-listed companies and analyze, whether agency ratings change around these credit shocks, and how long a potential adjustment requires.

The study's objective is unique, since to the best of our knowledge, this is the first study that does not analyze the determinants of observed ratings or rating changes (Ang/Patel 1975, Blume/Lim/MacKinlay 1998), but rather focuses on the reverse question, whether a rating *should* have been changed.[4] Furthermore, conditioning on credit shocks avoids some issues which could explain non-adjustment behavior but are difficult to assess from an outside perspective. In anecdotal case studies, often the observation of no adjustment is explained by the potential existence of private information by the CRA, or their adherence to the so-called rating-through-the-cycle approach.[5] Rating-through-the-cycle mandates to change ratings only, if quality shocks are persistent rather than transitory in the light of the current business cycle (Löffler 2004). However, since we condition our analysis on severe credit shocks to companies, private information can hardly explain missing adjustments on average, and credit quality shocks are designed to be too severe to be assessed as only temporary.

Our empirical analysis is based on the sample of European companies that were a constituent of the *Dow Jones STOXX TM* index at some time between the years 2000 and 2008. This cov-

[3] For example, the IOSCO states that "many investors and market participants effectively outsourced their valuations and risk analyses to the [Credit Rating Agencies]", IOSCO 2008a, p.2. IOSCO is an abbreviation for *International Organization of Securities Commission*.

[4] Robbe/Mahieu (2005) is the study closest to ours. They show that a capital market based rating from the commercial provider Moody's KMV predicts changes in long-term issuer ratings by Standard & Poor's. However, unlike to the focus of our study, they do not analyze the cases where the KMV rating predicts a change, but S&P does not adjust its corresponding rating.

[5] S&P defines rating-through-the-cycle as follows: „We attempt to avoid assigning high ratings to a company at its peak of cyclical prosperity, if that performance level is expected to be only temporary. Similarly, we may not lower ratings to reflect weakening performance because of cyclical factors, if the downturn is likely to be only temporary or there are good prospects for management to respond to the changed circumstances", S&P (2008).

ers a base sample of about 1600 companies out of which about 460 were rated by Standard & Poor's. We estimate a capital market rating for each of these companies based on the Merton (1974)-model. Since the Merton-type rating is well known to provide timely information on borrowers' credit risk in conjunction with a high predictive power regarding firm default (see for example Bohn/Arora/Korablev 2005, Hillegeist et al. 2004, and Bharath/Shumway 2008), this capital market rating serves as our economic benchmark rating.

We then define three different types of (publicly observable) shocks to firms' credit quality based on the capital market rating, and test whether these shocks are reflected in the corporate rating by S&P. Our empirical findings clearly show that corporate ratings by S&P unreliably reflect severe shocks to corporate credit risk as assessed by the capital market.

The study is organized as follows. In the second section we describe our data and provide the definition of the credit shocks used to validate S&P's rating adjustment behavior. In the third section, we provide a systematic empirical test whether S&P ratings adjust to these credit shocks and present case studies on typical event firms. Finally, in Section 4, we discuss our findings and their implications for the current discussion on how rating agencies should be regulated in the upcoming "new financial market order".

2 Data, Capital Market Rating, and Credit Shock Definition

2.1 Data

The empirical analysis of this study is based on the sample of European companies which were a constituent of the *Dow Jones STOXX Total Market* index at some time during the years 2000 and 2008. This constitutes a sample of about 1,600 large European companies, out of which about 460 were rated by Standard & Poor's. We use annual and quarterly reports from Worldscope and stock price information provided by Datastream as our main information sources. Information on S&P long-term issuer ratings is also taken from Datastream.[6] We use the period from 2000-2005 for calibration purposes, while the actual testing period starts in 2006 and extends until March 25, 2009. The testing period covers the international subprime crises, which started in Europe at about July 2007 and has (as of mid 2009) not yet ended.[7] Companies without rating by S&P are required for comparisons and rankings in the cross-section of our sample.

We avoid a survivorship bias in the sample construction by tracing back all companies that were a constituent of the STOXX index since 2000. Still, the sample is a selection of large companies which might impose some selection bias. However, we do not believe this selection to materially affect our analysis, since in Europe, basically only large firms are rated by credit rating agencies in the first place, and firm size is correlated with public attention and

[6] We rely on S&P long-term issuer ratings for maximum coverage of European firms and, most importantly, because these are unaffected by the LGD, i.e. the loss that occurs given a default, unlike the corresponding ratings by Moody's. Hence, at least theoretically, S&P ratings should closer resemble an estimator for a company's probability of default, as does our benchmark rating based on the structural model by Merton (1974).

[7] For a description and analysis of the subprime crisis see Reinhart/Rogoff (2008), Hellwig (2009), and Demyanyk/van Hemert (2009)

information production by investors, analysts and regulators. Analysing large firms thus ensures the availability of rated firms, a minimum level of available public information, and that reputation costs of false rating attributions by a CRA will be the highest. All of these features render our sample suitable for the intended analysis. Moreover, the reputation effect constitutes stronger incentives for the agencies to quickly adjust their corporate ratings if credit quality of companies changes.

2.2 Capital Market Rating

The measurement of S&P rating adjustments requires a benchmark to assess the credit quality of firms independently from any CRA's assessment. Due to the broad coverage of stock markets, the high frequency of price observations, and the evidence on the strong predictive power of ratings based on stock prices, we implement a capital market rating based on the structural by Merton (1974) in this regard.

In particular, we estimate the so-called distance-to-default (DD) as our central measure for the credit quality of firms. The DD is defined as the number of standard deviations a firm's asset value needs to change in order to hit the default barrier (in one year). We solve for each trading day and each company the central option-pricing equation (1), which relates the observable equity market value (the value of the call option of equity owners to buy the firm's asset by repaying the debt outstanding) to the unobservable asset value and its volatility. We employ a numerically efficient iterative procedure to solve the one equation for the two unknowns, based on a rolling window of 250 trading days. Duane et al. (2005) show, that this iterative procedure corresponds to a maximum likelihood estimation of these parameters, implicitly relying on the expectation maximization (EM) algorithm.

$$E = A\,N(d_1) - De^{-rT}N(d_2) \quad \text{mit} \quad d_1 = \frac{\ln\frac{A}{D} + \left(r + \frac{\sigma_A^2}{2}\right)T}{\sigma_A\sqrt{T}}, \qquad d_2 = d_1 - \sigma_A\sqrt{T} \tag{1}$$

In equation (1), E denotes the market value of equity (the call price), D the nominal amount of debt due at time T, r the continuous risk-free interest rate, A the asset value, σ_A the volatility of the asset value, and N(.) the cumulative distribution function of the standard normal distribution. The term labeled d_2 reflects the critical indifference point, where the equity owner's call option will for the first time not be exercised, and thus reflects the probability of default of a company. Hence, (-) d_2 is usually called the distance-to-default (DD), as illustrated by equation (2), where PD denotes probability of default.[8]

$$DD = \frac{\ln\left(\frac{A}{D}\right) + (r_f - 0.5\sigma_A^2)T}{\sigma_A\sqrt{T}} \qquad \wedge \qquad PD = N(-DD) \tag{2}$$

[8] For the implementation, we assume that the debt due at time T, which is chosen to be one year, is a company's total liabilities. Also, we calculate the DD under the risk neutral measure. We match balance sheet data to stock price information with a minimum lag of two month after the fiscal year end date, in order to avoid relying on information not yet available to investors. Altering these choices (increasing the lag, choosing short term debt plus half the long term debt as debt due etc.) does not qualitatively affect the results of our study.

Figure (1) illustrates the resulting DD estimated from firms' equity prices and debt information in our sample. The figure shows the development over time of the median and the 10th and 90th percentile of the DD of our STOXX firm universe (upper graph), and the corresponding development of the STOXX equity price market index (lower graph). Clearly, the DD of these companies reflects the business cycle and has been significantly deteriorated with the beginning of the subprime crises in 2007. Note that lower values of the DD reflect higher probabilities of default.

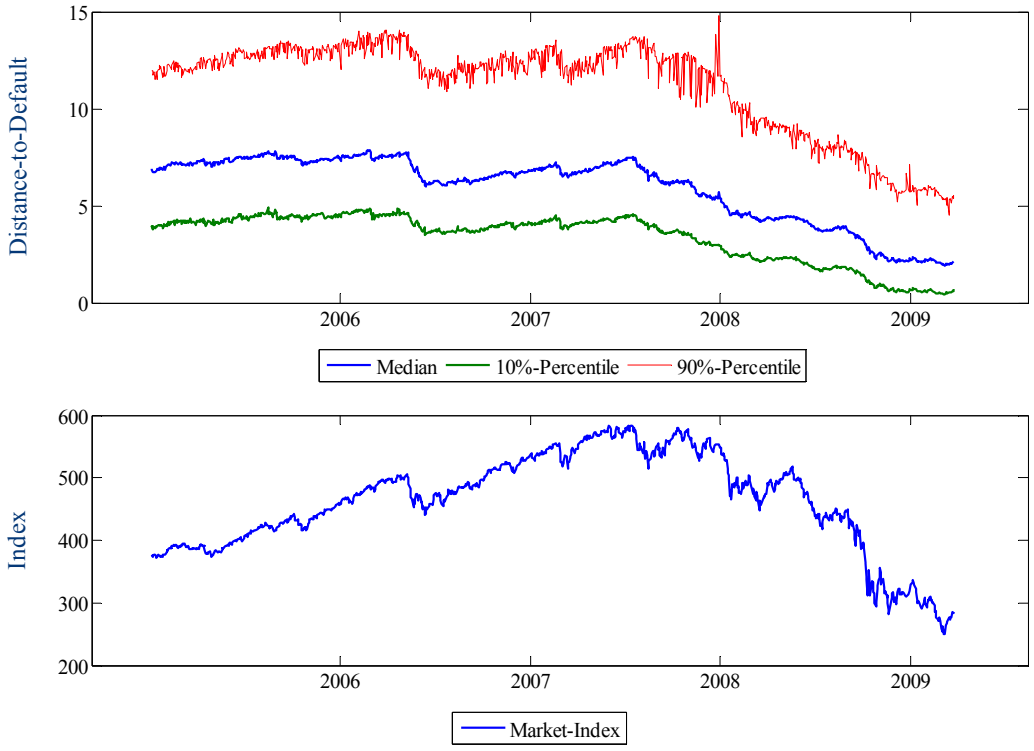

Figure 1: Time development of the DD compared to the DJ STOXX equity price index

Table 1 presents descriptive statistics on our firm sample, comparing financial ratios and DD-levels for several industries and at two points in time, before and at the subprime crises.

Table 1: Sample Descriptive Statistics

The table shows descriptive statistics for our sample, consisting of constituents of the *Dow Jones STOXX Total Market* index at some time between 2000 and 2008. The table is subdivided into ten different industries (rows, according to the GICS classification scheme), and two points in time of our observation period: January 5, 2005 and March 10, 2009. *DD* denotes distance-to-default, σ the standard deviation of the DD, *ROE* denotes return on equity (net income before extraordinary items / total common equity), *Leverage* is calculated as total liabilities / total assets. ROE and Leverage are reported in percentage points. All information from annual or quarterly reports is matched to calendar time with a minimum lag of two month with respect to the fiscal reporting date, to avoid using information that was not yet available to investors.

GICS Industry	**Sample as of January 2005**					**Sample as of March 2009**				
	Share of Sample [%]	DD [median]	DD [σ]	ROE [%]	Leverage [%]	Share of Sample [%]	DD [median]	DD [σ]	ROE [%]	Leverage [%]
Financials	21.76	6.14	2.70	9.49	76.55	21.81	1.19	1.39	11.12	76.71
Industrials	21.54	6.35	2.42	3.31	66.06	21.41	1.65	1.13	21.25	65.76
Consumer Discretionary	17.36	7.00	2.50	11.15	57.33	15.74	1.91	1.35	12.41	62.29
Information Technology	9.22	4.95	2.99	-9.61	47.71	7.37	2.42	1.38	13.92	47.91
Materials	8.15	7.25	2.37	5.96	56.37	8.86	1.68	1.28	13.00	54.58
Consumer Basics	6.32	8.81	2.71	17.49	61.58	6.08	3.00	1.19	22.62	59.63
Health Care	5.90	8.88	2.78	5.47	45.38	6.77	3.93	1.45	12.45	51.60
Energy, Equipment & Services	3.75	6.60	2.26	2.36	56.49	5.38	1.91	1.00	21.09	58.33
Utilities	3.64	7.94	1.89	9.06	65.54	4.18	2.32	0.92	12.29	68.61
Telecommunications	2.36	6.70	2.44	-1.74	59.06	2.39	2.87	1.40	25.08	65.86

From Table 1 can be seen that industry-specific DD levels have dramatically decreased with the subprime crises, although the effect is non-homogenous. For example, as to be expected, the financial sector is affected the most, with a median DD of 6.14 in 2005 decreasing to 1.19 in 2009. In comparison, the health care and telecommunications sectors are the least affected by the general deterioration. The table also shows the shares of industries of the overall sample, where financial and industrial firms have persistently the highest share in the STOXX universe.

Some results on the dynamics of S&P ratings are shown in Table 2, which also provides the number of firms in the sample (1591) and the number of firms with an S&P rating available (460). The table provides in particular results from a brief analysis of the association between changes in the distance-to-default and changes in S&P corporate ratings, conditioning on S&P changes.

The analysis of Panel B in Table 2 serves to establish that there is some relationship between the DD and changes in the S&P ratings. Downgrades by S&P are associated with a significant

decrease in DD before the downgrade. The table shows that over the 30 days period before the downgrade, the DD decrease by a statistically significant 9% in the median (there was a further reduction over the 30 days subsequent to the downgrade as well). DD changes before and after upgrades by S&P turn out not to be significant. These results are in line with the study by Robbe/Mahieu (2005), who show that the distance-to-default provided by the commercial vendor KMV can predict changes in S&P ratings.[9] However, this type of analysis cannot show, whether S&P should have changed its ratings, which is the focus of our subsequent analysis of adjustments following severe shocks to firms' credit quality.

Table 2: External Rating Dynamics

The table shows in Panel A the number of firms in our sample (overall and with S&P long-term issuer rating available). Panel B shows the frequency of observed downgrades by S&P (based on a 22-class rating scheme, i.e. treating +/- notches as a separate class). Panel B also shows the median DD at the day of an S&P rating change, and the median percentage change in the DD within a ± 30 days interval around the rating change. The significance of DD-changes is tested using a Wilcoxon rank test, where ***, ** denote significance at the 1%- and 5%-level, respectively.

Panel A: Sample Structure				
	S&P-Rating		Overall	
No. of Firms	460		1591	
Panel B: Association between DD and S&P Rating Changes				
		Δ DD (30 days before)	Median DD at rating change	Δ DD (30 days after)
Upgrades S&P	177	3.54 %	4.45	+0.49%
Downgrades S&P	115	-9.01 % ***	5.73	-2.84 %**

2.3 Credit Shocks used for Validation

To assess adjustment behavior by S&P to credit shocks, we need to define credit events which constitute a significant and likely persistent shock to the credit quality of firms. Although such definitions are to some extent arbitrary, we think it is plausible that the following three events represent such shocks, in ascending order regarding the severity for the company.

1. **Instantaneous Shock**: The default risk of a company increases significantly within a day.
2. **Non-Investment-Grade**: The default risk of a company becomes too high to be considered as investment grade.
3. **Financial Distress**: The default risk of a company is so high, that a company is in financial distress.

[9] We also conduct a more elaborate analysis using an ordered probit panel regression. Here, ordinal changes in S&P ratings (downgrade, stay, upgrade) are regressed on cumulative changes of the DD over different time intervalls, the DD level, and year dummies. The results from this multivariate analysis are similar in that cumulative decreases in the DD preceding the rating change by 30 days significantly explain rating downgrades.

We believe that all three situations characterize such severe and persistent shocks to the credit quality of companies that a corporate rating needs to be adjusted, even if the rating agency pursues a rating-through-the-cycle approach. To identify these situations using our capital-market-based distance-to-default measure, we mostly rely on empirical calibrations based on the level of the DD and the percentile of the company in the cross-section of sample.

The first situation of an instantaneous shock to the credit quality is measured by

- a spontaneous reduction in the DD by at least 25% (which remains stable for at least 10 successive days to avoid relying on outlier movements in the DD), and
- a DD level of at most 4, to ensure an economically significant level of default risk.

The second situation of a credit quality inconsistent with an investment grade status of the company occurs if:

- the DD is for at least 20 successive days in the lowest quartile of the cross-section of all companies in the STOXX-universe,
- the DD is numerically less than 2,
- the company is rated at least "BBB-" by S&P.

This criterion is based on the in-sample characteristics of our sample firms before the actual testing period, i.e. from 2000 until 2005. A change in a company's credit quality below an investment grade status is economically an important event, because many institutional investors are mandated (either by law or their own investment guidelines) to invest in investment grade assets only.[10] Empirically, in our sample, the median DD of an investment grade company was 5.98, while the median was only 4.98 for non-investment grade firms. Also, the average percentile rank of a non-investment grade firms was 33%. Thus, if a firm is persistently on a DD level of at most 2 and in the lowest quartile rank of all companies, it appears very likely, that one (i.e., S&P historically) would not consider it as being investment grade anymore.

Finally, the third and most severe credit event occurs if a firm is in financial distress. Financial distress describes a situation where the default risk of a company is critically high such that stakeholders start engaging in restructuring activities. Note that financial distress typically precedes the initiation of legal bankruptcy proceedings. We measure financial distress as follows:

- The distance-to-default is for at least 10 successive days less than 1.5,
- The company is in the lowest 5% percentile in the cross-section of all companies in our sample.

This distress criterion is again based on an empirical analysis, here for companies in Germany. Elsas/Hadder/Stein (2009) report that companies identified by this criterion comprise more than 85% of all German companies that subsequently went bankrupt (from 1990-2006),

[10] Historically, the notion of investment grade status was generally used by regulators and banker to describe securities "safe enough" to invest in. Nowadays, investment grade is usually defined by an S&P rating of at least "BBB-".

and in more than 70% of all cases restructuring activities such as management turnover, a change in ownership etc. occurred. Moreover, the average DD of German companies that subsequently go bankrupt is 1.5 about one year before the announcement of the initiation of bankruptcy proceedings. Hence, the distress criterion is likely to identify firms that are in severe financial trouble. Note that requiring a company to be in the lowest 5% percentile of the cross-section of all firms assures a relatively bad financial situation. Furthermore, the requirement on the DD-level assures that only firms with an economically significant default risk are identified, because in boom times of the business cycle, even low ranked companies might have very high DD and thus a sound financial situation.

3 Testing Rating Sensitivity to Credit Shocks

General Description

Table 3 shows the results from our rating sensitivity analysis, examining S&P responses to severe shocks in the credit quality of firms. The table differentiates between the three types of credit shocks, corresponding results are shown in the second (Instantaneous Shock), third (Non-Investment-Grade), and fourth (Financial Distress) column.

From Panel A of Table 3, it can be seen that out of the maximum of 460 STOXX constituent firms with an S&P rating, 102 faced an instantaneous credit shock, 120 faced a credit quality inconsistent with an investment grade status (although investment grade rated by S&P), and 55 firms entered financial distress. The second row in Panel A shows that the three shock situations are partly overlapping, because e.g. 22 out of 102 firms with an instantaneous drop in the DD also belonged to the group of firms categorized as financially distressed. Also, the fraction of companies facing the particular credit shock belonging to the financial sector is provided, with fractions ranging from 55% to 65% as an outcome of the subprime crisis.

Table 3: Credit Shocks and Rating Adjustment (2006 - March 2009)

The table shows the frequency and other information for S&P rated companies where one of the three credit shocks „Instantaneous Shock" (at least a 25% DD deterioration, for at least 10 successive days), "Non-Investment-Grade Status" (DD is in the lowest cross-sectional quartile, less than 2, for at least 20 successive days, firm is at least "BBB-" rated by S&P), "Financial Distress" (DD is in the lowest 5% percentile, less than 1.5, for at least 10 successive days) have occurred for the first time between 2006 and 2008.

	Instantaneous Shock	**Non-Investment-Grad**	**Financial Distress**
Panel A: All Rated Companies with Event			
No. event firms	102	120	55
Thereof in financial distress	22	25	(55)
Fraction of financials	55%	64%	65%
Panel B: Companies with Rating Change after Event			
No. firms (Fraction of Firms With Rating)	42 (59%)	37 (31%)	24 (44%)
Period from event until rating change [median]	254 days	170 days	175 days
Panel C: Companies without Rating Change after Event			
No. firms (fraction)	60 (59%)	83 (69%)	31 (56%)
Thereof in financial distress	27	22	(31)
Fraction of financials	62%	48%	71%
S&P-Rating at last rating change [median]	A-	A	A
DD at last rating change [median]	4.92	5.10	4.03
DD at event [median]	1.75	1.89	1.19
Period from last rating change to event [median]	616 days	641 days	859 days
Period since event (final obs. Day: March 25, 2009) [median]	177 days	189 days	244 days

Instantaneous Shock

Focusing first on the group of firms that (for the first time) faced an instantaneous drop in the DD, from Panel B can be inferred that only 41% out of the 102 cases were subsequently associated with a change in the S&P credit rating. Note that changes in the S&P rating here are defined as any change in the corporate rating, even if it is by just one "+" or "-"notch. Actually, the observed adjustment behavior needs to be further qualified, since the median time-span between facing the credit shock and a subsequent rating change is 254 days.

In Panel C of Table 3 the (majority) subsample of event firms without S&P rating adjustment is described. In the median, firms facing an instantaneous shock to their DD were "A-" rated, with a DD of 4.92 at the last rating change by S&P. After the instantaneous shock, the median DD level was only 1.75, which occurred in the median 616 days after the last rating change.

Finally, the last row of Panel C shows that since the occurrence of the shock, the S&P rating was (at least) not adjusted for 177 days in the median, such that the non-adjustment cannot be explained by having too short an observation period afterwards.

Figure 1 provides a graphical illustration of one company facing an instantaneous shock to their credit quality, as measured by the corresponding capital-market rating based criterion. The figure shows the DD development of ArcelorMittal, a large steel manufacturer headquartered in Luxembourg. Illustrating a typical pattern of a company being subject to an instantaneous shock to its credit quality, the DD-level of ArcelorMittal was fluctuating around a level of about 5 and slowly deteriorating since the third quarter of 2007, when in the first quarter of 2008 the sudden deterioration occurred.

ArcelorMittal was upgraded to the rating "BBB+" by Standard & Poor's in November 2007, and only in June 2009 the rating was reversed to "BBB".

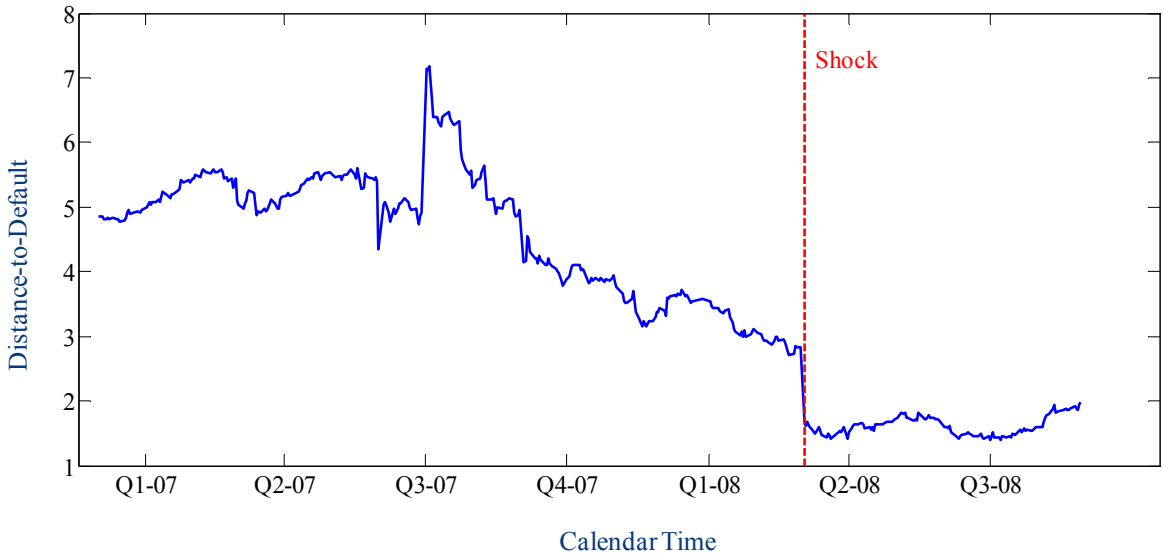

Figure 2: Development of the Distance-to-Default (DD) of ArcelorMittal

Non-Investment-Grade

The next group of event firms has a capital market rating inconsistent with an investment-grade-status. As described above, these firms have a DD of less than 2 for at least 20 successive days, belong to the lowest DD-quartile of the cross-section of all STOXX companies at each of these days, and are investment grade rated by S&P. Table 3 shows that out of the 120 firms comprised in this event group, 37 had a rating change by S&P after 170 days (in the median). However, 69% of all cases didn't have a rating change over at least the next 189 days (in the median). As Panel C shows, the median event firm without rating adjustment has been rated "A" by S&P since 641 days, where the DD at the last change was 5.1. After the event (i.e reaching a DD-level inconsistent with an investment grade status), the median DD was only 1.89.

Figure 2 shows again a typical case study on firms in this event group. The graph shows the DD development of Fiat Spa, the well known Italian automotive company, and illustrates a steady deterioration of Fiat's credit quality since the third quarter of 2007 (from the perspective of the capital market). About one year later, the DD and Fiat's relative rank in the cross-section became so low, that the company's financial status seems not consistent with an investment grade status anymore. Still, Fiat's rating by S&P has not been changed since April 2008, where it was set to "BBB-" (which is the lowest level of investment grade). In October 2008, the outlook, however, was set to "negative", but until March 2009, no downgrade occurred.

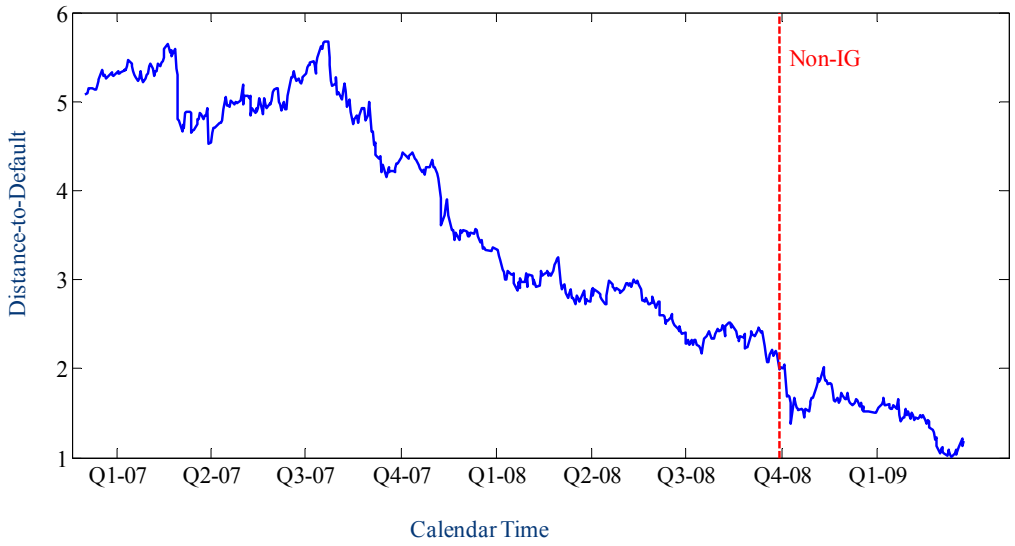

Figure 3: Development of the Distance-to-Default (DD) of Fiat Spa

Financial Distress

Finally, the group of event firms being in financial distress allows to analyze rating adjustment by S&P for companies facing the most severe shock to their credit quality, as assessed by the capital market benchmark rating. Here, a company belonged to the lowest 5% DD-percentile in the cross-section of firms, and the DD was less than 1.5 for at least 10 successive days. Although this constitutes a rather strict criterion for a having financial trouble, the adjustment pattern for S&P rating is similar to the other events. Only for 24 out of 55 companies did S&P change the corporate rating, which occurred in the median 175 days after the DD development fulfilled the distress criterion. Also similar to the other events, the actual observation period for companies without a rating change was 244 days in the median. This timespan appears long enough to allow for the observation of any rating adjustment. This however, did not occur for 56% of these firms classified as financially distressed.

From Panel C of Table 4 can be seen that the fraction of financial services firms is higher in the event group of financially distressed companies, due to the occurrence of the subprime crisis. Figure 4 provides another case study illustrating a typical credit quality development as measured by the distance-to-default. The figure shows the development of Commerzbank

AG's distance-to-default, where three days after the failure of Lehman Brothers in the U.S., the DD of Germany's second largest commercial bank fell dramatically and remained even lower subsequently, on a level very close to zero. Not surprisingly, in November 2008 Commerzbank received state guarantees as supportive action by the government, and was partly nationalized in January 2009 to avoid bankruptcy.[11]

At the same time, Commerzbank AG has been rated "A" by S&P since March 2007, and the outlook was changed to "negative" in September 2008. No further rating actions have been taken since.

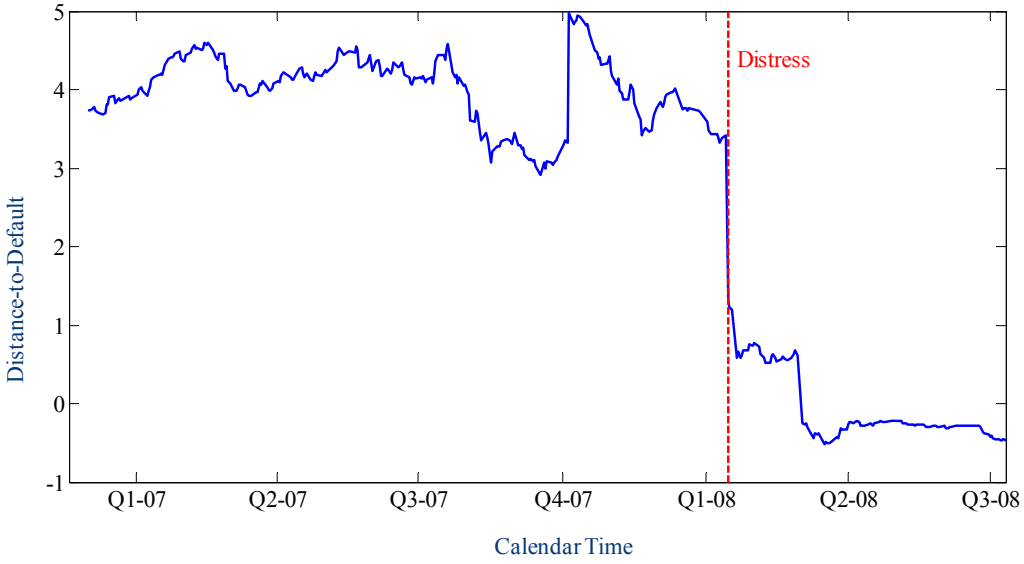

Figure 4: Development of the Distance-to-Default (DD) of Commerzbank AG

4 Conclusions and Implications for the Regulation of Credit Rating Agencies

This study contributes to the literature on credit rating agencies and financial market design by analyzing for the first time whether a CRA adjusts its corporate ratings to reflect fundamental credit shocks.

The analysis of adjustment behavior of corporate ratings by Standard & Poor's shows for a large sample of European firms, that these agency ratings very frequently do not reflect severe deteriorations or credit shocks to the credit quality of firms. We analyze instantaneous shocks, a financial status incompatible with being investment grade, and, as the most severe situation, companies entering financial distress. These categorizations are based on capital market ratings (the distance-to-default measure from a Merton (1974)-model implementation) as a benchmark, thus reflecting publicly available but timely information mostly from stock prices.

[11] The German government provided capital support of about 18 billion Euro, and received a 25% stake in Commerzbank shares in return. Actually, the overall market capitalization of Commerzbank was on January 2, 2009 about 4.9 billion.

In these situations, S&P did not adjust its corporate rating in more than 50% of all cases at all. Moreover, even if any rating change actually occurred, this happened typically at a lag of more than half a year. In our opinion, this evidence constitutes a clear indication that CRA's corporate ratings systematically do not reflect fundamental information on borrower's default risk.[12]

Naturally, this observed pattern of information insensitivity asks for an explanation. We have strived at setting-up an empirical design such that the examined credit shocks are too severe and persistent to be reasonably classified as temporary deteriorations. Hence, the observed lack of information in corporate ratings cannot be attributed to a rating-through-the-cycle approach by S&P. Moreover, since these events are publicly observable and very frequent, the lack of adjustment seems hard to be justified by any private information the CRA might have gathered, on average. This becomes particularly clear for the subsample of financially distressed firms, which consists of 65% of companies from the financial services sector. Our testing period covers the subprime crises and thus contains several banks that obviously came in severe financial difficulties, as evidenced by the significant supportive action programs setup by the governments around the world in 2008. S&P ratings do not reflect these shocks to the credit quality of banks, but it's very unlikely that S&P had any better information on distressed banks' bailout probabilities than other investors in the capital market. Hence, private information cannot explain the observed lack of rating adjustment.

This leaves several other explanations be potentially relevant, however. It might be that corporate ratings by rating agencies generally do not reflect fundamental information on companies. However, we do observe rating adjustments in about 45% of our events. Moreover, other studies show that market values of firms react to announcements of rating changes by CRA (Hand/Holthausen/Leftwich 1992, Krahnen/Hirsch 2007), and that rating changes can be explained by economically motivated determinants (Blume/Lim/MacKinlay1998). Hence, it's too general a conclusion that external ratings never reflect information on borrower default risk. However, our study shows that they are at least very slow doing so.

Another explanation is that rating agencies try to prevent so-called rating reversals, where a current rating (or rating change) is not conducted although fundamentally required, to avoid a reputational loss to the agency. Löffler (2005) shows that such a rating reversal avoidance could severely diminish the information content of ratings, potentially affecting information content more than monitoring credit quality of companies only twice per year.

Finally, at least our results regarding banks could potentially be explained by the rating agencies giving in to political pressure during the subprime crisis, not to downgrade bank ratings to avoid further destabilizations of financial systems. Of course, it is at least to be doubted whether such a behavior is desirable from an economic or a regulatory point of view.

In the light of the current attempts to make credit rating agency regulation more stringent, our results provide important insights. First of all, the current debate focuses mostly on how to

[12] We believe that our results based on S&P ratings carry over to the corresponding Moody's ratings. In general, the migration probabilities for both CRA's long-term issuer ratings are similarly low. Furthermore, we have verified that Moody's rating responses are similar to S&P for a random selection of our event cases.

make remuneration for corporate ratings incentive-compatible, to avoid having firms paying for better ratings than fundamentally justified. This seems an important issue of rating regulation, but the whole discussion up to now misses the issue what characteristics a desirable rating (from a regulatory perspective) should have. It appears natural to expect ratings to be reflecting actual probabilities of default for a given time period based on all available information, but these features are not imminent to current corporate ratings by CRAs. This is already induced by the alleged filtering called rating-through-the cycle. But even more so, our evidence clearly shows that ratings very frequently do not reflect even severe and likely persistent shocks to the credit quality of borrowers.

Hence, the intended regulation of credit rating agencies not only needs to validate the process of rating generation, it needs to define the purpose and desirable characteristics of ratings in the first place.

Finally, our study contributes to the literature by suggesting a methodology to validate corporate ratings by rating agencies based on public information. Validation of credit ratings will be a crucial feature for future regulation. We propose to assess the credit quality of companies based on publicly available capital market information, and condition the analysis on severe credit shocks. This avoids discussing temporary fluctuations in the credit risk of companies, but nevertheless provides at least a starting point for regulators to analyze and discuss rating quality with the agencies.

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