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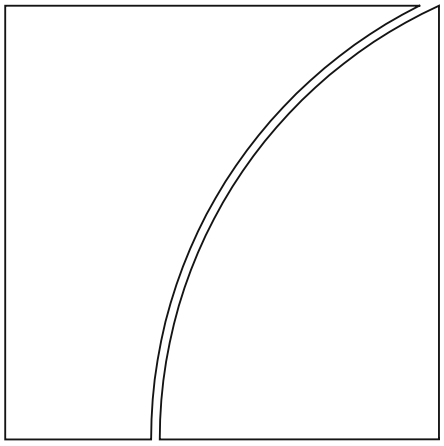

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# Are Credit Rating Agencies Discredited? Measuring Market Price Effects from Agency Sovereign Debt Announcements*

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**Abstract**

This paper investigates whether the price response to credit rating agency (CRA) announcements on sovereign bonds has diminished since the Global Financial Crisis (GFC). We characterize credit rating events more precisely than previous work, controlling agency announcements for the prior credit state – outlook, watch/review, or stable status as well as the level of the credit rating. Emphasizing the transition from one state to another allows us to distinguish between different types of announcement (rating changes, watch and outlook events) and their price effects. We employ an event study methodology and gauge market response by standardized cumulative abnormal returns (SCAR) and directional change statistics in daily credit default swap (CDS) spreads. We find that rating announcements provide a rich and varied set of information on how credit rating agencies influence market perceptions of sovereign default risk. CRA announcements continued to have significant effects on CDS spreads after the GFC, but the magnitude of the responses generally fell. Moreover, we find that accurate measurement of these effects depends on conditioning for the prior credit state of the sovereign bond.

**Key words**: CDS spreads, credit ratings, sovereign debt
**JEL classification**: F30, G01, G24, H63

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# 1 Introduction

Critical views of credit rating agencies and the value of their rating judgments became commonplace during the Global Financial Crisis (GFC) and European Sovereign Debt Crisis– especially in light of the conflicts of interest and mispricing of risk on mortgage-backed securities and other derivatives. Indeed, the International Organization of Securities Commissions (IOSCO) revised the Code of Conduct Fundamentals for credit Rating Agencies in 2008 to address issues of independence, conflict of interest, transparency and competition. And a new government entity was set up in the United States, the Office of Credit Ratings (OCR; an office in the Securities and Exchange Commission), as part of the Dodd-Frank Act, to monitor and regulate credit rating agencies. The 2015 OCR report documented continued problems with how CRAs function and how they have failed to follow regulator rules. In the Eurozone, Greece, Ireland and Portugal have been particularly affected by credit downgrades, with one or more CRAs downgrading their bonds to "junk" status at some point since spring 2010. Many officials publicly stated that these downgrades accelerated a burgeoning Eurozone sovereign debt crisis and, partly in response to this criticism, several new regulations and rules on CRAs have been put in place by the European Commission (EC). An EC memo explaining the new rules states: "CRAs have a major impact on today's financial markets, with rating actions being closely followed and impacting on investors, borrowers, issuers and governments: e.g. sovereign ratings play a crucial role for the rated country, since a downgrading has the immediate effect of making a country's borrowing more expensive." (European Commission (2013)). The new legislation requires CRAs operating in Europe to register with the Committee of European Securities Regulators (CESR), and the regulation of CRAs is under the European Securities and Markets Authority (ESMA).

It is not clear, however, whether credit rating agencies play such a pervasive role in the pricing of sovereign risk as their critics assume, especially since they were "discredited" with their systematic underpricing of CDOs (Collateralized Debt Obligations) during the GFC. There is some evidence that CRAs primarily gather publicly available information from various sources, incorporating this into a single measure of default risk (S&P (2012)). In this case, markets would most likely have already incorporated the same information used by CRAs into risk pricing, such as macro fundamentals or bond prices, with little value added by the agencies and only a small price effect

from rating changes. Moreover, credit rating changes would especially be limited if one or more agencies had already previously placed a particular sovereign bond on watch or outlook status–signals designed to forewarn market participants of changing economic and political conditions, rating reviews and possible rating changes. And if CRAs systematically under- or over-estimate risk assessments, as with CDOs prior to the onset of the GFC, then one would expect markets to largely discount credit-rating changes.[1]

The GFC and the Euro area sovereign debt crisis increased concerns about the information content of credit ratings and their association with sovereign spreads and default risk. Reviewing recent literature and developments in sovereign ratings, Powell (2013) addresses the criticism directed toward rating agencies for downgrading highly rated sovereigns. Arezki, Candelon, and Sy (2011) find that these downgrades also had significant spillover effects both across countries and financial markets. Aizenman, Hutchison, and Jinjarak (2013b) investigate the euro debt crisis in the context of the pricing of sovereign debt, and find a complex and time-varying environment with a key role for fiscal space in pricing sovereign risk. Aizenman, Binici, and Hutchison (2013a) find that the association between credit rating changes and sovereign spreads shifts between the pre-crisis and crisis periods.

Against this background, the foci of our study are two-fold. First, we investigate whether the information value of credit rating agency announcements–rating changes, outlook and watch announcements (positive and negative)–has diminished following the GFC. Although agency failures are mainly associated with CDOs, lack of confidence in CR "opinions" may have carried over to sovereign bonds as well. Second, we are interested in precisely measuring the information value of various CR announcements. We account for prior information associated with the status of a sovereign bond at the time of agency announcements, i.e. whether bonds are on outlook, watch or stable/developing status. For example, the response of a credit rating downgrade would in principle be much larger if the bond in question was on a "stable" status than on a "negative watch" status since the latter is already signaling the strong likelihood of downgrade. Similarly, the announcement of "negative watch" for a sovereign bond when the prior status is "stable" would in principle be larger than if the prior status was "negative outlook" since the latter is already signaling some weakness. These distinctions prove critical for accurate assessments of information value, and are not fully addressed in the literature.

To this end, four main questions are addressed: First, do credit rating agencies provide information value to market participants, thereby having substantial impacts on risk pricing? Second, how has this information value changed since the GFC? Third, in addition to rating changes, are supplementary announcements by credit rating agencies, in particular watch/review, outlook or stable/developing designations, incorporated into the market pricing of default risk? Fourth, how are market responses to credit rating change and other announcements affected by whether countries are already on outlook or watch status?

To address our research questions, we employ an event study framework using daily data, calculating (standardized) abnormal returns to assess the information value of rating announcements. We consider a two-day event window, as well as two pre-event windows and a post-event window to measure the effects of conditional announcements and the extent to which they are persistent and anticipated. To evaluate market assessments of sovereign default risk, we employ credit default swap (CDS) spreads on sovereign bonds. These spreads are closely related to expectations, as reflected in market prices, of the probability of sovereign default. Our sample spans 55 advanced and emerging market economies, using daily data from January 1, 2005 to December 31, 2012. Our sample is defined by countries with functioning CDS markets over the period – CDS transactions on sovereigns were severely regulated in the EU in recent years– and with sovereign bonds rated by the CRAs.

Summarizing our main conclusions, we find that credit agency announcements continue to have a statistically significant and economically important impact on CDS spreads following the GFC. However, some "discounting" of the information value of the CRA announcements is evident. In particular, the effect on CDS spreads was generally less after the GFC, especially the responses to credit downgrades and upgrades transitioning from the stable/developing state. Spreads also responded less to negative watch announcements and to negative outlook announcements transitioning from the stable/developing state. It is evident that accurate measurement of these effects depends importantly on conditioning the prior-state of the sovereign bond prior to the credit rating announcement. Conflicting results in the literature on the importance of CRA announcements to market pricing of sovereign default risk are partly attributable to a failure to fully condition on the credit status of sovereign bonds prior to the announcement.

The remainder of this paper is organized as follows. We start with a brief overview of the back-

ground literature in Section 2 and also discuss theoretical predictions and our main contributions. We then present data and methodology in Section 3, and our empirical results in Section 4. We conclude in Section 5.

# 2 Literature Review and Hypotheses

## 2.1 Literature Review

In theory, CRAs provide valuable information to investors about the riskiness of sovereign bonds. This information provision may work through several channels[2]. CRAs may add valuable information to markets in a world of asymmetric information, where payoffs depend on noisy ex post monitors of information quality[3]. CRAs also provide certification services in many countries. In particular, ratings are often used to classify yies as either investment or non-investment grade, which influences institutional demand and market liquidity, and serve as triggers in investment decisions and regulatory oversight[4]. Finally, CRAs may serve as monitors and help coordinate investors' beliefs in situations where the possibility of multiple equilibria is present[5].

The informational value of credit rating agencies, as seen by market participants, may partly be measured by the response of asset prices to CRA announcements, whatever the channel of transmission: superior information (associated with reputation capital), regulatory license, or as aggregators of information. A number of empirical papers have investigated this issue and generally find that sovereign rating announcements do affect financial markets, but oftentimes give contradictory results.

Some of the earliest papers investigating the impact of credit rating changes on corporate asset prices are Weinstein (1977), focusing on bond prices, and Pinches and Singleton (1978) focusing on stock prices. In terms of sovereigns, Cantor and Packer (1996) is the first study of which we are aware to investigate the impact of CRA announcements on daily sovereign bond prices. Their study, based on sovereign bond spreads for advanced and emerging economies, finds that the single rating variable explains 92 percent of the cross-country variation in spreads. Most of the correlation appears to reflect similar interpretations of publicly available information by the rating agencies and by market participants. In their event study analysis, using daily data, they find evidence that the rating agencies' opinions independently affect market spreads, especially in the

case of non-investment grade sovereigns. In particular, they consider announcements by Moody's or Standard and Poor's between 1987 and 1994 that indicated a change in sovereign risk assessment for countries with dollar bonds that traded publicly during that period. This gave them a sample of seventy-nine announcements in eighteen countries, thirty-nine (forty) of which were actual rating changes (outlook, watch/reviews). They considered a two-day window, the day of and the day after the announcement, to capture the immediate effect[6]. Within this window, relative spreads rose 0.9 percentage points for negative announcements and fell 1.3 percentage points for positive announcements. For the full sample of seventy-nine events, the impact of rating announcements on dollar bond spreads is highly statistically significant.

Other studies consider the impact of CRA announcements on equity prices (e.g. Dichev and Piotroski (2001); Vassalou and Xing, 2003), corporate and sovereign bond prices (e.g. Hamilton and Cantor (2004); Hite and Warga (1997); Steiner and Heinke (2001); Gande and Parsley (2005), foreign exchange rates (e.g. Alsakka and ap Gwilym (2012)), and CDS spreads (e.g. Hamilton and Cantor (2004); Hull, Predescu, and White (2004); Finnerty, Miller, and Chen (2013)).

Several asymmetries in the responses of asset prices to credit rating announcements have been found in the literature. In particular, previous studies have tested the hypothesis that outlook and watch events have more impact on market prices than actual credit rating changes. Examples providing evidence in favor of this hypothesis on CDS spreads for bond markets is reported by the IMF (2010) and Hull et al. (2004), on the foreign exchange market by Alsakka and ap Gwilym (2012), and on the stock market by Norden and Weber (2004). Hull et al. (2004), for example, consider the relationship between the credit default swap market and ratings announcements for CDS spreads on corporate bond issues. They find that reviews (watches) for downgrade contain significant information, but actual credit downgrades and negative outlooks do not.

Another asymmetry is that most studies in this literature find that negative events (credit downgrades or negative outlook/watch announcements) have a greater impact on asset prices than do positive events (upgrades or positive outlook/watch). In particular, a number of papers find that negative rating events impact own country asset prices movements (and cause significant spillovers to other countries asset prices), while upgrades have limited or insignificant impacts (e.g. Brooks, Faff, Hillier, and Hillier (2004); Gande and Parsley (2005) ; Ferreira and Gama (2007); Hooper, Hume, and Kim (2008); Hill and Faff (2010); Afonso, Furceri, and Gomes (2012)). Alsakka and

ap Gwilym (2010a), for example, argue that negative credit announcements are typically more informative than positive ones because of the stronger negative reputational effects for an agency being tardy in the case of downgrades. This may be because issuers have little incentive to leak negative news prior to a downgrade, while they may do so for positive news prior to an upgrade.

However, a number of studies find the opposite result: positive CRA announcements have a larger market impact. Cantor and Packer (1996), Ismailescu and Kazemi (2010) and Finnerty et al. (2013) find that positive credit rating events have a greater impact on asset prices than negative events. These are quite diverse studies as Cantor and Packer (1996) focus on sovereign bond spreads, Ismailescu and Kazemi (2010) investigate CDS spreads on sovereign bonds, and Finnerty et al. (2013) consider CDS spreads on corporate senior-debt tier credit ratings.

Most closely related to our work, Ismailescu and Kazemi (2010) consider the effect of sovereign credit rating change announcements by S&P on the CDS spreads for 22 emerging markets. They employ an event study methodology using daily data over 2001-2008. They find that upgrade rating changes lower sovereign spreads on average by 11bps in two days, and downgrades raise spreads by 67 bps. However, neither of the mean changes in CDS spreads are statistically significant[7]. Since the means are affected by outliers, they also look at median changes and the proportion of negative and positive CDS spread changes over the event window. They find that median changes are significant for both negative and positive events. Their main results, however, are that positive rating events appear to contain new information as more than 78% of the events result in a decline in spreads over the two-day window, while only 54% of negative events are associated with a rise in CDS spreads (not statistically different from random changes). Consistent with these results, the authors find that CDS spreads fell significantly at least one month prior to the rating upgrade (70% of events). However, spreads rose to an even larger extent prior to downgrades (83%). It appears that negative rating changes were anticipated more by markets than positive rating changes[8].

However, these and other studies of which we are aware do not address changes in the effects of CRA announcements on asset prices generally, and CDS on sovereign bonds in particular, since the GFC. Nor do they fully condition on outlook, watch or stable/developing assignments in analyzing the effects of credit rating changes or other agency announcements. These transitions vary substantially, as documented and discussed below. A few studies have conditioned on prior announcements of watch and outlook in selecting a "control" sample (Finnerty et al. (2013)) for corporate rating

changes, or to calculate transition likelihoods for upgrades and downgrades on corporate bonds (Hamilton and Cantor (2004)). However, no study of which we are aware adequately controls for all of the possible states of transition for credit rating change announcements as well as outlook and watch announcements, separately estimating impact effects on asset prices[9]. And no study of which we are aware considers conditional states of transition on sovereign bond CDS spreads. We conjecture that the substantial differences in empirical findings in the literature are partly attributable to not adequately capturing transition states in assessing the information value of announcements.

### 2.2 Predictions: Post GFC and Conditional on Prior States

As discussed in the introduction, our main contributions to the literature are to evaluate how market responses to credit rating agency announcements on sovereign debt have (1) changed since the GFC and (2) to more precisely measure the information value of announcements by carefully controlling for the prior credit state. For the latter exercise, we identify whether an announcement constitutes a positive or negative event. All positive (negative) events, whether rating change or outlook/watch announcements, are predicted to lower (raise) CDS spreads. Although all positive (negative) credit rating and watch announcements are positive (negative) events, assessing whether outlook and stable/developing announcements are positive or negative events depends on the prior credit status of the bond. In addition, we identify the relative information value (strength of the signal) of the event which in turn depends on the prior state, i.e. whether the sovereign bond is on stable/developing, watch or outlook status. The greater the information value, the larger (absolute value) predicted impact on CDS spreads. This is detailed in the following paragraphs.

The first area of investigation leads to a straight-forward prediction. If CRAs are generally discredited by their systematic failure to accurately judge credit risk of certain derivative products in the run-up to the GFC, then we would expect investors to discount the information value of their credit announcements. To the extent that this carries over to doubts about CRA judgement of sovereign default risk, the implication is that their announcements have less effect (in absolute value) on CDS spreads in the post-GFC period than the pre-GFC period.

The second area of investigation relates to the importance of conditioning on prior credit states in evaluating the effect of CRA announcements. This issue may be addressed by the type of CRA announcement and the transition from the prior state, highlighting both the expected sign and

magnitude of the CDS spread response.

*Credit rating upgrades (downgrades)* are positive (negative) events, irrespective of the prior state. However, the information value is stronger (largest surprise component) if the bond is on stable status rather than outlook or watch status when the credit rating change is announced. The reason for this is that stable is a neutral status about the likelihood of future credit rating changes, while outlook or watch status is a leading indicator of likely future credit rating changes. The least information value (least surprising) associated with a credit rating change is when a bond is already on watch status at the time of the credit rating change. CRAs view watch status as a strong signal of a likely near-term credit rating change, so relatively little new information is revealed when the actual credit rating is announced.

*Positive (negative) watch announcements* are positive (negative) events, but predicted to have greater information value when the bond is transitioning from stable status rather than from positive (negative) outlook status as the latter already incorporates a signal of the credit rating agencys views on the credit status of the bond.

*Positive (negative) outlook announcements* are positive (negative) events when the transition is from stable/developing status, but a negative (positive) event if the transition is from positive (negative) watch status. This latter prediction arises since watch status is signaling a likely near-term credit rating change, and a change to outlook status indicates that the likelihood of a credit rating change is now less imminent. (Outlook is considered a medium-term signal of a likely credit rating change).

Finally, *announcement of stable/developing status* from positive (negative) watch or outlook status is a negative (positive) event since the CRA is signaling that it *no longer* views a rating change as likely in the short-term (from watch status) or medium-term (from outlook status).

This discussion highlights how the sign and the magnitude of the CDS response to credit rating agency announcements depends on the prior state, and how unconditional estimates of CDS responses may be misleading. In the "preliminaries" part of the empirical results section we present the historical statistics associated with the "transition matrix" of agency announcements and the expected effects on CDS spreads.

# 3 Data and Methodology

## 3.1 Data

We use daily data in our analysis, ranging from January 1, 2005 to December 31, 2012. Daily data on CDS prices were taken from Markit. The data are unavailable for some issuers on some days owing to a lack of liquidity; we do not interpolate across announcement days but close the gap by assuming the latest price prevails until a new price is available. The data are 5-year on-the-run CDS spreads in US dollars on sovereign bonds. The quoting convention for CDS is the annual premium payment as a percentage of the notional amount of the reference obligation. The sovereign CDS spreads are reported in basis points, with a basis point equal to $1,000 to insure $10 million of debt. Table A1 provides summary statistics on the CDS spreads for each country in our sample, showing country means, standard deviations, minimum and maximum values. The sample includes 55 countries. Table A2 provides the number of upgrade and downgrade events by country.

The credit ratings are taken from S&P, Moody's and Fitch. For consistency and comparison across agencies, we consider sovereign rating changes on long-term foreign currencies. Rating agencies apply an ordinal-alphabetic scale reflecting an opinion about credit risk, i.e. the agency's judgment about the ability and willingness of a debtor to meet its obligations in full and on time. For example, S&P provides 25 rating categories, ranging from AAA, described as extremely strong capacity to meet financial commitments, to D, described as payment default on financial commitments. In its description of the credit ratings, S&P notes that likelihood of default is the single most important factor in its assessment of creditworthiness, but that reasons for ratings adjustments vary, and may be broadly related to overall shifts in the economy or business environment, or more narrowly focused on circumstances affecting a specific industry, entity, or individual debt issue, e.g. the creditworthiness of a state or municipality may be impacted by population shifts or lower incomes of taxpayers, which reduce tax receipts and ability to repay debt (S&P (2013)). In terms of sovereign ratings, S&P states that five factors form the foundation of its sovereign credit analysis: institutional effectiveness and political risks; economic structure and growth prospects; external liquidity and international investment position; fiscal performance and flexibility, as well as debt burden; and monetary flexibility (S&P (2012)).

In addition to credit ratings, however, CRAs also provide signals about the possibility of future credit rating changes. These signals, for S&P announcements (the other CRAs have similar designations), take the form of either "outlook" or "watch" designations. The outlook and watch designations may be either positive or negative, signaling the likelihood and direction of of a future rating change. The two other designations are "stable" and "developing", where the latter signals an uncertain state of events. Rating agencies have different horizons for outlook and watch designations. For instance, S&P describes the outlook horizon as 6-24 months ahead, and the watch horizon as within 3 months. Fitch Ratings (2017) writes: "Outlooks indicate the direction a rating is likely to move over a one- to two-year period. They reflect financial or other trends that have not yet reached or been sustained the level that would cause a rating action, but which may do so if such trends continue Outlooks can be raised or lowered without a prior revision to the Outlook." On the other hand, "Rating Watches indicate that there is a heightened probability of a rating change and the likely direction of such a change. A Rating Watch is typically event-driven, and as such, it is generally resolved over a relatively short period. The event driving the Watch may be either anticipated or have already occurred, but in both cases, the exact rating implications remain undetermined. The Watch period is typically used to gather further information and/or subject the information to further analysis".

### 3.2 Methodology

To determine the impact of credit rating events on the sovereign CDS markets, we employ an event study methodology. We use daily data on sovereign CDS spreads and rating announcements. The raw sample includes 55 countries and 1221 rating announcements.

### 3.3 Event Window

Define day 0 as the day of a credit rating event for a sovereign CDS issuer. Since our data covers only weekdays, our event windows are also defined on weekdays. Define day $n$ as the day that is $n$ weekdays ahead of the event day and $[a, b]$ as the $(b - a + 1)-$day window from the beginning of day $a$ (or equivalently, the close of day $(a - 1)$) to the close of day $b$. For example, suppose an event falls on Wednesday. The interval $[0, +4]$ refers to the one-week period from the beginning of Wednesday to end of the next Tuesday[10].

The event window is set to be 11 weeks, starting 8 weeks before a credit rating event and ending 3 weeks after an event. The preceding period of 8 weeks was selected as the preceding period because rating agencies seek to act upon material information within three months (Keenan, Fons, and Carty (2000)).

The event window is divided into four intervals: $[-40, -15]$, 8 to 3 weeks prior to a rating event; $[-14, -1]$, 3 weeks to one weekday before a rating event; $[0, +1]$, the event day and the subsequent day; $[+2, +14]$, two weekdays to three weeks after the event. If a negative rating event has an impact on market sentiments, then we anticipate a positive/negative significant CDS return on $[0, +1]$. If the market expects the credit rating event prior to its announcement, then the returns in the first two intervals $[-40, -15]$ and $[-14, -1]$ would be statistically significant.

### 3.4 Excluding Overlapping Events

When a credit rating event is preceded by another event within a short period of time, then the impact of the announcement may be muted. Following standard practice, we therefore exclude any event that is preceded by another event within three weeks when evaluating the effects of credit rating announcements. If two events of opposite nature (e.g., an upgrades and a downgrade for the same country) occur on the same day, then we exclude both events. If two events of the same type (e.g., downgrades for the same country) are on the same day, then these two events are counted as one event in the sample.

### 3.5 Calculation of Daily and Abnormal Return

Let $R^C_{i,t}$ designate the observed arithmetic sovereign CDS return for country $i$ at day $t$:

$$R^C_{i,t} = \frac{S_{i,t}}{S_{i,t-1}} - 1. \tag{1}$$

A positive spread change or a positive CDS return following a credit rating announcement can imply a significant effect of the credit rating event, but it can also stem from market-wide factors that move all prices simultaneously. To disentangle the country-specific spread change from the market-wide movement, we calculate the abnormal return for country $i$'s CDS. The abnormal return $AR^C_{i,t}$ for security $i$ at day $t$ is the difference between the actual return $R^C_{i,t}$ and the return as predicted

by the market model:

$$AR_{i,t}^{C} = R_{i,t}^{C} - \alpha_i^{C} - \beta_i^{C} R_{k,t}^{C}, \tag{2}$$

where we define the market CDS spread at time t to be the simple average of all sovereign CDS spreads in our sample at time t[11]:

$$S_{k,t} = \frac{1}{N} \sum_{i=1}^{N} S_{i,t}, \tag{3}$$

and the market CDS return is given by

$$R_{k,t}^{C} = \frac{S_{k,t}}{S_{k,t-1}} - 1. \tag{4}$$

In our sample, the number of countries $N = 55$. The parameters $\alpha_i^C$ and $\beta_i^C$ are estimated over a six-month (26-week) period preceding each event window. Cumulative abnormal returns (CAR) over the event window are given by

$$CAR_{i,[t+w_1,t+w_2]}^{C} = \sum_{s=t+w_1}^{t+w_2} AR_{i,s}^{C}, \tag{5}$$

where $t + w_1$ ($t + w_2$) is the first (last) day of the event window. Whether an abnormal return is sufficiently high to justify the effect of the credit rating announcement depends on the volatility or the standard deviation of the abnormal return. We, therefore, standardize the abnormal return on one single trading day by its standard deviation

$$SAR_{i,t}^{C} = \frac{AR_{i,t}^{C}}{\hat{s}_i^{C} \sqrt{1 + \frac{1}{T} + \frac{(R_{k,t}^{C} - \hat{R}_k^{C})^2}{\sum_{p=1}^{T} (R_{k,p}^{C} - \hat{R}_k^{C})^2}}} \approx \frac{AR_{i,t}^{C}}{\hat{s}_i^{C} \sqrt{1 + \frac{1}{T}}}, \tag{6}$$

where $s_i^C$ is the standard deviation of the abnormal return of country i's CDS over the estimation period. See, e.g., Boehmer, Masumeci, and Poulsen (1991). Standardized cumulative abnormal

returns (SCAR) for the window $[w_1, w_2]$ is

$$SCAR^C_{i,[t+w_1,t+w_2]} \approx \frac{CAR^C_{i,[t+w_1,t+w_2]}}{\hat{s}^C_i \sqrt{(w_2 - w_1 + 1)(1 + \frac{1}{T})}} \tag{7}$$

The discussion above focuses on one single event on country $i$ and on event day $t$. To evaluate the average effect of one event category, e.g., all downgrades conditioning on a prior negative outlook designation, we need to aggregate the SCAR over all events in this category. Let $j = 1, 2, .....M$ be indices for all events in the same category. Define event $j$ in the category to be the credit rating announcement for country $i$ and day $t$:

$$SCAR^C_{j,[w_1,w_2]} = SCAR^C_{i,[t+w_1,t+w_2]}. \tag{8}$$

The standardized aggregated test statistic over all events in the category on the same the event window is given by

$$t^S_{M-1} = \frac{\frac{1}{M}\sum_{j=1}^{M} SCAR^C_{j,t}}{\sqrt{\frac{1}{M(M-1)}\sum_{j=1}^{M}[SCAR^C_{j,t} - \frac{1}{M}\sum_{j=1}^{M} SCAR^C_{j,t}]^2}} \tag{9}$$

Under $H_0$, the hypothesis that the credit rating events (e.g., downgrades) do not have any effect on the SCAR, the test statistic $t^S_{M-1}$ follows a $t$-distribution with degrees of freedom $(M-1)$. We test $H_0$ against the alternative hypothesis $H_1$ that the events have a significant effect on these CDS spreads. We document the empirical results for credit rating announcement categories with at least 4 events.

### 3.6 Number of Positive/Negative Spread Changes in the Same Event Category

In addition to positive or negative abnormal returns, an alternative measure for the impact of a credit rating announcement on the CDS market is the spread change in the event window. On a priori grounds, a positive event should cause the CDS spread to decrease, while a negative event should cause the CDS spread to increase. If the positive/negative event category has a significant impact on CDS spreads, then we would anticipate the proportion of negative/positive spread change would be significantly higher than 1/2 (random change). We employ the chi-square

test to investigate whether the proportion of positive or negative spread changes is significantly different from 1/2 for each event category. We term this the "directional change" test statistic.

# 4 Empirical Results

## 4.1 Preliminaries

Table 1(a) shows the transition matrix from watch (negative and positive), outlook (negative and positive), and stable/developing/other status (shown in the first column) to the myriad of new status positions (shown in top row), e.g. the first element of the table shows that from negative watch status there are 13 credit rating downgrades combined with continued negative watch status. The table shows that there are a total of 759 transitions in our data set (last column), of which most are from stable/developing status (315), followed by negative outlook (196), and least from positive watch status (37). The most frequent transitions (136) are upgrades combined with stable/developing status. Outside of 4 outliers (seemingly contradictory moves), the least common transitions are moves from positive watch to an upgrade combined with continued positive watch (only 1 case), upgrades combined with positive outlook status (22 cases) and positive watch with no grade change (31 cases) [12]. In principle, each of these transitions leads to a different set of information for investors about the default risk of sovereign bonds. The move from negative watch to a downgrade with continued negative watch (13 cases), following the previous example, has a larger negative signal than the transition from negative watch to downgrade combined with a stable/developing status (also 13 cases).

For ease of presentation, we consider the signs of each transition and the breakdown frequency in Table 1(b). Table 1(b) shows the expected signs of the credit rating events, conditioned on the status of each bond (stable/developing, positive and negative outlooks, positive and negative watch/review) at the time of the announcement. We also list the number of events in each category and the percentage. We group each category by prior status in the first column and list the announcements (credit rating events) in the second column. For example, the first row of results indicates that credit rating agencies made 77 positive outlook announcements (without credit rating change) that were preceded by a stable/developing status. This represents 24% of the transitions from stable/developing status and we expect this to have a positive effect (falling spreads) on CDS.

It is evident from Table 1(b) that most events (315) are transitions from stable/developing status. Events from stable/developing status is the norm for sovereign bonds, followed by negative (196) and positive (107) outlook transitions. Negative watch transitions are also common. Positive watch transitions are the least frequent.

Of the stable/developing transitions, most are the transition to negative outlook without credit rating change (31%) followed by positive upgrades (25%) and transitions to positive outlook without credit rating change (24%). Relatively few are transitions to negative watch (11%) or directly from stable/developing status to credit rating downgrades (6%). By contrast, credit rating upgrade was the dominant transition category from positive outlook (50%), and credit rating downgrades were primarily moves from negative watch status (74%).

How often do sovereign bonds on watch status transition to stable/developing status, sending negative signals (transition from positive watch/outlook to stable/developing) or positive signals (removing the stigma of negative watch/outlook in a transition to stable/developing) to investors? Table 1(b) indicates that it is unusual to move from positive watch to stable/developing (8% of the transitions) and moves to positive outlook are also infrequent (16%). It is also unusual for transitions from negative watch to the neutral assessment of stable/developing (4%), though more common for a modest positive signal from negative watch to negative outlook (17%). By contrast, transitions from positive/negative outlook are more evenly balanced across the three categories: credit rating changes, moves to watch status, and moves to the stable/developing designation.

The implication is that watch status is much more likely to result in a credit rating change, and therefore less likely to contain a surprise component than credit rating changes from outlook (uncommon) or stable/developing (very uncommon) status. The corollary is that watch status, either positive or negative, is less likely to be reversed by a move to neutral status (i.e. stable/developing) or change to the more moderate outlook status.

Table 2 provides details on the timing and dynamics of the transitions to credit rating changes. The first column of the table shows the six categories of announcements other than credit rating changes: outlook (positive and negative), watch (positive and negative), stable and developing. The second column shows the number of events, and the remaining columns show how many of these events were followed by a credit rating upgrade (columns 3-5) or credit rating downgrade (columns 6-8). The timing is grouped by 30 days or less, 61 days or less and 91 days or less. For example,

there were 89 negative watches issued during our sample period, of which none were followed by an upgrade within a 91-day period. However, 17 (19%) of the negative watch assignments were followed by a downgrade within 31 days, 37 (42%) were followed by a downgrade within 61 days and 55 (62%) were followed by a downgrade within 91 days. The remaining 38% of negative watch announcements were not followed by a downgrade within 91 days. A similar pattern emerges for the positive watch events where 58% (13%, 39%) of positive watch announcements were followed by a credit rating upgrade within a three-month (one month, two month) time frame.

Table 2 supports the findings reported in Table 1. There is a symmetric and strong pattern linking negative and positive watch events to subsequent rating changes in terms of timing and likelihood. By contrast, there is a much weaker pattern associating negative and positive outlook announcements and credit rating changes, e.g. only 11% (6%) of negative (positive) outlook announcements are followed by negative (positive) credit rating changes within a 3-month period. Not surprisingly, stable and developing announcements are only infrequently followed by credit rating changes within a 3-month window.

The implication is that negative and positive watch are less frequent than outlook (or stable) announcements, but present a much stronger signal in terms of being followed by a credit rating change within a couple of months. Watch events have a relative short-maturity and send a strong signal that a credit rating event is likely to follow. This suggests that watch events send strong signals to the market, with the corollary that credit rating changes conditioned on prior watch status are largely predictable within a couple of months.

### 4.2 Full Sample Results

Table 3 presents the full sample results for credit rating changes conditional on prior status (Panel A) and for watch and outlook announcements conditional on prior status (Panel B). Following our theoretical discussion and findings from the statistics presented in the previous tables, we condition rating changes on the bond status immediately prior to the rating announcement. We focus on CDS returns and spreads for a two-day event window $[0, +1]$[13]. The panels depict the responses to bond rating upgrades/downgrades and watch/outlook announcements conditional on whether the bond was on a stable, positive (negative) watch, or positive (negative) outlook prior to the rating change. The unconditional change (all prior states) is also shown in the table. Also shown

are the number of events in each category, the median and mean values of the CAR, the SCAR test statistics (t-statistics and p-values). The SCAR, discussed in the methodology section, is a weighted average of the CAR values that takes into account that the standard errors vary across events. In addition, we show the unadjusted median spread change as well as the percentage of spread changes in the positive (negative) direction with the p-value of the one-sided test of whether the changes are in the expected direction[14].

The table shows that the number of credit rating upgrade and downgrade event frequencies are quite comparable (total 143 prior to upgrades and 138 prior to downgrade events). The number of events in the table is substantially less than the summary statistics since the empirical event study employs windows and deletes overlapping observations from the sample.

There is strong evidence that credit rating events have information value in the CDS market judging both by the SCAR and directional change statistics within the two-day event window. All the significant changes in the SCAR and spread directional changes (7/8 t-statistics for SCAR, and 6/8 for directional changes) are in the expected direction except for upgrades on positive watch status[15]. For instance, unconditional upgrades (including all outlook, watch and stable/developing prior states experienced mean (median) CAR declines of -1.4% (-1.1%) with the 2-day event window. The corresponding CDS increase for unconditional downgrades was 3.2% (1.4%). Both positive and negative credit rating announcements transmit useful information as evidenced by the CDS market even after controlling for prior status of outlook and watch events. CDS market reaction to downgrades, however, was substantially larger than to upgrades.

Relative magnitudes of the responses largely conform to our priors. Credit rating changes that are transitions from stable/developing status have the largest effect on CDS spreads. A credit rating upgrade from stable status (46 events) lowers the mean CAR value of CDS spreads by -2.3 (SCAR p-value of 0.001) and 67% (p-value 0.013) of the directional changes in spreads are in the expected (negative) direction. Analogously, a credit rating downgrade from stable status (13 events) raises the mean CAR value of CDS spreads by 3.0% (SCAR p-value of 0.028) and 69% of the directional changes in spreads are in the expected (positive) direction. By contrast, and as expected, credit rating upgrades from watch status have the smallest effect (statistically insignificant). While moves from negative watch to credit rating downgrades are statistically significant, the CAR value is much smaller than when transitioning from a stable outlook and the directional change is also somewhat

smaller than the other two categories (67%).

Overall, we find evidence in support of the view that credit rating changes from a neutral stance (stable) have the largest surprise component in terms of updating investors expectations about sovereign default risk, while transitions from watch status to credit rating changes have the smallest surprise component.

The effect of outlook and watch status announcements on CDS spreads during the whole sample is presented in Panel B of Table 3. Again we find that conditioning on the prior state is critical in the interpretation of results. Unconditional negative watch announcements have a highly significant positive impact on CDS spreads, judging both by SCAR and direction of change statistics. However, this effect is primarily due to announcements of negative watch when the bonds are already on negative outlook status (31 events). Surprisingly, negative watch announcements when the bonds are on stable/developing status at the time (32 events) have more muted effects on CDS spreads and the direction of change statistics indicate that the percentage of positive spread movements following the announcements (56%) is not significantly different than the percentage of negative spread movements (44%) during the two-day event window[16].

Similar findings are found for negative outlook announcements. In this case, we expect a negative outlook announcement to reduce CDS spreads if the transition is from negative watch (reducing the likelihood of expected sovereign bond default) and increase spreads if the move is from stable/developing status (increasing the likelihood of expected default). We find no evidence, however, that negative outlook announcements conditioned on negative watch status (41 events) reduce CDS spreads. As expected, however, negative outlook conditioned on stable/developing status have a large positive effect (4.2%, SCAR p-value of 0.000) on spreads.

Turning to positive watch announcements, we find no evidence of a CDS spread reaction either conditioned on positive outlook or stable/developing status. Positive outlook announcements from stable/developing status (94 cases) are highly significant, but not significant when these announcements are transitions from positive watch status.

By contrast to many other studies, we find that both upgrades and downgrades have high information content in certain circumstances–the former case when preceded by positive outlook and stable states, and the latter case when preceded by either negative outlook or watch states. These effects are large in magnitude and statistically significant measured by mean change, median

change and directional change. Moreover, our results are robust to an alternative measure of abnormal returns where the market portfolio is defined as the GDP-weighted average of CDS spreads across 19 countries. These results are shown in Table A3.

### 4.3 Are Events Anticipated?

In this section we address whether there is evidence that events were systematically "anticipated" prior to the event, i.e. are significant CARs evident prior to announcements? To investigate this issue we consider credit rating changes and outlook/watch announcements conditioned on prior status over two event windows prior to the rating event: three to eight-business weeks $[-40, -15]$ and one-day to three-business weeks $[-14, -1]$. Table 4 presents results for both event windows.

We do not find any evidence that CARs were present evident prior to credit rating change announcements– none of the SCAR statistics were statistically significant at conventional levels. However, SCAR statistics were statistically significant in most of the windows prior to negative outlook or watch announcements. These results are shown in the Table 5. In particular, negative watch announcements from the stable/developing state and all states (outlook and stable/developing), were significantly positive in the three-to-eight week window. This indicates that negative watch announcements were either anticipated or, more likely, preceded by adverse economic news that led to rising CDS spreads. Interestingly, these announcements did not experience significant increases in the three-week pre-event window. Rather, CDS spreads (CAR) were declining during this pre-event window. The dynamic pattern is that spreads initially rise and then fall prior to the negative watch announcement. At the time of the announcement (two-day event window), CDS spreads rise as expected.

Recall that negative outlook announcements when bonds are on negative watch status are expected to decrease CDS spreads, but that no evidence of this effect is evident during the two-day event window. By contrast, statistically significant and economically large CAR are found in both pre-event windows. Apparently, good news on these sovereign bonds were incorporated into market prices before rating agencies switched the status of these bonds from negative watch to negative outlook, i.e. removed the threat of an impending credit rating downgrade. Finally, we also find that CARs rise in the three-week period prior to negative outlook announcements conditional on stable/developing status. Again, bad economic news is apparently incorporated into market

pricing before credit agencies place sovereign bonds on negative outlook status (transitioning from the neutral stable/developing position) and the announcement itself also causes a significant rise in CDS spreads.

In summary, credit rating changes and positive outlook/watch announcements are not preceded by rising/falling CDS spreads (CAR) during the two pre-event windows. On the other hand, negative outlook and watch announcements are either largely anticipated or preceded by economic news that is incorporated into CDS spreads. Large and significant effects are also clearly evident during the event window after the announcement.

### 4.4 Effects of the Financial Crisis on Credit Rating Agency Market Impacts

This section investigates the differential impacts of credit rating announcements from the sample period prior to the GFC (January 2005 - August 2008) and the post-crisis sample period (January 2010 – December 2012). The crisis period, September 2008 through December 2009, was dropped from the sample. The basic analysis is analogous to the preceding section based on the two subsamples. Table 6 reports the conditional effects of credit rating change announcements on CDS spreads in the two-day event window [0,+1], with the pre-crisis period in Panel A and the post-crisis period in Panel B. Table 7 reports the market responses to outlook and watch announcements. The question raised earlier is whether the mistakes made by CRAs in rating many financial products prior-to and during the GFC have led investors and markets to pay less attention to announcements from credit rating agencies [17]. In other words, have the credit rating agencies been discredited?

In the post-crisis period downgrades in all categories – stable, negative outlook and negative watch states as well as the aggregate grouping – are statistically significant by both SCAR and directional change statistics. Clearly, CRA credit-downgrade announcements contain informational value for the market pricing of risk. In the pre-crisis period, downgrades from the negative-outlook state, downgrades from all states (aggregated), and credit upgrades from the stable state are statistically significant by both of these metrics. Comparing magnitudes, however, we generally find much smaller responses to downgrades after the GFC. The mean (median) CAR associated with a downgrade (all prior states) was 6.8 (4.3) percentage points before the GFC, and 2.2 (1.1) percentage points after the GFC. The mean (median) response for downgrades transitioning from a negative outlook state was 8.1 (5.0) percentage points before the GFC compared to only 1.7 (1.1)

percentage point after.

There are somewhat mixed results for outlook and watch announcement effects across the two samples, shown in Table 7. It is also noteworthy that the samples exhibit large differences in the number of positive and negative announcements: the pre-crisis period was dominated by positive news (77 positive watch and outlook announcements compared to 33 negative announcements) and the post-crisis period was dominated by negative news (106 negative watch and outlook announcements compared to 34 positive announcements).

In terms of negative announcements, only negative outlook announcements conditioned on the stable/developing state pass the two statistical metrics (statistically significant SCAR and directional change) in both the pre- and post-crisis samples. Negative watch and outlook announcements from the stable/developing state do not pass both metrics for either sample. Moreover, no positive outlook or watch announcements pass both test metrics.

In sum, we find evidence that the market responses from credit rating agency announcements continued to be statistically significant following the GFC. However, we find evidence that the magnitude of the price-response to credit rating downgrades in the period after the GFC became much weaker.

### 4.5 Extensions: Does the Initial Credit Rating Impact Market-Pricing Response?

There are several reasons to believe that credit rating changes across certain rating levels may elicit greater market-price responses than other rating levels. For example, market pricing may be particular sensitive for bonds in the medium-grade region, marginally above or below investment grade (BBB- by S & P), due to regulatory and other institutional features of portfolio management that discretely increases demand for investment grade bonds. Given these institutional features, CDS spreads may respond especially strongly to negative (positive) rating announcements for sovereign bonds for bonds just above (below) the investment grade level. Similarly, some bond funds only invest in the most highly rated sovereign bonds. Downgrades or threats of downgrades to this premium status may lead to sharp decreases in prices and large increases in yields and CDS spreads.

To address this issue we complete our event study analysis on four subsamples grouped by the

credit rating grade: BBB+ to AAA (high investment grade), BBB- to BBB (high medium grade: marginally above investment grade), BB to BB+ (low medium grade: marginally below investment grade), and CC to BB- (low grade). Appendix Table A4 shows the rating designations comparisons for the three rating agencies.

Table 8 summarizes the statistically significant results on these four subsamples. Full sample results are reported in appendix, Table A5. We group the significant results by: (1) whether the events were statistically significant judging by both the SCAR and directional change tests; (2) whether the events were statistically significant by the SCAR test only; or (3) whether the events were statistically significant by the directional change test only. Panel A presents effects on CDS spreads from credit rating changes, and Panel B presents effects from other credit rating agency announcements. It is noteworthy that the samples are necessarily smaller, especially in some categories, when bonds are divided among these credit grades, leading to lower statistical power.

Highly rated bonds appear to be the most sensitive to credit rating downgrades – all three conditional categories as well as unconditional credit rating downgrades are statistically significant by both tests of statistical significance. In addition, unconditional upgrade rating actions pass the directional change significance test for highly rated bonds. On the other side of the spectrum, low-rated bonds are clearly sensitive to credit rating actions conditional upon outlook status – both upgrades and downgrades conditional on outlook pass the two-test standard. In additional, a number of conditional and unconditional upgrades and downgrades pass the individual directional change tests of significance.

An issue with the "middle" credit grade area is the lack of events in many categories (see Appendix Table A5), reducing statistical power generally and in some cases not allowing us to calculate test statistics. Nonetheless, as expected, we find some asymmetry from the SCAR test statistics: high-medium grades respond to downgrades (mainly from negative outlook) and low-medium grades only respond to upgrades (from stable/developing or positive outlook status). The directional change statistics also provide some support for a significant impact of upgrades on CDS spreads for high-medium rated bonds.

### 4.6 Comparison with Previous Studies

Given our emphasis on the conditionality of announcements, perhaps it is not surprising that many of our results contrast with a number of previous studies. For instance, among the studies predominantly performed on corporate CDS markets, Norden and Weber (2004) and Hull et al. (2004) conclude that only negative credit rating announcements transmit useful information as evidenced by the markets' strong reaction to these events. Explaining this result, Gande and Parsley (2005) suggest that this may be "due to greater incentives by a foreign government to leak good news after favorable discussion with a rating agency" . By contrast, Ismailescu and Kazemi (2010) find that CDS markets react only weakly to negative credit rating events but respond strongly to positive events.

Despite this inconclusive evidence from extant literature on the market reaction to negative and positive rating events, our results indicate that both types of events contain important information incorporated by market participants although negative events have a distinctly larger impact.

Our approach allows us to document and compare which categories of outlook and watch status are perceived as a strong precursor of credit rating upgrades and downgrades. The effect of unconditional upgrades is generally smaller than downgrades arising from the watch status prior state. Credit upgrades from positive outlook or stable/develop status are statistically significant with the largest effect, as expected, from the stable/developing state. As expected, credit downgrades also have large effects when coming from stable/developing states. However, the downgrade effect conditional upon a prior negative outlook status is surprisingly large. These results point to substantial asymmetries of upgrades and downgrades depending on conditional states.

Comparing these findings with previous work on watch and outlook events, we also provide more precise and nuanced evidence on the information content of different rating events than unconditional studies. For instance, Norden and Weber (2004) find that the stock market exhibits significantly negative abnormal returns on days of negative watch announcements, whereas actual downgrades are not associated with abnormal returns. Additionally, IMF (2010) and Alsakka and ap Gwilym (2013) also claim that outlook and watch events have more information value than actual rating changes in, respectively, CDS spreads and foreign exchange markets. By contrast, we find upgrades and downgrades, as well as negative reviews lead to significant CDS abnormal

returns. We also find that the investment level rating grade is important for institutional investors, i.e. abnormal returns from credit rating changes are also conditional on the level of prior rating level. Our results may reconcile these apparent contradictory results in the literature.

# 5 Conclusion

Credit agency announcements continue to have a statistically significant and economically important impact on CDS spreads following the GFC. Systematic mispricing by CRAs and conflicts of interest in rating collateralized debt obligations before the GFC did not carry over to completely "discrediting" the information value of their announcements on sovereign bonds in the post-crisis period. However, the effect on spreads was generally less, especially the responses to credit downgrades transitioning from stable/developing and negative outlook states and credit upgrades transitioning from the stable/developing state. Spreads also responded less following the GFC to negative watch announcements and to negative outlook announcements transitioning from the stable/developing state.

The conditioning of credit rating announcements, whether rating changes, watch or outlook, influences all of our results and helps to reconcile some of the conflicting results in the literature. Accurately measuring the market response to CRA announcements requires the specific type of announcement to be carefully parsed – the transition from the prior-state (watch or outlook) to the new state. Both upgrades and downgrades have large effects on CDS spreads, but in the case of upgrades this effect is seen only when the bonds are on prior stable/developing or positive outlook status and not on positive watch status. Some studies find upgrades have a larger market impact than downgrades, while other studies reach the opposite conclusion. Unconditional assessments on the effects of credit rating changes and other announcements, however, can be misleading and lead to incorrect inferences.

Careful conditioning on prior states also allows us to more precisely estimate the quantitative effects for each announcement. We find, for example, that both positive and negative credit rating changes on sovereign bonds on stable/developing status have the largest market responses, while the weakest response occurs when the bond is already on watch status. This suggests that credit rating changes for bonds on watch status, already signaling a credit rating change in the near

future, have less marginal information value than those on the more-neutral stable/developing status. Similarly, negative and positive outlook announcements from the stable/developing state elicit large market responses, while analogous outlook announcements from watch status do not. These findings highlight why focusing on unconditional announcements alone may also provide misleading assessments of these magnitudes.

Credit rating changes are generally not anticipated by the market, judging by abnormal return distributions prior to the announcements in our sample. However, we find that negative news is incorporated into market pricing prior to both negative outlook and watch announcements, i.e. significant abnormal returns are evident in the pre-event windows. By contrast, no abnormal returns are present in the pre-event windows for positive outlook and watch announcements. This suggests that governments are not "leaking" positive news immediately prior to positive CRA announcements, at least during the pre-event window periods, as has been suggested for corporations in explaining why positive CRA announcements on corporate bonds tend to be discounted by the market relative to negative announcements. However, these results are consistent with governments (and corporations) releasing positive news (and suppressing negative news) gradually and earlier than our pre-event windows. Corporate downgrades may be anticipated, unlike sovereign downgrades, if CRAs delay downgrading corporate bonds – bonds they are paid to rate (unlike sovereign bonds) – until bad news is already incorporated into market prices. In addition, we find that especially high- and low-rated sovereign bonds are most sensitive to credit rating change announcements. Highly rated bonds respond very strongly to downgrades, while low-rated bonds respond strongly both to upgrade and downgrade announcements transitioning from outlook status. Not surprisingly, bonds marginally above investment-grade status are particularly sensitive to downgrade announcements while bonds marginally below investment-grade status are especially sensitive to upgrade announcements.

Overall, credit rating announcements provide a rich and varied set of information on how credit rating agencies influence market perceptions of sovereign default risk. We find that CRA announcements continue to have significant information value after the GFC, but that the magnitudes of the responses are generally much smaller. However, accurate measurement of these effects depends importantly on conditioning the prior-state of the sovereign bond prior to the credit rating announcement. Conflicting results in the literature on the importance of CRA announcements to the

market pricing of sovereign default risk are partly attributable to a failure to fully condition on the credit status of sovereign bonds prior to the announcement.

## References


Afonso, A., D. Furceri, and P. Gomes. 2012. Sovereign credit ratings and financial markets linkages: Application to European data. *Journal of International Money and Finance* 31:606 – 638.

Aizenman, J., M. Binici, and M. Hutchison. 2013a. Credit ratings and the pricing of sovereign debt during the Euro crisis. *Oxford Review of Economic Policy* 29:582–609.

Aizenman, J., M. Hutchison, and Y. Jinjarak. 2013b. What is the risk of European sovereign debt defaults? Fiscal space, CDS spreads and market pricing of risk. *Journal of International Money and Finance* 34:37–59.

Alsakka, R., and O. ap Gwilym. 2010a. Leads and lags in sovereign credit ratings. *Journal of Banking & Finance* 34:2614–2626.

Alsakka, R., and O. ap Gwilym. 2010b. Split sovereign ratings and rating migrations in emerging economies. *Emerging Markets Review* 11(2):79–97.

Alsakka, R., and O. ap Gwilym. 2012. Foreign exchange market reactions to sovereign credit news. *Journal of International Money and Finance* 31:845 – 864.

Alsakka, R., and O. ap Gwilym. 2013. Rating agencies' signals during the European sovereign debt crisis: Market impact and spillovers. *Journal of Economic Behavior & Organization* 85:144162.

Amstad, M., and F. Packer. 2015. Sovereign ratings of advanced and emerging economies after the crisis. *BIS Quarterly Review* pp. 77–91.

Arellano, M., and S. Bond. 1991. Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *Review of Economic Studies* 58:277–297.

Arezki, R., B. Candelon, and A. N. Sy. 2011. Sovereign ratings news and financial markets spillovers: Evidence from the European debt crisis. *IMF Working Paper* WP/11/68.

Beirne, J., and M. Fratzscher. 2013. The pricing of sovereign risk and contagion during the European sovereign debt crisis. *Journal of International Money and Finance* 34:60–82.

Boehmer, E., J. Masumeci, and A. B. Poulsen. 1991. Event-study methodology under conditions of event-induced variance. *Journal of Financial Economics* 30:253–272.

Boot, A., T. T. Milbourn, and A. Schmeits. 2006. Credit ratings as coordination mechanisms. *Review of Financial Studies* 19:81–118.

Brooks, C. 2014. *Introductory Econometrics for Finance*. 3rd ed. Cambridge University Press. Cambridge University Press.

Brooks, R., R. W. Faff, D. Hillier, and J. Hillier. 2004. The national market impact of sovereign rating changes. *Journal of Banking & Finance* 28:233 – 250.

Cantor, R., and F. Packer. 1994. The credit rating industry. *FRBNY Quarterly Review* Fall-summer:1–26.

Cantor, R., and F. Packer. 1996. Determinants and impact of sovereign credit ratings. *Federal Reserve Bank of New York Economic Policy Review* October:37–54.

Cantor, R., and F. Packer. 1997. Differences of opinion and selection bias in the credit rating industry. *Journal of Banking & Finance* 21:1395–1417.

Das, U. S., M. G. Papaioannou, and C. Trebesc. 2012. Restructuring sovereign debt: Lessons from recent history. Mimeo.

Dichev, I. D., and J. D. Piotroski. 2001. The long-run stock returns following bond ratings changes. *The Journal of Finance* 56:173–203.

European Commission. 2013. New rules on credit rating agencies (CRAs) frequently asked questions MEMO/13/13.

Ferreira, M., and P. M. Gama. 2007. Does sovereign debt ratings news spill over to international stock markets? *Journal of Banking & Finance* 31:3162–3182.

Finnerty, J. D., C. D. Miller, and R. Chen. 2013. The impact of credit rating announcements on credit default swap spreads. *Journal of Banking & Finance* 37:2011–2030.

Fitch Ratings. 2017. Rating Definitions.

Gande, A., and D. C. Parsley. 2005. News spillovers in the sovereign debt market. *Journal of Financial Economics* 75:691 – 734.

Grossman, J. S., and J. E. Stiglitz. 1980. On the impossibility of informationally efficient markets. *American Economic Review* 70(3):393–408.

Hamilton, D., and R. Cantor. 2004. Rating transition and default rates conditioned on outlook. *The Journal of Fixed Income* September:54–70.

Hill, P., R. Brooks, and R. Faff. 2010. Variations in sovereign credit quality assessments across rating agencies. *Journal of Banking & Finance* 34:1327 – 1343.

Hill, P., and R. W. Faff. 2010. The market impact of relative agency activity in the sovereign ratings market. *Journal of Business Finance & Accounting* 37:1309–1347.

Hite, G., and A. Warga. 1997. The effect of bond-rating changes on bond price performance. *Financial Analysts Journal* 53:35–51.

Hooper, V. J., T. P. Hume, and S.-J. Kim. 2008. Sovereign rating changes - Do they provide new information for stock markets? *Economic Systems* 32/2:142–166.

Hull, J., M. Predescu, and A. White. 2004. The relationship between credit default swap spreads, bond yields, and credit rating announcements. *Journal of Banking & Finance* 28:27892811.

IMF. 2010. *Global Financial Stability Report*, chap. 3. chap. 3. October.

Ismailescu, I., and H. Kazemi. 2010. The reaction of emerging market credit default swap spreads to sovereign credit rating changes. *Journal of Banking & Finance* 34:2861 – 2873.

Kaminsky, G., and S. Schmukler. 2002. Emerging market instability: Do sovereign ratings affect country risk and stock returns? *The World Bank Economic Review* 16(2):171–195.

Kashyap, A., and N. Kovrijnykh. 2013. Who should pay for credit ratings and how? *NBER Working Paper* 18923.

Keenan, S. C., J. S. Fons, and L. V. Carty. 2000. Credit rating dynamics Moodys Watchlist, rating migration, and credit quality correlation. *Credit derivatives and credit linked notes, 2nd ed* pp. 477–533.

Kiff, J., S. Nowak, and L. Schumacher. 2012. Are rating agencies powerful? An investigation into the impact and accuracy of sovereign ratings. *IMF Working Paper* WP/12/23.

Longstaff, F. A., J. Pan, L. H. Pedersen, and K. J. Singleton. 2011. How sovereign is sovereign credit risk? *American Economic Journal: Macroeconomics* 3(2):75–103.

Micu, M., E. Remolona, and P. Wooldridge. 2006. The price impact of rating announcements: which announcements matter? *BIS Working Papers* 207.

Millon, M. H., and A. Thakor. 1985. Moral hazard and information sharing: a model of financial information gathering agencies. *Journal of Finance* 40:1403–22.

Norden, L., and M. Weber. 2004. Informational efficiency of credit default swap and stock markets: The impact of credit rating announcements. *Journal of Banking & Finance* 28:2813 – 2843.

Partnoy, F. 1999. The Siskel and Ebert of financial markets?: Two thumbs down for the credit rating agencies. *Washington University Law Quarterly* 77(3):619 718.

Pinches, G., and J. Singleton. 1978. The adjustment of stock prices to bond rating changes. *Journal of Finance* 33:29–44.

Powell, A. 2013. On sovereign ratings: observations and implications. *BIS Papers* 72.

S&P. 2009. Use of creditwatch and outlooks. *Global Ratings Portal: Ratings Direct* 14 September.

S&P. 2012. How We Rate Sovereigns. *Global Ratings Portal: Ratings Direct* 13 March.

S&P. 2013. Credit Ratings Definitions and FAQs.

Steiner, M., and V. G. Heinke. 2001. Event study concerning international bond price effects of credit rating actions. *International Journal of Finance & Economics* 6:139–157.

Sy, A. 2004. Rating the rating agencies: Anticipating currency crises or debt crises? *Journal of Banking & Finance* 28(11):2845–2867.

Vassalou, M., and Y. Xing. 2003. Equity returns following changes in default risk: New insights into the informational content of credit ratings. *EFA Annual Conference Paper.*

Weinstein, M. 1977. The effect of a rating change announcement on bond price. *Journal of Financial Economics* 5:329–50.

## Notes

[1]For discussion on methodological changes in CRAs in post GFC, for example, see Amstad and Packer (2015).

[2]See Kiff et al. (2013) for a review of the literature.

[3]See Millon and Thakor (1985).

[4]Ratings are also frequently employed to calculate Basel II risk-based capital requirements and serve other regulatory functions.

[5]See Boot, Milbourn, and Schmeits (2006).

[6]The announcements are not time-stamped so they could not ascertain if the announcements occurred before or after the daily close of the bond market.

[7]They note that their results on sovereign CDS spreads contradict previous studies on corporate CDS markets (e.g. Norden and Weber (2004) and Hull et al. (2004)), which find only negative credit rating announcements affect CDS spreads. Ismailescu and Kazemi (2010) note that investment grade sovereign CDS respond to negative rating events, while speculative grade sovereign CDS respond to positive events (consistent with Hull et al. (2004) and Micu, Remolona, and Wooldridge (2006) . However, Ismailescu and Kazemi (2010) do not report these results in the article.

[8]The authors also use a logistic model to investigate formally whether CDS premiums predict rating announcements, and regression models to investigate spillover effects and channels of transmission.

[9]Our focus is on the effects of credit rating changes on CDS spreads. There is a large literature on factors causing credit rating changes. Das, Papaioannou, and Trebesc (2012), for example, note that debt restructuring is a good predictor of a sovereign credit rating upgrade within a two-year period.

[10]In some literature, $(a, b)$ is known as the $(b - a)$- day interval from the end of day $a$ to end of day $b$.

[11]As a robust test we also employ a GDP-weighted average of CDS spreads, calculated by the Bank for International Settlements, as an alternative for the market portfolios.

[12]Two groups of transitions are seemingly contradictory: 3 credit upgrades combined with a negative watch status, and1credit upgrade combined with a negative outlook status.

[13]The two-day event window $[0, +1]$ is the period starting at the beginning of the event day, day 0 (or the end of the day prior to the event day) to the end of the day after the event day, day 1. This interval is also known as $(-1, +1)$ in some literature.

[14]The expected directional signs are shown in Table 1(b). For example, the transition from positive outlook to positive watch (positive watch to positive outlook) is a positive (negative) signal, with an expected decline (rise) in CDS spreads.

[15]Statistical significance refers to the 10% significant level in unless otherwise specified.

[16]We do not present the unconditional effect of positive/negative outlook announcements because it is a mixture of positive/negative events. A move from positive/negative watch to positive/negative outlook is a negative/positive event, while a move to positive/negative outlook from stable or developing is a positive/negative event.

[17]It is noteworthy that the mistakes made by credit rating agencies were largely concentrated on CDO products, however, rather than sovereign bonds.

**Table 1(a).**
**Transition matrix of outlook and watch**

| Prior Status \ New Status | Neg Watch Downg. | Neg Watch N/C | Neg Watch Upg. | Neg Outl. Downg. | Neg Outl. N/C | Neg Outl. Upg. | Stable/ Dev Downg. | Stable/ Dev N/C | Stable/ Dev Upg. | Pos Outl. N/C | Pos Outl. Upg. | Pos Watch N/C | Pos Watch Upg. | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Negative Watch | 13 | 0 | 2 | 51 | 18 | 0 | 13 | 4 | 3 | 0 | 0 | 0 | 0 | 104 |
| Negative Outlook | 14 | 37 | 0 | 70 | 0 | 0 | 26 | 48 | 0 | 1 | 0 | 0 | 0 | 196 |
| Stable/Dev/Others | 1 | 34 | 1 | 10 | 98 | 1 | 9 | 0 | 74 | 77 | 3 | 7 | 0 | 315 |
| Positive Outlook | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 28 | 40 | 0 | 13 | 24 | 0 | 107 |
| Positive Watch | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 3 | 19 | 6 | 6 | 0 | 1 | 37 |
| Total | 28 | 73 | 3 | 131 | 118 | 1 | 48 | 83 | 136 | 84 | 22 | 31 | 1 | 759 |

The table depicts the frequencies of transitions from an outlook/watch status to another, with a credit upgrade/downgrade or without credit rating change. N/C = no credit rating change; Downg. = credit rating downgrade; Upg. = credit rating upgrade; Outl. = outlook. As an example, the $(2, 1)$ element of the matrix is 14, implying that of all the 196 negative outlook events that turn to the other states, 14 of them turn to negative watch with a downgrade. The $(2, 2)$ element of the matrix is 37, implying that 37 of them will turn to negative watch without a credit rating change. Two columns, positive outlook/watch with a downgrade, are not in this table since no events are in these two categories.

**Table 1(b).**
**The expected signs of the credit rating events, conditioned on each bond's status**

| Prior Status | Transition to: | Pos(+) Neg (-) Event | | No. events | | Percentage | |
|---|---|---|---|---|---|---|---|
| Stable/ | pos outlook | + | | 77 | | (24%) | |
| Developing/ | pos watch | + | | 7 | | (2%) | |
| Others | credit upgrade | + | | 79 | | (25%) | |
| | and stable/developing | | | | 74 | | (94%) |
| | and pos outlook | | | | 3 | | (4%) |
| | and neg outlook | | | | 1 | | (1%) |
| | and neg watch | | | | 1 | | (1%) |
| | neg outlook | – | | 98 | | (31%) | |
| | neg watch | – | | 34 | | (11%) | |
| | credit downgrade | – | | 20 | | (6%) | |
| | and stable/developing/other | | | | 9 | | (45%) |
| | and neg outlook | | | | 10 | | (50%) |
| | and neg watch | | | | 1 | | (5%) |
| | | | Total | 315 | | (100%) | |
| Positive | pos watch | + | | 24 | | (22%) | |
| Outlook | credit upgrade | + | | 53 | | (50%) | |
| | and stable/developing | | | | 40 | | (75%) |
| | and pos outlook | | | | 13 | | (25%) |
| | neg outlook | – | | 2 | | (2%) | |
| | stable/developing/other | – | | 28 | | (26%) | |
| | | | Total | 107 | | (100%) | |
| Positive | credit upgrade | + | | 26 | | (70%) | |
| Watch | and stable/developing | | | | 19 | | (73%) |
| | and pos outlook | | | | 6 | | (23%) |
| | and pos watch | | | | 1 | | (4%) |
| | pos outlook | – | | 6 | | (16%) | |
| | stable/developing/other | – | | 3 | | (8%) | |
| | neg outlook | – | | 2 | | (5%) | |
| | | | Total | 37 | | (100%) | |
| Negative | pos outlook | + | | 1 | | (1%) | |
| Outlook | stable/developing/other | + | | 48 | | (24%) | |
| | neg watch | – | | 37 | | (19%) | |
| | credit downgrade | – | | 110 | | (56%) | |
| | and stable/developing/other | | | | 26 | | (24%) |
| | and neg outlook | | | | 70 | | (64%) |
| | and neg watch | | | | 14 | | (13%) |
| | | | Total | 196 | | (100%) | |
| Negative | stable/developing/other | + | | 4 | | (4%) | |
| Watch | neg outlook | + | | 18 | | (17%) | |
| | credit upgrade | + | | 5 | | (5%) | |
| | and stable/developing | | | | 3 | | (60%) |
| | and neg watch | | | | 2 | | (40%) |
| | credit downgrade | – | | 77 | | (74%) | |
| | and stable/developing | | | | 13 | | (17%) |
| | and neg outlook | | | | 51 | | (66%) |
| | and neg watch | | | | 13 | | (17%) |
| | | | Total | 104 | | (100%) | |

All credit upgrades are positive events, while all credit downgrades are negative events. Entering the same outlook/watch status without credit rating change can be a positive or a negative event. For example, a move to positive outlook is a negative news signal if it is from a prior status of positive watch; a move to negative outlook is a positive news signal if it is from a prior status of negative watch.

**Table 2.**
**Number of upgrades and downgrades subsequent to outlook and watch events.**

| | | Days to upgrades | | | Days to downgrades | | |
|---|---|---|---|---|---|---|---|
| Outlook/Watch events | total | (+)≤ 30 | (+)≤ 61 | (+)≤ 91 | (–)≤ 30 | (–)≤ 61 | (–)≤ 91 |
| 1 | 89 | 0 | 0 | 0 | 17 | 37 | 55 |
| Negative watch | (100%) | (0%) | (0%) | (0%) | (19.1%) | (41.57%) | (61.8%) |
| 2 | 180 | 0 | 0 | 0 | 4 | 13 | 20 |
| Negative outlook | (100%) | (0%) | (0%) | (0%) | (2.22%) | (7.22%) | (11.11%) |
| 3 | 220 | 0 | 0 | 1 | 0 | 0 | 4 |
| Stable | (100%) | (0%) | (0%) | (0.45%) | (0%) | (0%) | (1.82%) |
| 4 | 31 | 0 | 1 | 1 | 0 | 0 | 0 |
| Developing | (100%) | (0%) | (3.23%) | (3.23%) | (0%) | (0%) | (0%) |
| 5 | 93 | 0 | 4 | 6 | 0 | 0 | 0 |
| Positive outlook | (100%) | (0%) | (4.3%) | (6.45%) | (0%) | (0%) | (0%) |
| 6 | 31 | 4 | 12 | 18 | 0 | 0 | 0 |
| Positive watch | (100%) | (12.9%) | (38.71%) | (58.06%) | (0%) | (0%) | (0%) |

The table depicts the credit rating events within 91 days after an outlook/watch event. A positive sign refers to an upgrade, while a negative sign a downgrade. For example, there were 89 negative watches (the first row) issued in the sample period, and there is no upgrades within 91 days following the negative watches. 17 of them were followed by a downgrade within 30 days, and 37 of them were followed by a downgrade within 61 days, 55 (61.8%) were followed by a downgrade within 91 days, implying 38.2% were not followed by any upgrade or downgrade within 91 days. The counts are cumulative, meaning that 37-17=20 downgrades occurred 31-61 days after negative watch events.

**Table 3.**
**The effects of credit rating changes (Panel A) and outlook/watch status changes (Panel B) on CDS in the event window $[0, +1]$ for the whole sample, conditioning on the prior outlook/watch status**

Panel A: Credit Rating Changes

| Credit Rating Change | Prior Status | Number of Events | CAR Mean | CAR Median | SCAR t-stat. | SCAR p-value | Median Spread Change | % Positive Spread Change | % Negative Spread Change | p-value of Spread Change |
|---|---|---|---|---|---|---|---|---|---|---|
| up | Stable | 46 | -2.315 | -1.355 | -3.453 | 0.001 | -2.472 | 30.435 | 67.391 | 0.013 |
| up | Pos Outlook | 63 | -1.464 | -1.072 | -1.975 | 0.026 | -0.604 | 31.746 | 61.905 | 0.039 |
| up | Pos Watch | 29 | 1.101 | -0.572 | 0.663 | 0.744 | -0.511 | 37.931 | 62.069 | 0.133 |
| up | All | 143 | -1.389 | -1.072 | -1.721 | 0.044 | -1.062 | 31.469 | 64.336 | 0.000 |
| down | Stable | 13 | 2.965 | 2.462 | 2.115 | 0.028 | 3.442 | 69.231 | 30.769 | 0.134 |
| down | Neg Outlook | 73 | 3.800 | 1.310 | 3.785 | 0.000 | 3.775 | 68.493 | 31.507 | 0.001 |
| down | Neg Watch | 52 | 2.525 | 1.398 | 2.792 | 0.004 | 5.129 | 67.308 | 32.692 | 0.009 |
| down | All | 138 | 3.241 | 1.435 | 5.109 | 0.000 | 4.151 | 68.116 | 31.884 | 0.000 |

Panel B: Outlook/Watch Changes

| Current Outlook Watch | Prior Status | Number of Events | CAR Mean | CAR Median | SCAR t-stat. | SCAR p-value | Median Spread Change | % Positive Spread Change | % Negative Spread Change | p-value of Spread Change |
|---|---|---|---|---|---|---|---|---|---|---|
| Neg Watch | Neg Outlook | 31 | 2.517 | 1.660 | 1.690 | 0.051 | 8.368 | 64.516 | 35.484 | 0.075 |
| Neg Watch | Stable/Developing | 32 | 2.265 | -0.848 | 1.498 | 0.072 | 0.878 | 56.250 | 43.750 | 0.298 |
| Neg Watch | All | 63 | 2.389 | 0.017 | 2.075 | 0.021 | 3.142 | 60.317 | 39.683 | 0.065 |
| Neg Outlook | Neg Watch | 41 | 2.069 | 1.791 | 1.732 | 0.955 | 5.025 | 68.293 | 31.707 | 0.986 |
| Neg Outlook | Stable/Developing | 95 | 4.223 | 2.033 | 3.740 | 0.000 | 4.908 | 78.947 | 17.895 | 0.000 |
| Pos Watch | Pos Outlook | 19 | 5.944 | -0.482 | 0.943 | 0.821 | 0.012 | 52.632 | 42.105 | 0.677 |
| Pos Watch | Stable/Developing | 7 | 0.124 | 0.898 | 0.104 | 0.540 | -1.433 | 42.857 | 57.143 | 0.500 |
| Pos Watch | All | 26 | 4.378 | -0.221 | 0.948 | 0.824 | 0.006 | 50.000 | 46.154 | 0.578 |
| Pos Outlook | Pos Watch | 6 | 2.226 | 0.568 | 1.383 | 0.113 | 0.049 | 50.000 | 50.000 | 0.500 |
| Pos Outlook | Stable/Developing | 94 | -0.707 | -0.788 | -2.253 | 0.013 | -0.582 | 35.106 | 61.702 | 0.015 |

**Table 4.**
**The effects of credit rating changes on CDS in the pre-event windows for the whole sample, conditioning on the prior outlook/watch status**

Panel A: Pre-event window $[-40, -15]$

| Credit Rating Change | Prior Status | Number of Events | CAR Mean | CAR Median | SCAR t-stat. | SCAR p-value | Median Spread Change | % Positive Spread Change | % Negative Spread Change | p-value of Spread Change |
|---|---|---|---|---|---|---|---|---|---|---|
| up | Stable | 46 | -1.033 | -0.135 | -1.098 | 0.139 | -3.659 | 36.957 | 63.043 | 0.052 |
| up | Pos Outlook | 63 | 2.977 | 0.809 | 1.004 | 0.840 | -0.533 | 42.857 | 57.143 | 0.157 |
| up | Pos Watch | 29 | -2.500 | -5.222 | -0.320 | 0.376 | -0.723 | 41.379 | 58.621 | 0.229 |
| up | All | 143 | 0.534 | -0.459 | 0.044 | 0.517 | -0.908 | 41.259 | 58.741 | 0.022 |
| down | Stable | 13 | 3.214 | 9.328 | 0.867 | 0.202 | 48.093 | 69.231 | 30.769 | 0.134 |
| down | Neg Outlook | 73 | 0.881 | 2.780 | 0.425 | 0.336 | 13.383 | 64.384 | 35.616 | 0.010 |
| down | Neg Watch | 52 | -9.394 | -8.248 | -3.927 | 1.000 | 11.532 | 61.538 | 38.462 | 0.064 |
| down | All | 138 | -2.771 | -1.562 | -1.664 | 0.951 | 14.128 | 63.768 | 36.232 | 0.001 |

Panel B: Pre-event window $[-14, -1]$

| Credit Rating Change | Prior Status | Number of Events | CAR Mean | CAR Median | SCAR t-stat. | SCAR p-value | Median Spread Change | % Positive Spread Change | % Negative Spread Change | p-value of Spread Change |
|---|---|---|---|---|---|---|---|---|---|---|
| up | Stable | 46 | -0.773 | -0.751 | -0.058 | 0.477 | -1.122 | 41.304 | 58.696 | 0.151 |
| up | Pos Outlook | 63 | -0.141 | 0.615 | -0.376 | 0.354 | -0.538 | 38.095 | 60.317 | 0.065 |
| up | Pos Watch | 29 | -0.614 | 0.117 | -0.300 | 0.383 | 0.432 | 58.621 | 41.379 | 0.771 |
| up | All | 143 | -0.916 | -0.475 | -0.937 | 0.175 | -0.625 | 41.958 | 56.643 | 0.066 |
| down | Stable | 13 | -0.519 | -1.580 | 0.066 | 0.474 | 17.752 | 53.846 | 46.154 | 0.500 |
| down | Neg Outlook | 73 | 0.936 | 1.428 | 0.891 | 0.188 | 13.851 | 71.233 | 28.767 | 0.000 |
| down | Neg Watch | 52 | -4.290 | -6.048 | -2.073 | 0.978 | 1.493 | 51.923 | 48.077 | 0.445 |
| down | All | 138 | -1.170 | -1.277 | -0.392 | 0.652 | 8.723 | 62.319 | 37.681 | 0.002 |

**Table 5.**
**The effects of outlook/watch status changes and on CDS in the pre-event windows for the whole sample, conditioning on the prior outlook/watch status**

Panel A: Pre-event window $[-40, -15]$

| Current Outlook Watch | Prior Status | Number of Events | CAR Mean | CAR Median | SCAR t-stat. | SCAR p-value | Median Spread Change | % Positive Spread Change | % Negative Spread Change | p-value of Spread Change |
|---|---|---|---|---|---|---|---|---|---|---|
| Neg Watch | Stable/Developing | 32 | 4.882 | 10.438 | 1.289 | 0.103 | 29.196 | 81.250 | 18.750 | 0.000 |
| Neg Watch | All | 63 | 3.597 | 5.131 | 1.954 | 0.028 | 33.579 | 76.190 | 23.810 | 0.000 |
| Neg Outlook | Neg Watch | 41 | -16.378 | -15.494 | -6.057 | 1.000 | -8.126 | 46.341 | 53.659 | 0.623 |
| Neg Outlook | Stable/Developing | 95 | -1.082 | -1.322 | -0.273 | 0.607 | 3.880 | 57.895 | 40.000 | 0.075 |
| Pos Outlook | Pos Watch | 6 | -3.694 | -3.123 | -0.216 | 0.419 | -0.913 | 33.333 | 66.667 | 0.342 |
| Pos Outlook | Stable/Developing | 94 | 1.828 | 0.692 | 0.256 | 0.601 | -0.716 | 42.553 | 57.447 | 0.090 |
| Pos Watch | Pos Outlook | 19 | -2.030 | -0.997 | 0.006 | 0.502 | -0.188 | 42.105 | 57.895 | 0.323 |
| Pos Watch | Stable/Developing | 7 | 0.466 | -2.573 | 0.237 | 0.590 | 0.480 | 57.143 | 42.857 | 0.500 |
| Pos Watch | All | 26 | -1.358 | -1.110 | 0.127 | 0.550 | -0.119 | 46.154 | 53.846 | 0.422 |

Panel B: Pre-event window $[-14, -1]$

| Current Outlook Watch | Prior Status | Number of Events | CAR Mean | CAR Median | SCAR t-stat. | SCAR p-value | Median Spread Change | % Positive Spread Change | % Negative Spread Change | p-value of Spread Change |
|---|---|---|---|---|---|---|---|---|---|---|
| Neg Watch | Stable/Developing | 32 | -7.819 | -7.522 | -3.163 | 0.998 | -0.112 | 50.000 | 50.000 | 0.500 |
| Neg Watch | All | 63 | -4.329 | -3.933 | -1.751 | 0.958 | 10.475 | 58.730 | 41.270 | 0.104 |
| Neg Outlook | Neg Watch | 41 | -3.554 | -3.351 | -1.884 | 0.967 | -5.012 | 39.024 | 60.976 | 0.894 |
| Neg Outlook | Stable/Developing | 95 | 2.429 | 1.143 | 1.803 | 0.037 | 0.702 | 53.684 | 44.211 | 0.269 |
| Pos Outlook | Pos Watch | 6 | -0.822 | -0.197 | -0.492 | 0.322 | 0.067 | 50.000 | 50.000 | 0.500 |
| Pos Outlook | Stable/Developing | 94 | 0.494 | -0.219 | 0.282 | 0.611 | -0.328 | 39.362 | 59.574 | 0.040 |
| Pos Watch | Pos Outlook | 19 | -2.217 | -1.945 | -0.689 | 0.250 | 0.079 | 52.632 | 47.368 | 0.500 |
| Pos Watch | Stable/Developing | 7 | 6.207 | -0.863 | 0.962 | 0.813 | -0.068 | 42.857 | 57.143 | 0.500 |
| Pos Watch | All | 26 | 0.051 | -1.486 | 0.148 | 0.558 | 0.005 | 50.000 | 50.000 | 0.500 |

**Table 6.**
**The effects of credit rating changes conditioning on the prior outlook/watch status on CDS in the event window** $[0, +1]$ **for the pre-crisis period, 01/2005-08/2008 (Panel A), and for the post-crisis period, 01/2010-12/2012 (Panel B).**

Panel A: The pre-crisis period, 01/2005-08/2008

| Credit Rating Change | Prior Status | Number of Events | CAR Mean | CAR Median | SCAR t-stat. | SCAR p-value | Median Spread Change | % Positive Spread Change | % Negative Spread Change | p-value of Spread Change |
|---|---|---|---|---|---|---|---|---|---|---|
| up | Stable | 27 | -2.671 | -1.085 | -2.802 | 0.005 | -1.438 | 35.185 | 64.815 | 0.089 |
| up | Pos Outlook | 43 | -1.299 | -0.718 | -1.169 | 0.125 | -0.249 | 39.535 | 60.465 | 0.111 |
| up | Pos Watch | 20 | 1.023 | -1.341 | 0.527 | 0.698 | -0.275 | 40.000 | 60.000 | 0.251 |
| up | All | 92 | -1.202 | -1.133 | -0.833 | 0.203 | -0.434 | 37.500 | 62.500 | 0.011 |
| down | Stable | 4 | 4.980 | 5.957 | 1.553 | 0.109 | 8.783 | 50.000 | 50.000 | 0.500 |
| down | Neg Outlook | 26 | 8.125 | 4.961 | 3.195 | 0.002 | 3.320 | 76.923 | 23.077 | 0.005 |
| down | Neg Watch | 6 | 2.026 | 0.302 | 0.966 | 0.189 | -1.614 | 33.333 | 66.667 | 0.658 |
| down | All | 36 | 6.759 | 4.346 | 3.648 | 0.000 | 1.397 | 66.667 | 33.333 | 0.033 |

Panel B: The post-crisis period, 01/2010-12/2012

| Credit Rating Change | Prior Status | Number of Events | CAR Mean | CAR Median | SCAR t-stat. | SCAR p-value | Median Spread Change | % Positive Spread Change | % Negative Spread Change | p-value of Spread Change |
|---|---|---|---|---|---|---|---|---|---|---|
| up | Stable | 11 | -0.503 | -0.578 | -0.824 | 0.215 | -2.383 | 45.455 | 54.545 | 0.500 |
| up | Pos Outlook | 14 | -1.588 | -1.072 | -1.501 | 0.079 | -1.263 | 35.714 | 64.286 | 0.211 |
| up | Pos Watch | 4 | 2.233 | 1.421 | 2.572 | 0.959 | 0.674 | 50.000 | 50.000 | 0.500 |
| up | All | 30 | -0.644 | -0.322 | -1.052 | 0.151 | -0.909 | 41.667 | 58.333 | 0.233 |
| down | Stable | 8 | 3.104 | 2.228 | 1.841 | 0.054 | 5.851 | 87.500 | 12.500 | 0.039 |
| down | Neg Outlook | 23 | 1.731 | 1.051 | 2.719 | 0.006 | 2.704 | 65.217 | 34.783 | 0.105 |
| down | Neg Watch | 34 | 2.225 | 0.645 | 1.873 | 0.035 | 6.960 | 73.529 | 26.471 | 0.005 |
| down | All | 65 | 2.158 | 1.051 | 3.226 | 0.001 | 4.720 | 72.308 | 27.692 | 0.000 |

Note: The empirical results are presented for categories with at least 4 events.

**Table 7.**
**The effects of outlook/watch status changes conditioning on the prior outlook/watch status on CDS in the event window $[0, +1]$ for the pre-crisis period, 01/2005-08/2008 (Panel A), and for the post-crisis period, 01/2010-12/2012 (Panel B).**

Panel A: The pre-crisis period, 01/2005-08/2008

| Current Outlook Watch | Prior Status | Number of Events | CAR Mean | CAR Median | SCAR t-stat. | SCAR p-value | Median Spread Change | % Positive Spread Change | % Negative Spread Change | p-value of Spread Change |
|---|---|---|---|---|---|---|---|---|---|---|
| Neg Watch | All | 5 | 13.130 | 2.052 | 1.733 | 0.079 | 7.892 | 80.000 | 20.000 | 0.186 |
| Neg Outlook | Stable/Developing | 28 | 8.852 | 3.326 | 2.580 | 0.008 | 2.876 | 82.143 | 14.286 | 0.001 |
| Neg Outlook | All | 28 | 8.852 | 3.326 | 2.580 | 0.008 | 2.876 | 82.143 | 14.286 | 0.001 |
| Pos Watch | Pos Outlook | 16 | 7.468 | -0.221 | 0.965 | 0.825 | 0.056 | 62.500 | 31.250 | 0.894 |
| Pos Watch | All | 17 | 6.837 | -0.482 | 0.943 | 0.820 | 0.037 | 58.824 | 35.294 | 0.834 |
| Pos Outlook | Stable/Developing | 60 | -1.013 | -0.788 | -2.807 | 0.003 | -0.505 | 30.000 | 65.000 | 0.014 |

Panel B: The post-crisis period, 01/2010-12/2012

| Current Outlook Watch | Prior Outlook Watch | Number of Events | CAR Mean | CAR Median | SCAR t-stat. | SCAR p-value | Median Spread Change | % Positive Spread Change | % Negative Spread Change | p-value of Spread Change |
|---|---|---|---|---|---|---|---|---|---|---|
| Neg Watch | Neg Outlook | 19 | -1.156 | -0.717 | -0.149 | 0.558 | 4.973 | 52.632 | 47.368 | 0.500 |
| Neg Watch | Stable/Developing | 21 | -1.430 | -1.591 | -1.050 | 0.847 | -0.730 | 42.857 | 57.143 | 0.669 |
| Neg Watch | All | 40 | -1.300 | -1.023 | -0.763 | 0.775 | -0.425 | 47.500 | 52.500 | 0.563 |
| Neg Outlook | Neg Watch | 30 | 2.949 | 2.174 | 1.794 | 0.958 | 6.401 | 76.667 | 23.333 | 0.997 |
| Neg Outlook | Stable/Developing | 36 | 1.678 | 1.657 | 2.876 | 0.003 | 3.031 | 75.000 | 19.444 | 0.002 |
| Pos Outlook | Stable/Developing | 29 | -0.356 | -0.968 | -0.460 | 0.325 | -1.830 | 44.828 | 55.172 | 0.355 |
| Pos Watch | All | 5 | -0.717 | 0.898 | -0.093 | 0.465 | -4.805 | 20.000 | 80.000 | 0.186 |

Note: The empirical results are presented for categories with at least 4 events.

**Table 8.**

**Effects of Credit Rating Agency Announcements Conditional on Initial Rating Level and Initial Bond Status**

| | Both SCAR and Directional Change | | SCAR only | | Directional change only | |
|---|---|---|---|---|---|---|
| | Action | Prior State | Action | Prior State | Action | Prior State |
| High Rating | Downgrade | Stable | NA | | Upgrade | All |
| | Downgrade | Neg Watch | | | | |
| | Downgrade | Neg Outlook | | | | |
| | Downgrade | All | | | | |
| High Medium Rating | NA | | Downgrade | Neg Outlook | Upgrade | Stable |
| | | | Downgrade | All | Upgrade | All |
| Low Medium Rating | NA | | Upgrade | Stable | NA | |
| | | | Upgrade | Pos Outlook | | |
| | | | Upgrade | All | | |
| Low Rating | Upgrade | Pos Outlook | Upgrade | All | Upgrade | Stable |
| | Downgrade | Neg Outlook | Downgrade | Stable | | |
| | | | Downgrade | All | | |

Note: See text for definition of "high", "high medium", "low medium", and "low" credit rating grade.

# Appendix

**Table A1.**
**Descriptive Statistics of CDS by country**

| ISO2 | Country | Mean | Standard Deviation | Max | Min |
|---|---|---|---|---|---|
| AR | Argentina | 1163.86 | 1016.81 | 4293.07 | 178.50 |
| AT | Austria | 49.51 | 56.66 | 268.88 | 1.49 |
| AU | Australia | 32.80 | 30.94 | 196.66 | 1.60 |
| BE | Belgium | 67.48 | 81.86 | 404.42 | 1.93 |
| BG | Bulgaria | 165.60 | 135.72 | 686.97 | 12.57 |
| BR | Brazil | 203.01 | 145.12 | 929.59 | 61.14 |
| CA | Canada | 27.03 | 25.76 | 133.50 | 1.60 |
| CH | Switzerland | 49.84 | 24.99 | 176.49 | 19.50 |
| CL | Chile | 69.19 | 49.83 | 315.95 | 12.53 |
| CN | China | 67.18 | 46.68 | 278.29 | 9.16 |
| CY | Cyprus | 325.24 | 449.16 | 1683.68 | 5.25 |
| CZ | Czech Republic | 60.83 | 56.26 | 350.14 | 4.69 |
| DE | Germany | 26.73 | 27.47 | 115.67 | 1.29 |
| DK | Denmark | 32.19 | 37.89 | 157.28 | 1.20 |
| EE | Estonia | 106.20 | 134.87 | 736.23 | 3.35 |
| ES | Spain | 132.49 | 149.87 | 633.49 | 2.35 |
| FI | Finland | 22.67 | 22.44 | 92.23 | 1.08 |
| FR | France | 48.94 | 56.37 | 247.31 | 1.47 |
| GB | United Kingdom | 45.45 | 34.46 | 164.63 | 1.20 |
| GR | Greece | 5561.93 | 9397.81 | 23188.54 | 4.72 |
| HR | Croatia | 201.46 | 155.32 | 594.13 | 14.95 |
| HU | Hungary | 207.35 | 176.60 | 736.35 | 9.84 |
| ID | Indonesia | 230.98 | 129.46 | 1246.75 | 91.82 |
| IE | Ireland | 188.65 | 247.51 | 1263.41 | 1.67 |
| IL | Israel | 95.30 | 57.79 | 285.00 | 16.92 |
| IN | India | 218.51 | 107.32 | 805.00 | 43.11 |
| IS | Iceland | 221.83 | 246.53 | 1114.52 | 3.26 |
| IT | Italy | 131.00 | 143.75 | 590.62 | 5.29 |
| JP | Japan | 43.65 | 38.43 | 159.31 | 2.45 |
| KR | Korea, Republic of | 89.08 | 79.45 | 708.64 | 14.05 |
| LT | Lithuania | 160.77 | 165.71 | 848.58 | 5.58 |
| LV | Latvia | 207.60 | 230.37 | 1161.00 | 4.50 |
| MK | Macedonia | 410.06 | 115.13 | 563.78 | 269.95 |
| MT | Malta | 125.91 | 122.81 | 466.10 | 4.50 |
| MX | Mexico | 118.05 | 70.50 | 587.88 | 28.51 |
| MY | Malaysia | 81.39 | 57.63 | 505.40 | 11.96 |
| NL | Netherlands | 33.54 | 34.15 | 135.45 | 1.13 |
| NO | Norway | 14.47 | 13.00 | 63.63 | 1.17 |
| NZ | New Zealand | 39.94 | 36.73 | 247.72 | 1.92 |
| PE | Peru | 170.78 | 95.58 | 604.80 | 59.60 |
| PH | Philippines | 223.30 | 126.97 | 865.62 | 81.77 |
| PK | Pakistan | 751.63 | 600.91 | 3509.02 | 155.00 |
| PL | Poland | 93.39 | 82.10 | 418.56 | 7.53 |
| PT | Portugal | 255.89 | 355.17 | 1656.67 | 3.86 |
| RO | Romania | 204.56 | 153.96 | 771.20 | 16.76 |
| RS | Serbia | 157.49 | 0.13 | 157.50 | 155.00 |
| RU | Russian Federation | 176.64 | 140.23 | 1105.94 | 36.89 |
| SE | Sweden | 24.86 | 28.08 | 158.44 | 1.31 |
| SI | Slovenia | 110.98 | 130.67 | 503.25 | 3.00 |
| SK | Slovakia | 72.64 | 73.08 | 322.03 | 5.48 |
| TH | Thailand | 96.29 | 60.26 | 510.50 | 23.68 |
| TR | Turkey | 234.31 | 96.94 | 820.55 | 110.37 |
| UA | Ukraine | 677.66 | 714.12 | 5543.31 | 124.80 |
| US | United States | 19.08 | 17.89 | 100.25 | 0.90 |
| VE | Venezuela | 791.90 | 533.49 | 3233.98 | 116.72 |
| ZA | South Africa | 139.79 | 87.80 | 658.08 | 24.44 |
| | | mean | | max | min |
| | | 272.84 | | 23188.54 | 0.9 |

**Table A2.**
**Positive/negative events upgrades/downgrades by country**

| Country | ISO2 | Total | Up/Downgrades | Negative Events | Downgrades | Positive Events | Upgrades |
|---|---|---|---|---|---|---|---|
| Argentina | AR | 16 | 11 | 7 | 3 | 9 | 8 |
| Austria | AT | 2 | 1 | 2 | 1 | 0 | 0 |
| Australia | AU | 1 | 1 | 0 | 0 | 1 | 1 |
| Belgium | BE | 11 | 4 | 9 | 3 | 2 | 1 |
| Bulgaria | BG | 16 | 7 | 7 | 2 | 9 | 5 |
| Brazil | BR | 20 | 13 | 0 | 0 | 20 | 13 |
| Canada | CA | 0 | 0 | 0 | 0 | 0 | 0 |
| Switzerland | CH | 0 | 0 | 0 | 0 | 0 | 0 |
| Chile | CL | 12 | 6 | 2 | 0 | 10 | 6 |
| China | CN | 12 | 8 | 0 | 0 | 12 | 8 |
| Cyprus | CY | 30 | 20 | 23 | 16 | 7 | 4 |
| Czech Republic | CZ | 7 | 4 | 1 | 0 | 6 | 4 |
| Germany | DE | 2 | 0 | 1 | 0 | 1 | 0 |
| Denmark | DK | 0 | 0 | 0 | 0 | 0 | 0 |
| Estonia | EE | 23 | 7 | 11 | 3 | 12 | 4 |
| Spain | ES | 22 | 14 | 21 | 14 | 1 | 0 |
| Finland | FI | 2 | 0 | 1 | 0 | 1 | 0 |
| France | FR | 3 | 2 | 3 | 2 | 0 | 0 |
| United Kingdom | GB | 2 | 0 | 1 | 0 | 1 | 0 |
| Greece | GR | 37 | 26 | 34 | 24 | 3 | 2 |
| Croatia | HR | 5 | 1 | 5 | 1 | 0 | 0 |
| Hungary | HU | 29 | 13 | 24 | 13 | 5 | 0 |
| Indonesia | ID | 20 | 12 | 0 | 0 | 20 | 12 |
| Ireland | IE | 24 | 15 | 21 | 15 | 3 | 0 |
| Israel | IL | 7 | 4 | 1 | 0 | 6 | 4 |
| India | IN | 12 | 3 | 5 | 0 | 7 | 3 |
| Iceland | IS | 31 | 15 | 22 | 13 | 9 | 2 |
| Italy | IT | 13 | 9 | 13 | 9 | 0 | 0 |
| Japan | JP | 14 | 7 | 10 | 5 | 4 | 2 |
| Korea, Republic of | KR | 9 | 5 | 1 | 0 | 8 | 5 |
| Lithuania | LT | 24 | 11 | 17 | 8 | 7 | 3 |
| Latvia | LV | 27 | 15 | 18 | 12 | 9 | 3 |
| Macedonia | MK | 7 | 3 | 3 | 1 | 4 | 2 |
| Malta | MT | 9 | 6 | 5 | 3 | 4 | 3 |
| Mexico | MX | 10 | 7 | 4 | 2 | 6 | 5 |
| Malaysia | MY | 2 | 0 | 1 | 0 | 1 | 0 |
| Netherlands | NL | 2 | 0 | 1 | 0 | 1 | 0 |
| Norway | NO | 0 | 0 | 0 | 0 | 0 | 0 |
| New Zealand | NZ | 5 | 2 | 4 | 2 | 1 | 0 |
| Peru | PE | 16 | 10 | 0 | 0 | 16 | 10 |
| Philippines | PH | 17 | 7 | 5 | 2 | 12 | 5 |
| Pakistan | PK | 18 | 9 | 10 | 6 | 8 | 3 |
| Poland | PL | 5 | 2 | 2 | 0 | 3 | 2 |
| Portugal | PT | 24 | 16 | 23 | 16 | 1 | 0 |
| Romania | RO | 15 | 7 | 6 | 2 | 9 | 5 |
| Russian Federation | RU | 18 | 9 | 6 | 2 | 12 | 7 |
| Sweden | SE | 0 | 0 | 0 | 0 | 0 | 0 |
| Slovenia | SI | 18 | 13 | 14 | 10 | 4 | 3 |
| Slovakia | SK | 14 | 8 | 3 | 2 | 11 | 6 |
| Thailand | TH | 11 | 2 | 6 | 1 | 5 | 1 |
| Turkey | TR | 16 | 6 | 4 | 0 | 12 | 6 |
| Ukraine | UA | 29 | 14 | 18 | 8 | 11 | 6 |
| United States | US | 4 | 1 | 3 | 1 | 1 | 0 |
| Venezuela, Bolivarian Republic of | VE | 14 | 7 | 8 | 3 | 6 | 4 |
| South Africa | ZA | 14 | 7 | 6 | 2 | 8 | 5 |
| Total | | 701 | 370 | 392 | 207 | 309 | 163 |

Positive events and negative events are defined as follows: Positive (negative) events are all positive (negative) signs in Table 1(b) . A positive event is an upgrade of a credit rating or an increase in an outlook/watch scale; a negative event is a downgrade of a credit rating or a decrease in an outlook/watch scale. See Table 1(b) for details.

**Table A3.**
**The effects of credit rating changes (Panel A) and outlook/watch status changes (Panel B) on CDS in the event window $[0, +1]$ for the whole sample, conditioning on the prior outlook/watch status, using GDP PPP-weighted average CDS spreads for the market portfolio**

Panel A: Credit Rating Changes

| Credit Rating Change | Prior Status | Number of Events | CAR Mean | CAR Median | SCAR t-stat. | SCAR p-value | Median Spread Change | % Positive Spread Change | % Negative Spread Change | p-value of Spread Change |
|---|---|---|---|---|---|---|---|---|---|---|
| up | Stable | 46 | -2.431 | -1.469 | -4.027 | 0.000 | -2.472 | 30.435 | 67.391 | 0.013 |
| up | Pos Outlook | 63 | -1.572 | -0.810 | -2.237 | 0.014 | -0.604 | 31.746 | 61.905 | 0.039 |
| up | Pos Watch | 29 | 0.566 | -0.942 | 0.487 | 0.685 | -0.511 | 37.931 | 62.069 | 0.133 |
| up | All | 143 | -1.619 | -1.112 | -2.196 | 0.015 | -1.062 | 31.469 | 64.336 | 0.000 |
| down | Neg Watch | 52 | 1.394 | 0.683 | 2.124 | 0.019 | 5.129 | 67.308 | 32.692 | 0.009 |
| down | Neg Outlook | 73 | 4.075 | 1.068 | 3.690 | 0.000 | 3.775 | 68.493 | 31.507 | 0.001 |
| down | Stable | 13 | 3.345 | 2.616 | 2.167 | 0.026 | 3.442 | 69.231 | 30.769 | 0.134 |
| down | All | 138 | 2.996 | 1.039 | 4.640 | 0.000 | 4.151 | 68.116 | 31.884 | 0.000 |

Panel B: Outlook/Watch Changes

| Current Outlook Watch | Prior Status | Number of Events | CAR Mean | CAR Median | SCAR t-stat. | SCAR p-value | Median Spread Change | % Positive Spread Change | % Negative Spread Change | p-value of Spread Change |
|---|---|---|---|---|---|---|---|---|---|---|
| Neg Watch | Neg Outlook | 31 | 4.816 | 1.676 | 2.702 | 0.006 | 8.368 | 64.516 | 35.484 | 0.075 |
| Neg Watch | Stable/Developing | 32 | 4.753 | 1.379 | 2.211 | 0.017 | 0.878 | 56.250 | 43.750 | 0.298 |
| Neg Watch | All | 63 | 4.784 | 1.676 | 3.173 | 0.001 | 3.142 | 60.317 | 39.683 | 0.065 |
| Neg Outlook | Neg Watch | 41 | 1.501 | 1.013 | 1.342 | 0.906 | 5.025 | 68.293 | 31.707 | 0.986 |
| Neg Outlook | Stable/Developing | 95 | 4.322 | 2.028 | 3.779 | 0.000 | 4.908 | 78.947 | 17.895 | 0.000 |
| Pos Watch | Pos Outlook | 19 | 6.230 | 0.425 | 0.966 | 0.827 | 0.012 | 52.632 | 42.105 | 0.677 |
| Pos Watch | Stable/Developing | 7 | 0.187 | 0.554 | 0.036 | 0.514 | -1.433 | 42.857 | 57.143 | 0.500 |
| Pos Watch | All | 26 | 4.603 | 0.489 | 0.967 | 0.829 | 0.006 | 50.000 | 46.154 | 0.578 |
| Pos Outlook | Pos Watch | 6 | 1.485 | -0.117 | 0.869 | 0.212 | 0.049 | 50.000 | 50.000 | 0.500 |
| Pos Outlook | Stable/Developing | 94 | -0.810 | -0.867 | -2.640 | 0.005 | -0.582 | 35.106 | 61.702 | 0.015 |

**Table A4.**
**Ratings by the 3 Major Credit Rating Agencies to Numerical Scales**

| Fitch Ratings | S&P Ratings | Moody's Ratings | Numerical Scale |
|---|---|---|---|
| AAA | AAA | Aaa | 25 |
| AA+ | AA+ | Aa1 | 24 |
| AA | AA | Aa2 | 23 |
| AA- | AA- | Aa3 | 22 |
| A+ | A+ | A1 | 21 |
| A | A | A2 | 20 |
| A- | A- | A3 | 19 |
| BBB+ | BBB+ | Baa1 | 18 |
| BBB | BBB | Baa2 | 17 |
| BBB- | BBB- | Baa3 | 16 |
| BB+ | BB+ | Ba1 | 15 |
| BB | BB | Ba2 | 14 |
| BB- | BB- | Ba3 | 13 |
| B+ | B+ | B1 | 12 |
| B | B | B2 | 11 |
| B- | B- | B3 | 10 |
| CCC+ | CCC+ | Caa1 | 9 |
| CCC | CCC | Caa2 | 8 |
| CCC- | CCC- | Caa3 | 7 |
| CC | CC | Ca | 6 |
| C | - | C | 5 |
| RD | R | | 4 |
| DDD | SD | | 3 |
| DD | D | | 2 |
| D | | | 1 |

**Table A5.**
**The effects of credit rating changes (Panel A) and outlook/watch status changes (Panel B) on CDS in the event window** $[0, +1]$ **for the whole sample period, 2005-2012, conditioning on the prior credit rating scale**

Panel A: Credit Rating Changes

| Prior Rating | Credit Rating Change | Number of Events | CAR Mean | CAR Median | SCAR t-stat. | SCAR p-value | Median Spread Change | % Positive Spread Change | % Negative Spread Change | p-value of Spread Change |
|---|---|---|---|---|---|---|---|---|---|---|
| 18+ | up | 44 | 0.003 | -0.590 | 0.391 | 0.651 | -0.331 | 35.227 | 64.773 | 0.035 |
| 18+ | down | 87 | 3.437 | 1.233 | 3.987 | 0.000 | 3.442 | 67.816 | 32.184 | 0.001 |
| 16-17 | up | 22 | -1.095 | -0.803 | -0.616 | 0.272 | -1.666 | 31.818 | 68.182 | 0.068 |
| 16-17 | down | 13 | 3.231 | 4.402 | 1.800 | 0.049 | 30.413 | 76.923 | 23.077 | 0.048 |
| 14-15 | up | 22 | -2.296 | -1.704 | -2.409 | 0.013 | -2.199 | 36.364 | 63.636 | 0.143 |
| 14-15 | down | 7 | 0.786 | -0.082 | 0.577 | 0.292 | -3.192 | 42.857 | 57.143 | 0.500 |
| 6-13 | up | 31 | -2.049 | -1.789 | -1.602 | 0.060 | -6.613 | 29.032 | 70.968 | 0.016 |
| 6-13 | down | 18 | 3.807 | 1.469 | 1.532 | 0.072 | 15.426 | 66.667 | 33.333 | 0.119 |

Panel B: Outlook/Watch Changes

| Prior Rating | Current Outlook Watch | Prior Outlook Watch | Number of Events | CAR Mean | CAR Median | SCAR t-stat. | SCAR p-value | Median Spread Change | % Positive Spread Change | % Negative Spread Change | p-value of Spread Change |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 18+ | Neg Watch | All | 44 | -0.009 | -1.023 | 0.372 | 0.356 | 0.6 | 54.545 | 45.455 | 0.326 |
| 18+ | Neg Outlook | Stable or Developing | 59 | 4.336 | 2.033 | 2.42 | 0.009*** | 3.546 | 83.051 | 13.559 | 0*** |
| 18+ | Pos Outlook | Stable or Developing | 41 | -0.658 | -0.888 | -1.4 | 0.085* | 0 | 43.902 | 48.78 | 0.5 |
| 18+ | Pos Watch | All | 12 | 9.296 | -0.368 | 0.932 | 0.814 | 0.081 | 66.667 | 25 | 0.926 |
| 16-17 | Neg Watch | All | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 16-17 | Neg Outlook | Stable or Developing | 12 | 3.455 | 1.932 | 2.037 | 0.033** | 6.702 | 75 | 25 | 0.074* |
| 16-17 | Pos Outlook | Stable or Developing | 17 | -0.502 | -1.356 | -1.044 | 0.156 | -0.409 | 47.059 | 52.941 | 0.5 |
| 16-17 | Pos Watch | All | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 14-15 | Neg Watch | All | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 14-15 | Neg Outlook | Stable or Developing | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 14-15 | Pos Outlook | Stable or Developing | 12 | -0.923 | -0.834 | -2.451 | 0.016** | -3.192 | 16.667 | 83.333 | 0.022** |
| 14-15 | Pos Watch | All | 5 | -0.838 | -1.829 | -0.684 | 0.266 | -0.578 | 40 | 60 | 0.5 |
| 6-13 | Neg Watch | All | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 6-13 | Neg Outlook | Stable or Developing | 16 | 3.422 | 1.731 | 2.795 | 0.007*** | 18.712 | 75 | 18.75 | 0.04** |
| 6-13 | Pos Outlook | Stable or Developing | 24 | -0.83 | 0.234 | -0.685 | 0.25 | -5.303 | 20.833 | 79.167 | 0.004*** |
| 6-13 | Pos Watch | All | 7 | 1.059 | 0.04 | 1.197 | 0.862 | -1.302 | 42.857 | 57.143 | 0.5 |

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