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Do Credit Rating Agencies Provide Valuable Information in Market Evaluation of Sovereign Default Risk?

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July 2016

Abstract

This paper accesses the information value of the three largest credit rating agencies' (CRA) announcements of sovereign credit rating changes, "outlook" changes and "watch" changes on market pricing of country default risk as embedded in credit default swap (CDS) spreads. A dynamic panel model is estimated with 56 advanced and emerging-market countries and monthly data over January 2004 through August 2012. This approach allows us to control for macroeconomic news in identifying the information value of the CRA announcements. We find marked asymmetries in market impact from watch and outlook designations; credit upgrades and downgrades; and across different CRA announcements. Credit rating downgrades and negative watch announcements have a large impact on CDS spreads even when controlling for macroeconomic and financial factors. Surprisingly, the effect of credit downgrades is substantially magnified if countries are placed on negative watch status prior to the credit rating change—presumably signaling rapidly deteriorating credit worthiness. Credit upgrades and positive watch/ outlook announcements, by contrast, have little impact on market prices. S&P and Fitch dominate Moody's in terms of the impact of their credit announcements on CDS spreads. Negative CRA announcements have a large and persistent effect on the market perception of sovereign default risk, constituting important "news" to financial markets.

Keywords: CDS Spreads, Credit Ratings, Sovereign Debt
JEL Codes: F30, G01, G24, H63

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1. Introduction and Overview

In theory, credit rating agencies provide valuable information to investors about the riskiness of sovereign bonds. This information provision may work through several channels[1]. CRAs may add valuable information to markets in a world of asymmetric information, where payoffs depend on noisy ex post monitors of information quality[2]. CRAs also provide certification services in many countries. In particular, ratings are often used to classify securities as either investment or non-investment grade, which influences institutional demand and market liquidity, and serve as triggers in investment decisions and regulatory oversight[3]. Finally, CRAs may serve as monitors and help coordinate investors' beliefs in situations where the possibility of multiple equilibria is present[4].

Despite these arguments supporting the value of CRAs, critical views of the agencies are commonplace-- especially following the conflicts of interest and mispricing of risk on mortgage backed securities and other derivatives that contributed to the 2007-08 Global Financial Crisis (GFC) and in the context of the European Sovereign Debt Crisis since 2009. 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.

To address some of these concerns, 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. However, the 2015 OCR report documented continued problems with how CRAs function and that in many instances they have failed to follow regulator rules.[5] In the Eurozone, Greece, Ireland and Portugal have been particularly affected by credit downgrades, with one or more CRAs rating their bonds "junk" status at some point since spring 2010. Many officials publically stated that these downgrades accelerated a burgeoning Eurozone sovereign debt crisis and, partly

[1] See Kiff et al. (2013) for a review of the literature.
[2] See Millon and Thakor (1985).
[3] Ratings are also frequently employed to calculate Basel II risk-based capital requirements and serve other regulatory functions.
[4] See Boot, Milbourn and Schmeits (2006).
[5] See Gretchen Morgenson, "Still Missing the Mark on Ratings", New York Times, January 10, 2016; and 2015 Section 15E Examinations Summary Report (published December 2015): "On numerous occasions, two larger NRSROs and one smaller NRSRO failed to adhere to their ratings policies and procedures, methodologies, or criteria, or to properly apply quantitative models." p. 11.

in response to this criticism, several new regulations and rules on CRAs have been put in place in the EU.[6] A EC memo explaining 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)[7]. The 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, that credit rating agencies play such a pervasive role in the pricing of sovereign risk as their critics presume. There is some evidence that CRAs primarily gather publically available information from various sources, incorporating this into a single measure of default risk. 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 on 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 are systematically under- or over-estimate risk assessments, as with collateralized debt obligations prior to the onset of the Global Financial Crisis, then one would expect markets to largely discount credit-rating changes.

To address these issues, we investigate whether announcements from credit rating agencies (CRA), changes in ratings or other announcements on credit worthiness (outlook, watch or review) are systemically incorporated into market pricing of sovereign default risk once macroeconomic factors and existing pricing of default risk are taken into account. We seek to answer whether credit rating agencies simply follow existing market-pricing of sovereign risk, and are simply reacting to information that is already publically available, in assigning credit

[6] These are commonly referred to as CRA I Regulation and CRA II regulation. New rules were also adopted in early 2013: http://ec.europa.eu/internal_market/securities/agencies/index_en.htm.

[7] As pointed out in Alsakka and ap Gwilym (2013), many other G-20 countries have introduced or are in the process of introducing new regulatory oversight for CRAs and the Basel Committee of the Bank for International Settlements reviewed the role of external ratings in the capital adequacy framework, mainly to incorporate the IOSCO Code into the committee's eligibility criteria.

ratings (or outlook or watch assignments), with the implication that actual announcements have little or no effect on prices.

Specifically, we address several main questions in our study. First, do credit rating agencies have superior information on current or likely future (and economically important) fundamentals, or provide value to market participants by coordinating disparate market views on credit worthiness, such that rating changes have substantial impacts on risk pricing? Second, are supplementary announcements by credit rating agencies, in particular "watch/review" or "outlook" designations, incorporated into market pricing of default risk? These announcements often precede credit rating changes, but not always, and may potentially have an even greater impact on market pricing that rating changes. Third, are market responses to credit rating change announcements affected by whether countries are already on watch or outlook status? To the extent that either "bad" or "good" news about sovereign creditworthiness is already incorporated into risk pricing with watch/outlook announcements, we would expect the actual price change when credit ratings are changed to be muted. Fourth, is there substantially asymmetry between the effects of credit-rating downgrades and upgrades, or other positive and negative announcements, on CDS spreads? Fifth, is there a difference between the credit rating agencies in terms of the effects of their announcements on CDS spreads?

To address our research questions, we consider CRA announcements of rating changes on sovereign debt, as well as "watch" (or "review") and "outlook" announcements. The latter provide "warning" signs that should lead information coming from credit rating changes even if CRAs have superior information or analytical evaluation tools. The information content of these warning signs—watch and outlook changes—and whether countries are on outlook/watch status prior to a rating change, and how long they have been in this status, are important elements in our analysis. Since we are concerned with evaluating the market impact of potentially "superior" CRA information regarding default risk, we control for macro fundamentals in market pricing and therefore employ monthly data in our analysis along with the credit rating agency announcements. We employ a panel framework with monthly data, allowing us to explore both macroeconomic and dynamic effects and consider longer-term adjustments. (A generic downside of event analyses, typically employed in this literature, is that they are not informative regarding the longer term adjustments induced by rating changes.) To assess market assessments of sovereign default risk, we employ credit default swaps (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 56 advanced and emerging market economies, using from January 2004 to August 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. Monthly data allows us to control for country-specific and global economic factors, in the context of a dynamic panel model with fixed effects.

We start with a brief overview of the background literature (section 2) and discussion of the credit rating agency announcements with some examples (section 3). We then present hypotheses (section 4) and our basic results (section 5). We conclude in section 6.

2. Literature Review

As discussed in the introduction, a vigorous debate about the social value of credit rating agencies and whether they should be monitored or regulated is common place in policy and academic circles. A fundamental benevolent interpretation of the rating agencies is as aggregators of costly information, ameliorating the market failure induced by costly information, a market failure highlighted by Grossman and Stiglitz (1980)'s seminal paper. This view, however, is challenged by the need to design the proper incentive structure for the rating agencies, needed in order to deliver efficient outcomes. The design of such an incentive system is a non-trivial challenge, and the welfare effects of the rating agencies remains a contestable issue.[8] Indeed, questions dealing with the economic rationale for the design and the functioning of the rating industry are probably as old as the rating industry itself.

A legalistic critical view of the role credit rating agencies in providing information about bonds is discussed in Partnoy (1999). The "reputational capital" view of credit rating agencies is that the agencies have survived and prospered since the early 1900s based on their ability to accumulate and retain good reputations by providing valuable information about the bonds they rate. Partnoy argues, however, that this view fails to explain, and is inconsistent with, estimation

[8] Kashyap and Kovrijnykh (2013) analyze the optimal compensation schemes for the rating agencies that differ depending on whether a social planner, the firm, or investors order the ratings. They find that rating errors are larger when the firm orders it than when investors do. However, investors ask for ratings inefficiently often. They also show that competition among credit rating agencies causes them to reduce their fees, put in less effort, thus leading to less accurate ratings.

of credit spreads, the number of credit ratings-driven transactions, and the explosion in use of credit derivatives. In place of the reputational capital view, he offers a "regulatory license" view of rating agencies as generating value, not by providing valuable information, but by enabling issuers and investors to satisfy certain regulatory requirements.

The informational value of credit rating agencies, as seen by market participants, may be partly be measured by the response of 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 news does affect financial markets, thereby providing prima facie evidence that CRAs possess private information or are able to process this information in a way not previously priced in the market.

Most studies investigating credit rating agencies and financial asset prices are event studies using daily data. Some of the earliest papers investigate 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) model the determinants of government bond ratings and ask the question of whether ratings add to public information. 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. While most of the correlation appears to reflect similar interpretations of publicly available information by the rating agencies and by market participants, their event study finds evidence that the rating agencies' opinions independently affect market spreads, especially in the case of non-investment grade sovereigns. In addition, the impact of one agency's announcement is greater if the announcement confirms the other agency's rating or a previous rating announcement.

Several empirical studies find that negative rating events impact own country equity and bond markets, while upgrades have limited or insignificant impact (e.g. Kaminsky and Schmukler, 2002; Brooks et al., 2004; Sy, 2004; Gande and Parsley, 2005; Ferreira and Gama, 2007; Hooper et al., 2008; Hill and Faff, 2010). 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. Alsakka and ap Gwilym (2013) also find that rating agencies' signals affect the own-country exchange rate and identify spillover effects to other countries' exchange rates. They find

that the impact of outlook and watch signals is stronger than the impact of actual rating changes, and that market reactions and spillovers are far stronger during the 2008-09 financial crisis period than the pre-crisis period.

A number of daily event studies have considered CRA announcements and CDS spreads. 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. They argue that the CDS market anticipates all three types of ratings announcements by the credit default swap market.

More recently, 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, using a bootstrap approach (t-statistics are biased given the non-normal distribution), neither of the mean changes in CDS spreads are statistically significant.[9] 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 results 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 significant from random). 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 extend prior to downgrades (83%). It appears that negative rating changes were anticipated more by markets than positive rating changes.

[9] They note that their results on sovereign CDS spreads contradict previous studies on corporate CDS markets (e.g. Norden and Weber, 2004; 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 et al., 2006). However, they do not report these results in the article.

Several studies lower frequency data in order to incorporate macroeconomic data into the determinants of sovereign risk. Focusing on macroeconomic variables, though not CRA announcements, Longstaff et al. (2011) find (using monthly data for a sample of 26 countries) that both "local" (country specific) and global macroeconomic/financial variables are important determinants of sovereign bond CDS spreads. Local stock prices, exchange rates and foreign exchange reserves are the local variables considered in the regressions, together with global financial variables, such as various measures of U.S. equity and fixed income markets, and risk factors. Local equity prices (U.S. equity prices) are the most important country-specific (global financial) variable systemically explaining CDS spread changes. Aizenman et al. (2013a) also considers macroeconomic variables but not CRA announcements, focusing in particular on "fiscal space" (fiscal sustainability), as determinants of sovereign CDS spreads in Europe. They find that fiscal space and macroeconomic variables are highly significant in explaining CDS spreads, but that that pricing norms shifted markedly with the onset of the European debt crisis, especially in the GIIPS countries.

Also focusing on the European sovereign debt crisis, Beirne and Fratzcher (2013) analyze the drivers of sovereign risk for 31 advanced and emerging economies. It shows that a deterioration in countries' fundamentals and fundamentals contagion – a sharp rise in the sensitivity of financial markets to fundamentals – are the main explanations for the rise in sovereign yield spreads and CDS spreads during the crisis, not only for euro area countries but globally. By contrast, regional spillovers and contagion have been less important, including for euro area countries. The paper also finds evidence for herding contagion – sharp, simultaneous increases in sovereign yields across countries – but this contagion has been concentrated in time and among a few markets. Finally, empirical models with economic fundamentals generally do a poor job in explaining sovereign risk in the pre-crisis period for European economies, suggesting that the market pricing of sovereign risk may not have been fully reflecting fundamentals prior to the crisis.

By contrast with other studies, Aizenman et al. (2013b) investigate the extent to credit rating changes as well as macroeconomic and financial factors account for CDS pricing in the Europe. They also investigate the time varying effects of a given credit rating change. They find that changes of ratings are informative, economically important and highly statistically significant in panel models even after controlling for a host of domestic and global fundamental

factors and investigating various functional forms, time and country groupings and dynamic structures. They also find that the association between credit rating changes and spreads shifted markedly between the pre-crisis and crisis periods.

3. Credit Rating Agencies and Announcements

3.1. Credit Rating Agencies: Rating Changes, Watch/Review and Outlooks

Table 1 presents the different rating designations given by the three major credit rating agencies—S&P, Moody's and Fitch. We show the alpha-numeric scales provided by each agency, their relationship to each other, and our numerical coding for each rating grade. Fitch and S&P have virtually identical rating designations, except for the lowest credits associated with default, and Moody's uses somewhat different coding. The ratings vary from 25 (highest rating of AAA for Fitch and S&P, Aaa for Moody's—where a country has "extremely strong capacity to meet financial commitments") to "normal" lows of 5 (C ratings for Fitch and Moody's) and 6 (CC for S&P). There are lower ratings (lowest is 2 in our sample) but these bonds are in default status. The investment grade distinction is ratings of BBB- or higher for Fitch and S&P, and Baa3 or higher for Moody's (rating level 16).

In their description of the credit ratings, Standard and Poor's notes that likelihood of default is the single most important factor in their 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 (Standard and Poor's, 2013). In terms of sovereign ratings, Standard and Poor's states that five factors form the foundation of their 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 (Standard and Poor's, 2012).

Table 2a shows the average rating levels for long-term foreign-currency denominated sovereign bonds for the 56 countries in the sample over the full 2004-12 sample period. The table shows large variations across countries in the average levels, but only modest differences in average ratings across the rating agencies for any given country. The average ratings range from

a high of 25 (15 countries) to lows of 5.4-9.8 for Argentina and 10.7-10.8 for Pakistan. Of course, the variation across ratings is much greater than country average values suggest, ranging from the high of 25 to lows of 2 (default) assigned by S&P for Greece (February 27, 2012), Argentina (February 12, 2002), and Venezuela (January 18, 2005). Moreover the number of credit rating changes varied greatly across countries during our sample period. This is shown in Table 2b. The largest number of downgrades (83) and upgrades (83) were announced by S&P. The smallest number of downgrades (59) and upgrades (52) was recorded by Moody's. On a country level, the largest number of downgrade actions were for Greece (S&P and Fitch announced 9 downgrades, Moody's announced 7 downgrades). The largest number of upgrade actions varied slightly by rating agency: Moody's had 6 upgrades for Brazil (5 for Indonesia), S&P had 5 upgrades for Brazil and China, and Fitch had 5 upgrades for Brazil.

Figure 1 shows the density of the ratings and the kernel density estimation. Ratings below 10 are uncommon, with the "normal range" about 15-25. Not surprisingly, the largest number of ratings are at the highest grade (25).

In addition to credit ratings, the agencies place "credit outlook" and "credit watch" (or "reviews" for Moody's) designations on sovereign bonds. Ratings are generally placed on credit watch when the agency determines that a development has occurred such that additional information is judged necessary to evaluate the current rating. The "positive" ("negative") watch designation, or "reviews" by Moody's, means that a rating may be raised (lowered), and "developing" means that a rating may be raised, lowered, or affirmed. Watch or reviews designations signal a substantial likelihood of rating action (50% likelihood of a rating action is noted by S&P) within a couple of months. The short-term time frame is identified as within 90 days by S&P and 30-90 days according to Moody's. Fitch simply notes a review takes place within "relatively short period." Moody's may also give a sovereign bond a "developing" watch status, indicating some instability with conflicting positive and negative development. A watch/review designation is not necessarily followed by a rating change. In fact, Moody's may issue notice of "rating confirmed" for a rating under review but where no rating action is taken. Fitch sometimes designates a rating "affirmed" when a review results in no change in the rating, as contrasted with the public "affirmation" designation of Moody's to signal no change in the rating when a bond is *not* under review.

The outlook designation is similar to watch, except that it is used more frequently and has a longer time frame. S&P lists the timeframe for outlook at six months to two years, Fitch lists one to two years, and Moody's simply notes the medium-term. The outlook designation may be positive (rating may be raised), negative (rating may be lowered), "stable" (rating likely to remain unchanged) or "developing" (rating may be raised or lowered). Fitch also has an outlook designation of "evolving", indicating strong but conflicting positive and negative developments that could affect the rating of the bond. Again, the outlook is not necessarily a precursor of a rating change, nor of a future watch or review action.

Table 2c shows the number of outlook and watch announcements during the sample period. 675 outlook and watch designations were announced during the sample period, most by S&P (247) and least by Fitch (197). This list of countries with an especially large number of outlook and watch announcements, representing countries with substantial turbulence in sovereign debt markets, is not surprising: Brazil, Bulgaria, Cyprus, Estonia, Iceland, Indonesia, Pakistan, Peru, Turkey and Ukraine. It is also evident that the number of outlook announcements (448) is almost twice as large as the number of watch announcements (226).

3.2. Example of Ireland

To illustrate the dynamics of the credit rating process, Figure 2 shows how credit rating agencies evaluated Ireland over 2009-12. All agencies had Ireland at the high credit rating (25) at the beginning 2009 and then started a process of negative actions-- negative outlooks, negative watches and credit downgraded—interspaced with a few favorable signals (e.g. move from negative watch to negative outlook, or negative outlook/watch to stable). S&P was first to act, placing Ireland on negative outlook in early January 2009, followed by Moody's (also negative outlook) at the end of the month. In March, Fitch followed with a negative watch assignment—more "immediate" short-run likelihood of a credit downgrade than a negative outlook. The first credit downgrade action occurred at the end of March 2009, again led by S&P. This was followed by single rating downgrade action by Fitch in early April, and a negative credit watch assignment by Moody's in mid-April. The next rating downgrade action, in early June, was also led by S&P and followed by Moody's in early July. Fitch took a two-step credit downgrade action in early November. The years 2010-11 followed similar patterns, while two agencies raised Ireland's negative watch status to negative outlook in January 2012.

3.3. Credit Ratings and Outlook/Watch Announcements

The credit ratings and other announcements are taken from Standard and Poor's, Moody's and Fitch. A common numeric scale is assigned to each credit rating level, shown in Table 1. Our focus is on the interaction of watch/outlook designations with credit rating changes. To this end, we consider some basic statistics on the frequency of various announcements by CRAs and the timing of these changes with outlook/watch status changes.

Tables 3 shows the number of credit rating changes (upgrades, Table 3a; and downgrades, Table 3b) by each of the three major CRAs and how many were preceded (during same month, but in days prior to the rating change, or during the preceding month) by either watch or outlook designations at the time of rating change. The table also presents mean and median measures of the duration that the country had been on outlook or watch status at the time of the credit rating change. Table 4 (Table 5) is analogous to Table 3 but focuses on outlook (watch/review) designations.

As noted above, there were 204 credit downgrades and 203 upgrades by the three credit rating agencies during our sample period. Of the downgrades, 193 (95%) were preceded by either a negative outlook or watch/review designation. The mean (medium) duration of being on a negative outlook or watch was 5.78 (4.33) months prior to the downgrade. Most of the agencies signaled rating changes prior to the rating downgrades, with outlook/watch designations ranging from 92% (S&P) to 97% (Fitch and Moody's). Median durations on average were also quite similar across the rating agencies (4-5 months)

Of the credit rating upgrades, 135 (67%) were preceded by either a positive outlook or watch/review designation. The mean (medium) duration of being on negative outlook or watch was 12.21 (10.33) months prior to the downgrade. There is more divergence across rating agencies in signaling upgrades than downgrades prior to rating changes. In particular, Fitch (S&P) placed countries on positive watch/outlook status only 56% of the time prior to rating upgrades, compared to 85% for Moody's. Moreover, when countries were placed on a positive watch/outlook status prior to upgrades, the duration of this status ranged from a median of 8 months to Fitch to 12 months for Moody's.

Evaluating outlook and watch designations separately provides further insights into explaining differences across negative and positive watch/outlook status and differences across credit rating agencies. First, credit rating agencies mainly lead credit downgrades by outlook designations (169 outlook assignments preceded the 204 credit downgrades, 83%; shown in Table 4a) rather than watch/review assignments (81 of 204 downgrades, 40%; shown in Table 5a). Second, there is a degree of uniformity across agencies in the percentage of downgrades preceded by negative outlook designations, within the narrow 80-85% range, but substantial variation in watch assignments prior to downgrades, with the later ranging from 31% (Fitch) to Moody's (56%). Third, median values across agencies of the duration on negative outlook (4.5-8 months) and negative watch (1-3 months) shows that all agencies use negative watch with a fairly short duration compared to negative outlook. S&P has the longest median watch duration (8 months) and Moody's has the longest median outlook duration 93 months).

Upgrades are also frequently "signaled" by positive outlook designations (52-64% across agencies), but watch designations vary across agencies. S&P does not place sovereign bonds on watch or review status and Fitch uses positive watch designations prior to upgrades infrequently--only 6% of their upgrades were preceded by a positive watch designation. 50% of Moody's upgrades, by contrast, were preceded by positive "review" designations. A substantial divergence across agencies is seen in durations of outlook status prior to upgrades, with the median duration ranging from 6 months for Fitch and 18.5 months for Moody's.

Many credit rating changes are *not* preceded by outlook and watch changes. And the converse is also evident—many negative/positive outlook and watch changes are not followed by credit rating changes ("false positives"). Table 6 presents these statistics for the three CRAs. The table shows the number of outlook or watch changes during a specific window that do not coincide with a credit rating change during that period of time. For example, Table 6a shows that S&P had 78 outlook/watch changes in a given month that were not coincident with a outlook/watch change in the same month. S&P had 143 cases where a credit rating change in a given month was not preceded by a outlook or watch announcement in the previous month (t-1). S&P had 150 cases where a credit rating change in a given month was not preceded by an outlook/watch announcement two months prior (t-2), and so on.

Table 7 takes a somewhat different angle by asking the instances of outlook or watch changes that were *not* followed by a credit rating change. For example, the table shows that S&P had 166 outlook/watch changes in a given month that was not coincident with a credit rating change. S&P had 228 (235) outlook/watch announcements at time t-1 (t-2) that were not followed by a credit rating change at time t. The upshot of the table is that outlook and watch changes are frequently *not* followed by credit rating changes.

4. Hypotheses and Methodology

4.1. Hypotheses

A major objective of this study is to investigate the market reaction in the sovereign bond CDS market to announcements by CRAs—credit rating changes (decreases and increases) and the placement of countries on "watch" and "outlook" status (negative and positive). The question we seek to answer is whether CRA "news" is incorporated into sovereign default risk pricing. In addressing this issue, we consider news announcements independently and also, in the case of credit rating changes, conditional upon whether the country was on watch or outlook status immediately prior to the credit market upgrade or downgrade. In principal, we would expect credit rating downgrades (upgrades) to result in a smaller rise (fall) in CDS spreads if the country was already in a negative (positive) watch/outlook status.

Motivated by our literature review, we consider five hypotheses to be tested:

H1: CRA announcements of positive (negative) credit rating changes, watch/review designations or outlook designations lower (raise) CDS spreads.

H2: CRA announcements of credit rating changes (watch/review designations) have larger impact, in absolute value, than watch/review designations (outlook designations).

H3: CRA announcements of negative credit rating changes, watch/review designations or outlook designations have larger absolute impacts on CDS spreads than corresponding positive announcements.

H4: CRA announcements of credit rating downgrades or upgrades have a smaller impact on CDS spreads when preceded by a negative watch/review or outlook designation compared to corresponding announcements not preceded by these designations.

4.2. Methodology

We estimate dynamic panel regressions for 56 advanced and emerging-market countries over January 2004-August 2012 using monthly data. The basic equation is specified as:

$$(1)\quad \Delta CDS_{it} = \beta_0 + \beta_1 \Delta CDS_{it-1} + \beta_2 \Delta Credit\ Rating_{it} + \beta_3 Watch_{it}^{N} + \beta_4 Watch_{it}^{P} + \beta_5 Outlook_{it}^{N} + \beta_6 Outlook_{it}^{P} + \beta_7 (Z_{it}) + \varepsilon_{it}$$

where ΔCDS_{it} is the change in the credit default swap spread (in basis points), $\Delta Credit\ Rating_{it}$ is the announcement of the change in the credit rating scale variable (positive or negative), $\Delta Watch_{it}$ is the announcement of the watch or review designation (positive or negative), $\Delta Outlook_{it}$ is the announcement of the outlook designation (positive or negative), Z_{it} is a vector of country specific and global control variables, and μ_i indicates country fixed effects. In this equation, *H1* (hypothesis 1) suggests that $\beta_2 < 0$, $\beta_3 > 0$, $\beta_4 < 0$, $\beta_5 > 0$, and $\beta_6 < 0$. *H2* suggests that $|\beta_2| > |\beta_3|$, $|\beta_2| > |\beta_4|$, $|\beta_2| > |\beta_5|$, $|\beta_2| > |\beta_6|$; $|\beta_3| > |\beta_5|$, $|\beta_4| > |\beta_6|$. *H3* suggests that credit downgrades (negative watch/outlooks) have larger absolute impacts than credit upgrades (positive watch/outlooks): $|\beta_2^N| > |\beta_2^P|$ $|\beta_3| > |\beta_4|$ and $|\beta_5| > |\beta_6|$.

In addition, we consider the effect of credit rating changes conditional upon the country being on the *watch list* prior to the announcement:

$$(2)\quad \Delta CDS_{it} = \beta_0 + \beta_1 \Delta CDS_{it-1} + \beta_2 \Delta Credit\ Rating_{it} + \beta_3 \Delta Credit\ Rating_{it} * Watch_{it-1}^{N} + \beta_4 \Delta Credit\ Rating_{it} * Watch_{it-1}^{P} + \beta_5 (Z_{it}) + \varepsilon_{it}$$

H4 suggests that $\beta_2 < 0$, $\beta_3 > 0$, *and* $\beta_4 > 0$.

Finally, we consider the effect of credit rating changes conditional upon the country being on the *outlook list* prior to the announcement:

$$(3)\quad \Delta CDS_{it} = \beta_0 + \beta_1 \Delta CDS_{it-1} + \beta_2 \Delta Credit\ Rating_{it} + \beta_3 \Delta Credit\ Rating_{it} * Outlook_{it-1}^{N} + \beta_4 \Delta Credit\ Rating_{it} * Outlook_{it-1}^{P} + \beta_5 (Z_{it}) + \varepsilon_{it}$$

H5 suggests that $\beta_2 < 0,\ \beta_3 > 0,\ and\ \ \beta_4 > 0$.

We estimate these three equations and several additional specifications to test our hypotheses. Given that the error term and lagged dependent variable is correlated by construction, thus introducing biased estimators, we estimate the dynamic model and use the Arellano and Bond (1991) generalized method of moment (GMM) approach. The estimators are obtained from moment equations constructed from further lagged levels of dependent variable and the first-differenced errors. Given the endogeneity problem introduced by the lagged dependent variable, further lags of ΔCDS are used as instruments (the number of lag is determined by $T_i - p - 2$).

The Arellano and Bond (1991) procedure allows the introduction of other endogenous variables. We treat contemporaneous credit rating changes ($\Delta Credit\ Rating_{it}$) endogenously in our dynamic panel setting, and use its first lag as an instrument. Although the flexibility of GMM estimation in dynamic panel model is favorable, this estimator is designed for datasets with a large number of cross-section units (large N) and few time periods (T). The opposite case (large T, small N) implies a large number of instruments, and may generate an over identification problem. In other words, the instrument proliferation may over-fit the endogenous variable, which may introduce bias in estimates and weaken the power of the Hansen test. Roodman (2009) discusses the potential pitfalls of instrument proliferation and suggests limiting the number to certain lags or collapsing the instruments by having separate moments for each lag (instead of a moment for each lag in a time period). We follow these guidelines to satisfy the condition of using the number of instruments equal to or less than the number of countries. Additionally, given the structure of our sample, we use a one-step GMM system in the estimations to lower the bias and improve efficiency. Along with the regression results, we report the diagnostic tests including the second-order autocorrelation, the Hansen J-test statistic for over-identifying restrictions. Furthermore, the dynamic panel model results are largely comparable with static panel model, and the persistency in CDS changes is small, we can also utilize the GMM estimators that incorporate the dynamic adjustment in CDS spreads[10]. We report robust standard errors to control for heteroscedasticity and autocorrelation.

[10] The static model estimates are not reported for brevity but are available upon request. The dynamic panel Arellano-Bond estimates give results that are almost identical to the static least squares estimations.

5. Data and Empirical Results

This section presents our basic empirical results where we test the effect of changes in credit rating changes on changes in CDS spreads, controlling for a host of country-specific and global economic factors.

5.1. Data Descriptive Statistics

We use monthly data in our analysis ranging from January 2004 to August 2012 for the longest sample. Daily data on CDS prices taken from Markit[11] is averaged into monthly values. The data are five-year on-the-run CDS spreads in USD on sovereign bonds. The quoting convention for CDSs 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 equals to $1,000 to insure $10 million of debt.[12] The description, transformation and source for each of the variables used in the empirical analysis is given the data appendix.

Table 8 provides some summary statistics on CDS spreads, credit ratings, stock prices, commodity prices, the VIX and inflation for the countries in our sample, showing country means, medians, standard deviations, minimum and maximum values and the number of observations. The table shows the wide divergence in CDS spreads across countries, with the low end of the spectrum (in terms of mean, median and standard deviations) represented by a group of advanced economies (e.g. Germany, Finland, Canada) and the high end of the spectrum represented by Ukraine and Argentina and, to a much lesser extent, Greece. The most recent country having a "credit event" (partial or full default) in our sample, triggering CDS payments, is Greece.[13]

5.2. Preliminary: Linkage between CDS and Credit Ratings

[11] Markit receives contributed CDS data from market makers from their official books and records. According to the company, Markit "cleans" this data, testing it "…for stale, flat curves, outliers and inconsistent data." If a contribution fails any one of these tests, they discard it. Markit states that they ensure superior data quality for an accurate mark-to-market and market surveillance.

[12] For example, a spread of 197 basis points for a 10-year tenor means that it costs 197,000 USD to insure against 10,000,000 in sovereign debt for 10 years; 1.97% of notional amount needs to be paid each year, so 0.0197 x 10 million = $197,000 per year.

[13] The International Swaps and Derivatives Association (ISDA), which determines whether a credit event has occurred, said the use of "collective action clauses (CACs) to amend the terms of Greek law governed bonds issued by The Hellenic Republic such that the right of all holders of the Affected Bonds to receive payments has been reduced." (Reported in Reuters, March 9, 2012).

Figure 3 shows a scatterplot and trend line for average CDS spreads (level) and average credit ratings (average of S&P, Moody's and Fitch) for 4 groups of countries: full sample, advanced economies, emerging markets and the Eurozone. The latter is included as a special group because of the public attention on CDS trading in the EU, resulting in new EU rules imposed in November 2014.[14] Trading in CDS markets in EU countries has virtually disappeared since that time. Clear negative relationships between CDS levels and credit ratings are indicated in all four groups. CDS spreads are much lower for highly rated sovereign bonds, indicating that market pricing is expecting less likelihood of default. Among the three subgroups, the negative correlation is strongest for Eurozone countries and weakest for advanced economies.

5.3. Signals

Our aim is to evaluate the information value provided by credit rating agencies in the market pricing of sovereign default risk. As in any asset market, only "surprise" or unanticipated credit rating changes, which are also valued by the market, should in principle impact CDS spreads. In addition to credit ratings, however, credit rating agencies also provide signals about the possibility of future credit rating changes. These signals, for S&P credit rating agencies (the other CRAs have similar designations), take the form of either "outlook" or "watch" designation announcements. The outlook and watch announcements may be positive, negative, stable or developing (explained as uncertain as to whether the change may be positive or negative) in terms of the likelihood of a future ratings changes. As discussed in section 3, the outlook horizon is defined by S&P as six to twenty-four months ahead and the watch horizon is within three months. The other agencies have similar horizons.

Table 9 presents estimates of the basic model where the dependent variable is the change in the CDS spread. The baseline model, shown in column (1), regresses the change in the CDS spread (*ΔCDS*) on the lagged dependent variable, change in the credit rating (*ΔCredit Rating*)

[14] Credit default swaps were at one point a major focus of public discussion surrounding euro-zone crisis. The European Union argued that rising CDS spreads had an additional adverse effect on investor sentiment that pulled down sovereign bond prices. In October 2011 the European Union introduced a set of rules to curb their use, including banning "naked" CDS positions (where purchasers do not hold the underlying security). The new rules came into effect on November 1, 2012. CDS trading in EU countries has virtually halted since that time. See "Wherever Did Europe's Sovereign CDS Trading Go?", by Serena Ruffoni, Wall Street Journal, Jan 31, 2014.

and four control variables: change in stock prices (*ΔStock Prices*), change in commodity prices (*ΔCommodity*), change in the VIX (*ΔVIX*), change in inflation (*ΔInflation*) and a constant. Column (2) enters positive and negative watch and outlook announcements (signals) to the regression, leaving out the credit rate change. Column (3) adds both the credit rating changes and the credit/watch announcements. Column (4) adds an interaction term consisting of the change in credit rate multiplied by a dummy variable that takes of a value of unity if the credit rating announcement change is negative (and zero otherwise). This allows us to test an asymmetric response between positive (baseline) and negative credit rating changes (given by the sum of the coefficients listed at the bottom of the table).

Column (1) of 9 reports the baseline model estimates. It indicates that a one unit credit rating upgrade (downgrade) lowers (raises) CDS spreads by 30 basis points, consistent with hypothesis 1 (H1). In addition, the lagged dependent variable is statistically significant (estimate of 0.185) as are the control variables (with the expected signs)-- lower CDS values with positive equity price and commodity price changes, and higher CDS values with positive VIX and inflation changes. There are 4,784 observations (56 countries) and Hansen J statistic and AR(2) test statistics indicates that the instruments used are valid and that the residuals are not subject to serial correlation of order two, respectively. This establishes the baseline by which to evaluate other CRA announcements.

Column (2) shows CRA announcements (positive and negative watch; positive and negative outlook) except for the change in credit ratings. In this case, negative watch announcements are statistically significant with the expected positive sign, consistent with H1. A negative watch announcement is estimated to increase CDS spreads by 57 basis points after controlling for contemporaneous developments in economic fundamentals. Negative outlook announcements are close to significant at conventional levels and estimated to increase CDS spreads, but the positive outlook and watch announcements do not appear to move CDS values systematically. The lagged dependent variable and control variable estimates are almost identical to the baseline model.

The results are very similar when credit ratings are added to the model, shown in column 3, with a credit rating announcement moving CDS spreads by an estimated 28 basis points and a negative watch announcement increasing spreads by 45 basis points. Negative outlooks and

positive watch/outlook announcements, as well as "stable-developing announcements, have no significant effect.

Given the asymmetric effects seen between negative and positive outlook and watch announcements, and previous findings in the literature, we also investigate the extent to which credit rating changes are asymmetric between upgrades and downgrades. This is shown in column (4) of Table 9 with both ΔCR and the ΔCR*(Downgrade Dummy) interactive term. The estimates indicate significant asymmetry between the effect of credit-rating upgrades and downgrades on CDS spreads—an upgrade announcement decreases CDS spreads by 9 basis points, while a downgrade announcement increases CDS spreads by 47.5 basis points. The CDS market responds much stronger to downgrades than upgrades, a multiple greater than five times. This is consistent with H3, although the difference in effect is surprisingly large. The other signals estimates, as well as the estimated coefficients for the macroeconomic controls, are very similar to the previous (column 3) specification.[15] Surprisingly, and inconsistent with H2, negative watch announcements appear to have a larger impact than negative credit rating announcements.

The large impact and strong statistical significance of negative watch and credit rating downgrade signals, together with little measureable impact of positive signals, indicates a substantial asymmetry in market responses to CRA announcements. This could either be because the market responds less to positive signals, or that positive signals are less of a surprise, i.e. they contain less of a "news" element (less information value). The latter could be because the market anticipates positive CRA announcements more than negative announcements and therefore responds less.

The asymmetric response we find for sovereign credit ratings, with negative news dominating movements in CDS spreads, is similar to that found in previous studies on corporate CDS markets (Norden and Weber, 2004; Hull et al., 2004; Norden, 2008), all using event study

[15] Including *contemporaneous* macroeconomic and financial control variables in the regressions likely minimizes the explanatory power of CRA announcements. Especially since credit rating announcement (and the lagged dependent variable) is treated as an endogenous variable in the GMM procedure. To give an upper bound to the estimated impact of CRA announcements, we estimate the same basic models as in Table 9 but now with contemporaneous announcements and *lagged* control variables. The estimated coefficients on the CRA announcements are very similar. (Not shown for brevity but available upon request from the authors). These results support the earlier findings that CRA announcements are important "events" in moving CDS spreads, especially negative watch and outlook announcements and credit downgrade announcement. By contrast, positive CRA watch and outlook announcements have little estimated impact.

frameworks without macroeconomic controls. Norden and Wedber (2004), for example, find that reviews (watches) for downgrades for corporates and financials exhibit the largest impact on CDS spreads. They also find a significant effect for credit downgrades announcements. They do not find that markets exhibit any significant response to positive rating announcements using their event study methodology on daily data. By contrast with previous studies, however, Ismailescu and Kazemi (2010) find that the news value of positive CRA events dominate positive events for sovereign bonds (using daily data in an event study framework).

5.4. Effects of Rating Changes Conditional upon Outlook and Watch Designations

Our estimates of the effect of credit rating changes on CDS spreads may be biased downwards to the extent that an actual credit rating change incorporates an expected component (signaled previously by outlook or watch announcements) and an unexpected component. In principal, only the unexpected component presumably would affect CDS spreads. Since actual credit rating changes include both components, the net effect would be the average of expected and unexpected, and tend to bias downwards the estimated effect.

We address whether being on watch or outlook status (positive or negative *prior to* the rating change) changes the impact of credit rating changes on CDS spreads. We would expect that being on negative (positive) watch/outlook would dampen the effect of the credit rating downgrade (upgrade) since some negative (positive) information would have been already incorporated into the CDS spread. We investigate this issue in Table 10.[16] Column (1) includes two "outlook/watch status" (combined outlook and watch status indicator) dummy variables and the associated interaction terms (each designation dummy multiplied by the credit rating change). "Pos Outlook/Watch" ("Neg Outlook/Watch") is equal to one if the country is on positive (negative) watch/outlook during the concurrent month (but prior to the day of the credit rating change), zero otherwise. Column (2) presents a similar model with outlook status, and column (3) reports a model with watch status. Column (4) reports results of the model with both outlook and watch status entered separately.

[16] All of the regressions in Table 10 include the change in credit rating, the lagged dependent variable and the control variables. Estimates for the macroeconomic controls are very similar to the previous tables and are not reported for brevity.

Column (1) of Table 10 suggests that the fall (rise) in CDS spread if a country is *not* on positive (negative) outlook or watch status is -5.6 (5.6) basis points. The fall (rise) in CDS spread if a country *is* on a positive (negative) outlook or watch and upgrades (downgrades) the credit rating is -6.4 (47.3) basis points. The total effects of both are statistically significant, but the former (positive upgrade while on positive outlook or watch) effect is not statistically different from the effect if the country is not on positive watch/outlook (-5.6; difference is -0.8 basis points). It appears that positive watch/outlook status has no bearing on how the market responds to a credit rating upgrade. By contrast, the effect of a credit rating downgrade if the country is already on negative outlook/watch is 47.3, both significantly different from zero (p-value 0.014) and significantly larger than the effect of a credit rating downgrade when the country is not on negative outlook/watch status (6.4; difference is 41.7 with p-value 0.009). Surprisingly, and inconsistent with H4, the market responds much more strongly to a credit rating downgrade when the country had already previously been placed on a negative outlook/watch list.

The asymmetry between positive and negative outlook/watch status follows through to the results presented in columns (2)-(4) of Table 10. Column (2), focusing on the effects of outlook status alone, indicates that the effect of an upgrade when the country is not on outlook status is -38.6, but only -3.8 (insignificantly different than zero) when it is on positive outlook. The difference between the two effects is -34.8 (p-value 0.10). The effect of a credit downgrade is to increase CDS spreads by 38.6 without being on a negative outlook, and 31.2 when on a negative outlook (p-value 0.003). This difference in effects is 7.4 (p-value 0.021). As standard theory suggests, the credit upgrade/downgrade effect on CDS spreads is smaller when countries are already on outlook status. While the difference in the upgrades is substantial (34.8 basis points), a relatively small difference is noted when countries are already on negative outlook status (7.4 basis points). Both are statistically significant, but the credit downgrades are measured with more precision.

However, the most substantial effects are noted for countries on watch status (column 3). The estimated effect of a credit rating upgrade (downgrade) when a country is not on watch status is -5.6 (5.6) basis points. When on watch status, by contrast, the estimated effects of rating changes jump in magnitude: a rating upgrade is associated with a -75.1 basis point fall in CDS spreads, though this decline is statistically insignificant. With downgrades, by contrast, the 94.6 basis points rise is statistically significant (p-value 0.04) as is the estimated difference between

the two effects (89 basis point difference, p-value 0.03). Watch status therefore appears to magnify rather than dampen the announcement effect on CDS spreads of credit rating changes, at least for downgrades. Similar results are reported in column (4).

This somewhat surprising result may be interpreted in light of the results shown in Tables 3, 4 and 5 on the frequency and duration of outlook/watch, outlook and watch/review designations, respectively, before credit rating changes. In particular, 40 percent of the credit-rating downgrades were on negative watch designations at the time. The median duration of the watch designation was only 1 month for S&P and Fitch and 3 months for Moody's. Hence a large fraction of the watch announcements occurred in the same month as a credit rating downgrade, perhaps signaling a particularly severe deterioration in the creditworthiness of the sovereign.

Nonetheless, there is little evidence that the impact of credit rating changes on CDS spreads diminish when countries are on either watch or outlook status, especially when on negative watch/outlook associated with a downgrade. Moreover, the same asymmetry found above follows through in our "conditional" regressions—negative watch/outlook status (in this case downgrades when on watch or outlook status) have a much larger impact than positive watch/outlook status.

5.5 Differential Effects of Credit Rating Agencies

Another question of interest is whether a particular credit rating agency has a larger effect on CDS spreads than the other CRAs. To address this issue, Table 11 estimates the effects of the three credit rating agencies separately using "signals" models (Table 9). Columns (1)-(3) report results without asymmetry in the effects on CDS from upgrades and downgrades, while columns (4)-(6) allow for asymmetric responses.

S&P credit rating announcements have the largest estimated effect on CDS spreads of the three agencies, followed by Fitch. The results in columns (1)-(3) suggest that a credit rating upgrade by S&P causes a 59 basis point fall in CDS spreads, while the same action by Fitch (Moody's) results in a 55 (20) basis point fall. These results are all statistically significant at the 5% level or better. Some evidence of the dominance of S&P and Fitch over Moody's is suggested by lead/lag regressions. This analysis shows S&P announcements leading the other

agencies, and Fitch also leading Moody's. This timing is also suggested by Figure 2 where it is evident that Ireland's downgrades are consistently led by S&P.

However, the market responds most to negative watch announcements by Fitch (75 basis points), followed by S&P (23 basis points). Only negative outlook announcements by Fitch have a significant positive effect on CDS spreads. Similar to previous results, no positive watch or outlook announcements have a measurable market response for any of the three agencies.

Columns (4)-(5) of Table 11 allow for asymmetric effects between upgrades and downgrades. The impact of credit rating on CDS spreads downgrade (coefficient sum a bottom of table) is 83, 119 and 25 basis points, respectively, for Fitch, S&P and Moody's. No credit rating upgrade is statistically significant. Only negative watch announcements by Moody's are statistically significant, raising CDS spreads by 72 basis points. Moody's negative outlook announcements also are statistically significant, as are those of Fitch. However, both negative outlook announcements have signs (negative) indicating a surprising decline in CDS spreads.

Other studies have found asymmetric effects on market prices associated with different CRAs. Alsakka and ap Gwilym (2013), for example, find quite different effects from CRA announcements on exchange rates. Other studies also find asymmetric impacts on a variety of market prices (e.g. Brooks et al., 2004; Alsakka and ap Gwilym, 2010b).

6. Conclusion

We find that risk assessments on sovereign bonds by credit rating agencies are a systematically important determinant of credit default swap spreads. Credit rating agencies play an important role in the pricing of sovereign risk—rating changes are informative, significant economically, and the marginal information value is robust to controlling for conventional economic fundamentals. Moreover, credit rating downgrade announcements appear to influence markets much more than upgrade announcements. There appears to be information value in credit rating announcements not already imbedded in macroeconomic and financial information available to the market.

The asymmetry observed in the differential effects of upgrades and downgrades carries over to the impact of watch announcements. Negative watch announcements have a much larger

effect on CDS spreads than positive watch announcements, especially if announced in the same month as the credit rating change. Similarly, negative watch announcements have larger impacts than negative outlook announcements, and both dominate the "news" value of either positive watch or outlook announcements. Negative news from CRAs dominates positive news in moving markets during our sample period. And the CRA news affects markets beyond that imbedded in information gleaned from macroeconomic and financial conditions. Another asymmetry noted in our work is on the differential effects on markets from announcements by each credit rating agencies. In particular, we find that S&P and Fitch dominate Moody's in providing news acted upon by agents in the CDS market.

On balance, our work finds that CRA announcements move CDS spreads, at least announcements by S&P and Fitch. Most of this movement, however, appears to be in response to negative news, in the form of credit downgrades or negative watch assignments. We found very little response to positive news. These results appears to confirm the fears of policymakers that CDS markets may exacerbate sovereign debt problems, and that credit rating agencies are not a stabilizing presence in the market.

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Table 1: Linear Scaling of Credit Ratings

Fitch Ratings	S&P Ratings	Moody's	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

Notes: The source of ratings are agencies websites.

Table 2a: Average Credit Ratings (long-term foreign currency) Across Rating Agencies

	Fitch	S&P	Moody's		Fitch	S&P	Moody's
United States	25.0	24.9	25.0	Mexico	17.0	17.1	17.9
United Kingdom	25.0	25.0	25.0	Peru	15.2	15.2	14.4
Austria	25.0	24.9	25.0	Venezuela	12.2	12.2	10.8
Belgium	23.7	23.9	23.8	Cyprus	20.8	19.7	20.2
Denmark	25.0	25.0	25.0	Israel	19.5	19.7	20.5
France	25.0	24.9	25.0	India	15.7	15.5	16.0
Germany	25.0	25.0	25.0	Indonesia	13.8	13.1	12.9
Italy	22.1	21.1	22.6	Korea	20.8	19.8	19.9
Netherlands	25.0	25.0	25.0	Malaysia	18.9	19.0	18.9
Norway	25.0	25.0	25.0	Pakistan		10.8	10.7
Sweden	25.0	25.0	25.0	Philippines	14.1	13.3	12.8
Switzerland	25.0	25.0	25.0	Thailand	17.5	17.9	18.0
Canada	24.9	25.0	25.0	Bulgaria	16.3	17.0	15.8
Japan	22.9	22.4	24.1	Russia	17.0	16.9	17.3
Finland	25.0	25.0	25.0	China	20.4	20.2	20.8
Greece	17.7	17.2	17.8	Ukraine	11.9	11.8	11.6
Iceland	18.8	18.9	21.2	Czech R.	20.3	19.8	21.0
Ireland	23.1	23.2	22.9	Slovak R.	20.2	20.0	20.5
Malta	20.6	19.9	20.0	Estonia	19.7	20.1	21.0
Portugal	21.6	20.5	21.4	Latvia	17.2	16.9	18.3
Spain	24.3	23.8	24.2	Hungary	17.5	17.3	19.0
Turkey	13.5	13.0	13.1	Lithuania	18.3	18.4	19.0
Australia	24.1	25.0	25.0	Croatia	16.0	16.7	16.0
New Zealand	23.9	23.9	25.0	Slovenia	22.4	22.5	22.4
South Africa	17.8	17.8	18.3	Macedonia	14.9	14.8	
Argentina	5.4	9.6	9.8	Poland	18.7	18.6	20.0
Brazil	14.9	14.9	14.5	Serbia	13.0	13.0	
Chile	20.0	20.5	20.1	Romania	15.8	15.3	15.4

*Average of monthly rating (level) over full sample, 2004-2012.

Table 2b: Number of Changes in Rating

	NUMBER OF CHANGES IN RATINGS							NUMBER OF CHANGES IN RATINGS					
	Downgrades			Upgrades				Downgrades			Upgrades		
	S&P	FITCH	MOODYS	S&P	FITCH	MOODYS		S&P	FITCH	MOODYS	S&P	FITCH	MOODYS
Argentina	2	1	0	4	3	1	Lithuania	3	3	2	2	2	1
Australia	0	0	0	0	1	0	Macedonia	2	0	0	1	1	0
Austria	1	0	0	0	0	0	Malaysia	0	0	0	0	1	1
Belgium	1	1	1	0	1	0	Malta	1	0	2	0	1	2
Brazil	0	0	0	5	5	6	Mexico	1	1	0	2	2	1
Bulgaria	1	1	0	3	2	3	Netherlands	0	0	0	0	0	0
Canada	0	0	0	0	1	0	N.Zealand	1	1	0	0	0	0
Chile	0	0	0	1	2	3	Norway	0	0	0	0	0	0
China	0	0	0	5	2	2	Pakistan	3	0	3	3	0	1
Croatia	1	0	0	1	0	0	Peru	0	0	0	4	4	4
Cyprus	6	4	5	1	1	2	Philippines	1	0	1	2	1	2
Czech R.	0	0	0	2	2	0	Poland	0	0	0	1	1	0
Denmark	0	0	0	0	0	0	Portugal	5	5	5	0	0	0
Estonia	1	2	0	3	3	0	Romania	1	1	0	2	3	2
Finland	0	0	0	0	0	0	Russia	1	1	0	3	3	2
France	1	0	0	0	0	0	Serbia	1	0	0	2	0	0
Germany	0	0	0	0	0	0	Slovak R.	1	0	1	4	3	2
Greece	9	9	7	1	1	0	Slovenia	3	3	4	2	2	1
Hungary	4	4	5	0	0	0	S. Africa	0	0	0	1	1	2
Iceland	5	4	4	1	1	0	Spain	5	4	5	1	0	0
India	0	0	0	2	1	0	Sweden	0	0	0	1	1	0
Indonesia	0	0	0	4	4	5	Switzerland	0	0	0	0	0	0
Ireland	6	4	5	0	0	0	Thailand	0	1	0	1	1	0
Israel	0	0	0	2	1	1	Turkey	0	0	0	2	3	3
Italy	4	3	3	0	0	0	Ukraine	3	3	1	5	2	0
Japan	1	1	2	1	0	1	Ukraine	0	0	0	0	0	0
Korea	0	0	0	1	1	3	US	1	0	0	0	0	0
Latvia	5	4	3	3	2	0	Venezuela	2	1	0	4	2	1
							Sum	83	62	59	83	68	52

Table 2c: Number of Changes in Outlook/Watch

	NUMBER OF OUTLOOK/WATCH CHANGE			NUMBER OF CHANGES IN OUTLOOK ONLY				NUMBER OF OUTLOOK/WATCH CHANGE			NUMBER OF CHANGES IN OUTLOOK ONLY		
	S&P	FITCH	MOODY'S	S&P	FITCH	MOODY'S		S&P	FITCH	MOODY'S	S&P	FITCH	MOODY'S
Argentina	3	1	2	3	0	2	Lithuania	7	5	6	5	5	2
Australia	0	0	0	0	0	0	Macedonia	4	5	0	4	5	0
Austria	2	0	1	0	0	1	Malaysia	2	4	3	2	4	1
Belgium	3	3	4	1	1	1	Malta	2	1	5	0	1	3
Brazil	7	6	6	7	6	2	Mexico	4	4	1	4	4	1
Bulgaria	4	6	8	4	6	2	Netherlands	2	0	1	0	0	1
Canada	0	0	0	0	0	0	N.Zealand	4	2	0	4	2	0
Chile	3	4	7	3	4	3	Norway	0	0	0	0	0	0
China	3	3	6	3	3	2	Pakistan	6	0	8	6	0	6
Croatia	3	2	3	3	2	3	Peru	7	8	6	7	8	2
Cyprus	7	4	10	2	2	2	Philippines	4	4	9	4	4	7
Czech R.	4	2	2	4	2	2	Poland	5	3	0	5	3	0
Denmark	0	0	0	0	0	0	Portugal	7	5	7	3	3	0
Estonia	11	5	6	7	3	4	Romania	7	4	4	7	4	2
Finland	2	0	0	0	0	0	Russia	4	4	6	4	4	2
France	2	1	1	0	1	1	Serbia	5	3	0	5	3	0
Germany	2	0	1	0	0	1	Slovak R.	6	4	8	4	2	4
Greece	7	9	11	3	3	3	Slovenia	5	4	6	3	2	2
Hungary	9	8	6	5	8	2	S. Africa	3	7	6	3	7	2
Iceland	12	6	8	6	4	6	Spain	4	3	7	2	1	0
India	7	1	2	7	1	2	Sweden	1	0	0	1	0	0
Indonesia	5	6	11	5	6	5	Switzerland	0	0	0	0	0	0
Ireland	5	8	6	1	4	1	Thailand	5	6	2	3	4	2
Israel	3	2	3	3	2	1	Turkey	10	9	5	10	7	5
Italy	6	6	2	4	2	0	Ukraine	9	8	11	9	8	5
Japan	6	2	7	6	2	3	UK	2	1	1	2	1	1
Korea	0	5	6	0	3	4	US	3	1	2	1	1	0
Latvia	9	9	5	5	7	5	Venezuela	4	3	2	4	3	0
							Sum	247	197	230	184	158	106

Table 3a: Duration of Negative Outlook and Watch before Rating Downgrade

	Number of Downgrades	Number of times countries are under negative outlook or watch during same month (but prior) of credit change or 1-month before	Duration (months) Mean	Median
S&P	83	76	6.26	4.00
FITCH	62	60	6.42	5.00
MOODYS	59	57	4.67	4.00
TOTAL	204	193	5.78	4.33

Table 3b: Duration of Positive Outlook and Watch before Rating Upgrade

	Number of Upgrades	Number of times countries are under positive outlook or watch during same month (but prior) of credit change or 1-month before	Duration (months) Mean	Median
S&P	83	53	10.85	11.00
FITCH	68	38	12.00	8.00
MOODYS	52	44	14.42	12.00
TOTAL	203	135	12.21	10.33

Table 4a: Duration of Negative Outlook before Rating Downgrade

	Number of Downgrades	Number of times countries are under negative outlook during same month (but prior) of credit change or 1-month before	Duration (months) Mean	Median
S&P	83	69	7.43	4.50
FITCH	62	53	8.69	8.00
MOODYS	59	47	5..53	5.00
TOTAL	204	169	8.06	5.83

Table 4b: Duration of Positive Outlook before Rating Upgrade

	Number of Upgrades	Number of times countries are under positive outlook during same month (but prior) of credit change or 1-month before	Duration (months) Mean	Median
S&P	83	53	11.00	10.00
FITCH	68	34	5.40	6.00
MOODYS	52	27	16.75	18.50
TOTAL	203	114	11.05	11.50

Table 5a: Duration of Negative Watch/Review before Rating Downgrade

	Number of Downgrades	Number of times countries are under negative watch during same month (but prior) of credit change or 1-month before	Duration (months) Mean	Median
S&P	83	29	1.79	1.00
FITCH	62	19	2.50	1.00
MOODYS	59	33	2.58	3.00
TOTAL	204	81	2.29	1.67

Table 5b: Duration of Positive Watch/Review before Rating Upgrade

	Number of Upgrades	Number of times countries are under positive watch during same month (but prior) of credit change or 1-month before	Duration (months) Mean	Median
S&P	n/a	n/a	n/a	n/a
FITCH	68	4	2.25	2.00
MOODYS	52	26	2.81	3.00
TOTAL	120	30	2.53	2.50

Table 6a: Rating Changes without Outlook/Watch Changes

	Number of Rating Changes	Number of Rating Changes not Preceded by Outlook/Watch *Changes*			
		t	t-1	t-2	t-3
S&P	166	78	143	150	151
FITCH	130	66	116	122	121
MOODYS	111	32	100	94	85

Table 6b: Rating Downgrades without Outlook/Watch Changes

	Number of Downgrades	Number of Downgrades not Preceded by Outlook/Watch *Changes*			
		t	t-1	t-2	t-3
S&P	83	40	67	76	76
FITCH	62	33	50	58	58
MOODYS	59	20	54	47	45

Table 6c: Rating Upgrades without Outlook/Watch Changes

	Number of Upgrades	Number of Upgrades not Preceded by Outlook/Watch *Changes*			
		t	t-1	t-2	t-3
S&P	83	38	76	74	75
FITCH	68	33	66	64	63
MOODYS	52	12	46	47	40

Table 7: Outlook/Watch Changes *Not* Followed by Credit Rating Change

	Outlook/Watch Changes with No Rating Changes at time "t"			
	t	t-1	t-2	t-3
S&P	166	228	235	235
FITCH	133	183	190	188
MOODYS	152	219	210	198

Table 8: Summary Statistics for Focus and Control Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
CDS Spread (monthly change, basis pts.)	5416	3.783	96.574	-1597.9	3107.9
Rating Changes (composite index change)	5871	-0.002	0.400	-8.0	8.0
Stock Prices (log change)	5822	0.234	7.341	-32.3	22.4
Commodity Prices* (log change)	103	0.926	7.434	-32.5	19.1
VIX* (level)	104	20.945	9.631	10.4	59.9
Inflation (change)	5122	-0.007	0.673	-8.3	8.8

*repeats across countries.

Table 9: Signals – Dependent Variable: Change in CDS Spread

	(1)	(2)	(3)	(4)
ΔCDS(-1)	0.185**	0.187**	0.183**	0.181**
	(0.083)	(0.076)	(0.082)	(0.082)
ΔCR Announcement	-30.400***		-28.520**	-9.145**
	(11.493)		(11.233)	(3.812)
ΔCR Announcement*Downgrade				-35.731**
				(17.515)
Neg Watch Announcement		56.705**	44.695**	38.594*
		(22.929)	(20.882)	(20.852)
Neg Outlook Announcement		15.885	11.008	8.580
		(11.799)	(10.417)	(10.645)
Stable-Developing Announcement		13.293	5.207	1.416
		(23.824)	(23.001)	(22.885)
Pos Watch Announcement		4.083	4.649	5.137
		(5.101)	(5.043)	(4.995)
Pos Outlook Announcement		-5.971	-3.48	-4.051
		(7.28)	(7.108)	(7.178)
ΔStock Price	-2.159***	-2.236***	-2.153***	-2.114***
	(0.534)	(0.557)	(0.528)	(0.528)
ΔCommodity Price	-1.461***	-1.417***	-1.452***	-1.478***
	(0.339)	(0.344)	(0.336)	(0.347)
VIX	0.276**	0.320**	0.255**	0.248*
	(0.133)	(0.145)	(0.13)	(0.132)
ΔInflation	6.686***	6.836***	6.760***	6.891***
	(2.431)	(2.471)	(2.449)	(2.465)
Constant	-1.527	-3.101*	-1.673	-2.746
	(1.519)	(1.804)	(1.588)	(1.971)
Observations	4,784	4,784	4,784	4,784
Number of Countries	56	56	56	56
Hansen J statistic	54.71	54.51	53.67	52.50
p value of Hansen statistic	0.267	0.273	0.3	0.340
AR(2) test statistic	-1.414	-1.299	-1.381	-1.425
p value of AR(2)	0.157	0.194	0.167	0.154
Coefficient sum				-44.88
p-value				0.0122

Notes: Standard errors are given in parenthesis and adjusted for autocorrelation and heteroscedasticity. *** p<0.01, ** p<0.05, * p<0.1. Dynamic panel model is estimated with one-step system GMM. Signals: Contemporaneous CR, Watch and Outlook Changes; Contemporaneous Macroeconomic controls.

Table 10: Credit Rating Changes Conditional on Outlook/Watch Status Designation

	(1)	(2)	(3)	(4)
ΔCDS(-1)	0.182**	0.185**	0.171*	0.171*
	(0.083)	(0.082)	(0.092)	(0.091)
ΔCR	-5.631	-38.593*	-5.576**	-19.788
	(6.039)	(22.819)	(2.186)	(15.152)
Pos Outlook/Watch Designation	3.890			
	(2.585)			
Neg Outlook/Watch Designation	2.364			
	(5.302)			
ΔCR* Pos Outlook/Watch Designation	-4.666			
	(12.911)			
ΔCR* Neg Outlook/Watch Designation	-39.288**			
	(15.608)			
Pos Outlook Designation		0.828		1.979
		(1.822)		(1.290)
Neg Outlook Designation		0.749		-0.417
		(4.707)		(2.746)
ΔCR* Pos Outlook Designation		34.003		16.554
		(22.761)		(14.488)
ΔCR* Neg Outlook Designation		8.178		27.647
		(22.131)		(27.884)
Pos Watch Designation			6.341	6.205
			(7.161)	(7.324)
Neg Watch Designation			35.182	38.289
			(34.560)	(35.707)
ΔCR* Pos Watch Designation			-75.913	-71.839
			(72.450)	(77.272)
ΔCR* Neg Watch Designation			-53.813***	-58.571***
			(14.869)	(18.273)
Observations	4,784	4,784	4,784	4,784
Number of Countries	56	56	56	56
Hansen J statistic	54.29	53.28	53.02	53.19
p value of Hansen statistic	0.280	0.313	0.322	0.316
AR(2) test statistic	-1.449	-1.432	-1.450	-1.439
p value of AR(2)	0.147	0.152	0.147	0.150
Sum of Pos. Watch/Outlook and Interactions	-6.407	-3.762	-75.15	-66.89
p-value	0.288	0.251	0.255	0.331
Sum ofNeg. Watch/Outlook and Interactions	47.28	31.16	94.57	88.58
p-value	0.0146	0.00325	0.0417	0.0358

Notes: Standard errors are given in parenthesis and adjusted for autocorrelation and heteroscedasticity. *** p<0.01, ** p<0.05, * p<0.1. Dynamic panel model is estimated with one-step system GMM. Macroeconomic controls included in regressions but not reported for brevity.

Table 11: Signals - Differential Effects of Credit Rating Agency Announcements

	Fitch	S&P	Moody's	Fitch	S&P	Moody's
	(1)	(2)	(3)	(4)	(5)	(6)
ΔCDS(-1)	0.169**	0.184**	0.188**	0.167**	0.181**	0.188**
	(0.083)	(0.082)	(0.082)	(0.082)	(0.080)	(0.082)
ΔCR	-54.725**	-58.655**	-20.196**	-8.940	-6.668	0.623
	(23.977)	(26.324)	(10.078)	(7.624)	(6.206)	(17.430)
ΔCR*(Downgrade Dummy)				-74.399**	-112.484***	-25.972
				(36.182)	(36.179)	(27.826)
Neg Watch	-13.321	23.128*	74.561*	-29.066	14.839	72.721*
	(15.807)	(13.120)	(43.282)	(23.724)	(15.876)	(42.361)
Neg Outlook	-20.520*	17.572	-40.709	-29.277**	-6.831	-45.183*
	(10.496)	(22.404)	(28.798)	(13.719)	(23.456)	(26.227)
Pos Watch	-9.003	na	5.419	-8.477	na	5.502
	(10.740)	na	(5.540)	(10.672)	na	(5.554)
Pos Outlook	-1.038	-9.083	5.319	-2.178	-9.815	1.320
	(3.004)	(8.688)	(3.239)	(2.715)	(10.122)	(3.238)
Stable-Developing	17.257	20.962*	-2.252	-9.163	-16.891*	-13.186
	(11.952)	(11.415)	(18.798)	(14.151)	(10.121)	(29.219)
Observations	4,694	4,784	4,703	4,694	4,784	4,703
Number of Countries	55	56	54	55	56	54
Hansen J statistic	52.65	52.86	52.06	52.58	53.48	52.26
p value of Hansen statistic	0.335	0.327	0.356	0.337	0.306	0.348
AR(2) test statistic	-1.421	-1.355	-1.382	-1.401	-1.421	-1.381
p value of AR(2)	0.155	0.176	0.167	0.161	0.155	0.167
Coefficient sum on Downgrade				-83.34	-119.2	-25.35
p-value				0.0115	0.00119	0.0700

Notes: Standard errors are given in parenthesis and adjusted for autocorrelation and heteroscedasticity. *** p<0.01, ** p<0.05, * p<0.1. Dynamic panel model is estimated with one-step system GMM. Macroeconomic controls included in regressions but not reported for brevity.

Figure 1: Distribution of Rating

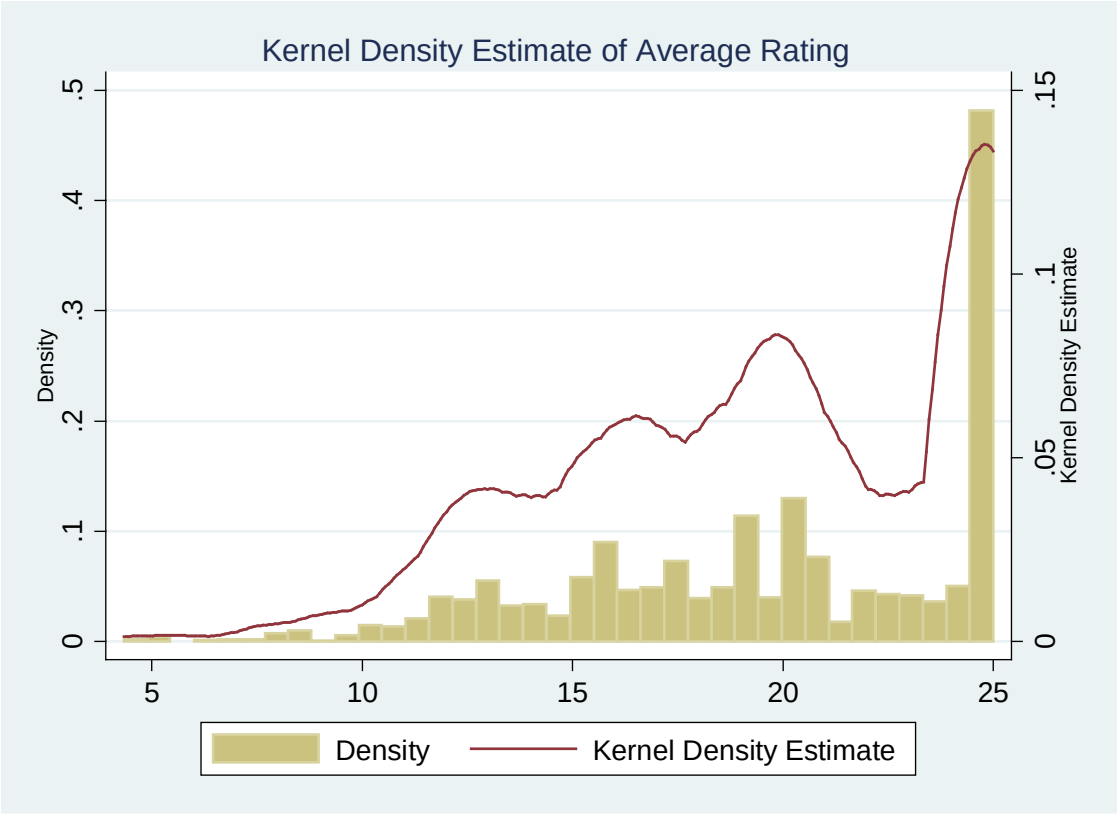

Figure 2: Ireland- Credit Downgrades, Watch and Outlook Announcements 2009-12

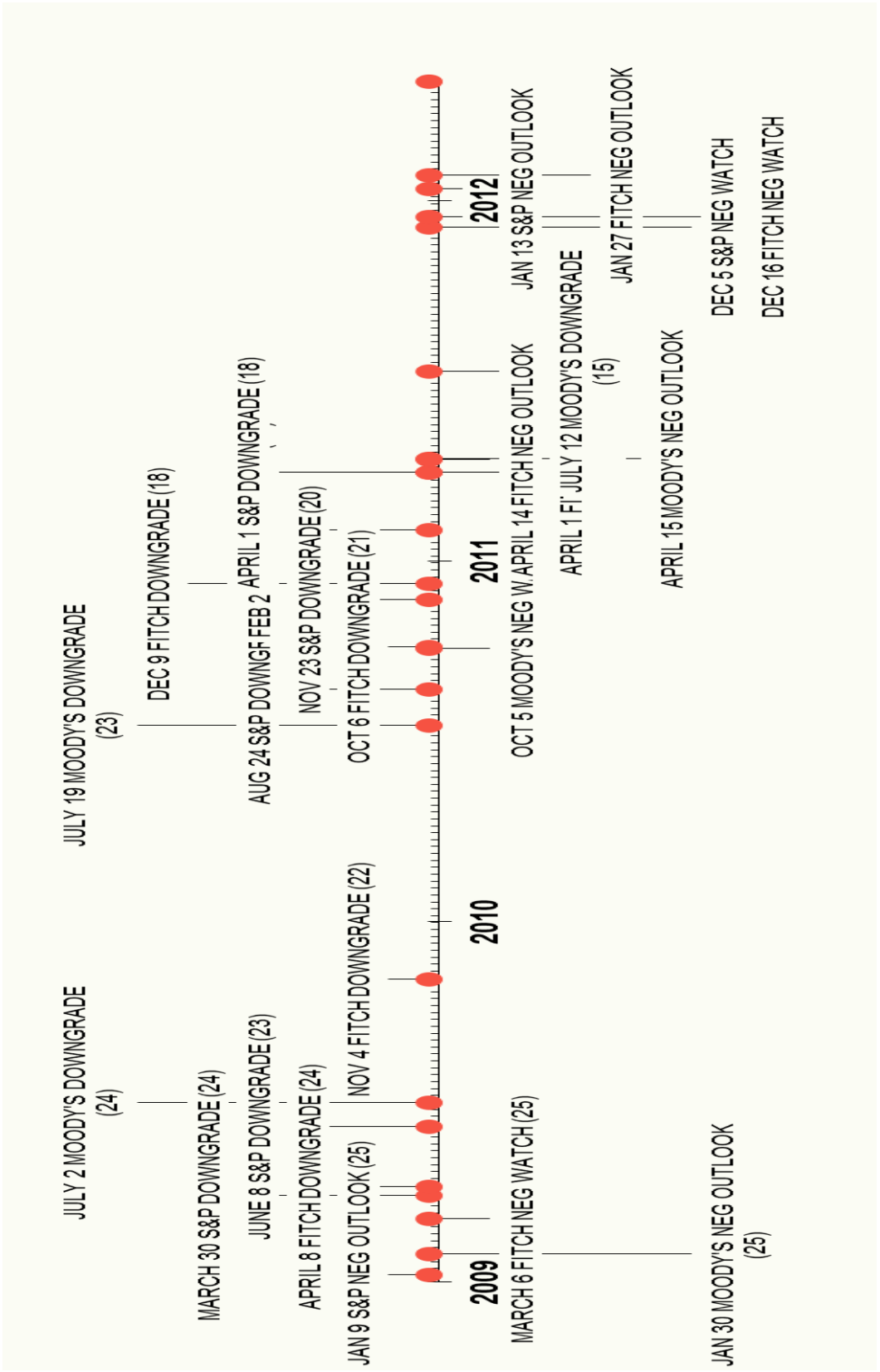

Figure 3: CDS Spread and Credit Rating Level

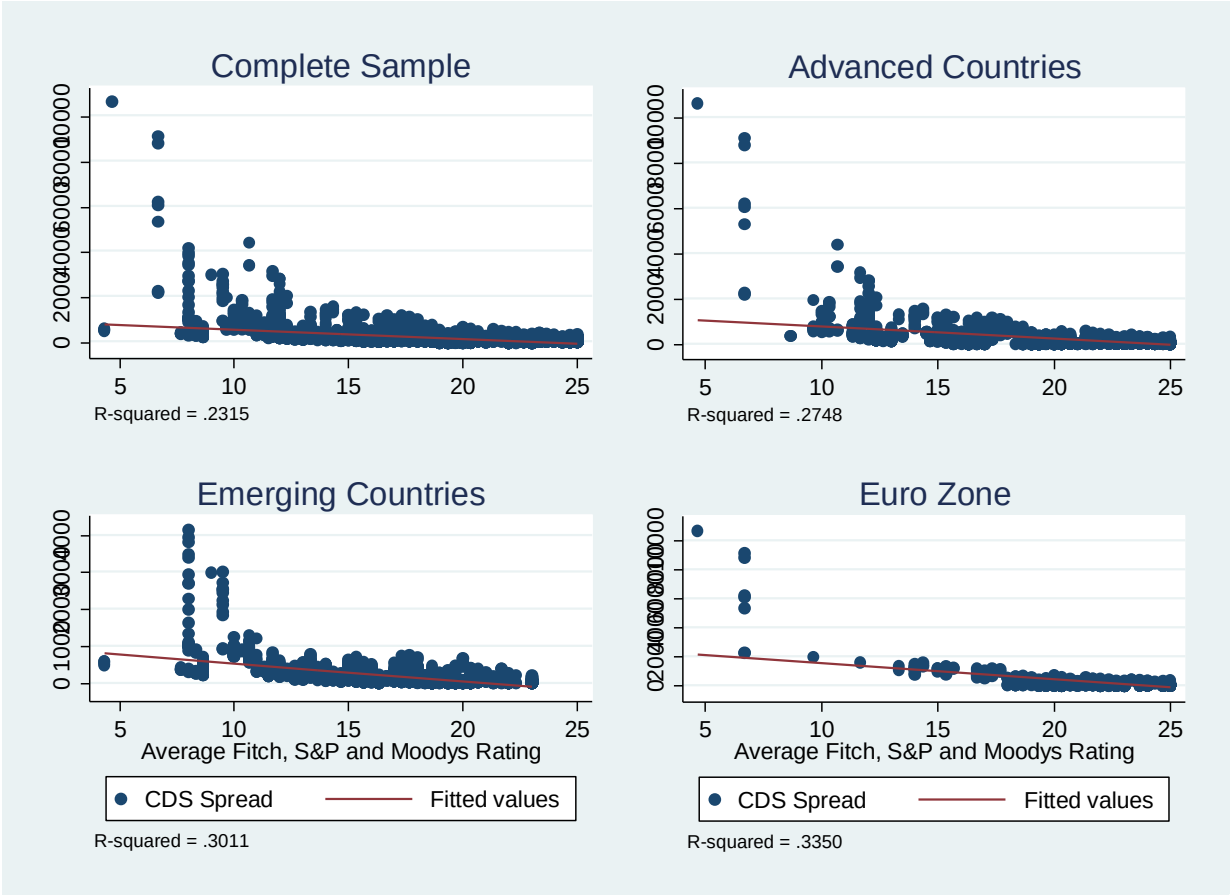

Table A1: Data Descriptions and Sources

Variable	Description	Source
CDS Spread	Market prices for five-year sovereign CDS contracts (in a basis points), daily data is averaged into monthly values. Used as monthly basis point change in regressions.	Markit, Bloomberg
Sovereign Ratings	Fitch, Moody's and Standard & Poor's long-term foreign currency ratings, scaled from 1 (D) to 25 (AAA). Monthly (in unit) change	CRA websites
Stock Prices	Local Stock Market Index -- MSCI or host country. Used as monthly percentage change in regressions.	Bloomberg, Thomson Reuters Datastream
Commodity	S&P Goldman Sacks Commodity Price Index (SPGSCI), US dollar. Used as monthly percentage change in regressions.	Bloomberg
Oil Price	Crude oil price ($/bbl), monthly average Used as monthly percentage change in regressions.	World Bank Commodity Price Data (Pink Sheet)
VIX	Chicago Board Options Exchange Market Volatility Index (implied volatility of S&P 500 index options), monthly average (of daily adjusted close)	Yahoo-Finance

Appendix A2: Excerpts from: Puccia, Mark (2009). Standard and Poor's Rating Direct "General Criteria: Use of CreditWatch and Outlooks," September 14, 2009 (underlining key phrases for emphasis by the authors of this paper, not contained in the Standard and Poor's report).

"Ratings may be placed on CreditWatch when such an event or a deviation from an expected trend occurs and we believe that additional information is necessary to evaluate the current rating or when there is, in our opinion, a material change in the performance of securitized assets and the magnitude of the rating impact has not been fully determined. A CreditWatch listing, however, does not mean a rating change is inevitable, and when appropriate, a range of potential alternative ratings that we believe could result will be shown. CreditWatch is not intended to include all ratings under review, and rating changes may occur without the ratings having first appeared on CreditWatch. The "positive" CreditWatch designation means that a rating may be raised; "negative" CreditWatch means a rating may be lowered; and "developing" CreditWatch means that a rating may be raised, lowered, or affirmed." (p. 2)

"Standard & Poor's uses CreditWatch when it believes that the likelihood of rating action within the next 90 days is substantial. Standard & Poor's will place a rating on CreditWatch if we determine that there is at least a one-in-two likelihood of a rating change within 90 days. From time to time, there may be events or issues that present such significant uncertainty to the creditworthiness of an issue or issuer that a rating is placed on CreditWatch without the need to assess this threshold of potential change." (p. 3)

"A Standard & Poor's rating outlook indicates our view regarding the potential direction of a long-term credit rating over the intermediate term (typically six months to two years). In determining a rating outlook, consideration is given to any changes we see in the economic and/or fundamental business/financial conditions. An outlook is not necessarily a precursor of a rating change or future CreditWatch action.

- Positive means that a rating may be raised.
- Negative means that a rating may be lowered.
- Stable means that a rating is not likely to change.
- Developing means a rating may be raised or lowered.
- N.M. means not meaningful.

Rating outlooks (other than stable) and CreditWatch are used in a changing credit situation when, in our view, a rating change is not certain. Although many rating changes are preceded by a non-stable outlook or a CreditWatch placement, changes can and should occur even when the outlook is stable or the rating is not on CreditWatch but when an abrupt change in the creditworthiness can be assessed immediately. Standard & Poor's priority is always to
get the rating appropriate as quickly as possible, even if a rating change is not signaled in advance because of unanticipated circumstances." (p. 2)

"Similar to CreditWatch, an outlook indicates our view regarding the potential for a rating change and its direction. In contrast to CreditWatch, an outlook generally is assigned as an ongoing component of long-term ratings, where appropriate, to corporate and government entities (except when the rating is on CreditWatch) and some structured finance ratings. Outlooks have a longer time horizon than CreditWatch listings and incorporate trends or risks that we believe have less-certain implications for credit quality. The time frame for an outlook generally is up to two years for investment grade and generally up to one year for speculative grade. The shorter time frame for speculative-grade outlooks reflects the very nature of speculative-grade credits: They are more volatile and more susceptible to nearer-term refinancing risks, liquidity issues, and covenant triggers." (p. 4)