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# Do credit rating agencies provide valuable information in market evaluation of sovereign default Risk? ☆

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ABSTRACT

We assess the marginal information value of credit rating announcements on market pricing of sovereign risk as measured by CDS spreads. We demonstrate that accurate assessment of the effect of credit rating changes must be conditioned on relevant information known prior to the rating change. To this end, we include macroeconomic conditions and the watch or outlook status of the bond immediately prior to the rating change in our information set. The empirical work employs a dynamic panel macroeconomic model with 56 countries using monthly data from January 2004 through August 2012. We find that watch/outlook status plays a critical role in accurately determining the information value of credit rating changes, with point estimates in some cases changing by a factor of eight. CDS spreads respond most strongly to credit rating changes when bonds are on stable status, but also respond significantly when bonds are on outlook status. The least response is found for bonds on watch status at the time of the downgrade—the downgrades in these cases are largely anticipated, and the information value incorporated at the time of the negative watch announcements.



## 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] Credit rating agencies (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]

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[1] See Kiff and Nowak (2012) 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 et al. (2006).

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Despite the potential 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.[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 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 in the European Union.[6] A European Commission 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 a pervasive role in the pricing of sovereign risk. CRAs may primarily gather publically available information from various sources, incorporating this into a single measure of default risk. Markets in this case would most likely have already incorporated the same information used by CRAs into risk pricing, such as macro fundamentals, with little value added by the agencies and resulting in only a small price effect from rating changes. Moreover, market response to credit rating changes should be affected by whether a sovereign bond had already been placed on watch or outlook status by the CRA – a signal designed to forewarn market participants of changing economic and political conditions, rating reviews and possible future rating changes.

In this paper we assess the extent to which macroeconomic developments and watch/outlook status, information known prior to rating changes, influences marginal information value of CRAs' announcements. If rating agencies mainly follow existing market-pricing of sovereign risk in assigning credit ratings or are simply reacting to macroeconomic information that is already publically available, then actual announcements should have little or no effect on prices, especially when taking into account existing watch and outlook status of the bonds. The latter consideration also motivates us to separately measure the information value of outlook and watch announcements from credit ratings to determine whether they are systemically incorporated into market pricing of sovereign default risk once macroeconomic factors and existing pricing of default risk are taken into account.

We employ a panel framework with monthly data in this study, departing from most previous work focusing on event studies using daily data, allowing us to explore macroeconomic and dynamic effects as well as to measure longer-term adjustments. A generic downside of event studies typically employed in this literature is that they are neither informative regarding the longer-term adjustments induced by rating changes nor capture macroeconomic controls. 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, defined by countries with functioning CDS markets over the period and with sovereign bonds rated by the CRAs. E.g. CDS transactions on sovereigns have been severely regulated in the EU in recent years, virtually eliminating the market on CDS for sovereign bonds.

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 discuss the hypotheses and methodology (in Section 4), and present data and our basic results (Section 5). We conclude in section.

## 2. Literature review

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% of the cross-country variation in spreads. While most of the correlation appears to reflect similar interpreta-

[5] However, the 2015 OCR report documented continued problems with how CRAs function and that in many instances they have failed to follow regulator rules 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.

[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 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.

tions 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. One part of their study considers macroeconomic developments coinciding with credit rating changes but are limited by a small sample size (35 observations) and do not control for outlook or watch status.

Several empirical studies find that negative-rating events impact own country equity and bond market prices, 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), and 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 Gwilym (2013) also find that credit rating agencies' signals affect own-country exchange rates and identify spillover effects. 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. However, using daily data, they do not control for macroeconomic developments or outlook/watch status prior to the credit rating change.

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. They also do not control for macroeconomic factors or outlook/watch status prior to the credit rating change.

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 rating upgrades lower sovereign spreads on average by 11 bps over a two-day period, and downgrades raise spreads by 67 bps. However, neither of the mean changes in CDS spreads are statistically significant.[8] 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) but 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. This study does not control for macroeconomic developments but does attempt to incorporate outlook and watch status by added a positive or negative numerical value to the bond rating (itself a given numerical value).

Similar to our work, several studies employ 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. (2013b) also consider 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 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, but not CRA announcements, Beirne and Fratzscher (2013) analyze the drivers of sovereign risk for 31 advanced and emerging economies. They show 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. Their paper also finds evidence for herding contagion – sharp, simultaneous increases in sovereign yields across countries – but that 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. (2013a,b) investigate the extent to credit rating changes as well as macroeconomic and financial factors account for CDS pricing in 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

[8] 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 and Remolona (2006)). However, they do not report these results in the article.

between credit rating changes and spreads shifted markedly between the pre-crisis and crisis periods. Their sample is focused on Europe, however, and does not fully control for watch and outlook status prior to CRAs' rating announcements.

In sum, studies of credit rating agency announcements on bond prices and CDS spreads find mixed results. Most studies find a price response to announcements but empirical results sharply differ on whether positive or negative announcements are most important. Studies also differ on whether credit rating announcements or outlook/watch announcements have the greatest impact on bond prices or CDS spreads. All of these studies make important independent contributions to the literature but do not adequately account for macroeconomic developments or outlook/watch status prior to CRA announcements. Our conjecture is that the mixed results in the literature may be in part attributable to the absence of these controls in measuring the market-pricing impact of CRA announcements.

## 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 convert the alpha-numeric scales provided by each CRA to a numerical coding for each rating grade (Appendix Table A1). 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 (Standards 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 (Standards and Poor's, 2012).

**Table 1**
Average credit ratings (long-term foreign currency) across rating agencies.[a]

| | 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 |

[a] Average of monthly rating (level) over full sample, 2004–2012.

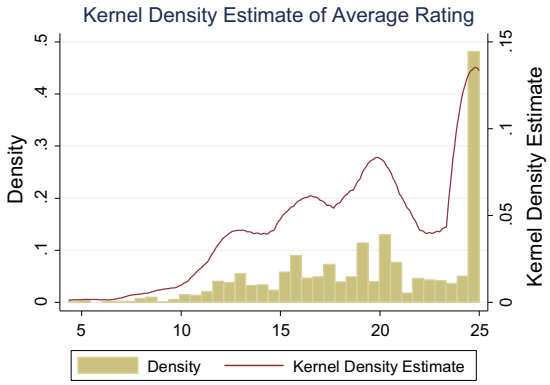


**Fig. 1.** Distribution of rating.

There are large variations across countries in the average credit ratings, but only modest differences in average ratings across the rating agencies for any given country (Table 1). 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 (Appendix Table A2). 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.

Fig. 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 means that a rating may be raised (lowered). The somewhat odd term "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.

674 outlook and watch designations were announced during the sample period, most by S&P (247) and least by Fitch (197).[9] The countries with an especially large number of outlook and watch announcements, representing countries with substantial turbulence in sovereign debt markets, are not surprising: Brazil, Bulgaria, Cyprus, Estonia, Iceland, Indonesia, Pakistan, Peru, Turkey and Ukraine. 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, Fig. 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

[9] Appendix Table A5 shows the number of outlook and watch announcements during the sample period.

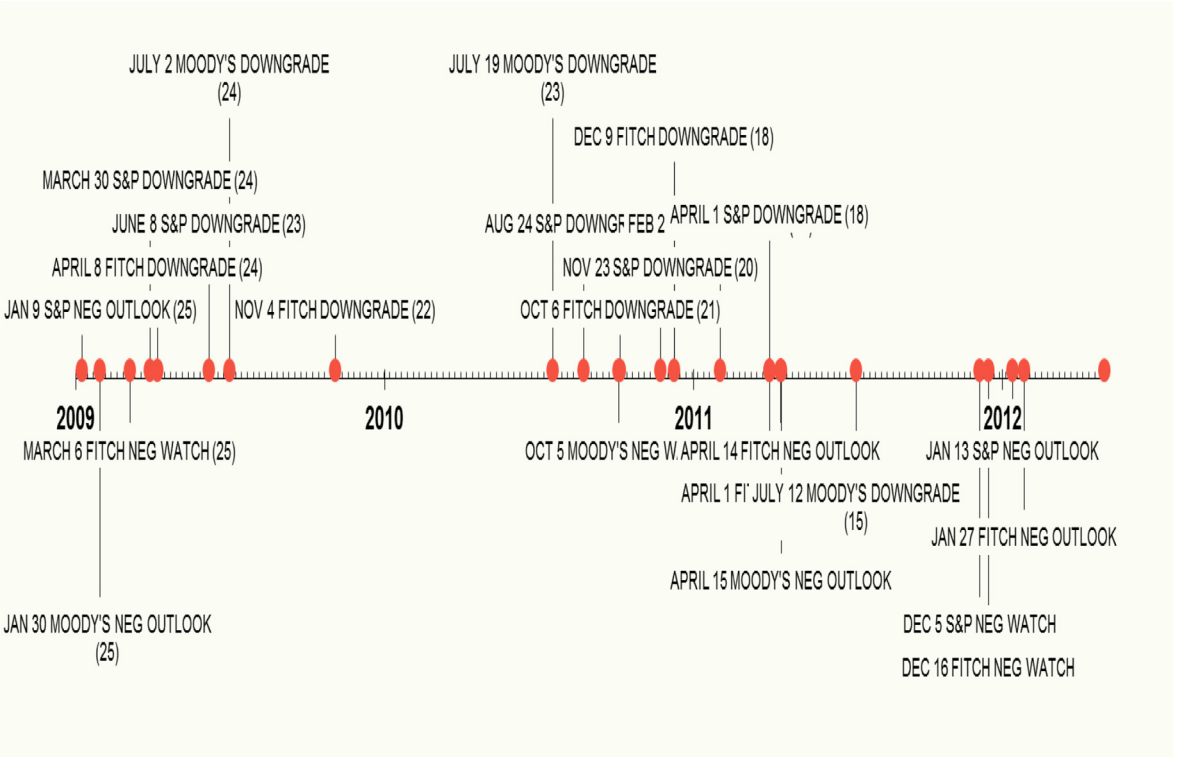


**Fig. 2.** Ireland-credit downgrades, watch and outlook announcements 2009–12.

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*

Tables 2a and 2b shows the number of credit rating changes (upgrades and downgrades ) 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. Tables 3a and 3b (Tables 4a and 4b) is analogous to Tables 2a and 2b 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 positive outlook or watch was 12 (10) months prior to the upgrade. 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. 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.

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 5a–5c presents

**Table 2a**
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 |
| MOODY'S | 59 | 57 | 4.67 | 4.00 |
| TOTAL (average) | 204 | 193 | (5.78) | (4.33) |

**Table 2b**
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 |
| MOODY'S | 52 | 44 | 14.42 | 12.00 |
| TOTAL (average) | 203 | 135 | (12.42) | (10.33) |

**Table 3a**
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 |
| MOODY'S | 59 | 47 | 5.53 | 5.00 |
| TOTAL (average) | 204 | 169 | (8.06) | (5.83) |

**Table 3b**
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 |
| MOODY'S | 52 | 27 | 16.75 | 18.50 |
| TOTAL (average) | 203 | 114 | (11.05) | (11.50) |

**Table 4a**
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 |
| MOODY'S | 59 | 33 | 2.58 | 3.00 |
| TOTAL (average) | 204 | 81 | (2.29) | (1.67) |

**Table 4b**
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 |
| MOODY'S | 52 | 26 | 2.81 | 3.00 |
| TOTAL (average) | 120 | 30 | (2.53) | (2.50) |

**Table 5a**
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 |
| MOODY'S | 111 | 32 | 100 | 94 | 85 |

**Table 5b**
Rating downgrades without outlook/watch changes.

| | Number of downgrades | Number of downgrades not coincided/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 |
| MOODY'S | 59 | 20 | 54 | 47 | 45 |

**Table 5c**
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 |
| MOODY'S | 52 | 12 | 46 | 47 | 40 |

these statistics for the three CRAs. These tables show 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 5a shows that S&P had 78 outlook/watch changes in a given month that were not coincident with an 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 an 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 month prior (t – 2), and so on.

Table 5d 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.

**Table 5d**
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 | 231 | 296 | 355 |
| FITCH | 133 | 183 | 245 | 299 |
| MOODY'S | 152 | 219 | 264 | 307 |

These summary statistics suggest that outlook and watch designations provide imperfect signals forewarning of changes in credit ratings, and they differ by (1) watch or outlook designation, (2) the timing between outlook/watch designations and credit rating changes, and (3) whether the designations are positive or negative outlook/watch. These designations are important to determine the current information value to markets of a credit rating change, but refined measures to distinguish between the type of designation (watch/outlook) and the sign (positive/negative) would appear to be critical in this evaluation. This is undertaken in the following sections.

## 4. Hypotheses and methodology

### 4.1. Hypotheses

The major objective of this study is to investigate the market reaction in the sovereign bond CDS market to announcements by CRAs after controlling for macroeconomic conditions and the prior watch or outlook status of the bonds. We seek to measure the "marginal" information value of CRA "news" incorporated into sovereign default risk pricing. In addressing this issue, we consider news announcements independently and conditional upon macro conditions and whether the country is 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. The related issue, also investigated, is how the market responds to watch and outlook announcements when conditioned on macroeconomic fundamentals. Moreover, following the extant literature, we determine asymmetries in respond to credit rating upgrades and downgrades as well as positive and negative watch/outlook announcements.

### 4.2. Methodology

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

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

where $\Delta CDS_{it}$ is the change in the credit default swap spread (in basis points),[10] $\Delta CreditRating_{it}$ is the announcement of the change in the credit rating scale variable (positive or negative), $Watch_{it}$ is the announcement of the watch or review designation (positive or negative), $Outlook_{it}$ is the announcement of the outlook designation (positive or negative), and $\varepsilon_{it}$ indicates a random error term. Country fixed effects are also included in the estimation.

We compare our baseline equation above to a model including macroeconomic conditions ($Z_{it}$) to more precisely measure the marginal information value of CRA announcements:[11]

$$\Delta CDS_{it} = \beta_0 + \beta_1 \Delta CDS_{it-1} + \beta_2 \Delta CreditRating_{it} + \beta_3 Watch_{it}^{N} + \beta_4 Watch_{it}^{P} + \beta_5 Outlook_{it}^{N} + \beta_6 Outlook_{it}^{P} + \beta_7 (Z_{it}) + \varepsilon_{it} \quad (2)$$

We then consider the effect of credit rating changes conditional upon the country being on the watch list prior to the announcement:

$$\Delta CDS_{it} = \beta_0 + \beta_1 \Delta CDS_{it-1} + \beta_2 \Delta CreditRating_{it} + \beta_3 Watch_{it}^{N} + \beta_4 Watch_{it}^{P} + \beta_5 \Delta CreditRating_{it} * Watch_{it-1}^{N} + \beta_6 \Delta CreditRating_{it} * Watch_{it-1}^{P} + \beta_7 (Z_{it}) + \varepsilon_{it} \quad (3)$$

Finally, in an equation analogous to (3), we consider the effect of credit rating changes conditional upon the country being on the outlook list prior to the announcement.

We estimate these equations and several additional specifications to measure the information value of CRA announcements. 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 $\Delta CDS$ are used as instruments (the number of lag is determined by $T_i$-$p$-2).

Arellano and Bond (1991) procedure allows the introduction of other endogenous variables. We treat contemporaneous credit rating changes ($\Delta CreditRating_{it}$) 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 collaps-

[10] The change in CDS is modelled since the CDS variable is non-stationary in levels. We performed two alternative panel unit root tests, Im-Pesaran-Shin and Fisher tests, both with the null hypothesis that all panels contain unit roots. Both test results indicate that CDS spreads are non-stationary in levels while stationary in first differences. Detailed results omitted for brevity but are available from the authors upon request.

[11] The next section discusses the macroeconomic controls.

ing 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 to 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.[12] We report robust standard errors to control for heteroscedasticity and autocorrelation.

## 5. Data and empirical results

### 5.1. Data and descriptive statistics

We use monthly data in our analysis ranging from January 2004 to August 2012. We end our sample in 2012 because of a major European regulatory change in sovereign CDS markets in the European Economic Area at the time, banning uncovered purchases of CDS ("naked" positions). This change virtually brought to a halt sovereign CDS trading in 26 EU countries at the time (affecting almost half of our sample of countries), changed the group of market participants and created a structural break in the sample.[13] Daily data on CDS prices taken from Markit is averaged into monthly values.[14] 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 $1000 to insure $10 million of debt.[15] The description, transformation and source for each of the variables used in the empirical analysis are given the data appendix.

Our macro/financial control variables are stock prices, commodity prices, the VIX and inflation. Data sources and definitions are given in appendix Table A4. These are standard controls in the literature, readily available public information in all the countries in our sample, and are largely known to market participants at the time of credit rating announcements.[16] The state of the economy is reflected in stock prices; commodity prices are especially important in emerging markets; VIX reflects general uncertainty, risk and turbulence in financial markets; and inflation is a general macroeconomic indicator. Appendix Table A5 provides summary statistics on CDS spreads, credit ratings, and the macro/financial controls for the countries in our sample, showing country means, medians, standard deviations, minimum and maximum values and the number of observations. There is a 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.[17]

### 5.2. Preliminary: Linkage between CDS and credit ratings

Fig. 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 2012.[18] Trading in CDS markets in EU countries has virtually disappeared since that time. Clear negative relation-

[12] The static model estimates are not reported for brevity but are available upon request.

[13] Credit default swaps were at one point a major focus of public discussion surrounding the 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, January 31, 2014. The April 2013 IMF Global Financial Stability Report's Chapter 2, "A New Look at the Role of Sovereign Credit Default Swaps," focuses on CDS markets, discusses and criticizes the EU ban on uncovered positions, and documents the subsequent collapse in sovereign CDS trading in Europe.

[14] 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.

[15] 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 $0.0197 \times 10$ million = $197,000 per year.

[16] The exception is inflation, which is normally released with a one- to two-month lag. However, inflation is a trending variable and accurate forecasts of inflation are generally available.

[17] 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).

[18] 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, January 31, 2014.

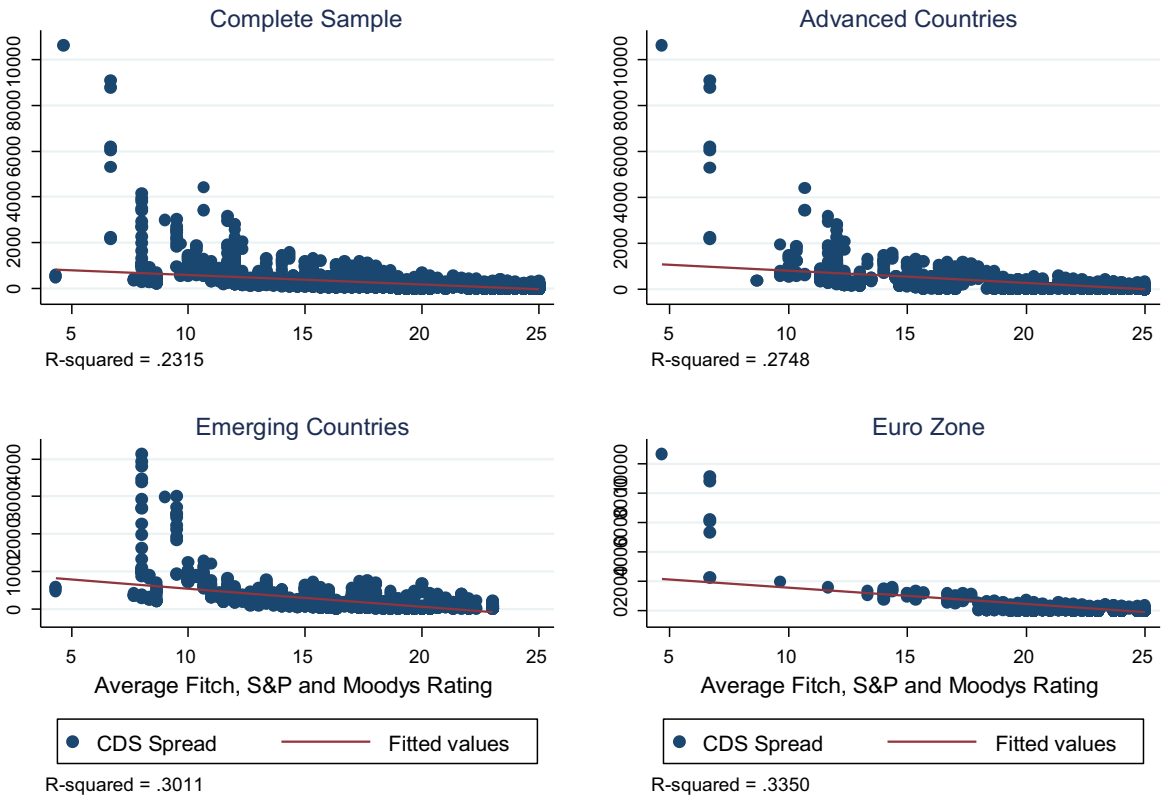


**Fig. 3.** CDS spread and credit rating level.

ships 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 other advanced economies.

### 5.3. Signals: Market response to rating change, watch and outlook announcements

Table 6 is our baseline "signals" model. It presents estimates of the basic model with and without macroeconomic controls where the dependent variable is the change in the CDS spread. Column (1) regresses the change in the CDS spread ($\Delta CDS$) on the lagged dependent variable and the change in the credit rating ($\Delta CR$). Column (2) adds four macroeconomic control variables to the basic model: change in stock prices ($\Delta StockPrice$), change in commodity prices ($\Delta CommodityPrice$), change in the *VIX*, change in inflation ($\Delta Inflation$) and a constant.[19] Column (3) enters positive and negative watch and outlook announcements (signals), as well as stable-developing announcements, to the regression, leaving out the credit rate change. Column (4) adds both the credit rating changes and the credit/watch announcements. Column (5) adds an interaction term consisting of the change in credit rate multiplied by a dummy variable (Downgrade) 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 and negative credit rating changes (given by the sum of the coefficients listed at the bottom of the table).

Column (1) of Table 6 indicates that a one unit credit rating upgrade (downgrade) lowers (raises) CDS spreads by 31 basis points. This point estimate is almost identical to the point estimate (30 basis points) when macroeconomic controls are included (column 2). The lagged dependent variable is statistically significant (estimate of 0.19) as are the control variables (with the expected signs) – lower CDS values are associated with positive equity price and commodity price changes, and higher CDS values are associated with positive VIX and inflation changes. There are 4784 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. These two regressions establish the baseline by which to evaluate other CRA announcements.

Column (3) shows CRA announcements (positive and negative watch; positive and negative outlook; stable-developing) except for the change in credit ratings. In this case, negative watch announcements are statistically significant with the expected positive sign. A negative watch announcement is estimated to increase CDS spreads by 57 basis points after con-

[19] We also included 3 additional macroeconomic control variables in Table 6 (and Table 7) with industrial production: month-to-month industrial production growth, year-over-year industrial production growth, and the 3-year standard deviation of industrial production growth. Only in one case is the variable marginally statistically significant (10% level), and no results are materially affected.

**Table 6**
Signals – dependent variable: change in CDS spread.

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| ΔCDS(-1) | 0.210** | 0.185** | 0.187** | 0.183** | 0.181** |
| | (0.092) | (0.083) | (0.076) | (0.082) | (0.082) |
| ΔCR announcement | −31.484*** | −30.400*** | | −28.520** | −9.267** |
| | (11.207) | (11.493) | | (11.233) | (3.799) |
| ΔCR announcement * downgrade | | | | | −61.830* |
| | | | | | (34.594) |
| Downgrade | | | | | −50.479 |
| | | | | | (42.828) |
| Neg watch announcement | | | 56.705** | 44.695** | 38.735* |
| | | | (22.929) | (20.882) | (20.419) |
| Neg outlook announcement | | | 15.885 | 11.008 | 9.623 |
| | | | (11.799) | (10.417) | (10.172) |
| Stable-developing announcement | | | 13.293 | 5.207 | 4.358 |
| | | | (23.824) | (23.001) | (22.980) |
| Pos watch announcement | | | 4.083 | 4.649 | 4.926 |
| | | | (5.101) | (5.043) | (5.053) |
| Pos outlook announcement | | | −5.971 | −3.480 | −4.267 |
| | | | (7.280) | (7.108) | (7.213) |
| ΔStock price | | −2.159*** | −2.236*** | −2.153*** | −2.103*** |
| | | (0.534) | (0.557) | (0.528) | (0.527) |
| ΔCommodity price | | −1.461*** | −1.417*** | −1.452*** | −1.484*** |
| | | (0.339) | (0.344) | (0.336) | (0.347) |
| VIX | | 0.276** | 0.320** | 0.255** | 0.284* |
| | | (0.133) | (0.145) | (0.130) | (0.160) |
| ΔInflation | | 6.686*** | 6.836*** | 6.760*** | 6.807*** |
| | | (2.431) | (2.471) | (2.449) | (2.449) |
| Constant | 2.786 | −1.527 | −3.101* | −1.673 | −3.199 |
| | (1.706) | (1.519) | (1.804) | (1.588) | (2.277) |
| Observations | 5346 | 4784 | 4784 | 4784 | 4784 |
| Hansen J statistic | 51.95 | 54.71 | 54.51 | 53.67 | 52.00 |
| p value of Hansen statistic | 0.360 | 0.267 | 0.273 | 0.300 | 0.358 |
| AR(2) test statistic | −1.460 | −1.414 | −1.299 | −1.381 | −1.420 |
| p value of AR(2) | 0.144 | 0.157 | 0.194 | 0.167 | 0.156 |
| Coefficient sum for downgrade | | | | | −71.1** |
| p-value | | | | | 0.040 |

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

trolling 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 (4), with a credit rating announcement moving CDS spreads by an estimated 29 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, again 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 (5) of Table 6 with both $\Delta CR$ and the $\Delta CR{*}Downgrade$ interactive term. The estimates indicate significant asymmetry – an upgrade announcement decreases CDS spreads by 9 basis points, while a downgrade announcement increases CDS spreads by 71 basis points (shown at bottom of table) – a difference of about 8 times in magnitude of response. The other signals estimates, as well as the estimated coefficients for the macroeconomic controls, are very similar to the previous (column 4) specification.[20] It is noteworthy that the lagged dependent variable (lagged changes

[20] 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 6 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.

in CDS spread) is statistically significant in all specifications, usually at the 95% level of confidence. The coefficient in the range of 0.18–0.21 suggests that most of the impact of CRA announcements on CDS spreads occur contemporaneously with the long-run impact only 22–27% larger than the short-run impact.

The large impact and strong statistical significance of negative watch and credit rating downgrade signals, together with little measurable 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 former interpretation (market responds less to positive signals) of the negative watch results is consistent for the stylized facts presented in the previous section – the median duration between a negative watch signal and a credit rating downgrade is only 1.7 months. On the other hand, the latter interpretation (positive announcements are less of a surprise) is consistent with a corporate finance literature that suggests that companies are less likely to reveal negative information about the firm than positive information, allowing the latter to be built into the pricing structure. Although intuitive, there is no corresponding "stylized fact" about governments withholding negative economic news relative to positive economic news.

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. Our contribution here is to show that this asymmetry follows through both to sovereign bond markets rating changes and watch announcements, and is robust to including macroeconomic fundamentals.[21]

Table 7 shows the estimation results of the signals model using alternative country samples. The first column reproduces the results from the previous table with the full sample as a basis of comparison. Column (2) reports the model estimates where only countries with credit rating changes are included, i.e. seven advanced economies had no credit rating changes and were therefore excluded from the sample. The exclusion of these countries did not materially change any of the results.

Columns (3) and (4) report the results from dividing the sample into advanced (22 countries) and emerging market (34 countries) economies. Interestingly, CDS spreads in advanced economies respond more than emerging markets to both credit market upgrades (−14 versus −8.6 basis points) and downgrades (88.9 versus 21.5 basis points). The asymmetry in response between upgrade and downgrade actions is also evident, but is much greater for advanced economies than emerging markets. Moreover, CDS spreads in advanced respond strongly to negative outlook announcements, amounting to a 26.1 basis point rise, while those in emerging markets do not. By contrast CDS spreads in emerging markets respond strongly to negative watch announcements (90.2 basis point rise), while CDS spreads on advanced economies do not. No market responses for positive watch or positive outlook are evident. Response asymmetries between negative and positive outlook announcements are therefore centered on the advanced economies, while response asymmetries between negative and positive watch announcements are centered on emerging markets.

### 5.4. Response of rating changes conditional on outlook and watch status

Our estimates of the effect of credit rating changes on CDS spreads may be biased 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. The importance of this issue is suggested by the previous results where the effects of negative watch announcements are often larger than credit rating downgrades.

We address whether being on watch or outlook status (positive or negative prior to the rating change), together with macroeconomic controls, changes the impact of credit rating changes on CDS spreads in Table 8a. 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. Moreover, a change from watch status to a credit rating change should have a smaller effect than a change from outlook status to a credit rating change since the former is more likely to be anticipated by the market.

Columns (1) and (2) of Table 8a include "outlook/watch status" (combined outlook and watch status indicator) combined with both double (credit rating changes multiplied either by positive or negative watch/outlook dummy variables) and triple interaction terms (credit rating changes multiplied by a downgrade dummy and a negative watch/outlook dummy variable).[22] The double interaction term captures the effect of a credit rating change conditional on the bond being on watch/outlook status, and the triple interaction term allows for asymmetry in positive and negative responses. The constant and all constitutive terms are included in the regressions but not reported for brevity, i.e. the constitutive variables in this regression are the downgrade dummy (DD), positive outlook/watch dummy, negative outlook/watch dummy, the interaction DD * Pos

[21] Norden and Weber (2004), Hull et al. (2004) and Norden (2008), for example, find the asymmetry for corporate bond ratings using event study frameworks (without macroeconomic controls). Norden and Weber (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, 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).

[22] Columns (2)–(5) of the regressions in Table 8a include the change in credit rating, the lagged dependent variable and the macroeconomic control variables. Column (1) does not include the macroeconomic controls. Estimates for the macroeconomic controls are very similar to the previous tables and are not reported for brevity.

**Table 7**
Alternative specifications of signals model.

| | Full sample (1) | Only ΔCR (2) | Advanced (3) | Emerging (4) |
|---|---|---|---|---|
| ΔCDS(-1) | 0.181** | 0.174* | 0.059*** | 0.296*** |
| | (0.082) | (0.097) | (0.006) | (0.041) |
| ΔCR announcement | −9.267** | −8.738** | −13.993*** | −8.579** |
| | (3.799) | (3.972) | (5.055) | (3.757) |
| Downgrade | −50.479 | −49.373 | −95.225** | 18.370 |
| | (42.828) | (42.797) | (39.230) | (93.030) |
| ΔCR announcement * downgrade | −61.830* | −62.355* | −74.865** | −12.871 |
| | (34.594) | (35.011) | (30.330) | (73.346) |
| Neg watch announcement | 38.735* | 41.263* | 8.438 | 90.192** |
| | (20.419) | (22.244) | (10.657) | (38.241) |
| Neg outlook announcement | 9.623 | 10.563 | 26.057** | −7.305 |
| | (10.172) | (11.143) | (11.621) | (15.075) |
| Stable-developing announcement | 4.358 | 2.951 | −20.196 | 14.086 |
| | (22.980) | (23.741) | (12.865) | (30.970) |
| Pos watch announcement | 4.926 | 5.983 | −0.002 | 5.788 |
| | (5.053) | (4.889) | (1.198) | (5.268) |
| Pos outlook announcement | −4.267 | 3.596 | 0.962 | −2.823 |
| | (7.213) | (2.450) | (9.550) | (7.979) |
| Observations | 4784 | 4213 | 1883 | 2901 |
| Number of countries | 56 | 49 | 22 | 34 |
| Hansen J statistic | 52.00 | 46.09 | 15.89 | 29.77 |
| p value of Hansen statistic | 0.358 | 0.592 | 0.999 | 0.986 |
| AR(2) test statistic | −1.420 | −1.044 | −0.718 | −1.287 |
| p value of AR(2) | 0.156 | 0.296 | 0.473 | 0.198 |
| Coefficient sum for downgrade | −71.10** | −71.09** | −88.86*** | −21.45 |
| p-value | 0.040 | 0.042 | 0.009 | 0.772 |

Notes: Standard errors are given in parenthesis and adjusted for autocorrelation and heteroscedasticity (robust standard errors). Dynamic panel model is estimated with one-step system GMM. Macroeconomic controls included in regressions but not reported for brevity. The first column is the entire sample of 56 countries (from column 5 of Table 6); the second column reports the regression where countries with no credit rating changes over the sample are excluded (7 countries); the third column reports results for the sample of 22 advanced economies; and the fourth column reports results for the emerging market sample of 34 countries.

*** $p < 0.01$.

** $p < 0.05$.

* $p < 0.1$.

outlook/watch, and the interaction DD ∗ Neg outlook/watch. Note that the outlook/watch dummy variables are 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), and zero otherwise. Column (3) presents a similar model with outlook status, and column (4) reports a model with watch status. All relevant constitutive terms are also included in these regressions.

Column (1) of Table 8a, with no macroeconomic controls, suggests that the fall (rise) in CDS spread in response to a credit rating upgrade (downgrade) if a country is not on positive (negative) outlook or watch status is −11 (5.6) basis points. The point estimate when including macroeconomic controls, column (2), is −7.4 (33.3) when no outlook/watch status is in effect. Including macroeconomic controls markedly increases the estimated effect on CDS spreads from a credit rating downgrade. Once a sovereign is on outlook or watch status, however, differences in estimated effects between the regressions with and without controls is much smaller.

Focusing on the baseline model with controls, column (2), the estimated effect of a credit rating upgrade (downgrade) when the bond is on positive (negative) outlook/watch designation is −4.7 (74.8). The substantial asymmetry evident in these specifications, as in Table 6, continues with the regressions concentrating on outlook and watch designations separately. In particular, column (3) using outlook designations indicates that a credit rating upgrade (downgrade) lowers CDS spreads by −9.7 (395.5) basis points when bonds are not on positive (negative) outlook status. When countries are on outlook status, a credit rating upgrade (downgrade) is estimated to reduce (increase) CDS spreads by −4.0 (49.9) basis points. By contrast, credit rating changes do not have a statistically significant effect on CDS spreads when countries are on watch status.

These results are summarized in Table 8b. Credit rating changes when countries are not on either outlook or watch status have the largest effects on CDS spreads. Moving from outlook designation to a credit rating change has a smaller effect than in cases with no such designation, and large asymmetric effects depending on upgrade or downgrade movements are still evident. However, credit rating changes when countries are on watch status either have small or statistically insignificant effects on CDS spreads.

These results are consistent with our previous observations on the frequency and duration of outlook/watch, outlook and watch designations before credit rating changes. In particular, 40% of the credit-rating downgrades were at the time on

**Table 8a**
Credit rating changes conditional on outlook/watch status.

| | No macro controls | Macro controls included | | |
|---|---|---|---|---|
| | Baseline (1) | Baseline (2) | Outlook (3) | Watch (4) |
| ΔCDS(-1) | 0.206** | 0.181** | 0.187** | 0.170* |
| | (0.092) | (0.082) | (0.076) | (0.088) |
| ΔCR | −10.978** | −7.361 | −9.681** | −7.369* |
| | (5.192) | (5.089) | (4.854) | (3.927) |
| ΔCR * (DD:Downgrade Dummy) | 5.396 | −25.948 | −349.836*** | −0.352 |
| | (6.208) | (19.596) | (117.775) | (18.189) |
| ΔCR * Pos outlook/watch designation | 2.454 | 2.645 | | |
| | (6.308) | (6.089) | | |
| ΔCR * Neg outlook/watch designation | −14.499 | −15.698 | | |
| | (9.469) | (9.614) | | |
| ΔCR * Pos outlook designation | | | 5.699 | |
| | | | (5.306) | |
| ΔCR * Neg outlook designation | | | −61.808*** | |
| | | | (18.314) | |
| ΔCR * Pos watch designation | | | | 5.246 |
| | | | | (10.140) |
| ΔCR * Neg watch designation | | | | −15.501 |
| | | | | (9.929) |
| ΔCR * DD * Neg outlook/watch designation | −54.153 | −25.821 | | |
| | (33.886) | (30.574) | | |
| ΔCR * DD * Neg outlook designation | | | 371.397*** | |
| | | | (120.508) | |
| ΔCR * DD * Neg watch designation | | | | −46.728 |
| | | | | (35.032) |
| Observations | 5346 | 4784 | 4784 | 4784 |
| Hansen J statistic | 50.62 | 51.21 | 53.60 | 52.25 |
| p value of Hansen statistic | 0.410 | 0.387 | 0.302 | 0.349 |
| AR(2) test statistic | −1.514 | −1.483 | −1.337 | −1.493 |
| p value of AR(2) | 0.130 | 0.138 | 0.181 | 0.136 |
| ΔCR effect conditional on pos. watch/outlook | −8.524** | −4.715* | −3.981* | −2.122 |
| p-value | 0.002 | 0.081 | 0.083 | 0.794 |
| ΔCR effect conditional on neg. watch/outlook | 74.23** | 74.83** | 49.93** | 69.95 |
| p-value | 0.036 | 0.028 | 0.002 | 0.111 |
| ΔCR downgrade (not on watch/outlook) | 5.582*** | 33.31* | 359.5*** | 7.721 |
| p-value | 0.002 | 0.059 | 0.002 | 0.666 |

Notes: Standard errors are given in parenthesis and adjusted for autocorrelation and heteroscedasticity. Dynamic panel model is estimated with one-step system GMM. Except specification (1), all macroeconomic controls are included in regressions but not reported for brevity. Constant and all constitutive interaction terms are included in regressions but not reported for brevity.
*** $p < 0.01$.
** $p < 0.05$.
* $p < 0.1$.

**Table 8b**
Summary of effects of credit rating changes conditional on watch/outlook status.

| | Credit rating upgrade | Credit rating downgrade |
|---|---|---|
| (a) No watch/outlook status controls | −9.3** | 71.1** |
| (b) Outlook status controls | | |
| On outlook | −4.0* | 49.9*** |
| Not on outlook | −9.7** | 359.5*** |
| (c) Watch status controls | | |
| On watch | −2.1 | 70 |
| Not on watch | −7.4* | 7.7 |
| (d) Outlook and watch status controls | | |
| On outlook or watch | −4.7 | 74.8** |
| Not on outlook or watch | −7.4 | 33.3* |

negative watch status. 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, indicating that these credit rating changes were largely anticipated.

## 6. Conclusion

Interpreting market responses to credit rating changes accurately must be conditional on the status of the bonds prior to the credit rating change, as well as the direction of the change. We find that controlling for watch and outlook status prior to credit upgrades and downgrades is essential in accurately measuring CDS response, with differences in the estimates varying by up to a factor of eight. The CDS price response is largest if a sovereign bond is downgraded when not on watch or outlook status. Credit rating changes when bonds are on negative outlook status have some effect on market pricing, but no effects are found for credit rating changes when the bond is on watch status at the time. These results are consistent with information theory: when a bond is placed on watch, the credit rating is likely to change soon. Credit rating changes when bonds are on outlook status are less likely than when they are on watch, and the biggest surprise are credit rating changes when bond are neither on watch or outlook designation.

## Appendix

**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). Used as monthly average percentage change in regressions | World Bank Commodity Price Data |
| VIX | Chicago Board Options Exchange Market Volatility Index (implied volatility of S&P 500 index options), monthly average (of daily adjusted close) | Yahoo-Finance |

**Table A2**
Summary statistics.

| Variable | Obs | Mean | Std. dev. | Min | Max |
|---|---|---|---|---|---|
| CDS spread (monthly change, basis pts.) | 5416 | 3.78 | 96.57 | −1597.88 | 3107.92 |
| Rating changes (change in composite index) | 5871 | 0.00 | 0.40 | −8.00 | 8.00 |
| Stock prices (log change) | 5822 | 0.23 | 7.64 | −46.51 | 36.10 |
| Commodity prices[a] (log change) | 103 | 0.93 | 7.40 | −32.53 | 19.15 |
| VIX[a] (level) | 104 | 20.94 | 9.59 | 10.42 | 59.89 |
| Inflation (change) | 5122 | −0.01 | 0.67 | −8.26 | 8.83 |

[a] Repeats across countries.

**Table A3**
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 |

(*continued on next page*)

**Table A3** (*continued*)

| Fitch ratings | S&P ratings | Moody's | Numerical scale |
|---|---|---|---|
| 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 sources of ratings are agencies websites.

**Table A4**
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 A5**
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 |

**Table A5** (*continued*)

| | 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 |
| 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 | South 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 |

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