THE CROSS-BORDER SPILLOVER EFFECT OF CREDIT RATING EVENTS ON SOVEREIGN CDS: EVIDENCE ON THE EMERGING MARKETS

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The cross-border spillover effect of credit rating events on sovereign CDS: evidence on the emerging markets

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Abstract

We document the cross-border spillover impact of S&P sovereign credit rating announcements on the sovereign credit default swaps using an extensive sample of emerging economies, covering a large period from 2004 to 2015. First, we find that downgrades are more likely to spill over into other emerging markets than upgrades, and they do with a greater impact. Second, sovereign credit risk of non-event countries within the same portfolio profit (suffer) from downgrades (upgrades). As expected, it implies a competition effect in terms of sovereign credit risk. However, between representative portfolios of emerging economies, upgrades display an imitation effect, indicating that both upgrades and downgrades affect positively non-event portfolios with a decrease in sovereign credit risk. Finally, there is enough evidence of cross-over effects to support the importance of this study.

1. Introduction

During the last decade, sovereign credit ratings and their impact on sovereign debt have received considerable attention, playing a pivotal role especially for emerging market investments, given the expansion of these economies over the last years. The recent literature confirms that sovereign ratings serve the function of enhancing the transparency of the emerging market's credit risk profile and therefore can significantly influence its national stock and bond market investment flows (Christopher *et al.*, 2012). Kim and Wu (2008) hypothesize that rating changes within emerging markets have significant information value to improve institutional quality for facilitating long-run financial and economic development. In short, sovereign ratings represent valuations of governments' capacity to deal with their financial obligations, as well as their capacity to get better financial conditions[1].

Nowadays, emerging sovereigns are among the largest high-yield borrowers in the world; however, their nature is different to other high-yield obligors. Since rating agencies usually assign them the non-investment grade status, they are more likely to default. However, emerging countries in financial distress generally do not enter bankruptcy proceedings or ever liquidate their assets, but go through debt restructuring mechanisms, which allow them to exchange defaulted bonds for new longer maturity, lower yield debt instruments.

This paper extends the literature related to the effect of credit rating announcements on emerging markets providing new analyses untested to date. The vast majority of results in this topic are related to the response of sovereign bond yield spreads to rating credit events produced in the same country. In this sense, we take a further step in the literature along different ways. Unlike the majority of existing studies that look at a combination of developed and emerging countries, we focus exclusively on emerging markets, given the significant growth that has experienced their credit market in last years. Then, we focus the analysis on the cross-border effect using an extensive sample of emerging economies. Following Wengner *et al.* (2015), we argue that the analysis of the reaction on the country that the event occurs is incomplete, because it does not reveal how much

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[1] Credit ratings changes are widely used in portfolio management, asset pricing and risk management. As pointed in Chiang *et al.* (2007), the news that received substantial attention from policy makers and investors included the announcements of changes in foreign sovereign credit ratings for a particular country in the region.

of the rating announcement's information is country-specific and how much is market-wide. Cross-border analysis allows us to investigate if non-event countries (seem as competitors) benefit or not from the rating event in a given country. The large amount of data used and the existing heterogeneity between all the countries considered, could cause a significant diversity of spillover effects, which we will analyze in terms of country/portfolio. In particular, the data set consists of the sovereign credit default swaps (CDS)[2] and rating announcements for a total of 45 emerging countries, which we use furthermore to construct 7 representative portfolios: BRIC, CIVEST, Eastern Europe, Asia, Middle East Asia, America and Africa. Moreover, given the advantages of CDS spreads instead of bond spreads[3], we use them as a proxy of the sovereign credit risk, covering a large period from 2004 to 2015. To the best of our knowledge, this has not been investigated up to now.

Similar to related literature, we employ the event study methodology (Finnerty *et al.*, 2013; Wengner *et al.*, 2015) to test the cross-border effects both at country and portfolio level. We distinguish between positive (upgrades) and negative (downgrades) rating events to test the potential asymmetry of events. Additionally, we also examine the effect in different time windows, differentiating between periods surrounding the event (around effect), as well as before and after the event (prior and post effects). If the prior-effect is significant it points out that sovereign CDS spreads in non-event countries anticipate sovereign rating events. By contrast, if a post-effect is significant, it indicates that sovereign CDS spreads in non-event countries react after a sovereign rating event occurs. Finally, if we assume emerging economies as competitors, we expect that changes in the credit quality would have an impact on refinancing conditions of cross-border economies. More specifically, we expect that competitors profit (suffer) from downgrades (upgrades) in terms of decreasing (increasing) sovereign credit risk. This means a competitive effect for both negative and positive events.

Our empirical findings show that the spillover effect of downgrades occurs more frequently and with a bigger impact, than the effect of upgrades. As we expected, rating

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[2] CDS is a contract in which the protection buyer makes a series of premium payments in exchange for the right to receive a payoff from the protection seller if the underlying debt defaults. The premium payment made by the protection buyer is called the CDS spread. CDS are quoted in basis points of the notional value of the underlying debt instrument, typically a corporate bond. In fact, theoretically CDS spreads and credit events reflect both, conversely, the credit quality of a particular country/firm.

[3] See for instance, Blanco *et al.* (2005), Norden and Weber (2009) and Jorion and Zhang (2009), among others.

announcements are generally related to a competition effect, supporting the results of Wengner *et al*. (2015) for international corporate CDS. Sovereign credit risk of non-events countries within the same portfolio profit (suffer) from downgrades (upgrades), with an improvement (deterioration) in their sovereign CDS levels. However, upgrades display an imitation effect at portfolio level, where both positive and negative rating announcements affect positively non-event portfolios' credit risk. Furthermore, the several significant cross-over effects findings support the importance of study not only the impact of credit rating announcements on the event country, but also on the non-event countries through spillover analysis.

This study may have useful applications. In fact, it allows to identify the competitive effect produced by credit rating events in emerging cross-border non-event economies. This might help investors to construct appropriately investment portfolios sensitive to sovereign credit risk. In addition, regulators may use these findings when implementing new capital adequacy frameworks for individual countries or portfolios in emerging markets, given the growing importance of the CDS market, which is considered as a good proxy of credit risk.

The remaining part of this study is organized as follows. In the next section, we review the existing literature. Section 3 and 4 describe the data and the cross-border estimation methodology, respectively. Section 5 presents our empirical results and discusses their interpretation and we end with a brief conclusion in Section 6.

2. Literature review

Initial studies have investigated the reaction of CDS spreads to credit events during the last decade, focusing exclusively in the effect on the rerated firm or country. The seminar papers of Hull *et al*. (2004) and Norden and Weber (2004) examine international sovereign and corporate CDS spreads conditional on announcements by rating agencies. Both papers find that CDS market anticipates ratings announcements, especially for downgrades. More recently, Galil and Soffer (2011) confirm that international corporate CDS market response to bad news is stronger than to good news, after controlling for the presence of concurrent public and private information. Based on more extensive sample, Finnerty *et al*. (2013) document the ability of international corporate CDS market to

anticipate favorable as well as unfavorable credit rating announcements, but negative events are better predicted than positive ones.

Besides, the impact of sovereign risk on bank economic and financial performance has recently attracted huge attention given such serious events as the European sovereign debt crisis and the turmoil in Middle East Asia. Following this idea, Williams *et al.* (2013) focus on emerging economies and analyze the effects of sovereign rating actions on the rating change probabilities of the banks within the event country. They find that sovereign rating upgrades (downgrades) have strong effects on bank rating upgrades (downgrades). In the links between potential contagion channels between sovereign credit risk and bank valuations in emerging markets, Williams *et al.* (2015) find strong evidence of a rating channel for the transmission of sovereign risk to bank valuations, while the collateral and guarantee channels only play modest roles.

However, all the previous studies focus on the direct effect, that is, the effect of a rating event of a certain country/firm within itself. A growing strand of the literature focus on cross-border spillover effects, measuring whether the impact of rating events also extends to economies beyond the respective country. In this line, Gande and Parsley (2005), Ferreira and Gama (2007) and Afonso *et al.* (2012) examine the cross-border effect of sovereign credit ratings on international sovereign bond spreads, stocks and European Union sovereign bond and CDS spreads, respectively. They all find the existence of asymmetric spillovers, with the effect of downgrades being the more pronounced. More recently, Böninghausen and Zabel (2015) confirm previous results, studying the impact of sovereign rating events on international sovereign bond market[4]. In addition, their results suggest that the effect is more pronounced for countries within the same region. In this line, Christopher *et al.* (2012) using data of emerging countries analyze the effects of credit ratings on time-varying stock and bond market correlations with their respective regional markets. They conclude that co-movements within a region respond heterogeneously to sovereign ratings' information. Finally, at international corporate level, Wengner *et al.* (2015) investigate the impact of rating events on the CDS spreads not only for the event firm but also for the non-event firms. Their empirical findings suggest the existence of spillover effects on competitors.

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[4] By contrast, Alsakka and ap Gwilym (2012) document symmetric spillover responses to positive and negative sovereign credit rating news on the foreign exchange market.

This paper contributes to the literature that investigates the spillover impact of sovereign rating announcements on the sovereign credit risk markets, concretely through sovereign CDS spreads of emerging markets. Nowadays, CDS spreads represent the direct prices of credit risk and therefore are the most suitable sources for such studies. Besides, the election of emerging sovereigns is basically due to the special nature of their default risk, and also because they are among the largest high-yield borrowers in the world.

In this sense, this paper is closely related with Ismailescu and Kazemi (2010) that investigate the cross-border spillover impact of sovereign credit events on sovereign CDS spreads during the period 2001-2009. They find that upgrades are more likely to spill over to the emerging economies. However, we differ from their paper in several ways. Related with the data, we have doubled the emerging markets analyzed and the sample period includes the more recent period, concluding in March, 2015. Following Wengner *et al.* (2015) among others, we use the event study methodology to test a great variety of different spillover analysis. We run the cross-border analysis at portfolio and country level, the latter using all the available emerging economies in the sample as well as within each portfolio. Besides, we study not only the effect during the days surrounding the event, but we also analyze the effect before and after the event occurs. Our research not only complements but also deepens the literature on international information transmission across emerging countries via examining the impact of sovereign rating changes in the sovereign CDS.

3. Data

We use two major datasets. One consists of daily sovereign CDS spreads, collected from Datastream, for 45 emerging countries. We consider US dollar denominated, senior tier and 5-year CDS quotes, since these contracts are the most liquid and largest of the segment of the emerging economies' CDS market (Jorion and Zhang, 2007, Ismailescu and Kazemi, 2010 and Eichengreen *et al.*, 2012, among others). The sample comprises a wide period from January 1, 2004 to March 4, 2015, with 114,587 unbalanced panel observations for 2,915 days. Our interest in sovereign emerging markets is twofold. Firstly, since rating agencies usually assign them the non-investment grade status, they are more likely to default. However, they do not fall into default in classical terms due to the special nature of their default risk.

The 45 emerging countries[5] have been classified in seven representative portfolios, selected as follows. The first portfolio is the well-known BRIC portfolio (P1), which is comprised by Brazil, China, India and Russia. This is a sub-group of emerging countries with a remarkable strong development over the recent years. Secondly, CIVEST portfolio (P2) is constituted by Colombia, Egypt, Indonesia, South Africa, Turkey and Vietnam. These economies are considered very promising and they have been called the new BRICs. The remaining five portfolios are formed by geographical zone. Eastern Europe portfolio (P3) is formed by Bulgaria, Czech Republic, Estonia, Hungary, Lithuania, Poland, Romania, Slovakia and Slovenia. Asia portfolio (P4) is comprised by Kazakhstan, Pakistan, Philippines, Malaysia, Thailand, South Korea and Sri Lanka. Middle East Asia portfolio (P5) is constituted by Bahrain, Israel, Lebanon, Qatar and Saudi Arabia. America portfolio (P6) includes Argentina, Chile, Costa Rica, Dominican Republic, El Salvador, Guatemala, Mexico, Panama, Peru, Uruguay and Venezuela. Finally, Africa portfolio (P7) closes the list and is formed by Ghana, Morocco and Tunisia.

Table 1 presents the descriptive statistics on the CDS data for each country and portfolio, while Figure 1 illustrates the daily time evolution of the mean CDS spreads through all the countries in the sample (Panel A), and the seven portfolios (Panel B).

CDS spreads differ substantially by country and portfolio[6]. The maximum values in the sample are observed for Asia and America portfolios with 1,652.64 bps (due to Pakistan and Sri Lanka) and 1,066.99 bps (due to Venezuela and Argentina), respectively. The mean of CDS spreads range from 130.06 bps for Eastern Europe (with Czech Republic presenting the minimum mean of the sample) to 324.01 bps to America (with Argentina and Venezuela displaying the maximum means of the sample). It is noticeable the sharp increase in the CDS premiums during 2008, which corresponds to the global financial crisis. It affected to all portfolios with a bigger impact in Asia and America. After 2009 they strongly decrease, but still exceeding the values they had before the crisis. Overall, all portfolios display a quite stable pattern with the exception of America, which

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[5] We retain all the emerging countries with available data in our sample period. Furthermore, we exclude countries for which no S&P rating history is available.
[6] Since the 45 emerging countries considered in the study represent a very heterogeneous sample, the significant differences between the descriptive statistics are not unexpected.

experiences a considerably intense rise after 2012, reflecting the Argentine and Venezuelan credit risk troubles.

Our second data set contains credit rating events that occur for all the emerging countries considered and for the same period as the CDS data. We collect rating announcement events from S&P's Sovereign Rating and Country Transfer and Convertibility Assessment Histories. Previous studies show that S&P rating changes occur more frequently, are less predictable by markets, and antecede those of other rating agencies (Gande and Parsley, 2005, Reisen and Von Maltzan, 1999). In this study a credit rating event consists of a change in a country's actual rating, a change in its review for a rating change or its entrance in the watch-list for a possible rating change. Positive (negative) events are upgrades (downgrades) of S&P's letter credit ratings or revisions in the sovereign's credit outlook, as well as in the watch-list.

Table 2 displays the distribution of credit rating events per year (Panel A) and per country and portfolio (Panel B). We observe a total of 373 credit rating announcements for the 45 emerging countries in our sample, where positive and negative rating events are slightly asymmetrical, with 197 upgrades in contrast with the 176 downgrades[7]. This is also the case at portfolio level for CIVEST, Asia and Middle East Asia, which have almost the same number of upgrades and downgrades. In the other four portfolios this relationship is asymmetrical. BRIC and America display more positive credit rating events, in contrast to Eastern Europe and Africa that present more negative credit rating events. Finally, until 2008 positive events clearly dominate negative ones. However, during 2008, in the global financial crisis context, the tendency changes, and negative events become the most numerous. In addition, 2008 is the year that presents more rating events and concretely more negative ones. This large amount of downgrades in 2008 are directly related with the credit quality of the countries, displayed as a rise in the CDS spreads (Figure 1).

4. Methodology

We employ the standard event study methodology (Kothari and Warner, 1997; Hull *et al.*, 2004; Norden and Weber, 2004; Finnerty *et al.*, 2013), but we apply it to test the cross-border effects. In particular, the cumulative abnormal returns (CARs) of a country

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[7] A similar pattern is observed if we look at the type of the event, with more positive credit rating changes (110 versus 61) and positive outlooks (97 versus 84). The opposite is given in the credit watch-list, which presents only downgrades (21). These results are not shown but available upon request.

(portfolio) around the credit rating event date of a different country (portfolio) will be tested. The aim is to investigate whether the credit rating announcement in a given emerging country (portfolio) has any impact on the sovereign CDS spreads of cross-border emerging economies.

More concretely, in a first analysis we will test the spillover effect on average through all the countries and events considered in the sample, distinguishing between rating upgrades and downgrades. That way, we will be able to analyze whether the cross-border reaction of sovereign CDS is symmetric to positive and negative rating news' responses in a given country. Secondly, we will repeat the previous analysis employing in this case the seven representative portfolios considered, in order to study the effect at portfolio level. Afterwards, we will study whether there is any portfolio that leads the spillover effect among portfolios, with the purpose of isolating each transmitting portfolio. Finally, we will repeat the same steps to analyze the relationships at country level inside each portfolio. In this case, we argue that it seems more likely to find significant spillovers among the countries belonging to the same portfolio, since they are more likely to be seemed as competitors.

The methodology follows a two-stage empirical procedure. The first step consists of calculating at each day t the abnormal return of each CDS series i by applying the following formula:

$$AR_{it} = \Delta CDS_{it} - \Delta Index\ CDS_t$$

where ΔCDS_{it} represents the increment in the credit spread for country or portfolio i at time t, and the $Index\ CDS_t$ is a benchmark that represents the market factor. Following Ismaliescu and Kazemi (2010), this index is calculated as the average of all the CDS considered in the analysis. Therefore, it consists in measuring the adjusted increment in the CDS spread by taking away the increment in a benchmark CDS spread from the absolute increment in the sovereign CDS spread for country or portfolio i to control for changes in sovereign CDS emerging market conditions[8].

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[8] Related literature (see for instance Finnerty *et al.*, 2013), consider a second market index calculated as the average of all the available CDS in the analysis within the same credit rating category. This adjustment would control for the average default risk in a certain rating class. This is an interesting robustness test that we will consider in a further research.

The second step consists of using the abnormal returns to calculate the CAR, which is given by the following equation:

$$CAR_{i(t_1, t_2)} = \sum_{t=t_1}^{t_2} AR_{it}$$

where (t_1, t_2) is the window where we analyze whether the sovereign credit rating announcement in a given emerging economy has any impact on the CDS spreads of cross-border emerging economies. Following previous literature, we first consider a window around the announcement date [-1,1], where the credit rating event date is considered the day zero. To analyze the spillover effects prior and post the event occurs, we consider the windows [-30,-2], [-60,-31] and [2,30], [31,60], respectively[9]. To test the absence of effects we use the standard *t*-test following Boehmer *et al.* (1991)[10].

If a prior-effect is statistically significant means that it exists a significant spillover prior to the event, suggesting that before the event occurs in a given country (portfolio), the sovereign CDS of the others incorporate the rating information. On the other hand, a significant post-effect indicates a significant spillover after the event, suggesting that rating news in a particular country (portfolio) contain new information that has a significant impact on the sovereign CDSs of the other bordering countries (portfolios).

The use of positive and negative credit rating events separately allows us to distinguish two types of effects among countries/portfolios, the competition effect and the imitation effect. If downgrades in a given country/portfolio lead a significant and negative (positive) CAR mean, indicates a decrease (increase) on average of sovereign CDS increments of the rest of the countries/portfolios, which means an improvement (worsening) in their sovereign credit risk. Hence, the investors see the rest of the countries/portfolios as non-substitute (substitute) assets, so there exists a competitive (imitation) effect. Similarly, if upgrades in a given country/portfolio lead a significant and negative (positive) CAR mean, indicates an improvement (worsening) in the

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[9] We do that for the entire sample which means that there is no control for prior (post) credit rating events. As a robustness test it would be appropriate to repeat the analysis for a controlled subsample. In particular, in order to avoid any possible contamination, the credit rating announcements that were preceded by other events in the same country or portfolio in each of the considered windows should be eliminated. We will perform it in a further research.

[10] As a robustness test we use the non-parametric Wilcoxon signed-rank test.

sovereign credit risk of the rest of the countries/portfolios. Hence, the investors see them as substitute (non-substitute) assets, so there exists an imitation (competitive) effect.

If we assume that given a rating announcement in a given country/portfolio, the rest of emerging economies are competitors, we expect that changes in the credit quality would have an impact on refinancing conditions of cross-border economies. More specifically, we expect that competitors profit (suffer) from downgrades (upgrades) in terms of decreasing (increasing) sovereign credit risk. This means a competitive effect for both negative and positive events, which will be reflected in a negative and positive significant CAR, respectively.

5. Results

First of all we analyze the possible spillover effect on average through all the countries and all the events considered in the sample. We observe that there are not significant values in any case[11]. Certainly, there is a notable heterogeneity among the 45 emerging countries considered, hence it is not surprising the absence of cross-over effects between credit rating events and sovereign CDS when considering these markets all together, which does not mean that there are not among some countries. However, it is likely that when considering them on average all together the existing effects cancel out.

In view of the results it seems more convenient to realize the study in terms of portfolios. We repeat the significance test considering the seven CDS spreads emerging portfolios previously constructed (BRIC, CIVEST, Eastern Europe, Asia, Middle East Asia, America and Africa). Panel A in Table 3 exhibits the results.

As we expected, at portfolio level we do find significant spillover effects on average among portfolios. It is outstanding that significant values are observed exclusively prior to the rating announcement. These results suggest that before the event occurs in a given portfolio, the sovereign CDS of the others already incorporate the rating event information. Besides, the negative CAR values for downgrades and upgrades indicate that non-event portfolios profit in terms of an improvement in sovereign credit risk. There is an asymmetric response to negative and positive rating events, with a competitive and imitation effect, respectively (always before the event occurs).

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[11] The results are not shown due to their non-significance, but they are available upon request.

Next, we study the spillover effects of the rating announcements in a given portfolio to the rest, to examine if any portfolio leads the prior-effect previously found in terms of average, or if there are also other effects depending on the analyzed portfolio. The purpose is to isolate each transmitting portfolio and investigate whether its events have on average spillover effects on the rest of portfolios, the latter considered all together. Panel B in Table 3 displays the results.

First of all, it is interesting to observe that, contrary to our expectations, P1 and P2 (BRIC and CIVEST) do not show any type of spillovers. Both are the most developed portfolios in emerging markets, hence it was reasonable to presume that they led the existing average effects among the emerging portfolios. However, results reveal the opposite. Rating announcements given in these portfolios do not seem to affect the sovereign credit risk of the rest of emerging portfolios, suggesting that they are not seem as competitors of the rest of portfolios.

P3 (Eastern Europe), P4 (Asia) and P6 (America) are the ones leading the transmission. These are the only portfolios with significant cross-over effects. The three of them lead the previously observed competition effect for downgrades prior to the event. However, the imitation effect for upgrades (also prior to the event) seems to be due exclusively to P6 (America). Additional significant values are found in P4 (Asia), which were not found in the previous joint analysis, where they probably had balanced out and therefore they were not result significant. In particular, downgrades in Asia profit the non-event portfolios' sovereign credit risk after and around the event (competition effect).

In short, results show that emerging economies profit from sovereign downgrades, in Eastern Europe, Asia and America (prior, post or around the event depending of the transmitter portfolio), and upgrades in America (prior the event). Thus, there is evidence of an asymmetric spillover effect of sovereign credit announcements, with a competition (imitation) effect of downgrades (upgrades) among portfolios.

Finally, we measure the cross-border effect of sovereign rating announcements inside each portfolio at country level. We argue that it seems more likely to find significant spillovers among the countries belonging to the same portfolio, since they are more likely to be seemed as competitors. Thus, we perform an intra-portfolio analysis. Table 4 displays the results.

As we expected, even though the portfolio formed by the most developed emerging countries, BRIC (P1), did not display significant spillover effects to the rest of the portfolios, these effects are found when conducting an intra-portfolio analysis. Downgrades (upgrades) in Russia (Brazil) cause an improvement (deterioration) of the sovereign CDS of the non-event countries inside the portfolio. The effect is of competition in both cases.

A similar pattern is observed in the CIVEST (P2) portfolio. It did not exhibit cross-over effects at portfolio level neither. However, the intra-portfolio analysis underlines some significant effects. Egypt displays a competition effect for downgrades and upgrades, while the case of Vietnam is slightly different. Downgrades profit the non-event sovereign credit risk of the rest of the CIVEST countries before and around the event, but the opposite effect is observed after the event.

Despite Eastern Europe (P3) was one of the portfolios leading the transmission between portfolios, there are not observed significant spillover effects among the nine countries that comprise P3. They are not seem to be considered as competitors in the sovereign emerging market. In fact, at country level only upgrades in Lithuania imply a deterioration of the sovereign credit risk of the rest of Eastern European countries (competition effect).

Asia (P4) was also one of the cross-border effects leader among portfolios. However, on average significant spillover effects among the seven countries that form P4 are not found. More concretely, we observe two countries leading the intra-portfolio transmission with opposite effects. Overall, downgrades in Pakistan (and to a lesser extent in Kazakhstan) display an improvement of the sovereign credit risk in non-event countries (competition effect). By contrast, an imitation effect is observed in the case of negative rating announcements in Philippines. A similar pattern is presented for upgrades. They imply a competition (imitation) effect before they occur in Sri Lanka (Pakistan).

Middle East Asia portfolio (P5) did not exhibit cross-over effects at portfolio level, but it does inside the portfolio at country level. Upgrades (downgrades) in Lebanon profit the non-event countries (competition effect). However, downgrades in Bahrain show a changing effect behavior. They benefit the other countries in Middle East Asia in terms of decreases in sovereign credit risk in the period prior and around the negative event

(competition effect), but the opposite effect (imitation effect) is given after the event occurs.

America portfolio (P6) showed significant spillovers to the rest of portfolios and also shows some significant effects intra-portfolio. Argentina and Venezuela are the only two transmitters among the eleven American countries. Upgrades in Argentina benefit the non-event countries, prior to the event occurs. However, the effect of downgrades is not clear, because it changes depending on the window.

Finally, in the case of Africa (P7) only negative rating announcements in Ghana present after the event a significant competition effect in the sovereign CDS of the rest of the African countries comprising the portfolio.

To sum up our findings provide evidence of asymmetric market reaction around sovereign credit upgrades and downgrades at portfolio level, in which competitors gain advantage in terms of decreasing their sovereign credit risk from upgrades and downgrades in the event portfolio. This means an imitation (competition) effect for upgrades (downgrades). The market reaction is more pronounced among countries within the same portfolio. Overall the results reveal that both downgrades and upgrades have a competition effect on non-event countries. Thus, competitors profit (suffer) from downgrades (upgrades). Accordingly, rating announcements contain information that is both country-specific and market-wide. Roughly speaking, significant spillover effects are found for events in Russia and Brazil (within BRIC portfolio), Egypt and Vietnam (CIVEST), Lithuania (Eastern Europe), Pakistan and Philippines (Asia), Bahrain and Lebanon (Middle East Asia), Argentina and Venezuela (America) and Ghana (Africa). Among them, some particular cases are observed with the opposite effect in contrast to the majority. For instance, downgrades in Philippines affect the non-event countries within Asia negatively with a worsening of their sovereign credit risk. Setting aside this particular cases, our findings support the results found by Wengner *et al.* (2015) for international corporate CDS. Furthermore, it is also remarkable the asymmetry in the results related to positive and negative events since the latter are more frequent and have more impact[12].

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[12] Overall, the results using the non-parametric Wilcoxon singed-rank test do not show significant differences. There are more significant cross-border spillover effects, but the general conclusions hold. The results are not shown, but available upon request.

Finally, we have found sufficient evidence of cross-border effects to support that the impact of credit rating events should not be studied exclusively for the rerated country, as traditional literature does, but also for the non-event countries.

6. Conclusions

We study the cross-border spillover impact of sovereign credit rating announcements on the sovereign CDS spreads using an extensive sample of emerging economies and covering a large period from 2004 to 2015. Traditionally literature has focused on the analysis of the reaction on the country that the event occurs. However, we argue that this study is incomplete, because it does not reveal how much of the rating announcement's information is country-specific and how much is market-wide. Cross-border analysis allows us to investigate if non-event emerging economies (seem as competitors) benefit or not from the sovereign rating event in a given country.

Our empirical analysis show that downgrades are more likely to spill over into other emerging CDS markets than upgrades, and they do with a greater impact. As we expected, rating announcements are generally related to a competition effect (which supports the results of Wengner *et al*., 2015). However, upgrades display an imitation effect between portfolios. In this way, sovereign credit risk of non-events countries within the same portfolio profit (suffer) from downgrades (upgrades). Nevertheless, at portfolio level, both positive and negative rating announcements affect positively non-event portfolios. In this way, we have found sufficient evidence of cross-over effects to support the importance of study not only the impact of credit rating announcements on the event country, but also on the non-event cross-border economies through spillover analysis.

These findings may be useful for practical applications. Investors could evaluate industry models and hedging against the effect of future credit rating announcements in one country to the non-event bordering economies. This information is crucial in order to construct appropriately portfolios sensitive to sovereign credit risk. Moreover, it permits to identify the competition effect produced by negative and positive rating events in cross-border emerging economies. Additionally, given the importance and the increase of the CDS market, which is considered a reasonable proxy of credit risk, these results may also be helpful for future regulators when implementing new capital adequacy frameworks for individual countries and portfolios in sovereign credit risk market.

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Table 1: Descriptive statistics of daily CDS spreads for all the countries and portfolios

This table presents the descriptive statistics for the sovereign CDS spreads for all the 45 emerging countries and 7 portfolios, expressed in basic points. The sample period is from January 1, 2004 to March 4, 2015.

Portfolio / Country	Obs.	Min.	Max.	Mean	Std. Dev.
Brazil	2,915	61.10	900.20	199.59	138.38
China	2,915	9.00	296.70	68.18	45.24
India	2,539	31.00	218.50	73.79	28.47
Russia	2,797	37.00	1,116.70	185.64	147.98
BRIC (P1)	2,915	35.53	546.40	138.55	79.58
Colombia	2,915	64.70	655.90	185.00	113.83
Egypt	2,181	68.50	843.54	356.76	196.92
Indonesia	2,717	91.40	1,256.70	215.04	125.76
South Africa	2,915	23.80	683.30	142.54	85.60
Turkey	1,671	109.82	835.01	212.69	86.47
Vietnam	2,624	51.90	982.90	235.83	112.38
CIVEST (P2)	2,915	62.16	851.75	217.37	92.99
Bulgaria	2,915	13.00	698.16	164.10	131.15
Czech Republic	2,912	4.30	350.00	60.20	54.39
Estonia	2,366	1.00	736.80	121.01	134.30
Hungary	2,915	9.20	729.89	204.43	170.68
Lithuania	2,543	1.00	849.90	178.07	160.13
Poland	2,915	6.80	417.58	91.32	79.61
Romania	2,915	17.20	780.78	199.93	149.30
Slovakia	2,912	4.00	306.01	71.83	71.36
Slovenia	2,915	3.80	488.58	114.33	123.97
Eastern Europe (P3)	2,915	10.63	540.96	130.06	105.95
Kazakhstan	2,490	33.30	1,646.32	220.61	206.99
Pakistan	2,712	146.20	5,105.70	782.05	624.49
Philippines	2,901	79.47	870.00	213.15	127.16
Malaysia	2,915	12.00	520.20	82.32	56.15
Thailand	2,915	24.00	524.20	96.45	58.10
South Korea	2,913	14.00	700.00	86.79	77.14
Sri Lanka	1,728	282.81	3,000.00	578.90	492.47
Asia (P4)	2,915	32.50	1,652.64	260.42	199.67
Bahrain	1,745	96.20	714.50	253.46	99.31
Israel	2,822	15.00	285.41	95.37	56.71
Lebanon	2,915	166.27	955.50	385.75	91.37
Qatar	2,885	7.80	379.60	75.09	55.80
Saudi Arabia	1,741	43.30	335.00	96.24	49.45
Middle East Asia (P5)	2,915	74.19	496.74	180.26	61.78
Argentina	2,758	1.50	4,961.65	1,035.10	1,025.47
Chile	2,915	4.50	315.00	69.33	49.04
Costa Rica	1,867	115.00	381.10	228.32	71.44
Dominican Republic	1,322	0.00	475.52	375.16	53.08
El Salvador	2,380	24.33	548.78	305.21	156.69
Guatemala	1,868	122.96	304.77	209.92	37.68
Mexico	2,915	28.70	606.70	115.95	68.71
Panama	2,915	61.90	613.80	152.04	78.61
Peru	2,835	59.90	611.20	160.71	89.00
Uruguay	1,782	120.82	264.00	165.64	27.97
Venezuela	2,823	118.67	8,588.31	938.62	933.81
America (P6)	2,915	65.50	1,066.99	324.01	190.43
Ghana	1,229	28.67	656.17	373.83	170.60
Morocco	1,884	70.00	500.00	190.42	59.26
Tunisia	2,915	17.96	455.10	173.36	118.46
Africa (P7)	2,915	17.96	409.59	177.48	120.15
Average	2,915	55.09	784.40	215.72	117.97

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Table 2: The distribution of sovereign credit rating events

This table presents the distribution of the credit rating events per year (Panel A) and per country and portfolio (Panel B), distinguishing between positive and negative events for all the 45 emerging countries and 7 portfolios. The sample period is from January 1, 2004 to March 4, 2015.

Panel A: The distribution of credit rating events per year

Year	Upgrades	Downgrades	Total
2004	26	2	28
2005	39	4	43
2006	30	7	37
2007	22	7	29
2008	12	39	51
2009	6	18	24
2010	18	7	25
2011	19	27	46
2012	8	24	32
2013	10	21	31
2014	6	11	17
2015	1	9	10
Total	197	176	373

Panel B: The distribution of credit rating events per country and portfolio

Portfolio / Country	Upgrades	Downgrades	Total
Brazil	10	2	12
China	10	0	10
India	4	2	6
Russia	5	6	11
BRIC (P1)	29	10	39
Colombia	6	0	6
Egypt	1	14	15
Indonesia	10	0	10
South Africa	1	5	6
Turkey	7	3	10
Vietnam	4	4	8
CIVEST (P2)	29	26	55
Bulgaria	6	6	12
Czech Republic	4	0	4
Estonia	6	7	13
Hungary	0	15	15
Lithuania	7	11	18
Poland	5	0	5
Romania	6	3	9
Slovakia	9	2	11
Slovenia	2	9	11
Eastern Europe (P3)	45	53	98
Kazakhstan	5	5	10
Pakistan	5	6	11
Philippines	6	4	10
Malaysia	1	0	1
Thailand	1	3	4
South Korea	3	0	3
Sri Lanka	3	4	7
Asia (P4)	24	22	46
Bahrain	2	8	10
Israel	4	0	4
Lebanon	3	7	10
Qatar	3	0	3
Saudi Arabia	4	1	5
Middle East Asia (P5)	16	16	32
Argentina	4	9	13
Chile	5	0	5
Costa Rica	1	0	1
Dominican Republic	4	5	9
El Salvador	0	5	5
Guatemala	2	1	3
Mexico	5	2	7
Panama	6	0	6
Peru	11	0	11
Uruguay	9	0	9
Venezuela	4	10	14
America (P6)	51	32	83
Ghana	0	4	4
Morocco	3	5	8
Tunisia	0	8	8
Africa (P7)	3	17	20
Total	197	176	373

Table 3: Credit rating events' cross-border effect on emerging sovereign CDS at portfolio level

This table presents the credit rating events' prior, around and post effect on average through all the portfolios and all the events (Panel A) and from each portfolio to the rest of the portfolios (Panel B), distinguishing between positive and negative events. Following the standard event study methodology, the average cumulative abnormal returns (CAR) are shown. The table only reports the windows that result significant, using the standard t-test, at the 10% level (*), at the 5% level (**) or at the 1% level (***).The sample period is from January 1, 2004 to March 4, 2015 for a total of 7 representative portfolios constructed from the 45 available emerging countries.

Panel A: Spillover effects on average for all the portfolios

Panel A: All the portfolios			
Window		Upgrades	Downgrades
prior-effect	[-30,-2]	-1.8529**	-3.8829*
	[-60,-31]		-4.0778**

Panel B: Spillover effects on average from the event portfolio to all the non-events portfolios

Panel B.1: Eastern Europe (P3)			
Window		Upgrades	Downgrades
prior-effect	[-60,-31]		-4.2384*

Panel B.2: Asia (P4)			
Window		Upgrades	Downgrades
post-effect	[31,60]		-6.5086*
around-effect	[-1,1]		-3.8938**
prior-effect	[-60,-31]		-9.1152**

Panel B.3: America (P6)			
Window		Upgrades	Downgrades
prior-effect	[-30,-2]	-2.4184**	-11.6058***

Table 4: Credit rating events' cross-border effect on emerging sovereign CDS at country level inside each portfolio

This table presents the credit rating events' prior, around and post effect on average through all the countries and all the events in each portfolio (Panel A) and from each country to all the rest inside each portfolio (Panel B), distinguishing between positive and negative events. Following the standard event study methodology, the average cumulative abnormal returns (CAR) are shown. The table only reports the windows that result significant, using the standard *t*-test, at the 10% level (*), at the 5% level (**) or at the 1% level (***).The sample period is from January 1, 2004 to March 4, 2015 for a total of 7 representative portfolios constructed from the 45 available emerging countries.

Panel 1: Spillover effects in BRIC (P1)

Panel A.1: All the countries in BRIC (P1)

Window		Upgrades	Downgrades
around-effect	[-1,1]		-9.5532*
prior-effect	[-60,-31]		-50.4352***

Panel B.1: From the event country to all others in BRIC (P1)

Country	Window		Upgrades	Downgrades
Brazil	*around-effect*	[-1,1]	2.1360**	
	prior-effect	[-60,-31]	5.9963**	
Russia	*around-effect*	[-1,1]		-15.8919*
	prior-effect	[-60,-31]		-83.8849***

Panel 2: Spillover effects in CIVEST (P2)

Panel A.2: All the countries in CIVEST (P2)

Window		Upgrades	Downgrades
post-effect	[2,30]		-4.1198*
prior-effect	[-60,-31]		-3.3428*

Panel B.2: From the event country to all others in CIVEST (P2)

Country	Window		Upgrades	Downgrades
Egypt	*post-effect*	[31,60]	14.4653**	-4.1343*
		[2,30]		-4.6701*
	prior-effect	[-60,-31]		-4.4812*
Vietnam	*post-effect*	[31,60]		8.1831**
	around-effect	[-1,1]		-2.1062**
	prior-effect	[-60,-31]		-4.2466*

Panel 3: Spillover effects in Eastern Europe (P3)

Panel B.3: From the event country to all others in Eastern Europe (P3)				
Country	Window		Upgrades	Downgrades
Lithuania	*around-effect*	[-1,1]	1.4435**	

Panel 4: Spillover effects in Asia (P4)

Panel B.4: From the event country to all others in Asia (P4)				
Country	Window		Upgrades	Downgrades
Kazakhstan	*post-effect*	[31,60]		-20.3374**
Pakistan	*post-effect*	[31,60]		-48.3163***
	around-effect	[-1,1]		-33.2748***
	prior-effect	[-30,-2]	-22.9867**	-57.1867**
		[-60,-31]		-43.2519***
Philippines	*post-effect*	[2,30]		10.1600***
	around-effect	[-1,1]		1.8194***
	prior-effect	[-60,-31]		9.0152***
Sri Lanka	*prior-effect*	[-60,-31]	49.4775**	

Panel 5: Spillover effects in Middle East Asia (P5)

Panel A.5: All the countries in Middle East Asia (P5)			
Window		Upgrades	Downgrades
post-effect	[2,30]		2.9694**
around-effect	[-1,1]		-5.0702**
prior-effect	[-30,-2]	6.2836*	-5.6016***

Panel B.5: From the event country to all others in Middle East Asia (P5)				
Country	Window		Upgrades	Downgrades
Bahrain	*post-effect*	[2,30]		3.6926*
	around-effect	[-1,1]		-1.8423**
	prior-effect	[-30,-2]		-9.0700***
Lebanon	*post-effect*	[31,60]		-12.8932*
	around-effect	[-1,1]		-11.3266*
	prior-effect	[-30,-2]	22.5029**	

Panel 6: Spillover effects in America (P6)

Panel A.6: All the countries in America (P6)			
Window		Upgrades	Downgrades
around-effect	[-1,1]		6.3429**
prior-effect	[-30,-2]		-41.3064***

Panel B.6: From the event country to all others in America (P6)				
Country	Window		Upgrades	Downgrades
Argentina	*post-effect*	[2,30]		18.3922***
	prior-effect	[-30,-2]		-62.8105***
		[-60,-31]	13.9301*	21.6077***
Venezuela	*around-effect*	[-1,1]		16.6281**
	prior-effect	[-30,-2]		-66.5719***

Panel 7: Spillover effects in Africa (P7)

Panel B.7: From the event country to all others in Africa (P7)				
Country	Window		Upgrades	Downgrades
Ghana	*post-effect*	[31,60]		-21.6100*

Figure 1: Daily time evolution of CDS spreads

This figure represents the daily time evolution of the emerging market average CDS spreads (Panel A), calculated as the average CDS spreads of all 45 emerging countries, and the daily time evolution of the 7 portfolios' CDS spreads (Panel B), calculated as average of all emerging countries' CDS spreads that are included in the same portfolio. The sample period is from January 1, 2004 to March 4, 2015.

Panel A: Emerging market Average CDS spreads

Panel B: Emerging portfolios CDS spreads