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The influence of rating levels and rating convergence on the spillover effects of sovereign credit actions

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Abstract

This paper assesses contagion and competition as alternative types of stock market spillovers arising from sovereign rating actions. Our research design is based on the premise that the type of spillover effects within and between groups of countries will be influenced by the sovereign rating level, split ratings and the extent of rating convergence i.e. specific types of rating action will induce different and/or stronger effects. The results reveal a clear pattern whereby downgrades of high-rated countries induce contagion to both high and low-rated countries, while downgrades of low-rated countries reveal the opposite i.e. they induce competitive effects. Split ratings are found to intensify stock market spillover effects. Rating convergence/divergence across similarly-rated sovereigns has a meaningful influence on the spillover effects. For the downgrades of high-rated countries, rating convergence mitigates the contagion effect to other high-rated countries in the region, but has very limited effect on the contagion to low-rated countries. For downgrades of low-rated countries, rating convergence strengthens the competitive effect on other low-rated countries but has little effect on the competitive impact on high-rated countries.

JEL classification: G11, G14, G15.
Keywords: Contagion versus Competition; Spillovers; Sovereign credit signals; Split rating; Rating convergence.

1. Introduction

The role of credit rating agencies (CRAs)[1] has been under the spotlight during the recent global financial crisis. Their failures in rating structured finance products had a major influence on the US sub-prime crisis and its consequences. This motivated a tightening of regulations surrounding the CRA industry, especially in the US (e.g. Dimitrov et al., 2015), and the European Union. The regulatory debate ensured that CRAs maintained a high profile globally, which was reinforced by further controversy arising from the timing and severity of their sovereign rating downgrades during the European debt crisis. Subsequent to the latter crisis, a 'new normal' has emerged in the form of an increasing prevalence of differences of opinion among CRAs on sovereign ratings, especially in Europe (e.g. Vu et al., 2015).

The above developments have contributed to a burgeoning academic literature which studies the impact of rating actions (e.g. Baum et al., 2016; Böninghausen and Zabel, 2015; Caselli et al., 2016; Chen et al., 2016; Drago and Gallo, 2016).[2] This recent literature has addressed a number of angles on the impact of CRA sovereign and corporate rating actions on economies and financial markets. For sovereign rating actions, several papers focus on the own-country effects, but as in several historical crisis episodes, the European debt crisis spotlighted the potential spillover effects of these credit actions. This prior literature has identified different types of spillover, broadly termed as contagion (or common) versus competition (or differential) effects. In this paper, several strands of related literature inform the development of competing hypotheses for contagion versus competition effects across countries in high rating and low rating categories. Our approach also has connections with literature on the competition-contagion effects arising from corporate rating actions (e.g. Jorion and Zhang, 2010; Wengner et al., 2015).

[1] The 'big 3' CRAs have been the focus of attention, namely Fitch Ratings, Moody's Investors Service and Standard & Poor's Corporation (Fitch, Moody's and S&P hereafter).

[2] The term 'rating actions' refers to rating changes, outlook changes and watchlist changes.

Sovereign rating actions have demonstrated a persistent and widespread influence in recent years, especially in Europe. In June 2016, CRAs' downgrades of the UK sovereign rating and the European Union (EU) quickly followed the UK's 'leave' vote in its European referendum ('Brexit').[3] Research on the sovereign (rather than corporate) rating sector is arguably more insightful due to the strong influence of the 'sovereign ceiling' and sovereign-bank linkages (e.g. Alsakka et al., 2014). Sovereign rating actions very frequently drive rating actions at the corporate and bank levels (e.g. Adelino and Ferreira, 2016; Almeida et al., 2017; Borenzstein et al., 2013; Huang and Shen, 2015). In addition, banks are strongly affected by sovereign rating actions for their home country and internationally, due to their holdings of sovereign debt, collateral, and implicit government guarantees (e.g. BIS, 2011; Blundell-Wignall and Slovik, 2010; Caselli et al., 2016; De Bruckyere et al., 2013). Such influences imply that both domestic and international stock markets are potentially strongly affected by sovereign rating actions (e.g. Correa et al., 2014).

This paper provides unique insights on the cross-country stock market spillover effects of sovereign rating actions. We focus on the Europe and Central Asia region (as defined by the World Bank). We select this region due to (i) it having witnessed a very high volume of sovereign rating actions during recent years; (ii) the European sovereign debt crisis; and (iii) the identification in prior literature that spillover effects of rating actions are stronger within a geographic region (e.g. Böninghausen and Zabel, 2015; Kaminsky and Schmukler, 2002). The paper addresses a number of gaps in prior literature. Firstly, we utilize the categorization of high-rated versus low-rated sovereigns to develop competing hypotheses on the potential contagion and competition types of spillover effects (both within and between groups). Secondly, the closely related literature has particularly neglected the potential impact of

[3] The 'unexpected' S&P downgrade of Poland in January 2016 was another case where political (rather than economic or financial) factors instigated sovereign rating action.

differences of rating opinion across CRAs. Given the increasing prevalence of such 'split ratings', these are anticipated to be influential on the spillover evidence. Several closely related papers only use one CRA's data hence are unable to account for this effect in any way (e.g. Chen et al., 2016; Drago and Gallo, 2016; Wengner et al., 2015). Relating to the quantification of split ratings, most prior papers ignore outlook and watch actions, which have been demonstrated to be a crucial component of the information content of CRA actions (e.g. Kaminsky and Schmukler, 2002). Thirdly, we develop and apply a novel measure of inter-country rating convergence to further test our anticipation that some types of rating actions are more influential on spillovers.

In brief, the results reveal a clear pattern whereby downgrades of high-rated countries induce contagion to both high and low-rated countries, while downgrades of low-rated countries reveal the opposite i.e. they induce competitive effects. Split ratings are found to intensify stock market spillover effects. Rating convergence/divergence across similarly-rated sovereigns has a meaningful influence on the spillover effects.

The remainder of the paper is organized as follows. Section 2 reviews the relevant prior literature and Section 3 develops the paper's hypotheses. Section 4 explains the methodology and data. Section 5 presents the empirical results and Section 6 concludes.

2. Context and Literature Review

2.1. Institutional features of sovereign credit ratings

Several studies suggest that sovereign rating levels and actions can be determined by quantitative economic and financial indicators such as GDP per capita, GDP growth, inflation, external debt, level of economic development and default history, as well as qualitative factors such as political and institutional environments (Afonso et al., 2011; Vu et al., 2017). These determinants capture the capacity as well as the willingness of the sovereign to meet its debt

obligations on time and as promised. However, the determinants and their weights are subject to periodic review and vary across CRAs (Hill et al., 2010). The models permit limited judgemental input from analysts. CRAs generally aim to assign ratings that remain stable over time and are not conditioned on the point of the economic cycle.

The detailed process of sovereign credit risk assessments by CRAs is disclosed in their published methodologies (Fitch, 2017; Moody's, 2016; S&P, 2014). For each sovereign rating action, CRAs now publish commentaries on the drivers for their decision. Fitch's (2017) approach is based on four analytical pillars, as follows: (i) structural features of the economy including financial sector risk, political risk and governance factors; (ii) macroeconomic performance, policies and prospects; (iii) budget balances, the structure and sustainability of public debt and fiscal financing; (iv) external finances, including the sustainability of current account balances and capital flows, and the level and structure of external public and private debt. Moody's (2016) approach is based on four key factors, as follows: (i) economic strength based on growth dynamics, scale of the economy and national income; (ii) institutional strength, which includes policy credibility and effectiveness; (iii) fiscal strength, including the government's debt burden and debt affordability; (iv) susceptibility to political risk, government liquidity risk, banking sector risk and external vulnerability risk. S&P (2014) considers these five aspects: (i) institutional assessment of policymaking and political institutions, the transparency and accountability of institutions and debt payment; (ii) an economic assessment, which includes income levels, growth prospects, and economic diversity; (iii) external assessment which includes the status of the currency and the country's external liquidity; (iv) fiscal assessment and debt burden; (v) monetary assessment including the exchange rate regime, the coordination of economic policies and the credibility of monetary policy.

2.2. Prior academic research

The European sovereign debt crisis has contributed to strong renewed academic and practitioner interest in the influence of CRAs' sovereign rating actions upon financial markets and institutions. While some studies focus on own-country effects of these rating actions, others have a particular focus on spillover effects. Recent work has studied spillover effects of sovereign rating actions upon banks (Alsakka et al., 2014), bond markets (Afonso et al., 2012) and credit default swap (CDS) markets (Afonso et al., 2012; Drago and Gallo, 2016).[4]

Alsakka et al. (2014) investigate the sovereign-to-bank rating channel, using data from Fitch, Moody's and S&P. They report clear evidence that sovereign rating downgrades and negative watch signals have strong connections with bank rating downgrades during the European debt crisis. This effect is stronger in the peripheral European countries which were most affected by the crisis (Greece, Ireland, Italy, Portugal and Spain).

Afonso et al. (2012) find that an increase in the event-country average rating induces spillover effects in non-event countries' bond markets but not in CDS markets. While using data from the 'big 3' CRAs, unusually they specify the rating actions within an average rating function. They focus more on the upgrade cases, and do not investigate the peak of the European debt crisis in 2011-12; in this case the data sample ends in 2010. Baum et al. (2016) examine the effects of sovereign rating actions during the European debt crisis in 2010-2012. They find no significant impact on the exchange rate, but some effects on volatility. Of particular interest for our paper, they find that rating events significantly affect sovereign bond yields, and link this to the observation that investors rebalanced their portfolios to reduce their exposure to sovereigns with declining credit ratings.

[4] Ismailescu and Kazemi (2010) investigate similar issues for CDS markets but restrict the analysis to non-European emerging markets. Bissondoyal-Bheenick et al. (2014) investigate related effects in Asia-Pacific markets only. Other papers have considered spillovers in higher moments of asset returns e.g. Afonso et al. (2014), Brooks et al. (2015) and Do et al. (2014).

Böninghausen and Zabel (2015) find that bond market spillover reactions to sovereign downgrades are significantly stronger for countries within the same region. Drago and Gallo (2016) focus on spillovers within the Eurozone CDS market relating to sovereign rating actions (by S&P only). Contrary to many previous studies, they suggest that the information content of watch and outlook signals is very limited. This is a strongly counter-intuitive finding given that the role of watch and outlook is to improve rating accuracy i.e. rating adjustments are firstly evident in the watch and outlook sphere. In using data for only one CRA, the robustness of the above findings might be questionable. Additionally, the authors report significant contagion (to non-event countries) from downgrades but not from upgrades.

In considering the spillover effects of sovereign rating changes on economic growth, Chen et al. (2016) provide a rationale for distinguishing between 'contagion' and 'competition' at the country level. They identify that adverse output effects for non-event countries arise from differential (common) spillovers from event-country upgrades (downgrades). Similarly, Drago and Gallo (2016) draw a contrast between a common information effect and a flight to quality effect.[5]

Some corporate rating literature has focused on the possibility of both common (contagion) and differential (competition) effects of downgrades. In a notable contribution, Jorion and Zhang (2010) hypothesise that the contagion and competition effects on industry rivals will depend on the original credit quality of the downgraded firm. The downgrades of investment-grade firms are likely to induce contagion effects (i.e. negative spillovers) while the downgrades of speculative-grade firms are more likely to induce competition effects (i.e. positive news for firms in the same industry). Focusing on stock market returns, they find that industry rivals can be subject to both contagion and competition effects of rating actions. One particularly insightful aspect is their finding that these effects are strongly influenced by the

[5] The latter was particularly evident in German government bond yields during the European crisis period.

rating level of the firm which receives the credit action. Among investment-grade firms, a contagion effect is prevalent. Among speculative-grade firms, a competition effect dominates.[6]

Despite the insights from this very recent body of research, important gaps and issues remain to be addressed. Firstly, in the European context, relatively little attention has been placed on the stock market effects of sovereign rating actions. An exception is Alsakka et al. (2017) who report strong evidence that S&P sovereign rating actions influence stock market reactions much more than Moody's and Fitch. They also find that pre-event differences of opinion between CRAs (split ratings) influence the intensity of spillover effects in non-event countries.

Secondly, the literature reviewed in this section has ignored the potential impact of inter-CRA differences. A large group of the related papers use data from only one CRA (e.g. Chen et al., 2013; 2016; Drago and Gallo, 2016; Ferreira and Gama, 2007; Gande and Parsley, 2005; Ismailescu and Kazemi, 2010; Wengner et al., 2015),[7] hence cannot begin to consider inter-CRA effects. Others pool data from multiple CRAs (e.g. using an average rating as in Afonso et al., 2012) or use multiple CRA event data while failing to consider the additional information present in the evident differences of opinion between CRAs (e.g. Afonso et al., 2014; Baum et al., 2016; Böninghausen and Zabel, 2015; Do et al., 2014; Jorion and Zhang, 2010). Others have shown the importance of differences across CRAs in sovereign rating actions (e.g. Hill and Faff, 2010). Incorporating CRA differences of opinion in the research design is highly important because split ratings have become the "new normal" in European

[6] Wengner et al. (2015) consider the impact of S&P rating events on the CDS spreads of competitor firms. They report that both downgrades and upgrades induce spillovers, but the extent and significance varies across industries and has been stronger since 2007. Hu et al. (2016) analyze the spillover effects of corporate rating actions on the G7 stock markets, and report mixed findings across industries and countries.

[7] Generally, authors provide weak or implausible justifications for employing data from only one CRA e.g. only using S&P data because it is claimed to be 'more active' in taking rating actions and thereby somehow offers a better sample. A further example is Chen et al.'s (2016) statement that "S&P rating changes are also less likely to be anticipated by market investors and tend to precede the rating changes of other rating agencies" without providing any supporting citation. In contrast, Cantor et al. (2007, Exhibits 4A and 4B) demonstrate that fund managers and plan sponsors extensively use multiple CRAs not only one.

sovereign and bank ratings since the onset of the crisis period. For example, Alsakka et al. (2017) report sovereign rating disagreements in 63.1% of S&P-Moody's comparisons and 51.8% (52.9%) in Fitch-S&P (Fitch-Moody's) comparisons, when considering ratings, watch and outlook status.[8] A further important issue is that data from only one CRA does not enable event-study findings which are robust to contamination from the recent events of other CRAs.

Thirdly, we introduce a novel method of capturing inter-country effects of rating actions. A measure of rating convergence within high-rated and low-rated groups of countries is devised. This enables the investigation of hypotheses surrounding potentially different effects of rating actions dependent on the rating context of neighbouring or similarly-rated countries. This has not been addressed in any of the literature discussed above.

Fourth, the distinction between positive and negative spillovers deserves further investigation in the sovereign sphere because of the sovereign rating ceiling effect (e.g. Adelino and Ferreira, 2016; Almeida et al., 2017; Borensztein et al., 2013; Huang and Shen, 2015). Therefore, sovereign rating actions are the driving force for many of the spillovers reported in the corporate rating literature. Related to this, we demonstrate an alternative approach to the competition/contagion distinction, by grouping high-rated and low-rated sovereigns, across both event and non-event countries, thus enabling four-way comparisons. In this context, we have scope to bridge some of the approaches used in the corporate versus sovereign literature.

Finally, Böninghausen and Zabel (2015) contend that the results of different event studies are not easily comparable or generalizable. Therefore, one cannot presume any given outcome when testing the impact of sovereign rating actions for different financial markets, geographical regions and time periods. Taken together, these gaps in the prior literature provide a clear agenda for this paper's original contributions.

[8] A given financial market may react very differently to rating actions which narrow or widen CRA differences of opinion (or lead to rating convergence/divergence). Such considerations have been shown to reveal more nuanced aspects of market reactions (e.g. Vu et al., 2015).

3. Hypotheses

This section explains the hypotheses to be tested in the paper. If the CRAs base their actions on existing publicly available information only, the efficient market hypothesis implies that stock prices will not react to credit rating signals. Prior literature demonstrates that sovereign rating news affects own-country equity markets and causes significant spillovers to other countries' equity markets (e.g. Afonso et al., 2012; Brooks et al., 2004; Ferreira and Gama, 2007; Hill and Faff, 2010). This implies that CRAs incorporate private information which is released into the public domain through credit signals (Brooks et al., 2004). Equity markets can be affected by sovereign credit signals due to the spillover effect from any sovereign distress to private debtors (Borensztein et al., 2013). This is triggered by measures such as inflationary financing, tax increases and potential imposition of direct capital controls, undertaken by a sovereign in financial difficulties. These could directly influence the corporates' solvency and liquidity, and hence their ability to repay their financial obligations.

Further, if market participants view credit news as country-specific, little spillover effect would be observed in other equity markets. However, there are many potential transmission channels through which sovereign rating signals may spillover to other countries' equity markets (Almeida et al., 2017; Alsakka et al., 2014; Alter and Beyer, 2014; Arezki et al., 2011; Ferreira and Gama, 2007; Sy, 2009). These include: the globalized nature of financial markets, financial connections across countries, rational and irrational behaviour of investors, and changes in capital supply following rating news. These can in turn affect real economic activity, holdings of foreign sovereign debt by domestic corporates, interbank lending, portfolio rebalancing, information asymmetries among market participants, rating-based triggers (e.g. heavy use of ratings in regulation and central banks' collateral rules) and linkages between sovereign and non-sovereign ratings. See also Section 4.1 for further discussion on spillover channels in the countries included in the study sample.

In order to investigate the contagion versus competition aspect, we define a high-rated group of countries as 'A', which comprises sovereigns with an average rating level within the categories of 'AAA/Aaa', 'AA/Aa' or 'A' at the end of the day on which a rating action occurred.[9] The low-rated group of sovereigns 'B' comprises sovereigns with an average rating level within the categories of BBB+/Baa1 or below at the end of the day of a rating action. Rating observations in the latter group are almost all between BBB+/Baa1 and B-/B3, hence the group is labelled here as 'B'. Rating actions are defined both in terms of being within the same group and between groups. For example, a rating downgrade can be from AAA to AA (same group) or from A to BBB+ (between groups), but the rating level of a sovereign at the end of the day of the rating action determines whether it belongs to group 'A' or 'B'.[10]

Figures 1 and 2 summarize the potential spillover effects across the two groups, for downgrades and upgrades of the event country (E denotes the event country and NE denotes the non-event country to which a potential spillover occurs), respectively. The geographical composition of the sample (see Section 4) provides a context which underpins the plausibility of underlying financial and trade channels to explain spillover effects (e.g. membership of the European Union, the Eurozone and/or the European Economic Area). The formulation of the hypotheses draws from the prior literature discussed in Section 2. Overall, the prior literature suggests that one should expect stronger effects to emanate from downgrades compared to upgrades. For all cases in Figures 1 and 2, the null hypothesis is that no spillover occurs, neither of contagion nor competition types. There are two competing alternative hypotheses of contagion and competition in each case (which are verified based on significantly positive/negative coefficients in the estimated results).

[9] In the asset management industry, a criteria of '6 As' is sometimes applied in fixed income investment i.e. AAA/AA/A. Some further justification for this categorisation is provided in Cantor et al. (2007, Exhibits 3A and 3B).

[10] Within the sample, there are only 26 rating actions whereby sovereigns' average rating crossed the boundary of the groups (13 actions from 'A' to 'B', and 13 actions from 'B' to 'A').

Some authors consider that contagion is the predominant type of spillover (e.g. Kaminsky and Schmukler, 2002), whereby all rating actions contribute to a pro-cyclical phenomenon. Others propose that contagion (common) spillovers will be evident for downgrades while competition (differential) spillovers will occur with upgrades (e.g. Chen et al., 2016). Others differentiate in terms of the debt issuer's credit quality. In the corporate setting, Jorion and Zhang (2010) propose competitive effects among lower quality issuers and contagion effects among the higher quality issuers.

In considering several of the hypotheses, the concepts of market access and flows of funding are crucial. Some hypotheses imply a more restricted (increased) market access for B-rated countries when they are downgraded (upgraded). Also, downgraded (upgraded) sovereigns will potentially attract decreased (increased) fund flows to the advantage (detriment) of others.

In addition, we propose hypotheses for the contexts of inter-CRA split ratings and inter-country rating convergence (motivated by prior literature and incorporated in the research design in Section 4). It is hypothesized that rating actions which widen splits will increase ambiguity surrounding the sovereign's rating status (see Vu et al., 2015) and will thereby induce a stronger market reaction to the news. Therefore, we expect a strengthening of spillover (either competition or contagion effects) when a CRA action induces a wider split rating for a given country. Similarly, a weakened spillover effect is expected in cases where the rating action has the consequence of narrowing or removing the split rating across CRAs. At the inter-country level, when a given CRA action induces greater rating convergence (within either the 'A' or 'B' groups), we propose that this will reduce the surprise content of a rating action and therefore mitigate any spillovers. Similarly, rating actions which cause greater divergence in ratings (within either the 'A' or 'B' groups) will introduce additional uncertainty or ambiguity about sovereign credit quality and are hypothesized to be characterized by stronger spillover effects.

Figure 1: Competing hypotheses for downgrades of event countries (E)	
E is A-rated	(a) If NE (non-event country) is also A-rated: H1: Contagion or common effect (-ve, i.e. negative coefficient expected): Following the evidence of Jorion and Zhang (2010), the A-rated downgrade will negatively affect similarly-rated NE stock markets. This would reflect a revision of market expectations. H2: Competition or differential effect (+ve): A positive spillover effect is anticipated. Downgrades of a high-rated sovereign weaken its relative credit standing compared to other high-rated countries. The latter may thereby generate investors' portfolio shifts i.e. attract increased financial flows e.g. to the stock market. Such competitive effects are consistent with the findings of Wengner et al. (2015). (b) If NE is B-rated: H1: Contagion effect (-ve): A negative spillover could arise because the downgrade is indicative of weakening economic circumstances for all countries in the region. This perspective of contagion is supported by e.g. Afonso et al. (2012), Gande and Parsley (2005), Chen et al (2016). H2: Competition effect (+ve): No differential spillover is anticipated. There is unlikely to be a strong benefit for lower-rated countries nor any capital flight from A-rated to B-rated.
E is B-rated	(a) If NE is also B-rated: H1: Contagion effect (-ve). A common and negative spillover could arise because the downgrade is indicative of weakening economic circumstances for lower-rated countries in the region. This perspective of contagion is supported by e.g. Afonso et al. (2012), Gande and Parsley (2005), Chen et al (2016). It is also evident in cases such as the effects of B-rated Greece's downgrades upon other peripheral Eurozone markets during the European crisis. H2: Competition effect (+ve), i.e. B-rated NE stock markets will benefit. In the corporate context, Jorion and Zhang (2010) present evidence that makes a case for this. At the country level, this implies that funds flow out from the event country market yet are reinvested in similarly risky NE markets within the same region. (b) If NE is A-rated: H1: Contagion effect (-ve): The downgrade is perceived to reflect a wider economic malaise in the region and therefore negatively affects even the higher rated NE countries' stock markets. This would reflect a revision of market expectations. Afonso et al (2012) take this view. H2: Competition effect (+ve): These downgrades are good news for the 'A' rated NE countries' stock markets. Such a positive spillover effect could be characterized as 'flight to quality' or 'flight to liquidity' (for a detailed discussion, see e.g. Beber et al., 2009). Specific examples include the strong positive effects on German bonds (see Baum et al., 2016) and Swiss franc-denominated assets following negative rating trends in peripheral Eurozone countries e.g. Greece, Ireland and Portugal.

Figure 2: Competing hypotheses for upgrades of event countries (E)	
E is A-rated	(a) If NE is also A-rated: H1: Contagion effect (+ve): A common and positive spillover could arise because the upgrade is indicative of potentially improving economic circumstances for higher rated countries in the region. In the context of the European crisis, this could reflect likely events in the upturn or recovery period. H2: Competition effect (-ve): Other A-rated countries will face negative stock market returns due to their reduced relative credit standing i.e. the event country market becomes more attractive. It could generate a shift in investors' portfolios. Such competitive effects are consistent with the findings of Wengner et al. (2015). (b) If NE is B-rated: H1: Contagion effect (+ve): A common and positive spillover could arise because the upgrade is indicative of potentially improving economic circumstances for both higher and lower rated countries in the region i.e. a revision of market expectations. H2: Competition effect (-ve): We anticipate a negative spillover effect whereby flows of funds are attracted away from B-rated sovereigns i.e. investors adjust their portfolios.
E is B-rated	(a) If NE is also B-rated: H1: Contagion effect (+ve): A positive spillover effect is anticipated. The upgrade is perceived to indicate strengthening economic circumstances for lower rated sovereigns and to attract flows of funds to such countries. Christopher et al. (2012) find that sovereign credit signals positively affect regional stock market integration. Rating upgrades provide benefits for surrounding countries in a region. Kim and Wu (2011) highlight that improvements to the sovereign ratings in one region draw G7 bank inflows away from the other world regions. H2: Competition effect (-ve): i.e. B-rated NE stock markets will be negatively affected. This draws from the assumption that funds will flow out from the NE markets and are reinvested in the event country due to its new higher relative standing (a portfolio shift by investors). (b) If NE is A-rated: H1: Contagion effect (+ve): A common and positive spillover could arise because the upgrade is indicative of potentially improving economic circumstances for higher rated countries in the region, i.e. a revision of market expectations. H2: Competition effect (-ve): We do not anticipate any strong spillover. We propose that there are no likely competition effects in this upgrade channel i.e. A-rated countries will not experience negative returns as a consequence of B-rated upgrades.

4. Data and Methodology

4.1. Data

The analysis focuses on the Europe and Central Asia (EU-CA) region, as defined by the World Bank. This region is of particular interest due to the European sovereign debt crisis, and it is the region with the greatest intensity of CRA sovereign actions (i.e. rating actions per sovereign) during the time period of interest. Additionally, in pursuing our research questions relating to competition versus contagion spillovers, it is necessary to focus upon groups of countries where such effects are plausible (see below). Prior literature has shown that spillover effects tend to be stronger within regions and between neighbouring countries (e.g. Böninghausen and Zabel, 2015; Kaminsky and Schmukler, 2002). For example, there is clear evidence of potential contagion effects between core and peripheral Eurozone countries during the European sovereign debt crisis (e.g. Abad and Chulia, 2016). Extending the region beyond the European Union (EU) enables a more credible analysis of another of our research questions, namely to differentiate the spillover effects between 'high rated' and 'low rated' countries, as defined in Section 3. Finally, the research questions surrounding split ratings and rating convergence can be addressed more thoroughly by including a larger sample of countries from the middle-income level (as defined by the World Bank) which tend to fall into our defined 'B' group.

The spillover of rating news can be transmitted across EU-CA countries because of their real and financial linkages. Dornbusch et al. (2000) explain that trade links, regional patterns, liquidity constraints and macroeconomic similarities facilitate the spillover of a shock (e.g. rating actions in this study) across countries. The European Free Trade Association (EFTA) links 28 EU state members, Iceland, Norway, Liechtenstein and Switzerland. The European Economic Area (EEA) unites the EU Member States and the EFTA States (except for Switzerland which has a series of bilateral agreements, including a free trade agreement

with the EU) into a single market governed by the same rules, which enables the free movement of goods, services, capital and people. In addition, the 19 Eurozone member countries are strongly linked by the joint monetary policy transmission mechanism, the Eurosystem's collateral framework, and the shared default risk of Eurozone member countries via the European Stability Mechanism (ESM) and the European Financial Stability Facility (EFSF) (see Alter and Beyer, 2014). Further, EFTA has free trade agreements with non-EU countries in our sample including Bosnia and Herzegovina, Macedonia, Montenegro, Serbia, Turkey and Ukraine, while there are ongoing free trade negotiations with Kazakhstan and Russia.[11] The EU has also co-operated with Central Asian countries in order to strengthen economic relations and trade e.g. through the EU Generalised System of Preferences. Preferential frameworks exist to encourage exports, economic diversification, and improved regional cooperation with these countries (World Bank, 2017).

The stock market data comprises daily equity indices and is collected from Bloomberg. There are 39 countries included in the sample and the time period is from August 1994 to October 2015. Where a country's stock index data is not available for the whole sample period, the start date is indicated in the Appendix (all countries' data ends in October 2015). In cases where Bloomberg provides more than one equity index for a given country, we select the index which is consistent with Afonso et al. (2012). The sample includes 14 countries not analysed by Afonso et al. (2012). For five of these countries, Bloomberg provide more than one index and in these cases, we select the headline index. The Appendix provides the summary statistics for the two-day cumulative event return spread over the benchmark (defined beneath Equation (1) below).[12]

[11] For more details, see http://www.efta.int.

[12] All cases with 'extreme' values have been checked. For example, some of the extremes occur during the Icelandic financial crisis (October 2008), the Russian financial crisis (September 2008), and the Turkish liquidity and banking crisis (December 2000).

The analysis is focused upon the sovereign rating sector (with justification for this provided in Section 2's review of the prior literature). Daily data on sovereign rating actions by Fitch, Moody's and S&P is collected directly from the CRAs' publications. The data includes information on the rating level, rating outlook and rating watch status.[13] The reason for starting the sample period on 10th August 1994 is that Fitch did not assign sovereign watch until that year.[14] The rating opinion (including the rating, outlook and watch) must be converted to a numerical scale. To incorporate outlook and watch, we employ a comprehensive credit rating (CCR) which is mapped to a 58-point scale (discussed in Sy, 2004) which has become widely used in the related literature, as follows: AAA/Aaa = 58, AA+/Aa1 = 55, AA/Aa2 = 52 … CCC-/Caa3 = 4, CC/Ca, SD-D/C = 1, and we then add '+2' for positive watch, '+1' for positive outlook, '-1' for negative outlook, '-2' for negative watch, and '0' for stable outlook. This also enables the quantification of differences of CCR opinion between CRAs on each day, which is termed as the split rating (e.g. Vu et al., 2015). A rating action is defined as any daily change in CCR for a given CRA for a given sovereign.

Table 1 presents the distribution of CCR changes (upgrades and downgrades in the rating opinion) for each country during the sample period. Only one of the 39 sampled countries has no rating actions during the time period (Switzerland). The sample includes a total of 1184 actions, which compares well with the data samples in the related literature. It is evident that the highest numbers of CCR actions are observed for Greece, Ireland, Russia, Turkey and Ukraine.

[13] CRAs use outlook and watch signals to mitigate the tension between rating accuracy and rating stability (e.g. Hamilton and Cantor, 2004). The outlook status reflects the medium-term outlook for the rating and can be stable, negative, positive or developing. The watch status reflects a shorter-term expectation for the rating and can be negative, positive or developing. If a 'watch' status is in place, this replaces the prior outlook status. Section 2 explains the importance of outlook/watch for financial market reactions to CRA actions.

[14] In 1989, S&P was the first CRA to start applying outlook/watch to its sovereign ratings. Moody's started using sovereign watch signals in 1991, while outlooks came into extensive use in 1995. Fitch began to assign outlook to sovereign ratings in September 2000.

Table 2 reports the summary statistics of the annual average CCR ratings of the A-rated and B-rated groups over the entire sample period and for four sub-periods: (i) 1994 to 2000, (ii) 2001 to 2006, (iii) 2007 to 2010 and (iv) 2011 to 2015. The A-rated group has an average rating of 52.6 (approx. AA/Aa2), with a standard deviation of 0.6, while the B-rated group has an average rating of 27.3 (approx. BB+/Ba1) with a standard deviation of 1.1. The low average rating for the B-rated group in the 1994-2000 period is attributable to the Asian and Turkish crises. During the 2001-2006 period, the slightly lower (higher) average rating for group 'A' ('B') reflects that many European emerging countries were upgraded to the A-rating level (BBB-rating level) at the bottom (top) of the range in that group. During the 2007-2010 period, many European countries were downgraded to the bottom range of group 'A' rating or the top range of group 'B' rating, which explains the slightly higher (lower) average rating for group 'B' ('A').

There are several cases where multiple countries are upgraded/downgraded by a given CRA on the same day. Excluding these cases enables cleaner analysis of the 'A' and 'B' groups, because there are some cases where both 'A' and 'B' sovereigns are upgraded/downgraded by the same CRA on the same day. Therefore, the overall quantification of the spillover effects errs on the conservative side. On re-estimation including all cases, the inferences are not affected. Figure 3 demonstrates the pattern of actions across the time dimension. The highest concentrations of CCR actions are observed in 2001-3 (which are dominated by positive actions) and in 2008-12 (which are dominated by negative actions).[15] The former is partly attributable to positive developments in European emerging markets, while the latter is evidently the global financial crisis period.

In relation to the hypotheses discussed in the previous Section 3, Table 3 presents the distribution of CCR actions (whereby multiple rating actions by a given CRA on the same day

[15] These full statistics are available on request.

are excluded) across the defined 'A' and 'B' categories. Despite the global financial crisis, the number of upgrade actions exceeds downgrades. The 'B' group sovereigns have substantially more actions (549) than the 'A' group (237). This is to be expected due to higher rating volatility in the lower range of the rating scale, which is widely documented in CRA publications and in the literature on rating transitions (e.g. Bangia et al., 2002).

The modelling approach discussed below takes into account the differences of opinion across CRAs on any given day. We follow two approaches to capture changes in CRAs' split opinions arising from a given rating action, one of which focuses on inter-CRA differences (split ratings) and the other focuses on inter-country differences (rating convergence/divergence). The first approach involves identifying whether the split rating widens or narrows due to the rating action (the prior hypotheses for this were stated in Section 3). The intention is to establish whether the changing disagreement between CRAs increases or reduces the effects of the rating action. The second approach involves quantifying the extent of rating convergence resulting from a given rating action i.e. to what extent a rating action draws that sovereign's rating closer to those of other countries in its group ('A' or 'B' as defined above). This approach is original and novel in the rating literature, and uses the Euclidean distance (defined below Equation (3)). Greater rating convergence is hypothesized to reduce the surprise content of a rating action (see Section 3).

Table 3 documents the distribution of pre-event split ratings and the preponderance of split-widening (W) and split-narrowing (N) rating actions. Table 3 identifies that split ratings are a prevalent phenomenon in sovereign ratings during this sample period. This provides further justification for incorporating information on split ratings within the methodology. For downgrades, the mean split is typically around five CCR points, which is close to two rating notches. In contrast, upgrades tend to be applied to cases with narrower splits of around 3.7 CCR points on average. Similarly, the maximum split is larger for countries facing downgrades

(20 CCR points versus 15). Cases of split-widening and split-narrowing actions are evenly balanced at 35% of rating events for the whole sample. The "B" rated group demonstrates stable percentages in different cases of downgrade / upgrade and widening / narrowing. Split-widening downgrades are 46% of rating downgrades for the "A" rated group and split-narrowing upgrades are 41% of cases for this group. Split-widening upgrades are only 25% of rating upgrades in the "A" group.

The high percentages of disagreement between CRAs on their assessment of the creditworthiness of EU-CA countries can be partly explained by increases in sovereign opacity.[16] During the European debt crisis (especially between 2010 and 2013), there was a wave of negative sovereign rating actions (although not simultaneous across CRAs), which resulted in persistent split ratings for many high-rated countries in Europe. It became more challenging for CRAs to determine the amounts and recoverability of the loss to investors from holding sovereign debt (e.g. debt issued by Greece, Ireland and Portugal). The strong interdependence among EU countries made the assessment of cross-border debt holdings and potential spill-over effects more difficult. Also, there were and still remain differences of opinion across CRAs about EU countries' prospects for economic growth and their support for domestic banking systems. After 2013, several EU countries still faced major challenges, including large amounts of public debt and restrictive financing conditions. In these circumstances, split ratings are more likely to occur. Further, political uncertainty in the EU-CA region has been a major issue during the latter part of our sample period. This includes challenging political dynamics in Greece and Turkey, the rise of new political parties e.g. in Poland, Portugal and Spain, and conflict between Russia and Ukraine. The assessment of political issues usually involves subjectivity and ambiguity, and hence exaggerates the division

[16] Vu et al. (2017) provide evidence of harsher split ratings between CRAs in countries in Europe and Central Asia than in the rest of the world during 1997 to 2011.

of credit opinions between CRAs. Further, CRAs encounter opacity in sovereign credit risk assessments when governments' information disclosure, transparency and data quality are imperfect, which is the case for many countries in our sample, including Kazakhstan, Russia and Turkey.

Table 4 presents summary data for the rating convergence measure. On this measure, downgrades have a strong tendency of creating divergence rather than convergence, especially for the "A" group. Upgrades produce markedly different consequences in the "A" and "B" groups, whereby convergence occurs in 78% of "A" group cases and only 43% of "B" group cases.

4.2. Methodology

We now explain the methodology for identifying the competition versus contagion effects of rating actions upon the stock markets. We initially employ a 'baseline' model, which is then augmented to account for split ratings and rating convergence (separately). The models are estimated for downgrades and upgrades separately (which is a commonplace approach in the related literature due to the clarity of interpretation). The models are estimated separately using the groups A and B of event-country and groups A and B of non-event countries. Further, the models are estimated separately for the full sample and for the global financial crisis period (defined as 2007-2015).

The baseline model is specified as:

$$CRS_t^{NE} = \beta_0 + \beta_1 \Delta CCR_t^E + \beta_2 Prior_t^E + \beta_3 VIX_t + \beta_4 GDP_t^E + \beta_5 GDP_t^{NE} + \varphi C_t + \rho Y_t + \varepsilon_t \quad \text{(Eq. 1)}$$

E refers to the event country i.e. the sovereign rating for which CCR has changed on day t. *NE* represents a non-event country.

CRS_t^{NE} is the cumulative returns spread of the non-event countries for the event day t. All non-event countries are included in the estimation for the periods for which their stock index data is available. It is defined using a two-day window and employing a benchmark index.[17]

ΔCCR_t^E is the absolute value[18] of the maximum change[19] in the 58-unit comprehensive credit rating (CCR) across S&P, Moody's and Fitch on day t. [20]

$Prior_t^E$ is a dummy variable taking the value of 1 if there are any other rating action(s) taken on the event country by different CRA(s) during the two-week interval [-14,-1] (calendar days) before the rating action under consideration. This is widely used in prior literature with the aim of capturing any contamination, but is an infrequent event (there are only eight cases in total when this variable equals 1).

VIX_t is the CBOE Volatility index (from Bloomberg), which is included to control for prevailing global risk (as in many previous papers e.g. Vu et al., 2015).[21]

GDP_t^E (GDP_t^{NE}) is the size of the event (non-event) economy measured in US dollar GDP (annual) in the previous year (collected from the World Bank).

C is a series of country dummy variables to control for any country-specific effects and Y is a series of time dummies, which are included to account for any time effect. We consider four

[17] $CRS_t^{NE} = \ln\left(\frac{\text{Index}_t^{NE}}{\text{Index}_{t-1}^{NE}}\right) + \ln\left(\frac{\text{Index}_{t+1}^{NE}}{\text{Index}_t^{NE}}\right) - \ln\left(\frac{\text{Index}_t^{M}}{\text{Index}_{t-1}^{M}}\right) - \ln\left(\frac{\text{Index}_{t+1}^{M}}{\text{Index}_t^{M}}\right)$. M represents the benchmark market index.

[18] i.e. the absolute value is used in the models for downgrades in order to ease the interpretation, relative to the competing hypotheses in Figures 1 and 2.

[19] 'Maximum' refers to the potential for more than one CRA taking a rating action on the same sovereign on day t. This is very rare in the sample.

[20] To address possible non-linearity in the rating scale, we also estimate Eqs. (1), (2) and (3) using the rating event variable '$\Delta LCCR_t^E$' instead of 'ΔCCR_t^E'. $\Delta LCCR_t^E$ is the absolute value of the maximum change in a logit-type transformation of the 58-point numerical rating scale (LCCR), across S&P, Moody's and Fitch on day t, as follows. $LCCR_t = \ln [CCR_t / (59 - CCR_t)]$, where CCR_t is the rating according to the 58-point numerical rating scale (see Sy, 2004). The results, available upon request, are consistent with those reported in Tables 5-7.

[21] Motivated by Ehrmann et al. (2011), we also used alternative specifications which controlled for large events in the US stock market that could affect the European stock markets. This involved a dummy variable set equal to 1 for days with extreme values of S&P500 absolute returns (in the upper 10% of the distribution) and zero otherwise. The inferences from Eqs. (1), (2) and (3) are robust when adding this dummy variable and when replacing the VIX index variable with this dummy variable (results available on request).

periods: a) from 1994 to 2000, b) from 2001 to 2006, c) from 2007 to 2010 and d) from 2011 to 2015. Only the latter two apply for the defined crisis period (2007-2015) results.

For the return spread, the Eurostoxx (collected from Bloomberg) is employed as a suitable benchmark index because we are utilizing a sample of Europe-Central Asia countries.[22] The rating event dates are matched with non-event dates to further aid the robustness and interpretation of results. This approach was instigated by Gande and Parsley (2005) and Ferreira and Gama (2007). It has been very widely employed subsequently in this branch of credit rating literature (e.g. Brooks et al., 2015). Specifically, to estimate the stock market reaction to a rating action, a country-matched random sample (with replacement from the original time series excluding the observations within a one-month window centered in each event day) of non-event days is added to the sample of event days.[23] Hence, the number of observations in the estimated models is double the number of rating events relevant to that specification.

The augmented second model accounts for the widening or narrowing in the split rating as a consequence of the rating action, and is specified as:

$$CRS_t^{NE} = \beta_0 + \beta_1 \Delta CCR_t^E + \beta_2 WS_t^E * Split_{t-1} + \beta_3 NS_t^E * Split_{t-1} + \beta_4 Prior_t^E + \beta_5 VIX_t + \beta_6 GDP_t^E + \beta_7 GDP_t^{NE} + \varphi C_t + \rho Y_t + \varepsilon_t \quad \text{(Eq. 2)}$$

WS_t^E (NS_t^E) is a dummy variable taking the value of one if the event-country sovereign ratings are unequal (split) on the day prior to the rating action (t – 1) and the rating action causes the split to widen (narrow) i.e. $Split_t > Split_{t-1}$ ($Split_t < Split_{t-1}$).

[22] There is some variation in the closely related prior literature regarding the use of a benchmark return. In the CDS and foreign exchange markets, several studies use the raw returns rather than adjusted return (e.g. Drago and Gallo, 2016; Ismailescu and Kazemi, 2010). In the stock and bond strands of the related literature, there is a tendency to regard the use of a benchmark return as necessary (e.g. Böninghausen and Zabel, 2015; Jorion and Zhang, 2010). The wider event study literature overwhelmingly uses a benchmark or expected return in stock market studies.

[23] The sample is adjusted for outliers using trimming at the extreme 5% tails.

The augmented third model accounts for rating convergence or divergence within the 'A' and 'B' rated groups. The hypothesis is that rating actions that result in convergence have lesser spillover impact within the group (refer to Section 3). The model is specified as:

$$CRS_t^{NE} = \beta_0 + \beta_1 \Delta CCR_t^E + \beta_2 CONV_t^E + \beta_3 Prior_t^E + \beta_4 VIX_t + \beta_5 GDP_t^E + \beta_6 GDP_t^{NE} + \varphi C_t + \rho Y_t + \varepsilon_t \quad \text{(Eq. 3)}$$

$CONV_t^E$ is a dummy variable taking the value of one if the rating action produces a lower value of a convergence index (CI) for the event country (i.e. $CI_t^E < CI_{t-1}^E$).

CI_t^E is a novel and original measure not previously applied in the related literature. It is calculated as the Euclidean distance between the CCR level of the event country and the average of the sovereign CCR levels in the event country's group ("A" or "B" as defined above) on a given day, considering the three agencies:

$$CI_t^E = \sqrt{(SP_t^E - \overline{SP}_t)^2 + (M_t^E - \bar{M}_t)^2 + (F_t^E - \bar{F}_t)^2}$$

SP_t^E, M_t^E and F_t^E are the CCR of the event country on a given day, assigned by Standard & Poor's, Moody's and Fitch respectively. $\overline{SP}_t$, $\bar{M}_t$ and $\bar{F}_t$ are the average of the S&P, Moody's and Fitch CCR of all countries in the event country's group ("A" or "B") on a given day.

5. Empirical Results

Table 5 presents the results of estimating Equation (1) for the whole sample and for the crisis period sample. Panel A presents the results for rating downgrades. The results reveal a clear pattern whereby downgrades of A-rated countries induce contagion to both A-rated and B-rated countries, while downgrades of B-rated countries reveal the opposite i.e. they induce competitive effects. These unique findings are strongly significant and robust across different specifications, including the restriction of the sample to the crisis period as presented. The coefficients for ΔCCR_t^E are generally large. Specifically, a negative outlook action (1-CCR point downgrade) of an A-rated country is associated with a negative abnormal return of 12.3 and 22.7 basis points (bps) for A-rated and B-rated non-event countries respectively. The effect is slightly stronger (14.9 and 25.1 bps) during the crisis period. On the other hand, positive abnormal returns of 5 and 5.9 bps for B-rated and A-rated non-event countries are observed following a 1-CCR point downgrade of B-rated countries during the crisis period. These results imply that the effect of the contagion cases is broadly somewhat stronger than for the competition cases. Our findings suggest that stock markets of non-event countries are subject to both contagion and competition effects of negative rating signals depending on the rating level of the country which experiences a rating action. For the A- to A-rated contagion and B- to B-rated competitive effects, the findings are consistent with those presented by Jorion and Zhang (2010) in a corporate context.

The presence of very recent prior rating actions is only significant during the crisis period, as may be anticipated due to the increased intensity of rating activity at that time. The coefficients on the VIX index are significantly negative during the crisis period, consistent with negative stock market returns at that time, when the VIX index was elevated. The size (GDP) of the event country only has a significant coefficient in the A-rated event country samples, suggesting that the reactions of non-event countries' stock market returns are stronger

following the downgrades of larger A-rated countries than smaller ones. The size of the non-event country has no significant influence.

Panel B of Table 5 presents the equivalent results for rating upgrades. There is a very minimal spillover impact of upgrades. The only case of a significant ΔCCR coefficient is from A-rated to A-rated, which reflects a competition effect. Good rating news for an A-rated sovereign has a negative consequence for other A-rated countries in the region. A positive outlook signal for A-rated country causes a negative abnormal return of 3.9 bps for other A-rated countries. The coefficient is smaller than all but one in Panel A. Also, the effect is not present when the sample is restricted to the crisis period. Apart from the 'A to A' case, the null hypothesis of no spillover holds. The coefficients on the VIX index are mixed, and there is no clear pattern in the event country GDP coefficients. Smaller non-event countries face negative returns in the crisis period, as would be expected.

The results of Table 5 are consistent with prior studies which show that negative rating events cause significant spillovers to other countries' equity markets, while positive rating signals have limited or insignificant impact (e.g. Kaminsky and Schmukler, 2002; Sy, 2004; Ferreira and Gama, 2007; Hill and Faff, 2010; Afonso et al., 2012; Drago and Gallo, 2016). As a consequence of the findings in Panel B of Table 5, the remaining results tables and discussion focus on the cases of downgrades only. The key results observed in Table 5 for the effects of rating downgrades are maintained in Tables 6 and 7 when additional variables are introduced. As in Table 5, the coefficients on prior events and on the VIX index remain significant with anticipated signs for the crisis period results in Tables 6 and 7.

Table 6 presents the results of estimating Equation (2) for the whole sample and for the crisis period sample. In general, pre-event split ratings accentuate the contagion and competition effects. This is in line with the findings of Alsakka et al. (2017) that pre-event split ratings influence the intensity of spillover effect of sovereign credit actions in the equity

markets of non-event countries. Some authors (e.g. Vu et al., 2015) argue that credit signals which widen split ratings induce more ambiguity about the creditworthiness of the sovereign and therefore cause stronger market impact. In contrast, we do not find a clear differentiation in the impact of downgrades of A-rated sovereigns that widen or narrow a split rating. Table 6 shows that a negative rating action that widens (narrows) the split ratings across CRAs of A-rated sovereign causes a negative abnormal return of 2.7 (2.9) bps for A-rated non-event countries and of 4.7 (3.0) bps for B-rated non-event countries.

On the other hand, and consistent with our expectations, the competitive effect is relatively stronger for rating actions on B-rated sovereigns that widen rather than narrow the split across CRAs. A negative rating action that widens split ratings on a B-rated sovereign induces a positive abnormal return of 4.5 (3.7) bps for B- (A)-rated non-event countries. These are relatively larger than the positive abnormal return for B- (A)-rated non-event countries (2.2 (3.2) bps) associated with a negative rating action that narrows the split ratings across CRAs for B-rated sovereigns. The influence of split ratings is weaker in the crisis period sample, when the ΔCCR_t^E coefficients and their significance are much stronger than in the whole sample period.

Table 7 presents the results of estimating Equation (3). In general, any rating convergence produces positive and significant coefficients regardless of the A-rated and B-rated categorization. For the downgrades of A-rated sovereigns, rating convergence mitigates the contagion effect to other A-rated countries in the region, but has very limited effect on the contagion to B-rated countries. A 1-CCR point downgrade of an A-rated sovereign spills over to other A-rated countries leading to a negative abnormal return of 12.0 bps. However, if the rating event produces a convergence of ratings across CRAs, this leads to a positive abnormal return of 14.2 bps for A-rated non-event countries. On the other hand, a 1-CCR point downgrade of an A-rated sovereign spills over to B-rated countries, leading to a strong negative

abnormal return of 22.4 bps regardless of whether the event produces rating convergence across CRAs for the event country or not. This is logical given the variable construction.

For the cases of downgrades of B-rated countries, rating convergence strengthens the competitive effect on other B-rated countries, but there is little effect of rating convergence on the spillover to A-rated countries. The abnormal return for B-rated countries is 36.4 bps following a negative action on a B-rated country that produces a convergence of ratings across CRAs only (i.e. no spill-over effect is evident in the case of no rating convergence). In comparison, a 1-CCR point downgrade of a B-rated sovereign leads to a positive stock market return of 4.0 bps for A-rated countries, but in the case that the rating event produces rating convergence, this leads to an additional (relatively stronger) positive abnormal return of 10.7 bps for A-rated non-event countries.

The results during the crisis period are consistent with the whole sample period. There are no previous research papers which offer any possibility of direct comparisons with the split rating and rating convergence results presented here.

Further, following the methodology applied by Böninghausen and Zabel (2015) and Ismailescu and Kazemi (2010), we add a *Region* dummy variable to Eqs. (1), (2) and (3) to account for the potential influence of differences in banking regulations and trade relations across the countries in our sample. The *Region* dummy variable takes the value of 1 if both the non-event and event countries belong to the same geographical region, and 0 otherwise.[24] The robustness of the previous inferences is confirmed (results available upon request). The Region

[24] We consider the following regions (see Böninghausen and Zabel, 2015): (i) Central Europe: Czech Republic, Hungary, Poland, Slovak Republic and Slovenia; (ii) Eastern Europe: Estonia, Kazakhstan, Latvia, Lithuania, Russia and Ukraine; (iii) Northern Europe: Denmark, Finland, Iceland, Norway and Sweden; (iv) South Eastern Europe: Bosnia and Herzegovina, Bulgaria, Croatia, Macedonia, Montenegro, Romania, Serbia and Turkey; (v) Southern Europe: Cyprus, Greece, Italy, Malta, Portugal and Spain; (vi) Western Europe: Austria, Belgium, France, Germany, Ireland, Luxembourg, Netherlands, Switzerland and United Kingdom.

dummy suggests that spillover effects are more pronounced for rating actions from A to A rated countries within the same region.[25]

6. Conclusions

The influence of CRAs' actions upon financial markets has attracted close scrutiny since the global financial crisis. Sovereign rating actions have wide-ranging implications for economies and markets (e.g. Adelino and Ferreira, 2016; Almeida et al., 2017; Borenzstein et al., 2013; Brooks et al., 2015; Chen et al., 2013, 2016; Drago and Gallo, 2016; Kim and Wu, 2011). A particular aspect deserving a detailed evidence base is the potential spillover effects from a sovereign rating action to other countries' financial markets. In the recent context of the European sovereign debt crisis, one may perceive that negative (and common) spillovers across peripheral Eurozone countries are a dominant feature. In contrast, we may also envisage differential (competition) spillovers such as 'flight to quality' and 'flight to liquidity' effects of downgrades during the crisis period. In taking a longer run view across the Europe and Central Asia region, we consider both negative and positive spillovers, based on common (contagion) and differential (competition) effects of sovereign rating actions, with hypotheses drawing from a related literature which includes Gande and Parsley (2005) in the sovereign context and Jorion and Zhang (2010) in the corporate context. Competing hypotheses are set up for different types of rating actions. Importantly, we consider that different rating groups/levels influence whether contagion or competition effects are likely to dominate within specific spillover channels.

One important issue which is absent in the closely related spillover literature is the influence of CRAs' differences of opinion (split ratings) upon spillover effects. In addition, no

[25] Eqs. (1), (2) and (3) are also estimated using a sub-sample that excludes Turkey and Kazakhstan, which are under different banking regulations than EU countries. Robust results are obtained (available upon request).

attention has been paid to rating convergence as a contributory factor in the strength of spillover effects. Incorporating both inter-CRA split ratings and inter-country rating convergence reinforces the paper's positioning in the literature (as detailed in Sections 1 and 2). We examine spillovers in the stock market, motivated by the influence of the sovereign rating ceiling and sovereign-bank linkages (e.g. Almeida et al., 2017; Borenzstein et al., 2013). Böninghausen and Zabel (2015) contend that the results of previous sovereign rating event studies are not easily generalizable, and our different approach adds much to the evidence base.

This paper's findings reinforce the importance of considering rating levels, split ratings and rating convergence within an analysis of the spillover effects of sovereign rating actions. Both contagion (common) and competition (differential) types of spillovers in stock market returns are evident across rating actions for high-rated and low-rated sovereigns. The results reveal a clear pattern whereby downgrades of A-rated countries induce contagion to both A-rated and B-rated countries, while downgrades of B-rated countries reveal the opposite i.e. they induce competitive effects. These unique findings are strongly significant and robust across different specifications. Downgrade are found to produce far stronger spillover effects than upgrades. Several prior hypotheses on the directions of spillover are verified by these results.

Split ratings are found to intensify stock market spillover effects, although the impacts of split-widening and split-narrowing rating actions are not as differentiated as was anticipated. Strong findings are reported for the rating convergence element of the analysis, in that rating convergence/divergence across similarly-rated sovereigns has a meaningful influence on the spillover effects. For the downgrades of A-rated countries, rating convergence mitigates the contagion effect to other A-rated countries in the region, but has very limited effect on the contagion to B-rated countries. For downgrades of B-rated countries, rating convergence strengthens the competitive effect on other B-rated countries but has little effect on the

competitive impact on A-rated countries. The latter results are quite intuitive, yet no prior evidence exists on this.

Overall, this paper makes a clear and substantial contribution to the sovereign rating literature. The findings have implications for future research, especially on the influence of rating levels, split ratings and rating convergence. The results should be of interest to credit and equity market participants, CRAs and regulators.

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Table 1. The distribution of CCR changes for each country

	Down	Up		Down	Up
Austria	4	2	Lithuania	17	32
Belgium	10	6	Luxembourg	2	3
Bosnia and	4	4	Macedonia	6	5
Bulgaria	10	29	Malta	9	10
Croatia	17	8	Montenegro	8	3
Cyprus	34	16	Netherlands	4	4
Czech Rep.	4	12	Norway	0	1
Denmark	1	5	Poland	6	19
Estonia	12	26	Portugal	27	15
Finland	6	13	Romania	15	30
France	11	0	Russia	34	41
Germany	2	2	Serbia	7	6
Greece	47	32	Slovakia	10	35
Hungary	26	28	Slovenia	18	24
Iceland	24	26	Spain	24	15
Ireland	21	25	Sweden	4	12
Italy	22	7	Turkey	29	41
Kazakhstan	14	32	UK	8	2
Latvia	20	29	Ukraine	40	27
TOTAL: 1184	**Downgrades: 557**		**Upgrades: 627**		

Table 1 presents the distribution of rating upgrades and downgrades by CCR points for each of 39 countries included in the sample for August 1994 to October 2015. The reported events include multiple rating actions by a given CRA on the same day. Switzerland is the only sampled country which does not appear in the table. This is because it did not experience any rating actions during this time period.

Table 2. CCR evolution over time and across country groups

	1994-2015	1994-2000	2001-2006	2007-2010	2011-2015
A-rated Group					
Mean	52.55	52.96	52.19	52.50	52.50
Max	53.63	53.63	53.24	53.07	53.52
Min	50.80	52.11	51.18	51.80	50.80
Std dev	0.61	0.47	0.59	0.33	0.67
Median	52.61	53.14	52.29	52.52	52.80
B-rated Group					
Mean	27.29	26.79	27.30	28.37	27.03
Max	29.64	29.11	29.58	29.64	28.65
Min	24.87	24.96	25.36	26.99	24.87
Std dev	1.14	1.02	1.21	0.81	0.78
Median	27.24	26.86	27.28	28.41	27.13

Table 2 reports the summary statistics of the annual average CCR ratings of the A-rated and B-rated groups across the 39 sovereigns included in the sample over the entire sample period and for four sub-periods: (i) 1994 to 2000, (ii) 2001 to 2006, (iii) 2007 to 2010 and (iv) 2011 to 2015.

Table 3. CCR and split rating distributions for days immediately preceding event days

Downgrades									
	No. of downgrades	**Split Mean**	**Split-1 Mean**	**Split Max**	**Split-1 Max**	**W Count**	**W %**	**N Count**	**N %**
B group	232	4.93	4.99	18	20	84	36%	80	34%
A group	117	5.15	4.75	20	17	54	46%	36	31%
Total	349	5.00	4.91	20	20	138	40%	116	33%
Upgrades									
	No. of upgrades	**Split Mean**	**Split-1 Mean**	**Split Max**	**Split-1 Max**	**W Count**	**W %**	**N Count**	**N %**
B group	317	3.72	3.73	15	15	107	34%	117	37%
A group	120	3.44	3.67	13	13	30	25%	49	41%
Total	437	3.65	3.71	15	15	137	31%	166	38%
Total credit events									
	Total No. of rating events	**Split Mean**	**Split-1 Mean**	**Split Max**	**Split-1 Max**	**W Count**	**W %**	**N Count**	**N %**
B group	549	4.23	4.26	18	20	191	35%	197	36%
A group	237	4.28	4.20	20	17	84	35%	85	36%
Total	786	4.25	4.24	20	20	275	35%	282	36%

Table 3 presents the distribution of CCR actions (whereby multiple rating actions by a given CRA on the same day are excluded) across the defined 'A' and 'B' categories for the 39 sovereigns included in the sample for August 1994 to October 2015. The Table also presents the distribution of pre-event split ratings and the preponderance of split-widening (W) and split-narrowing (N) rating actions. The rating action on date t widens (W) the split when the split after the rating action ($Split_t$) is larger than the split on the day prior to the rating action ($Split_{t-1}$) i.e. $Split_t > Split_{t-1}$. The rating action on day t narrows (N) the split when the split after the rating action ($Split_t$) is smaller than the split on the day prior to the rating action ($Split_{t-1}$) i.e. $Split_t < Split_{t-1}$. '%' reflects the split-widening (W) and split-narrowing (N) rating actions as a percentage of the total number of downgrades, upgrades or total number of events reported in the first column of this table.

Table 4. Convergence index on event days: Summary statistics

Downgrades						
	CI (Mean)	**CI (Max)**	**CONV (count)**	**CONV (%)**	**DIVER (count)**	**DIVER (%)**
B group	14.85	45.44	105	46%	126	54%
A group	10.44	22.86	31	26%	86	74%
Upgrades						
	CI (Mean)	**CI (Max)**	**CONV (count)**	**CONV (%)**	**DIVER (count)**	**DIVER (%)**
B group	12.34	39.23	137	44%	179	56%
A group	11.38	22.92	94	78%	26	22%
Downgrades & upgrades						
	CI (Mean)	**CI (Max)**	**CONV (count)**	**CONV (%)**	**DIVER (count)**	**DIVER (%)**
B group	13.40	45.44	242	44%	305	56%
A group	10.91	22.92	125	53%	112	47%

Table 4 presents summary data for the Rating Convergence Index (*CI*) for the 39 sovereigns included in the sample for August 1994 to October 2015. *CONV* occurs when the rating action on day t produces a convergence, i.e. a lower value of the convergence index (CI) for the event country ($CI_t^E < CI_{t-1}^E$). *DIVER* is when the rating action on day t produces a divergence, i.e. a larger value of the convergence index (CI) for the event country ($CI_t^E > CI_{t-1}^E$). CI is calculated as the Euclidean distance between the CCR level of the event country and the average of the sovereign CCR levels in the event country's group ("A" or "B" as defined in the text) on a given day, considering the three CRAs:

$$CI_t^E = \sqrt{(SP_t^E - \overline{SP}_t)^2 + (M_t^E - \bar{M}_t)^2 + (F_t^E - \bar{F}_t)^2}$$

See Section 4 for further details.

Table 5. Results of the estimation of Equation (1)

Explanatory Variables	Whole sample				Crisis sample			
	A – A	**A – B**	**B – B**	**B – A**	**A – A**	**A – B**	**B – B**	**B – A**
	Panel A: Downgrades							
ΔCCR_t^E	-0.123***	-0.227***	0.027	0.041***	-0.149***	-0.251***	0.050***	0.059***
	(-7.41)	(-7.00)	(1.43)	(4.06)	(-6.96)	(-7.01)	(2.63)	(4.69)
$Prior_t^E$	0.311	-0.084	-0.057	0.446**	0.993**	0.682*	0.883***	0.976***
	(0.84)	(-0.17)	(-0.16)	(2.28)	(2.53)	(1.45)	(2.68)	(4.19)
VIX_t	-0.005	-0.028***	-0.009	-0.004	-0.015***	-0.041***	-0.014***	-0.010***
	(-1.50)	(-4.44)	(-1.58)	(-1.45)	(-3.76)	(-5.30)	(-2.37)	(-3.04)
GDP_t^E	0.044***	0.082***	0.036**	0.003	0.340***	0.552***	0.081*	-0.035**
	(5.17)	(4.93)	(2.22)	(0.41)	(7.28)	(6.97)	(1.34)	(-1.86)
GDP_t^{NE}	-0.002	-0.018	-0.030	0.000	-0.015	0.109**	-0.018	0.018
	(-0.34)	(-0.73)	(-0.92)	(0.02)	(-0.65)	(1.73)	(-0.33)	(0.92)
Constant	-0.520***	-0.482	1.710	-0.234	-1.118***	-1.925***	0.598	0.318*
	(-3.05)	(-0.86)	(1.15)	(-1.13)	(-3.95)	(-3.03)	(1.13)	(1.46)
Time & country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No of observations	8385	5134	6390	10146	3368	2885	4582	5724
R-squared	0.05	0.07	0.03	0.03	0.11	0.14	0.04	0.05

Table 5. Continued

Explanatory Variables	Whole sample				Crisis sample			
	A – A	**A – B**	**B – B**	**B – A**	**A – A**	**A – B**	**B – B**	**B – A**
	Panel B: Upgrades							
ΔCCR_t^E	-0.039***	-0.014	-0.003	-0.007	0.033	0.064	0.002	-0.006
	(-2.83)	(-0.39)	(-0.16)	(-0.84)	(0.77)	(0.77)	(0.10)	(-0.45)
$Prior_t^E$	--	--	0.140	-0.081	--	--	--	--
			(0.23)	(-0.58)				
VIX_t	0.013***	0.003	-0.015*	-0.006**	0.018***	-0.002	0.034***	0.018***
	(3.54)	(0.42)	(-1.75)	(-1.99)	(2.77)	(-0.20)	(3.05)	(3.52)
GDP_t^E	0.035***	0.005	-0.081***	-0.034***	-0.041	-0.242*	0.079	-0.046
	(2.62)	(0.16)	(-3.20)	(-2.68)	(-0.73)	(-1.95)	(1.23)	(-1.21)
GDP_t^{NE}	0.007	-0.019	0.008	-0.003	-0.069***	-0.214***	-0.072**	-0.064***
	(1.20)	(-0.52)	(0.42)	(-0.61)	(-2.86)	(-2.73)	(-2.12)	(-3.92)
Constant	-0.383**	0.427	0.776	0.606**	0.784***	6.008***	0.332	0.631
	(-2.22)	(0.55)	(1.59)	(2.15)	(2.68)	(3.52)	(0.67)	(0.78)
Time & country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No of observations	8311	4338	6831	12683	2239	1627	3272	3755
R-squared	0.04	0.04	0.03	0.02	0.11	0.09	0.07	0.04

Note: The table reports the results of Eq. (1). The dependent variable is CRS_t^{NE} which measures, in basis points, the cumulative return spread of the non-event country on day t, against Eurostoxx. The independent variables are defined as follows. ΔCCR_t^E is the credit event variable, measuring the absolute value of the maximum change in the CCR for event-country on event date t. $Prior_t^E$ is a dummy variable taking the value of 1 if there are announcement(s) made on the event country by other CRAs during the two-week interval [-14,-1] (calendar days) before the event. VIX_t is the CBOE Volatility index. GDP_t^E (GDP_t^{NE}) is the event (non-event) country size measured in US dollar GDP in the previous year (from the World Bank). We control for the fixed-effects of country and time by adding a full set of country dummy variables and four time dummy variables: i) from 1994 to 2000, ii) from 2001 to 2006, iii) from 2007 to 2010 and iv) from 2011 to 2015. We estimate Eq. (1) separately for positive events and negative events, for four-way comparisons across the A- and B-rated groups. We apply Huber-White robust standard errors. t-values are in parentheses. ***, **, and * refer to significant coefficients at the 1%, 5% and 10% levels.

Table 6. Results of the estimation of Equation (2) – Rating downgrades only

Explanatory Variables	Whole sample				Crisis sample			
	A – A	**A – B**	**B – B**	**B – A**	**A – A**	**A – B**	**B – B**	**B – A**
ΔCCR_t^E	-0.106***	-0.208***	0.011	0.019*	-0.151***	-0.256***	0.047**	0.045***
	(-6.13)	(-6.21)	(0.55)	(1.68)	(-7.04)	(-7.15)	(2.47)	(3.48)
$WS_t * Split_{t-1}$	-0.027**	-0.047**	0.045**	0.037***	0.003	0.016	0.026	0.033**
	(-2.02)	(-2.00)	(2.45)	(3.50)	(0.17)	(0.55)	(1.37)	(2.53)
$NS_t * Split_{t-1}$	-0.029***	-0.030*	0.022*	0.032***	-0.010	-0.006	-0.001	0.029***
	(-3.10)	(-1.70)	(1.67)	(3.96)	(-0.85)	(-0.28)	(-0.11)	(3.03)
$Prior_t^E$	0.452	0.010	-0.030	0.497***	1.092***	0.757	0.877***	0.965***
	(1.27)	(0.02)	(-0.08)	(2.59)	(2.93)	(1.64)	(2.67)	(4.30)
VIX_t	-0.005	-0.029***	-0.009	-0.004	-0.015***	-0.041***	-0.014**	-0.010***
	(-1.51)	(-4.46)	(-1.59)	(-1.51)	(-3.78)	(-5.33)	(-2.35)	(-3.05)
GDP_t^E	0.041***	0.078***	0.039**	0.008	0.342***	0.550***	0.077	-0.045**
	(4.84)	(4.71)	(2.46)	(0.96)	(7.25)	(6.85)	(1.25)	(-2.35)
GDP_t^{NE}	-0.001	-0.016	-0.031	-0.001	-0.014	0.108*	-0.020	0.009
	(-0.16)	(-0.66)	(-0.97)	(-0.09)	(-0.62)	(1.72)	(-0.37)	(0.45)
Constant	-0.565***	-0.562	1.707	-0.365*	-1.251***	-1.910***	0.585	0.307
	(-3.31)	(-0.99)	(1.15)	(-1.75)	(-4.44)	(-3.00)	(1.10)	(1.40)
Time & country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No of observations	8385	5134	6390	10146	3368	2885	4582	5724
R-squared	0.05	0.07	0.04	0.03	0.11	0.14	0.04	0.05

Note: See Table 5 for further details. $WS_t(NS_t)$ is a dummy variable taking value 1 if the sovereign has a split rating on day t-1 (i.e. different CRAs assign unequal ratings to the same issuer at the same time) and the event causes wider (narrow) split on day t i.e. $Split_t > Split_{t-1}$ or vice versa.

Table 7. Results of the estimation of Equation (3) - Rating downgrades only

Explanatory Variables	Whole sample				Crisis sample			
	A – A	**A – B**	**B – B**	**B – A**	**A – A**	**A – B**	**B – B**	**B – A**
ΔCCR_t^E	-0.120***	-0.224***	0.025	0.040***	-0.134***	-0.244***	0.048***	0.059***
	(-7.16)	(-6.90)	(1.31)	(3.93)	(-6.22)	(-6.83)	(2.58)	(4.62)
$CONV_t$	0.142**	0.081	0.364***	0.107*	0.423***	0.245	0.268**	0.097
	(2.11)	(0.64)	(3.35)	(1.87)	(4.15)	(1.43)	(2.06)	(1.22)
$Prior_t^E$	0.334	-0.067	-0.082	0.439**	1.093***	0.761	0.859***	0.967***
	(0.90)	(-0.13)	(-0.22)	(2.24)	(2.77)	(1.59)	(2.58)	(4.12)
VIX_t	-0.005	-0.029***	-0.010*	-0.005	-0.016***	-0.042***	-0.015**	-0.010***
	(-1.58)	(-4.45)	(-1.74)	(-1.54)	(-3.97)	(-5.35)	(-2.48)	(-3.08)
GDP_t^E	0.038***	0.079***	0.019	-0.001	0.285***	0.532***	0.055	-0.046**
	(4.32)	(4.54)	(1.13)	(-0.10)	(5.89)	(6.61)	(0.83)	(-2.08)
GDP_t^{NE}	-0.003	-0.018	-0.030	0.000	-0.018	0.108*	-0.017	0.019
	(-0.41)	(-0.74)	(-0.92)	(-0.02)	(-0.78)	(1.71)	(-0.31)	(0.95)
Constant	-0.519***	-0.505	1.516	-0.209	-1.040***	-1.998***	0.620	0.324
	(-3.07)	(-0.89)	(1.03)	(-1.01)	(-3.67)	(-3.12)	(1.17)	(1.49)
Time & country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No of observations	8385	5134	6390	10146	3368	2885	4582	5724
R-squared	0.05	0.07	0.04	0.03	0.12	0.14	0.04	0.05

Note: See Table 5 for details. $CONV_t$ is a dummy variable taking the value of 1 if the rating change produces a lower value in the convergence index (CI) of the event-country on day t (i.e. $CI_t^E < CI_{t-1}^E$).

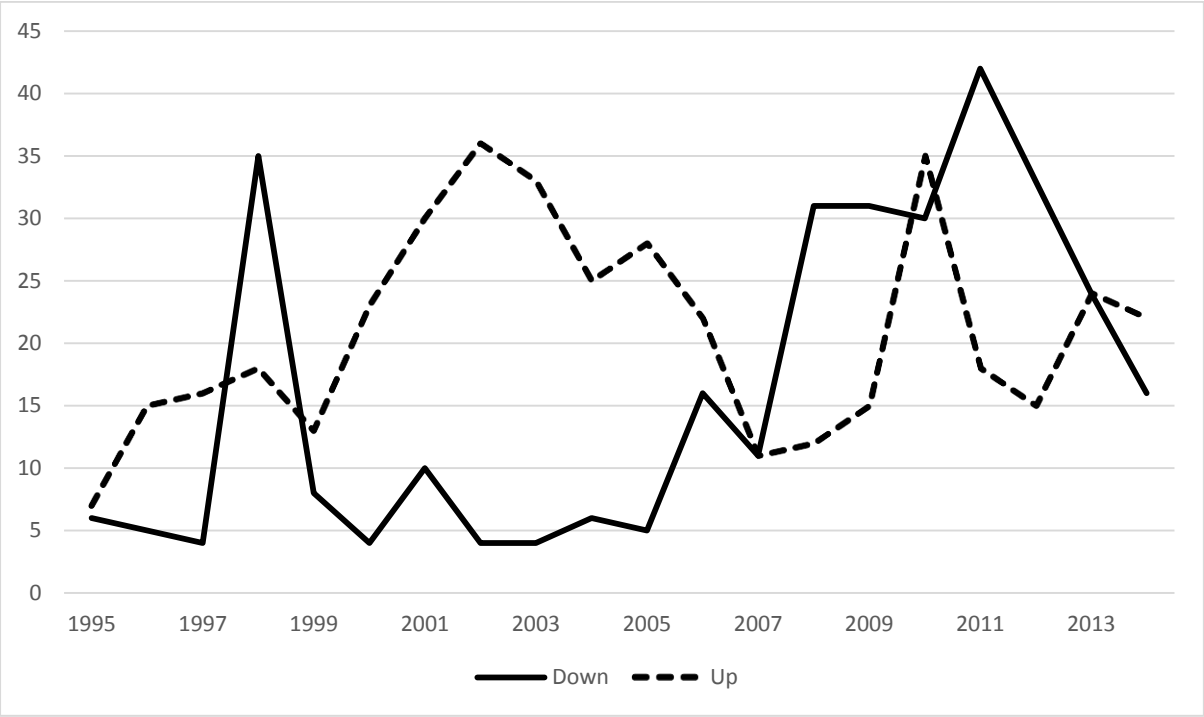

Figure 3. Evolution of rating downgrades and upgrades
This figure includes data for the 39 sovereigns in the sample. The data is based on all actions i.e. rating, outlook and watch.

Appendix: Summary statistics for national stock market indices

Country	Index	Sample from	Mean	SD	Max	Min
Austria	ATX	01-94	0.0034	0.0146	0.1358	-0.1690
Belgium	BEL20	01-94	0.0082	0.0126	0.1480	-0.1434
Bosnia and	BIRS	05-04	-0.0540	0.0219	0.1050	-0.1308
Bulgaria	SOFIX	10-00	0.0660	0.0253	0.2881	-0.1999
Croatia	CRO	06-02	-0.0075	0.0184	0.1736	-0.1843
Cyprus	CYSMMAPA	09-04	-0.2008	0.0356	0.2554	-0.2028
Czech Republic	PX	04-94	-0.0218	0.0173	0.1226	-0.1500
Denmark	KFX	01-94	0.0542	0.0141	0.1755	-0.1556
Estonia	TALSE	06-96	0.0682	0.0254	0.2367	-0.2564
Finland	HEX	01-94	0.0347	0.0192	0.1745	-0.1767
France	CAC	01-94	0.0037	0.0123	0.1482	-0.1465
Germany	DAX	01-94	0.0308	0.0136	0.1532	-0.1764
Greece	ASE	01-94	-0.0349	0.0249	0.1430	-0.1874
Hungary	BUX	01-94	0.0783	0.0218	0.1820	-0.2359
Iceland	ICEXI	01-94	0.0243	0.0291	0.1273	-1.2251
Ireland	ISEQ	01-94	0.0206	0.0153	0.1593	-0.1459
Italy	FTSEMIB	12-97	-0.0219	0.0139	0.1472	-0.1126
Kazakhstan	KZKAK	07-00	0.1062	0.0334	0.4808	-0.5061
Latvia	RIGSE	01-00	0.0805	0.0241	0.1763	-0.2350
Lithuania	VILSE	01-00	0.0738	0.0189	0.1658	-0.1206
Luxembourg	LUXXX	01-99	0.0058	0.0147	0.1025	-0.0953
Macedonia	MBI	12-04	0.0275	0.0258	0.1598	-0.1269
Malta	MALTEX	12-95	0.0386	0.0201	0.1510	-0.1252
Montenegro	MONEX20	03-03	0.1126	0.0280	0.1908	-0.1506
Netherlands	AEX	01-94	0.0080	0.0126	0.1632	-0.1516
Norway	OBX	01-96	0.0578	0.0153	0.1707	-0.1958
Poland	WIG	01-94	0.0262	0.0237	0.2191	-0.2368
Portugal	PSI20	01-94	-0.0135	0.0148	0.1468	-0.1320
Romania	BET	09-97	0.0687	0.0266	0.1826	-0.2190
Russia	CF	09-97	0.1051	0.0353	0.3994	-0.2949
Serbia	BELEX15	10-05	-0.0418	0.0240	0.1701	-0.1455
Slovakia	SKSM	01-94	0.0107	0.0258	0.3221	-0.1690
Slovenia	SBITOP	04-03	-0.0302	0.0190	0.0984	-0.0867
Spain	IBEX	01-94	0.0147	0.0141	0.1498	-0.1271
Sweden	OMX	01-94	0.0366	0.0143	0.1540	-0.1817
Switzerland	SMI	01-94	0.0158	0.0129	0.1428	-0.1608
Turkey	XU100	01-94	0.1855	0.0348	0.3355	-0.2298
Ukraine	PFTS	01-98	0.0392	0.0293	0.1938	-0.2007
UK	UKX	01-94	0.0004	0.0101	0.1359	-0.1474

Note: The table presents the national stock market indices along with descriptive statistics of the 2-day event cumulative log return spread during the sample period available for each country. SD denotes the standard deviation. Means are multiplied by 100. The sample ends in October 2015 for all countries.