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The national market impact of sovereign rating changes

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Abstract

This study investigates the aggregate stock market impact of sovereign rating changes. Consistent with evidence pertaining to company credit rating changes, we report that rating downgrades have a negative wealth impact on market returns. Moreover, we find that a downgrade impacts negatively on both the domestic stock market and the dollar value of the country's currency. Interestingly, of the four credit rating agencies examined, only Standard & Poors and Fitch rating downgrades result in significant market falls. Finally, we can find no evidence that emerging markets are particularly sensitive to rating changes or that markets react more severely to multiple rating changes.

JEL classification: G14; G15
Keywords: Sovereign rating changes; Event study; Country beta risk

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1. Introduction

There exists a large body of literature analysing the impact of bond rating changes on individual stocks. This literature is primarily focused on the information content of bond rating change announcements. If rating agencies base their rating changes on publicly available information, the efficient market hypothesis (EMH) predicts that stock prices will not adjust in response to the ratings change event. Therefore to the extent that stock prices are found to react to bond rating changes, this implies either evidence against the semi-strong form EMH, or, the presence of some private information available only to ratings agencies that has, as a consequence, come into the public domain.

There are two key stylized findings in the literature on corporate bond rating change announcements that present a natural focus for the current paper. [1] First, in general, ratings upgrades have no impact upon the bond and stock markets (see Barron et al., 1997; Ederington and Goh, 1998; Goh and Ederington, 1993, 1999; Griffin and Sanvicente, 1982; Holthausen and Leftwich, 1986; Impson et al., 1992; Liu et al., 1999; Matolcsy and Lianto, 1995; Wansley et al., 1992; Zaima and McCarthy, 1988). [2]

Second, ratings downgrades are consistently associated with significant negative returns in equity and bond markets (see Barron et al., 1997; Ederington and Goh, 1998; Glascock et al., 1987; Goh and Ederington, 1993, 1999; Griffin and Sanvicente, 1982; Holthausen and Leftwich, 1986; Hsueh and Liu, 1992; Impson et al., 1992; Liu et al., 1999; Matolcsy and Lianto, 1995; Wansley et al., 1992; Zaima and McCarthy, 1988).

While the determinants of sovereign rating changes and their effect on bond yields have been investigated (Cantor and Packer, 1996a, b), the literature is silent on the corresponding stock market impact of sovereign rating changes. Accordingly, the primary contribution of the current paper is to help fill this important void and investigate the impact of sovereign rating changes on the returns of the associated national stock market. As such, an important aim of our study is to assess whether and to what extent the key results documented for corporate bond rating changes on individual stocks, also apply in the aggregate country level context.

Why is such a study important? A key part of the answer to this question relates to the fact that with the inevitable globalisation of markets, investors and particularly managed funds are increasingly focused on international diversification. As stated by Erb et al. (1996, p. 29) "... given the increasingly global nature of investment portfolios, an understanding of country risk is very important". Further, Harvey and

[1] Several other results have also been documented in the literature. For example, the market seems to be able to anticipate some ratings changes – particularly downgrades (for example, see McCarthy and Melicher, 1988) and the impact of downgrades is not necessarily confined to individual stocks – sometimes the impact spreads to other stocks belonging to the same industry (for example, see Akhigbe and Madura, 1997).

[2] Exceptions to this general finding have been documented by Glascock et al. (1987) and Hsueh and Liu (1992).

Zhou (1993, p. 107) state "... there is increased interest in international asset allocation. A number of mutual funds offer country index portfolios. Pension funds are beginning to realize the benefit of international participation. As such, it is important to be able to reliably assess the risk of investing in different national markets...".

The formation of international portfolios requires a range of fundamental inputs into the asset allocation decision and for active investment strategies there are major information events that may affect the top–down choice of the basic allocation of funds to different regions and national markets. The change of sovereign ratings is one such key event that may trigger substantial re-weighting of international portfolios. While there may be a temptation to simply adopt the basic results that have been established for credit rating changes at the individual stock level (as outlined above), unless the impact of sovereign rating changes is directly tested, there will never be total confidence that such an approach is valid. Accordingly, the current study is motivated by both a basic need and a fundamental desire to uncover empirical evidence that will either deliver such confidence in applying the outcomes found for bond ratings changes on individual stocks or, alternatively, that will carefully guide our thinking in the appropriate way to modify the translation of empirical knowledge around individual bond ratings changes to the sovereign rating change domain.

To achieve our objective, we investigate the aggregate stock market impact of sovereign rating changes, using the population of all ratings changes over the period 1973–2000. Our analysis investigates the foreign currency ratings changes produced by four competing agencies, namely, Standard & Poors (S&P), Moodys, Thomson and Fitch IBCA. A secondary objective of the study is to examine local currency ratings changes. [3] The main findings of our paper can be readily summarized as follows. First, rating upgrades over the entire event window show little evidence of abnormal returns behavior. Second, with regard to rating downgrades, but not for local currency downgrades, the event day impact is significantly negative. Thus our event study findings largely echo those documented for ratings changes for individual companies, namely, that upgrades do not have a great wealth impact while downgrades do reveal a significant impact.

Third, irrespective of whether returns are denominated in domestic currencies or US dollars, the wealth impact of a sovereign rating downgrade remains. Fourth, there does not appear to be an equal reaction to sovereign rating changes by rating agency. Of the four major rating agencies we examine, only S&P and Fitch IBCA elicit a significant market reaction when they downgrade a country's credit rating.

[3] Local currency ratings reflect a country's capacity to meet debt obligations that are denominated in local currency terms. Local currency ratings are generally based on: political stability, fiscal and monetary policy, inflation, economic prosperity, and of course (local currency) debt repayment history. On the other hand, foreign currency ratings reflect a country's capacity to meet debt obligations that are denominated in foreign currency terms. While foreign currency ratings are broadly based on the same factors as the local currency ratings, they give more focus to balance of payments, political risk, economic policies and global integration.

This is surprising given that Moodys and Thomson are major players in the sovereign ratings industry.

Fifth, based on an analysis of our sample, emerging markets do not appear to be particularly sensitive to sovereign rating changes and, although these countries experience significant negative abnormal returns when a rating downgrade is announced, it is no more severe than the reaction elicited by developed markets. Sixth, (relative to single step downgrades) multiple downgrades do not appear to impart an additional wealth effect on country markets.

The plan of this paper is as follows. In Section 2 we outline the data used in our analysis. Section 3 presents the empirical tests and results of our empirical analysis, while the final section concludes the paper.

2. Data

A credit rating represents an assessment of the overall creditworthiness of an obligor in terms of both its capacity and willingness to meet its financial commitments as they fall due. Accordingly, rating agencies provide an evaluation of a country's creditworthiness and assign a rating to that country. We investigate the own-market impact of sovereign rating changes on the stock market return of countries using the population of all rating change announcements for the period 1 January 1973 through 31 July 2001 by four specialised rating agencies, namely, S&P, Moodys, Fitch and Thomson. The re-ratings announcements for all four ratings agencies were sourced from Bradynet Inc. [4] Generally, the date nominated as the re-rating announcement date pertains to that of the local analyst responsible for the re-rating event. For example, the rating for Malaysia or Korea would be assigned by the 'local' Singapore office and the time/date would be the Singapore time/date. As such, the date (if not the actual time) will be identical to that of the affected country.

Although the individual agencies' ratings are measured on different scales, there are very broad similarities between them. For all four agencies the highest band of ratings is the 'A' band, which has seven 'notches': Aaa, Aa1, ..., A3 for Moodys and AAA, AA+, ..., A− for the other three agencies. The next band of ratings is the 'B' level rating, which has nine notches: Baa1, Baa2, ..., B3 for Moodys and BBB+, BBB, ..., B− for the other three agencies. The lowest band ('non-investment' grade) of credit rating varies a little across agencies. While Thomson has just three notches: CCC, CC and D; S&P and Fitch have six notches at this level: CCC+, CCC, ..., D and CCC, CC, ..., D, respectively. Finally, Moodys has five such notches: Caa1, Caa2, Caa3, Ca and C.

Interestingly, S&P is the only rating agency that assigns both a local currency and a foreign currency sovereign rating. While they have always given foreign currency sovereign ratings, historically not all of these countries have been assigned local currency ratings – indeed, many countries have only been added to the local currency ratings list gradually over time. To illustrate this point, in 1998, of the group of countries as-

[4] The website address for Bradynet ratings information is: http://www.bradynet.com/m-ratings.html.

signed a foreign currency rating by S&P, there were seven without a local currency rating: China, Qatar, Oman, Venezuela, Turkey, Pakistan, and Russia. In early 2002 there were only two without a local currency rating, namely, China and Venezuela. Most rating changes that occur tend to involve both foreign and local currency re-ratings. While there is no compelling reason why rating changes *have* to occur together, historically they have done so approximately 75% of the time, particularly for countries with lowly ratings. This is especially the case for underdeveloped countries or emerging markets. In contrast, developed countries tend to experience foreign currency re-ratings more often than local currency re-ratings, predominantly because they typically already have quite high local currency sovereign ratings.

Table 1 presents a summary of rating agency activity over the period of analysis. The table is partitioned into two parts – the top part provides some basic statistics in terms of the countries rated, while the bottom part reports some general rating statistics. As a result of data availability, only local currency rating changes by S&P are reported whereas for foreign currency rating changes, all four agencies are represented. S&P generated the first set of sovereign ratings in 1961 and has been a major

Table 1
Summary of rating agency activity

	First appearance in sample	Number of countries rated	Countries re-rated once	Countries re-rated twice	Countries re-rated three or more	
Country statistics						
Panel A: Local currency ratings						
S&P	30 May 1990	25	0	10	15	
Panel B: Foreign currency ratings						
S&P	1 January 1961	62	15	15	32	
Moodys	15 January 1974	69	20	9	40	
Fitch IBCA	10 August 1994	53	19	18	16	
Thomson	15 July 1987	62	20	18	24	
	First appearance in sample	Mean rating	Number of upgrades	Number of downgrades	Number rating changes first[a]	Number rating changes following[b]
Rating statistics						
Panel A: Local currency ratings						
S&P	30 May 1990	B+	30	44	N/A	N/A
Panel B: Foreign currency ratings						
S&P	1 January 1961	BB	88	83	107	64
Moodys	15 January 1974	Ba2	105	95	89	111
Fitch IBCA	10 August 1994	BB+	57	52	53	56
Thomson	15 July 1987	BB+	61	77	78	60

This table summarizes the sovereign rating activity across four leading credit rating agencies: S&P; Moodys; Fitch IBCA and Thomson.

[a] No ratings changes by any agency in the six months prior to announcement.

[b] Rating change announcement follows an announcement of a rating change for the same country in the previous six months.

force in sovereign ratings assessment since that time. Moodys began rating the creditworthiness of countries in 1974 while two other agencies, Thomson and Fitch, entered the market considerably later in 1987 and 1994, respectively. Each agency has a similar coverage of countries and all are relatively active in assigning sovereign ratings, with Thomson having a particular emphasis on emerging markets. Interestingly S&P, the oldest provider of sovereign ratings are the least active (in terms of average re-ratings per year) but as will be seen later, also have the greatest impact on market returns when announcing a ratings downgrade.

Table 1 also reveals the number of countries that are re-rated multiple times in our sample by each agency. For example, we see that in the case of Moodys of the 69 countries rated, 20 countries were re-rated only once over our sample period; nine countries were re-rated twice and 40 countries were re-rated three or more times. In addition, in the lower half of Table 1 we report the number of cases in which the re-ratings announcement was the 'first' for that country (i.e. there were no rating changes for that country by any agency in the previous six months) and the number of re-ratings in which the ratings announcement was not the first for that country. The main feature emanating from these statistics is that S&P tends to 'lead' the other agencies with 107 out of its 171 re-ratings (62.5%) being 'first move' re-ratings. Conversely, Moodys tend to be 'followers' with only 89 out of its 200 re-ratings (44.5%) being first move cases. As would be expected over a relatively long sample period, we also see from Table 1 that the number of ratings upgrades is approximately equal to the number of downgrades. The final descriptive statistic of note in Table 1 is the measure of mean ratings across agencies. Specifically, in the case of foreign currency ratings we see that S&P and Moodys have an average rating of BB and Ba2, which are both at notch number 5 (and midpoint) in their respective (nine-notch) B-level groupings. Interestingly, Fitch and Thomson both have an average rating of BB+, which is one notch higher, suggesting that these two ratings agencies tend to assign slightly higher, and perhaps more inflated, ratings. This may be particularly the case for Thomson given its emphasis on emerging markets.

Our sample period captures all the world's currency crises over the last thirty years of the twentieth century and as such provides a good test of the incremental informational impact of sovereign rating changes. Daily market percentage returns denominated in both US dollars and domestic currencies were collected from Datastream International. However, in those cases where a country return series was not available, other sources including FT Extel and the individual country stock exchanges where consulted. The MSCI World Index was used to proxy for a world benchmark return.

Our analysis centers primarily on S&P ratings changes for several reasons. First, S&P have provided sovereign ratings analyses for forty years and as such their activity spans by far the longest period over the four agencies included in our study. Second, our analysis of local currency rating changes is only available for S&P ratings and to allow a consistent comparison between local and foreign currency rating changes we require an equivalent analysis, which is only available for S&P rating changes. Third, as will be seen, the market reaction to sovereign rating changes is highest when S&P changes their ratings assessment of a country. To avoid a loss

of power in our tests because of the contaminating influence of potentially non-informative announcements by other agencies, our general focus on just S&P rating changes is well motivated.

3. Empirical tests

3.1. S&P foreign and local currency sovereign rating changes

To determine the impact of foreign and local currency sovereign rating changes, an event study methodology is employed to detect the abnormal returns resulting from an upgrade or downgrade announcement. Daily risk adjusted abnormal market returns are derived from the conventional market model:

$$\mathrm{AR}_{it} = R_{it} - (\alpha_i + \beta_i R_{\mathrm{m}t}), \tag{1}$$

where R_{it} is the return on market i at day t, $R_{\mathrm{m}t}$ is the corresponding return on the MSCI World Market Index at day t, and α_i and β_i are the market model parameters obtained from an ordinary least squares regression.

The market model parameters are based upon approximately six months of daily return observations beginning 120 days through to 21 days before the sovereign rating change. The event period ranges from 10 days before to 10 days after the rating change. Averaging the abnormal returns over each day in the event period generates average abnormal returns (AAR). Abnormal return test statistics are taken from Boehmer et al. (1991) and are estimated as follows. Risk adjusted abnormal returns are first standardised to give the 'standardised abnormal return' (SAR):

$$\mathrm{SAR}_{it} = \mathrm{AR}_{it}/\hat{\sigma}_i \sqrt{1 + \frac{1}{T_i} + \frac{(R_{\mathrm{m}t} - \overline{R}_{\mathrm{m}})^2}{\sum_{E=-120}^{-21} (R_{\mathrm{m}t} - \overline{R}_{\mathrm{m}})^2}}, \tag{2}$$

where $\hat{\sigma}_i$ is market i's standard deviation of the risk adjusted abnormal share price return during the estimation period; T_i is the number of trading days in the estimation period of country i; and $\overline{R}_{\mathrm{m}}$ is the average world market return during the estimation period.

For each day in the event period, the cross-sectional standard deviation of the SARs is then calculated. This can be written as

$$\sigma_{\mathrm{SAR}_t} = \sqrt{\frac{\sum_{i=1}^{N} \left(\mathrm{SAR}_{it} - \sum_{i=1}^{N} \mathrm{SAR}_{it}/N\right)^2}{N(N-1)}}. \tag{3}$$

The standardised cross-sectional test statistic is thus:

$$Z = \frac{\sum_{i=1}^{N} \mathrm{SAR}_{it}/N}{\sigma_{\mathrm{SAR}_t}}. \tag{4}$$

The individual SARs are assumed to be cross-sectionally independent and distributed normally. By the Lindberg–Levy and Lindberg–Feller central limit theorems

Table 2
Market reaction to S&P foreign currency sovereign rating changes

Event day	Rating upgrades				Rating downgrades			
	AAR	*t*-stat	CAR	*t*-stat	AAR	*t*-stat	CAR	*t*-stat
−10	0.0031	1.02	0.0031	1.02	−0.0021	−0.40	−0.0021	−0.40
−9	0.0002	0.06	0.0033	0.80	0.0124	1.87*	0.0104	1.23
−8	−0.0014	−0.37	0.0019	0.33	0.0058	1.15	0.0162	1.65
−7	−0.0034	−1.10	−0.0015	−0.24	0.0008	0.11	0.0169	1.41
−6	−0.0036	−1.31	−0.0051	−0.74	0.0026	0.30	0.0195	1.33
−5	0.0045	1.27	−0.0006	−0.07	−0.0091	−1.10	0.0105	0.62
−4	0.0051	1.51	0.0045	0.53	0.0038	0.49	0.0143	0.77
−3	0.0039*	1.83	0.0084	0.96	−0.0038	−0.55	0.0105	0.53
−2	−0.0019	−0.69	0.0065	0.71	−0.0013	−0.17	0.0092	0.43
−1	−0.0024	−1.04	0.0041	0.44	−0.0096	−1.24	−0.0005	−0.02
0	−0.0021	−0.83	0.0020	0.21	−0.0197	−3.86**	−0.0202	−0.87
1	0.0036	1.28	0.0056	0.56	−0.0027	−0.39	−0.0229	−0.94
2	0.0032	1.09	0.0089	0.84	0.0040	0.53	−0.0189	−0.74
3	0.0015	0.82	0.0104	0.97	0.0004	0.05	−0.0185	−0.70
4	−0.0002	−0.08	0.0102	0.93	−0.0056	−1.02	−0.0241	−0.90
5	−0.0028	−0.99	0.0074	0.66	−0.0071	−1.16	−0.0312	−1.13
6	−0.0038	−1.32	0.0037	0.32	0.0040	0.53	−0.0272	−0.95
7	−0.0014	−0.58	0.0023	0.19	0.0135	1.84*	−0.0137	−0.46
8	0.0011	0.39	0.0034	0.28	−0.0051	−1.04	−0.0187	−0.63
9	−0.0033	−1.36	0.0001	0.01	−0.0002	−0.04	−0.0190	−0.62
10	0.0008	0.28	0.0009	0.07	0.0130	1.13	−0.0060	−0.18

This table reports AAR and CAR as measures of the own-market reaction to S&P foreign currency rating changes. AAR and CAR are generated using a standard mean-adjusted event study methodology. Abnormal returns are defined as

$$\mathrm{AR}_{it} = R_{it} - (\alpha_i + \beta_i R_{\mathrm{m}t}),$$

where R_{it} is the return on market i on day t; $R_{\mathrm{m}t}$ is the return on the MSCI World Market Index on day t; and α_i, β_i are market model parameters generated from a 100-day estimation period beginning 120 days through 21 days before the sovereign re-rating. All returns are denominated in US dollars. Standard errors are calculated as in Boehmer et al. (1991). Note that standard errors are estimated using SARs but only AAR are reported. A rating change occurs when S&P announces a rating change.

* Denotes statistical significance at the 10% level.

** Denotes statistical significance at the 5% level.

(Greene, 2000), the distribution of the sample average SARs will converge to normality. [5]

Table 2 reports the market reaction to S&P foreign currency sovereign re-ratings. From this table, it is clear that foreign currency rating downgrades have a significant 'own-market' wealth effect. Prior to a rating downgrade, market re-

[5] Boehmer et al. (1991) report that the test is correctly specified even when there is a variance increase in the event period. This is plausible for our sample since many of the countries experiencing rating changes are emerging markets, which could be potentially more sensitive to ratings changes. Moreover, the rating change itself may cause an increase in the volume of trading, thus causing a growth in return volatility around this time.

turns are not significantly worse or better than in other periods. However, announcement day AAR are significantly negative at −1.97% (one day return). Subsequent to downgrades in sovereign ratings, the market reverts to normal with returns in general, similar to the estimation period. In contrast, for the rating upgrade event, announcement date country returns are not quantifiably different from other days.

With regard to the market reaction to S&P local currency sovereign re-ratings, the results (unreported) indicate that there is no additional information content imparted by the actual announcement of a ratings change. Specifically, AAR, show no significant increases or decreases either before or after a ratings change. However, for rating downgrades there is a general negative tendency in AAR in the days leading up to the rating change and although AAR revert to randomly varying around zero in the days after the downgrade, the cumulative wealth decrease is much greater for local currency downgrades than that of foreign currency downgrades.

In summary, with reference to the event study experiment in this section, our findings echo those widely documented for ratings changes for individual companies. That is, basically upgrades do not have a great wealth impact (see for example, Barron et al., 1997; Ederington and Goh, 1998; Goh and Ederington, 1993, 1999; Griffin and Sanvicente, 1982) while downgrades have a negative wealth impact (see for example, Barron et al., 1997; Ederington and Goh, 1998; Goh and Ederington, 1993, 1999; Liu et al., 1999).

3.2. Analysis by rating agency

Rating agencies cite many different factors, both quantitative and qualitative, as contributing towards a sovereign ratings assessment. These factors (see Cantor and Packer, 1996a), which include per capita income, GDP growth, inflation, fiscal and external balance, external debt, economic development and default history, all undoubtedly impact upon the creditworthiness of a country. However, it is interesting to determine whether the understanding and synthesis of this information together with any private information held may differ across rating agencies. One way of assessing differential use of information is to examine the market reaction to individual agencies' sovereign rating changes. Accordingly, in Table 3, the cumulative abnormal returns (CAR) for rating agency upgrade and downgrade announcements are summarised and compared.

It should be noted that there is some degree of doubt about the time of the day at which the sovereign re-rating announcements are made. As such the extent to which the announcements are made late in the day or even after trading has finished for the day, will mean that the event date abnormal return is measured imprecisely. However, we feel that the 'timing uncertainty' issue may not be so important, given that it is clear from Table 2 that the (downgrade) reaction occurs on day zero. Nevertheless, in order to err on the side of caution, in all remaining analysis and discussion we focus on summary abnormal return measures defined over three non-overlapping periods: (a) a 'pre-event' period: $t-10{:}t-1$; (b) a

Table 3
Market reaction to foreign currency sovereign rating changes by agency

	$CAR_{t-10:t-1}$	$AAR_{t=0:t+1}$	$CAR_{t+2:t+10}$	
Panel A: Rating downgrades				
Moodys	−0.0161	−0.0041	−0.0316	
	(−0.75)	(−0.49)	(−1.19)	
S&P	−0.0004	−0.0224**	0.0169	
	(−0.02)	(−2.61)	(0.77)	
Fitch IBCA	−0.0643	−0.0650**	0.0661	
	(−1.32)	(−2.22)	(0.98)	
Thomson	−0.0870**	0.0018	0.0313	
	(−2.70)	(0.09)	(0.64)	
Panel B: Rating upgrades				
Moodys	0.0037	−0.0080*	−0.0096	
	(0.43)	(−1.89)	(−1.32)	
S&P	0.0041	0.0015	−0.0047	
	(0.44)	(0.41)	(−0.60)	
Fitch IBCA	0.0012	−0.0074	−0.0250*	
	(0.56)	(−1.49)	(−1.72)	
Thomson	0.0128	−0.0020	−0.0192	
	(1.10)	(−0.40)	(−1.55)	
	Moodys	S&P	Fitch IBCA	Thomson
Panel C: Two-sample test statistics for differences in mean event day abnormal returns across agencies: upper triangle – rating upgrades; lower triangle – rating downgrades				
Moodys	–	0.01	0.61	−0.82
S&P	1.73*	–	0.70	−0.98
Fitch IBCA	1.43	0.79	–	−1.42
Thomson	−1.36	−2.47**	−2.07**	–

This table reports selected AAR and CAR as indicative measures of the own-market reaction to foreign currency rating changes made by four leading credit rating agencies: S&P; Moodys; FitchIBCA and Thomson Bank Watch (TBW). AAR and CAR are generated using a standard mean-adjusted event study methodology. Abnormal returns are defined as

$$\mathrm{AR}_{it} = R_{it} - (\alpha_i + \beta_i R_{\mathrm{m}t}),$$

where R_{it} is the return on market i on day t; $R_{\mathrm{m}t}$ is the return on the MSCI World Market Index on day t; and α_i, β_i are market model parameters generated from a 100-day estimation period beginning 120 days through 21 days before the sovereign re-rating. All returns are denominated in US dollars. Standard errors are calculated as in Boehmer et al. (1991). Note that standard errors are estimated using SARs but only AAR are reported. The sample consists of all foreign currency rating changes disaggregated over the four rating agencies, S&P, Moodys, Fitch and Thomson. A rating change occurs when an agency announces a rating change. The column headed $CAR_{t-10:t-1}$ contains the CAR measured over the 10-day pre-event window $t-10$ to $t-1$. The column headed $AAR_{t=0:t+1}$ contains the AAR on the two day event window (days 0 and $t+1$). The column headed $CAR_{t+2:t+10}$ contains the CAR measured over the nine-day post-event window $t+2$ to $t+10$.

* Denotes statistical significance at the 10% level.

** Denotes statistical significance at the 5% level.

two day 'event date' period: $t = 0{:}t+1$; and (c) a 'post-event' period: $t+2{:}t+10$. Thus, we employ this conservative approach focusing on the two day event date abnormal return, to control for any time differences.

Surprisingly, there are some large differences between rating agencies. Starting with ratings downgrades (Panel A of Table 3), it can be seen that market abnormal returns are negative (over the 10 days) prior to a change for all agencies. Interestingly, the 'pre-event date' impact associated with Thomson re-ratings is significantly negative, which may suggest that this agency tends to hold off announcing a downgrade until after the market has in essence given its 'verdict'. The general finding of negative pre-event date performance is followed by a negative reaction (on the two day event date, $t = 0{:}t + 1$) to the downgrade for three of the four rating agencies, with S&P and Fitch eliciting a significant reaction. While the Fitch reaction is of lower statistical significance compared with the S&P counterpart, the magnitude of the impact associated with Fitch (6.50% two day decline) clearly dominates S&P (2.24% two day decline). In the days following a ratings downgrade, there are no significant abnormal returns associated with any agency ratings change.

Regarding upgrade announcements (Panel B of Table 3), only Moodys is associated with a market reaction (at the 10% level of significance) – but perversely, the reaction is negative. Moreover, subsequent to an upgrade announcement, market abnormal returns are only significant, but negatively so (at the 10% level), for Fitch. These negative reactions, while isolated and somewhat weak, are puzzling as they are robust to outlier extraction techniques and an analysis of additional news items in the period around the upgrade date.

In Panel C of Table 3 we report the outcome of some formal two-sample tests for a differential mean event day reaction across pairs of agencies, both in the case of upgrades (upper triangle) and downgrades (lower triangle). First, with regard to upgrades, it is evident that in no case is the pairwise difference significant. Second, with regard to downgrades, we observe that (at the 5% level) the impact found for Thomson is significantly different from and, hence, less negative than the impact found for S&P and Fitch re-rating announcements. Also, it is observed that the impact found for Moodys is significantly different (at the 10% level) from the impact found for S&P.

Several insights are provided by this analysis. First, from an event study perspective S&P appear to be a very 'important' player among the four rating agencies in sovereign ratings. This is evidenced from the near zero abnormal returns before and after a downgrade announcement in conjunction with the significant negative abnormal return on the announcement date indicating that their position on countries' creditworthiness imparts a wealth effect on the respective countries. Although Fitch downgrades are also associated with a negative market reaction, the announcement itself follows negative abnormal returns. Second, it appears that Thomson's rating downgrades are in response to earlier negative information released to the markets. Of all the four rating agencies, only sovereign rating downgrades by Thomson are associated with significant negative abnormal returns (over the ten days immediately) prior to an announcement. Recall that Table 1 reported some basic statistics on the relative 'timeliness' of re-ratings between each agency. Specifically, we observed that in terms of being a 'first mover' on re-ratings, Thomson (56.5%) rates second just behind S&P (62.5%) – the most 'timely' agency. Hence, this suggests that a lack of timeliness on the part of Thomson is not the primary or sole explanation of

its significant pre-event negative abnormal return. [6] Fitch also appears to be reacting to previous information with a high CAR in markets prior to their downgrade announcements. [7]

3.3. Domestic versus US dollar returns

The negative market reaction to sovereign rating downgrades can be the result of (at least) two factors. The announcement of a downgrade could raise uncertainties about the economic condition of firms within the affected country, leading to a fall in the national market index. Alternatively, the announcement could result in a weakening of the country's currency because of a fall in investor confidence concerning the value of future country denominated cash flows. A plausible explanation is that the negative market reaction is the result of a combination of these factors.

To determine the relative contribution of currency devaluations and underlying market declines to the negative abnormal returns associated with sovereign rating downgrades, we rerun the event study methodology of Section 3.1. Specifically, we perform a comparison of domestic currency abnormal returns, US dollar denominated returns and exchange rate abnormal returns.

Constructing abnormal returns for different countries using domestic currency returns and foreign exchange returns is difficult because the notion of a world benchmark portfolio becomes unclear. As a result, for the current analysis we adopt a different model of expected returns that disposes of the need for a benchmark return. To be specific, an abnormal return is calculated as follows:

$$\mathrm{AR}_{it} = (R_{it} - \overline{R_i})/\sigma_i, \tag{5}$$

where R_{it} is the return on market i on day t; $\overline{R_i}$ is the mean daily return in a 100-day estimation period beginning 120 days through 21 days before the sovereign re-rating; and σ_i is the standard deviation of returns generated from the same estimation period. Three returns are investigated for: (a) the US dollar denominated equity market return; (b) the domestic currency denominated equity market return; and (c) the exchange rate return.

This mean-adjusted methodology has been shown by Brown and Warner (1985) to frequently be as powerful as the more complex market model, (2), for daily returns. The construction of test statistics are also unaffected by the change in the ex-

[6] In addition, with regard to a potential differential impact between re-ratings that have been a first move change (i.e. there are no other re-ratings announcements for that country within six months) versus ones that have not, in unreported results we examined an extended analysis of Table 3 whereby re-ratings are partitioned into first mover and non-first mover subgroups. We found in this extended analysis that the basic results are robust regardless of the first mover status. Details are available from the authors upon request.

[7] We also explored the issue of whether the differences found between rating agencies are due to the agencies rating different countries. Upon manual inspection, we found that most countries are rated by all agencies. Nevertheless, we followed up with a formal event study analysis involving just the subset of countries which were rated by all agencies. The analysis revealed that our reported results are robust to this issue. For brevity, we do not report the details here but they are available from the authors upon request.

pected return generating mechanism. The abnormal return in (5) can be viewed as a standardized return where the mean and standard deviation are measured in another period. As such, the test provides an additional robustness check on the wealth impact of sovereign rating changes.

Table 4 (Panels A–C) presents the results of our analysis comparing the impact of foreign currency sovereign ratings changes (pooled across all four agencies) on US

Table 4
Market reaction to S&P foreign currency sovereign rating changes: Domestic equity returns versus US dollar equity returns versus exchange rate returns

	$CAR_{t-10:t-1}$	$AAR_{t=0:t+1}$	$CAR_{t+2:t+10}$
Panel A: US dollar excess returns			
Rating upgrades	0.5175	0.1091	−0.2590
	(1.10)	(1.10)	(−0.64)
Rating downgrades	−1.2670	−1.049**	0.1867
	(−1.32)	(−2.80)	(0.19)
Panel B: Domestic currency excess returns			
Rating upgrades	0.4873	−0.0691	−0.2847
	(0.97)	(−0.28)	(−0.61)
Rating downgrades	−0.3231	−0.6053	0.5027
	(−0.31)	(−1.44)	(0.59)
Panel C: Exchange rate excess returns			
Rating upgrades	−0.0706	0.5466**	−0.4678
	(−0.17)	(2.05)	(−1.25)
Rating downgrades	−3.874*	−2.026	−9.038**
	(−1.94)	(−1.60)	(−3.05)
Panel D: Relative contribution to US dollar wealth changes – raw returns			
	Rating upgrades	Rating downgrades	
Domestic price level	36.7%	46.9%	
Currency level	63.3%	53.1%	

This table reports selected AAR and CAR as indicative measures of the own-market reaction to foreign currency rating changes across four ratings agencies. The market reaction is measured for equity returns denominated in US dollars (Panel A), for equity returns expressed in domestic currency terms (Panel B) and for country exchange rate changes with respect to the US dollar (Panel C). Average standardised returns and cumulative standardised returns are generated by dividing the excess event period return by the standard deviation of returns in an estimation period. Standardised returns are defined as

$$AR_{it} = (R_{it} - \overline{R_i})/\sigma_i,$$

where R_{it} is the return on market or currency i on day t, $\overline{R_i}$ is the mean daily return in a 100-day estimation period beginning 120 days through 21 days before the sovereign re-rating and σ_i is the standard deviation of returns generated from the same estimation period. Standard errors are calculated as in Boehmer et al. (1991). Note that standard errors are estimated using SARs but only AAR are reported. Sample consists of all foreign currency rating changes by S&P. A rating change occurs when an agency announces a rating change. In Panel D we report the relative contribution of the domestic price level versus the currency level, to the US dollar denominated equity wealth changes. This decomposition is based on a parallel event study using raw returns (instead of mean-adjusted returns), thereby allowing a direct comparison of the impact on exchange rates, domestic returns and US dollar returns.

*Denotes statistical significance at the 10% level.

**Denotes statistical significance at the 5% level.

dollar returns to abnormal returns in domestic currency terms. First, consider the results for the US dollar excess returns reported in Panel A. Similar to earlier results, while upgrades do not exhibit any market impact, downgrades are associated with changes in market expectations leading to a significant negative market impact. Interestingly, the domestic currency returns analysis (Panel B) suggests that neither upgrades nor downgrades produce a significant market impact. However, in unreported results we find that when the event date is defined more narrowly as just day zero, domestic currency abnormal equity returns are also significantly negative (at the 5% level) in the downgrade case – although to a lesser extent than their US dollar counterparts.

In Panel C, we observe that sovereign rating downgrades induce a significantly negative exchange rate reaction 10 days either side of the re-rating event. Taken together, the downgrade analysis reported in Panels A to C suggests that the general finding of a negative market impact of ratings downgrades comes from both a decline in the national stock market and from a weakening of the local currency. Of note however, is the finding that the negative exchange rate impact is temporally much more extended (over a 20 day period) than is the equity market impact (being centred on the two day event date, $t = 0{:}t + 1$). Perhaps of even greater interest in Panel C, is that rating upgrades induce a significantly positive exchange rate reaction centred on the two day event date ($t = 0{:}t + 1$) window. This suggests that a (more subtle) ratings 'upgrade effect' is evident – not in the equity market but in the exchange rate market.

While the preceding analysis is insightful, we need to be careful pushing any abnormal return comparisons too far due to a 'differential benchmark' problem. That is, for each of the US dollar equity returns, domestic currency equity returns and exchange rate returns we are necessarily using different indices and different abnormal return metrics. To address this problem, we also carry out a parallel event study using raw returns (instead of mean-adjusted returns) and this then allows us to directly compare the impact on exchange rates, domestic returns and US dollar returns. [8] Specifically based on this additional raw return analysis, in Panel D of Table 4 we report the relative contribution of the domestic price level versus the currency level, to the US dollar denominated equity wealth changes. First, with regard to rating upgrades about one-third (two-thirds) is attributable the domestic price level (currency level). This confirms the earlier suggestion that for sovereign rating upgrades, while an overall impact is difficult to detect, the dominant source comes from the currency market. Second, with regard to rating downgrades, the domestic price level and the currency level approximately have an equal role in producing the overall significantly negative impact. However as identified above, it seems that the decline in the domestic price level is concentrated very narrowly on the event date whereas the weakening of the currency is spread over a much wider 20-day period surrounding the rating downgrade.

[8] In order to conserve space, the full details of this analysis are suppressed. They are, however, available from the authors upon request.

3.4. Determinants of abnormal returns on rating change date

In this section we examine the role of several potentially important factors impacting on the event date abnormal returns experienced by national market indices, namely, (a) emerging market status; (b) the 'strength' of the re-rating; (c) the agency assigning the re-rating; (d) whether the re-rating is a first mover change; and (e) the pre-event abnormal return. With regard to a possible 'emerging market effect', many studies have examined the differential impact of macroeconomic and firm-specific events on emerging market returns and the general finding of heightened sensitivity to events is consistent with the additional risks faced by investors in these economies (see, for example, Frankel and Rose, 1996; Larrain et al., 1997; Reinhart, 2001). With respect to sovereign ratings changes, emerging markets may respond differently to developed markets if they are more affected by the associated costs or benefits arising from changes.

Given that a rating change is an assessment of an individual country's creditworthiness (theoretically incorporating all relevant characteristics of that country), the magnitude of a market response may be a result of the strength of a rating change (in the form of a multiple upgrade or downgrade). To the extent that they are unanticipated events, multiple rating upgrades or downgrades may be viewed as a stronger signal than a single rating change. Furthermore, given that we have previously observed the identity of the rating agency itself may be a factor, we will include variables that capture such differential agency effects. In addition, we will also include a variable that captures the first mover status, as previously described, as well as the pre-event abnormal return motivated by the proposition that there may be an 'anticipation effect' i.e. markets may increase the likelihood of a sovereign rating downgrade shortly after a period of very poor market performance.

Accordingly, we estimate the following cross-sectional model for rating upgrades and downgrades:

$$\begin{aligned} \mathrm{AR}_i = {} & \gamma_0 + \gamma_1 \mathrm{EMD}_i + \gamma_2 \mathrm{MCD}_i + \gamma_3 \mathrm{SPD}_i + \gamma_4 \mathrm{FD}_i + \gamma_5 \mathrm{TD}_i + \gamma_6 \mathrm{FAD}_i \\ & + \gamma_7 \mathrm{CAR}_i + \varepsilon_i, \end{aligned} \tag{6}$$

where AR_i is the event date abnormal return on market i; EMD_i is a dummy variable equal to unity if market i is an emerging market (as classified by International Finance Corporation) and zero if it is a developed country; MCD_i is a dummy variable equal to unity if the rating change was greater than one classification and zero otherwise; SPD_i, FD_i, TD_i, are dummy variables equal to unity if the re-rating was announced by, respectively, S&P, Fitch or Thomson and zero otherwise; FAD_i is a dummy variable equal to unity if the re-rating was the first such announcement by any agency within a prior period of six months and zero otherwise; and CAR_i is the CAR measured over the pre-event period (day $t-10$ to day $t-1$).

The coefficients from each regression are presented in Table 5. First, with regard to rating upgrades we see that in this more general context in which several factors are being controlled simultaneously, there is some evidence that Moodys rating upgrades are associated with a positive abnormal return. Specifically, a non first mover,

Table 5
Determinants of abnormal return on day of S&P foreign currency sovereign rating change

Independent variable	Rating upgrades	Rating downgrades
Constant	0.0207*	0.0139
	(1.82)	(0.73)
Emerging market dummy	−0.0009	−0.0215*
	(−0.14)	(−1.75)
Multiple grade change dummy	0.0108	0.0096
	(1.62)	(0.87)
S&P dummy	0.0055	−0.0092
	(0.73)	(−0.64)
Fitch IBCA dummy	−0.0039	−0.0320**
	(−0.47)	(−2.25)
Thomson dummy	0.0300**	0.0038
	(3.10)	(0.29)
First announcement dummy	0.0027	−0.0007
	(0.51)	(−0.07)
$CAR_{t-10:t-1}$	−0.0537*	0.1203**
	(−1.94)	(2.64)
R^2	11.9%	13.8%
F-statistic	2.646**	2.833**

This table reports cross-sectional regressions with event day abnormal returns (AR_i) as the dependent variable.

$$AR_i = \gamma_0 + \gamma_1 EMD_i + \gamma_2 MCD_i + \gamma_3 SPD_i + \gamma_4 FD_i + \gamma_5 TD_i + \gamma_6 FAD_i + \gamma_7 CAR_i + \varepsilon_i. \quad (6)$$

The independent variables are an emerging market dummy variable, EMD_i, equal to unity for emerging markets and zero otherwise; a multiple grade rating change dummy variable, MCD_i, equal to unity when a sovereign rating changes by more than one increment and zero otherwise; SPD_i, FD_i, TD_i, are dummy variables equal to unity if the re-rating was announced by, respectively, S&P, Fitch or Thomson and zero otherwise; FAD_i is a dummy variable equal to unity if the re-rating was the first such announcement by any agency within a prior period of six months and zero otherwise; and CAR_i is the CAR measured over the pre-event period (day $t-10$ to day $t-1$). Rating changes relate to S&P foreign currency rating changes.

*Denotes statistical significance at the 10% level.

**Denotes statistical significance at the 5% level.

single notch upgrade for a developed market by Moodys (being the omitted case in the regression) is represented by the estimated intercept, suggesting a significantly positive abnormal return of around 2% (at the 10% level). Moreover, the Thomson ratings are found to be on average 3% points higher (and significantly so) than the base case of Moodys. That is, on average when Thomson announces a rating upgrade (specifically, a non first mover, single notch upgrade for a developed market), there is a 5.07% positive abnormal return for the re-rated country. The final thing to note in the ratings upgrade regression is that the pre-event CAR has a significantly negative role – that is, if the abnormal returns in the 10 days prior to an upgrade are positive, this will have a negative affect on the event date impact.

Now consider the outcome of the same regression applied to the rating downgrade sample. First, we should note that the AAR for Moodys downgrade announcements

(non first mover, single notch upgrade for a developed market) is not significantly different from zero. Second, the emerging market coefficient is significantly negative (at the 10% level) suggesting that ratings downgrades for emerging markets are mildly related to a negative price impact. Third, we find that the Fitch coefficient is also significantly negative, suggesting that downgrades announced by Fitch on average result in an event date impact that is 3.2% points lower than the base case. Fourth, we can see that the combination which yields the largest negative impact is a first announcement by Fitch of a sovereign rating downgrade for an emerging market. According to our model, such a circumstance yields an average event date abnormal return of −4%. Finally, as reflected by a significantly positive coefficient on the pre-event CAR, in circumstances where the pre-event CAR is negative, the event date impact of a downgrade will be even more negative, than it would have been if the pre-event CAR was zero or positive.

4. Conclusions

In this paper, we examine the impact of a sovereign rating change on the re-rated country's national equity market return. While the impact of ratings changes on individual stocks is a widely researched topic, the literature is silent on the stock market impact of sovereign rating changes. Our primary aim has been to make a contribution to this area of knowledge.

Consistent with research into corporate bond rating changes, the analysis of our sample suggests that, in general, only sovereign ratings downgrades convey information to the market. Moreover, these findings are robust to domestic or US dollar currencies being used to measure returns, whether the country affected by the rating change is a developed or emerging market and if the rating change spanned more than one rating classification. Surprisingly, we find a differential market reaction to the rating changes of the four major rating agencies (S&P, Moodys, Fitch and Thomson) examined in this study.

With the inevitable globalisation of markets, investors and particularly managed investment funds are increasingly focused on international diversification. The formation of international portfolios requires a range of fundamental inputs into the asset allocation decision. A change in sovereign ratings is one such key event that may trigger substantial re-weighting of international portfolios. Can we safely and legitimately apply the basic results that have been established for corporate bond rating changes at the individual stock level, to the international domain? Mostly, our evidence suggests that the answer to this question is yes, but importantly, in some areas we need to be careful – the details of these qualifications have been outlined above.

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