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Sovereign Credit Ratings, Emerging Market Risk and Financial Market Volatility

This article presents event studies that find a significant effect on dollar bond yield spreads when rating agencies put emerging-market sovereign bonds on review with negative outlook. The finding has two conditional implications. If rating agencies can be turned from late into early warning signals, they would have the potential to dampen boom-bust cycles in emerging-market flows. If rating agencies cannot improve on their reactive approach witnessed in the run-up and aftermath of recent currency crises, regulation and guidelines stipulating a certain rating status for institutional investment will continue to intensify boom-bust cycles. The paper concludes with regulatory suggestions for both outcomes.

The Asian financial and currency crisis of 1997-98 and the Mexican crisis of 1994-95 have again demonstrated the vulnerability of emerging-market economies associated with the reversal of excessive private capital flows. The boom-bust cycle with overborrowing can be explained, inter alia, by the negative Harberger externality:[1] Private borrowers do not internalise the rising marginal social cost of a country's growing foreign debt that arises from the upward-rising supply of foreign capital.

We will provide evidence that sovereign credit ratings, if they are reactive rather than preventive, will amplify boom-bust cycles in emerging-market lending. Credit rating agencies were conspicuous (among the many) who failed to predict the Mexican and the Asian currrency crisis. Having first failed to perceive the extent of problems as long as foreign money flowed in, the rating agencies appeared to be overreacting after the outbreak of these crises by downgrading the affected countries to junk status.

Whether and by how much rating behaviour does indeed intensify boom-bust cycles and financial market volatility, depends on its market impact. The fact that sovereign bond yields tend to rise when ratings worsen does not say anything about the causal relationship between the two. In fact, Granger causality tests reveal a bi-directional relationship,[2] revealing not much more than that the credit rating industry is part of the financial industry and largely shares with investors the same model on bond default determinants.

Boom and Bust and Sovereign Ratings

Cantor and Packer have recently claimed that "credit ratings appear to have some independent influence on yields over and above their correlation with other publicly available information".[3] The authors have argued that their finding would imply that the ratings lead rather than lag the financial markets, by acquiring advance knowledge or superior information that has subsequently been conveyed to market participants. However, the information content of sovereign-risk ratings and the nature of sovereign risk suggest that the rating agencies have little room in acquiring advance knowledge or superior information on emerging-market economies:

☐ First, sovereign-risk ratings are primarily based on publicly-available information, such as foreign debt and reserves or political and fiscal constraints. Consequently, any sovereign rating announcement will be "contaminated" with other publicly-available news. By contrast, rating agencies may be able to receive private inside information from domestic corporate borrowers (such as acquisition, new products and debt issuance plans). Such advance knowledge or better information can be conveyed to market participants through ratings on private borrowers, but very unlikely on sovereign borrowers.

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[1] A. Harberger: Lessons for Debtor-Country Managers and Policy Makers, in: G. Smith and J. T. Cuddington (eds.): International Debt and the Developing Countries, World Bank 1985.

[2] G. Larraín, H. Reisen, J. von Maltzan: Emerging Market Risk and Sovereign Credit Ratings, OECD Development Centre, Technical Papers, No. 124, 1997.

[3] R. Cantor, F. Packer: Determinants and impact of sovereign credit ratings, in: Federal Reserve Bank of New York, Economic Policy Review 2.2, 1996, pp. 37-53, here p. 34.

☐ Second, in the absence of a credible supranational mechanism to sanction sovereign default, unlike in national lending the default risk premium is more determined by the borrower's willingness to pay than by his ability to pay.[4] This does not just result from the existence of informational asymmetries between borrowers and lenders, that can be particularly pronounced in the international context. The incumbent authorities can also not commit themselves or their successors credibly that the foreign capital inflow will be put to productive use or that future returns will be used to repay the foreign liability.

Moreover, the sovereign rating industry gets most of its revenue from the governments to provide a debt rating and thus is loath to downgrade their clients. The industry can be characterised as a duopoly where the two leading agencies – Moody's Investor Service and Standard and Poor's – fight for market share between each other as well as with smaller agencies. The fear of upsetting clients, losing their rating demand and the respective fee income may introduce "downgrade rigidity" into ratings in periods of excessive capital inflows.

Unlike in private-sector ratings, then, any market impact of sovereign ratings can hardly be interpreted as an indication that rating agencies lead the market by conveying new or superior information to market participants. A more plausible explanation would be that herd instinct among investors, often reinforced by inappropriate prudential regulation, gives sovereign ratings the power to influence sovereign bond yields. Many institutional investors are debarred from holding any debt securities other than those of investment grade status, and sovereign ratings absolve money managers from making independent judgements about sovereign risk. Reactive sovereign ratings – to the extent that they exert a market impact – thus tend to amplify boom-bust cycles. During the boom, improving ratings reinforce euphoric expectations and stimulate excessive capital inflows; during the bust, downgrading adds to panic among investors, driving money out of the country and sovereign yield spreads up.

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[4] J. Eaton, Gersowitz, J. Stiglitz: The Pure Theory of Country Risk, in: European Economic Review 1986.

[5] In the case of sovereign government bonds the sample countries include Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, Colombia, Czech Republic, Denmark, Finland, Germany, Hungary, Indonesia, Ireland, Italy, Korea, Malaysia, Mexico, New Zealand, Norway, Philippines, Poland, Portugal, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, UK, USA, and Venezuela. Where the stock market index was used we were able to add the following countries to the sample: China, Egypt, France, Greece, India, Japan, Jordan, Netherlands, Pakistan, Russian Federation, Singapore, Slovakia and Taiwan.

Data and Sample Selection

We next present the econometric evidence on the interaction between ratings (assigned or imminent) and dollar yield spreads on sovereign government bonds. As a further measure for country risk perception we construct the historical volatility of sovereign bond yield spreads. Taking into account the strong sensitivity of stock markets towards news, we calculate likewise the historical volatility of stock market returns. This approach allows us to increase the number of observations for the event study, as government bonds are not regularly quoted while stocks are quoted daily.

The sample consists of the ratings of sovereign foreign-currency debt for the period early 1987 to mid 1996 which have been assigned by Moody's and Standard & Poor's. The rating history has been obtained directly from these two market leaders who cover ca. 80 per cent of sovereign credit ratings. We do not only analyse implemented rating assignments, but also imminent rating changes (when Moody's puts a country on watchlist and Standard & Poor's assigns a country with a positive or negative outlook). The data will be used for a short-term event study on 78 rating announcements from 1987 to 1996.[5]

The second core data needed for our analysis are fixed-rate dollar bond redemption yield spreads on central government bonds above US treasury bond yields. Excluding currency risk, dollar bond spreads can be assumed to primarily reflect country risk premia on government bonds of the same maturity.

The benchmark are 10-year US treasury bonds. For our sample, more than 70 per cent of the government bonds observed are of 10-year maturity; for the rest (except Brazil where maturity is 20 years), we had to take bonds of shorter maturity. The inclusion of shorter maturities introduces differences in yield spreads which are related to the yield curve; fortunately, the shorter maturities apply only for the period 1992-95 when the US yield curve remained relatively stable. Transaction price data on government bonds, in particular for the emerging markets, are not easily available. The major problem is that the government bonds are not actively traded, being mostly held by long-term institutional investors or by central banks. Among the full data set on government dollar bond yields, obtained from Datastream, Bloomberg, JP Morgan, Merrill Lynch and the Federal Reserve Bank of New York, we filtered out by visual inspection all countries of which government bonds were not regularily priced, leaving

us with a sample of 26 countries against a total of ca. 60 countries whose sovereign debt has been rated during part of the observation period. For every rating observation, we selected only one, the most regularly traded, government bond for each country, in order to maintain an equally weighted sample.

Our second measure for country risk perception is historical volatility for relative yield spreads and real stock market returns. We assume that high volatility levels correspond with high risk perception of market participants. The performance of stock markets is measured by IFC Global indexes for total return in US$, published by the International Finance Corporation (IFC). IFCG indexes are intended to represent the performance of the most active stocks in their respective stock markets, and to be the broadest possible indicator of market movements and volatility. We have chosen the end-week notation for 22 developing countries for the period from end-December 1988 until end-March 1997. Stock market indices for industrialised countries were extracted from Datastream, using end-week notation starting from 1988 until end March 1997. As a benchmark against which to measure changes in volatility we construct historical volatility by using a moving average measure over a window of 30 days for yield spreads and over a window of 8 weeks for stock market returns.

Methodology

First, we undertake an event study to investigate the short-run impact of press releases where the two leading agencies announce imminent or implemented rating changes on sovereign bonds. The event-study method analyses the yield spread response of sovereign dollar bonds in an observation window spanning from 40 trading days before the press release (day 0) to 40 trading days after. Usually[6] the method would focus on "abnormal" excess returns after correcting yield spreads in a market model that relates the country-specific yield to the respective benchmark (in our case, JP Morgan's global government bond index or JP Morgan's emerging markets bond index plus). Alternatively, the event study can use relative yield spreads (the yield spread as a fraction of the benchmark yield) to study the response to rating announcements. In both cases, the response of yield spreads is subsequently subject to test-statistic which follows a t-distribution.

In order to assess the impact of rating events on the volatility of financial market returns, a second event study will test to what extent sovereign bond

and stock market volatility will change in the wake of imminent or implemented rating changes. We measure historical volatility using the standard deviations of price changes for defined time intervals:

$$S(X)_t = \sqrt{\frac{1}{(k-1)} \sum_{i=1}^{k} (X_{t-i+1} - \overline{X}_t)^2},$$

with $\quad \overline{X}_t = \frac{1}{k} \sum_{i=1}^{k} X_{t-i+1}$

and $\quad k \begin{cases} = 30 \text{ days for yield spreads} \\ = 8 \text{ weeks for stock market returns} \end{cases}$

where X is either the sovereign bond yield spread or the stock market return. Historical volatility is thus an average over a window of 30 days (= 1 month) for yield spreads and over a window of 8 weeks (= 2 months) for stock market returns where each window moves over the whole observation period. Increasing the 30 days window for yield spreads by another 30 days in order to be in line with the window for stock market returns would have substantially decreased the number of rating events. On the other hand, we could not further decrease the 8 weeks window to a 4 weeks window as the volatility would have been calculated only out of 4 observations.

Relative Yield Spreads

We investigate how dollar bond spreads respond to Moody's and Standard & Poor's announcements of changes in their sovereign assessments. Our analysis is based on 78 rating events between 1987 and 1996,[7] of which 42 events affected the emerging markets. 8 ratings were put on review for possible downgrade and 14 for possible upgrade; 25 of the announcements report actual rating downgrades and 27 actual upgrades. Figure 1 visualises the average movements of relative yield spreads – yield spreads divided by the appropriate US treasury rate – around the day 0 of the 78 rating announcements.

In general, Figure 1 shows clearly that a change in the risk assessment by the two leading rating agencies is preceded by a similar change in the market's assessment of sovereign risk. The pattern is particularly clear when countries have been put on

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[6] E.g., J. Hand, R. Holthausen, R. Leftwich: The effect of bond rating agency announcements on bond and stock prices, in: The Journal of Finance 157.2, 1992, pp. 733-752.

[7] Between 1987 and 1996, we observe 126 precisely dated rating events by the two leading rating agencies, of which 48 cannot be used for our analysis for lack of regular trading of the underlying sovereign bond.

review for possible downgrade or upgrade. During the 29 days preceding a review for possible downgrade, relative spreads rise by about 25 percentage points – a result which is heavily influenced by Mexico's Tesobono crisis and the Tequila effect on Argentina. Likewise, during the 29 trading days before a country is put on positive outlook by one of the two agencies, the relative yield spread falls on average by eight percentage points. Moreover, once a country's rating has been put on review for a negative or positive outlook, the market trend appears to reverse. This pattern clearly recalls the common bourse wisdom to buy on the rumour and to sell on the fact.

For actual rating changes, Figure 1 displays a somewhat different observation. Only shortly ahead of the agency announcement a market movement can clearly be discerned, when a downgrade (upgrade) is preceded by a modest rise (drop) in yield spreads. After the rating has been changed, the market appears to vindicate the agencies' assessment over the next 30 trading days with a respective movement in relative yield spreads.

To capture the immediate effects of rating announcements, Table 1 presents the change of the mean of relative yield spreads and the respective t-statistic[8] for several time windows – three windows each for the 29 trading days before and after the announcement as well as a two-day window (day 0 and day 1) for the date of the announcement. The table replicates quite closely Cantor and Packer[9] to see whether dollar bond spreads respond to rating announcements. Note, however, that our analysis fully captures events following Mexico's Tesobono crisis up to 1996, unlike Cantor and Packer whose tests are based on observations up to 1994 only. Moreover, our more recent observation period implies that our country sample represents relatively more emerging-market observations. Our findings question the results obtained by Cantor and Packer for the full sample of rating events which applies to all OECD and non-OECD countries: the impact of rating announcements on dollar bond spreads is not significant, in contrast to the findings by Cantor and Packer.[10] However, we

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[8] Using daily changes of the mean of the relative yield spreads and their standard deviation over the 60 days period surrounding the announcement, we constructed a test statistic which is t-distributed, following R. Holthausen and R. Leftwich: The effect of bond rating changes on common stock prices, in: Journal of Financial Economics 17, 1986, pp. 57-89.

[9] R. Cantor, F. Packer, op. cit.

[10] Because positive rating announcements should be associated with negative changes in spread, we multiply the changes in the relative spread by -1 when rating announcements are positive.

Figure 1
78 Rating Events and Sovereign Yield Spreads, 1990-96

Reviews for Possible Downgrades

Reviews for Possible Upgrades

Rating Downgrades

Rating Upgrades

Sources: Bloomberg, Datastream, DRI, JPMorgan, Merrill Lynch, Moody's, Standard & Poor's.

do find a highly significant (at the 1 per cent level) impact of rating announcements on emerging market sovereign bonds. Within the announcement window (day 0-1), a rating event on emerging-market sovereign bonds moves the relative yield spread by 1.6 percentage points. The change in the yield spread during the rating announcement is larger than the change in the preceding 29 trading days; but it is subsequently reversed, indicating a degree of market overshooting.

Roughly 55 per cent of the full sample and 64 per cent of the emerging-market sample of rating events are associated with the expected change in the yield spread. Moody's rating events seem to exert a more important effect on emerging market bond yields than rating events triggered by Standard & Poor's: the coefficient of the impact of rating events on yield spreads is slightly higher as is the percentage of observations where rating events coincide with the expected sign in yield spread changes.

To explore the announcement effect of rating events in more detail, Table 2 reports the median changes of relative yield spreads for four rating announcement categories: downgrade outlook/ watchlist change announcements, upgrade outlook/ watchlist change announcements, assigned rating downgrades, and assigned rating upgrades. The statistical significance of our results suffers obviously from that disaggregation; however, the distinction into different announcement categories allows us to originate the source of significant announcement effects that we reported in Table 1.

Table 2 reports a significant change of the yield spread in the expected direction during the announcement period (day 0-1) only when a country is put on review for a possible downgrade. For emerging-market securities, the negative announcement has a strong and significant effect on relative yield spreads, which rise by 11.3 percentage points. There is also a strong market anticipation in the 19 trading days before that rating event as spreads rise by 2 percentage points on a daily basis. Also significantly, part of the rise in relative yield spreads is reversed in the month following the announcement that an emerging-country rating has been put on review with a negative outlook (the reversal may indicate economic policy reactions by the authorities concerned). Finally, it is noteworthy that Table 2 reports a slow but rising market response when rating downgrades are actually implemented. The rise in the dollar bond spread in response to a downgrade on

Table 1
Short-term Impact of the Full Sample of Rating Announcements
– mean change of relative yield spreads –

Full sample

No. of announcements Trading Days	full sample 78			emerging markets 42		
	Cumulative Mean Change	t-statistic	% with right sign	Cumulative Mean Change	t-statistic	%with right sign
–30 to –21	0.002	0.17		0.003	0.27	
–20 to –11	0.009	0.75		0.017	1.43*	
–10 to –1	0.012	1.06		0.026	2.18**	
0 to +1	0.007	1.27	55.1	0.016	2.95***	64.3
+2 to +10	–0.010	–0.98	1.81	–0.017	–1.62*	3.70
+11 to +20	0.000	–0.01		–0.004	–0.35	
+21 to +30	–0.007	–0.59		–0.018	–1.55*	

Moody's

No. of announcements Trading Days	full sample 40			emerging markets 20		
	Cumulative Mean Change	t-statistic	% with right sign	Cumulative Mean Change	t-statistic	%with right sign
–30 to –21	–0.007	–0.53		–0.021	–1.67*	
–20 to –11	0.005	0.43		0.014	1.12	
–10 to –1	0.000	–0.04		0.006	0.50	
0 to +1	–0.006	1.08	55.0	0.017	3.01***	70.0
+2 to +10	–0.005	–0.46	1.26	–0.005	–0.45	3.58
+11 to +20	0.003	0.26		0.001	0.05	
+21 to +30	0.004	0.29		–0.003	–0.23	

Standard & Poor's

No. of announcements Trading Days	full sample 41			emerging markets 23		
	Cumulative Mean Change	t-statistic	% with right sign	Cumulative Mean Change	t-statistic	%with right sign
–30 to –21	0.010	0.65		0.027	1.64*	
–20 to –11	0.011	0.71		0.019	1.15	
–10 to –1	0.024	1.48*		0.041	2.53***	
0 to +1	0.007	0.95	56.1	0.013	1.84**	56.5
+2 to +10	–0.015	–1.04	1.56	–0.029	–1.98**	1.25
+11 to +20	–0.002	–0.14		–0.005	–0.32	
+21 to +30	–0.018	–1.11		–0.034	–2.11**	

* Significant at the 10 percent level.; ** Significant at the 5 percent level.; *** Significant at the 1 percent level.

Sources: Bloomberg, Datastream, JP Morgan, Merrill Lynch, Moody's, Standard & Poor's; own calculations.

emerging-market sovereign bonds becomes significant only 20 trading days after the rating event. The slow response may reflect the reorientation of portfolios by institutional investors which are often guided by prudential regulation that discourages the holding of low-rated securities.

Historical Volatility

We next examine the impact of rating events on financial market volatility. We divide the volatility event study in two parts. First, we analyse changes in volatility of sovereign bond yield spreads with respect to rating announcements which leaves us with 67 rating events between 1987 and 1996.[11] Second, we analyse the volatility of stock market returns. Using regularly quoted stock market returns raises the number of observed rating events up to 210. We measure the impact of rating events on the volatility of bond yield spreads on a daily basis and of stock market returns on a weekly basis. This important difference has to be kept in mind when interpreting the results. Figure 2 visualises now the average historical volatility of relative yield spreads around day 0 for the 67 announcements and the average historical volatility for real stock market returns around week 0 for 210 announcements.

The results displayed in the eight panels in Figure 2 clearly are in line with the results obtained earlier for the yield spread response to rating events. We observe a significant change in the level of volatility for both relative bond yield spreads and real stock market returns upon the rating event. Volatility increases with rating downgrades and decreases with rating upgrades. The size of the shift is bigger for

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[11] The number of rating events decreases by 11 events compared to the first event study. This is because calculating historical volatility requires a minimum of 30 days ahead in order to calculate the moving average variance.

Table 2
Short-term Impact of various Rating Announcements Categories
– mean change of relative yield spreads –

| | OUTLOOK / CREDITWATCH: downgrade | | | | OUTLOOK / CREDITWATCH: upgrade | | | |
| No. of announcements | full sample 8 | | emerging markets 3 | | full sample 14 | | emerging markets 11 | |
Trading Days	Cumulative Mean Change	t-statistic	Cumulative Mean Change	t-statistic	Cumulative Mean Change	t-statistic	Cumulative Mean Change	t-statistic
–30 to –21	0.019	0.36	0.026	0.50	–0.015	–0.68	–0.016	–0.75
–20 to –11	0.087	1.66*	0.228	4.36**	–0.010	–0.47	–0.011	–0.50
–10 to –1	0.096	1.85*	0.275	5.26***	–0.023	–1.04	–0.026	–1.21
0 to +1	0.042	1.78*	0.113	4.86**	0.001	0.06	–0.003	–0.34
+2 to +10	–0.135	–2.88**	–0.351	–7.52***	–0.006	–0.30	–0.005	–0.24
+11 to +20	–0.046	–0.89	–0.137	–2.63**	0.011	0.52	0.012	0.56
+21 to +30	–0.011	–0.21	–0.052	–1.00	–0.010	–0.48	–0.010	–0.45

| | RATING: downgrade | | | | RATING: upgrade | | | |
| No. of announcements | full sample 25 | | emerging markets 6 | | full sample 27 | | emerging markets 20 | |
Trading Days	Cumulative Mean Change	t-statistic	Cumulative Mean Change	t-statistic	Cumulative Mean Change	t-statistic	Cumulative Mean Change	t-statistic
–30 to –21	0.019	1.86**	0.035	3.40***	0.010	0.43	0.008	0.37
–20 to –11	–0.002	–0.23	–0.016	–1.55*	–0.001	–0.02	0.002	0.09
–10 to –1	–0.005	–0.45	–0.015	–1.45*	–0.004	–0.17	–0.009	–0.40
0 to +1	0.000	0.00	0.005	1.04	–0.009	–0.91	–0.014	–1.37*
+2 to +10	0.002	0.18	0.008	0.89	0.000	–0.01	–0.001	–0.04
+11 to +20	0.002	0.18	0.014	1.37	–0.023	–1.04	–0.021	–0.96
+21 to +30	0.008	0.76	0.021	2.09**	0.035	1.57*	0.050	2.23**

* Significant at the 10 percent level.; ** Significant at the 5 percent level.; *** Significant at the 1 percent level.
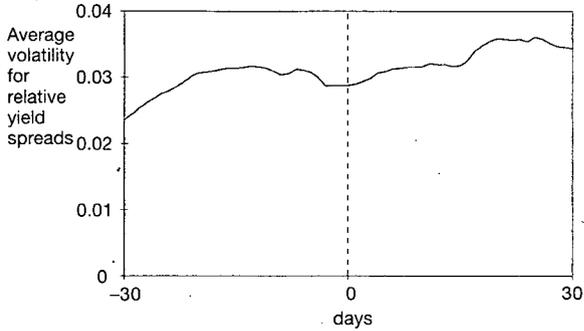
S o u r c e s : Bloomberg, Datastream, JP Morgan, Merrill Lynch, Moody's, Standard & Poor's; own calculations.
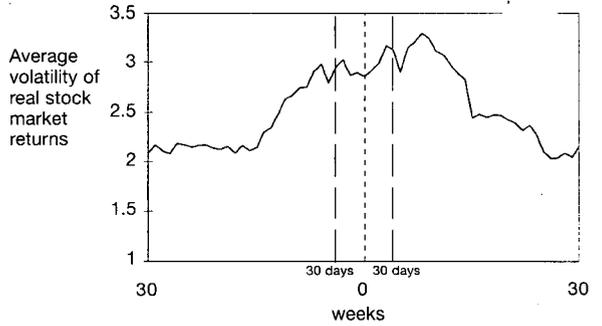
Figure 2
Rating Events and Volatility

67 rating events and sovereign yield spreads, 1990-96

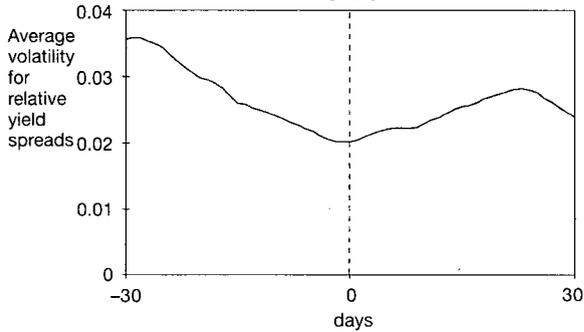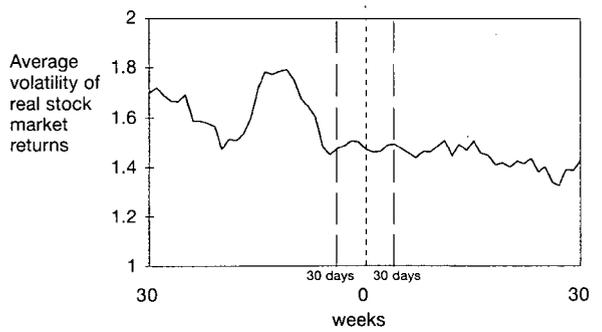210 rating events and real stock market returns, 1990-96

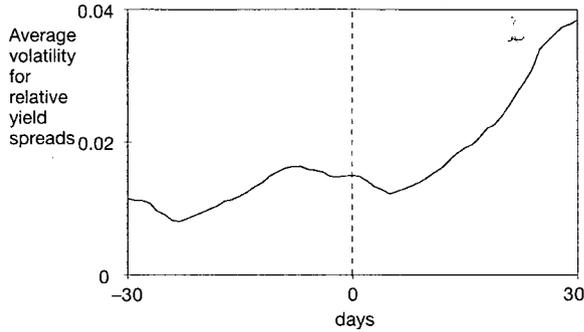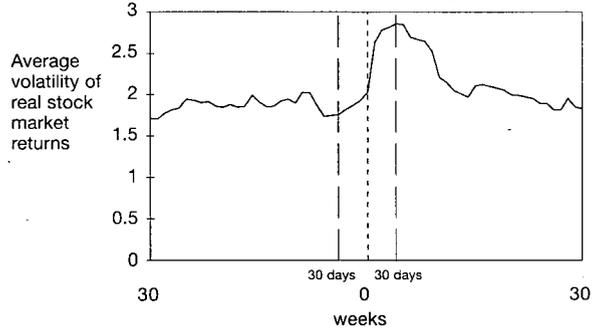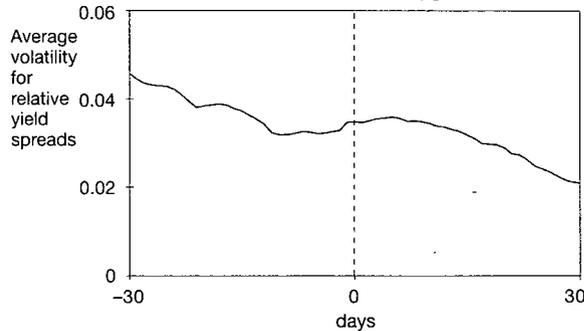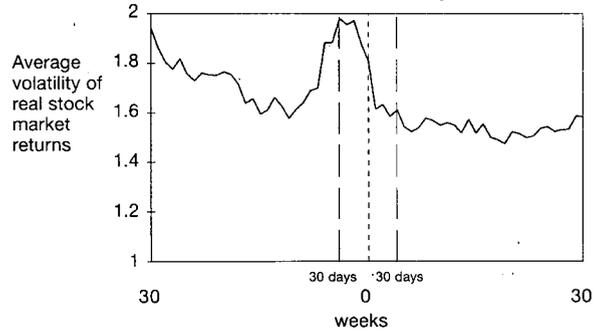Sources: Bloomberg, Datastream, DRI, JPMorgan, IFC, Merrill Lynch, Moody's, Standard & Poor's.

reviews of ratings than for implemented ratings. While implemented downward rating changes raise volatility by 10 percent for both bonds and stocks, announced downward rating reviews lead to changes of up to 40 percent in the level of stock market volatility. As these findings are based on 210 rating events over the period between end-December 1988 and end-March 1997 and cover 22 emerging markets and 27 industrialised countries, they can be interpreted with a higher degree of confidence than those on the impact of ratings on yield spreads.

Likewise, we find that rating upgrades and reviews for rating upgrades are usually preceded by declining volatility levels for relative yield spreads. For positive reviews, the trend towards lower bond yield volatility continues after the event. However, once the news on implemented upgrades are out, volatility tends to rise again. By contrast, stock market returns remain

volatile well up to the positive rating event. The observation suggests that sovereign bond markets anticipate rating announcements, while stock market participants are more concerned about domestic news and therefore capture news about sovereign risk changes via rating agencies' announcements.

In Tables 3 and 4 we present the econometric analysis of rating announcement effects on changes in volatility for relative yield spreads and stock market returns. For the test procedure we assume that the volatility before the rating event mirrors "normal" volatility.[12] Both tables show test statistics of cumulative average volatility that are tested to be equal to the volatility before the rating event. We find a significant change in volatility levels for yield

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[12] "Normal" volatility for yield spreads and stock market returns is calculated from the 30 days, respectively from the 30 weeks, preceding the rating event.

Table 3
Short-term Impact of various Rating Announcements Categories
– average volatility of relative yield spreads –

| No. of announcements | OUTLOOK / CREDITWATCH: downgrade | | | | OUTLOOK / CREDITWATCH: upgrade | | | |
| | full sample 1 | | emerging markets 0 | | full sample 8 | | emerging markets 7 | |
Trading Days	Cumulative Average Volatility	t-statistic	Cumulative Average Volatility	t-statistic	Cumulative Average Volatility	t-statistic	Cumulative Average Volatility	t-statistic
−30 to −21	0.10	−0.74			0.42	12.0***	0.46	16.2***
−20 to −11	0.12	−0.14			0.37	−1.01	0.40	−0.16
−10 to −1	0.16	0.88			0.33	−11.0***	0.33	−16.0***
0 to +1	0.03	1.08			0.07	16.9***	0.07	16.7***
+2 to +10	0.12	0.25			0.32	−4.4***	0.33	−5.8***
+11 to +20	0.19	1.97			0.31	−13.6***	0.34	−14.9***
+21 to +30	0.33	5.79*			0.24	−30.8***	0.25	−34.5***

| No. of announcements | RATING: downgrade | | | | RATING: upgrade | | | |
| | full sample 24 | | emerging markets 5 | | full sample 26 | | emerging markets 20 | |
Trading Days	Cumulative Average Volatility	t-statistic	Cumulative Average Volatility	t-statistic	Cumulative Average Volatility	t-statistic	Cumulative Average Volatility	t-statistic
−30 to −21	0.27	−3.96***	0.72	−2.49**	0.34	25.0***	0.40	21.9***
−20 to −11	0.31	2.89***	0.86	1.90*	0.27	−2.39**	0.31	−1.88*
−10 to −1	0.30	1.06	0.82	0.59	0.22	−22.6***	0.24	−20.0***
0 to +1	0.06	10.2***	0.15	5.17***	0.04	11.7***	0.04	7.2***
+2 to +10	0.28	2.21**	0.70	−0.49	0.20	−21.1***	0.22	−17.8***
+11 to +20	0.33	6.1***	0.80	0.05	0.26	−8.2***	0.29	−6.2***
+21 to +30	0.35	9.5***	0.91	3.58***	0.27	−3.8***	0.30	−4.2***

*Significant at the 10 percent level.; ** Significant at the 5 percent level.; *** Significant at the 1 percent level.

Sources: Bloomberg, Datastream, JP Morgan, Merrill Lynch, Moody's, Standard & Poor's; own calculations.

spreads and for stock market returns on the event day, respectively the event week. This indicates that volatility differs before and after the rating event. Rating announcements thus have a significant impact on volatility levels, with positive news reducing and negative news raising volatility levels.

Volatility levels increase when we restrict the analysis to emerging markets. Furthermore, if negative rating events are divided into investment grades and non-investment grades as in Figure 3, non-investment grades exhibit higher general volatility levels for both yield spreads and stock market returns. This latter point confirms awareness of market participants about increased risk levels for non-investment grades. Higher volatility will immediately

imply larger confidence intervals for the return prediction in portfolio models, hence reducing the attractiveness of downgraded emerging markets for institutional investors even further.

Generally, the findings of the volatility study show a strong market reaction to rating announcements. Positive announcements tend to reduce volatility levels in both markets, bond and stock, while the contrary holds for negative rating announcements. It has been shown, however, that rating events never fully come out of the blue, but are anticipated by financial markets to a certain degree, but not to a full extent. Financial markets show a stronger reaction when rating events concern the emerging markets than when they apply to OECD countries.

Table 4
Short-term Impact of various Rating Announcements Categories
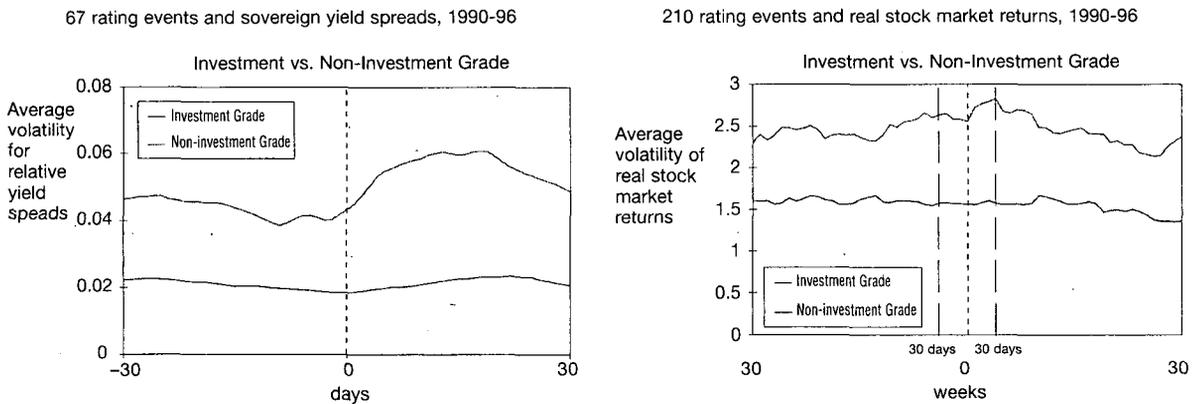### – average volatility of real stock market returns –

| | OUTLOOK / CREDITWATCH: downgrade | | | | OUTLOOK / CREDITWATCH: upgrade | | | |
| No. of announcements | full sample 21 | | emerging markets 9 | | full sample 41 | | emerging markets 25 | |
Trading Weeks	Cumulative Average Volatility	t-statistic	Cumulative Average Volatility	t-statistic	Cumulative Average Volatility	t-statistic	Cumulative Average Volatility	t-statistic
–30 to –21	18.42	–0.35	19.90	0.22	17.95	2.2***	21.22	16.6***
–20 to –11	18.92	0.33	18.14	–2.15**	16.60	–6.0***	18.63	0.77
–10 to –1	18.68	0.01	21.16	1.93**	18.19	3.8***	20.67	13.2***
0 to +1	4.66	8.5***	6.00	12.2***	3.42	22.7***	3.75	25.8***
+2 to +10	24.03	10.3***	30.17	17.7***	14.12	–10.9***	15.52	–7.3***
+11 to +20	20.63	2.66***	23.36	4.9***	15.25	–14.2***	16.25	–13.7***
+21 to +30	18.97	0.41	21.13	1.89**	15.34	–13.6***	16.82	–10.2***
	RATING: downgrade				RATING: upgrade			
No. of announcements	full sample 33		emerging markets 15		full sample 46		emerging markets 29	
Trading Weeks	Cumulative Average Volatility	t-statistic	Cumulative Average Volatility	t-statistic	Cumulative Average Volatility	t-statistic	Cumulative Average Volatility	t-statistic
–30 to –21	21.40	–8.6***	23.22	–17.3***	16.46	0.94	19.06	1.20
–20 to –11	22.52	–5.1***	28.46	–1.1	16.48	1.02	19.23	1.78**
–10 to –1	28.59	13.7***	34.77	18.4***	15.60	–1.97**	17.82	–2.98***
0 to +1	5.78	23.2***	7.22	30.0***	2.94	9.9***	3.36	11.3***
+2 to +10	28.18	20.9***	35.16	30.1***	13.23	–4.7***	14.75	–7.4***
+11 to +20	26.49	7.2***	30.83	6.2***	14.56	–5.5***	16.84	–6.3***
+21 to +30	21.81	–7.3***	25.58	–10.0***	13.94	–7.5***	16.00	–9.1***

* Significant at the 10 percent level.; ** Significant at the 5 percent level.; *** Significant at the 1 percent level.

Sources: Bloomberg, Datastream, JP Morgan, IFC, Merrill Lynch, Moody's, Standard & Poor's; own calculations.

Figure 3
Volatility of Non-Investment Grades

67 rating events and sovereign yield spreads, 1990-96

210 rating events and real stock market returns, 1990-96

Sources: Bloomberg, Datastream, DRI, JPMorgan, IFC, Merrill Lynch, Moody's, Standard & Poor's.

Conclusion

Our rating event studies find that negative announcements on sovereign ratings by the two leading agencies significantly raise sovereign bond yield spreads as well as bond and stock market volatility in the countries concerned, in particular in the emerging markets. The significant market response to sovereign rating events can hardly be attributed to superior information or advanced knowledge conveyed by such ratings to the markets. First, unlike for private securities traded within a national jurisdiction with effective debt enforcement procedures, sovereign default determinants are subject to the borrowers' willingness to pay, while the latter's ability to pay depends on factors widely known by the public. Second, our event study shows a strong market anticipation of rating events, supporting the hypothesis that sovereign ratings react to events and hence lag rather than lead financial markets. We attribute the significant impact of sovereign rating events on bond yield spreads and financial price volatility to investor herd behaviour and to prudential regulation imposed on institutional investors.

Unless sovereign ratings can be turned from a late into an early warning system, they contribute to destabilising international capital flows and to reducing their benefits, in particular in the context of emerging markets. By reducing volatility levels through positive rating and by raising yield spreads and volatility levels through negative ratings over and above the market response which precedes sovereign rating events, the agencies amplify boom-bust cycles in emerging-market lending and reduce the possibilities for intertemporal consumption smoothing and the scope for the global diversification of institutional portfolios. Prudential regulation for institutional investors should therefore reconsider the role of sovereign ratings that it stipulates for the holding of emerging-market assets. Removal of investment grading requirements for institutional portfolios would attenuate the boom-bust cycle in emerging-market assets and stabilise investor's returns.

Ways should be searched for turning sovereign ratings into early warning signals. Our study implies that the sovereign rating industry would have the potential to help dampen excessive capital inflows which precede the bust. If the rating industry came up with negative rating announcements early enough as to lead the financial markets by introducing a dose of risk consciousness to investors, the agencies' impact could help reduce boom-bust cycles in emerging-markets lending. But as the current dependence of rating agencies on borrowers for most of their revenue is apt to introduce downward rigidity into rating decisions, the sovereign rating industry will have to reorient its fee structure towards investors, if it wants to transform into an early warning system. The current dependence of rating agencies on borrowers is incompatible with the incentive to come up with timely negative sovereign ratings.