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# EMERGING MARKET RISK AND SOVEREIGN CREDIT RATINGS

by

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Research programme on:  
Macroeconomic Interdependence and Capital Flows

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## SUMMARY

In principle, the sovereign credit rating industry could help mitigate the congestion externalities common to world capital markets that arise from the failure of market participants to internalise the social cost of external borrowings. This would require that modifications in ratings on government bonds convey new information to market participants, with changes in credit ratings leading to changes in country risk premia. Using panel data analysis and event studies this paper presents econometric evidence that changes in credit rating have a significant impact on international financial markets. In line with earlier studies, our event study finds a highly significant announcement effect when emerging-market sovereign bonds are put on review with negative outlook. Our findings imply that the sovereign rating industry has the potential to help dampen excessive private capital inflows into the emerging markets with negative rating announcements.

## RÉSUMÉ

En principe, l'existence d'agences d'évaluation financière (*the sovereign credit rating industry*) pourrait contribuer à limiter les externalités dues à l'afflux de capitaux étrangers et communes à tous les marchés des capitaux du fait de l'incapacité des acteurs du marché à internaliser le coût social des emprunts extérieurs. Toute nouvelle cotation des obligations d'État devrait transmettre de nouvelles informations aux intervenants sur le marché et les changements dans les évaluations financières devraient se répercuter sur l'évolution du risque pays. Ce document technique repose sur une analyse en données de panel et sur des études de cas ; il ressort de l'analyse économétrique que les changements dans les cotations ont des répercussions importantes sur les marchés financiers internationaux. Notre analyse, qui s'inscrit dans le prolongement des travaux précédents, met en évidence un effet d'annonce très significatif quand les perspectives d'évolution des obligations d'État sur les marchés émergents ne sont pas favorables. Nos résultats montrent que les agences d'évaluation financière ont le pouvoir de freiner, grâce à des annonces de notations négatives, les entrées de capitaux privés excessives sur les marchés émergents.

## PREFACE

What is the most important visit that a developing country expects in the present decade? According to a recent issue of the International Herald Tribune, it is that of credit rating agencies such as Moody's Investors Service Incorporated or Standard and Poor's. In the 1970s, the awaited visitor would have been from major aid agencies, and in the 1980s, from the IMF.

The rise in private capital flows, and the stagnation of concessional financial assistance, have significantly raised the influence of credit rating agencies on the terms at which developing economies can tap world financial markets. Nevertheless, the Mexican crisis of 1994-95 brought out that credit rating agencies were probably reacting to events rather than anticipating them. The reliability of their sovereign ratings on developing countries was therefore called into question.

In the present paper, Guillermo Larrain, Helmut Reisen and Julia von Maltzan undertake an empirical analysis to verify whether the two major rating agencies lead or lag market events with respect to sovereign risk. Results caution against overestimating the long-run impact that credit ratings exert on the assessment of sovereign risk by financial markets. In parallel, the authors also find a highly significant short-run announcement effect when negative reviews of emerging-market sovereign bonds are published.

The paper, which is part of the research project on "Macroeconomic Interdependence and Capital Flows", thus leads to the conclusion that sovereign rating agencies can potentially assist in dampening excessive private inflows into emerging markets.

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## INTRODUCTION

Credit rating agencies were conspicuous among the many who failed to predict Mexico's economic 1994-95 crisis. While the December 20 devaluation of the peso rocked the world financial markets, until December 22 Standard and Poor's had Mexico's sovereign debt only one step below an investment grade rating with a "positive outlook". The Mexican crisis has thus produced the sentiment that rating agencies react to events rather than anticipating them and raised questions about how seriously investors should take sovereign ratings on developing countries.

Our paper aims at broader empirical content for judging whether the two leading rating agencies lead or lag market events with respect to sovereign risk. The evidence will be based on announced as well as implemented ratings of sovereign bonds from the two major rating agencies for 26 OECD and non-OECD countries and their impact on yield spreads relative to US treasury bonds. The next section will present a discussion on the potential of the rating industry to attenuate boom-bust cycles with overborrowing in the international capital markets. Section 2 will describe the country sample, the data and the methodology. Section 3 will present the econometric evidence on the interaction of sovereign yield spreads and changes in country ratings. We take two approaches: first, we perform Granger causality tests based on an unbalanced panel data set with yearly observations for the period 1988-95; second, we examine the daily reaction of sovereign yield spreads on rating change announcements and implemented rating changes between 1987 and 1996. Section 4 concludes.

## SECTION I. SOVEREIGN EMERGING-MARKET RISK AND THE RATING INDUSTRY

The Mexican crisis of 1994-95 has again demonstrated the vulnerability of emerging-market economies to financial crises associated with the reversal of excessive private capital inflows. The boom-bust cycle with overborrowing can be explained, *inter alia*, by negative Harberger externality (Harberger, 1985): private borrowers do not internalise the rising marginal social cost of their private borrowing that arises from the upward-rising supply of foreign capital. In principle, the credit rating industry could help mitigate such congestion externality in world capital markets.

Governments generally seek credit ratings not only to ease their access to international capital markets, but also because these assessments affect the ratings of other borrowers of the same nationality. Many investors, in particular institutional investors, prefer rated over unrated securities, partly as a result of domestic prudential regulation. Sovereign yields also tend to rise as ratings worsen, reflecting the rise in the default risk premium (Cantor and Packer, 1996). The increase in the cost of borrowing, along with the threat of reduced availability of credit, would then provide the incentive for both the public and private sector to abstain from excessive capital inflows. By reducing the negative Harberger externality, early changes in sovereign ratings could help to impose market-based financial discipline. Cantor and Packer (1996) have recently claimed that “credit ratings appear to have some independent influence on yields over and above their correlation with other publicly available information (p. 34)”. This 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.

Several considerations, however, suggest that there is little room for the credit rating industry to reduce congestion externalities with respect to sovereign emerging-market risk. These considerations originate in the nature of sovereign risk, the information content of sovereign-risk ratings, and the industrial organisation of the rating industry.

First, in the absence of a credible supranational mechanism to sanction sovereign default, the default risk premium is more determined by the borrower’s willingness to pay than by his ability to pay (Eaton, Gersowitz and Stiglitz, 1986). 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 to using the foreign capital inflow for productive purposes or that future returns will be used to repay the foreign liability.

Second, therefore, the nature of information that a rating may convey is not the same for sovereign risk as it is for national risk. While rating agencies may receive inside information from domestic corporate borrowers that can be essentially defined as *private* (such as acquisition, expansion, new products and debt issuance plans), sovereign-risk ratings are primarily based on publicly available information (such as debt and foreign-reserve levels or political and fiscal constraints). Consequently, announced or implemented rating changes will rarely be “uncontaminated” with other publicly-available news.

Third, the sovereign credit rating industry derives most of its fee income from governments which solicit ratings of their bond issues. 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 losing demand (and fee income) from governments which look for ratings on their securities may delay rating deteriorations in periods of excessive capital inflows. The high share of split ratings (indicating disagreement in the evaluation of sovereign risk) can be partly traced to the endeavour of small agencies to gain market share by rating more generously than the market leaders. Table 1 exemplifies the point.

Table 1. **Split Sovereign Credit Ratings of Central Government and Central Banks, January 1994**

|  | Moody’s | Standard and Poor’s | Other agencies, avg. <sup>1</sup> |
|--|---------|---------------------|-----------------------------------|
| Avg. rating notches above Moody’s                | -       | 0.18                | 1.36                              |
| Highest rating difference with Moody’s (notches) |         |                     |                                   |
| • above  | -       | 2                   | 3.2                               |
| • below  | -       | 2                   | 0.1                               |
| Number of observations                           | 49      | 45                  | 24                                |
| Market share, %                                  | 41.5    | 38.1                | 20.3                              |

1. The average “other agencies” includes 10 rating agencies. Consequently, the systematic bias in the rating level might not be relevant for individual agencies of this group.

Source: Financial Times, Credit Ratings International, 1995.

Whether the sovereign credit rating industry leads or lags the financial markets is not just of academic interest. In order to help mitigate boom-bust cycles with overborrowing, the industry — in particular the two leading agencies — would have to lead by acquiring advance knowledge or by superior analysis that is subsequently conveyed to market participants. If, by contrast, rating agencies lag market events, they might contribute to amplify boom-bust cycles. During the boom, improving ratings would reinforce euphoric expectations and stimulate excessive capital inflows; during the bust, downgrading might add to panic among investors, driving money out of the country and sovereign yield spreads up.

## SECTION II. DATA, SAMPLE SELECTION AND METHODOLOGY

Our analysis presents the econometric evidence on the interaction between ratings (assigned or imminent) and yield spreads on sovereign government bonds, including those of emerging markets. This focus severely limits data availability because most emerging-market government securities have been rated only since the 1990s and are not regularly quoted on the financial markets.

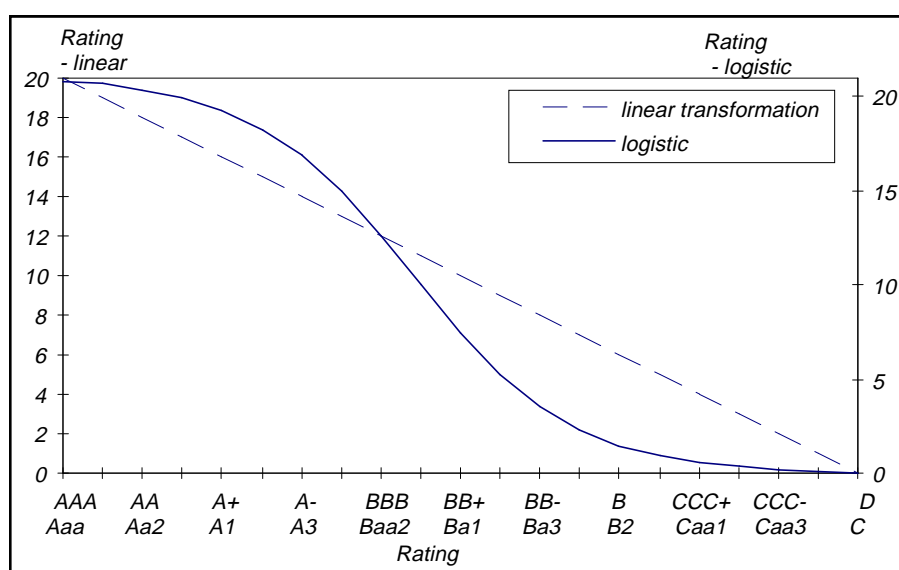
### ***Data and Sample Selection***

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 some 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 an annual Granger causality test on 26 sovereign ratings from 1988 to 1995 and for a short-term event study on 78 rating announcements from 1987 to 1996<sup>1</sup>.

Although the two agencies use different symbols in assessing credit risk, every Moody's symbol has its counterpart in Standard & Poor's rating scale. This correspondence allows us to transform the rating notches<sup>2</sup> into numbers, either by way of linear or logistic transformation, representing two hypotheses about the sovereign risk implied by varying rating notches. A linear scale of transformation assigns the highest rating notch (Aaa for Moody's, AAA for Standard & Poor's) the number 20 and falls over the residual 19 notches to the lowest level of creditworthiness (C for Moody's, D for Standard & Poor's), equal to zero. The linear scale implies that differences of ratings correspond one to one with differences in perceptions of country risk<sup>3</sup>. The logistic transformation, by contrast, implies the hypothesis that risk perceptions first deteriorate slowly as rating notches decrease, then deteriorate faster in a certain region of rating notches (where ratings fall from investment-grade to speculative-grade) and finally deteriorate slowly again as ratings reach the bottom of the classification (see Figure 1).



Figure. 1. Numerical Transformation of Sovereign Ratings



Source: Author calculations.

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 primarily to reflect country risk premia on government bonds of the same maturity.

The benchmark is for 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 took 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 regularly priced, leaving us with a sample of 26 countries against a total of some 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.

Apart from the two core data on ratings and dollar bond spreads, we use standard macroeconomic variables that determine country risk (see, e.g., Edwards, 1984) to correct our long-term analysis for such factors. In order to have a consistent data base that covers the full sample period, we took these variables from the DRI database (see Appendix 1).

### **Methodology**

To examine whether the two rating agencies lead or lag financial markets, we proceed with two different methodologies. First, we perform *Granger causality tests* based on an unbalanced panel data set with yearly averages for ratings and yield spreads during 1988-95<sup>4</sup>. Representing annual average of the yield spread by a vector  $Y$ , the average of the numerically transformed annual rating levels assigned by Moody's and Standard & Poor's by a vector  $X$ , and exogenous macroeconomic country risk determinants (see below) by a vector  $W$ , the Granger causality test can be performed by the estimation equations

$$(2.1) Y_{it} = \beta X_{it-1} + \mu W_{it-1} + \alpha_i + U_{it}$$

$$(2.2) X_{it} = \gamma Y_{it-1} + \eta W_{it-1} + \lambda_i + V_{it}$$

where subscripts  $i$  and  $t$  denote countries and years respectively, where  $\alpha$  and  $\lambda$  are country-specific intercepts (fixed effects), and  $U$  and  $V$  residuals.

If ratings would Granger cause dollar bond spreads, the estimation should find a feedback from  $X_{it-1}$  on  $Y_{it}$  (with  $\beta \neq 0$ ). Simultaneously, Granger causality requires that dollar bond spreads should not influence ratings ( $\gamma = 0$ ). Granger causality would imply that the history of ratings matters for the evolution of yield spreads, but not vice versa. Were the rating agencies to lead (inform) the market, omitting  $X_{t-1}$  in the estimation equation (2.1) would alter the joint distribution of the vector  $W_{t-1}$ , while omitting  $Y_{t-1}$  in equation (2.2) would not alter the joint distribution of  $W$ .

The vector  $W$  represents the determinants of default cited in the literature on sovereign credit risk (e.g., Edwards, 1984). These variables are also repeatedly cited in rating agency reports as determinants of sovereign ratings (Cantor and Packer, 1996), with the expected impact on ratings in parentheses:

- total foreign debt as a percentage of exports (-)
- central government spending as a percentage of GDP (-)
- annual rate of consumer price inflation (-)

- current account deficit as a percentage of GDP (-)
- real rate of annual GDP growth (+)
- savings as a percentage of GDP (+)
- default history, represented by a dummy, if the country has defaulted on its foreign-currency liabilities since 1970 (-).

Since a considerable amount of capital flows to the emerging markets is determined by global cyclical factors (Calvo, Leiderman and Reinhart, 1996), our vector  $W$  includes also the 10-year US treasury bond yield. We assume that a rise in the US treasury bond yield will tend to raise yield spreads, since it will cause a return of foreign capital to the industrial countries.

Second, 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 (e.g., Hand, Holthausen, and Leftwich, 1992) 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. The null hypothesis for the sovereign bond market is that rating announcements will not lead to significant changes in yield spreads, since these announcements are “contaminated” with other publicly available news.

## SECTION III. RESULTS

### *Granger Causality*

We perform the Granger Causality test by estimating equations (2.1) and (2.2) in an unbalanced panel of 114 observations for 26 countries, of which 10 are classified as emerging-market economies by the International Finance Corporation. The structure of Granger Causality tests would require the application of a dynamic model, which can be estimated efficiently by using a General Methods of Moments (GMM) (see, e.g. Ahn and Schmidt, 1995)<sup>5</sup>. Since the GMM estimator would require a high number of instrument variables which would entail an important loss of degree of freedom for our estimates, we are forced to use the less efficient Maximum Likelihood (ML) estimator in a panel model of fixed effects<sup>6</sup>. We make the usual assumptions of a fixed-effect model in a one-way error component regression (Baltagi, 1995). We obtain heteroskedasticity-robust standard errors by using the White estimator. We first estimate equations (2.1) and (2.2) by using four lags for each variable and subsequently reduce the number of explanatory variables by using the Schwartz Bayesian criterion.

Table 2 presents the statistics of the Granger Causality test, using the logistic transformation of ratings into numbers which produced slightly more significant estimates than the linearly transformed ratings. The underlying estimation equations are (2.1) and (2.2) (see Appendix 2 for more detailed results). The results show a two-way causality between ratings and yield spreads and reject Granger Causality of both ratings and yield spreads. While the estimation equation (2.1) leads to reject the hypothesis  $\beta = 0$ , equation (2.2) rejects the hypothesis  $\gamma = 0$ . This result means that ratings cause yield spreads and vice versa.

While the adjusted  $R^2$  in Table 2 points to a high explanatory power of the model underlying equations (2.1) and especially (2.2) and while the t-statistics of the underlying parameters are generally significant, we cannot exclude multicollinearity problems in our vector  $W$  variables<sup>7</sup>.

**Table 2. Granger Causality Test Statistics**  
— from panel regressions —

| Equation           | (2.1)        | (2.2)   |
|--------------------|--------------|---------|
| Dependent Variable | yield spread | rating  |
| Period             | 1988-95      | 1988-95 |
| F-statistic        | 11.13***     | 9.04*** |
|                    | F(2,97)      | F(1,93) |
| P-value            | 0.000        | 0.000   |
| adjusted $R^2$     | 0.920        | 0.966   |
| SER                | 0.565        | 0.311   |
| Observations       | 114          | 114     |

\*\*\* Significant at the 1 per cent level. The F-statistic tests whether the coefficient of the rating variable in eq. (2.1) and of the yield spread variable in eq. (2.2) differs significantly from zero when comparing the unrestricted with the restricted equation where the rating, resp. the yield spread variable has been excluded.

## **Event Study**

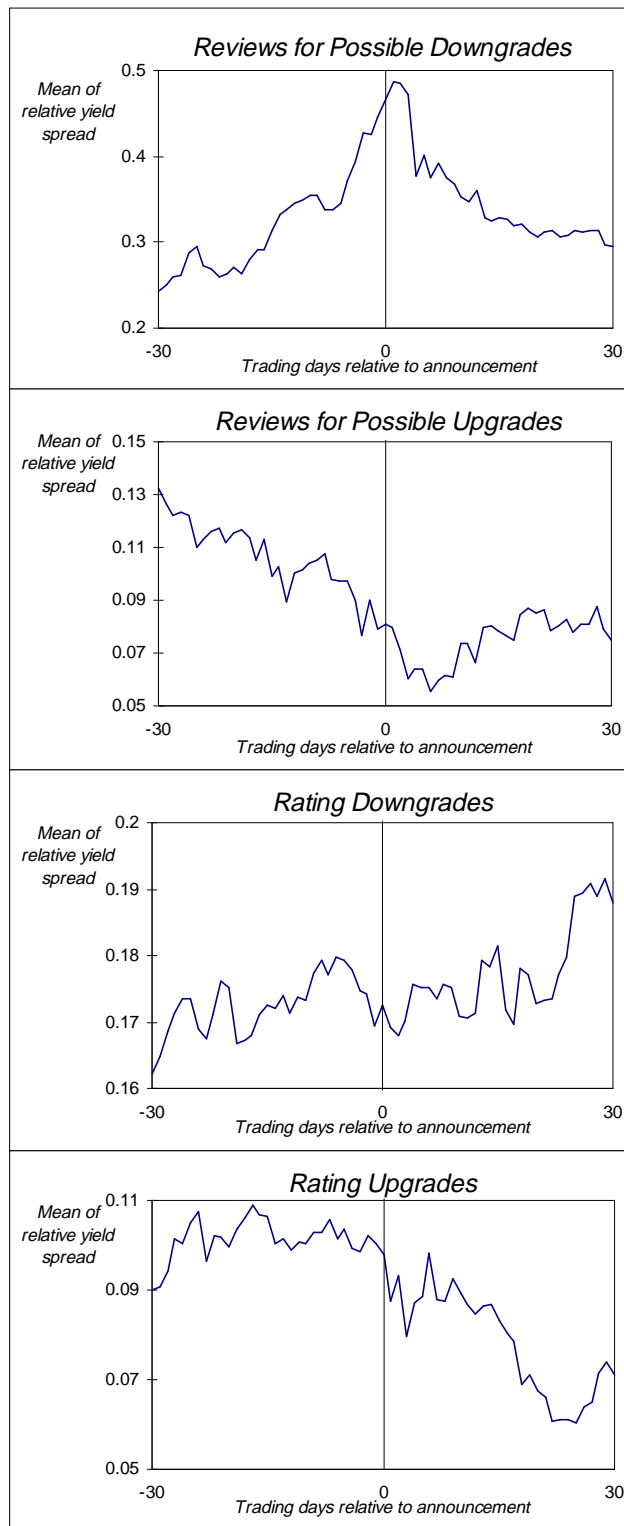
We next investigate how dollar bond spreads respond to Moody's and Standard & Poor's announcements of changes in their sovereign assessments. Our analysis is based on 78 rating events between 1987 and 1996<sup>8</sup>, of which 42 events affected the emerging markets. 8 ratings were put on review for possible downgrade and 14 for possible upgrade; 25 of the announcements report actual rating downgrades and 27 actual upgrades. Figure 2 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 2 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 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, 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 2 displays a somewhat different observation. Only shortly ahead of the agency announcement can a market movement 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 3 presents the results of our event study 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. Ideally, the event study should investigate 'abnormal' excess returns after correcting dollar bond spreads in a market model that relates the country-specific yield to an appropriate benchmark. This procedure would require that the signs of the 'abnormal' excess returns are homogenous with the direction of each announced change in the agencies' rating. Since this requirement did not hold for our sample<sup>9</sup>, Table 3 displays the change of the mean of the relative yield spreads and the respective t-statistic<sup>10</sup>.

Figure. 2. **78 Rating Events and Sovereign Yield Spreads, 1990-96**



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

Table 3. **Short-term impact of the full sample of rating announcements**  
**— mean change of relative yield spreads —**

| Full sample                          |                           |             |                      |                           |             |                      |
|--------------------------------------|---------------------------|-------------|----------------------|---------------------------|-------------|----------------------|
| No. of announcements<br>Trading Days | full sample<br>51         |             |                      | emerging markets<br>31    |             |                      |
|                                      | Cumulative<br>Mean Change | t-statistic | % with<br>right sign | Cumulative<br>Mean Change | t-statistic | % with right<br>sign |
| -30 to -21                           | 0.013                     | 0.98        |                      | 0.021                     | 1.60*       |                      |
| -20 to -11                           | 0.015                     | 1.17        |                      | 0.022                     | 1.67**      |                      |
| -10 to -1                            | 0.015                     | 1.12        |                      | 0.025                     | 1.89**      |                      |
| 0 to + 1                             | 0.009                     | 1.53*       | 54.9                 | 0.014                     | 2.44***     | 58.1                 |
| +2 to +10                            | -0.019                    | -1.66**     |                      | -0.032                    | -2.76***    |                      |
| +11 to +20                           | -0.007                    | -0.56       |                      | -0.014                    | -1.07       |                      |
| +21 to +30                           | 0.009                     | 0.66        |                      | 0.009                     | 0.73        |                      |

| Moody's                              |                           |             |                      |                           |             |                      |
|--------------------------------------|---------------------------|-------------|----------------------|---------------------------|-------------|----------------------|
| No. of announcements<br>Trading Days | full sample<br>22         |             |                      | emerging markets<br>12    |             |                      |
|                                      | Cumulative<br>Mean Change | t-statistic | % with<br>right sign | Cumulative<br>Mean Change | t-statistic | % with<br>right sign |
| -30 to -21                           | 0.009                     | 0.73        |                      | 0.007                     | 0.54        |                      |
| -20 to -11                           | 0.015                     | 1.20        |                      | 0.018                     | 1.47*       |                      |
| -10 to -1                            | -0.013                    | -1.08       |                      | -0.021                    | -1.66*      |                      |
| 0 to + 1                             | 0.007                     | 1.20        | 50.0                 | 0.011                     | 2.04**      | 58.3                 |
| +2 to +10                            | -0.008                    | -0.75       |                      | -0.008                    | -0.75       |                      |
| +11 to +20                           | -0.004                    | -0.33       |                      | -0.008                    | -0.61       |                      |
| +21 to +30                           | 0.018                     | 1.45        |                      | 0.021                     | 1.70        |                      |

| Standard & Poor's                    |                           |             |                      |                           |             |                      |
|--------------------------------------|---------------------------|-------------|----------------------|---------------------------|-------------|----------------------|
| No. of announcements<br>Trading Days | full sample<br>29         |             |                      | emerging markets<br>19    |             |                      |
|                                      | Cumulative<br>Mean Change | t-statistic | % with<br>right sign | Cumulative<br>Mean Change | t-statistic | % with<br>right sign |
| -30 to -21                           | 0.015                     | 0.80        |                      | 0.033                     | 1.77**      |                      |
| -20 to -11                           | 0.015                     | 0.83        |                      | 0.026                     | 1.39*       |                      |
| -10 to -1                            | 0.034                     | 1.83**      |                      | 0.055                     | 2.96***     |                      |
| 0 to + 1                             | 0.010                     | 1.23        | 56.7                 | 0.017                     | 2.02**      | 58.0                 |
| +2 to +10                            | -0.027                    | -1.64*      |                      | -0.050                    | -3.04***    |                      |
| +11 to +20                           | -0.008                    | -0.41       |                      | -0.016                    | -0.87       |                      |
| +21 to +30                           | 0.000                     | 0.01        |                      | -0.001                    | -0.04       |                      |

Table 3. (continued)

| No. of<br>announcements<br>Trading Days | Investment grade             |                 |                         |                              |                 |                         | Speculative grade            |                 |                         |
|---|------------------------------|-----------------|-------------------------|------------------------------|-----------------|-------------------------|------------------------------|-----------------|-------------------------|
|   | full sample<br>39            |                 |                         | emerging markets<br>19       |                 |                         | full sample<br>12            |                 |                         |
|   | Cumulative<br>Mean<br>Change | t-<br>statistic | % with<br>right<br>sign | Cumulative<br>Mean<br>Change | t-<br>statistic | % with<br>right<br>sign | Cumulative<br>Mean<br>Change | t-<br>statistic | % with<br>right<br>sign |
| -30 to -21                              | 0.00007                      | 0.01            |                         | -0.0002                      | -0.03           |                         | 0.0009                       | 0.01            |                         |
| -20 to -11                              | -0.001                       | -0.11           |                         | -0.007                       | -0.94           |                         | 0.004                        | 0.07            |                         |
| -10 to -1                               | -0.001                       | -0.16           |                         | -0.002                       | -0.22           |                         | -0.0004                      | -0.01           |                         |
| 0 to + 1                                | 0.003                        | 0.89            | 51.3                    | 0.006                        | 1.61*           | 52.6`                   | -0.011                       | -0.38           | 66.7                    |
| +2 to +10                               | -0.0006                      | -0.09           |                         | -0.002                       | -0.25           |                         | -0.012                       | -0.21           |                         |
| +11 to +20                              | 0.003                        | 0.33            |                         | 0.002                        | 0.28            |                         | 0.0005                       | 0.01            |                         |
| +21 to +30                              | 0.010                        | 1.32            |                         | 0.01                         | 1.72            |                         | 0.060                        | 0.92            |                         |

\* Significant at the 10 per cent level.; \*\* Significant at the 5 per cent level. ;\*\*\* Significant at the 1 per cent level.  
Source: Bloomberg, Datastream, JP Morgan, Merrill Lynch, Moody's, Standard & Poor's; own calculations.

Table 3 replicates quite closely Cantor and Packer (1996) 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. Nevertheless, our sample weakens Cantor and Packer for the full sample of rating events: the impact of rating announcements on dollar bond spreads is not significant<sup>11</sup>. However, that impact is highly significant only (at the 1 per cent level) for 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, more than for the full sample (0.7 percentage points). The change in the yield spread during the rating announcement is larger than the change in the preceding 29 trading days on a daily basis; 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<sup>12</sup>. Moody's and Standard & Poor's perform equally well. Disaggregation of announcements for investment-grade across speculative grade finds, in contrast to Cantor and Packer, a significant impact only for investment-grade, emerging-market securities.



To explore the announcement effect of rating events in more detail, Table 4 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 3.

Table 4. **Short-term impact of various rating announcements categories**  
— mean change of relative yield spreads —

| No. of announcements<br>Trading Days | OUTLOOK / CREDITWATCH: downgrade |             |                        |             | OUTLOOK / CREDITWATCH: upgrade |             |                        |             |
|--------------------------------------|----------------------------------|-------------|------------------------|-------------|--------------------------------|-------------|------------------------|-------------|
|                                      | full sample                      |             | emerging markets       |             | full sample                    |             | emerging markets       |             |
|                                      | Cumulative Mean Change           | t-statistic | Cumulative Mean Change | t-statistic | Cumulative Mean Change         | t-statistic | Cumulative Mean Change | t-statistic |
|                                      | 8                                |             | 4                      |             | 10                             |             | 8                      |             |
| -30 to -21                           | 0.019                            | 0.36        | 0.02                   | 0.44        | -0.028                         | -1.02       | -0.030                 | -1.10       |
| -20 to -11                           | 0.087                            | 1.66*       | 0.17                   | 3.30**      | -0.019                         | -0.69       | -0.019                 | -0.68       |
| -10 to -1                            | 0.10                             | 1.85*       | 0.205                  | 3.93***     | -0.016                         | -0.58       | -0.017                 | -0.62       |
| 0 to + 1                             | 0.042                            | 1.78**      | 0.083                  | 3.57**      | 0.0026                         | 0.21        | -0.0003                | -0.02       |
| +2 to +10                            | -0.13                            | -2.88**     | -0.26                  | -5.63***    | 0.00028                        | 0.01        | 0.001                  | 0.06        |
| +11 to +20                           | -0.046                           | -0.89       | -0.103                 | -1.97*      | 0.012                          | 0.43        | 0.015                  | 0.54        |
| +21 to +30                           | -0.011                           | -0.21       | -0.033                 | -0.64       | -0.0035                        | -0.13       | -0.003                 | -0.10       |

| No. of announcements<br>Trading Days | RATING: downgrade      |             |                        |             | RATING: upgrade        |             |                        |             |
|--------------------------------------|------------------------|-------------|------------------------|-------------|------------------------|-------------|------------------------|-------------|
|                                      | full sample            |             | emerging markets       |             | full sample            |             | emerging markets       |             |
|                                      | Cumulative Mean Change | t-statistic | Cumulative Mean Change | t-statistic | Cumulative Mean Change | t-statistic | Cumulative Mean Change | t-statistic |
|                                      | 17                     |             | 8                      |             | 16                     |             | 11                     |             |
| -30 to -21                           | 0.015                  | 1.25        | 0.035                  | 2.85**      | 0.006                  | 0.40        | 0.006                  | 0.36        |
| -20 to -11                           | -0.008                 | -0.62       | -0.016                 | -1.30       | -0.005                 | -0.31       | -0.00002               | -0.001      |
| -10 to -1                            | -0.006                 | -0.48       | -0.015                 | -1.22       | -0.003                 | -0.18       | -0.003                 | -0.20       |
| 0 to + 1                             | 0.003                  | 0.56        | 0.005                  | 0.87        | -0.007                 | -0.97       | -0.008                 | -1.06       |
| +2 to +10                            | 0.004                  | 0.34        | 0.008                  | 0.75        | 0.007                  | 0.44        | 0.012                  | 0.80        |
| +11 to +20                           | 0.007                  | 0.55        | 0.014                  | 1.15        | -0.009                 | -0.57       | -0.014                 | -0.81       |
| +21 to +30                           | 0.011                  | 0.94        | 0.021                  | 1.76*       | -0.01                  | -0.61       | -0.009                 | -0.54       |

\* Significant at the 10 per cent level.; \*\* Significant at the 5 per cent level. ;\*\*\* Significant at the 1 per cent level.  
Source: Bloomberg, Datastream, JP Morgan, Merrill Lynch, Moody's, Standard & Poor's; own calculations.

Table 4 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). Even when including the weak significance for rating upgrades in emerging markets, our results contrast with Cantor and Packer who find significant results only for positive announcements. However, we are in line with most other studies using stock market data finding a significant price response to downgrades but not to upgrades (Goh and Ederington, 1993).

Finally, it is noteworthy that Table 4 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 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.

## SECTION IV. CONCLUSION

First, our Granger causality test cautions against overestimating the independent long-run impact that sovereign credit ratings exert on the financial-market assessment of sovereign risk. The financial market and the two leading rating agencies appear broadly to share the same model in that assessment. As indicated by the explanatory power of the equations that underlie the causality test, dollar bond spreads and a set of default determinants seem to explain somewhat better the level of credit ratings than vice versa. The mutual interaction between sovereign yield spreads and ratings may be characterised by the nature of sovereign risk (requiring assessments on present and future willingness rather than only ability to pay), the information content of sovereign risk ratings ('contaminating' rating changes with other publicly-available news) and the industrial organisation of the rating industry (introducing an upward bias in sovereign ratings).

Second, contrary to our expectations but in line with earlier studies, our event study finds a highly significant announcement effect — obviously muted by strong market anticipation — when emerging-market sovereign bonds are put on review with negative outlook. The result may surprise, beyond the above considerations, because the rating of these bonds is fairly new to the industry; this lack of experience is reflected by a high degree of split ratings. Negative rating announcements seem also to be effective in the aftermath of rating deteriorations (possibly not fully captured by the length of our observation window), as investors are incited to reorient their portfolios. Positive rating events, by contrast, do not seem to have a significant announcement effect on dollar bond spreads.

Third, these findings imply that the sovereign rating industry has the potential to help dampen excessive private capital inflows into the emerging markets with negative rating announcements. Positive announcements, by contrast, do not seem to exert a significant impact on sovereign risk assessments and thus are unlikely to add to the Harberger externality. For two reasons, even this conclusion must be cautioned however. The econometric analysis of rating decisions seems sensitive to the sample period chosen. Even if rating agencies have the potential to dampen excessive inflows, our analysis does not provide information on whether the agencies would provide negative rating announcements in time.

## NOTES

1. The sample countries include Argentina, Austria, Australia, Belgium, Brazil, Canada, Chile, Colombia, Czech Republic, Denmark, Finland, Germany, Hungary, Indonesia, Ireland, Italy, Korea, Malaysia, Mexico, New Zealand, Norway, Philippines, Poland, Portugal, Spain, South Africa, Sweden, Switzerland, Thailand, Turkey, UK, USA, and Venezuela.
2. A rating notch is the one-level difference on a rating scale.
3. An alternative transformation form could be a linked function with a “structural break” when the sovereign bond passes non-investment grade to investment grade.
4. Unfortunately, monthly data for variables such as government spending are not available for all countries.
5. The estimation of this model leaves us with two alternatives. One is to use an ANOVA based General Least Square (GLS) estimator for an unbalanced panel. The GLS estimator uses the true variance covariance matrix. It is possible to obtain an unbiased, but not optimal estimator for the matrix with the ANOVA method. Secondly, we can use instrumental variables to capture the dynamic of a balanced model. In the latter case we would be using a General Methods of Moments (GMM) estimator which is an efficient instrument variable estimator as shown in Ahn and Schmidt (1995). As both methods cannot be used simultaneously, we decided to use the method for dynamic models, the GMM estimator.
6. This results from F and Hausmann tests which tested for alternative model specification simple OLS, the Var model (variation of slopes and intercepts across the country units), and the Between model.
7. Further research will work with the Principal Component Model in order to reduce the number of regressors and multicollinearity. This would allow to use a GMM estimator for a simultaneous equation model with endogenous variables.
8. 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.

9. We constructed market models that regressed country-specific yields on the JP Morgan Global Government Bond Index (for OECD countries) and on the JP Morgan Emerging Market Bond Index Plus to calculate 'normal' returns. Although our market models yielded very high  $R^2$ , the signs of the 'abnormal' excess returns (actual yields minus 'normal' yields) were not in line with the direction of rating changes.
10. 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 Holthausen and Leftwich (1986).
11. 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.
12. The number in parenthesis is a test-statistic which is based on a binomial distribution with p equal to 0.5.

## APPENDIX 1

### Source and Description

| Variable                            | Source  | used | Period    | Definition                       | Problem   | Countries   |
|-------------------------------------|---|------|-----------|----------------------------------|---|---|
| Rating Announcements                |   |      |           |                                  |   |   |
| Standard & Poor's                   | Standard & Poor's   | x    | 1987-1995 | monthly                          | Rating & outlook  | OECD and non-OECD   |
|                                     |   | x    | 1990-1996 | daily                            | Rating & outlook  | OECD and non-OECD   |
| Moody's                             | Moody's   | x    | 1986-1994 | daily                            | rating & creditwatch  | non-OECD  |
| Government Bonds                    |   |      |           |                                  |   |   |
|                                     | Datastream,<br>Bloomberg  | x    | 1987-1995 | annual,<br>quarterly,<br>monthly | in general Government bonds<br>with maturity of 10 years, but<br>some have also maturities of 3, 5,<br>7 or 20 years. | Argentina, Austria,<br>Australia, Belgium, Brazil,<br>Canada, Chile, China,<br>Colombia, Denmark,<br>Finland, Germany, India,<br>Indonesia, Ireland, Italy,<br>Korea, Malaysia, Mexico,<br>New Zealand, Norway,<br>Philippines, Portugal, Spain,<br>Sweden, Switzerland,<br>Thailand, Turkey, UK, USA,<br>Venezuela |
|                                     | Bloomberg,<br>Datastream,<br>JPMorgan, Merrill<br>Lynch, Cantor &<br>Packer | x    | 1990-1996 | daily                            | in general Government bonds<br>with maturity of 10 years, but<br>some have also maturities of 3, 5,<br>7 or 20 years. | Argentina, Brazil, Canada,<br>Colombia, Czech Republic,<br>Denmark, Finland, Hungary,<br>Ireland, Italy, Korea,<br>Malaysia, Mexico, New<br>Zealand, Poland, South<br>Africa, Sweden, Turkey  |
| Bond Benchmarks                     |   |      |           |                                  |   |   |
| Emerging Markets<br>Bond Index Plus | JPMorgan  | x    | 1991-1996 | daily                            | weighted Index of several<br>emerging markets bonds   | Index   |
| Global Government<br>Bond Index     | JPMorgan  | x    | 1990-1996 | daily                            | weighted Index of Government<br>bonds from OECD   | Index   |
| US treasury                         | Datastream  | x    | 1987-1995 | annual,<br>quarterly,<br>monthly | 5 Indices of US Government<br>bonds with maturities of 3, 5, 7,<br>10 or 20 years.                                    | USA   |

**Source and Description (continued 1)**

| Variable                           | Source     | used | Period           | Definition                           | Problem  | Countries                    |
|------------------------------------|------------|------|------------------|--------------------------------------|--|------------------------------|
| <b>Rating Announcements</b>        |            |      |                  |                                      |  |                              |
| <b>Macro-economic Variables</b>    |            |      |                  |                                      |  |                              |
| Consumer Price Index               | DRI        | x    | 1987-1995 annual | Percent change from previous year    | Eastern Europe is missing<br>1995 missing  |                              |
|                                    | IMF        |      | 1987-1994 annual |                                      | Only some emerging markets and some OECD countries, not always consistent with other sources | OECD                         |
|                                    | JPMorgan   |      | 1990-1995 annual |                                      | Non-OECD missing<br>1994, 1995 missing   | OECD                         |
|                                    | OECD       |      | 1987-1995 annual |                                      |  | OECD                         |
|                                    | World Bank |      | 1987-1993 annual |                                      |  | All countries                |
| <b>Current Account Balance/GDP</b> |            |      |                  |                                      |  |                              |
|                                    | DRI        | x    | 1987-1996 annual | Negative number indicates a deficit. | Eastern Europe is missing  |                              |
|                                    | JPMorgan   |      | 1987-1996 annual | Negative number indicates a deficit. | Only some emerging markets and some OECD countries, not always consistent with other sources | Emerging markets + some OECD |
|                                    | Worldbank  |      | 1987-1993 annual | Negative number indicates a deficit. | 1994, 1995 missing   |                              |
| <b>External Debt</b>               |            |      |                  |                                      |  |                              |
|                                    | JPMorgan   | x    | 1987-1996 annual | Including short term debt            | Only some emerging markets and some OECD countries, not always consistent with other sources | Emerging markets             |
|                                    | OECD       | x    | 1987-1995 annual | Stock of foreign liabilities         | Belgium, Ireland, Portugal, Spain missing  |                              |

**Source and Description (continued 2)**

| Variable                | Source                   | used | Period           | Definition                         | Problem  | Countries        |
|-------------------------|--------------------------|------|------------------|------------------------------------|--|------------------|
| Rating Announcements    |                          |      |                  |                                    |  |                  |
| External Debt           | World Bank - Debt Tables |      | 1987-1995 annual |                                    | Not always consistent with other sources           |                  |
| External Debt/GDP       | JPMorgan                 | x    | 1987-1996 annual | Including short term debt          | Only some emerging markets and some OECD countries | Emerging markets |
| External Debt/Exports   | JPMorgan                 | x    | 1987-1996 annual | Including short term debt          | Only some emerging markets and some OECD countries | Emerging markets |
| GDP                     | DRI                      | x    | 1987-1995 annual | Nominal in US\$                    | Eastern Europe is missing                          |                  |
| GDP per capita          | OECD                     |      | 1987-1995 annual |                                    | Non-OECD missing.                                  | OECD             |
| GDP growth              | DRI                      |      | 1987-1995 annual | Nominal in US\$                    | Eastern Europe is missing                          |                  |
|                         | World Bank               | x    | 1987-1995 annual | Real change from previous year     | Eastern Europe is missing                          | All countries    |
| Government Spending/GDP | DRI                      |      | 1987-1993 annual |                                    | 1994, 1995 missing                                 |                  |
|                         | IMF                      | x    | 1987-1995 annual | Government spending divided by GDP | Eastern Europe is missing                          |                  |
|                         | Worldbank                |      | 1987-1994 annual |                                    | Not existing for all countries                     |                  |
|                         |                          |      | 1987-1993 annual |                                    |  | All countries    |



**Source and Description (continued end)**

| Variable                           | Source     | used | Period    | Definition                         | Problem   | Countries     |
|------------------------------------|------------|------|-----------|------------------------------------|---|---------------|
| Rating Announcements               |            |      |           |                                    |   |               |
| Investment Ratio                   | DRI        | x    | 1987-1995 | Domestic investment divided by GDP | Eastern Europe is missing 1994, 1995                            | All countries |
|                                    | World Bank |      | 1987-1993 | Domestic investment divided by GDP | missing   |               |
|                                    | IMF        |      | 1987-1994 |                                    | Not consistent for all countries, often missing thus incomplete |               |
| Real Effective Exchange Rate Index | JPMorgan   | x    | 1987-1995 |                                    | Not existing for all countries                                  |               |
| Saving ratio                       | DRI        | x    | 1987-1995 | Domestic saving divided by GDP     | Eastern Europe is missing                                       |               |
|                                    | IMF        |      | 1987-1994 | Residual                           | Not consistent for all countries, often missing thus incomplete |               |
|                                    | World Bank |      | 1987-1993 | Domestic saving divided by GDP     | 1994, 1995 missing  | All countries |

Appendix 2. Granger- Causality Coefficients

|                                       |                |                   |                |                 |
|---------------------------------------|----------------|-------------------|----------------|-----------------|
| <i>No. of observations</i>            | 114            |                   | 114            |                 |
| <i>No. of countries</i>               | 26             |                   | 26             |                 |
| <i>Adj. R2</i>                        | 0.933          |                   | 0.966          |                 |
| <i>SER</i>                            | 0.516          |                   | 0.311          |                 |
| <i>Dependent variable</i>             |                | - yield spreads - |                | - rating -      |
| <i>Rating</i>                         | <i>RS(-2)</i>  | -0.037<br>-2.09   | <i>RS(-1)</i>  | 0.126<br>7.76   |
|                                       | <i>RS(-3)</i>  | 0.132<br>6.23     | <i>RS(-3)</i>  | -0.044<br>-0.89 |
| <i>Yield spreads</i>                  |                |                   | <i>YS(-1)</i>  | -0.017<br>-2.26 |
| <i>Real growth</i>                    | <i>GG(-3)</i>  | -0.108<br>-3.02   | <i>GG(-4)</i>  | 0.056<br>2.57   |
| <i>Current account / GDP</i>          | <i>CA(-2)</i>  | -0.078<br>-2.19   | <i>CA(-2)</i>  | 0.078<br>4.03   |
|                                       |                |                   | <i>CA(-3)</i>  | 0.019<br>1.85   |
|                                       |                |                   | <i>CA(-4)</i>  | 0.018<br>1.83   |
| <i>Saving ratio</i>                   | <i>SR(-1)</i>  | -0.091<br>-2.07   | <i>SR(-3)</i>  | -0.105<br>-3.06 |
|                                       | <i>SR(-2)</i>  | 0.090<br>1.61     |                |                 |
|                                       | <i>SR(-3)</i>  | -0.114<br>-2.75   |                |                 |
| <i>US treasury bond 10 years</i>      | <i>UTR(-2)</i> | 0.368<br>5.85     |                |                 |
|                                       | <i>UTR(-4)</i> | -0.078<br>-7.39   |                |                 |
| <i>Change of Consumer Price Index</i> | <i>CCP(-1)</i> | -0.076<br>-1.68   | <i>CCP(-4)</i> | 0.051<br>3.71   |
|                                       | <i>CCP(-4)</i> | 0.109<br>4.82     |                |                 |
| <i>Government spending / GDP</i>      | <i>GS(-1)</i>  | -0.070<br>-1.65   | <i>GS(-1)</i>  | 0.098<br>5.01   |
|                                       |                |                   | <i>GS(-2)</i>  | -0.062<br>-4.85 |
|                                       |                |                   | <i>GS(-3)</i>  | -0.059<br>-5.06 |
|                                       |                |                   | <i>GS(-4)</i>  | 0.060<br>3.37   |

Appendix 2. (continued)

|   |                 |        |                 |        |
|---|-----------------|--------|-----------------|--------|
| <i>Real effective exchange rate index</i> | <i>RERJ(-1)</i> | 2.216  | <i>RERJ(-1)</i> | 1.664  |
|   |                 | 1.72   |                 | 1.71   |
|   |                 |        | <i>RERJ(-2)</i> | -1.779 |
|   |                 |        |                 | -1.21  |
|   |                 |        | <i>RERJ(-3)</i> | 1.551  |
| <i>External debts / exports</i>           |                 |        |                 | 1.21   |
|   |                 |        | <i>RERJ(-4)</i> | -2.438 |
|   |                 |        |                 | -2.20  |
|   | <i>EX(-1)</i>   | -0.036 | <i>EX(-2)</i>   | 0.060  |
|   |                 | -3.27  |                 | 14.95  |
|   | <i>EX(-2)</i>   | 0.006  | <i>EX(-3)</i>   | -0.016 |
|   |                 | 2.00   |                 | -6.93  |
|   | <i>EX(-3)</i>   | 0.009  | <i>EX(-4)</i>   | -0.008 |
|   | 3.88            |        | -2.57           |        |
|   | <i>EX(-4)</i>   | 0.005  |                 |        |
|   |                 | 1.75   |                 |        |

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

## BIBLIOGRAPHY

AHN, S. and P. SCHMIDT (1995), Efficient Estimation of Models for Dynamic Panel Data, *Journal of Econometrics* 68.1, 5-27.

BALTAGI, B. (1995), *Econometrics Analysis of Panel Data*, John Wiley & Sons.

CALVO, G., L. LEIDERMAN and C. REINHARDT (1996), Inflows of capital to developing countries in 1990s, *Journal of Economic Perspectives* 20.2, 123-40.

CANTOR, R. and F. PACKER (1996), Determinants and impact of sovereign credit ratings, Federal Reserve Bank of New York, *Economic Policy Review* 2.2, 37-53.

EATON, J., M. GERSOVITZ and J. STIGLITZ (1986), The Pure Theory of Country Risk, *European Economic Review*, Vol. 30, No. 3.

EDWARDS, S. (1984), LDC foreign borrowing and default risk: an empirical investigation, 1976-80, *American Economic Review* 74.4, 726-34.

GOH, J.C. and L.H. EDERINGTON (1993), Is a bond rating downgrade bad news, good news, or no news for stockholders?, *The Journal of Finance* 158.5, 2001-2008.

GRANGER, C.W.J. (1969), Investigating causal relations by econometric models and cross-spectral methods, *Econometrica* 37, 424-438.

HAND, J., R. HOLTHAUSEN and R. LEFTWICH (1992), The effect of bond rating agency announcements on bond and stock prices, *The Journal of Finance* 157.2, 733-752.

HOLTHAUSEN, R. and R. LEFTWICH (1986), The effect of bond rating changes on common stock prices, *Journal of Financial Economics* 17, 57-89.

HARBERGER, A. (1985), Lessons for Debtor-Country Managers and Policy Makers, in *International Debt and the Developing Countries*, edited by G. SMITH and J.T. CUDDINGTON, World Bank.