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Abstract:

The experience in the period during and after the Asian crisis of 1997-98 has provoked an extensive debate about the credit rating agencies' evaluation of sovereign risk in emerging markets lending. This study analyzes the role of credit rating agencies in international financial markets, particularly whether sovereign credit ratings have an impact on the financial stability in emerging market economies. The event study and panel regression results indicate that credit rating agencies have substantial influence on the size and volatility of emerging markets lending. The empirical results are significantly stronger in the case of government's downgrades and negative imminent sovereign credit rating actions such as credit watches and rating outlooks than positive adjustments by the credit rating agencies while by the market participants' anticipated sovereign credit rating changes have a smaller impact on financial markets in emerging economies.

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I   Introduction

> *"There are two superpowers in the world today in my opinion. There's the United States and there's Moody's Bond Rating Service. The United States can destroy you by dropping bombs, and Moody's can destroy you by downgrading your bonds. And believe me, it's not clear sometimes who's more powerful."*[1]

During the 1990s, global securities markets have become an increasingly important source of external funding for many emerging market countries. As a result, the portfolio preferences of institutional investors have been vital determinants of the scale and composition of capital flows to emerging markets, and of the terms and conditions under which those markets can be accessed. In this regard, credit rating agencies such as Standard & Poor's (S&P) and Moody's Investors Service (Moody's) have been perceived by both market participants and policymakers as having a strong impact on both the cost of funding and the willingness of institutional investors to hold certain types of financial instruments.

The severe adjustments of sovereign credit ratings for many emerging market economies throughout the Asian financial crisis of 1997-98 have raised anxiety about the credit rating process and in particular about the usefulness of sovereign credit ratings.[2] Indeed, critics have argued that the improvements in sovereign credit ratings during the first half of the 1990s and the subsequent sharp declines in the latter half initiated a pro-cyclical element into global capital flows by accelerating capital inflows during the mid-1990s and contributing to the collapse of these inflows after the Asian crisis emerged. To examine these concerns, this study analyzes the specific experience with sovereign credit ratings for emerging markets in the second half of the 1990s.

The reminder of the paper is organized as follows. Section II explores the role of credit rating agencies in international financial markets. First to be considered is the credit rating agencies' concept of sovereign risk and default and presents the criteria and methodology underlying their sovereign credit risk assessments. Furthermore, the importance of credit ratings for institutional investors is considered. Section III investigates, in a detailed empirical study, the question whether credit rating agencies may aggravate the dynamics of financial

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[1]   This quotation is taken from a comment by FRIEDMAN (1999) in the *New York Times Magazine*.

[2]   See for a detailed discussion Kräussl (2003).

market crises. This aspect is imperative in emerging markets where investor confidence is not particularly strong. Moreover, investor's behavior is more volatile, given that some institutional investors are constrained to hold securities that have been classified as investment-grade by the credit rating agencies as a result of either official regulations or banks' internal risk management practices.

This study complements earlier research on the impact of sovereign credit rating changes on financial markets in emerging economies in many ways. Most of the previous studies, for instance REISEN AND VON MALTZAN (1999), have focused on quantifying the effects of changes in country ratings on sovereign risk as measured by the yield spreads of domestic financial instruments relative to mature market benchmarks. However, they have not scrutinized whether credit rating changes for one type of security have an effect on other asset markets within and across national borders. Consequently, this study specifies an index of speculative market pressure consisting of daily changes in the nominal exchange rate, daily changes of the short-term interest rate, and daily changes in the major national stock market index. In addition, the empirical analysis also investigates the potential impact of changes in the US short-term interest rate on financial markets in emerging market economies as suggested, for example, by EICHENGREEN AND MODY (1998) and CALVO AND MENDOZA (2000a).

In contrast to the recent analysis by KAMINSKY AND SCHMUKLER (2002), this empirical study examines not only implemented sovereign credit rating changes, but also imminent rating actions by the agencies, such as credit watches and rating outlooks. In addition, it analyzes whether anticipated or unanticipated and whether contaminated or uncontaminated sovereign credit rating actions have a stronger effect on the financial markets of emerging market countries. As a result of the rapid growth in the agencies' sovereign risk assessments, such a detailed analysis has only recently become feasible.

Section IV presents the empirical results. To study the effects between sovereign credit ratings and a country's financial market vulnerability, two different methodologies have been applied. First, event studies are employed to get an idea of any possible dynamic effects after the agencies' sovereign credit rating actions, and then panel regressions are estimated to get a sense of probable contemporaneous effects following the changes in the sovereign credit ratings. Section V concludes and presents an outlook.

II   The Role of Credit Rating Agencies in International Financial Markets

II.1   Financial Markets, Asymmetric Information and Credit Rating Agencies

The historical logic underlying the existence of credit rating agencies has clearly resided within the basic problem of financial markets: asymmetric information. Credit rating agencies can play a useful role in financial decision-making by providing market participants with information about the credit risk associated with different financial investments. Borrowers commonly seek credit ratings to facilitate their own access to global capital markets since many international investors prefer rated securities over non-assessed securities of apparently similar credit risk. In addition, the agencies' risk assessments on external debt are vital because numerous institutional investors are constrained to hold only investment-grade rated bonds in their portfolios.

Credit rating agencies provide standardized evaluations of the likely risks and returns associated with alternative investments according to standardized creditworthiness categories.[3] They assign credit ratings for the purpose of generating information about default probabilities that are pertinent for pricing and hedging risky fixed-income securities of corporate, municipal and sovereign issuers. Credit rating agencies supply market participants with a system of relative creditworthiness of all bond issues by incorporating all the components of default risk into a single code: the credit rating. However, the choice concerning the investments to be undertaken remains with the investor. The cost of producing such information is imposed through fees on the issuers of rated securities and is not related to sales of particular financial products.

WHITE (2002) points out that since credit rating agencies' judgments are widely disseminated, broadly used, and unmistakably understood by market participants, they can open the issuer's debt to a wider range of prospective investors. In nowadays global financial markets, a credit rating can provide access to international capital, for instance, in debt markets where the issuer is not well-known or where investors may not be familiar with the issuer's language, its business culture or its accounting standards.

MERRILL LYNCH (1999) accentuates that credit rating agencies can assist lenders to "pierce the fog" of asymmetric information that surrounds lending relationships. Equivalently,

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[3]   While there are several credit rating agencies, the industry is dominated by just two who operate in global financial markets: S&P and Moody's. Reflecting this supremacy, the following discussion and analysis is for the most part confined to these two businesses.

credit rating agencies can help borrowers and their credit qualities to emerge from that same fog. In the case of government bonds, for instance, where thousands of lenders may possess the obligation of a single issuer, credit rating agencies can reduce or eradicate the replication of information-generation efforts in which individual bondholders might otherwise engage. The BANK FOR INTERNATIONAL SETTLEMENTS (2000) clarifies that this also implies that credit ratings allow holders of relatively small shares to forestall the high per unit costs that their own investigations otherwise might necessitate.

II.2 The Increasing Significance of Sovereign Credit Ratings

In recent years, the request for sovereign credit ratings, i.e., the risk assessments assigned by the credit rating agencies to the obligations of central governments, has increased considerably. By reducing investor uncertainty about risk exposures, sovereign credit ratings have enabled many governments, even some with former histories of debt default, to once more gain access to international bond markets.

Even though the credit rating agencies' current practice of assigning credit ratings for sovereign risk originated on the whole only a few decades ago, Moody's has been evaluating foreign governments' bonds since 1919. According to OBSTFELD AND TAYLOR (2003), international bond markets were extremely dynamic in the early part of the twentieth century. By 1929, Moody's was evaluating bonds issued by roughly 50 central governments. The demands for sovereign credit ratings, however, subsided with the arrival of the Great Depression, and after the Second World War the international bond markets came to a standstill.

In the 1970s international bond markets revitalized, but the demand for sovereign credit ratings was slow to materialize. MOODY'S INVESTORS SERVICE (2001) points out that about 15 years ago merely 15 foreign governments, which borrowed in the US capital markets, considered the need to obtain a sovereign credit rating. For the reason that these governments were in effect all sound borrowers from industrial countries, their sovereign risk assessments were quite straightforward and non-controversial. During these times other governments were able to achieve international financing through other resources. According to CANTOR AND PACKER (1995), a few financially strong governments gained access to international capital through European markets without holding a sovereign credit rating. They observe that less creditworthy sovereigns frequently achieved international credit from commercial banks, and

a small number of governments issued privately placed bonds without retaining a credit risk assessment by the credit rating agencies.

While the credit rating agencies evaluated the financial and economic soundness of countries, banks, companies, and security issues of industrialized countries for a long while, only during the last decade have they paid closer attention to the rating of credit risk associated with emerging market economies. However, PARTNOY (2002) points out that one should not construe this behavior of the credit rating agencies as having left a vacuum in central regions of the world. Throughout the 1970s and 1980s international financing was first and foremost channeled through major commercial banks which were supposed to have the capability to separately observe and assess the creditworthiness of sovereign borrowers. SYLLA (2002), for example, argues that in domestic markets the prevalent relationship among commercial banks and their customers to the international sphere left little space for the work of profitable credit rating agencies.

Table 1 illustrates that over the last decade Moody's has seen more than a fivefold growth in the number of emerging market sovereigns that have received a credit rating on their long-term foreign currency debt issues.

Table 1: *Moody's Emerging Market Sovereign Credit Ratings by Region (1993 to 2000)*

Region \ Year	1993	1994	1995	1996	1997	1998	1999	2000
Asia	6	7	10	10	10	11	11	11
Latin America	4	6	7	7	9	13	14	14
Middle East	1	1	1	9	10	11	11	11
Transition Economies	1	2	2	4	12	15	16	16
Others	0	1	4	5	8	10	12	12
Total	12	17	24	35	49	60	64	64

Table 1 indicates that in 1993 only 12 emerging market economies were assessed by Moody's. The number of rated governments accelerated rapidly in the mid-1990s, as several governments, particularly transition economies and countries in the Middle East, sought access to international bond markets.

II.3   Sovereign Credit Ratings

The agencies interpret their sovereign credit ratings as forward-looking indications of the relative risk that a sovereign debt issuer will not have the ability and willingness to make full and timely payments of principal and interest over the life of a particular rated financial instrument. Sovereign credit risk analysis may be divided into two broad components, specifically economic and political risk. Economic risk deals with the government's ability to repay its obligations on time and is a function of both qualitative and quantitative factors, while political risk addresses the sovereign's willingness to repay its outstanding debt on time. For example, STANDARD & POOR'S (1997) divides the factors which influence the determination of the overall sovereign credit rating into eight categories: political risk, income and economic structure, economic growth prospects, fiscal flexibility, public debt burden, price stability, balance of payments flexibility, and external debt and liquidity.[4]

Despite the fact that the agencies list the relevant political and economic factors that underlie their sovereign credit ratings, they provide no information about the weights they assign to each factor and the role of non-quantifiable criteria such as government stability and policy consensus. The credit rating agencies underline that they do not employ a specific formula to combine their assessments of political and economic factors to derive the overall rating (see STANDARD & POOR'S (1999) and MOODY'S INVESTORS SERVICE (2001)).

For assigning their sovereign credit ratings the agencies apply an ordinal scale. S&P's ratings for long-term foreign currency bonds run from AAA, the highest, through AA, A, and BBB, and then all the way down to CC. Similarly, Moody's sovereign credit ratings range from that the sovereign is fairly unlikely to default (Aaa) down to that it has a relatively high risk of default (C).[5] Sovereign credit ratings are also subject to refinements. S&P's sovereign credit ratings from double-A to triple-C may be modified by the addition of a plus or a minus to show their relative standing within the major rating categories. Moody's applies for this reason numerical modifiers 1, 2 and 3 in each rating category from double-A to Caa.

In recent years, both S&P and Moody's have supplemented their credit risk assessments with credit watches and rating outlooks, respectively, designed to indicate the credit rating agencies' perspectives on developments that might induce a rating change. But as

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[4]   Table A1 in the Appendix illustrates in detail the political and economic factors S&P focuses on when rating sovereigns.

[5]   See Tables A2 and A3 in the Appendix for a detailed description of the long-term issuer sovereign credit rating scales of S&P and Moody's, respectively.

STANDARD & POOR'S (2000) points out, it is central to understand that a rating outlook or a credit watch is not necessarily an antecedent of a rating change.[6]

Credit ratings are often separated into two broad categories, i.e., investment-grade and speculative- or non-investment-grade. MERRILL LYNCH (1999) mentions that investment-grade issues are typically considered to be appropriate investments for institutional investors. S&P's issues rated BBB− and above are investment-grade, while Moody's split is made at Baa3. This differentiation has an essential role for institutional investors since the majority of them operate within restrictive limitations on the risk of financial instruments in their portfolio. In some cases these are absolute constraints: a manager of an investment-grade bond portfolio may be precluded from trading bonds that are not classified as investment-grade.

As a consequence, a sovereign credit rating upgrade to investment-grade is vital since it opens up a much wider investor base by making the bonds appropriate for enclosure in benchmark investment-grade indexes. This implicates that the sovereign credit rating upgrade will result in both increased and more stable demand for bonds of that particular emerging market. On the other hand, when an issuer receives a credit rating below-investment-grade, the number of potential investors radically declines. However, such a credit rating-effect is to some extent incorporated into the pricing of the country's debt concurrently with the news that the sovereign credit rating will be placed on review for a possible upgrade.[7]

Furthermore, through the so-called "sovereign ceiling", however, the sovereign credit rating has a major influence on the credit risk assignments for all other domestic entities. STANDARD & POOR'S (1997) and MOODY'S INVESTORS SERVICE (1999) record that until recently, the sovereign credit rating set a ceiling on the credit risk assessment that could be achieved by other domestic entities, under the assumption that the sovereign has the first

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[6]   MOODY'S INVESTORS SERVICE (2001) mentions that it is crucial to discriminate between a credit watch and a rating outlook. Both are intended to communicate the agencies' credit opinion to the market participants, but each contains different information and has separate rating implications. Credit watches are part of the formal committee-based rating process by which the agencies' credit ratings are assigned, monitored and changed over time. In contrast, as the agencies emphasize, a change in the rating outlook is neither a rating change nor a review for a potential credit rating change. Therefore, a rating outlook may be considered as a useful early indicator, but as a weaker signal than a credit watch.

[7]   This reflects the demand both from investment-grade portfolio managers that have some flexibility to make allocations to non-investment-grade assets, and from unconstrained investors, for example high-yield portfolio managers and hedge funds. These institutional investors are able to purchase opportunistically and realize much of the prize impact of the credit rating upgrade and subsequently sell after the actual upgrade to other investors who have not had the flexibility to buy prior to the actual inclusion in investment-grade indexes.

claim on available foreign exchange reserves and controls the ability of any resident entity to get hold of international funds to compensate lenders.[8]

III   Sovereign Credit Ratings and Their Impact on Financial Stability in Emerging Market Economies

A number of empirical studies tried to shed light on the issue of whether credit rating agencies have a significant influence on financial markets by using event study approaches, Granger causality analysis and vector autoregressive (VAR) modeling, respectively. However, through examining the relationship between changes in sovereign credit ratings and movements in bond yield spreads between domestic US dollar-denominated Eurobonds and comparable US treasury bonds, somewhat disparate results have been obtained.

CANTOR AND PACKER (1996) study the effects of sovereign credit rating announcements on government bond yield spreads, using daily data covering the periods before and after the 79 rating announcements in their sample of 35 industrial and emerging market countries. They conclude that announcements of sovereign credit rating upgrades were followed by statistically significant deteriorations in government bond yield spreads, but sovereign credit rating downgrades did not produce significant rating effects. Moreover, the impact of sovereign credit rating announcements on government bond yield spreads was much stronger for speculative-grade than for investment-grade sovereigns.

REISEN AND VON MALTZAN (1999) also undertake an event study and make use of data on 29 countries from 1989 to 1997 including 152 sovereign credit rating announcements. They find that a significant rating effect in the government bond yield spread in the expected direction occurred only when a country was put on review for possible downgrade. These results are in sharp contrast to those of CANTOR AND PACKER (1996), who found sizeable rating effects only for positive sovereign credit rating announcements. Nonetheless, one similarity between these two empirical studies is that REISEN AND VON MALTZAN (1999) conclude that the largest rating effects are for emerging market sovereign yield spreads, which are usually of lower credit quality, i.e., below investment-grade. In addition, the authors test for Granger causality and find a causal relationship in both directions. Consequently, they are

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[8]   For instance, when Moody's downgraded Japan's long-term foreign currency rating on November 18, 1998, from Aaa to Aa1, all other triple-A rated Japanese issuers were also downgraded by one rating-notch. This credit rating boundary of the sovereign ceiling can generate a fundamental problem for companies located in countries that have political or financial instabilities, but which would otherwise have high corporate credit ratings.

unconvinced that credit rating agencies lead international financial markets. Instead, they argue that sovereign credit rating assignments lag the government bond markets, thereby intensifying boom-bust cycles in emerging markets lending.

KRÄUSSL (2000), employing a later sample period that fully captures the financial turbulences in emerging market countries during the latter half of the 1990s, examines the link between sovereign credit rating announcements and government bond yield spreads by using a VAR model. Contrary to previous studies, he concludes that the empirical results suggest an unexpected sovereign credit rating change does not necessarily have an immediate impact on emerging market bond yield spreads. Nevertheless, all empirical studies conclude that sovereign credit ratings appear to provide additional information beyond that contained in government bond yield spreads, but lag rather than lead international financial markets.

III.1 Theory and Hypotheses

There are two alternative views about the informational value of the agencies' credit ratings. One view is that credit rating agencies only have access to publicly available information and that the agencies generally lag the financial markets in processing that information. Proponents of this viewpoint reason that the frequency with which credit rating agencies review corporate and sovereign issuers is too low even to generate appropriate summaries of relevant public information (see GROPP AND RICHARDS (2001)). According to this argumentation, credit rating changes should not affect market prices, if financial markets are efficient in semi-strong form.

An alternative view is that credit rating agencies are specialists at obtaining and processing information, and thereby generate information on issuers' default risk that was not previously in the financial markets. A negative credit rating announcement might induce institutional investors to rebalance their portfolios for risk management, liquidity and/or other reasons. Sovereign credit rating changes may also reveal new information about a country and thus may encourage financial market rallies or downturns. This rating effect is likely to be stronger in emerging markets, where problems of asymmetric information and transparency are more severe.

Proponents of the asymmetric information framework emphasize that in financial markets information acquisition and processing is subject to free-rider problems, which can be aggravated in the wake of a (rating) shock event. CALVO AND MENDOZA (2000b), for

example, argue that because of the high costs of generating information, most market participants prefer to follow a handful of supposedly informed investors and financial analysts. As a result, the financial market will be subject to rumors and will exhibit herding behavior, since less informed investors choose mistakenly but rationally to "follow the herd" if they are evaluated based on their relative performance vis-à-vis other portfolio managers. These growing informational asymmetries might lead in the aftermath of a (rating) shock event to a homogeneously negative perception of overall credit quality so that creditors ultimately will withdraw their funds.

This sort of collective action problem multiplies the likelihood of large swings in international capital flows in the absence of any substantial changes in the countries' economic fundamentals. WYPLOSZ (1998) indicates that the essential reason for the existence of this phenomenon is that when financial markets act on the basis of expectations of a particular outcome, they are strong enough to actually provoke this particular outcome. But what makes this phenomenon particularly puzzling is that expectations that are ex-ante reasonable are validated ex-post by the outcome that they have generated, implying they can be self-fulfilling. As a consequence, dramatic losses can be directly caused by the financial market exit lenders who suspect that the financial position of their debtors is considerably distressed.

An essential implication of the model by CALVO AND MENDOZA (2000b) is that credible financial market institutions which ease the process of extracting information from noise will tend to moderate emerging market countries' vulnerability to external shocks. Credit rating agencies are designed exclusively for the task of overcoming such informational asymmetries. Their fundamental responsibility is to release early warnings so that investors can reach well-timed financial markets (exit) decisions.

Credit rating agencies have been sharply criticized by both academics and market participants as promoters of financial market turbulences. For example, FERRI, LIU AND STIGLITZ (1999) argue that the credit rating agencies' pro-cyclical behavior, that is upgrading sovereigns in good financial market conditions and downgrading them in turbulent times, may have contributed to deepen the observed boom-bust pattern in global financial markets. REISEN AND VON MALTZAN (1999) emphasize that this potential financial market impact of sovereign credit ratings would be crucial to their power to moderate, through well-timed credit rating actions or intensify through too late credit risk adjustments, boom-bust cycles in emerging markets lending cycles. The authors argue that, during the boom, an appropriate

lowering of the sovereign's credit rating would help to diminish euphoric market sentiment. This in turn would help to tone down private short-term capital inflows which have over and over again been recognized as promoters of credit-lending booms and financial vulnerability in emerging market economies.

Beyond this issue of market power, there is also the persistent question of whether the credit rating agencies generate any additional informational value for the financial markets. Credit ratings might merely be reflecting financial market outcomes rather than the other way around. Therefore, in the following it will be examined whether a change in the sovereign credit rating causes a significant change in financial markets, implying that the credit rating change is providing new information to the market participants, or whether the financial market variables remain relatively unaffected, indicating that the market participants already captured the change in the country's underlying economic conditions that motivated the sovereign credit rating adjustment.

III.2 Methodology

For assessing the characteristics of the emerging market countries that have been affected during the financial crises in the latter half of the 1990s, an operational definition of speculative market pressure is required. In contrast to previous empirical studies, for example REISEN AND VON MALTZAN (1999) and KAMINSKY AND SCHMUKLER (2002), which try to analyze the influence of credit rating agencies on emerging market crises by looking solely at the effects of sovereign credit rating actions on government bond yield spreads, this index of speculative market pressure should not contain government bond yield spreads for several central reasons. Firstly, many of the emerging market economies do not have well-developed domestic financial markets implying that the construction of a reliable and comparable data set on government bond yield spreads is a problematical task, given the low liquidity of the sovereign bonds.

Secondly, there is the general issue that government bonds are typically less liquid than stocks, and that the reported prices are often indicative quotes rather than actual trades. It can be very difficult to get accurate up-to-date pricing of all but a few benchmark issues. Previous empirical studies make also the factual error that they consider for their whole investigation and estimation period only a single sovereign bond, despite the fact that the maturity structure of these government bonds changes over time. Finally, especially during financial crisis

episodes many of these emerging market governments' bonds are not traded on a regular basis and therefore not accurately priced.

In following the approach by FRANKEL AND ROSE (1996), a financial crisis could be identified simply as a substantial nominal currency devaluation. But this criterion would rule out instances where a currency came under severe pressure but the country's authorities successfully defended it by intervening vigorously in the foreign exchange market and/or by raising interest rates sharply. Nonetheless, many such occurrences would reasonably be considered as financial crises. An alternative approach would be to construct an index of speculative pressure that takes into account not only nominal exchange rate movements but also changes in international reserves and/or domestic interest rates that absorb financial market pressure and as a result moderate the nominal exchange rate changes (see EICHENGREEN, ROSE AND WYPLOSZ (1996)).

But (financial) shocks may not be confined only to a single market, such as foreign exchange, and may have more far-reaching consequences by having a substantial effect on domestic money and equity markets. Many popular explanations for the Asian crisis of 1997-98 emphasize the relationship between equity and currency markets in the crisis-ridden emerging market economies.[9]

AZIZ, CARAMAZZA AND SALGADO (2000) lay emphasis on that interest rate movements have played a significant role either in triggering or in preventing financial market crises, both directly through their effects on international capital flows and indirectly as a signal of the country's authorities' commitment to defend an exchange rate peg. They show that prior to the financial crises in emerging markets during the latter half of the 1990s, the real interest rate moved sharply upwards. DRAZEN (2003) points out that a major effect of high interest rates is the signal of the government's willingness or ability to defend the exchange rate. He

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[9] For example, CORSETTI, PESENTI AND ROUBINI (1999) point out that the collapse in the Southeast Asian equity markets has led to the outflow of foreign investments which in turn put downward pressure on the domestic currencies. In addition, RADELET AND SACHS (1998) notice that especially during the Asian crisis, financial market breakdowns have been closely associated with the collapse of asset prices. They reason that the increase in non-performing loans and capital losses caused by the currency depreciation sharply reduced the commercial banks' available capital, by this means forcing commercial banks to selling assets and reducing lending in order to move towards capital adequacy ratios required by regulators and the IMF. HARTMANN, STRAETMANS AND DE VRIES (2001) indicate that because stock market returns are proxies for expectations of future profitability in the economy, their movements may be as reflective of adjustments in investors' perceptions of sovereign credit risk as movements in government bond yield spreads.

notes that a frequently used measure to prevent existing financial market speculation is to increase short-term interest rates.[10]

Therefore, as the financial crises in the latter half of the 1990s have shown, when an emerging market economy suffers a deep financial crisis all domestic financial markets are affected at the same time: the currency weakens, domestic interest rates increase and stock market indexes slide. This implies that a convenient indicator of speculative market pressure in emerging markets financial crises should be broadened to include foreign exchange rate pressures as well as pressures in other financial markets such as movements in domestic short-term interest rates and domestic equity prices.

As a measure of financial market crises, hence, an index of speculative market pressure is specified as a weighted average of daily nominal exchange rate changes, daily short-term interest rate changes and daily stock market changes. The resulting index of a country's i daily speculative market pressure at time t is given through

$$
\begin{aligned}
SMP_{it} &\equiv a_1 e_{it} + a_2 r_{it} + a_3 s_{it} \\
&= a_1 \frac{E_{it} - E_{it-1}}{E_{it-1}} + a_2 \frac{R_{it} - R_{it-1}}{R_{it-1}} + a_3 \frac{S_{it} - S_{it-1}}{S_{it-1}}
\end{aligned}
\tag{1}
$$

where e_{it} denotes the first differences of the nominal exchange rate, that is the price of one US dollar in country i's currency at time t, r_{it} denotes the first differences of the domestic short-term interest rate, s_{it} denotes the first differences of the domestic main stock market index, and a_1, a_2 and a_3 are the weights assigned to these three factors, respectively.

The relationship between the nominal exchange rate and the sovereign credit rating should be negative, indicating that a lower sovereign risk assessment should be connected with a higher nominal exchange rate. The relationship between the short-term interest rate and the sovereign credit rating should also be negative, which indicates that a negative sovereign credit rating action should be associated with rising short-term interest rates. Since negative sovereign credit rating announcements should be associated with positive movements in the index of speculative market pressure, the relative changes in the domestic stock market prices indexes are multiplied by −1.

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[10] For example, Hong Kong SAR raised overnight interest rates to several hundred percent and successfully defended its currency in October 1997 against a mounting speculative attack. On the contrary, Sweden similarly raised its short-term interest rate by several hundred percent in its currency defense during the EMS crisis in September 1992, but its success was only short-lived.

A higher speculative market pressure index *SMP* indicates greater pressure on the financial markets in country i at day t since it will be mirrored in higher values of the three components. Insofar as sovereign credit ratings convey new information to market participants, the expected rating effect on the index of speculative market pressure is straightforward: in case of a sovereign credit rating downgrade the index should rise, while in the occurrence of a sovereign credit rating upgrade the *SMP* should fall.

A crucial step is weighting the three components of the speculative market pressure index of equation (1). An obvious choice would be an unweighted average which the advantage of simplicity. Such a weighting would reflect a preference to identify which component causes the principal change in the speculative market pressure index. But since the volatility of nominal exchange rates, short-term interest rates and stock market indexes is very different, the components are weighted instead so as to equalize the volatilities of the three components, i.e., in inverse proportion to their volatility, thereby preventing any of them from dominating the index of speculative market pressure. For instance, the variance weighted factor for the nominal exchange rate is equal to:

$$w_e = \frac{\dfrac{1}{\sigma_e^2}}{\sum \dfrac{1}{\sigma_e^2} + \dfrac{1}{\sigma_r^2} + \dfrac{1}{\sigma_s^2}} \tag{2}$$

Therefore, the variance weighted index of speculative market pressure is specified as:

$$SMP_{it}^w \equiv w_e\, e_{it} + w_r\, r_{it} + w_s\, s_{it} \tag{3}$$

while in the following the superscript w is dropped for clarity.

To get an idea of any possible dynamic effects that might take place after the agencies' sovereign credit ratings actions, event studies commonly used in the finance literature are employed. The event study methodology furthermore allows the examination of the perception that credit rating agencies behave pro-cyclically, that is upgrading countries during flourishing financial market conditions and lowering them in times of financial turbulence. For that reason, the movements of the speculative market pressure index around the time of the sovereign credit rating changes are analyzed.

Standard event study methodology requires linking sovereign credit rating events to abnormal movements in the index, which is given as the difference between model-generated

and actual market movements. The model-generated movement $\overline{SMP_{it}}$ which depends on the actual movements of the speculative market pressure index SMP_{it}^m is given by

$$\overline{SMP_{it}} = \alpha_i + \beta_i SMP_{it}^m + \varepsilon_{it} \tag{4}$$

with $E[\varepsilon_{it}] = 0$ and $Var[\varepsilon_{it}] = \sigma_{\varepsilon_i}^2$. However, the coefficients for model-generated movements have to be calculated for periods free of sovereign credit rating events. But since the relevant time series of sovereign credit ratings are much too short to calculate the coefficients within an event-free period, CAMPBELL, LO AND MACKINLAY (1997) proposes that α_i have to be constrained to zero and β_i to one.

As a consequence, the abnormal movements of the speculative market pressure index SMP_{it}^a are given in analogy to market-adjusted yield spreads as the difference between the model-generated movements and the actual variations:

$$\Delta SMP_{it}^a = \overline{SMP_{it}} - SMP_{it}^m \tag{5}$$

This implies that the event study is based on the observed "foreign exchange spreads" between the domestic nominal exchange rates and the US dollar. In the case of short-term interest rates, the yield spreads between the domestic and the benchmark US short-term interest rates are exercised, while in the case of stock market indexes the "stock spreads" between domestic stock market indexes and the US S&P500 stock market index are utilized.

To perform event studies, "clean events" are necessary, that means that sovereign credit rating actions do not overlap. This distinction is important when considering an event window, in order to be able to isolate the effect of each sovereign credit rating. In the following, the sovereign rating effects will be examined ten days before and ten days after the event. As Figure 1 illustrates, the event is defined as day-zero, the period between the days 0 to +1 is defined as the event window, the period from the days −10 to −1 as the pre-announcement window, and the period from the days +2 to +11 as the post-announcement window.
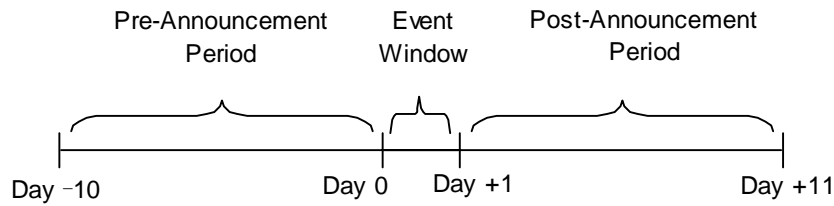
Figure 1: *The Event Window*

The event window is defined somewhat wider than just one day, because there is no exact information available on the announcement time of the sovereign credit rating action by the agencies and hence it is not possible to determine whether the announcement was done during trading or after trading on a given day. The index of speculative market pressure is set to 100 at day -10, once appropriate sovereign credit rating events are identified, in a way that it is more comfortable to measure the cumulative sovereign credit rating effects over time and at the same time, to compare different variations of the *SMP* across the emerging market economies.

In addition to the event studies of dynamic effects following the agencies' sovereign credit rating actions, the contemporaneous effects of sovereign credit rating changes on the speculative market pressure index are also quite significant. Furthermore, recent empirical studies have focused on the relationship between emerging markets' capital inflows or foreign exchange reserves and interest rates in financial centers, for example EICHENGREEN AND MODY (1998) and CALVO AND REINHART (2000), while others have analyzed the links between financial market returns in emerging market economies and returns in financial centers, for instance CALVO (1999) and KAMINSKY AND SCHMUKLER (2002).

The following panel regression analysis examines the reaction of the speculative market pressure index to changes in sovereign credit ratings and changes of US short-term interest rates. The fact that the empirical study uses daily data does not allow controlling for the countries' economic fundamentals, which are in general reported on a lower frequency basis. Nevertheless, it will be controlled for past movements of the explanatory variable ΔSMP_{it}. The specification results show that a first-order autoregressive process is sufficient, since further lags appear to be insignificant.

The resulting specification I is given by the pooled panel:

$$\Delta SMP_{it} = \alpha + \beta \Delta SMP_{it-1} + \gamma \Delta R_{it} + \delta \Delta r_t^{US} + \varepsilon_{it} \qquad (6)$$

The sub-indexes i and t identify country and time, respectively. The error term ε_{it} is characterized by an independently distributed random variable with mean zero and variance σ_{it}^2. The coefficients α, β, γ and δ of equation (6) are estimated via ordinary least squares (OLS), allowing for heteroscedastical residuals.

The variable ΔR_{it} stands for the change in sovereign credit ratings. It is equal to 1 if there is a positive sovereign credit rating announcement by the agencies, equal to -1 when there is a negative sovereign credit rating announcement and equal to zero otherwise. If changes in sovereign credit ratings pass on new information to market participants, it is expected that $\hat{\gamma} < 0$, which means that sovereign credit rating downgrades lead to increases in the index of speculative market pressure.

The variable Δr_t^{US} represents changes in US short-term interest rates, that is the interest given through 100 times $\log(1 + r_t^{US})$. There are at least two probable transmission channels through which variations in US interest rates might have an effect on emerging markets' sovereign risk. Firstly, GERTLER AND ROGOFF (1990) emphasize that a rise in US interest rates increases the burden of the emerging markets' outstanding debt, thereby decreasing the countries' repayment capability. Secondly, increases in US interest rates can lessen institutional investors' "appetite for risk", thereby reducing the demand for risky high-yield assets from emerging market economies and, as a result, increasing the sovereign risk of these countries (see, for example, EICHENGREEN AND MODY (1998)). For these reasons it is expected that $\hat{\delta} > 0$, since increases in US short-term interest rates may lead to a higher index of speculative market pressure.

The alternative specification II which allows discriminating the magnitudes of the rating effects between implemented and imminent sovereign credit rating actions is given by the pooled panel

$$\Delta SMP_{it} = \alpha + \beta \Delta SMP_{it-1} + \gamma^I R_{it}^I + \gamma^P \Delta R_{it}^P + \delta \Delta r_t^{US} + \varepsilon_{it} \tag{7}$$

where all variables have the same meaning as above, while R_{it}^I stands for the implemented sovereign credit rating changes and R_{it}^P indicates the imminent (potential) sovereign credit rating actions, that are the rating outlooks and credit watches by the credit rating agencies. As in the previous specification, the coefficients of Equation (7) are estimated using OLS, thereby allowing for heteroscedastical residuals.

III.3 Data

The data set consists of daily sovereign credit ratings of long-term foreign currency debt which have been assigned by the two major credit rating agencies, S&P and Moody's. The observed period between January 1, 1997, and December 31, 2000 fully captures the financial market turmoil in the latter half of the 1990s, i.e., the financial market crises in Southeast Asia, Russia and Brazil. In the case of S&P, the sovereign credit rating history was obtained directly from its historical database on the Internet. However, in the case of Moody's, the press releases about its sovereign credit rating actions had to be collated and checked over the full four years to construct its sovereign credit rating history.

In total, a sample of 302 sovereign credit rating announcements assigned by the two agencies for the 28 countries in the sample during the period between January 1, 1997 and December 31, 2000 has been gathered. 69 of the credit rating agencies' announcements report actual sovereign credit rating downgrades and 43 actual upgrades, 42 sovereign credit ratings were assigned a negative rating outlook and 28 a positive rating outlook, 30 times sovereigns were put on negative credit watch and 14 times on positive credit watch, while the remainder contained sovereign credit rating confirmations or first assignments. A detailed illustration of the sovereign credit rating actions for all 28 emerging market countries employed in the empirical analysis during this period is presented in Table A4 in the Appendix.

Although the credit rating agencies use different symbols in assessing sovereign credit risk, every S&P's symbol has its counterpart in Moody's sovereign credit rating scale. This correspondence allows comparison of the sovereign credit ratings assigned by the two agencies. Moreover, it permits a linear transformation of the agencies' ordinal sovereign credit rating scales into numbers (see Table A5 in the Appendix). This linear transformation implies that a higher sovereign credit rating denotes a lower probability of (selective) default. As discussed above, the effect of a sovereign credit rating change is often partially incorporated into the institutional investor's credit risk judgments when the country is placed on review for a possible upgrade or a possible downgrade. In order to consider not only the implemented long-term foreign currency debt rating changes but also the credit rating agencies' imminent rating actions, the numerical scale of the transformed sovereign credit ratings also contains positive and negative rating outlooks and credit watches.

The obtained sovereign credit rating history indicates that countries with a positive (negative) credit watch have never been downgraded (upgraded) at the next sovereign credit rating change. Moreover, about 60 percent of all credit watches in the sample have resulted in

a sovereign credit rating change in the expected direction. As a result, the consideration of imminent sovereign credit rating actions is realized by adding 0.3 of one rating-notch for a positive credit watch by S&P and Moody's and by adding −0.3 of one rating-notch for a negative credit watch to the implemented sovereign credit rating. A positive rating outlook by S&P and Moody's is considered by adding 0.15 of one rating-notch, while a negative rating outlook by S&P and Moody's is taken into account by adding −0.15 to the implemented sovereign credit rating.

The other three types of data needed to build the speculative market pressure index are the daily nominal exchange rates, short-term interest rates and stock market price indexes. In the case of short-term interest rates overnight interbank interest rates are employed since the overnight interest (call) rate, i.e., the interest rate on the interbank market, is the typically watched indicator of liquidity conditions in the money market (see, for example, BORENSZTEIN AND LEE (2002)). In the case of stock markets the major national stock indexes are used, which are measured for each country in US dollars to enable comparison of stock market returns across countries in the same unit of account. All these three types of data were obtained from Bloomberg L.P., with holidays and weekends excluded. In case of missing values, the data were obtained from Datastream and from the websites of the emerging market economies' respective central banks.

Table 2 illustrates that the sample used in this study consists of 28 emerging and transition economy countries, while the inclusion criterion is that the sovereigns have to be rated both by S&P and Moody's throughout the period between January 1, 1997 and December 31, 2000. However, in the cases of Ecuador, Peru and Egypt, a country is employed in the empirical analysis when the sovereign is first rated by either S&P or Moody's. When the other credit rating agency also starts assessing this country, the averages of the adjustments of the sovereign credit ratings by both agencies are employed. Table A1 in the Appendix indicates that when the credit rating agencies disagreed in their overall risk level assigned to an emerging market country, their sovereign credit ratings in most cases differed by only one rating-notch.

Table 2 *Emerging Market Countries Employed in the Empirical Study*

IMF	Country	S&P	Moody's	Stock Market Index
186	Turkey	X	X	ISE Nat 100
199	South Africa	X	X	JSE All Share
213	Argentina	X	X	General
223	Brazil	X	X	Bovespa
228	Chile	X	X	IPSA
233	Colombia	X	X	IBB General
248	Ecuador	07/29/00	07/24/97	ECGUB
273	Mexico	X	X	IPC
293	Peru	12/18/97	X	Lima General
299	Venezuela	X	X	IBC
469	Egypt	01/15/97	X	CMA
532	Hong Kong SAR	X	X	Hang Seng
534	India	X	X	BSE Sensex 30
536	Indonesia	X	X	Jakarta Composite
542	South Korea	X	X	Seoul Composite
548	Malaysia	X	X	KLSE Composite
564	Pakistan	X	X	Karachi 100
566	The Philippines	X	X	PSE Composite
576	Singapore	X	X	Straits Times
578	Thailand	X	X	Bangkok SET
686	Morocco	03/02/98	03/02/98	CASA CSG 25
922	Russia	X	X	Moscow Times
924	China	X	X	Shanghai A
935	Czech Rep.	X	X	PX 50
936	Slovak Rep.	X	X	SAX
944	Hungary	X	X	Bux
964	Poland	X	X	Wig
9998	Taiwan	X	X	Taiwan Weighted

Table 2 shows that the sample contains 11 Asian economies (China, Hong Kong SAR, India, Indonesia, South Korea, Malaysia, Pakistan, the Philippines, Singapore, Taiwan and Thailand), eight Latin American economies (Argentina, Brazil, Chile, Colombia, Ecuador,

Mexico, Peru and Venezuela), five Eastern European (Transition) economies (the Czech Republic, Hungary, Poland, Russia and the Slovak Republic), three African/Middle East economies (Egypt, Morocco and South Africa) and Turkey. Therefore, the empirical study analyzes exactly those countries which are classified by *The Economist* and the *Financial Times* as emerging market economies as of January 1997, with the exception of Israel.

Table 3 provides some useful measures of financial market stability in the sample.

Table 3: *Sample Statistics*

Log Change in Variable	Mean	Median	Min	Max	SD
Nominal Exchange Rate	0.0184	0.0155	0.0000	0.4241	0.0213
Stock Market Index	0.0142	0.0098	0.0000	0.3865	0.0167
Overnight Interest Rate	0.0219	0.0164	0.0000	0.4773	0.0258
SMP Index	0.0177	0.0143	0.0000	0.0435	0.0201

It shows that daily variations in absolute values are large in all three separate financial markets and oscillate around 1.8 percent for nominal exchange rates, around 1.4 percent for stock market indexes and around 2.2 percent for overnight interest rates, thereby resulting in a daily average movement in absolute value of about 1.8 percent for the index of speculative market pressure.

IV   Empirical Results

IV.1   Short-Term Impact of Sovereign Credit Actions

In a test for statistical significance of the dynamic impact of sovereign credit rating changes on financial prices in emerging market countries, Table 4 shows the results of the event study for the ten trading days before and after the credit rating agencies' announcement as well as for the two-day event window, i.e., day-zero and day +1, for the date of the sovereign credit rating action. Since positive sovereign credit rating announcements should be associated with a sliding index of speculative market pressure, movements in the index are multiplied by −1 for negative sovereign credit rating actions. Table 4 displays the change of the cumulative mean of the speculative market pressure index, with the respective t-statistics and the significance levels.

Table 4: *Short-Term Impact of Sovereign Credit Rating Actions*

Period	Cumulative Mean Change of SMP Index
−10 to −1	−0.019[*]
	(−1.725)
0 to +1	−0.013[*]
	(−1.689)
+2 to +11	−0.031[*]
	(−1.952)

Table 4 shows a statistically significant rating effect at the ten percent level on the speculative market pressure index when all sovereign credit rating announcements are combined. Nevertheless, within the announcement window, a sovereign credit rating event moves the index of financial market pressure only by 1.3 percent. Adding the significant response of the *SMP* during the ten days after the sovereign credit rating modification, the cumulative movement of the speculative market pressure index is as high as 4.4 percent.

To explore the potential rating effects of sovereign credit rating actions in more detail, Table 5 reports the cumulative median changes of the speculative market pressure index separately for implemented upgrades and downgrades by the credit rating agencies.

Table 5: *Short-Term Impact of Implemented Sovereign Credit Rating Changes*

Period	Upgrades	Downgrades
−10 to −1	−0.010	0.024[**]
	(−0.931)	(2.083)
0 to +1	−0.012[*]	0.031[***]
	(−1.836)	(4.514)
+2 to +11	−0.013	0.044[***]
	(−0.973)	(3.887)

Table 5 indicates a significant response to implemented sovereign credit rating changes with the expected sign in both sub-panels. During the event window and the post-announcement period, the index of speculative market pressure rises in the case of sovereign

credit rating downgrades by accumulated 7.5 percent, while in the case of sovereign credit rating upgrades the effect is only −2.5 percent. Table 5 shows that the event study results are significant at the one percent level for downgrades, but sovereign credit rating upgrades are significant only at the ten percent level. Moreover, in the pre-announcement period and in the ten days after the rating event, there is no significant market response to sovereign credit rating upgrades.

Figure 2 summarizes the results of the event study in some detail for the case of sovereign credit rating upgrades and downgrades.
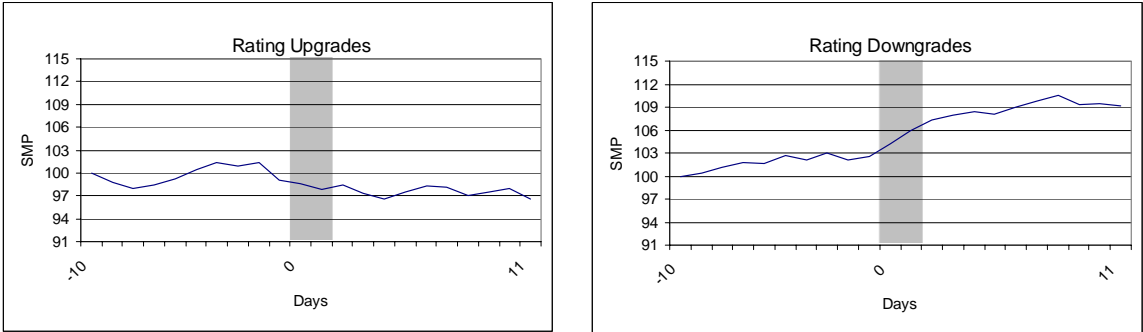
Figure 2:   *Short-Term Impact of Implemented Sovereign Credit Rating Changes*

Figure 2 illustrates the average cumulative abnormal movements of the speculative market pressure index around the time of the implemented sovereign credit rating changes. The index is normalized to 100 at day −10, day-zero is the day of the rating event, the gray period illustrates the event window (day-zero to day +1), while day 11 is the end of the post-announcement period. The empirical results suggest that sovereign credit rating downgrades generate a strong financial market reaction, while sovereign credit rating upgrades have a much lesser impact on financial markets in emerging market economies.

In addition to implemented changes in sovereign credit ratings, it is essential to also consider the information of imminent sovereign credit rating actions, which are the credit rating agencies' positive and negative credit watches and rating outlooks. Table 6 reports the cumulative median changes of the speculative market pressure index separately for the imminent positive and imminent negative sovereign credit rating actions by S&P and Moody's throughout the period between January 1997 and December 2000.

Table 6: *Short-Term Impact of Imminent Sovereign Credit Rating Actions*

Period	Positive	Negative
−10 to −1	−0.026**	0.033**
	(−2.184)	(2.114)
0 to +1	−0.022**	0.044***
	(−2.077)	(6.152)
+2 to +11	−0.019*	0.051***
	(−1.749)	(6.724)

Table 6 indicates a significant response to imminent positive and imminent negative sovereign credit rating actions with the expected sign in both sub-panels. The assignment of negative rating outlooks and negative credit watches generates a strong market reaction, with the index of speculative market pressure rising by over four percent on the sovereign credit rating announcement day. Adding the significant response of the *SMP* during the ten days after the negative rating event, the combined move of the speculative market pressure index is nearly ten percent around the negative imminent sovereign credit rating action. For positive imminent sovereign credit rating actions the event study indicates also strong rating effects. The event study results are statistically highly significant at the one percent level for negative credit watches and negative rating outlooks, while positive imminent sovereign credit rating announcements are significant at the five percent level during the event window.
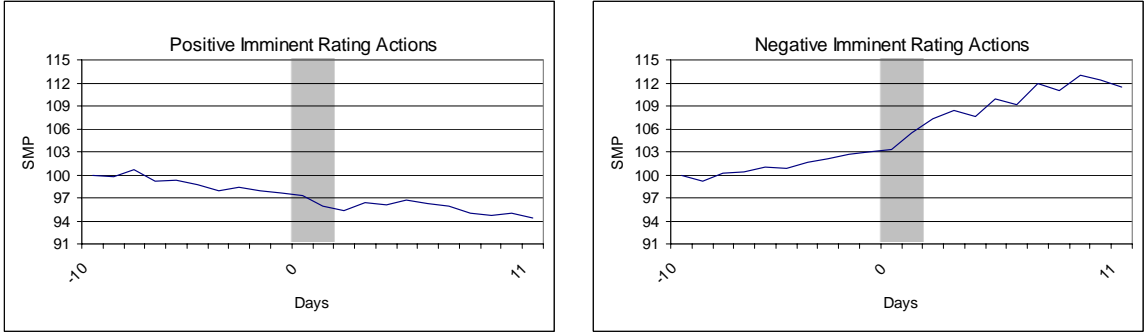
Figure 3: *Short-Term Impact of Imminent Sovereign Credit Rating Actions*

Figure 3 illustrates the results of the event study separately for imminent positive and imminent negative sovereign credit rating actions. The empirical findings confirm that as in the case for implemented sovereign credit rating changes, the rating effect of negative imminent sovereign credit rating actions is stronger than the rating effect of positive rating

outlooks and positive credit watches on the financial markets of the emerging markets economies.

Imminent sovereign credit rating actions can also be used to distinguish between anticipated and unanticipated sovereign credit rating changes (see GROPP AND RICHARDS (2001)). A sovereign credit rating adjustment that is preceded by a credit watch in the same direction should be largely anticipated by the institutional investors and hence should not necessarily be associated with a strong reaction in financial market prices. In other words, in order to discriminate between anticipated and unanticipated sovereign credit rating events, it is necessary to identify whether the sovereign credit rating change occurred after a credit watch in the same direction, i.e., whether a sovereign credit rating downgrade occurred after a negative credit watch, or if a sovereign credit rating upgrade occurred after a positive credit watch. If this is the case, the sovereign credit rating change is identified as being largely anticipated by the market participants.

Table 7 reports the cumulative median changes of the speculative market pressure index separately for the anticipated and unanticipated implemented sovereign credit rating changes by S&P and Moody's.

Table 7: *Short-Term Impact of Anticipated versus Unanticipated Sovereign Credit Rating Changes*

Period	Anticipated	Unanticipated
−10 to −1	0.003	−0.012[*]
	(0.375)	(−1.693)
0 to +1	−0.008	−0.043[***]
	(−0.922)	(−4.753)
+2 to +11	−0.011	−0.054[***]
	(−1.165)	(−3.938)

The results of the event study indicate that unanticipated sovereign credit rating changes imply a strong response in financial markets in emerging market economies, with the index of speculative market pressure rising by over four percent on the sovereign credit rating announcement day. Adding the significant response of the *SMP* during the post-announcement period, the combined rating effect of an unanticipated sovereign credit rating change is close to ten percent. However, none of the anticipated upgrades or downgrades by

the credit rating agencies is associated with a significant reaction of the speculative market pressure index.

Figure 4 illustrates the different short-term impacts of anticipated and unanticipated sovereign credit rating changes, respectively.
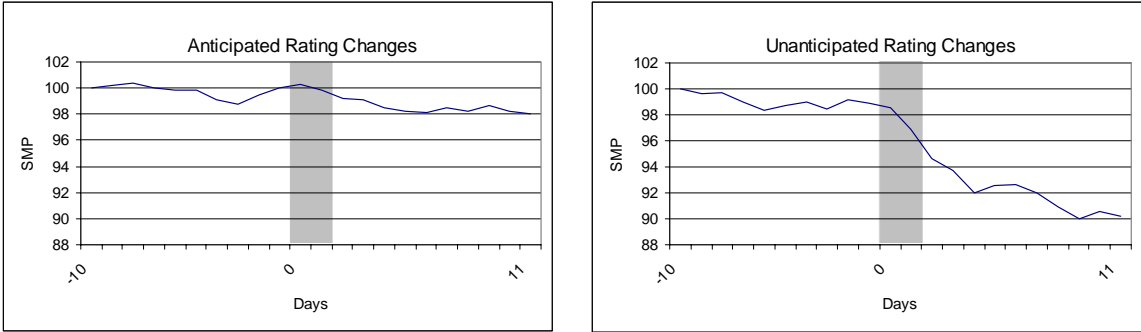
Figure 4:   *Short-Term Impact of Anticipated versus Unanticipated Sovereign Credit Rating Changes*

These empirical results indicate that when emerging market sovereigns are put on credit watch by the credit rating agencies, market participants anticipate that it is likely that an implemented sovereign credit rating change will occur in the expected direction, i.e., a sovereign downgrade will follow a negative credit watch, and react accordingly.

It is apparent that at least some of the abnormal movements in the index of speculative market pressure are contaminated, both by news stories and the release of information about the sovereign, which became public information simultaneously with the sovereign credit rating action. As discussed in Section II, the credit rating agencies' sovereign risk assessments are primarily based on publicly available information such as countries' levels of foreign debt and exchange reserves or political and fiscal constraints. Consequently, as GROPP AND RICHARDS (2001) emphasize, the agencies' sovereign credit rating announcements may be largely anticipated by the market participants.

If this is the case, the financial market reaction may in fact be due to this information and not due to the sovereign risk adjustments by the credit rating agencies themselves. This implies that the estimated results of the information content of sovereign credit rating actions may be biased upward, as the speculative market pressure index may have reacted to other news rather than to the changes in sovereign credit ratings.

For that reason, the following event study will distinguish between contaminated and uncontaminated sovereign credit rating actions. The credit rating agencies' adjustments of

sovereign risk are considered as contaminated if there were relevant news stories around the event window. According to this definition a sovereign credit rating action is considered as uncontaminated when no such news occurred during this announcement period of day-zero and day +1. In order to identify contaminated sovereign credit rating actions, news stories in Bloomberg L.P. during the event window of the sovereign credit rating actions were scanned for news regarding the respective country. If a news story was identified which revealed the reasoning for the sovereign credit rating action by the credit rating agencies, this rating event is considered as contaminated.

A relevant news story is found in 181 of the 302 sovereign credit rating events in the sample. Table 8 reports the cumulative median changes of the speculative market pressure index separately for the contaminated and uncontaminated sovereign credit rating actions by the agencies.

Table 8: *Short-Term Impact of Contaminated versus Uncontaminated Sovereign Credit Rating Actions*

Period	Contaminated	Uncontaminated
−10 to −1	−0.013	−0.009
	(−0.924)	(−0.744)
0 to +1	−0.016**	−0.011*
	(−2.141)	(−1.836)
+2 to +11	−0.024**	−0.018*
	(−2.330)	(−1.932)

Table 8 displays that the empirical results become less strong in the case of un-contaminated sovereign credit rating events. But it is not possible to reject at the ten percent significance level the presence of significant abnormal movements in the index of speculative market pressure, both for the event day and the post-announcement period. In the case of contaminated sovereign credit rating actions, there is no significant market reaction subsequent to the rating event, while during the event window and the post-announcement period the empirical results of the event study are significant at the five percent level.

Figure 5 illustrates the different rating effects for contaminated and uncontaminated sovereign credit rating actions.
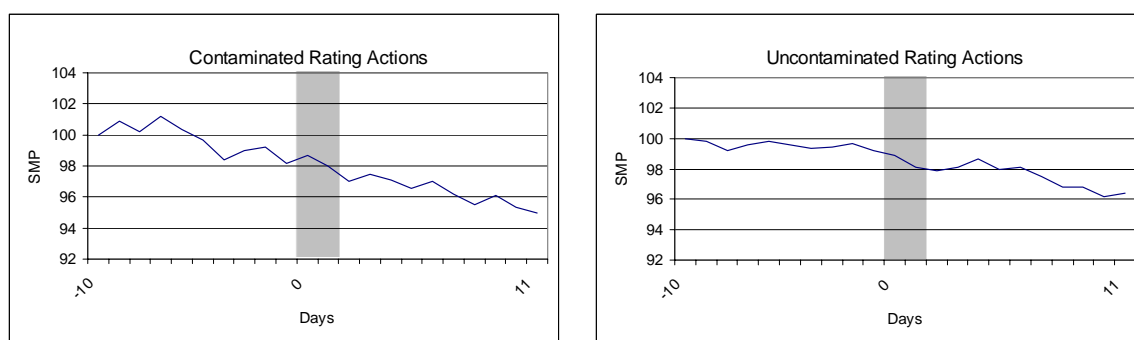
Figure 5: *Short-Term Impact of Contaminated versus Uncontaminated Sovereign Credit Rating Actions*

The empirical results in Figure 5 suggests that although the failure to control for contamination may overstate the rating effects of sovereign credit rating actions, there also appears to be information contained in the agencies' sovereign credit rating changes per se. In this context, GROPP AND RICHARDS (2001) remark that by excluding all contaminated sovereign credit rating events a downward bias would be introduced into the empirical results of the event studies, in the sense that the release of this information may have been provoked by the expectation of the negative or positive sovereign credit rating action. In other words, the country's officials may not have made this information public had they not known that the credit rating agency would be releasing this information in any event. The BANK FOR INTERNATIONAL SETTLEMENTS (2000) emphasize that in this regard, credit rating agencies may perform a useful public service, by forcing governments and other countries' authorities to release information, especially negative news.

The most important result which emerges from the event studies is that sovereign credit rating actions by the agencies do produce significant financial market responses in emerging market economies. Negative sovereign credit rating announcements lead to a rising index of speculative market pressure, while implemented upgrades, positive outlooks and positive credit watches result in a decreasing *SMP*. Furthermore, the empirical results of the event studies could be interpreted as indicating that credit rating agencies are behaving procyclically. The movements of the index of speculative market pressure in the pre-announcement period indicate that the agencies decide to downgrade (upgrade) a sovereign when the *SMP* goes up (down). This empirical evidence seems to support the hypothesis expressed by REISEN AND VON MALTZAN (1999) that credit rating agencies may have contributed to amplifying the boom-bust cycles in emerging markets lending, thereby intensifying financial market crises in the latter half of the 1990s.

IV.2   Country Study: Short-Term Impact of Sovereign
Credit Rating Actions

In the following the event study approach is also employed for the analysis of separate sovereign credit rating actions in emerging market economies. Figure 6 illustrates the impact of an adjustment in their respective sovereign credit ratings on the speculative market pressure index for Thailand, South Korea, Russia, Brazil, Mexico and South Africa. The event windows are chosen so as to consider the most important rating actions on the respective sovereigns by the credit rating agencies, thereby trying to analyze "clean events" in order to be able to isolate the rating effect of each sovereign credit rating announcement.
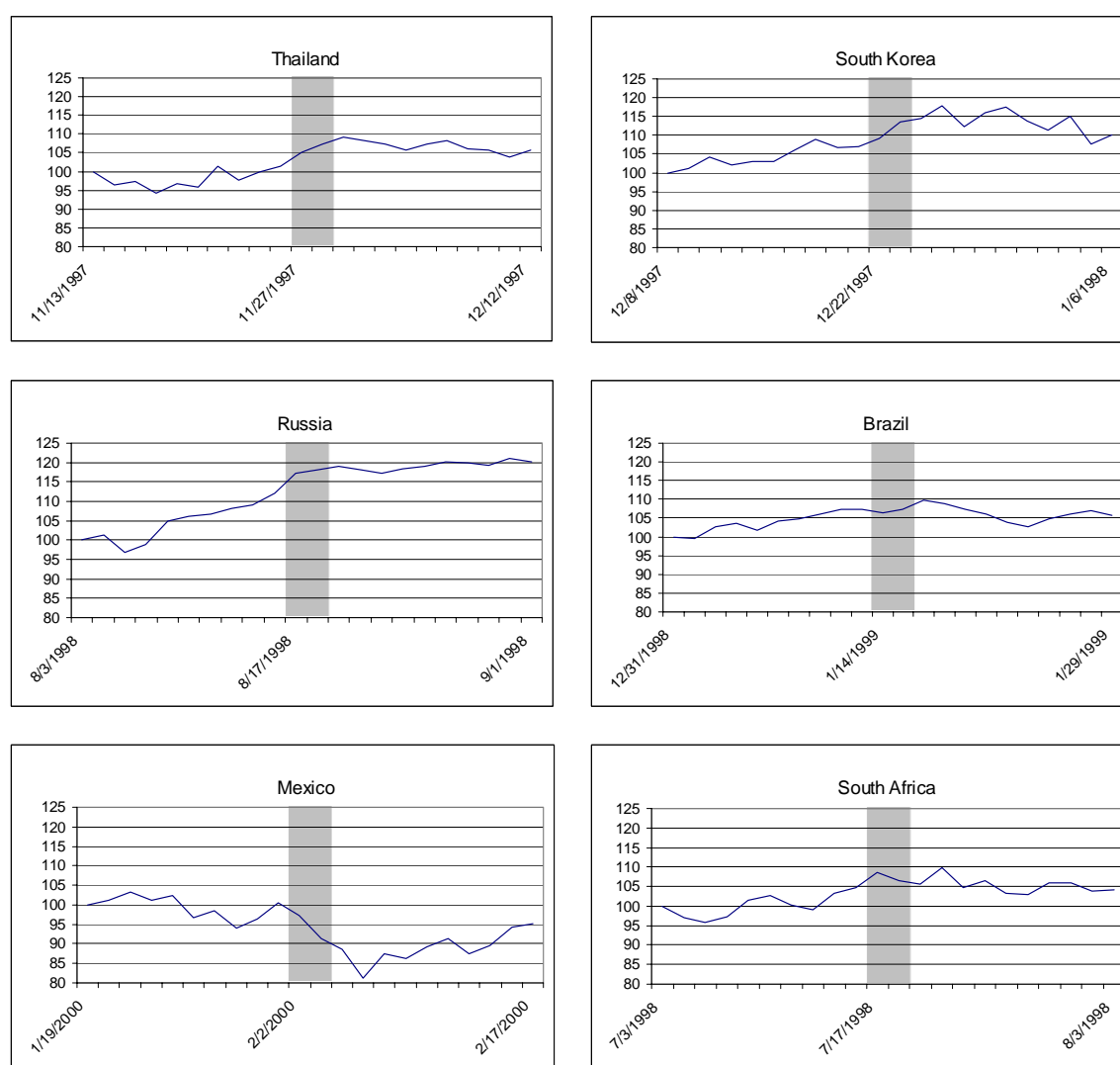
Figure 6:   *Country Study: Short-Term Impact of Sovereign Credit Rating Actions*

Figure 6 defines that in the case of Thailand, day-zero is determined as November 27, 1997 when Moody's downgraded Thailand from Baa1 and assigned a negative rating outlook to the sovereign's Baa3 investment-grade credit rating. The movement of the speculative

market pressure index indicates that the financial market reaction was strong. However, this should not be attributed only to the negative sovereign credit rating actions, because in late November 1997 there was a significant amount of other negative news which contaminated Moody's negative sovereign credit rating actions and had a strong impact on the country's creditworthiness (see Table A4 in the Appendix).

Figure 6 shows that in the case of South Korea the event window is specified around its downgrade to below investment-grade by both S&P and Moody's on December 22, 1997. But it is not possible to entirely attribute the strong movement of the speculative market pressure index to the negative sovereign credit rating action on South Korea, because as Table A4 in the Appendix indicates, on the same day the sovereign credit ratings of Indonesia, Malaysia and Thailand were also lowered by Moody's.

Day-zero has been chosen in the case of Russia as August 17, 1998 when S&P down-graded the sovereign from B− to triple-C and kept a negative rating outlook. Figure 6 points out that the impact on the speculative market pressure index seems to be impressive, but around these days in mid-August there were many negative sovereign credit rating announcements by the agencies. Moreover, it seems implausible that in the case of Russia the sovereign credit rating event was uncontaminated by other news. On August 17, 1998 Russia devaluated its currency and unilaterally suspended payments on most of its outstanding foreign debt.[11] Nonetheless, it was the first time that a transition economy was rated less than triple-C+, leading to market participants' worries of a general sovereign default.

The fourth emerging market economy to be considered is Brazil. Day-zero is given by S&P's sovereign credit rating downgrade on January 14, 1999, from BB− to B+, while still keeping a negative rating outlook on the country. As Figure 6 shows, the market reaction was not as strong as in the sovereign credit rating events of Thailand, South Korea and Russia, respectively. As discussed in Kräussl (2003), in the second half of January 1999 the financial market pressure on Brazil continued, but the empirical results of the event study seem to suggest that this was not due to the negative sovereign credit rating change by S&P.

For Mexico, day-zero is chosen as February 2, 2000 when Moody's assigned a positive credit watch to the assigned sovereign credit rating of Ba1, implying that Mexico was under review for an upgrade to an investment-grade sovereign credit rating. Figure 6 illustrates that this positive imminent sovereign credit rating action may have contributed to the positive sentiment over the country's economic future by the market participants, indicated by the

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[11] See Kräussl (2003) for a detailed discussion of the Russian case.

sharply sliding index of speculative market pressure after the positive sovereign credit rating announcement.

Finally, in the case of South Africa, day-zero is determined by Moody's negative credit watch on the sovereign's investment-grade rating of Baa3 on July 17, 1998 implying that South Africa was under review for a lowering of its sovereign credit rating to below investment-grade. Figure 6 indicates that this had a strong financial market impact on the creditworthiness of the sovereign, as the speculative market pressure index rose more than ten percent in the aftermath of the negative sovereign credit rating announcement.

IV.3   Contemporaneous Effects of Sovereign Credit Rating Actions

The panel regression results for equations (6) and (7) are reported in Table 9 with the respective t-statistics and significance levels. The panel regression is estimated via OLS with robust standard errors, using the White correction for heteroscedasticity. Column 2 presents the pooled panel estimation results for specification I, i.e., when both implemented and imminent sovereign credit rating actions are considered as one variable, while column 3 displays the pooled panel estimation results for specification II, i.e., when the contemporaneous impact for the implemented sovereign credit rating changes and for the imminent sovereign credit rating actions on the speculative market pressure index are separately examined.

The empirical results for both specifications indicate that the coefficient for the lagged dependent variable is positive and statistically highly significant.[12] The coefficient for the changes in sovereign credit ratings is as expected negative and statistically highly significant: a negative (positive) sovereign credit rating action increases (decreases) the index of speculative market pressure. Nevertheless, this rating effect is smaller than the average daily change in the speculative market pressure index: the *SMP* only varies by 1.1 percent while the average absolute movement of the speculative market pressure index in the sample is about 1.8 percent.

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[12] PESARAN AND SMITH (1995) mention that the size of the coefficient of the lagged dependent variable in a dynamic fixed-effect model might be biased. Nonetheless, the focus lies here on the significance and size of the exogenous variables, i.e., the size of the long-run effects is not of primary interest. Moreover, if the fixed-effect homogeneity restrictions were dropped, the consequence would be a considerable loss of degrees of freedom.

Table 9: *Panel Regression Results*

Variable	Specification I	Specification II
Constant	0.000	0.000
	(−0.634)	(−0.463)
Lagged SMP	0.107***	0.107***
	(5.332)	(5.301)
Rating	−0.011***	
	(−3.812)	
Implemented Rating		−0.007***
		(−3.734)
Imminent Rating		−0.019***
		(−4.934)
US Interest Rate	0.036***	0.036***
	(2.958)	(3.027)
R^2	0.011	0.011

As expected from the theoretical consideration above, the third explanatory variable, the US short-term interest rate has the right positive sign and is also statistically highly significant. This implies that a rise in US interest rates increases the financial market pressure on emerging economies due to a shift by institutional investors from high-yield investments to investments in probable "safer haven".

Specification II distinguishes explicitly between implemented and imminent sovereign credit rating actions by S&P and Moody's. The negative sign of the coefficients is as expected: sovereign credit rating downgrades (upgrades) or negative (positive) rating outlooks and negative (positive) credit watches increases (decreases) the index of speculative market pressure. Table 9 shows that the rating effect of the agencies' sovereign upgrade or downgrade on the emerging economies' financial markets is statistically highly significant but with 0.7 percent smaller than in specification I, while the impact of rating outlooks and credit watches is also statistically highly significant and with 1.9 percent substantially larger than the coefficient of implemented sovereign credit rating changes. This seems to suggest that market participants anticipate sovereign credit rating changes since countries are typically placed on negative (positive) credit watch or are at least assigned a negative (positive) rating

outlook before being downgraded (upgraded) by the credit rating agencies (see also the empirical results of the event studies above).

To check for robustness of the event studies and panel regression results, a number of alternative specifications based on S&P's and Moody's sovereign credit ratings have been applied, but none substantially improved the fit. In particular, the sovereign risk assessments from only one credit rating agency at a time were included or the higher or the lower sovereign credit rating for each country has been selected.

A kinked function with a structural break instead of the linear transformation has been also considered.[13] Another alternative transformation of the sovereign credit rating symbols by S&P and Moody's is the logistic transformation which contains the hypothesis that risk perceptions first deteriorate slowly as rating-notches decrease, then deteriorate faster when sovereign credit ratings fall from investment-grade to speculative-grade, and finally deteriorate slowly again as sovereign risk assessments reach the bottom of the agencies' sovereign credit rating classification. However, both transformations did not change the empirical results of the event studies and panel regressions significantly.

In addition, several assumptions on which the event study is built are tested. Econometric tests applying the autocorrelation function (ACF) and the partial autocorrelation function (PACF) prove that the time series are not autocorrelated. The augmented Dickey-Fuller (ADF) test rejected the hypothesis that the time series are integrated of the order one or higher. The Jarque-Bera (JB) test could not reject the hypothesis that the time series follow a normal distribution in the sample or in any of the sub-samples. Furthermore, in the sample and all the sub-samples more than 75 percent of the sovereign credit rating actions have the right sign: the speculative market pressure index increases with a negative sovereign credit rating action but decreases with a positive sovereign credit rating announcement by the credit rating agencies.

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[13] This transformation allows fully capturing the impact when the sovereign passes from investment-grade to non-investment-grade by allowing for a numerical change of three rating-notches instead of only one (see Table A5 in the Appendix). Additionally, the imminent sovereign credit rating actions between investment-grade and speculative-grade are also considered with a more heavy weight by adding + (−) one rating-notch for a positive (negative) credit watch, and by adding + (−) half a rating-notch for a positive (negative) rating outlook to the implemented sovereign credit rating.

V   Conclusion and Outlook

Sovereign credit rating adjustments may convey substantial new information about an individual country's creditworthiness. Credit rating changes for long-term foreign currency debt may act as a wake-up call with upgrades and downgrades in one country affecting other financial markets within and across national borders. Such a potential rating effect is likely to be stronger in emerging market economies, where institutional investors' problems of asymmetric information are more present. Therefore, this empirical study has analyzed the role of credit rating agencies in international financial markets. In particular, the specific impact of sovereign credit rating changes during the financial turmoil in emerging markets in the latter half of the 1990s has been examined. The data set is not only expanded to update previous studies but also to test new hypotheses about the implications of sovereign credit rating changes on financial markets in emerging economies.

The results of the empirical study indicate that credit rating agencies have a substantial influence on the size and volatility of emerging markets lending. The empirical results are significantly stronger in the case of government's downgrades and negative imminent sovereign credit rating actions such as credit watches and rating outlooks than positive adjustments by the credit rating agencies while by the market participants' anticipated sovereign credit rating changes have a smaller impact on financial markets in emerging economies. Another substantial result of the empirical analysis is that speculative-grade rated emerging market economies are more vulnerable to interest rate changes in financial centers.

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Appendix

Table A1: *S&P's Sovereign Credit Rating Criteria*

Political Risk	- Form of government and adaptability of political institutions - Extent of popular participation - Orderliness of leadership succession - Degree of consensus on economic policy objectives - Integration in global trade and financial system - Internal and external security risks
Income and Economic Structure	- Living standards, income, and wealth distribution - Market versus non-market economy - Resources endowments and degree of diversification
Economic Growth Prospects	- Size and composition of savings and investment - Rate and pattern of economic growth
Fiscal Flexibility	- General government operating and total budget balances - Tax competitiveness and tax-raising flexibility - Spending pressures
Public Debt Burden	- General government financial assets - Public debt and interest burden - Currency composition and structure of public debt - Pension liabilities - Banking, corporate and other contingent liabilities
Price Stability	- Trends in price inflation - Rates of money and credit growth - Exchange rate policy - Degree of central bank autonomy
Balance of Payments Flexibility	- Impact of fiscal and monetary policies on external accounts - Structure of the current account - Composition of capital flows
External Debt and Liquidity	- Size and currency composition of public external debt - Importance of banks, public and private entities as contingent liabilities - Maturity structure and debt service burden - Level and composition of reserves and other public external assets - Debt service track record

Source: Standard & Poor's (1997)

Table A2: *S&P's Long-Term Issuer Sovereign Credit Rating Scale*

Rating Category	Definition
AAA	An obligor rated AAA has extremely strong capacity to meet its financial commitments. AAA is the highest Issuer Credit Rating assigned by S&P's.
AA	An obligor rated AA has very strong capacity to meet its financial commitments. It differs from the highest-rated obligors only in small degree.
A	An obligor rated A has strong capacity to meet its financial commitments but is somewhat more susceptible to the adverse effects of changes in circumstances and economic conditions than obligors in higher-rated categories.
BBB	An obligor rated BBB has adequate capacity to meet its financial commitments. However, adverse economic conditions or changing circumstances are more likely to lead to a weakened capacity of the obligor to meet its financial commitments.
BB	An obligor rated BB is less vulnerable in the near term than other lower-rated obligors. However, it faces major ongoing uncertainties and exposure to adverse business, financial, or economic conditions which could lead to the obligor's inadequate capacity to meet its financial commitments.
B	An obligor rated B is more vulnerable than the obligors rated BB, but the obligor currently has the capacity to meet its financial commitments. Adverse business, financial, or economic conditions will likely impair the obligor's capacity or willingness to meet its financial commitments.
CCC	An obligor rated CCC is currently vulnerable, and is dependent upon favorable business, financial, and economic conditions to meet its financial commitments.
CC	An obligor rated CC is currently highly vulnerable.
SD	An obligor rated SD is in selective default.

Source: STANDARD & POOR'S (2000)

Table A3: *Moody's Long-Term Issuer Sovereign Credit Rating Scale*

Rating Category	Definition
Aaa	Issuers rated Aaa offer exceptional financial security. While the creditworthiness of these entities is likely to change, such changes as can be visualized are most unlikely to impair their fundamentally strong position.
Aa	Issuers rated Aa offer exceptional financial security. Together with the Aaa group, they constitute what are generally known as high grade entities. They are rated lower than Aaa entities because long-term risks appear somewhat larger.
A	Issuers rated A offer good financial security. However, elements may be present which suggest a susceptibility to impairment sometime in the future.
Baa	Issuers rated Baa offer adequate financial security. However, certain protective elements may be lacking or may be unreliable over any great period of time.
Ba	Issuers rated Ba offer questionable financial security. Often the ability of these entities to meet obligations may be moderate and not well safeguarded in the future.
B	Issuers rated B offer poor financial security. Assurance of payment of obligations over any long period of time is small.
Caa	Issuers rated Caa offer very poor financial security. They may be in default on their obligations or there may be present elements of danger with respect to punctual payment of obligations.
Ca	Issuers rated Ca offer extremely poor financial security. Such entities are often in default on their obligations or have other market shortcomings.
C	Issuers rated C are the lowest rated class of entity, are usually in default on their obligations, and potential recovery values are low.

Source: MOODY'S INVESTORS SERVICE (2001)

Table A4: *S&P's and Moody's Emerging Market Sovereign Credit Rating History (January 1997 to December 2000)*

IMF	Country	Date	S&P	Moody's
186	Turkey	01/01/1997	B (N)	Ba3 (N)
		01/09/1997		Ba3 (CW−)
		03/13/1997		B1 (N)
		08/10/1998	B (O+)	
		01/21/1999	B (N)	
		11/30/1999		B1 (O+)
		12/10/1999	B (O+)	
		04/25/2000	B+ (O+)	
		07/24/2000		B1 (CW+)
		12/05/2000	B+ (N)	
		12/22/2000		B1 (N)
199	South Africa	01/01/1997	BB+ (O+)	Baa3 (N)
		03/06/1998	BB+ (N)	
		07/17/1998		Baa3 (CW−)
		10/02/1998		Baa3 (N)
		02/07/2000		Baa3 (O+)
		02/25/2000	BBB− (N)	
213	Argentina	01/01/1997	BB− (N)	B1 (N)
		04/02/1997	BB (N)	
		10/02/1997		Ba3 (N)
		09/03/1998		Ba3 (CW−)
		02/10/1999		Ba3 (O−)
		07/22/1999	BB (O−)	
		08/20/1999		Ba3 (CW−)
		10/06/1999		B1 (N)
		02/10/2000	BB (N)	
		10/31/2000	BB (CW−)	
		11/14/2000	BB− (N)	
		11/21/2000		B1 (O−)
223	Brazil	01/01/1997	B+ (O+)	B1 (N)
		04/02/1997	BB− (N)	
		06/08/1998		B1 (O−)
		09/03/1998		B2 (N)
		09/10/1998	BB− (O−)	
		01/14/1999	B+ (O−)	
		11/09/1999	B+ (N)	
		02/29/2000	B+ (O+)	
		08/17/2000		B2 (CW+)
		10/16/2000		B1 (CW+)
228	Chile	01/01/1997	A− (N)	Baa1 (N)
233	Colombia	01/01/1997	BBB− (O+)	Baa3 (N)
		10/07/1997	BBB− (N)	

233	Colombia	05/21/1998		Baa3 (O−)
		09/30/1998		Baa3 (CW−)
		12/18/1998		Baa3 (O−)
		06/09/1999		Baa3 (CW−)
		06/11/1999	BBB− (O−)	
		08/11/1999		Ba2 (N)
		09/21/1999	BB+ (N)	
		04/10/2000	BB+ (O−)	
		05/23/2000	BB (O−)	
248	Ecuador	01/01/1997	n. r.	n. r.
		07/24/1997		B1 (N)
		04/17/1998		B1 (O−)
		06/08/1998		B1 (CW−)
		09/14/1998		B3 (N)
		10/05/1999		Caa2 (N)
		07/29/2000	SD	
		08/28/2000	B− (N)	
273	Mexico	01/01/1997	BB (N)	Ba2 (N)
		09/02/1997	BB (O+)	
		09/03/1998		Ba2 (CW−)
		10/02/1998	BB (N)	
		02/10/1999		Ba2 (O−)
		06/09/1999		Ba2 (N)
		06/21/1999		Ba2 (CW+)
		08/10/1999		Ba1 (O+)
		09/02/1999	BB (O+)	
		02/02/2000		Ba1 (CW+)
		03/07/2000		Baa3 (N)
		03/10/2000	BB+ (O+)	
293	Peru	01/01/1997	n. r.	B2 (N)
		12/18/1997	BB (N)	
		01/13/1998		B2 (O+)
		02/13/1998		B2 (CW+)
		03/27/1998		Ba3 (N)
		05/19/2000	BB (CW−)	
		06/15/2000	BB (N)	
		10/31/2000	BB− (N)	
		12/12/2000		Ba3 (O−)
299	Venezuela	01/01/1997	B (O+)	Ba2 (N)
		06/05/1997	B+ (N)	
		02/12/1998		Ba2 (O−)
		05/08/1998		Ba2 (CW−)
		07/22/1998		B1 (N)
		08/31/1998	B+ (O−)	
		09/03/1998		B2 (N)
		12/21/1999	B (N)	
469	Egypt	01/01/1997	n. r.	Ba2 (N)

469	Egypt	01/15/1997	BBB− (N)	
		08/12/1997		Ba2 (O+)
		10/01/1997		Ba2 (CW+)
		11/14/1997		Ba1 (N)
		07/03/2000	BBB− (O−)	
532	Hong Kong SAR	01/01/1997	A (O+)	A3 (N)
		05/14/1997	A+ (N)	
		02/18/1998		A3 (O−)
		06/22/1998	A+ (CW−)	
		08/31/1998	A (O−)	
		09/03/1998		A3 (CW−)
		05/24/1999		A3 (N)
		12/07/1999	A (N)	
534	India	01/01/1997	BB+ (O+)	Baa3 (N)
		10/06/1997	BB+ (N)	
		01/08/1998		Baa3 (CW−)
		05/22/1998	BB+ (O−)	
		06/19/1998		Ba2 (N)
		10/22/1998	BB (N)	
		10/06/1999		Ba2 (O+)
		03/20/2000	BB (O+)	
		10/10/2000	BB (N)	
536	Indonesia	01/01/1997	BBB (N)	Baa3 (N)
		10/10/1997	BBB− (N)	
		10/27/1997		Baa3 (O−)
		12/22/1997		Ba1 (N)
		12/31/1997	BB+ (O−)	
		01/09/1998	BB (CW−)	
		01/27/1998	B (CW−)	
		03/11/1998	B− (CW−)	
		03/20/1998		B3 (N)
		05/15/1998	CCC+ (CW−)	
		07/08/1998	CCC+ (O−)	
		03/30/1999	SD	
		03/31/1999	CCC+ (N)	
		09/13/1999	CCC+ (CW−)	
		12/15/1999		B3 (O+)
		04/17/2000	SD	
		10/02/2000	B− (N)	
542	South Korea	01/01/1997	AA− (N)	A1 (N)
		08/05/1997		A1 (O−)
		08/06/1997	AA− (O−)	
		10/24/1997	A+ (O−)	
		11/25/1997	A− (CW−)	
		11/27/1997		A3 (N)
		12/10/1997		Baa2 (CW−)
		12/11/1997	BBB− (CW−)	

542	South Korea	12/22/1997	B+ (CW−)	Ba1 (N)
		01/09/1998		Ba1 (CW−)
		02/18/1998	BB+ (N)	
		03/30/1998		Ba1 (N)
		12/18/1998		Ba1 (CW+)
		01/04/1999	BB+ (O+)	
		01/25/1999	BBB− (O+)	
		02/12/1999		Baa3 (O+)
		08/23/1999		Baa3 (CW+)
		11/11/1999	BBB (O+)	
		12/16/1999		Baa2 (N)
548	Malaysia	01/01/1997	A+ (O+)	A1 (N)
		08/18/1997	A+ (N)	
		09/25/1997	A+ (O−)	
		12/22/1997		A2 (N)
		12/23/1997	A (O−)	
		02/05/1998		A2 (O−)
		04/17/1998	A− (N)	
		06/04/1998		A2 (CW−)
		07/23/1998		Baa2 (N)
		07/24/1998	BBB+ (O−)	
		09/14/1998		Baa3 (CW−)
		09/15/1998	BBB− (O−)	
		12/01/1998		Baa3 (O−)
		03/31/1999	BBB− (N)	
		04/20/1999		Baa3 (N)
		06/10/1999		Baa3 (O+)
		11/11/1999	BBB (N)	
		07/12/2000		Baa3 (CW+)
		09/01/2000	BBB (O+)	
		10/17/2000		Baa2 (N)
564	Pakistan	01/01/1997	B+ (N)	B2 (N)
		01/14/1998	B+ (O−)	
		05/22/1998	B+ (CW−)	
		05/28/1998		B3 (N)
		06/01/1998	B− (CW−)	
		07/14/1998	CCC (CW−)	
		10/12/1998	CCC− (O−)	
		10/23/1998		Caa1 (N)
		12/03/1998	CC (O−)	
		01/29/1999	SD	
		12/21/1999	B− (N)	
566	The Philippines	01/01/1997	BB− (O+)	Ba2 (N)
		01/23/1997		Ba2 (CW+)
		02/21/1997	BB+ (O+)	
		05/19/1997		Ba1 (N)
		09/25/1997	BB+ (N)	
		02/23/1998	BB+ (O−)	

566	The Philippines	01/06/1999	BB+ (N)	
		10/19/2000	BB+ (O−)	
		10/27/2000		Ba1 (O−)
576	Singapore	01/01/1997	AAA (N)	Aa1 (N)
578	Thailand	01/01/1997	A (N)	A2 (N)
		02/13/1997		A2 (CW−)
		04/08/1997		A3 (N)
		07/24/1997		A3 (O+)
		08/01/1997	A (CW−)	
		09/03/1997	A− (O−)	
		09/09/1997		A3 (CW−)
		10/01/1997		Baa1 (O−)
		10/24/1997	BBB (O−)	
		11/27/1997		Baa3 (O−)
		12/22/1997		Ba1 (N)
		01/08/1998	BBB− (O−)	
		05/03/1999		Ba1 (O+)
		05/05/1999	BBB− (N)	
		04/03/2000		Ba1 (CW+)
		06/22/2000		Baa3 (N)
686	Morocco	01/01/1997	n. r.	n. r.
		03/02/1998	BB (N)	Ba1 (N)
922	Russia	01/01/1997	BB− (N)	Ba2 (N)
		12/19/1997	BB− (O−)	
		02/03/1998		Ba2 (CW−)
		03/11/1998		Ba3 (N)
		05/27/1998	BB− (CW−)	
		05/29/1998		B1 (N)
		06/09/1998	B+ (N)	
		08/13/1998	B− (O−)	B2 (N)
		08/17/1998	CCC (O−)	
		08/21/1998		B3 (N)
		09/16/1998	CCC− (O−)	
		01/27/1999	SD	
		04/10/2000		B3 (O+)
		08/23/2000		B3 (CW+)
		11/13/2000		B2 (N)
		12/08/2000	B− (N)	
924	China	01/01/1997	BBB (O+)	A3 (N)
		05/14/1997	BBB+ (N)	
		02/19/1998		A3 (O−)
		07/16/1998	BBB+ (O−)	
		09/03/1998		A3 (CW−)
		12/03/1998		A3 (N)
		07/21/1999	BBB (N)	
935	Czech Rep.	01/01/1997	A (N)	Baa1 (N)
		11/05/1998	A− (N)	

936	Slovak Rep.	01/01/1997	BBB− (N)	Baa3 (N)
		11/03/1997		Baa3 (O−)
		01/20/1998		Baa3 (CW−)
		03/30/1998		Ba1 (N)
		04/07/1998	BBB− (O−)	
		09/17/1998	BB+ (O−)	
		10/01/1998		Ba1 (CW−)
		02/18/1999		Ba1 (O−)
		10/27/1999		Ba1 (N)
		11/12/1999	BB+ (N)	
		11/07/2000		Ba1 (O+)
		11/09/2000	BB+ (O+)	
944	Hungary	01/01/1997	BBB− (N)	Baa3 (N)
		11/05/1997		Baa3 (O+)
		01/22/1998	BBB− (O+)	
		03/20/1998		Baa3 (CW+)
		05/08/1998		Baa2 (O+)
		12/11/1998	BBB (O+)	
		06/25/1999		Baa1 (N)
		02/02/2000	BBB+ (O+)	
		04/10/2000		Baa1 (O+)
		09/13/2000		Baa1 (CW+)
		11/14/2000		A3 (N)
		12/19/2000	A− (N)	
964	Poland	01/01/1997	BBB− (N)	Baa3 (N)
		06/03/1997	BBB− (O+)	
		12/03/1998		Baa3 (O+)
		06/10/1999	BBB (O+)	
		09/02/1999		Baa1 (N)
		05/15/2000	BBB+ (N)	
9998	Taiwan	01/01/1997	AA+ (N)	Aa3 (N)
		12/06/2000	AA+ (O−)	

Table A5: *Linear Transformation of Sovereign Credit Rating Scales*

S&P	Moody's	Linear Scale	Structural Break
AAA	Aaa	20	22
AA+	Aa1	19	21
AA	Aa2	18	20
AA−	Aa3	17	19
A+	A1	16	18
A	A2	15	17
A−	A3	14	16
BBB+	Baa1	13	15
BBB	Baa2	12	14
BBB−	Baa3	11	13
BB+	Ba1	10	10
BB	Ba2	9	9
BB−	Ba3	8	8
B+	B1	7	7
B	B2	6	6
B−	B3	5	5
CCC+	Caa1	4	4
CCC	Caa2	3	3
CCC−	Caa3	2	2
CC	Ca	1	1
SD	C	0	0

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