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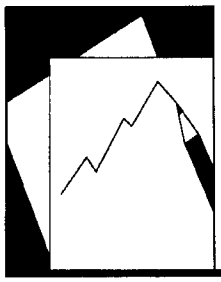

IMF Working Paper

Foreign Currency Credit Ratings for Emerging Market Economies

Christian Mulder and Roberto Perrelli

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Policy Development and Review Department

Foreign Currency Credit Ratings for Emerging Market Economies

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Abstract

This paper examines how ratings for emerging market economies have been set. Given the high degree of autocorrelation in ratings, we use estimators that yield consistent parameters in the presence of such correlation. The results show that rating changes for emerging market economies have been dominated by variables different from those suggested by the literature. We also conclude that some deterioration in the ratings was warranted during the recent crisis episodes in view of the behavior of economic fundamentals, but that the agencies overreacted for several key countries. We find evidence of a structural break: since the Asian crisis period, ratings have been influenced by reserves in relation to short-term debt.

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I. Introduction and Summary

It has been widely suggested that the downgrades of credit ratings for major crisis countries contributed dramatically and unnecessarily to the Asian economic crisis of 1997. This paper examines how foreign currency credit ratings for emerging market economies have been set. We make use of a sample period (1992 - 99) that includes the crisis peaks to examine whether ratings correctly anticipated the deepening and temporary nature of a number of crises or overshot. A time period that extends beyond the troughs of the crises allows us to decompose the results and show which factors (e.g. increasing fiscal deficits or inflation following crises) contributed to what extent to the deterioration in ratings and which factors should have tempered the downgrades.

The results show that rating changes were dominated by variables other than those suggested by the empirical literature (e.g. the seminal paper by Cantor and Packer, 1996). We conclude that some deterioration in the ratings was warranted during the recent crisis episodes in view of the behavior of macroeconomic fundamentals, but that the agencies overreacted for several key countries. A brief summary of the results is that: (a) the ratings can be satisfactorily reproduced using a static equation of macroeconomic fundamentals and are reasonably predictable; (b) the rating changes for key countries are dominated by the ratio of investment to GDP and not by commonly-accepted variables such as per capita income, growth and inflation; (c) there is some evidence of structural breaks, as rating agencies appear to have considered the ratio of short-term debt to reserves in their ratings since the Asian crisis; and (d) we find that there is a significant overshooting of the ratings during crisis periods, at least for the main Asian economies where many of the rating changes occurred.

Ferri, Liu and Stiglitz (1999) in particular concluded that ratings agencies downgraded several key countries more than the economic variables that govern the risk ratings would have warranted. They based this conclusion on the fact that the residuals of their estimated equation were particularly large and positive during the Asian crisis. This evidence is not quite conclusive, however, because their estimations ended shortly after the beginning of the crisis. For example, one could argue that the crises were still deepening and that the downgrades correctly anticipated this deepening. Moreover, those estimations consider a wide range of countries — notably more developed countries — whose ratings are influenced by different considerations than those that affect the emerging markets. Furthermore, ratings series entail a high degree of positive autocorrelation, and usually the constructed panels are unbalanced and heteroskedastic. These considerations contribute to a relatively poor fit and a reduced reliability of deviations from fitted values.[2] In this paper we

[2] Monfort and Mulder (2000) found evidence that ratings responded asymmetrically, with downgrades being triggered by crises, and that downgrades responded with a lag to a crisis indicator.

provide a more consistent sample of countries and an extended time-horizon, along with proper estimation techniques to deal with the problems above. Last, but not least, we introduce a decomposed macroeconomic model of ratings that helps to explain the extent of the overshooting phenomenon and to identify which economic fundamentals mattered in the downgrade process.

II. SAMPLE AND ESTIMATION TECHNIQUE

Sample and specification

We use a panel of 25 countries containing the core emerging market economies.[3] The sample was selected by taking the major emerging market economies for which adequate data were available in the IMF's International Financial Statistics (IFS). The sample includes countries from all regions and covers 75 percent of the exposure by commercial banks (BIS consolidated banking statistics March 2000). Though not random, this sample is less heterogeneous than the ones used by Cantor and Packer (1996) and Ferri, Liu, and Stiglitz (1999). In particular the sample of Cantor and Packer was diverse as it includes industrial countries whose higher ratings were explained by proxy variables such as per capita GDP. This homogeneity provides more robust results and less pronounced random-effects[4] across countries.

We construct panel data for the sovereign ratings provided by Moody's and Standard & Poor's, and use as potential explanatory variables a set of macroeconomic fundamentals found in the literature and summarized by Monfort and Mulder (2000) (see Table 1 below). This set of variables contains the key variables rating agencies mention to use.[5]

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[3] Argentina, Brazil, Chile, China, Colombia, Czech Republic, Hungary, India, Indonesia, Israel, Jordan, Kazakhstan, Korea, Malaysia, Mexico, Pakistan, Philippines, Poland, Russia, Slovakia, Slovenia, South Africa, Thailand, Turkey, and Venezuela.

[4] The traditional random-effects and fixed effects models were disregarded here for two reasons: first, the Hausman test (see Hausman (1978) for a better illustration) suggests that the models are not statistically different from each other, and second the relative homogeneity of the sample allows us to focus on more crucial issues, e.g. autocorrelation, that request the use of generalized models such as FGLS panel data estimators.

[5] While ratings are quite similar across agencies, the description of the rating methodology varies considerably. Standard and Poor's (1998) assigns ratings based on rankings on a scale of one to six for each of eight analytical categories – political risk, income and economic structure, economic growth prospects, fiscal flexibility, public debt burden, price stability, balance of payments flexibility, external debt and liquidity – but no exact formula is used to combine the scores in ratings. Moody's approach is more "eclectic" and focuses on social structure, social action, political dynamics, economic fundamentals (resources, quality of

(continued...)

Since most countries were not rated until the early nineties, the sample period commences in 1992 and ends in 1999, so as to secure sufficient consistency in the observations (Table 2, attached, shows the availability of Moody's and Standard & Poor's ratings for each country.) Given restrictions in the data for the explanatory variables, we focused on semi-annual data, i.e. 15 data periods, effectively yielding about 200 observations for most estimations. (The sources and frequency of each series are summarized in Table 3.)

Table 1: Set of potential explanatory variables

Type	Name	Description
Balance of payments	CA/GDP	Current account deficit as percent of gross domestic product
	REER	Index of real effective exchange rate
	TOT	Terms of international trade: ratio of price of exports to price of imports
Debt	DEBTGDP	Ratio of total debt to gross domestic product
	DEBTX	Ratio of total debt to exports
	DSX	Ratio of debt service to exports
	RSCH	Dummy indicator of debt rescheduling between 1970 and 1993 (assumes the values of 1 if there was rescheduling, and 0 otherwise)
Fiscal	FBGDP	Ratio of general government balance to gross domestic product
Growth prospects	GRGDP	Growth rate of gross domestic product
	IGDP	Ratio of investment to gross domestic product
	XGR	Growth rate of exports
Liquidity	STDR	Ratio of short-term debt to reserves
Price stability	Ln(INFLATION)	Natural logarithm of the change in the consumer price index (12 months)

economic management, export mix, capital flows), external debt, and short-term debt. Fitch-IBCA is more explicit in the ratios used (Moody's 1991). It highlights ratios of debt to exports and GDP, debt service to exports, the fiscal balance, the size of foreign reserves, trends in savings and investments, inflation, growth, external balance, unemployment rate, living standards, openness to trade and investment, and the share of investment to GDP. Their ratings are quite comparable to the ratings used in this paper. All agencies emphasize the difficulties in establishing the probability of sovereign default.

In line with the literature (Cantor and Packer 1997) the credit ratings were transformed into a linear scale with AAA assigned a 1, and default rating C, 20. Speculative ratings commence at BB+ or 11 on a linear scale. Following Monfort and Mulder, we take account of the so-called "Outlook" or "Credit Watch" reports that provide signals to the market for the likelihood of imminent upgrades or downgrades, by adding to each observed rating scalar a common weight of 0.3 in the case of a negative Outlook (Credit Watch), zero in the case of neutral report, and -0.3 in the case of positive Outlook (Credit Watch). [6]

Estimation techniques

We employ two different versions of panel data regressions — Pooled Ordinary Least Squares (POLS), and Feasible Generalized Least Squares (FGLS). The POLS estimations of static credit ratings specifications display a very high degree of first order positive *autocorrelation*. Monfort and Mulder (2000) attributed such autocorrelation to the fact that ratings should only respond to new information, and their time path resembles a random walk. This corresponds well to the professed objective of rating agencies to limit changes in grading. In addition, the fact that rating agencies started to rate emerging markets at different dates results in a rather *unbalanced sample*, and missing observations for a number of explanatory variables add to this problem. Given that dynamic POLS yields consistent and unbiased estimates in the presence of autocorrelation, and FGLS estimators are particularly suited for static models using unbalanced samples such as that of ratings, we performed dynamic estimations using POLS, and employed FGLS for the static version. Finally, we take account of *heteroskedasticity* in both FGLS and POLS (the latter using White (1980) adjusted covariance matrices).

For variable selection we adopted a "Hendry-type" methodology, commencing with the full set of variables and then eliminating insignificant variables. Next, all eliminated variables were included one by one again in the remaining equation and kept if significant. The same test was applied iteratively to the resulting equation until no further eliminated variables were significant.

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[6] We tested for the linearity of the scale by using different non-linear transformations of the explanatory variables. The estimations point to a linear relation between most variables and the ratings. Monfort and Mulder (2000) show that risk is an exponential function of the ratings.

III. EMPIRICAL RESULTS

In Table 4 we present the estimations results for the FGLS that follow from the selection process for the period 1992:2 to 1997:1. In the same table we also present the POLS results for the same set of variables to show the contrast. Econometrically, three results stand out: (1) the POLS estimations suffer indeed from a high degree of positive autocorrelation, with Durbin-Watson statistics close to zero; (2) the parameters in the POLS estimations, while also significant, are rather different from those in the FGLS estimations, which underscores the impact of misspecified standard errors computed by an inefficient estimation method and the need to focus on the FGLS results; and (3) some parameters show significant variation from one sub-period to another.

The results show that 6 key variables explain about 65-80 percent of the variation in ratings (compared to about 30 percent found by Ferri, Liu, and Stiglitz, 1999), with the percentage considerably higher for Moody's than for Standard and Poor's ratings. Many variables that are found to be significant by other studies—notably, Cantor and Packer (1996) and Ferri, Liu and Stiglitz (1999)—are also significant here: debt over exports (DEBTX), the rescheduling history (RSCH),[7] the fiscal balance (FBGDP), output growth (GRGDP), and natural logarithm of inflation (log(INF)) feature in the core equation. However, this similarity does not imply that the contribution of these variables is large as we show below. A variable put forward by Edwards (1984), the ratio of investment to GDP (IGDP), is among the most significant in the FGLS estimates. The external current account deficit (CAGDP) has the wrong sign. We neither include the development indicator (OECD membership) nor per capita income, as did Cantor and Packer (1996) and Ferri, Liu, and Stiglitz (1999), because our sample did not include industrialized countries as their samples. Both are proxy variables with minor relevance in a sample consisting only of emerging market economies.

When extending the period to the end of 1999, the GDP growth rate parameter changed quite significantly, especially for the Standard and Poor's estimation.[8] This suggests a break in the ratings series. To understand the nature of the break, we again conducted the process of model selection for the total period. The same core equation resulted from this selection process, with the exception of short-term debt over reserves, which featured strongly only in the latter period. This fits well with explanations by the rating agencies (see e.g. the comment by Fitch IBCA, 1998) that they began to pay greater attention to the ratio of short-term debt to reserves following the crisis. Indeed, the estimations in Table 5 provide compelling empirical support for such a break. For both Moody's and Standard and Poor's,

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[7] Stiglitz, et al., did not include this variable.

[8] The results for Standard and Poor's, while broadly similar, still differ in a number of ways from those for Moody's. Inflation and fiscal balances contribute more to Standard and Poor's results, and the role of debt over exports somewhat less.

the FGLS estimates show very significant effects of short-term debt over reserves from the second half of 1997 onward, and insignificant effects until that time.

Dynamic specification

To examine whether a dynamic specification would result in stable parameters, we used a Hendry-based selection process. The results, presented in Table 6, show that only a few variables are significant at the 95 percent level. The ratings follow something close to a random walk but there is evidence of drift, as various lagged variables (e.g. export growth and short-term debt over reserves) are significant. These estimations imply a long-term solution (see the Appendix) driven by export growth and the ratio of short-term debt to reserves that is rather different from the static specification. This seems to reflect the change in rating agency behavior during the relatively short period (15 observations over seven and a half years), notably that more attention is paid to short-term debt over reserves during the second half of the period. In the following we focus therefore on the results of the static equation.

Robustness

To test the robustness of the estimations in the presence of outliers, we exclude four of the countries with the largest changes in ratings (Indonesia, Korea, Malaysia, and Thailand) from the sample, one by one, and generate new estimates. The results for both rating agencies are shown in Table 7. The signs and levels of significance of the covariates almost did not change when compared with the full sample results.

IV. Role of Macroeconomic Fundamentals and Overshooting of Credit Ratings

Graphs of the four core Asia crisis countries illustrate quite clearly the extent to which rating agencies anticipated a deepening of the crises (Figure 1). For all countries, with the possible exception of Malaysia, there is a strong case of overshooting vis-à-vis the underlying model estimated for the period 1992:2 to 1997:1. In all countries the model estimates, evaluated with observed values for the exogenous variables for the period 1997:2 to 1999:2 deteriorated, implying that some downgrades at the onset of the crises were warranted by the subsequent evolution of fundamentals.

The deterioration in the countries' fundamentals suggests that ratings should have been downgraded in Korea, Indonesia and Thailand by about 2 notches. Malaysia's performance, which saw a bigger drop in investment, would have warranted a 4-notch downgrade. However, ratings for all countries were downgraded by a wider margin than the

model estimates evaluated at post-crisis levels imply. Actual downgrades exceeded the modeled downgrades, evaluated at the peak of the crisis, by 4.5 in the case of Korea, 3 in the case of Indonesia, 2.5 in the case of Thailand and 1.5 in the case of Malaysia. For Indonesia the downgrade reflects the move to default status following actual defaults. Korea has subsequently been upgraded again to a level closer to that implied by the model.

Figure 1 also highlights the role played by each of the fundamentals. The maximum contribution of GDP growth to the change in ratings over the entire period amounts to about half a notch. The impact of changing fiscal balances was similarly limited. Only in Indonesia was there any significant impact of inflation and even there it is limited to an estimated quarter notch. The change in debt over exports had a modest impact of about a quarter notch in Indonesia and Korea. By far the largest change in modeled ratings comes from the changing ratio of investment to GDP. This had an impact of 1.5 notches in Korea and Indonesia, 2 notches in Thailand and about 3.5 in Malaysia.

The dominance of investment as an explanatory variable is also confirmed by the impulse response functions. These impulse responses are in essence the average contribution of the various variables to the estimated outcome (see the Appendix for their formal definition), and are presented in Table 8 for the four Asian countries for Moody's and Standard and Poor's.

V. Conclusion

In this paper we identify the mechanics of the foreign currency credit ratings for the set of emerging market economies that accounts for 75 percent of commercial bank exposure. The estimations focus on two major foreign currency credit rating agencies: Standard & Poor's and Moody's. A decomposition of the results shows that the ratio of investment to GDP has by far the largest impact in explaining the change in the level of the ratings. In addition, the ratio of debt to exports and the rescheduling history are important sources in explaining differences in ratings across countries. The partition of the sample period into pre- and post-Asian crisis samples confirms that the rating companies started to give greater consideration to the ratio of short-term debt to reserves after the Asian crisis.

Since estimates for a Pooled Ordinary Least Square (POLS) regression suffer from a very high level of positive autocorrelation, we use Feasible Generalized Least Squares (FGLS) panel data estimators. We apply this method with corrections for panel specific autocorrelations and for heteroskedasticity on the unbalanced panel. This yields results that are robust across countries and shows that the mechanics of the rating agencies can be nicely replicated. The results confirm that traditional POLS estimations for static specifications are very inefficient estimates, with misspecified standard errors, as a consequence of rampant autocorrelation. They also indicate significant overshooting of the credit ratings during the crisis period for the main Asian emerging markets, although part of the deterioration in the ratings was warranted ex-post by deterioration in the economic fundamentals, mainly the reduction in investment over GDP that accompanied the crises.

A possible extension of our method is to use the transitional probability matrix of ratings to estimate hidden Markov models of changes in countries' risk levels, and their impacts in Sovereign bonds spreads. This would not require the attribution of any specific number to the rating levels, and the scale-matching problem (linear or not) could be ignored.[9] Moreover, if more recent data become available it would be useful to examine whether the crisis was mainly temporary, in the sense that fundamentals returned to pre-crisis levels. Finally, estimations of ratings remain to be fully integrated with estimations of the actual losses sustained by investors due to debt rescheduling.

[9] Nickell, Perraudin, and Varotto (2000) used the ordered probit technique to assess the distribution of rating transitional probabilities. A natural difficult with this technique is the use of strong independence assumptions: the authors argue that "rating transitions for different obligors are independent both cross-sectionally and through time." In our specific case, however, a high positive autocorrelation was detected on the sample. Besides that, the international finance literature presents a vast number of crisis contagion across countries (for example, see Baig and Goldfajn, 1999).

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The marginal contributions of macroeconomic fundamentals can be approximated through the short-run impulse responses, which are basically the elasticities of the ratings with respect to each of the covariates. The short-run elasticities are calculated as follows:

$$\eta_k = \frac{\partial \ln y}{\partial \ln x_k} = \beta_k \left(\frac{x_k}{y} \right) \cong b_k \left(\frac{\bar{x}_k}{\bar{x}'b} \right) \tag{1}$$

where y is the dependent variable, x_k is the k-th explanatory variable, and β_k is its respective true coefficient in the static regression. We estimate the value of the elasticity η_k using the sample means (x-bar) and the estimated coefficients (b's). The interpretation is straightforward: for a 1% change in the explanatory variable x_k, the dependent variable y will change by the value of the respective elasticity η_k. The computed results are shown in Table 8.

The short-run impulse responses just capture the immediate impact of shocks on explanatory variables. Given the size of the coefficient of the lagged dependent variable, the long-term elasticity is generally much larger than the short-run one. The estimation results for the dynamic equation suggest that the sovereign credit ratings are governed by the following first-order stochastic difference equations (e.g. from Table 6, pooled estimation for Moody's sovereign credit ratings in the period 1993:1-1997:1, after selection process):

$$MD_t = E_t \begin{Bmatrix} 0.97MD_{t-1} - 0.61XGR_{t-1} + 0.07STDR_{t-1} + 0.08DEBTX_{t-1} + 0.02\Delta \ln(INF)_t \\ -6.89\Delta IGDP_t + 0.08\Delta STDR_t - 0.41\Delta XGR_t + 0.75 \end{Bmatrix} \tag{2}$$

The long-run impulse response can be obtained by solving the first-order stochastic difference equation as follows:

$$Rating_t = E_t \left\{ \alpha Rating_{t-1} + \sum_{k=1}^{K} \beta_k x_{kt} \right\} \tag{3}$$

$$Rating_T = E_T \left\{ \alpha^T Rating_0 \right\} + E_T \left\{ \sum_{t=1}^{T} \sum_{k=1}^{K} \alpha^{T-t} \beta_k x_{kt} \right\} \tag{4}$$

At the steady state we have

$$Rating_T = Rating_{T-1} = \ldots = Rating_{T-t} = R^* \text{ and } x_{kT} = x_{kT-1} = \ldots = x_{kT-t} = x_k^*, \forall t$$

Hence, if $|\alpha| < 1$, then $\lim_{T \to \infty} \alpha^T = 0$, and $Rating_T \xrightarrow{T \to \infty} E_T \left\{ \sum_{k=1}^{K} \frac{1}{1-\alpha} \beta_k x_{kT} \right\}$ (5)

$$\text{Thus } Rating^{*} = E\left\{\sum_{k=1}^{K} \frac{1}{1-\alpha} \beta_k x_k^{*}\right\} \tag{6}$$

In the scheme above, equation (3) is just the short-run version of the model, while equation (4) is a generalized solution for the stochastic difference equation, given the known initial condition ($Rating_0$). The terminal condition for convergence is given by equation (5). For practical purposes, one can solve (4) adopting the steady state solution (6), which relies on general asymptotic convergence properties assumed by the model.[10]

The steady state version of the Moody's results is given in equation (7) below.

$$MD^{*} = E\left\{-20.33XGR^{*} + 2.33STDR^{*} + 2.67DEBTX^{*} + 25.00\right\} \tag{7}$$

The same approach is valid to calculate the Standard & Poor's steady state results.

[10] Specifically, we assume that at the steady state, the dependent and the independent variables converge to their respective stationary values, indicated by the superscript star.

Table 2: Rating Availability

Country	Moody's		S&P's	
	Available Since	N° of Considered observations	Available Since	N° of Considered observations
Argentina	November 1986	15	August 1993	13
Brazil	November 1986	15	November 1994	11
Chile	February 1994	12	December 1992	15
China	May 1988	15	December 1992	15
Colombia	August 1993	13	June 1993	14
Czech Republic	March 1993	14	July 1993	13
Hungary	July 1989	15	April 1992	15
India	January 1988	15	December 1992	15
Indonesia	March 1994	12	December 1992	15
Israel	November 1995	9	December 1992	15
Jordan	October 1995	9	October 1995	9
Kazakhstan	November 1996	7	November 1996	7
Korea	November 1986	15	October 1988	15
Malaysia	November 1986	15	September 1990	15
Mexico	December 1990	15	July 1992	15
Pakistan	November 1994	11	November 1994	11
Philippines	July 1993	13	June 1993	14
Poland	June 1995	10	June 1995	10
Russia	October 1996	7	October 1996	7
Slovakia	May 1995	10	February 1994	12
Slovenia	May 1996	8	May 1996	8
South Africa	October 1994	11	October 1994	11
Thailand	August 1989	15	June 1989	15
Turkey	May 1992	15	April 1994	15
Venezuela	June 1987	15	October 1977	15
Total		**311**		**320**

Source: Bloomberg.

Table 3: Data sources

Variable	Source	Periodicity
Ratings		
Moody's and Standard and Poor's ratings 1/	Moody's, S&P's	Daily
Debt		
Total External Debt	IFS	Annual
Debt Rescheduling	WDT/WEO	Annual
Short-Term Debt	BIS	Semi-Annual
Gross domestic product		
GDP at current prices, national currency	IFS	Annual, Quarterly
Gross domestic product, constant prices	IFS or WEO	Annual, Quarterly
Balance of payments		
Exports	IFS	Monthly
Exchange rate, official rate	IFS	
Prices		
CPI nominal	INS	Monthly
REER	INS	Monthly
Terms of trade		
Price of imports	WEO	Annual
Price of exports	WEO	Annual
Other		
General government balance	WEO	Annual
Gross fixed capital formation, current prices	WEO	Annual

1/ To allow for semi-annual estimation, we interporlated data for which only the annual observations are available. The abbreviations are as follows: IFS (International Financial Statistics), BIS (Bank for International Settlements), WEO (World Economic Outlook database of the IMF), INS (International Notification System). The WEO database was used to fill gaps in the IFS data, such as in GDP at constant prices. Since ratings are available contemporeneously, while other variables come available with a lag, we estimated ratings for end-January and end-July using observations on exogenous variables at end-December and end-June, respectively.

Table 4: Static Specification: Pooled OLS and Feasible GLS Models 1/ 2/

	Standard & Poor's						Moody's					
	1992:2	1997:1	1997:1	1999:2	1992:2	1999:2	1992:2	1997:1	1997:1	1999:2	1992:2	1999:2
	Pooled OLS	Feasible GLS	Pooled OLS	Feasible GLS	Pooled OLS	Feasible GLS	Pooled OLS	Feasible GLS	Pooled OLS	Feasible GLS	Pooled OLS	Feasible GLS
ln(INFLATION)	2.58	1.38	8.24	4.73	3.44	1.33	0.70	0.41	4.84	3.61	0.85	0.43
	3.03	6.31	5.25	5.41	3.12	4.09	10.86	3.41	5.21	6.73	7.10	3.71
GRGDP	-9.75	-0.92	-14.81	-11.59	-16.83	-7.47	-10.72	-2.55	-16.93	-10.00	-18.57	-5.44
	-2.53	-0.58	-3.59	-5.13	-4.96	-4.64	-4.24	-2.14	-5.47	-5.33	-7.40	-4.05
FBGDP	-19.90	-16.83	-28.40	-29.87	-24.43	-18.04	-6.83	-7.37	-13.72	-13.50	-11.03	-7.60
	-4.88	-8.96	-3.89	-5.27	-6.09	-5.41	-2.72	-3.30	-2.36	-3.09	-3.85	-2.71
IGDP	-10.26	-13.31	-8.02	-5.59	-7.91	-10.68	-11.63	-13.32	-6.41	-12.77	-8.45	-12.21
	-4.34	-11.90	-2.15	-2.18	-3.64	-7.62	-7.22	-11.82	-2.18	-5.06	-4.88	-8.33
DEBTX	0.61	0.28	0.88	0.72	0.65	0.37	0.85	0.71	1.06	0.82	0.89	0.66
	6.69	5.96	4.73	5.91	6.40	3.88	11.73	12.04	7.32	8.49	11.27	8.14
RSCH	1.07	2.15	0.31	0.75	1.00	1.89	1.26	1.96	0.45	0.51	1.06	2.00
	3.84	13.09	0.64	1.96	3.49	6.63	6.30	12.30	1.12	1.31	4.83	7.70
CONSTANT	10.61	11.55	9.92	9.57	10.35	11.30	10.98	11.05	9.81	12.17	10.63	11.27
	14.16	31.94	9.03	12.53	15.65	28.94	23.10	27.25	11.44	15.47	20.99	22.61
Adjusted R-squared	0.74		0.62		0.65		0.87		0.70		0.77	
Joint Significance 3/	92.80	1359.89	33.35	284.53	90.07	619.55	200.33	1884.03	48.71	559.45	160.30	945.68
Prob > F, chi2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Durbin-Watson	0.21		0.61		0.38		0.19		0.53		0.31	

1/ t-students statistics below coefficients for the Pooled OLS regressions; z-Normal statistics below coefficients for the remaining cases.

2/ White (1980) heteroskedasticity-consistent covariance matrix for OLS cases, but no correction for autocorrelation.

FGLS correction for heteroskedasticity and for first-order autocorrelation for the remaining cases.

3/ F-test of joint significance statistics for the Pooled OLS regression; Wald chi-squared test of joint significance statistics for FGLS regression.

Table 5: Structural Breaks: Pooled OLS and Feasible GLS Models 1/ 2/

	Standard & Poor's						Moody's					
	1992:2	1997:1	1997:1	1999:2	1992:2	1999:2	1992:2	1997:1	1997:1	1999:2	1992:2	1999:2
	Pooled OLS	Feasible GLS	Pooled OLS	Feasible GLS	Pooled OLS	Feasible GLS	Pooled OLS	Feasible GLS	Pooled OLS	Feasible GLS	Pooled OLS	Feasible GLS
Ln(INFLATION)	2.50	1.39	8.18	4.07	3.49	1.38	0.69	0.32	4.81	4.27	0.86	0.43
	2.98	4.91	5.26	3.95	3.10	4.15	10.27	3.04	5.14	7.89	7.06	3.79
GRGDP	-8.56	-1.48	-13.67	-11.20	-16.34	-7.06	-9.29	-1.82	-16.34	-10.60	-18.24	-5.59
	-2.26	-0.88	-3.17	-4.97	-4.77	-4.37	-3.84	-1.83	-5.15	-5.33	-7.15	-3.99
FBGDP	-18.14	-19.27	-28.27	-24.83	-23.88	-19.50	-7.18	-8.35	-13.65	-10.31	-11.41	-9.27
	-4.44	-7.43	-3.91	-4.40	-5.84	-4.98	-2.79	-5.29	-2.37	-2.34	-3.93	-2.93
IGDP	-11.19	-10.87	-7.16	-8.33	-7.98	-9.58	-12.01	-12.46	-5.97	-12.51	-8.36	-11.60
	-4.81	-6.66	-1.78	-2.69	-3.48	-5.12	-7.33	-15.55	-1.90	-4.67	-4.60	-7.36
DEBTX	0.64	0.28	0.78	0.62	0.65	0.36	0.86	0.67	1.01	0.96	0.89	0.70
	6.86	5.73	4.08	4.13	6.39	3.59	11.61	15.64	6.92	9.98	11.38	8.14
RSCH	1.08	2.43	0.40	0.75	0.99	1.98	1.30	2.26	0.50	0.53	1.06	1.84
	3.79	11.60	0.82	1.70	3.46	5.85	6.32	17.42	1.22	1.47	4.84	6.84
STDR	-0.21	0.13	0.83	0.69	0.19	0.16	-0.13	0.02	0.42	0.35	0.08	0.08
	-1.53	2.03	1.98	3.16	1.12	2.41	-1.32	0.50	1.42	1.85	0.67	1.52
Constant	10.93	10.61	9.19	9.84	10.20	10.77	11.04	10.60	9.44	11.34	10.50	10.98
	13.13	19.02	7.25	10.12	13.48	17.27	20.59	35.19	9.63	13.69	18.33	20.66
Adjusted R-squared	0.75		0.63		0.65		0.87		0.71		0.77	
Joint Significance 3/	81.17	1172.11	30.65	235.17	76.71	536.75	175.49	4387.29	42.87	1027.34	136.23	844.53
Prob > F, chi2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Durbin-Watson	0.23		0.56		0.37		0.20		0.50		0.30	

1/ t-students statistics below coefficients for the Pooled OLS regressions; z-Normal statistics below coefficients for the remaining cases.

2/ White (1980) heteroskedasticity-consistent covariance matrix for OLS cases, but no correction for autocorrelation.

FGLS correction for heteroskedasticity and for first-order autocorrelation for the remaining cases.

3/ F-test of joint significance statistics for the Pooled OLS regression; Wald chi-squared test of joint significance statistics for FGLS regression.

Table 6: Dynamic Specification: Pooled OLS Model 1/

	Standard & Poor's						Moody's					
	1993:1 1997:1		1997:1 1999:2		1993:1 1999:2		1993:1 1997:1		1997:1 1999:2		1993:1 1999:2	
	Pooled OLS		Pooled OLS		Pooled OLS		Pooled OLS		Pooled OLS		Pooled OLS	
Lagged Dependent	0.96	0.98	0.97	0.93	0.93	0.96	0.97	0.97	0.94	0.93	0.95	0.95
Variable	30.35	60.52	17.41	19.22	24.43	31.13	49.43	52.35	24.74	24.46	36.13	36.71
Lagged XGR	-1.51	-1.61	0.13	-0.55	-1.40	-1.41	-0.59	-0.61	-0.45	-1.05	-0.84	-1.15
	-2.48	-2.52	0.18	-0.94	-2.86	-3.44	-1.70	-2.79	-0.83	-1.91	-2.81	-4.37
Lagged STDR	0.11	0.13	0.95	0.96	0.34	0.39	0.07	0.07	0.55	0.56	0.19	0.20
	2.09	2.33	2.12	2.35	2.01	2.36	2.07	2.27	1.83	1.96	1.74	1.91
Lagged DEBTX	0.08		-0.17		0.08		0.08	0.08	-0.05	0.01	0.06	0.07
	1.20		-1.24		1.18		1.73	1.69	-0.59	0.08	1.35	1.55
Difference INFLATION	0.11	0.12	2.56	2.43	0.20	0.21	0.02	0.02	0.69	0.72	0.02	0.02
	2.77	2.74	1.42	1.32	1.54	1.64	3.10	3.13	1.31	1.29	11.03	8.20
Difference FBGDP	-15.85	-25.26	-13.24	-29.56	-13.10	-28.81	-0.22		-8.49		-1.39	
	-1.32	-2.26	-0.44	-1.17	-0.99	-2.37	-0.04		-0.44		-0.16	
Difference IGDP	-5.52		-17.59		-14.99		-6.93	-6.89	-18.33	-17.73	-15.97	-15.35
	-1.09		-2.91		-3.07		-1.83	-1.82	-3.05	-3.12	-3.36	-3.17
Difference DEBTX	-1.55	-1.83	1.46	0.14	-0.26	-0.46	0.03		1.17		0.43	
	-1.92	-1.94	1.51	0.27	-0.42	-0.91	0.07		1.98		1.26	
Difference STDR	0.07	0.09	2.28	2.04	0.58	0.57	0.08	0.08	1.21	1.19	0.34	0.34
	1.13	1.47	2.44	2.38	1.60	1.58	1.63	1.65	2.02	2.02	1.50	1.52
Difference XGR	-0.80	-0.84	0.16	-0.10	-0.93	-0.78	-0.40	-0.41	-0.11	-0.61	-0.54	-0.76
	-1.64	-1.68	0.35	-0.27	-2.28	-2.35	-1.48	-2.09	-0.40	-1.79	-2.40	-3.18
CONSTANT	1.79	1.80	0.00	0.84	1.86	1.74	0.72	0.75	0.88	1.55	1.23	1.59
	2.24	2.29	0.00	1.12	2.96	3.30	1.64	2.75	1.46	2.56	3.00	4.35
Adjusted R-squared	0.97	0.97	0.87	0.88	0.90	0.90	0.99	0.99	0.92	0.92	0.95	0.95
Joint Significance 2/	454.92	565.52	84.69	136.86	221.58	314.14	1062.86	1347.02	146.94	180.88	480.96	598.93
Prob > F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Durbin-Watson	2.35	2.44	2.35	2.14	2.10	2.10	1.92	1.91	2.17	2.13	1.99	1.95

1/ t-students statistics below coefficients. White (1980) heteroskedasticity-consistent covariance matrix provided.

2/ F-test of joint significance statistics.

Table 7: Robustness Test: Stability of the Ratings Models Excluding Selected Countries - 1992:2 - 1999:2 1/2/3/

	Static Model (FGLS)									
	Standard & Poor's					Moody's				
	No Exclusion	Indonesia	Korea	Malaysia	Thailand	No Exclusion	Indonesia	Korea	Malaysia	Thailand
ln(INF)	1.33	1.32	1.30	1.36	1.35	0.43	0.45	0.42	0.44	0.43
	4.09	*4.03*	*4.09*	*4.14*	*4.10*	*3.71*	*3.73*	*3.63*	*3.88*	*3.78*
GRGDP	-7.47	-6.54	-7.20	-5.95	-5.88	-5.44	-5.04	-4.37	-4.10	-3.82
	-4.64	*-3.96*	*-4.62*	*-3.51*	*-3.51*	*-4.05*	*-3.69*	*-3.30*	*-2.87*	*-2.81*
FBGDP	-18.04	-19.28	-18.72	-19.09	-19.82	-7.60	-8.62	-7.38	-8.55	-6.97
	-5.41	*-5.79*	*-5.95*	*-5.80*	*-6.12*	*-2.71*	*-2.98*	*-2.66*	*-2.97*	*-2.52*
IGDP	-10.68	-10.22	-10.11	-9.59	-11.29	-12.21	-10.35	-11.13	-9.59	-10.29
	-7.62	*-6.61*	*-7.43*	*-6.11*	*-7.11*	*-8.33*	*-7.48*	*-7.76*	*-6.08*	*-6.91*
DEBTX	0.37	0.31	0.31	0.35	0.33	0.66	0.63	0.66	0.73	0.72
	3.88	*3.18*	*3.60*	*3.67*	*3.67*	*8.14*	*8.53*	*8.36*	*8.88*	*9.00*
RSCH	1.89	2.06	2.02	1.87	2.02	2.00	2.26	2.19	2.25	2.22
	6.63	*7.37*	*7.61*	*6.62*	*7.14*	*7.70*	*9.82*	*8.71*	*8.65*	*8.54*
CONSTANT	11.30	11.21	11.24	11.04	11.30	11.27	10.59	10.81	10.16	10.40
	28.94	*28.63*	*30.31*	*27.62*	*29.23*	*22.61*	*23.97*	*22.45*	*19.52*	*20.91*
Joint Signif. 3/	619.55	416.44	589.29	397.57	395.00	945.68	797.88	865.77	748.78	838.22
Prob > F, chi2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Log likelihood	-261.28	-227.44	-223.94	-245.77	-239.08	-166.86	-140.68	-133.22	-148.91	-137.84

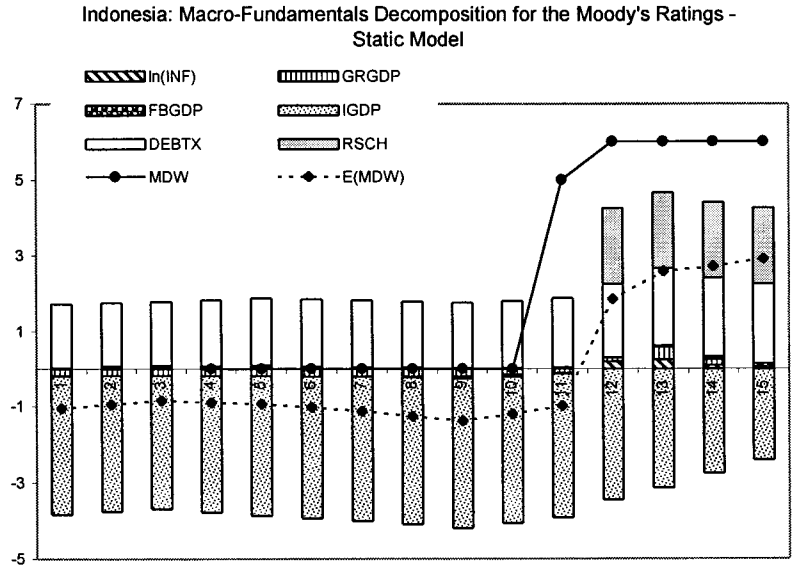
1/ t-students statistics below POLS coefficients; z-Normal statistics below FGLS coefficients. (Italic)
2/ White (1980) heteroskedasticity-consistent covariance matrix for POLS cases. FGLS correction for heteroskedasticity and for first-order autocorrelation for the remaining cases.
3/ Joint significance: F-test statistics for the POLS regressions; Wald chi-squared-test for the FGLS regressions.

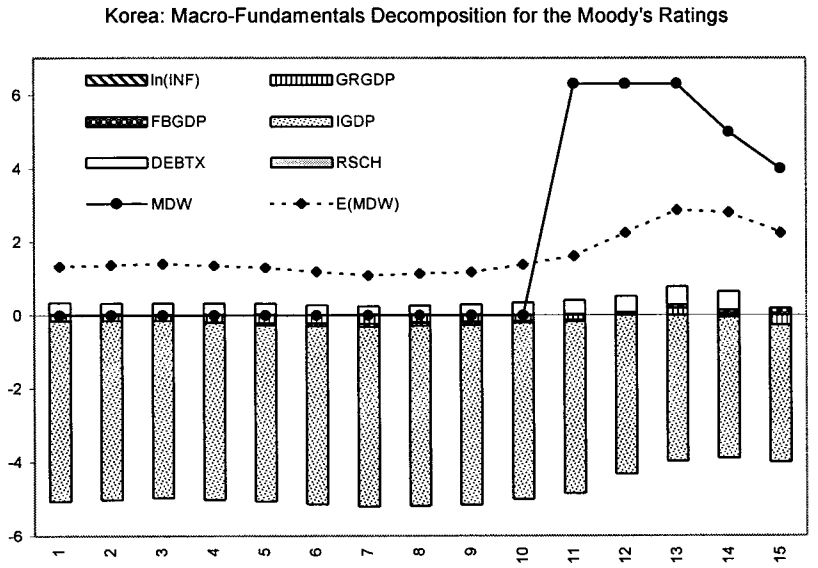
Table 8: Impulse Response Proxies for Selected Countries (1992:2 - 1997:1)

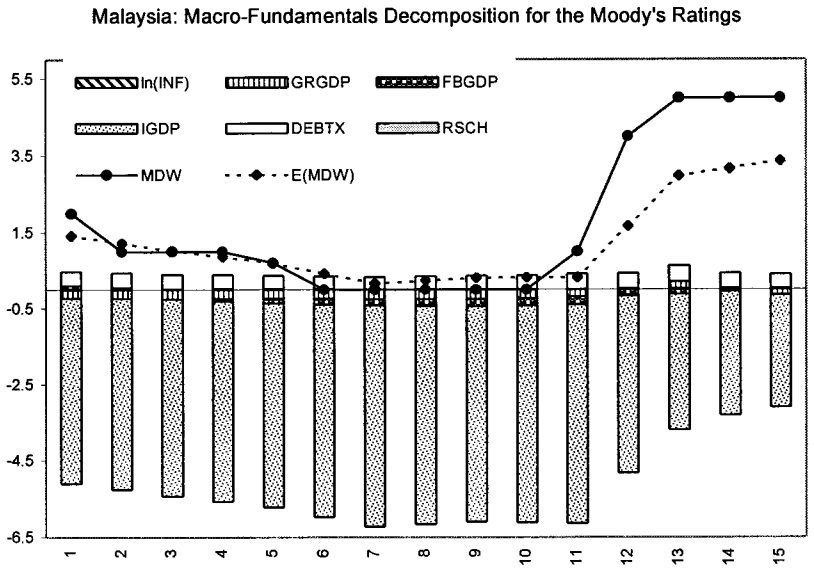
	Static Model							
	Standard & Poor's				Moody's			
	Indonesia	Korea	Malaysia	Thailand	Indonesia	Korea	Malaysia	Thailand
Ln(INFLATION)	0.012	0.015	0.009	0.010	0.003	0.004	0.003	0.003
GRGDP	-0.007	-0.014	-0.016	-0.011	-0.019	-0.035	-0.043	-0.032
FBGDP	0.001	-0.023	-0.039	-0.073	0.001	-0.009	-0.017	-0.034
IGDP	-0.397	-1.100	-0.969	-0.829	-0.371	-0.971	-0.973	-0.871
DEBTX	0.073	0.025	0.025	0.064	0.175	0.057	0.064	0.172
RSCH	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Dynamic Model 1/							
	Standard & Poor's				Moody's			
	Indonesia	Korea	Malaysia	Thailand	Indonesia	Korea	Malaysia	Thailand
XGR	-9.388	-19.960	-16.290	-13.889	-2.266	-4.544	-4.220	-3.761
STDR	1.128	2.447	0.374	1.035	0.362	0.740	0.129	0.373
DEBTX					0.669	0.217	0.246	0.657

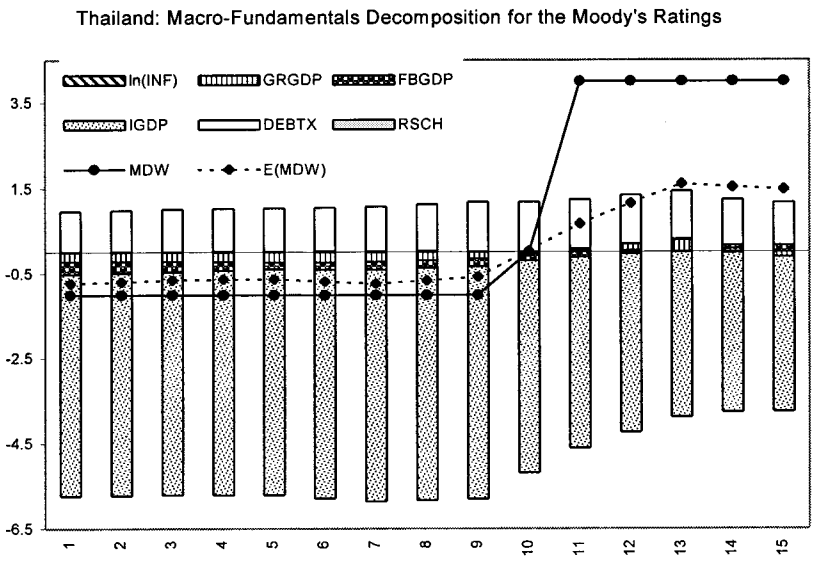
1/ Steady state specification.

Figure 1


Indonesia: Macro-Fundamentals Decomposition for the Moody's Ratings - Static Model
ln(INF)
GRGDP
FBGDP
IGDP
DEBTX
RSCH
MDW
E(MDW)


Korea: Macro-Fundamentals Decomposition for the Moody's Ratings
ln(INF)
GRGDP
FBGDP
IGDP
DEBTX
RSCH
MDW
E(MDW)


Malaysia: Macro-Fundamentals Decomposition for the Moody's Ratings
ln(INF)
GRGDP
FBGDP
IGDP
DEBTX
RSCH
MDW
E(MDW)


Thailand: Macro-Fundamentals Decomposition for the Moody's Ratings
ln(INF)
GRGDP
FBGDP
IGDP
DEBTX
RSCH
MDW
E(MDW)