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WP/96/9

INTERNATIONAL MONETARY FUND

Research Department

The Economic Content of Indicators of Developing Country Creditworthiness

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January 1996

Abstract

This paper analyzes the economic determinants of developing country creditworthiness indicators for over 60 developing countries for the period from 1980 to 1993. Our results indicate that economic fundamentals--the ratio of non-gold foreign exchange reserves to imports, the ratio of the current account balance to GDP, growth, and inflation explain a large amount of the variation in the credit ratings. All developing country ratings were adversely affected by an increase in international interest rates independently of the domestic economic fundamentals. A country's regional location and the structure of its exports (such as whether it is primarily an exporter of fuel products or manufactured products) were also important.

JEL Classification Numbers:

G15, G24, P52

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<sup>1/</sup> The authors would like to thank Patrick Conway, Robert Feldman, Mohsin S. Khan, John Montgomery, Peter Montiel, Michael Wattleworth, and Peter Wickham for their comments on an earlier draft of the paper and Ravina Malkani for excellent research assistance. We are indebted to Mr. Piggot of Euromoney, and to Mrs. Toksoz of Economist Intelligence Unit for providing us with their respective country risk ratings. Any errors that remain are, of course, the authors' responsibility.

<u>Contents</u>	<u>Page</u>
Summary	iii
I. Introduction	1
II. Indicators of Country Creditworthiness	2
III. The Ratings--Their Trends and Covariance	5
1. Creditworthiness of country groupings over time	5
2. Correlation and association	6
IV. The Empirical Framework	10
1. The debt-service capacity approach	12
2. The cost benefit approach	13
3. The explanatory variables	14
V. Previous Studies of Creditworthiness Indicators	17
VI. The Empirical Results--What the Ratings Reveal	20
1. Persistence	20
2. Country specific factors	27
3. External variables	28
VII. Conclusions	29
Text Tables:	
1. Rating Agencies: Criteria for Assessing Country Risk	4
2. Pairwise Correlations and Kendall's Measure of Concordance	7
3. Summary of Principle Components Analysis	9
4. Country Risk: Variables Indicated by Economic Theory	11
5. Definitions of Explanatory Variables	15
6. Institutional Investor Ratings	21
7. Euromoney Ratings	23
8. Economist Intelligence Unit Ratings	25
Charts:	
1. Capital Flows and Ratings--Africa	2a
2. Capital Flows and Ratings--Asia and Latin America	2b
3. Credit Ratings Over Time--Regional Averages	6a
4. Credit Ratings Over Time--Average for Export-Oriented Categories	6b
5. Credit Ratings Over Time--Average for Borrowing Categories and Least Developed Countries	6c
Appendix: Assessment of Country Credit Risk--Methodologies Used by Rating Agencies	31
References	34

### Summary

Country creditworthiness ratings provided by commercial vendors have influenced both the flow of capital to developing countries and the risk premiums associated with those flows. This paper examines the economic content of three widely used creditworthiness ratings for developing countries (compiled by *Institutional Investor*, *Euromoney*, and *The Economist Intelligence Unit*). The empirical results indicate that economic fundamentals have played a key role in determining a developing country's credit rating. The combination of persistence in the ratings and economic fundamentals typically accounts for 80 to 97 percent of the variation in credit ratings.

The most important domestic economic variables influencing a country's credit rating were found to be the ratio of its non-gold foreign exchange reserves to imports, the ratio of the current account balance to GDP, GDP growth, and inflation. The largest elasticities were often associated with the ratio of non-gold foreign exchange reserves to imports. In addition, the effect of inflation on credit rating was found to be nonlinear: high-inflation countries were heavily penalized relative to countries with low or moderate inflation.

Country ratings were also found to be sensitive to developments in global financial markets: increases in the level of international interest rates adversely affect all developing country ratings independently of the quality of the countries' domestic economic fundamentals. A country's credit rating has also often been affected by its regional location and the structure of its exports (e.g., fuel products as opposed to manufactured products).

The results imply that certain policies can facilitate rebuilding a country's credit rating during economic stabilization programs, even though the persistence evident in country ratings means that rebuilding creditworthiness would normally take considerable time. The paper identifies certain measures that can help to shorten the rebuilding process. For those countries that have been experiencing a high rate of inflation, a marked reduction in inflation could significantly improve the country's rating by moving it out of the high-inflation grouping used by the rating agencies. The rebuilding of foreign exchange reserves would also be an important step to improve the country's credit rating, as would an improvement in the country's current account balance and a revival of growth.



## I. Introduction

This paper provides an empirical analysis of the economic determinants of developing country creditworthiness indicators. These indicators, or risk ratings, have played a critical role in determining both the volume, and the spread over LIBOR, of syndicated commercial bank loans to developing countries over the last two decades. Although the mechanisms for providing private capital to developing countries have evolved significantly beyond the syndicated loans in recent years, the concept of country risk or creditworthiness remains both valid and important. This is not only so for the resumed voluntary bank lending to developing countries, but also for the other forms of private capital flows, including portfolio equity and bond flows, which have increased dramatically over the last four to five years. Indeed, many institutional investors from industrial countries can often only invest in instruments that meet or exceed a minimum credit rating standard.

Commercial creditworthiness ratings have long been used for the measurement of corporate risk. More recently, country credit ratings compiled by commercial sources have attempted to estimate country-specific risks, particularly the probability that a country will default on its debt servicing obligations. This default risk is measured using country-specific information about political and economic developments that have been identified in theoretical analyses as influencing the ability and willingness to service external debt obligation.

In general terms, the indicators of developing country creditworthiness were affected very adversely by the onset of the international debt crisis in August 1982, when Mexico announced that it could no longer service its external debt. <sup>1/</sup> While these ratings remained depressed throughout the rest of the 1980s, they began to improve in the early 1990s in response both to the announcement of the Brady Plan to "writedown" external debt in March 1989 and to significant policy reforms in many developing countries, particularly in Latin America and Asia. Nevertheless, on average, the current risk ratings of developing countries still remain below those before the onset of the debt crisis, although there is a significantly greater variation in ratings across countries than a decade or so ago.

As indicated in Charts 1 and 2, the recovery of creditworthiness ratings in the 1990s was associated with a sharp expansion in portfolio investment flows to developing countries in Asia and Latin America.

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<sup>1/</sup> In our analysis, we use creditworthiness indicators developed by the Euromoney and the Institutional Investor magazines and the Economist Intelligence Unit. We intend to analyze the indices developed by the Moody's and Standard and Poor's credit rating agencies in forthcoming papers.

While events in Mexico in December 1994 illustrated how quickly market creditworthiness perceptions can change, it is nonetheless evident that achieving sustained access to international capital markets in order to increase the supply of investment funds will be a key policy objective for many developing countries during the rest of the 1990s and beyond. If one of the objectives of an adjustment program is to help achieve or restore access to international financial markets, then the issue of what policies or economic developments are likely to make the largest contribution to restoring creditworthiness will be important to the design of these programs. The empirical analysis of the economic determinants of the country creditworthiness indicators presented in this paper provides some evidence on this issue.

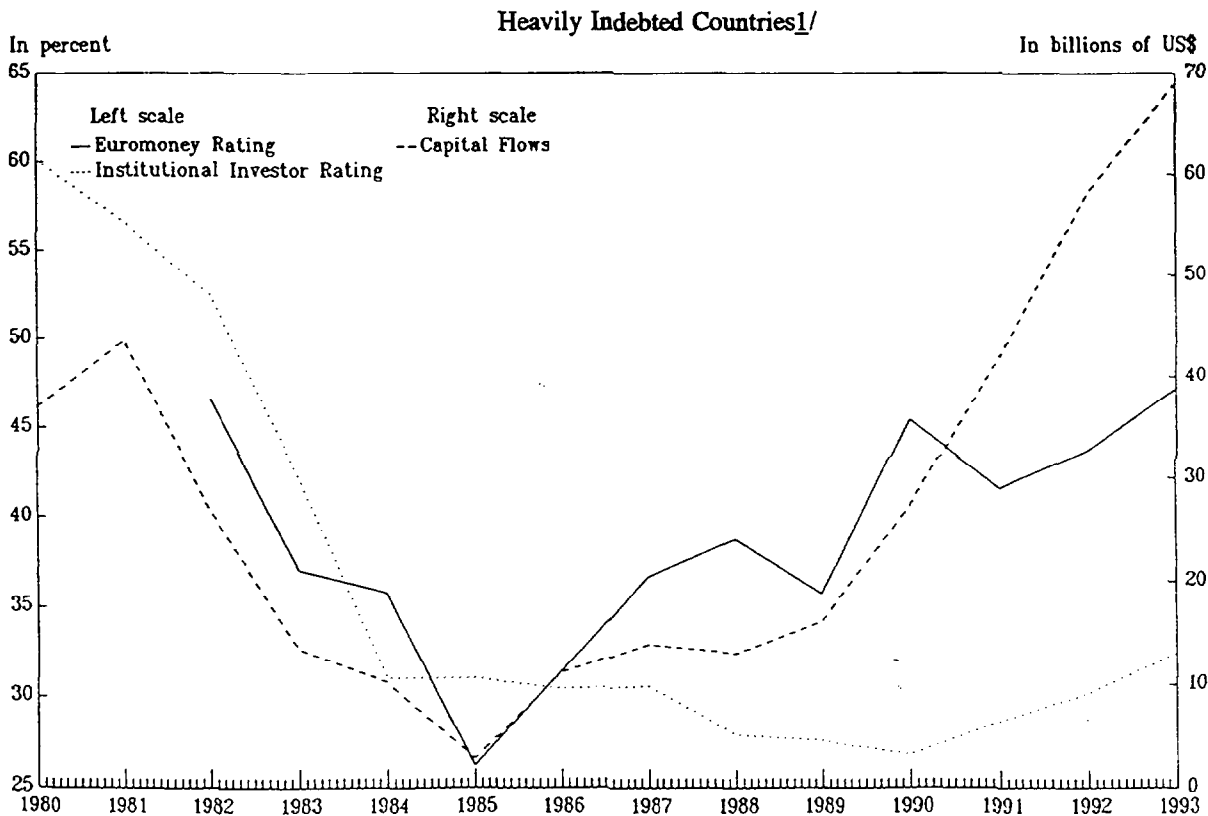
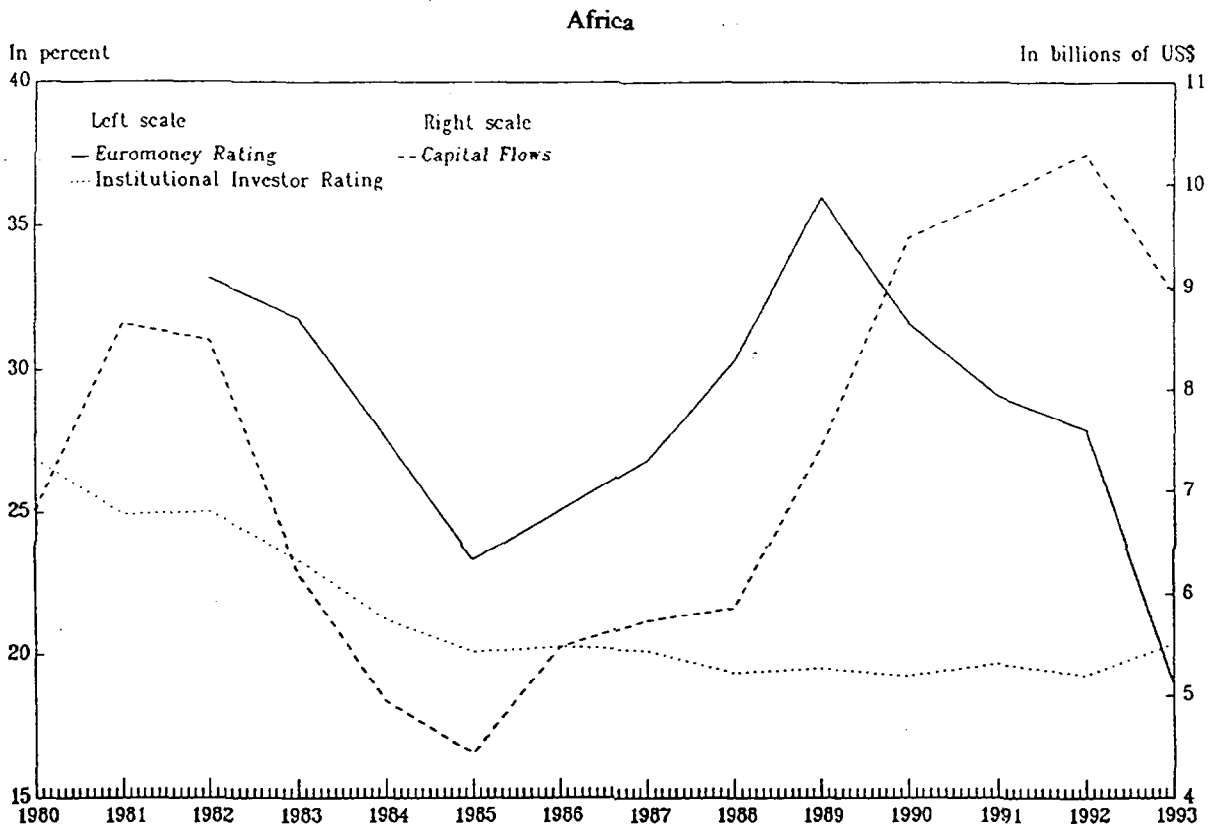
While a number of previous empirical studies have examined the economic determinants of country creditworthiness, this paper extends the literature in the following five ways: (a) it utilizes three separate measures of country risk ratings, and employs a comprehensive set of explanatory variables to explain these ratings; (b) it pays much more attention to the dynamics and the lag structures of explanatory variables; (c) it uses a much larger sample of countries, and the longest time-series, as well as the most recent data, of any study to date; (d) it analyzes the degree of persistence or inertia in country credit ratings; and (e) it examines the extent to which there are significant differences in the determinants of ratings across groups of countries, using dummies for countries in different geographical regions as well as for countries with different export structures.

In examining the empirical determinants of creditworthiness ratings, the key issues are what economic, political and social factors influence credit rating agencies' decisions and to what extent these factors are consistent with the political economy theories of the determinants of creditworthiness that have been developed. These issues are examined in the following five sections. Section II describes the methodology used by the "Institutional Investor", "Euromoney", and the "Economist Intelligence Unit" to compile their creditworthiness indicators. Section III provides an assessment of the degree of co-variation and persistence in these country credit ratings. Section IV examines the theoretical approaches to the determinants of country creditworthiness and discusses the methodology and the variables used in this paper. Section V reviews the previous empirical investigations of creditworthiness indicators and identifies the contribution of this study. Section VI discusses our empirical results. A summary of our main conclusions and policy implications is provided in the final section.

## II. Indicators of Country Creditworthiness

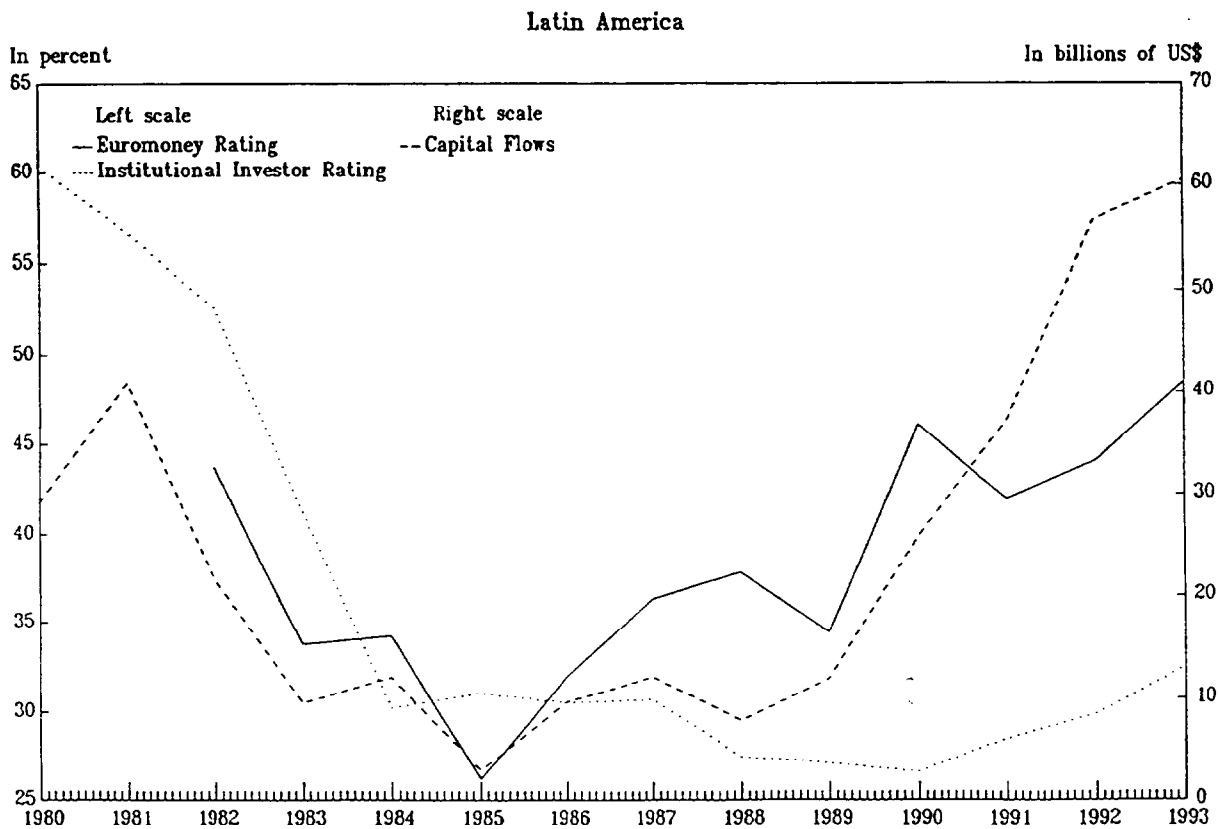
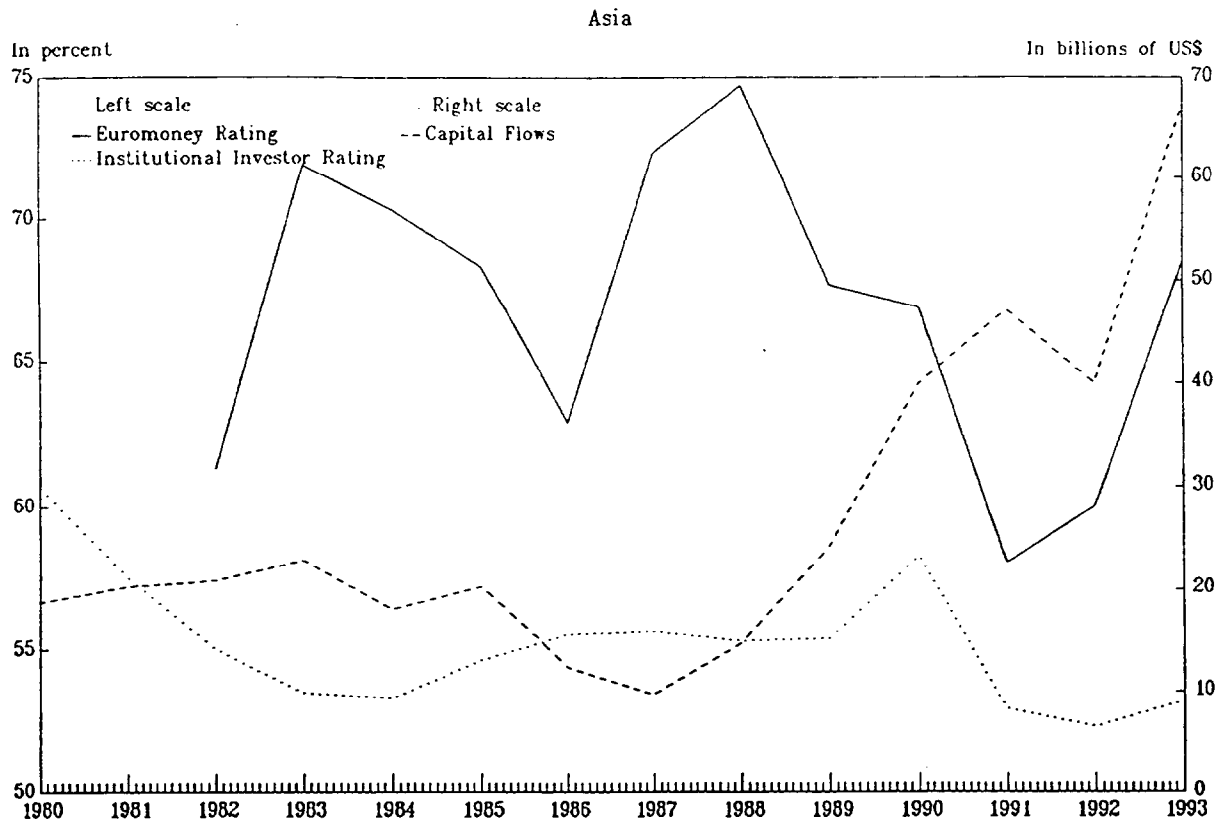
Our study extends the earlier analyses by examining the behavior of three creditworthiness series over the longest time period used to date--two for more than a decade and a third since its inception in 1987. Our data

CHART 1.  
Capital Flows and Ratings



<sup>1/</sup> Denotes the group of 15 heavily indebted countries in the 1989 (the so called Baker 15 Countries) excluding Yugoslavia.

CHART 2.  
Capital Flows and Ratings





set consists of the credit ratings constructed by the Institutional Investor (II), Euromoney (EM), and the Economist Intelligence Unit (EIU). While all three credit ratings are designed to measure a country's ability and willingness to service its financial obligations, they are based on different methodologies and compiled by quite different groups of experts (see Appendix I). The II is based on the weighted evaluations of the staffs of about the largest 100 international commercial banks; whereas the EM index reflects assessments of a country's creditworthiness by panels of political risk specialists and economists. In contrast, the EIU index reflects an evaluation by the EIU's own staff.

The three indices are based on the evaluations of a number of macroeconomic, financial, debt-servicing and political factors (Table 1). The macroeconomic and financial variables are designed to measure a country's capacity to service its debt obligations and the scale of its current commitments. These variables include a country's rate of growth, the ratio of savings to investment, the current account balance relative to GDP and the ratios of external debt to GDP, debt service payments to GDP and interest payments to GDP. In addition, a country's vulnerability to external shocks is also gauged by its degree of reliance on a single export good. A country's willingness to service its financial obligations is proxied both by financial variables such as arrears on international bank loans, reschedulings, access to bond markets, and cost of various forms of trade credits and by political considerations which typically involves a subjective evaluation of the policies toward foreign creditors, the likely policies of opposition parties, the capacity of the government to implement the measures needed to stabilize the economy and meet external payments, and the likelihood and potential effects of any political instability. <sup>1/</sup>

While the summary description of the criteria for assessing credit risk provided in Table 1 suggests a precise relationship between a country's credit rating and the individual political, economic and financial variables, it is evident that judgmental factors play an important role both at the level of evaluating the individual economic and political variables (e.g., judging the degree of political stability) and in determining the weight attached to the individual variables within each group of factors. Given the role of these judgmental consideration, the historical role that individual economic and political factors have played in determining a country's creditworthiness rating can only be identified through an empirical analysis.

One of the surprising features of the credit rating systems is the seemingly limited role assigned to external factors in determining a country's creditworthiness. The primary external factors that are

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<sup>1/</sup> See Appendix I for a more detailed discussion of the economic, political and financial variables used in constructing the various creditworthiness indicators.

Table 1. Rating Agencies: Criteria for Assessing Country Risk

Rating Agency	Criteria for Ratings
Institutional Investor	<p>Information provided by 75-100 leading international banks who grade each country on a scale of 0-100, with 100 representing least chance of default.</p> <p>Individual responses are weighted using a formula that gives more importance to responses from banks with greater worldwide exposure.</p> <p>Criteria used by the individual banks are not specified.</p>
Euromoney	<p>Assessment based on three main indicators:</p> <p>Analytical indicators (40%):  Political risk (15%)  Economic risk (10%)  Economic indicators (15%);  (debt service/export, external debt/GNP, balance of Payments/GNP)</p> <p>Credit indicators (20%):  Payment record (15%)  Rescheduling (5%).</p> <p>Market indicators (40%):  Access to bond markets (15%)  Selldown on short-term paper (10%)  Access to discount available on forfeiting (15%).</p>
Economist Intelligence Unit	<p>Medium-term lending risk (45%):</p> <p>Total external debt/GDP, total debt serving ratio, interest payment ratio, current account/GDP, savings/investment ratio, arrears on international bank loans, recourse to IMF credit, and the degree of reliance on a single export.</p> <p>Political and policy risk (40%)</p> <p>Short-term trade risk (15%)</p>

considered are country specific such as external debt ratios or dependence on a single export. However, the experience of the debt crisis in the 1980s demonstrated that external financial market developments (such as a sharp rise in international interest rates) and crises in neighboring or economically similar countries can influence a country's access to international financial markets. Although these factors are not discussed explicitly in the description of the rating process, such external considerations may nevertheless indirectly affect the compilers' evaluations. We will, therefore, test to see if external developments affect credit ratings.

### III. The Ratings--Their Trends and Covariance

The different techniques used to compile these creditworthiness indices raise the issue of whether these ratings have evolved in a similar manner overtime. To make this comparison, we first consider the behavior of the ratings for various country groupings and then examine the correlations of the three series for each country over time. To measure the extent of the co-movement of three ratings, we employ Kendall coefficients of concordance as well as principal component analysis.

#### 1. Creditworthiness of country groupings over time

All three ratings show a considerable variation across countries and over time. Chart 3 displays the average of each rating for the developing countries in Asia, Africa, the Mideast, Europe, and the Western Hemisphere. For the II and the EM indices, which have been available since 1981 and 1982 respectively, the data suggest the possibility of three distinct regimes: the period of the debt crisis, a period of consolidation, and finally a period of rebuilding creditworthiness. During the debt crisis of the early 1980's, the (II) and (EM) ratings generally declined across all regions. <sup>1/</sup> After a period of consolidation, an improvement in the ratings for the Asian, Middle Eastern, and Latin American countries is seen in the late 1980's. The improvement is not uniform across countries or regions as creditworthiness appears to have declined in Africa and Europe.

Chart 4 displays average ratings for countries grouped according to their principle export orientation, while Chart 5 plots the average ratings for countries grouped according to their borrower classifications (panels 5.1-5.3). Finally, panel 5.4 provides an average of each of the ratings for the least developed countries. The ratings are characterized by a fair degree of persistence over time for most of the categories in the sample.

Charts 3-5 also suggest that the response of the various ratings to changes in the economic situations of countries may occur at different speeds. For example, the upturn of the ratings signifying the beginning of

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<sup>1/</sup> The EIU rating was not initiated until 1989.

the third regime is led by an increase in the EM ratings in 1988, whereas the upturn in the II ratings does not begin until 1990.

## 2. Correlation and association

The high degree of cross-sectional agreement among the alternative ratings suggested by Charts 3-5 can be measured more formally. The first three rows of Table 2 report pairwise correlations between the ratings for each year that data were available. These correlations indicate that there is a substantial degree of cross-sectional agreement among the ratings. Indeed, the smallest correlation coefficient is 0.75 between the II and EM ratings in 1982. In 1993, in contrast, the correlation between those two ratings is 0.93. As can be seen, the correlation between each of these two ratings and the Economist Intelligence Unit (EIU) ratings from 1989 to 1993 are very high as well.

In order to examine the degree of association between the three series over time, we first computed the *Kendall's coefficient of concordance*, denoted by  $W$  in Table 2. This statistic is the counterpart of the bivariate Spearman's Rank correlation coefficient for measuring the relationship between three or more variables. <sup>1/</sup> As can be seen from the third row of

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<sup>1/</sup> See Gibbons (1993) for a description of the *Kendall's measure of concordance*. Basically, the data are assumed to be collected in the form of  $k \geq 3$  sets of rankings for  $n$  objects by  $k$  judges. The sum of the ranks given to the respective objects by the  $k$  judges are denoted by  $R_1, R_2, \dots, R_n$ . The sum of the rank around  $k(n+1)/2$ , the expected rank sum under a random assignment, is denoted by  $S$  and defined as

$$S = \sum_{i=1}^n [R_i - \frac{k(n+1)}{2}]^2 \quad (1)$$

If there is complete agreement among the judges on the rankings, the sum of squared deviations around  $k(n+1)/2$  is

$$J = \sum_{i=1}^n [ik - \frac{k(n+1)}{2}]^2 \quad (2)$$

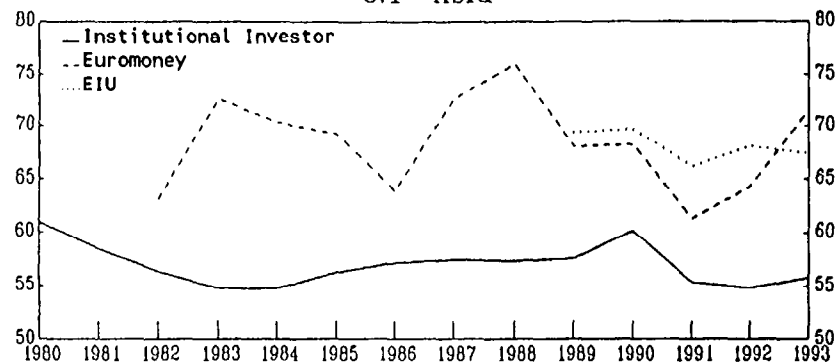
A relative measure of agreement is then the ratio of  $S$  and  $J$ , which is the estimate of the *Kendall's measure of concordance* i.e.  $W = S/J$ .

For  $k = 3$  ratings and  $n$  countries, the statistic  $Q = k(n-1)W$  is distributed as a chi-square variate with  $(n-1)$  degrees of freedom under the hypothesis that there is no agreement among the three ratings, which we use to formally test for the presence of a relationship among the ratings.

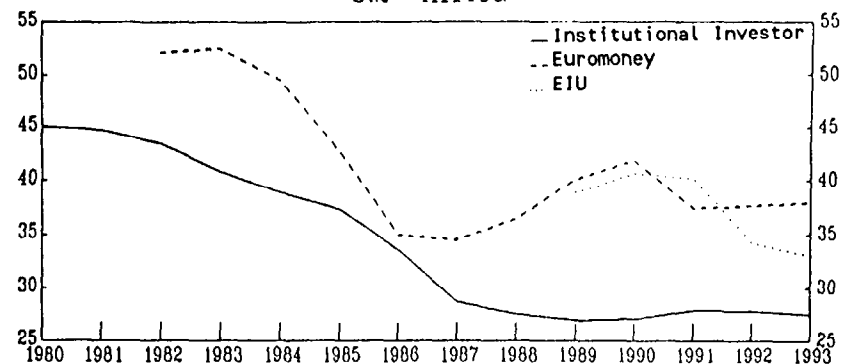
CHART 3.

## Credit Ratings Over Time -- Regional Averages

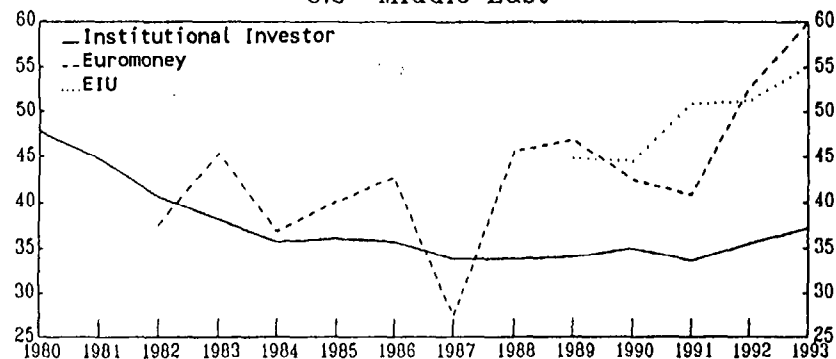
3.1 Asia



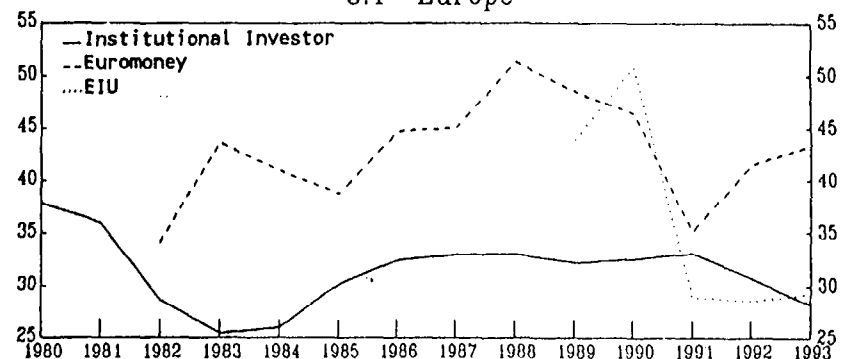
3.2 Africa



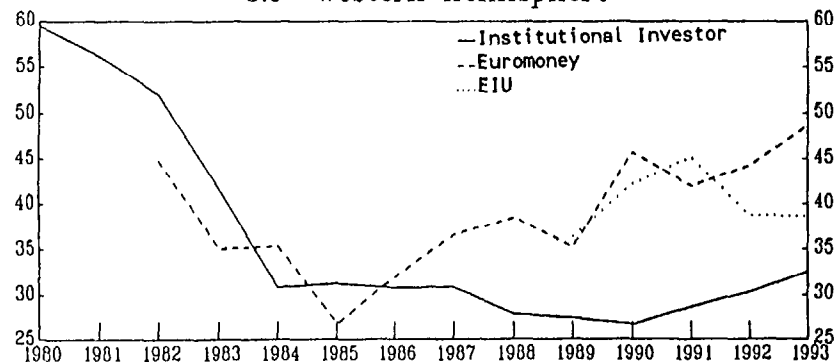
3.3 Middle East



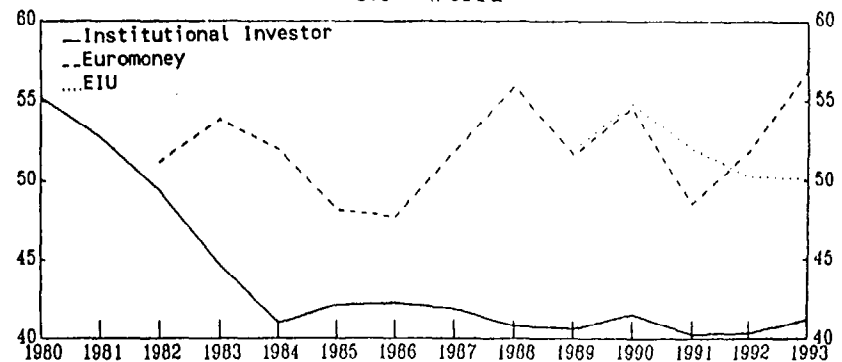
3.4 Europe



3.5 Western Hemisphere



3.6 World

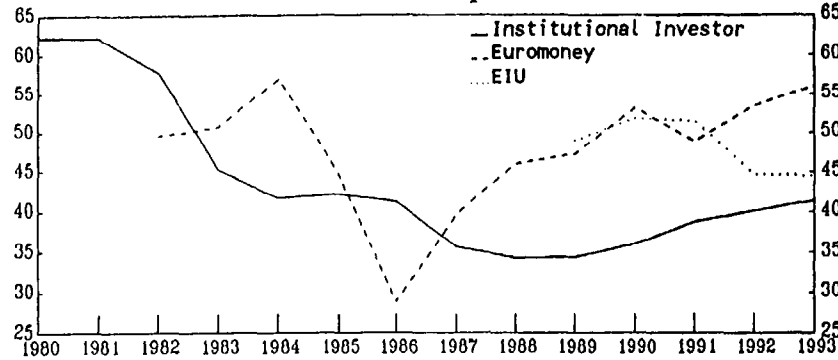


Source: Data obtained from Institutional Investor, Euromoney and Economist Intelligence Unit (EIU). Data for EIU were available only from 1989 onwards.

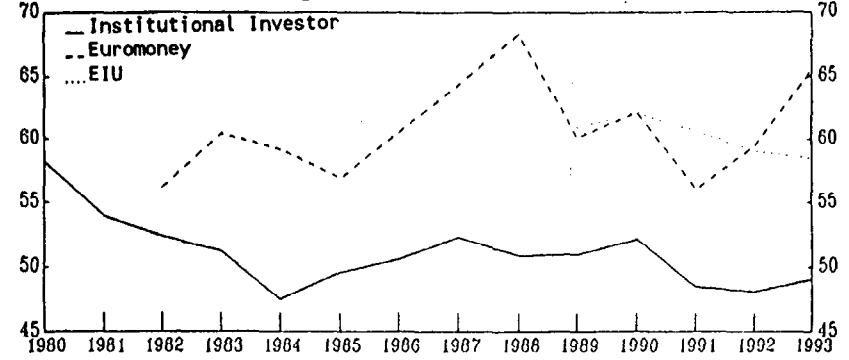
CHART 4.

Credit Ratings Over Time -- Average for Export-Orientation Categories

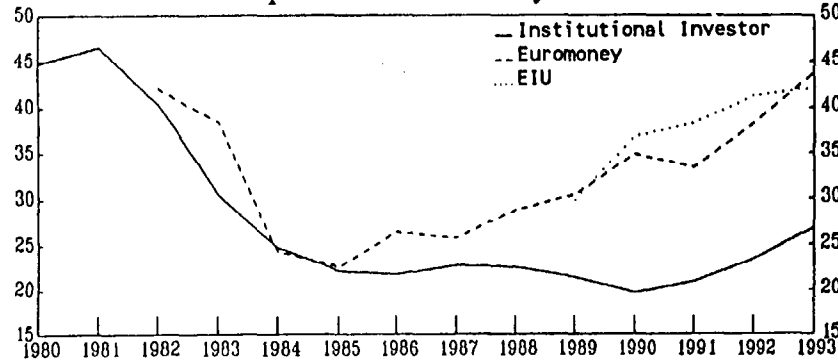
4.1 Fuel Exporters



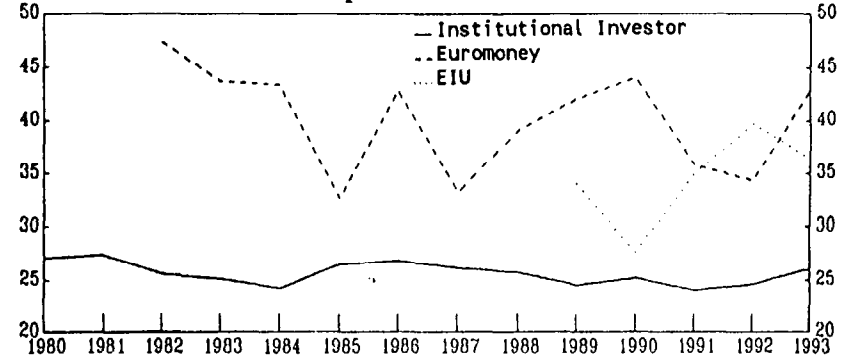
4.2 Exporters of Manufactures



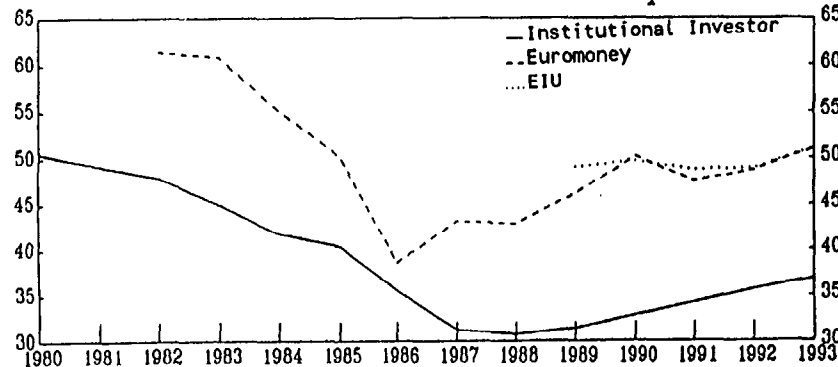
4.3 Exporters of Primary Products



4.4 Exporters of Services



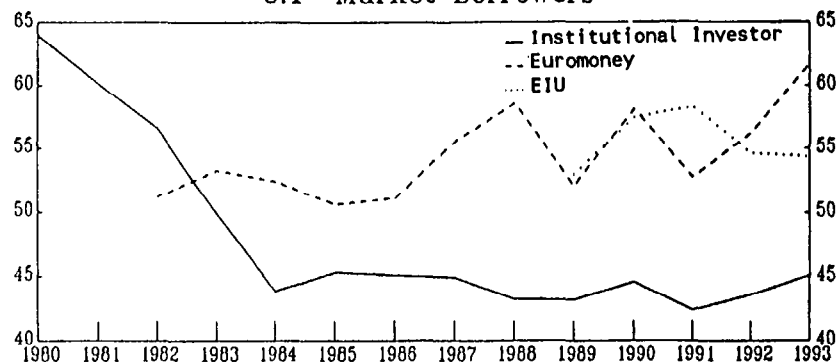
4.5 Countries with Diversified Exports



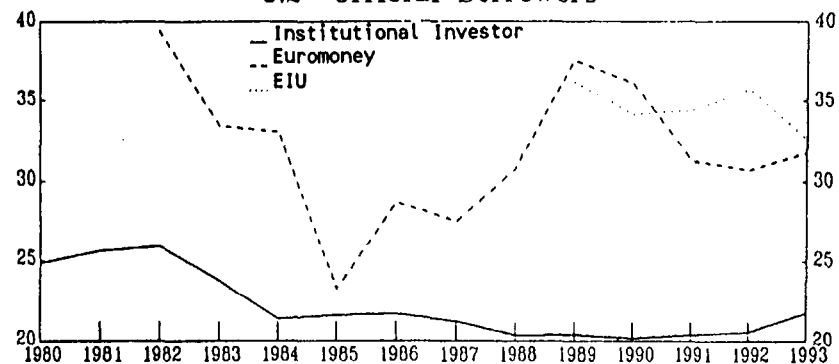
Source: Data obtained from Institutional Investor, Euromoney and Economist Intelligence Unit (EIU). Data for EIU were available only from 1989 onwards.

CHART 5.  
Credit Ratings Over Time -- Average for Borrowing Categories and  
Least Developed Countries

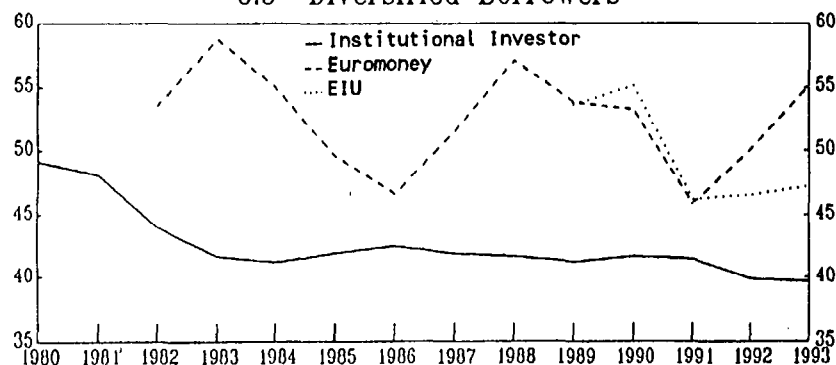
5.1 Market Borrowers



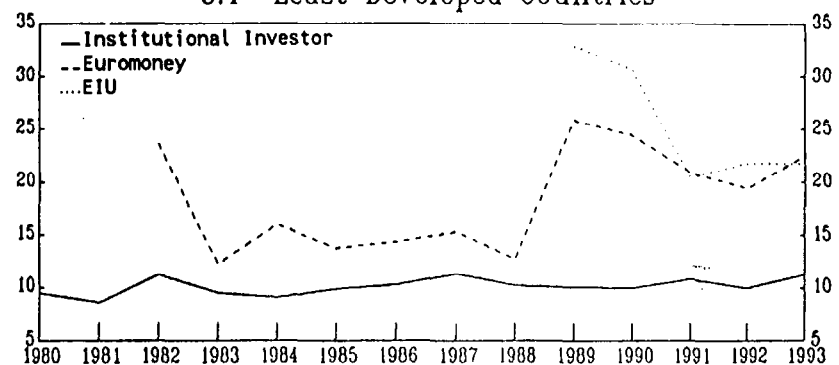
5.2 Official Borrowers



5.3 Diversified Borrowers



5.4 Least Developed Countries



Source: Data obtained from Institutional Investor, Euromoney and Economist Intelligence Unit (EIU). Data for EIU were available only from 1989 onwards.





Table 2. Pairwise Correlations and Kendall's Measure of Concordance

	Year										
	1982	1983	1984	1985	1986	1988	1989	1990	1991	1992	1993
$\rho(\text{II}, \text{EM})$	0.752	0.825	0.873	0.903	0.898	0.916	0.930	0.888	0.923	0.954	0.962
$\rho(\text{II}, \text{EIU})$	..	..	..	..	..	..	0.853	0.857	0.816	0.842	0.892
$\rho(\text{EM}, \text{EIU})$	..	..	..	..	..	..	0.835	0.846	0.864	0.863	0.919
W	..	..	..	..	..	..	0.884	0.882	0.883	0.894	0.914
Q	..	..	..	..	..	..	145.9	156.1	161.6	158.2	161.8
msl	..	..	..	..	..	..	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
df	..	..	..	..	..	..	55	59	61	59	59

## Notes:

II = Institutional Investor,

EM = Euromoney,

EIU = Economist Intelligence Unit.

W = Kendall's coefficient of concordance,

Q =  $3(n-1)W$  is distributed as a chi-square variate with  $n-1$  degrees of freedom under the hypothesis of no association.

msl = marginal significance level.

df = degrees of freedom

Table 2, W ranges from 0.88 to 0.91, indicating a high degree of concordance among the three ratings, and the hypothesis that there is no association among the three ratings is rejected at any reasonable level of significance.

Principal component analysis provides an alternative measure of the degree of covariation among a series. 1/ It makes little sense to ask to what extent ratings for two different, and possibly quite diverse, countries can be characterized by a single unobserved factor over time, which is what one would obtain by stacking the individual country observations and performing a single analysis of the principle components. Instead, we conduct a principal component analysis for each country for the three ratings. 2/ To efficiently summarize these results, Table 3 reports the

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1/ More formally, for each country,  $j = 1, 2, \dots, n$ , the point of the analysis is to characterize the extent to which each of the  $i=1, \dots, k$  creditworthiness ratings (or some transformation),  $y_{t,i,j}$ , can be represented as an affine function,

$$y_{t,i,j} = \alpha_{j,i} p_{j,t} + v_{j,t} \quad (3)$$

of a single, possible unobservable factor,  $p_{j,t}$ , plus a linear least squares projection error,  $v_{j,t}$ . Here,  $p_{j,t}$  is the first principle component of the  $T \times k$  matrix of creditworthiness ratings,  $Y_j$ , for country  $j$ . In this analysis, we present results using only the first principle component, since we are analyzing a small number of series ( $k=2$  or  $k=3$ ). The analysis is carried out for each of the  $j = 1, \dots, n$  countries individually over the time span for which the data is available.

2/ For each country, we calculate

$$\hat{\lambda} = \lambda_1 / \text{tr}[Y_j' Y_j] \quad (4)$$

where,  $\lambda_1$  is the largest eigenvalue of the matrix  $Y_j' Y_j$ .  $\hat{\lambda}$  measures the degree to which the variation in the  $k$  ratings is accounted for by the first principle component. We also calculate

$$\bar{\alpha}_i = \frac{\hat{\alpha}_i^2}{\sum_{t=1}^T y_{t,i,j}} \quad (5)$$

which measures the proportion of the variation of  $y_{t,i,j}$ , that can be attributable to the first principle component. We do this both for the raw levels of the creditworthiness ratings,  $y_{t,i,j} = C_{t,i,j}$  and for the log

transformation  $y_{t,i,j} = 100 \ln [C_{t,i,j} / (100 - C_{t,i,j})]$ , which is the form employed in the regression analysis below.

Table 3. Summary of Principal Components Analysis

	II, EM, EIU Logistic	II, EM, EIU Levels	II, EM Logistic	II, EM Levels
$\hat{\lambda}$	0.921 (0.089)	0.988 (0.016)	0.919 (0.086)	0.990 (0.007)
$\hat{\alpha}_1$	0.914 (0.185)	0.986 (0.026)	0.864 (0.252)	0.974 (0.023)
$\hat{\alpha}_2$	0.836 (0.231)	0.989 (0.012)	0.847 (0.226)	0.995 (0.005)
$\hat{\alpha}_3$	0.763 (0.290)	0.984 (0.024)	-- --	-- --

Standard deviations in parentheses.

Notes:

II Institutional Investor,

EM Euromoney,

EIU Economist Intelligence Unit.

average of these coefficients taken over the countries in the sample. 1/ Over the period 1989-1993, the first principal component accounts for the overwhelming proportion of the variation in both the logistic transformation and of the levels of the three ratings. As indicated by the small values of the standard deviations, there were only a small number of countries for which this was not the case. Indeed, on average, the first principal component explains 99 percent of the variation in the II and EM ratings, and 98 percent of the variation in the EIU ratings (second column). 2/

#### IV. The Empirical Framework

We have seen (Section II) that the ratings issued by each of the three services display substantial variation both across countries in any given year and over time for various country classifications. Before examining the extent to which this variation reflects changes in global factors and idiosyncratic changes in a country's economic conditions, it is useful to first consider whether the determinants of the ratings as described by the compilers are consistent with theoretical approaches to the determination of a country's creditworthiness.

Two different theoretical approaches have been used to model country default risk. The debt-service capacity approach regards default as arising out of an unintended deterioration in the borrowing country's capacity to service its debt. In contrast, the cost-benefit approach views the rescheduling (or default) of a country's external debt as a rational choice by the borrower based on an assessment of the costs and benefits of rescheduling or repudiation. 3/ We summarize briefly the main arguments of the two approaches; Table 4 lists the variables that are recommended for an econometric analysis by the two approaches and indicates the expected signs on the estimated coefficients.

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1/ The complete individual country results are not reported to economize on space, but are available upon request.

2/ Over the longer period from 1982 to 1993, the first principle component, on average, accounts for 92 percent of the variation in the logistic transformed II and EM ratings and 99 percent of the levels of those two ratings. An examination of the individual series again reveals that well over 90 percent of the variation in the levels of these ratings can be attributable to the first principle component.

3/ The literature on country creditworthiness and the possibility of default, not surprisingly, has focused entirely on a country's external debt. In recent years issues related to a government's domestic liabilities have also become very important. For a discussion of the relationship between external and domestic debt, see, for instance, Guidotti and Kumar (1991).

Table 4. Country Risk: Variables Indicated by Economic Theory 1/

Variable	Debt-Service Approach	Cost Benefit Approach
1. GDP growth	+	na
2. Domestic price inflation	-	na
3. Current account/GDP	+	na
4. Terms of trade	+	na
5. Reserves/imports	+	na
6. External debt	-	-
7. Real exchange rate	-	na
8. Variability in terms of trade	-	+
9. Income variability	-	+
10. International reserves	-	na
11. Variability in exports	-	+
12. Imports/GNP	na	+
13. Growth in exports	na	+
14. Variability in current account	na	+

1/ The columns indicate the partial derivatives of each of the variables with respect to country creditworthiness in the two approaches respectively.  
na Indicates the variable is not included in the approach.

# 1. The debt-service capacity approach

In the debt-service capacity approach, the probability of default is a function of the unsustainability of a given level of external debt, either as a result of short-term illiquidity, or long-run insolvency which is reflected in liquidity problems. This approach therefore essentially assumes that the debtor's intertemporal budget constraint is breached. The breach may have occurred due to short-run economic mismanagement, long-run structural problems, domestic policy as well as non-policy shocks (such as harvest failures), or external shocks such as an increase in international interest rates, deterioration in a country's terms of trade, or a weakening in industrial country activity. <sup>1/</sup>

This approach suggests a number of key economic variables that can serve as indicators of future liquidity and solvency problems. In any given period, for example, lower export earnings are likely to increase the likelihood of short-term liquidity problems and hence debt service difficulties; whereas a decline in the growth of output could contribute to long-term insolvency problems and hence lower creditworthiness ratings. Similarly, the higher the ratio of debt to GDP, or the lower the ratio of international reserves to imports, the higher would be the threat of a sudden liquidity crisis. Hence, the lower would be a country's risk rating. Conversely, if the balance of payments on the current account is positive, or if there is a positive terms of trade shock in the period immediately preceding the year of the rating, the creditworthiness indicator would be expected to be higher.

The inflation rate can be regarded as a proxy for the quality of economic management; and, as a result, the higher the inflation rate, the lower the creditworthiness rating. The real exchange rate variable can be

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<sup>1/</sup> In contrast to the cost-benefit approach which we will discuss later, this approach excludes the possibility of a debtor country willingly repudiating debt even when the intertemporal budget constraint holds. While the cost-benefit approach and the associated literature on optimal debt accumulation assumes that the debtor's intertemporal budget constraint is satisfied, the debt-service capacity approach deals with cases where it is breached. The literature in this area predates the cost-benefit approach with a number of major contributions in the 1970s and early 1980s. The conceptual underpinnings of this approach were provided by the application of the permanent income theory to a nation portrayed as an infinitely lived agent to for a study of balance of payments and debt developments in an intertemporal framework, (see Bazdarich (1978), Dornbusch and Fischer (1980), Sachs (1981), and Razin and Svensson (1983)).

included to measure the trade competitiveness of the economy, with a high real rate expected to affect adversely the credit rating. 1/

## 2. The cost benefit approach

The cost-benefit approach was formalized by Eaton and Gersovitz (1981) who argued that in the absence of legal institutions to enforce international loan agreements, a market mechanism emerges in the form of a threat of future exclusion from voluntary international capital flows. 2/ In the extreme case, the cost of repudiation of debt is the loss in welfare due to the debtor being forced into autarky or, at a minimum, barter, in foreign trade. The benefit of default is the windfall gain consisting of the economy's total outstanding debt. 3/ Consequently, any variables that served to increase the benefit of a default would serve to increase the probability of a default. On the other hand, those variables that served to increase the cost of a default would reduce the probability of a default.

The Eaton-Gersovitz approach emphasized four motives for a country to incur sovereign external debt: the consumption smoothing motive; the transactions or the "reputation" motive, where the debtor has an incentive to maintain a reputation; the investment motive arising from an expectation of relatively high productivity in the borrowing country; and the adjustment motive arising from a measure of current account sustainability. These motives are regarded as instrumental in determining the probability of default, and hence play a fundamental role in influencing the measures of country creditworthiness. For example, countries susceptible to shocks have a greater incentive to smooth their consumption by maintaining access to international markets (the consumption smoothing motive). More openness means a greater vulnerability to innovations in the international

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1/ In addition, high export variability could lead to a deterioration in the economy's ability to adjust to external shocks, by compounding the irregularity in foreign exchange receipts which results from these shocks. Similarly high variability in the terms of trade, GDP growth, as well as in reserves would be expected to adversely affect the country's ability to meet its external liabilities and hence would have an adverse effect on creditworthiness. However, we were unable to find any empirically significant effect of the volatility variables on the credit-rating indicators.

2/ An earlier study by Freeman (1979) had considered the benefits and costs of debt repudiation by allowing the debtor to consider default as a possible strategy. The analysis of the risk of repudiation was also undertaken by Kharas (1984), Kletzer (1984), Krugman (1985), and Sachs and Cohen (1985). For an early survey of this approach, see Eaton, Gersovitz and Stiglitz (1986).

3/ While the Eaton-Gersovitz approach to debt repudiation (or rescheduling) has been extended in recent years using modern bargaining theories by Eaton (1989), Bulow and Rogoff (1989), and Atkeson (1991), their basic framework still remains valid.

market and hence a greater cost of default (the transactions motive). Higher domestic growth can be a indicative of a higher marginal product that will make it more beneficial to maintain a borrower stance and therefore postpone default (the investment motive). <sup>1/</sup> A large current account deficit might create a concern on the part of lenders about the country's ability to service such debts (the adjustment motive).

Thus, according to these approaches from the theoretical literature, the credit risk rating of an economy,  $C_r$ , (equal to  $1 - \Pi$ , where  $\Pi$  is the probability of default) can be specified as follows:

$$C_r = C_r (D, g_y, g_x, R_m, CA_y, TOT, cpi, reer) \quad (6)$$

where  $D$  equals the ratio of a country's external debt to GDP,  $g_y$  denotes GDP growth rate,  $g_x$  is the growth rate of the country's exports,  $R_m$  is the ratio of reserves to imports,  $CA_y$  ratio of current account to GDP,  $TOT$  is the country's terms of trade,  $cpi$  equals inflation as measured at the consumer price index, and  $reer$  is the real effective exchange rate. The partial derivatives of  $C_r$  with regard to  $D$ ,  $cpi$ , and  $reer$  are negative while the partial derivatives with respect to  $g_y$ ,  $g_x$ ,  $R_m$ ,  $CA_y$  and  $TOT$  are positive.

Table 4 summarizes the above discussion. It inventories the variables that would be included in a econometric analysis as suggested by these theories and notes the expected sign on the coefficients of the included variables.

### 3. The explanatory variables

The explanatory variables that we have chosen are designed to measure domestic and external economic performance of the country and the impact of exogenous shocks on the rating agencies' assessments of a country's creditworthiness (Table 5). They are consistent with the factors that the compilers of the ratings have indicated that they used in assessing a country's performance and what the theoretical literature has stressed as important in determining the capacity and willingness to service external debt.

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<sup>1/</sup> In this context, it has been argued that it may even be in the lender's interest to write-off part of the debt because a write-off could boost investment in the debtor country and result in better repayment (see Dooley (1989) and Froot (1989)). This issue is complementary to the debt-overhang issue which emphasizes the inability of a debtor country, hampered by illiquidity, to finance desirable investments, as well as the disincentive effects of high debt.



Table 5. Definitions of Explanatory Variables

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Measure of external shocks

TOT            Terms of trade in the last year prior to the year of the rating

TBill        3 month US treasury bill rate

Measures of external sector performance

EXC            The growth of exports in the year prior to the year of the rating

CUR            The current account balance as a proportion of GDP for the year prior to the year of the rating

RES            International Reserves as a ratio of imports for the year prior to the year of the rating

HI-DEBTDUM    Intercept Dummy: 1 if debt/GDP ratio greater than 47 percent (for II 100 percent); otherwise

HI-DEBT SLP    Slope Dummy: Debt to GDP ratio in high debt countries (i.e., countries with debt GDP ratio greater than 47 percent (100 percent for II); 0 otherwise

LO-DEBT SLP    Slope Dummy: Debt to GDP ratio in low debt countries (i.e. countries with debt-GDP ratio less than 47 percent (100 percent for II); 0 otherwise.

REER            Real exchange rate in the year prior to the rating.

Measures of domestic economic performance

GR            The growth rate in GDP for the year prior to the year of the rating

HI-INF DUM    Intercept Dummy: 1 if inflation is greater than 300 percent per annum; 0 otherwise

HI-INF SLP    Slope Dummy: Inflation rate in high inflation countries (i.e., countries with inflation greater than 300 percent per annum; 0 otherwise

LO-INF SLP    Slope Dummy: Inflation rate in countries with inflation less than 300 percent per annum

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Table 5 (Concluded). Definitions of Independent Variables

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Intercept Dummies

Regional Categorization

AFRICA	1 if country in Africa; 0 otherwise
ASIA	1 if country in Asia; 0 otherwise
MIDEAST	1 if country in Middle East; 0 otherwise
EUROPE	1 if country in Europe; 0 otherwise
WEST HEM	1 if country in Central or Latin America; 0 otherwise

Export orientation categories

PRIMARY	1 if country is exporter of primary goods; 0 otherwise
FUEL	1 if country is exporter of fuel; 0 otherwise
MANUFACTURE	1 if country is an exporter of manufactured goods; 0 otherwise
SERVPRIV	1 if country is an exporter of services and recipient of private transfers; 0 otherwise
DIVERSEX	1 if country has a diversified export base; 0 otherwise

Financial Classification

DIVERS BOR	1 if country borrows from diverse services; 0 otherwise
OFFICIAL BOR	1 if country borrows mainly from official sources; 0 otherwise
MARKET BOR	1 if country borrows mainly from market sources; 0 otherwise

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Domestic economic performance is measured in terms of a country's rate of growth and its rate of inflation. Our preliminary analysis of the data revealed that countries experiencing high inflation appear to have been treated differently in the ratings. To account for the differential treatment, we sorted countries into groups of "high" and "low" inflation according to whether a country's inflation is above an empirically determined level. These categories were incorporated into the regressions by including dummy variables that allowed the slope and intercept coefficients of the high inflation countries to differ from those of the low inflation countries.

The influence of a country's external position on its creditworthiness is measured in terms of the scale of its existing obligations and the factors affecting its ability to service these obligations. The scale of a country's external payment obligations is measured by the ratio of its external debt to GDP. As with high inflation countries, we also consider the possibility that the credit rating agencies may treat "high" debt countries differently than "low" debt countries by including dummy variables that allow the slope and intercept coefficients for the high-debt countries to differ from those of low-debt countries. A country's capacity to service its external obligations is assumed to be reflected in the rate of growth of its exports, its current account position, the ratio of its non-gold international reserves to imports, and its real exchange rate.

The influence of international developments on a country's credit rating is examined in terms of two variables that capture the effects of external shocks to a country's trade and financial flows. Shocks to a country's trade flows are represented by changes in a country's terms of trade. We will also use the 3-month US treasury bill rate to capture the effects of external financial developments. This is consistent with recent work by Calvo, et.al (1993), Dooley et. al (1995), and Frenkel (1995) suggesting that changes in international interest rates have been a key factor influencing capital flows to developing countries in the 1990s.

#### V. Previous Studies of Creditworthiness Indicators

Since commercially-available creditworthiness indicators have been viewed as an important determinant of the flow of international capital, it is somewhat surprising that there has been only a relatively limited number of empirical studies which have examined the determinants of country creditworthiness. Moreover, many of these studies are fairly limited in their coverage of countries, the number of creditworthiness indicators utilized, and the economic variables considered. <sup>1/</sup>

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<sup>1/</sup> See, for instance, Feder and Uy (1984), Cooper (1987), Brewer and Rivoli (1990), Corset and Roy (1991) and Lee (1993).

One of the earliest studies, by Feder and Uy (1984), is noticeable for its large sample (55 countries) and the use of a wide range of economic explanatory variables. This study attempted to explain cross-sectional and inter-temporal variation in credit ratings based on Institutional Investor data. <sup>1/</sup> The study undertook two main exercises. First, regression analysis was used to determine the significant explanatory variables, and the estimated coefficients were then used to compute the elasticity of the creditworthiness ranking with respect to each of these variables. The results show that all variables were statistically significant, but that the computed elasticities were generally quite low. The authors also examined changes over time in the impact of economic indicators on creditworthiness and found that there was a significant difference between the 1979-1981 and the 1982-83 periods.

In the second exercise, the study tried to evaluate the effect of changes in economic variables on creditworthiness within a framework of a simulation model of the economy. A two-gap model (which assumes that growth is constrained by an effective trade gap) was used, with 15 behavioral equations and identities. Given initial values and other parameter values, the model simulated the evolution over time of a hypothetical economy, by generating the time profile of exports, imports, reserves, GNP, external debt, and consumption. This profile was then used to calculate the indicators that served as explanatory variables in the creditworthiness equation.

The results of this exercise suggested that a higher rate of growth of GDP, holding export growth constant, improved the initial creditworthiness rating, but as it entailed heavier borrowing to provide for resources for increased investment, it could reduce creditworthiness in subsequent periods. Increases in rate of growth of exports (if sustained over the long run) had a highly significant positive effect on creditworthiness. For instance, in the long run, an increase of one percentage point in export growth generated nearly a 5 percentage points improvement in creditworthiness. This effect was much larger than the "static" effect of export growth, and was due to the fact that an acceleration in export revenue growth reduced borrowing requirements in every period, lowering debt/GDP ratios, improving creditworthiness further.

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<sup>1/</sup> The data set covers eight periods of six months each, between the second half of 1979 and the first half of 1983. The basic methodology is to apply logistic transformation to the creditworthiness rankings and then use regression analysis. Nine economic explanatory variables are considered: debt/GNP; reserves/imports; average export growth rate; GDP growth; terms of trade; concentration of exports; GNP per capita; oil exporter dummy; and lastly, dummy for countries with debt servicing difficulties. An explanatory variable to capture political risk, in the form of a dummy for political turmoil, is also included in some of the regressions.

A more recent study was undertaken by Brewer and Rivoli (1990), who focused on the effect of political instability in determining creditworthiness, although they also considered the impact of some economic variables. Their sample consisted of 30 most heavily indebted developing countries; the country creditworthiness indicators were mainly from Institutional Investor but some analysis was also done using Euromoney data. <sup>1/</sup> The explanatory variables included several measures of political instability and armed conflict, but only two economic variables: the ratios of current account to GNP, and external debt to GNP. The analysis was cross-sectional, using data on creditworthiness for 1987; the data on economic variables were for the preceding year while explanatory variables were computed over a period ranging from 1967-1986. The results show that while the frequency of government regime change, as a proxy for political stability, was significant, two other variables proxying the degree of armed conflict and political legitimacy were not significant.

Corset and Roy (1991) examined the credit rating scores of seventy-one developed and developing countries taken from the September 1987 issues of Euromoney and the Institutional Investor. They found that the most significant variables explaining the rankings were the level of per capita GNP, the propensity to invest, (proxied by the ratio of investment to GNP) and the ratio of net foreign debt to exports. However, since the authors examined the ratings at only a single point in time, they were not able to address the issue of the persistence of the ratings over time. Moreover, the authors' results did not indicate whether the same variables were important for developed as opposed to developing countries.

A fourth study by Lee (1993) examined the effects of both economic and political variables. His sample consisted of 29 (of the 30 Brewer and Rivoli) heavily indebted countries. This study again used mainly Institutional Investor data with some estimates based on Euromoney ratings. The explanatory variables included three economic variables :debt/GNP; per capita GDP growth, and domestic public debt/GDP, although it was noted that other debt service variables such as the ratio of debt service to exports, total debt to exports, and reserves to imports were also included. In addition, several political instability variables were included in the cross-sectional analysis. The results suggest that creditworthiness indicators were explained mainly by the countries' economic performance, rather than their political situation.

Unlike the above studies which rely exclusively on standard regression techniques, Cooper (1987) applied a different statistical methodology to explain country risk ratings. He utilized cluster analysis as well as Multiple Discriminant Analysis in distinguishing countries which were likely

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<sup>1/</sup> As discussed in section II, the two indicators are based on different types of sources; Institutional Investor data are based on surveys of bankers, while Euromoney data reflect financial market conditions, based on credit and market indicators.

to seek a rescheduling of their debt. <sup>1/</sup> Cluster Analysis was used to partition countries into two groups: group 1, comprising countries which did not seek any rescheduling of their international debt obligations during 1983; and group 2, comprising countries which rescheduled all or part of their debt during 1983. In all, eight explanatory variables were included: average GDP growth (1960-82), inflation (1970-82), external debt/GNP (1982), short-term debt/total external debt (1982), short-term debt/exports (1982), reserves/imports (1982), and two measures of debt service ratio in 1982. The results indicated that the Cluster analyses were 90 percent correct in their predictions. But the extent to which the analyses misclassify rescheduling countries as non-rescheduling countries ranged from 12 to 25 percent. The above eight variables were also used in the Discriminant Analysis; the main conclusion was that the classificatory efficiency of the discriminant functions was quite high, ranging from 70 to 80 percent correct classification. However, the misclassification of countries rescheduling in 1983 as non-rescheduling countries ranged from 20 to 70 percent.

#### VI. The Empirical Results--What the Ratings Reveal

While our empirical results suggest that a set of common economic variables influence all three country credit ratings, there are significant differences in the relative importance attached to individual economic factors by the various rating agencies (Tables 6 to 8). Moreover, there is clear evidence that a country's rating persist over time; that international factors influence country ratings independently of developments in the country; and that regional considerations and a country's export profile often have a strong influence on a country's rating.

##### 1. Persistence

The persistence in country credit ratings is evidenced by the high (near unity) values attached to the lagged value of the credit rating in all of the regressions (Tables 6 to 8). While these coefficients are all significantly less than one, they indicate that the greatest persistence has been evident in the case of the II rating with some lower values in the case of the EM and EIU ratings. Not surprisingly, this suggests that, in the absence of new information, the ratings remain virtually constant over time.

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<sup>1/</sup> In the Discriminant Analysis, the starting point is a sample of countries from two or more known groups and the objective is to devise a method of allocating a new country, whose group membership is unknown, to the appropriate group on the basis of that country's characteristics. In Cluster Analysis, group membership of the sample of countries is unknown and the problem is one of determining the relative position of countries and seeing which groups emerge.

Table 6. Institutional Investor Ratings

Variable	Estimate	ELAST	Estimate	ELAST	Estimate	ELAST	Estimate	ELAST
CONSTANT	48.074 (3.722)	..	46.376 (3.572)	..	56.696 (4.007)	..	52.698 (3.960)	..
HI-INF SLP	2.746 (0.933)	0.020	3.367 (1.136)	0.024	3.012 (1.095)	0.022	2.632 (0.902)	0.019
LO-INF SLP	-9.152 (-3.259)	-0.066	-9.867 (-3.387)	-0.071	-10.947 (-3.675)	-0.079	-10.283 (-3.621)	-0.074
HI-DEBT SLP	0.016 (0.388)	0.002	0.013 (0.313)	0.001	0.021 (0.519)	0.002	0.019 (0.471)	0.002
LO-DEBT SLP	-0.071 (-2.716)	-0.020	-0.057 (-2.222)	-0.016	-0.056 (-2.132)	-0.015	-0.077 (-2.826)	-0.022
HI-INF DUM	-64.264 (-2.575)	-12.846*	-72.365 (-2.812)	-14.465*	-76.248 (-3.100)	-15.241*	-70.320 (-2.789)	-14.056*
HI-DEBT DUM	-5.550 (-0.922)	-1.109*	-4.011 (-0.665)	-0.802*	-5.368 (-0.898)	-1.073*	-6.173 (-1.022)	-1.234*
TOT	0.008 (0.541)	0.007	0.018 (1.199)	0.014	0.017 (1.145)	0.014	0.010 (0.671)	0.008
EXG	0.057 (2.095)	0.002	0.051 (1.870)	0.002	0.056 (2.087)	0.002	0.056 (2.052)	0.002
CUR	0.327 (3.961)	0.008	0.305 (3.691)	0.008	0.295 (3.585)	0.007	0.346 (4.172)	0.009
RES	0.065 (2.929)	0.013	0.078 (3.339)	0.016	0.079 (3.401)	0.016	0.061 (2.747)	0.013
GR	1.088 (9.158)	0.021	1.076 (9.434)	0.020	1.084 (9.099)	0.020	1.070 (9.123)	0.020
TBILL	-1.918 (-7.920)	-0.111	-1.853 (-7.564)	-0.107	-1.866 (-7.544)	-0.108	-1.910 (-7.920)	-0.111
LDV	0.942 (91.010)	0.628	0.931 (84.514)	0.621	0.931 (78.515)	0.621	0.937 (90.956)	0.625

Table 6 (Concluded). Institutional Investor Ratings

Variable	Estimate	ELAST	Estimate	ELAST	Estimate	ELAST	Estimate	ELAST
ASIA	..	..	4.369 (2.571)	0.006	..	..	..	..
AFRICA	..	..	-0.288 (-0.218)	-0.001	..	..	..	..
MIDEAST	..	..	2.687 (1.612)	0.002	..	..	..	..
EUROPE	..	..	5.654 (1.900)	0.003	..	..	..	..
FUEL	..	..	..	..	-3.605 (-1.819)	-0.005	..	..
PRIMARY	..	..	..	..	-4.960 (-2.340)	-0.011	..	..
SERVPRIV	..	..	..	..	-5.009 (-2.331)	-0.006	..	..
DIVERSEX	..	..	..	..	-3.823 (-1.830)	-0.004	..	..
MARKET BOR	..	..	..	..	..	..	2.389 (1.392)	0.004
DIVERS BOR	..	..	..	..	..	..	-0.008 (-0.006)	-0.000
R-SQUARED:	0.971	..	0.971	..	0.971	..	0.971	..
NOBS:	942.000	..	942.000	..	942.000	..	942.000	..
RBAR-SQUARED:	0.971	..	0.971	..	0.971	..	0.971	..

\* DERIVATIVE



Table 7. Euromoney Ratings

Variable	Estimate	ELAST	Estimate	ELAST	Estimate	ELAST	Estimate	ELAST
CONSTANT	167.154 (4.329)	..	161.716 (4.092)	..	212.455 (5.385)	..	186.745 (4.711)	..
HI-INF SLP	20.252 (1.839)	0.121	22.824 (2.276)	0.136	24.524 (2.422)	0.147	20.298 (1.805)	0.121
LO-INF SLP	-24.885 (-3.140)	-0.149	-27.776 (-3.469)	-0.166	-34.303 (-4.321)	-0.205	-29.680 (-3.631)	-0.177
JI-DEBT SLP	-0.125 (-2.109)	-0.031	-0.094 (-1.524)	-0.023	-0.095 (-1.589)	-0.023	-0.095 (-1.559)	-0.023
LO-DEBT SLP	-0.248 (-1.393)	-0.020	-0.095 (-0.544)	-0.008	0.041 (0.229)	0.003	-0.285 (-1.633)	-0.023
HI-INF DUM	-269.675 (-3.004)	-64.839*	-303.166 (-3.617)	-72.892*	-354.050 (-4.229)	-85.126*	-300.039 (-3.254)	-72.140*
HI-DEBT DUM	-1.576 (-0.203)	-0.379*	2.401 (0.312)	0.577*	7.431 (0.984)	1.787*	-5.888 (-0.746)	-1.416*
TOT	-0.027 (-0.456)	-0.017	0.017 (0.293)	0.011	0.033 (0.586)	0.022	-0.011 (-0.196)	-0.007
EXG	-0.076 (-0.643)	-0.002	-0.111 (-0.924)	-0.003	-0.063 (-0.545)	-0.002	-0.083 (-0.700)	-0.002
CUR	0.911 (2.585)	0.014	0.793 (2.249)	0.012	0.543 (1.548)	0.008	0.945 (2.711)	0.015
RES	0.154 (2.454)	0.027	0.185 (2.870)	0.033	0.230 (3.567)	0.041	0.116 (1.834)	0.020
GR	1.347 (3.721)	0.021	1.297 (3.585)	0.020	1.325 (3.848)	0.021	1.264 (3.498)	0.020
TBILL	-6.723 (-7.178)	-0.291	-6.753 (-7.363)	-0.293	-6.710 (-7.422)	-0.291	-6.813 (-7.303)	-0.295
LDV	0.794 (34.219)	0.191	0.747 (29.516)	0.179	0.734 (28.637)	0.176	0.769 (31.044)	0.185

Table 7 (Concluded). Euromoney Ratings

Variable	Estimate	ELAST	Estimate	ELAST	Estimate	ELAST	Estimate	ELAST
ASIA	..	..	19.825	0.023	..	..	..	..
	..	..	(3.392)	..	..	..	..	..
AFRICA	..	..	-3.163	-0.006	..	..	..	..
	..	..	(-0.683)	..	..	..	..	..
MIDEAST	..	..	12.442	0.009	..	..	..	..
	..	..	(2.130)	..	..	..	..	..
EUROPE	..	..	22.400	0.013	..	..	..	..
	..	..	(3.830)	..	..	..	..	..
FUEL	..	..	..	..	-23.599	-0.027	..	..
	..	..	..	..	(-4.573)	..	..	..
PRIMARY	..	..	..	..	-34.117	-0.059	..	..
	..	..	..	..	(-6.051)	..	..	..
SERVPRIV	..	..	..	..	-27.756	-0.025	..	..
	..	..	..	..	(-4.516)	..	..	..
DIVERSEX	..	..	..	..	-22.720	-0.020	..	..
	..	..	..	..	(-3.964)	..	..	..
MARKET BOR	..	..	..	..	..	..	15.064	0.022
	..	..	..	..	..	..	(3.110)	..
DIVERS BOR	..	..	..	..	..	..	1.665	0.004
	..	..	..	..	..	..	(0.429)	..
R-SQUARED:	0.780	..	0.787	..	0.790	..	0.783	..
NOBS:	766.000	..	766.000	..	766.000	..	766.000	..
RBAR-SQUARED:	0.776	..	0.783	..	0.785	..	0.778	..

\*Derivative.

Table 8. Economist Intelligence Unit Ratings

Variable	Estimate	ELAST	Estimate	ELAST	Estimate	ELAST	Estimate	ELAST
CONSTANT	41.251 (0.749)	..	95.580 (1.686)	..	81.868 (1.259)	..	47.927 (0.857)	..
HI-INF SLP	6.181 (0.351)	0.035	8.854 (0.540)	0.050	10.290 (0.592)	0.058	2.910 (0.159)	0.016
LO-INF SLP	-7.007 (-0.619)	-0.040	-14.052 (-1.243)	-0.080	-10.198 (-0.818)	-0.058	-10.093 (-0.899)	-0.057
HI-DEBT SLP	-0.118 (-1.213)	-0.034	-0.074 (-0.750)	-0.021	-0.131 (-1.296)	-0.038	-0.093 (-0.963)	-0.027
LO-DEBT SLP	-0.583 (-1.917)	-0.038	-0.658 (-2.273)	-0.043	-0.381 (-1.273)	-0.025	-0.617 (-2.090)	-0.041
HI-INF DUM	-76.953 (-0.569)	-18.894*	-135.824 (-1.061)	-33.349*	-127.875 (-0.947)	-31.397*	-76.084 (-0.546)	-18.681*
HI-DEBT DUM	-9.150 (-0.687)	-2.246*	-13.590 (-1.068)	-3.337*	-1.666 (-0.129)	-0.409*	-12.741 (-0.985)	-3.128*
TOT	0.083 (0.305)	0.046	-0.069 (-0.241)	-0.039	-0.159 (-0.534)	-0.089	0.145 (0.529)	0.081
EXG	0.366 (2.123)	0.016	0.351 (1.983)	0.015	0.412 (2.285)	0.017	0.360 (2.150)	0.015
CUR	1.395 (2.455)	0.017	1.465 (2.505)	0.018	1.344 (2.364)	0.017	1.360 (2.352)	0.017
RES	0.232 (1.984)	0.044	0.177 (1.471)	0.034	0.255 (2.184)	0.049	0.233 (1.993)	0.044
GR	0.338 (0.551)	0.005	0.360 (0.588)	0.006	0.523 (0.858)	0.008	0.140 (0.227)	0.002
TBILL	-2.032 (-1.481)	-0.070	-1.756 (-1.260)	-0.061	-1.726 (-1.232)	-0.060	-2.020 (-1.501)	-0.070
LDV	0.802 (16.284)	0.118	0.761 (14.963)	0.112	0.770 (15.461)	0.113	0.781 (15.539)	0.115

Table 8 (Concluded). Economist Intelligence Unit Ratings

Variable	Estimate	ELAST	Estimate	ELAST	Estimate	ELAST	Estimate	ELAST
ASIA	..	..	4.025 (0.548)	0.005 ..	..	..	..	..
AFRICA	..	..	-20.159 (-3.027)	-0.034 ..	..	..	..	..
MIDEAST	..	..	-2.343 (-0.292)	-0.001 ..	..	..	..	..
EUROPE	..	..	7.724 (0.741)	0.003 ..	..	..	..	..
FUEL	..	..	..	..	-21.421 (-2.487)	-0.027 ..	..	..
PRIMARY	..	..	..	..	-14.084 (-1.999)	-0.026 ..	..	..
SERVPRIV	..	..	..	..	-8.636 (-0.840)	-0.005 ..	..	..
DIVERSEX	..	..	..	..	-10.685 (-1.418)	-0.008 ..	..	..
MARKET BOR	..	..	..	..	..	..	12.854 (1.841)	0.022 ..
DIVERS BOR	..	..	..	..	..	..	-0.678 (-0.113)	-0.001 ..
R-SQUARED:	0.853	..	0.861	..	0.857	..	0.856	..
NOBS:	238.000	..	238.000	..	238.000	..	238.000	..
RBAR-SQUARED:	0.844	..	0.850	..	0.845	..	0.846	..

\* DERIVATIVE.

## 2. Country specific factors

The most important domestic factors that have influenced rating analysts from all three agencies appear to be the country's reserve holdings and its current account balance in the year prior to the rating. The ratio of non-gold foreign exchange reserves to imports, RES, has a significant positive coefficient in all the regressions. The elasticity estimate for RES typically has one of the largest values in most of the regressions. The ratio of the current account balance to GDP also has a consistently positive and significant sign in all regressions. However, the elasticity of the current account balance is typically less than half that for the reserve ratio.

While a higher real rate of growth (GR) had a significantly positive effect on the II and EM ratings, there was only a statistically insignificant positive effect on the EIU rating. In contrast, an increase in the rate of growth of a country's exports, EXG, would significantly raise the country EIU and II ratings, but would have a smaller positive effect on its EM rating. In those regressions where the coefficients on both GR and EXG are significantly positive, the elasticity of the growth rate of GDP is much larger than that for the rate of growth of exports, and the GDP growth rate elasticity is often comparable to that for the ratio of reserves to imports.

Interestingly, once developments in reserves, the current account balances, exports, and GDP growth are taken into account, the terms of trade do not appear to have had a significant impact on country ratings.

The estimation results also suggest that the rating agencies designate some countries as being "problem" countries according to whether or not they experience "high" inflation. In particular, the high inflation dummy, HI-INFDUM, is significant and negative in all regressions. Moreover, the estimated elasticities suggest that, once a country is placed in the "problem" category, its rating is shifted down dramatically and marginal changes in inflation are basically ignored by the rating agencies. The largest penalty for high inflation is imposed in the EM ratings with a country's rating falling 60 and 80 points (out of 100). <sup>1/</sup> Moreover, countries that are not in the high inflation group were also penalized in both the EM and II ratings as their inflation rate increased. <sup>2/</sup>

Although it was expected that a similar distinction would be made for countries with high and low ratios of external debt to GDP, the coefficients on the high debt dummy variable and the high debt slope dummy variable are insignificant in all regression. Nonetheless, the low debt slope dummy

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<sup>1/</sup> One anomaly in the EM results is that in some regressions the high inflation slope coefficient is significantly positive.

<sup>2/</sup> This is reflected in the significant negative coefficients on the low inflation slope dummy variable LO-INF SLP.

variable is significantly negative in the case of the II rating implying that low debt countries are penalized as their debt ratio increases.

Regional and structural characteristics appeared to have influenced country rating independently of other economic fundamentals. As mentioned above, we have examined this possibility by using three different country-classifications criteria; regional location, export orientation, and the type of borrower (e.g., borrowers from international capital markets versus official sources).

Regional effects are evident in all three ratings. In the case of EM ratings, for example, developing countries in Asia, the Middle East and Europe have traditionally had ratings between 10 and 20 points higher than countries from Latin America (which is taken as the control group) and Africa. Similarly, the EIU ratings tend to assign significantly positive values to countries from Asia and to a lesser extent from Europe. In addition, the EIU ratings assign a lower rating to African countries.

In our analysis, the effect of a country's export orientation is measured relative to that for the group of developing countries exporting manufactured goods. In EM and II ratings regressions, all other country groupings appear to have significantly lower rankings than the exporters of manufactured goods. In contrast, the EIU appears to attach significantly negative ratings to only fuel exporters and producers of primary products.

While it naturally should be the case that borrowers from commercial markets and diversified borrowers should score higher than official borrowers, the advantage in terms of credit rating score seems relatively modest. Only in the case of the EM rating is there a significantly positive coefficient associated with the market borrowing dummy variable.

### 3. External variables

Although the ratings criteria utilized by the three rating services focus primarily on domestic economic variables, our results indicate that external financial market conditions influence the ratings of all developing countries independently of the quality of their domestic policies and economic performance. In particular, a 100 basis point increase in international interest rates (as represented by the U.S. Treasury bill rate) would reduce a country's rating by between 2 (in the case of the EIU and II)

and 7 (in the case of the EM) points in the short-term independently of any domestic economic developments. <sup>1/</sup>

## VII. Conclusions

Our empirical results indicate that economic fundamentals have played a key role in determining a developing country's credit rating. These fundamentals are linked to those variables which have been identified in the literature on the determinants of a country's capacity and willingness to service external debt. Nonetheless, our analysis has shown that there is considerable persistence in the ratings so that a country tends to retain its rating over time unless significant adverse or positive developments occur. Indeed, the combination of the lagged value of the country's rating and economic fundamentals typically accounts for 80 to over 95 percent of the variation in credit ratings.

The most important domestic economic variables influencing a country credit rating were found to be the ratio of non-gold foreign exchange reserves to imports, the ratio of the current account balance to GDP, the country's rate of growth, and its rate of inflation. In terms of elasticities, the largest values were often associated with the ratio of non-gold foreign exchange reserves to imports. In addition, the effect of inflation on credit ratings was found to be nonlinear with high-inflation countries being heavily penalized relative to countries with low or moderate inflation. Moreover, a country's credit rating has often been affected by its regional location and the structure of its exports (such as primarily an exporter of fuel products as opposed to manufactured products).

Although international financial market conditions have seldom been discussed explicitly as factors influencing a country's credit rating, it was found that an increase in the level of international interest rates would adversely affect all developing country ratings independently of the quality of their domestic economic fundamentals.

Our results imply that certain policies will play a key role in rebuilding a country's credit rating during stabilization programs. First,

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<sup>1/</sup> Given the large coefficient of the lagged value of the credit rating variable ( $\alpha_L$ ), the long-run effect on a country's credit rating of the higher interest rate would be  $\alpha_{ius}/(1-\alpha_L)$  where  $\alpha_{ius}$  is the short-term effect of a higher international interest rate. If we do not include the international interest rate and the lagged dependent variable we find that the rating calculations suggest three distinct regimes: the debt crisis and its immediate aftermath 1981-83, the post debt crisis period 1984-88 and the return of capital flows 1989-1992. However, these regime differences seem to follow the development in the international financial markets and are rendered insignificant with the inclusion of the international interest rate in the regression analysis.

the persistence evident in country ratings means that the rebuilding of a country's creditworthiness rating would normally take an extended period of time. However, there are certain measures which can help shorten the rebuilding process. For those countries that have been experiencing a high rate of inflation, a sharp reduction in inflation would significantly improve the country's rating by moving it out of the high-inflation grouping used by the rating agencies. The rebuilding the ratio of non-gold foreign exchange reserves to imports would also be an important step since this variable consistently has one of the largest estimated elasticities in all the rating equations. Finally, an improvement in the country's current account balance and a revival of growth would also appear to be important for improving the country's rating.



Assessment of Country Credit Risk:  
Methodologies Used by Rating Agencies

1. Institutional Investor

The Institutional Investor (II) country credit ratings, which were first compiled in 1979, are published semiannually and are based on evaluations obtained from the staffs of about the largest 100 international commercial banks. Every six months, each bank provides an update of its ratings. The banks are asked to grade countries on a scale of zero to 100, with 100 representing those with the smallest chance of default. <sup>1/</sup> Banks are not permitted to rate their home countries. The Institutional Investor ratings for individual countries are then obtained by weighting individual bank responses using a formula that gives greater weight to responses from banks with the largest worldwide loan exposures and most sophisticated country-risk analysis systems. While there is substantial consistency amongst bankers regarding the attributes that determine the country credit ratings, there are apparently considerable differences regarding the relative importance attached to these attributes by bankers in different countries. <sup>2/</sup>

2. Euromoney

In recent years, Euromoney (EM) has changed the methodology used in its annual assessment of country risk. Prior to 1987, its risk ratings were based solely on judgmental criteria with the following weights : access to international bond markets, 20 percent; access to trade finance, 10 percent; external payment record, 15 percent; rescheduling difficulties, 5 percent; political risk, 20 percent; and "sell-down" (a measure of over-subscription of international bond or equity issues), 30 percent.

In 1987, the methodology was changed to reflect an assessment of country creditworthiness by a panel of experts. For each country, the experts were asked to base their views on the evaluation of three broad sets of indicators: analytical indicators, credit indicators, and market indicators. The analytical indicators were given a weight of 40 percent (Table 1) and encompassed an evaluation of political risk (15 percent), economic risk (10 percent), and additional economic indicators (15 percent).

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<sup>1/</sup> See Table 1 for a summary of the determinants of the available creditworthiness indicators as well as a comparison of these determinants.

<sup>2/</sup> For instance, in rating developing countries, European bankers ranked foreign direct investment as fifth in importance, while Asian bankers put it in seventh place, and the Western Hemisphere bankers rank it ninth. In contrast, bankers in the Western Hemisphere ranked fiscal policy fifth, while those in Europe and Asia ranked this policy respectively as the seventh and ninth most important factor.

Political risk reflects a judgement by political risk specialists regarding the likelihood, and the potential effects, of any political instability. Economic risk is based on a prospective view of economic performance up to two years ahead, as judged by the panel of economists. The additional economic indicators consist of three ratios, based on historic data: the ratio of exports to debt service payments which serves as a measure of short-term liquidity needs; the ratio of external debt to GNP and the ratio of the balance of payments to GNP which are taken as measures of solvency.

The credit indicators, which have a weight of 20 percent, are based on a measure of historical creditworthiness of countries (see Table 1). These indicators are made up of the country's external payment record (15 percent) and a subjective impression of the ease of any rescheduling that may have taken place in the past (5 percent). Ease of rescheduling indicates a country's general creditworthiness in the face of temporary liquidity problems.

The market indicators, which attempt to incorporate the information available on the secondary markets for sovereign debt, have a weight of 40 percent and reflect access to international bond markets (15 percent), the selldown on short-term paper (10 percent), and access to and discount available on forfeiting (15 percent). 1/

### 3. Economist Intelligence Unit

The quarterly country creditworthiness ratings prepared by the Economist Intelligence Unit (EIU) are based on an evaluation of medium-term lending risk, political and economic policy risk, and short-term trade risk (see Table 1).

Medium-term lending risk is based on an evaluation of the evolution of external indebtedness and trends in the current account. The following variables are used in assessing this risk: total external debt/GDP, total debt service ratio, interest payments ratio, current account/GDP, saving/investment ratio, arrears on international bank loans, recourse to IMF credit, and the degree of reliance on a single export. Each of the variables accounts for 5 points, except the interest payments ratio which accounts for 10 points; in this classification 0 represents the lowest risk, and 5 (or 10) represents the highest risk. Thus, a maximum weight of 45 points is possible for this category, indicating maximum risk. 2/

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1/ Forfeiting entails the discounting of medium-term promissory notes or drafts related to an international trade transaction. Repayments are semiannual and discounting is at a fixed rate. "Sell down" is a measure of over-subscription or otherwise of short-term paper.

2/ For each of the above variables, the scores are obtained using the average of the ratios over the preceding two years.

Political and economic policy risk, which carries a maximum weight of 40 points, is based on two considerations. Although economic policy risks are more difficult to quantify than the medium-term lending risks, they relate to the quality and consistency of economic management, as well as the underlying performance of the economy. Fiscal, monetary and exchange rate policies, attitudes towards foreign investment and the size and performance of the public sector are rated into categories such as "very good" or "poor" and receive a quantitative score.

Political and strategic risks are the most subjective of all the factors. The aim is to assess the capacity of the government to implement the measures necessary to stabilize the economy and meet its external commitments. The factors considered include, for example, the operation of the political system, the policies likely to be adopted by opposition political parties, the degree of enfranchisement, and policies towards foreign creditors.

Short-term trade risks account for 15 percent of the total score. Two basic factors are considered: the import cover ratio (i.e., the ratio of non-gold reserves to imports) and the country's current record on foreign exchange transfers for payments of imports. An additional factor is whether the country has arrears with multilateral financial institutions.

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