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Source: *Staff Papers (International Monetary Fund)*, Dec., 1996, Vol. 43, No. 4 (Dec., 1996), pp. 688-724

Published by: Palgrave Macmillan Journals on behalf of the International Monetary Fund

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The Economic Content of Indicators of Developing Country Creditworthiness

NADEEM UL HAQUE, MANMOHAN S. KUMAR, NELSON MARK,
and DONALD J. MATHIESON*

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 nongold 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 increases in international interest rates, independent 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 G15, G24, P52]

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

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the spread over the London interbank offered rate (LIBOR) of syndicated commercial bank loans to developing countries over the past 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 holds not only for the resumption of 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 past four to five years. Indeed, many institutional investors from industrial countries can often invest only in instruments that meet or exceed a minimum credit rating standard.

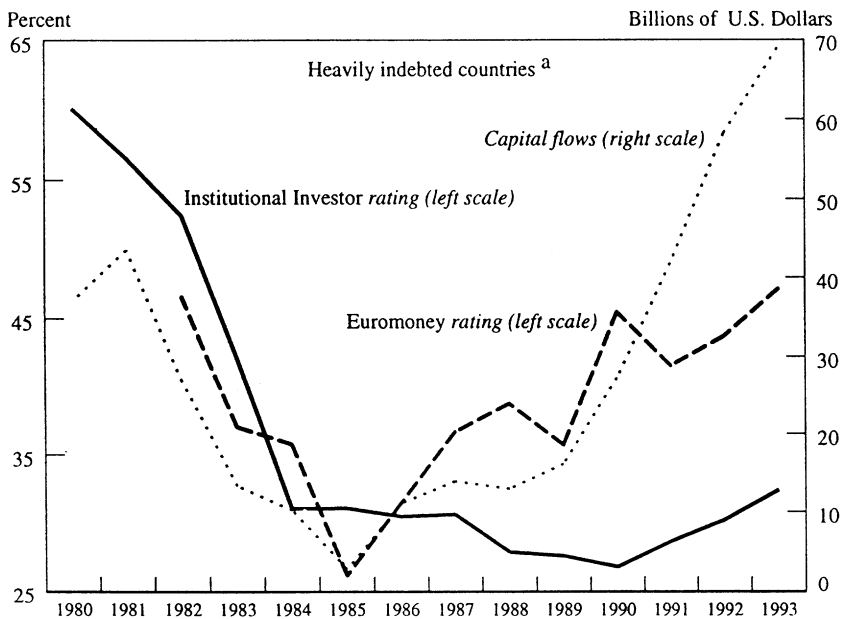
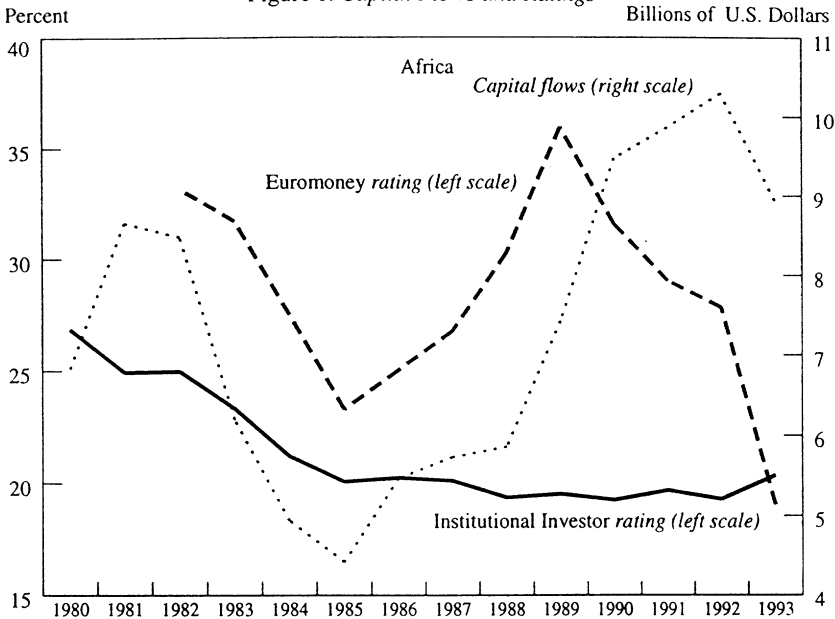
Commercial creditworthiness ratings have long been used to measure corporate risk. More recently, country credit ratings compiled by commercial sources have attempted to estimate country-specific risks, particularly the probability that a country will default on its debt-servicing obligations. This default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

In general terms, the indicators of developing country creditworthiness dropped sharply at the onset of the international debt crisis in August 1982, when Mexico announced that it could no longer service its external debt.¹ 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 in March 1989 to "write down" external debt 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 lower than 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 Figures 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. While events in Mexico in December 1994 illustrate 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

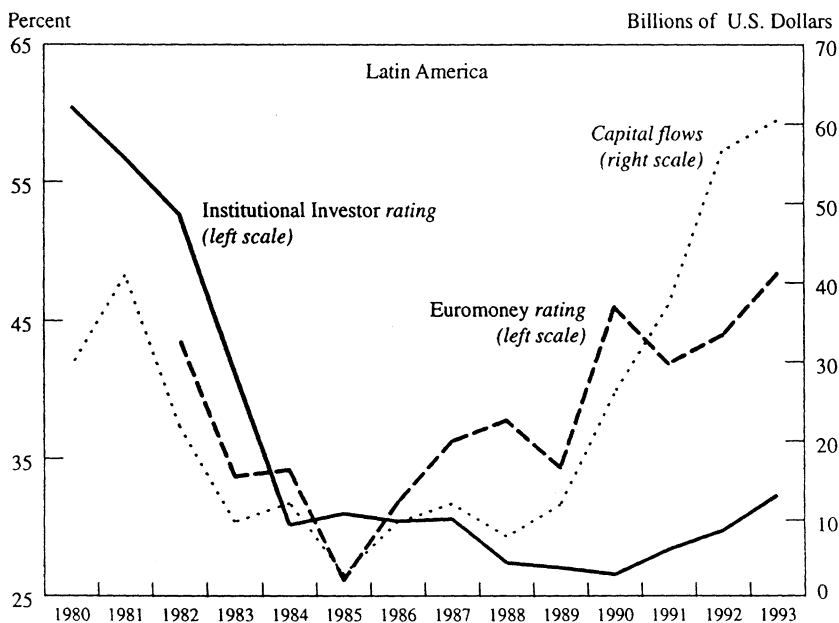
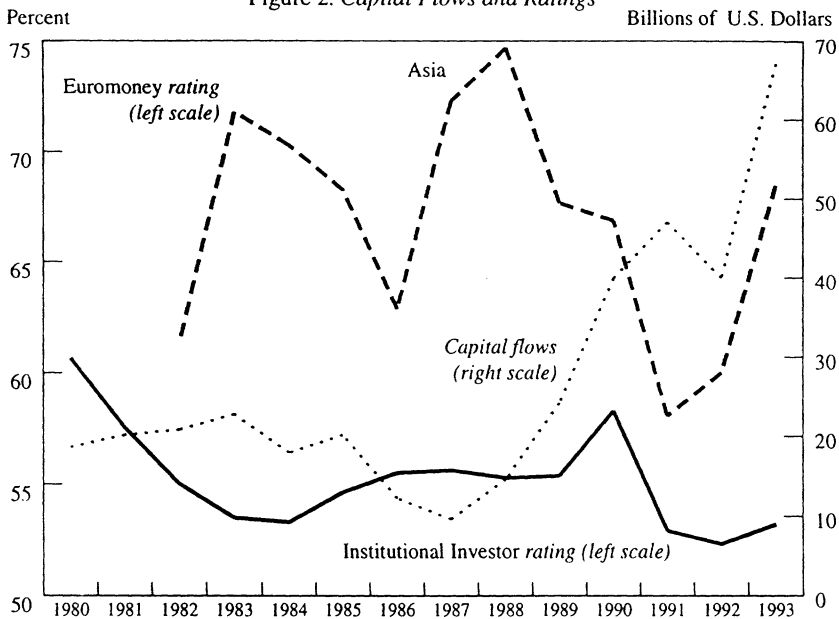
¹ In our analysis, we use creditworthiness indicators developed by *Euromoney* and *Institutional Investor* magazines and the Economist Intelligence Unit. We intend to analyze the indices developed by the Moody's and Standard and Poor's credit rating agencies in forthcoming papers.

Figure 1. *Capital Flows and Ratings*



^a The group of 15 heavily indebted countries identified in the 1989 Brady initiative (the so-called Baker 15 countries).

Figure 2. *Capital Flows and Ratings*



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, the issue of which policies or economic developments are likely to help most in restoring creditworthiness will be important to the design of these programs. The empirical analysis in this paper of the economic determinants of country creditworthiness indicators 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: (1) it utilizes three separate measures of country risk ratings and employs a comprehensive set of explanatory variables to explain these ratings; (2) it pays much more attention than previous studies to the dynamics and the lag structures of explanatory variables; (3) it uses a much larger sample of countries, the longest time series, and the most recent data of any study to date; (4) it analyzes the degree of persistence or inertia in country credit ratings; and (5) it examines the extent to which the determinants of ratings significantly differ across groups of countries, using dummies for countries in different geographical regions and for countries with different export structures.

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

I. 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 of the series cover more than a decade, and the third has data extending from its inception in 1987 to 1993. Our data set consists of the credit ratings constructed by the *Institutional Investor*, *Euromoney*, and the Economist Intelligence Unit. 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 are compiled by quite different groups of experts (see Appendix I). The *Institutional Investor* index is based on the weighted evaluations of the staffs of about the 100 largest international commercial banks; the *Euromoney* index reflects assessments of a country's creditworthiness by panels of political risk specialists and economists; and the Economist Intelligence Unit index is the evaluation of that unit'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 gauged by its degree of reliance on a single export good. A country's willingness to service its financial obligations is proxied by financial variables, such as arrears on international bank loans, reschedulings, access to bond markets, and the cost of various forms of trade credits, as well as by political considerations, which typically involve a subjective evaluation of the country's policies toward foreign creditors, the policies that opposition parties might implement in office, 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.²

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, judgmental factors play an important role, both in evaluating the individual economic and political variables (for example, judging the degree of political stability) and in determining the weight attached to the individual variables within each group of factors. Given the importance of these judgmental considerations, the historical role that individual economic and political factors have played in determining a country's creditworthiness rating can be identified only 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 considered are country specific, such as external debt ratios or dependence on a single export.

² See Appendix I for a more detailed discussion of the economic, political, and financial variables used to construct the various creditworthiness indicators.

Table 1. *Rating Agencies: Criteria for Assessing Country Risk*

| Rating agency | Criteria for ratings | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|------------|---------|---|----|------------------------------------|------|-----------------------|------|--|------|-------------------|----|----------------|------|--------------|-----|-------------------|----|------------------------|------|-------------------------------|------|---|------|-------|-----|
| <i>Institutional Investor</i> | <p>Each country graded by 75–100 leading international banks 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 world-wide exposure.</p> <p>Criteria used by the individual banks are not specified.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Euromoney</i> | <p>Assessment based on three main indicators:</p> <table border="0"> <thead> <tr> <th>Indicators</th> <th>Percent</th> </tr> </thead> <tbody> <tr> <td>Analytical indicators</td> <td>40</td> </tr> <tr> <td> Political risk</td> <td>(15)</td> </tr> <tr> <td> Economic risk</td> <td>(10)</td> </tr> <tr> <td> Economic indicators (debt service/export, external debt/ GNP, and balance of payments/GNP)</td> <td>(15)</td> </tr> <tr> <td>Credit indicators</td> <td>20</td> </tr> <tr> <td> Payment record</td> <td>(15)</td> </tr> <tr> <td> Rescheduling</td> <td>(5)</td> </tr> <tr> <td>Market indicators</td> <td>40</td> </tr> <tr> <td> Access to bond markets</td> <td>(15)</td> </tr> <tr> <td> Sell-down on short-term paper</td> <td>(10)</td> </tr> <tr> <td> Access to discount available on forfeiting</td> <td>(15)</td> </tr> <tr> <td>Total</td> <td>100</td> </tr> </tbody> </table> | Indicators | Percent | Analytical indicators | 40 | Political risk | (15) | Economic risk | (10) | Economic indicators (debt service/export, external debt/ GNP, and balance of payments/GNP) | (15) | Credit indicators | 20 | Payment record | (15) | Rescheduling | (5) | Market indicators | 40 | Access to bond markets | (15) | Sell-down on short-term paper | (10) | Access to discount available on forfeiting | (15) | Total | 100 |
| Indicators | Percent | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Analytical indicators | 40 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Political risk | (15) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Economic risk | (10) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Economic indicators (debt service/export, external debt/ GNP, and balance of payments/GNP) | (15) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Credit indicators | 20 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Payment record | (15) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rescheduling | (5) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Market indicators | 40 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Access to bond markets | (15) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sell-down on short-term paper | (10) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Access to discount available on forfeiting | (15) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total | 100 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Economist Intelligence Unit</i> | <p>Assessment based on three factors:</p> <table border="0"> <thead> <tr> <th>Factors</th> <th>Percent</th> </tr> </thead> <tbody> <tr> <td>Medium-term lending 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 degree of reliance on a single export)</td> <td>45</td> </tr> <tr> <td>Political and economic policy risk</td> <td>40</td> </tr> <tr> <td>Short-term trade risk</td> <td>15</td> </tr> <tr> <td>Total</td> <td>100</td> </tr> </tbody> </table> | Factors | Percent | Medium-term lending 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 degree of reliance on a single export) | 45 | Political and economic policy risk | 40 | Short-term trade risk | 15 | Total | 100 | | | | | | | | | | | | | | | | |
| Factors | Percent | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Medium-term lending 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 degree of reliance on a single export) | 45 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Political and economic policy risk | 40 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Short-term trade risk | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total | 100 | | | | | | | | | | | | | | | | | | | | | | | | | | |

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 whether external developments affect credit ratings.

II. The Ratings: Their Trends and Covariance

The different techniques used to compile the three creditworthiness indices raise the issue of whether these indices have moved in a similar manner over time. 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.

Creditworthiness of Country Groupings over Time

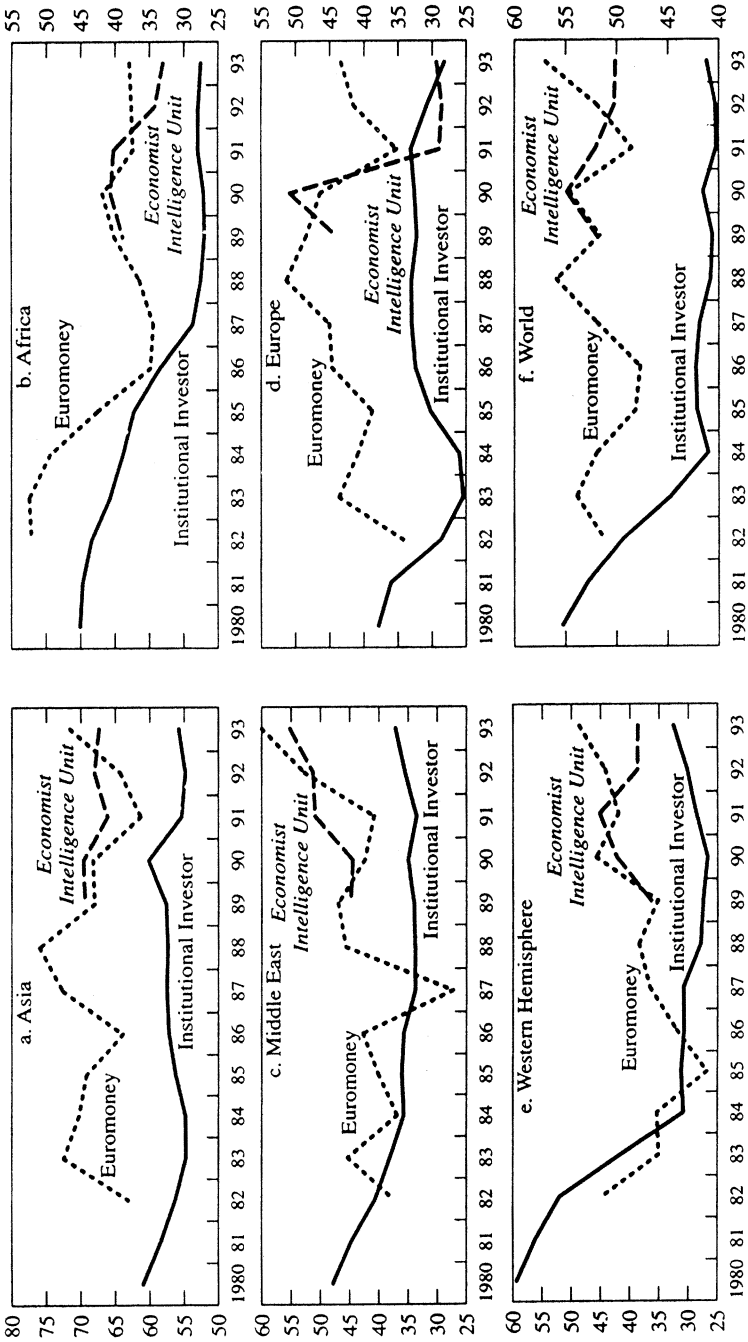
All three ratings show a considerable variation across countries and over time. Figure 3 displays the average of each rating for the developing countries in Asia, Africa, the Middle East, Europe, the Western Hemisphere, and the world. For the *Institutional Investor* and *Euromoney* indices, which have been available since 1980 and 1982, respectively, the data suggest the possibility of three distinct regimes: the period of the debt crisis, the period of consolidation, and, finally, the period of the rebuilding of creditworthiness. During the debt crisis of the early 1980s, the *Institutional Investor* and *Euromoney* ratings generally declined across all regions.³ After a period of consolidation, the ratings for the Asian, Middle Eastern, and Latin American countries improved in the late 1980s.

Figure 4 displays average ratings for countries grouped according to their principal export orientation, while Figures 5a–5c plot the average ratings for countries grouped according to their borrower classifications. Finally, Figure 5d provides an average of each of the ratings for the least-developed countries. The ratings for most of the categories in the sample are characterized by a fair degree of persistence over time, as the categories tend to retain their ratings in the absence of significant positive or adverse developments.

Figures 3–5 also suggest that the various ratings respond to changes in the economic situations of countries at different speeds. For example, the

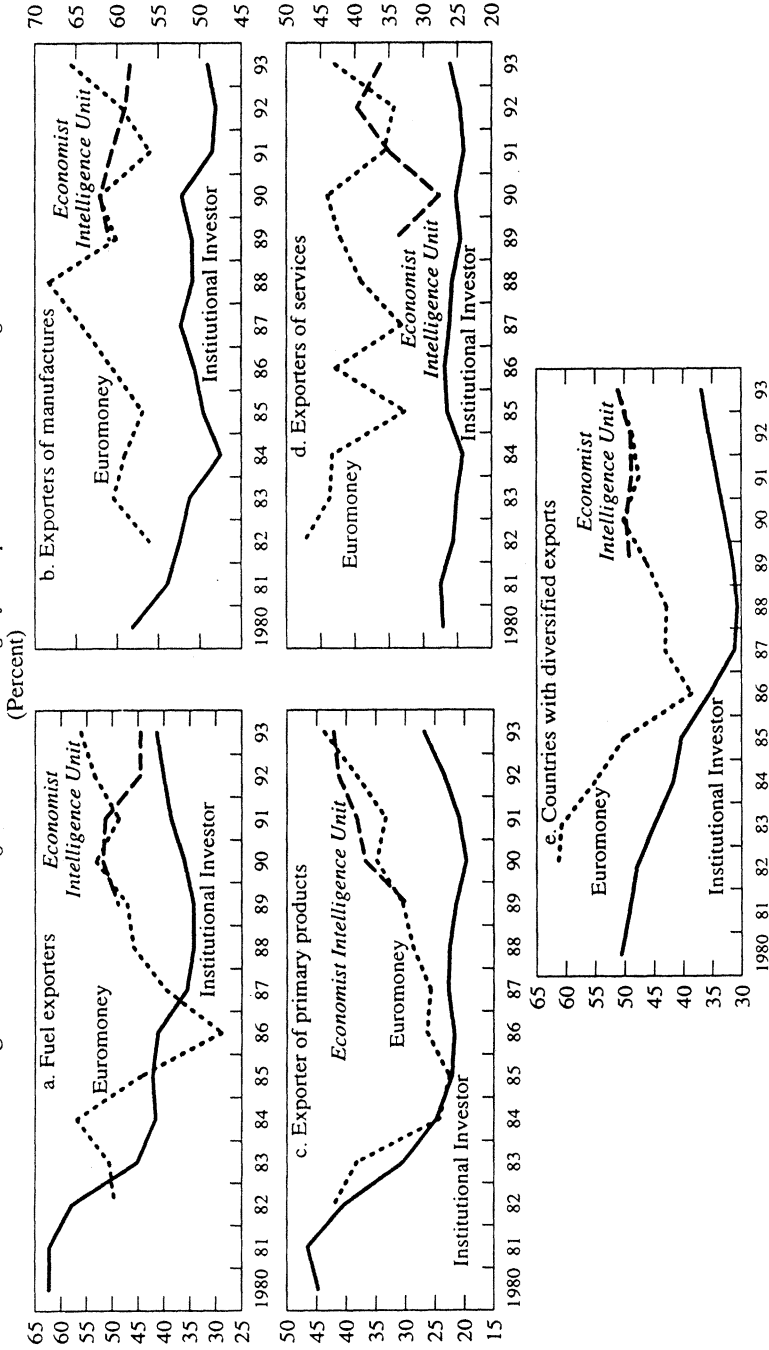
³ The Economist Intelligence Unit rating was not initiated until 1989.

Figure 3. Credit Ratings Over Time: Regional Averages (Percent)



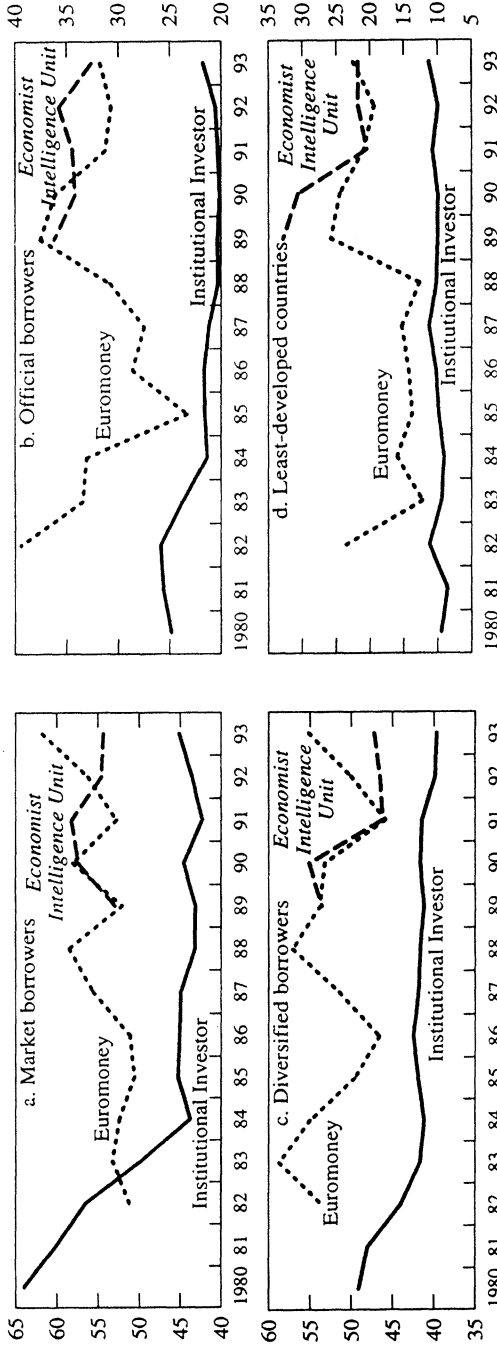
Sources: Institutional Investor, Euromoney, and Economist Intelligence Unit (EIU). Data for EIU are available only from 1989 onward.

Figure 4. Credit Ratings Over Time: Averages for Export-Orientation Categories



Sources: Institutional Investor, Euromoney, and Economist Intelligence Unit (EIU). Data for EIU are available only from 1989 onward.

Figure 5. Credit Ratings Over Time: Averages for Borrowing Categories and Least-Developed Countries (Percent)



Sources: *Institutional Investor*, *Euromoney*, and Economist Intelligence Unit (EIU). Data for EIU are available only from 1989 onward.

upturn of the ratings signifying the beginning of the third regime (the rebuilding of creditworthiness) was led by an increase in the *Euromoney* ratings in 1988, whereas the upturn in the *Institutional Investor* ratings did not begin until 1990.

Correlation and Association

The high degree of cross-sectional agreement among the alternative ratings suggested by Figures 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 was 0.75, registered between the *Institutional Investor* and *Euromoney* ratings in 1982. In 1993, in contrast, the correlation between those two ratings was 0.96. As can be seen, the correlation between each of these two ratings and the Economist Intelligence Unit ratings from 1989 to 1993 was very high as well.

In order to examine the degree of association among the three series over time, we first compute 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 relationships among three or more variables.⁴ As can be seen from the fourth row of Table 2, W ranges from

⁴ See Gibbons (1993) for a description of 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

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

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

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

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

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. Q is then used to formally test for the presence of relationships among the ratings.

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

| | 1982 | 1983 | 1984 | 1985 | 1986 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 |
|-----------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| $\rho(II,EM)$ | 0.752 | 0.825 | 0.873 | 0.903 | 0.898 | 0.916 | 0.930 | 0.888 | 0.923 | 0.954 | 0.962 |
| $\rho(II,EIU)$ | ... | ... | ... | ... | ... | ... | 0.853 | 0.857 | 0.816 | 0.842 | 0.892 |
| $\rho(EM,EIU)$ | ... | ... | ... | ... | ... | ... | 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 |
| Marginal significance level | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Degrees of freedom | ... | ... | ... | ... | ... | ... | 55 | 59 | 61 | 59 | 59 |

Notes: II , EM , and EIU are the *Institutional Investor*, *Euromoney*, and Economist Intelligence Unit credit ratings, respectively. W is Kendall's coefficient of concordance, and Q ($3(n-1)W$) is distributed as a chi-square variate with $n-1$ degrees of freedom under the hypothesis of no association.

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. 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 principal components. Instead, we conduct a principal component analysis of each country for the three ratings. To efficiently summarize these results, Table 3 reports the average of these coefficients taken over the countries in the sample. Over the period 1989–93, the first principal component accounts for the overwhelming proportion of the variation in both the logistic transformation and the levels of the three ratings. The small values of the standard deviations indicate that there were only a small number of countries for which this was not the case.

III. The Empirical Framework

We have seen in Section II that the ratings issued by each of the three services vary substantially 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, on one hand, and idiosyncratic changes in a country's economic conditions, on the other, 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.⁵

⁵The 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 3. *Summary of Principal Components Analysis, 1989–93*

| | <i>II, EM, and EIU</i> | | <i>II and EM</i> | |
|------------------|------------------------|------------------|------------------|------------------|
| | Logistic | Levels | Logistic | 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) | — — | — — |

Notes: Standard deviations in parentheses. *II*, *EM*, and *EIU* are the *Institutional Investor*, *Euromoney*, and *Economist Intelligence Unit* credit ratings, respectively.

For each country, we calculate

$$\hat{\lambda} = \lambda_1 / \text{tr}[\mathbf{Y}_j' \mathbf{Y}_j], \quad (3)$$

where λ_1 is the largest eigenvalue of the matrix $\mathbf{Y}_j' \mathbf{Y}_j$. $\hat{\lambda}$ measures the degree to which the variation in the k ratings is accounted for by the first principle component. We also calculate

$$\tilde{\alpha}_i = \frac{\hat{\alpha}_i^2}{\sum_{t=1}^T y_{t,i,j}}, \quad (4)$$

which measures the proportion of the variation of $y_{t,i,j}$ that can be attributable to the first principal component. We do this both for the raw levels of the credit-worthiness 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.

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, arising either as a result of short-term illiquidity or long-run insolvency that is reflected in liquidity problems. This approach, therefore, essentially assumes that the debtor's intertemporal budget constraint is breached. The breach may have occurred because of short-run economic mismanagement, long-run structural problems, or domestic policy measures. The breach may also have been caused by nonpolicy shocks (such as harvest failures) or by external shocks, such as an increase in international interest rates, deteriora-

tion in the country's terms of trade, or a weakening in industrial country activity.⁶

A number of key economic variables can serve as indicators of future liquidity and solvency problems in the debt-service capacity approach. In any given period, for example, lower export earnings can increase the likelihood of short-term liquidity problems and, hence, debt-service difficulties, whereas a decline in the growth of output can 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 greater will be the threat of a sudden liquidity crisis and, hence, the lower 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 will be expected to be higher.

The inflation rate can be regarded as a proxy for the quality of economic management; as a result, the higher the inflation rate, the lower will be the creditworthiness rating. The real exchange rate variable can be included to measure the trade competitiveness of the economy, with a high real rate expected to affect adversely the credit rating.

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.⁷ In the extreme case, the cost of repudiation of debt is the loss in welfare owing to

⁶ In contrast to the cost-benefit approach, which we will discuss in the next subsection, 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 assume that the debtor's intertemporal budget constraint is satisfied, the debt-service capacity approach deals with cases in which the constraint is breached. The literature in this area predates the cost-benefit approach, as a number of major contributions were made 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. 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).

⁷ 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 (1982). For an early survey of this approach, see Eaton, Gersovitz, and Stiglitz (1986).

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.⁸

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, in which 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, based on 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, a country 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 market and, hence, a greater cost of default (the transactions motive). Higher domestic growth can be indicative of a higher marginal product, which will make it more beneficial to maintain a borrower stance and, therefore, postpone default (the investment motive). 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 two approaches from the theoretical literature, the credit risk rating of an economy, C_r (equal to $1 - \pi$, where π is the probability of default), can be specified as follows:

$$C_r = C_r(D, g_y, g_x, R_m, CA_y, TOT, cpi, reer), \quad (5)$$

where D equals the ratio of a country's external debt to GDP, g_y denotes the 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 is the ratio of current account to GDP, TOT is the country's terms of trade, cpi equals inflation as measured by 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 an econometric analysis, as suggested by these

⁸Modern bargaining theories have extended the Eaton-Gersovitz approach to debt repudiation (or rescheduling) in recent years (see Eaton, 1990; Bulow and Rogoff, 1989; and Atkeson, 1991); nevertheless, their basic framework still remains valid.

Table 4. *Country Risk: Expected Sign for Variables Based on Economic Theory*

| Variable | Debt-service approach | Cost-benefit approach |
|--------------------------------|-----------------------|-----------------------|
| GDP growth | + | ... |
| Domestic price inflation | - | ... |
| Current account-to-GDP ratio | + | ... |
| Terms of trade | + | ... |
| Reserves-to-imports ratio | + | ... |
| External debt | - | - |
| Real exchange rate | - | ... |
| Variability in terms of trade | - | + |
| Income variability | - | + |
| International reserves | - | ... |
| Variability in exports | - | + |
| Imports-to-GNP ratio | ... | + |
| Growth in exports | ... | + |
| Variability in current account | ... | + |

Note: The columns indicate the partial derivatives of each of the variables with respect to country creditworthiness in the two approaches, respectively.

theories, and notes the expected sign on the coefficients of the included variables.

Explanatory Variables

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

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 its existing obligations and the factors affecting its

ability to service these obligations. The magnitude 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 nongold international reserves to imports, and its real exchange rate.

The influence of international developments on a country's credit rating is examined through 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 also use the three-month U.S. treasury bill rate to capture the effects of external financial developments. This methodology is consistent with recent work by Calvo, Leiderman, and Reinhart (1993), Dooley, Fernández-Arias, and Kletzer (1996), and Frankel (1994) suggesting that changes in international interest rates have been a key factor influencing capital flows to developing countries in the 1990s.

IV. Previous Studies of Creditworthiness Indicators

Because commercially available creditworthiness indicators have been viewed as an important determinant of the flow of international capital, it is somewhat surprising that only a few empirical studies 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.⁹

One of the earliest studies, by Feder and Uy (1985), 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 intertemporal variation in credit ratings based on *Institutional Investor* data.¹⁰

⁹ See, for instance, Feder and Uy (1985), Cooper (1987), Brewer and Rivoli (1990), Cosset and Roy (1991), and Lee (1993).

¹⁰ The data set covered eight periods of six months each between the second half of 1979 and the first half of 1983. The basic methodology was to apply logistic transformation to the creditworthiness rankings, followed by regression analysis. Nine economic explanatory variables were considered: the ratio of debt to GNP; the ratio of reserves to imports; average export growth rate; GDP growth; terms of trade; concentration of exports; GNP per capita; an oil exporter dummy; and a dummy for countries with debt-servicing difficulties. An explanatory variable to capture political risk, in the form of a dummy for political turmoil, was also included in some of the regressions.

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 showed 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 1979–81 and the 1982–83 periods.

In the second exercise, Feder and Uy's study tried to evaluate the effect of changes in economic variables on creditworthiness in 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; however, as this higher growth rate entailed heavier borrowing to provide for resources for increased investment, it could reduce creditworthiness in subsequent periods. Increases in the rate of growth of exports (if sustained over the long run) significantly strengthened creditworthiness. For instance, in the long run, an increase of 1 percentage point in export growth improved creditworthiness by nearly 5 percentage points. This effect, which was much larger than the "static" effect of export growth, was due to the fact that an acceleration in export revenue growth reduced borrowing requirements in every period, which, in turn, lowered the ratio of debt to GDP and improved creditworthiness further.

A more recent study was undertaken by Brewer and Rivoli (1990), who focused on the effect of political instability—as well as the impact of some economic variables—in determining creditworthiness. Their sample consisted of the 30 most heavily indebted developing countries; the country creditworthiness indicators were mainly from *Institutional Investor*, but some analysis was also done using *Euromoney* data.¹¹ 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

¹¹ As explained in Appendix I, the two indicators are based on different types of sources: *Institutional Investor* data are based on surveys of bankers, while *Euromoney* data use credit and market indicators to gauge financial market conditions.

creditworthiness for 1987; the data on economic variables were for the preceding year while explanatory variables were computed over the 1967–86 period. The results showed that, while frequency of a change in government regime was significant as a proxy for political stability, two other variables proxying the degree of armed conflict and political legitimacy were not significant.

Cosset and Roy (1991) examined the credit rating scores of 71 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, as 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 both developed and developing countries.

A fourth study by Lee (1993) examined the effects of both economic and political variables. His sample consisted of 29 heavily indebted countries (of the 30 examined by Brewer and Rivoli). This study again used mainly *Institutional Investor* data, with some estimates based on *Euromoney* ratings. The explanatory variables included three economic variables: the ratio of external debt to GNP; per capita GDP growth; and the ratio of domestic public debt to GDP. However, it was noted that other debt-service variables, such as the ratios of 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 suggested that creditworthiness indicators were explained mainly by the countries' economic performance, rather than by their political situation.

Unlike the above studies, which relied exclusively on standard regression techniques, Cooper (1987) applied a different statistical methodology to explain country risk ratings. He utilized cluster analysis and multiple discriminant analysis to distinguish countries that were likely to seek a rescheduling of their debt.¹² Cluster analysis was used to partition countries into two groups. The first group comprised countries that did not seek any rescheduling of their international debt obligations during 1983, and the

¹²In 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 objective is to determine the relative position of countries and identify the groups that emerge.

second group comprised countries that rescheduled all or part of their debt during 1983. In all, eight explanatory variables were included: average GDP growth (1960–82); inflation (1970–82); the ratio of external debt to GNP (1982); the ratio of short-term debt to total external debt (1982); the ratio of short-term debt to exports (1982); the ratio of reserves to imports (1982); and two debt-service ratios (1982). The results indicated that the cluster analyses were 90 percent correct in their predictions. However, the extent to which the analyses misclassified rescheduling countries as countries that did not reschedule ranged from 12 percent to 25 percent. These eight explanatory variables were also used in the discriminant analysis; the main conclusion was that the discriminant functions scored well in their predictions, with correct classifications ranging from 70 percent to 80 percent. However, the misclassification of countries rescheduling in 1983 as countries that did not reschedule ranged from 20 percent to 70 percent.

V. The Empirical Results: What the Ratings Reveal

While our empirical results suggest that a set of common economic variables influences all three country credit ratings, there are significant differences in the relative importance attached to individual economic factors by the various rating agencies (Tables 5–7). Moreover, there is clear evidence that a country's rating persists over time; that international factors influence country ratings independent of developments in the country; and that regional considerations and a country's export profile often strongly influence a country's rating.

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 the regressions (Tables 5–7).¹³ While these coefficients are all statistically significantly less than one, they indicate that the greatest persistence has been evident in the case of the *Institutional Investor* ratings, with some lower values for *Euromoney* and Economist Intelligence Unit ratings.¹⁴ Not surprisingly, these findings suggest that, in the absence of new information, the ratings remain virtually constant over time.

¹³ The *t*-ratios are given in the parentheses below each coefficient. A double asterisk indicates those parameters that are statistically significant at the 5 percent level of confidence.

¹⁴ A first-difference specification of our model was also examined, and the results are available upon request.

Table 5. Institutional Investor Ratings

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

| | | | | | | | | |
|------------------------|-------|-----|--------------------|--------|----------------------|--------|--------------------|--------|
| <i>ASIA</i> | ... | ... | 4.369** (2.571) | 0.006 | ... | ... | ... | ... |
| <i>AFRICA</i> | ... | ... | -0.288 (-0.218) | -0.001 | ... | ... | ... | ... |
| <i>MIDEAST</i> | ... | ... | 2.687 (1.612) | 0.002 | ... | ... | ... | ... |
| <i>EUROPE</i> | ... | ... | 5.654 (1.900) | 0.003 | ... | ... | ... | ... |
| <i>FUEL</i> | ... | ... | ... | ... | -3.605 (-1.819) | -0.005 | ... | ... |
| <i>PRIMARY</i> | ... | ... | ... | ... | -4.960** (-2.340) | -0.011 | ... | ... |
| <i>SERVPRIV</i> | ... | ... | ... | ... | -5.009** (-2.331) | -0.006 | ... | ... |
| <i>DIVERSEX</i> | ... | ... | ... | ... | -3.823 (-1.830) | -0.004 | ... | ... |
| <i>MARKET BOR</i> | ... | ... | ... | ... | ... | ... | 2.389 (1.392) | 0.004 |
| <i>DIVERS BOR</i> | ... | ... | ... | ... | ... | ... | -0.008 (-0.006) | -0.000 |
| R^2 | 0.971 | ... | 0.971 | ... | 0.971 | ... | 0.971 | ... |
| Number of observations | 942 | ... | 942 | ... | 942 | ... | 942 | ... |
| \bar{R}^2 | 0.971 | ... | 0.971 | ... | 0.971 | ... | 0.971 | ... |

Notes: The t -ratios are given in parentheses below each coefficient. A single asterisk indicates a derivative. A double asterisk indicates statistical significance at the 5 percent level.

Table 6. Euromoney Ratings

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

| | | | | | | | | |
|------------------------|-------|-----|----------|--------|-----|-----------|--------|----------|
| 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** |
| | ... | ... | ... | ... | ... | ... | ... | (3.110) |
| DIVERS BOR | ... | ... | ... | ... | ... | ... | ... | 1.665 |
| | ... | ... | ... | ... | ... | ... | ... | (0.429) |
| R ² | 0.780 | ... | 0.787 | ... | ... | 0.790 | ... | 0.783 |
| Number of observations | 766 | ... | 766 | ... | ... | 766 | ... | 766 |
| \bar{R}^2 | 0.776 | ... | 0.783 | ... | ... | 0.785 | ... | 0.778 |

Notes: The *t*-ratios are given in parentheses below each coefficient. A single asterisk indicates a derivative. A double asterisk indicates statistical significance at the 5 percent level.

Table 7. *Economist Intelligence Unit Ratings*

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

| | | | | | | | | |
|------------------------|-------|-----|-----------|--------|-------|-----|-------|-----|
| <i>ASIA</i> | ... | ... | 4.025 | 0.005 | ... | ... | ... | ... |
| | ... | ... | (0.548) | ... | ... | ... | ... | ... |
| <i>AFRICA</i> | ... | ... | -20.159** | -0.034 | ... | ... | ... | ... |
| | ... | ... | (-3.027) | ... | ... | ... | ... | ... |
| <i>MIDEAST</i> | ... | ... | -2.343 | -0.001 | ... | ... | ... | ... |
| | ... | ... | (-0.292) | ... | ... | ... | ... | ... |
| <i>EUROPE</i> | ... | ... | 7.724 | 0.003 | ... | ... | ... | ... |
| | ... | ... | (0.741) | ... | ... | ... | ... | ... |
| <i>FUEL</i> | ... | ... | ... | ... | ... | ... | ... | ... |
| | ... | ... | ... | ... | ... | ... | ... | ... |
| <i>PRIMARY</i> | ... | ... | ... | ... | ... | ... | ... | ... |
| | ... | ... | ... | ... | ... | ... | ... | ... |
| <i>SERVPRIV</i> | ... | ... | ... | ... | ... | ... | ... | ... |
| | ... | ... | ... | ... | ... | ... | ... | ... |
| <i>DIVERSEX</i> | ... | ... | ... | ... | ... | ... | ... | ... |
| | ... | ... | ... | ... | ... | ... | ... | ... |
| <i>MARKET BOR</i> | ... | ... | ... | ... | ... | ... | ... | ... |
| | ... | ... | ... | ... | ... | ... | ... | ... |
| <i>DIVERS BOR</i> | ... | ... | ... | ... | ... | ... | ... | ... |
| | ... | ... | ... | ... | ... | ... | ... | ... |
| <i>R²</i> | 0.853 | ... | 0.861 | ... | 0.857 | ... | 0.856 | ... |
| Number of observations | 238 | ... | 238 | ... | 238 | ... | 238 | ... |
| \bar{R}^2 | 0.844 | ... | 0.850 | ... | 0.845 | ... | 0.846 | ... |

Notes: The *t*-ratios are given in parentheses below each coefficient. A single asterisk indicates a derivative. A double asterisk indicates statistical significance at the 5 percent level.

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 nongold 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*, has a significantly positive effect on the *Institutional Investor* and *Euromoney* ratings, it has only a statistically insignificant positive effect on the EIU ratings. In contrast, an increase in the rate of growth of a country's exports, *EXG*, would significantly raise the country's Economist Intelligence Unit and *Institutional Investor* ratings but would have a smaller positive effect on its *Euromoney* rating. In those regressions in which the coefficients on both *GR* and *EXG* are significantly positive, the elasticity of the growth rate of GDP is much higher than that for the growth rate of exports; in fact, the elasticity of the GDP growth rate is often comparable to that of 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 "problem" countries according to whether these countries experience high inflation. In particular, the high-inflation dummy, *HI-INF DUM*, 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 *Euromoney* ratings, in which a country's rating can fall 60–80 points (out of 100).¹⁵ Moreover, countries that are *not* in the high-inflation group were also penalized in both the *Euromoney* and *Institutional Investor* ratings as their inflation rate increased.¹⁶

Although it was expected that a similar distinction would be made for countries with high and low ratios of external debt to GDP, the coeffi-

¹⁵ One anomaly in the *Euromoney* results is that in some regressions the high-inflation slope coefficient is significantly positive.

¹⁶ This situation is reflected in the significant negative coefficients on the low-inflation slope dummy variable, *LO-INF SLP*.

cients on the high-debt dummy variable and the high-debt slope dummy variable are insignificant in all regressions. Nonetheless, the low-debt slope dummy variable is significantly negative in the *Institutional Investor* ratings, implying that low-debt countries are penalized as their debt ratio increases.

Regional and structural characteristics appear to have influenced country ratings independent of other economic fundamentals. As mentioned above, we have examined this possibility by using three different criteria for classifying countries: regional location, export orientation, and the type of borrower (for example, borrowers from international capital markets versus official sources).

Regional effects are evident in all three ratings. In the *Euromoney* ratings, for example, developing countries in Asia, the Middle East, and Europe have traditionally had ratings between 10 points and 20 points higher than countries from Latin America (which is taken as the control group) and Africa. Similarly, the Economist Intelligence Unit ratings tend to assign significantly positive values to countries from Asia and, to a lesser extent, from Europe. In addition, the Economist Intelligence Unit 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 the regressions involving the *Euromoney* and *Institutional Investor* ratings, all other country groupings appear to have significantly lower rankings than the exporters of manufactured goods. In contrast, the Economist Intelligence Unit appears to attach significantly negative ratings to only fuel exporters and producers of primary products.

While borrowers from commercial markets and diversified borrowers should score higher than official borrowers, the advantage in terms of credit ratings seems relatively modest. Only in the case of the *Euromoney* ratings is there a significantly positive coefficient associated with the dummy variable for market borrowing.

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 independent of the quality of their domestic policies and economic performance. In particular, an increase of 100 basis points in international interest rates (as represented by the U.S. treasury bill rate) would reduce a country's rating in the short term by between 2 points (in the case of the Economist Intelligence Unit and *Institutional Investor* ratings) and 7

points (in the case of the *Euromoney* ratings), independent of any domestic economic developments.¹⁷

VI. 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 that 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 the economic fundamentals typically accounts for 80 percent to over 95 percent of the variation in credit ratings.

The most important domestic economic variables influencing country credit ratings were found to be the ratio of nongold 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 nongold foreign exchange reserves to imports. In addition, the effect of inflation on credit ratings was found to be nonlinear, with high-inflation countries penalized more than 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 whether it is primarily an exporter of fuel or 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, independent of the quality of their domestic economic fundamentals.

Our results imply that certain policies play a key role in rebuilding a country's credit rating during stabilization programs. The persistence evi-

¹⁷ Given the large coefficient of the lagged value of the credit rating variable (α_L), the long-run effect on a country's credit rating of the higher interest rate would be $\alpha_{ius}/(1-\alpha_L)$, where α_{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 (1989–92). However, these regime differences seem to follow developments in the international financial markets and are rendered insignificant with the inclusion of the international interest rate in the regression analysis.

dent in country ratings means that the rebuilding of a country's creditworthiness rating normally takes an extended period of time; however, certain measures can help shorten the rebuilding process. For a country that has 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. Rebuilding the ratio of nongold foreign exchange reserves to imports would also be an important step, as this variable consistently has one of the highest estimated elasticities in all the rating equations. Finally, an improvement in the country's current account balance and a revival of growth would also help strengthen the country's rating.

APPENDIX I

Assessment of Country Credit Risk: Methodologies Used by Rating Agencies

Institutional Investor

The *Institutional Investor* country credit ratings, which were first compiled in 1979, are published semiannually and are based on evaluations obtained from the staffs of about the 100 largest 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 0–100, with 100 representing those with the smallest chance of default.¹⁸ Banks are not permitted to rate their home countries. The *Institutional Investor* ratings for individual countries are then obtained by weighting individual bank responses according to a formula that gives greater weight to responses from those banks with the largest worldwide loan exposures and most sophisticated systems for analyzing country risk. While there is substantial consistency among 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.¹⁹

Euromoney

In recent years, *Euromoney* has changed the methodology used in its annual assessment of country risk. Prior to 1987, its risk ratings were based solely on judgmental criteria. The following weights applied: access to international bond markets,

¹⁸ See Table 1 for a summary of the determinants of the available creditworthiness indicators, as well as for a comparison of these determinants.

¹⁹ For instance, in rating developing countries, European bankers rank foreign direct investment as fifth in importance, while Asian bankers put it in seventh place and Western Hemisphere bankers rank it ninth. In contrast, bankers in the Western Hemisphere rank fiscal policy fifth, while those in Europe and Asia rank this policy as the seventh and ninth most important factor, respectively.

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 oversubscription 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 an 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). Political risk reflects a judgment by political risk specialists regarding the likelihood and the potential effect 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 debt-service payments to exports, which serves as a measure of short-term liquidity needs; and 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 sell-down on short-term paper (10 percent), and access to, and discount available on, forfeiting (15 percent).²⁰

Economist Intelligence Unit

The quarterly country creditworthiness ratings prepared by the Economist Intelligence Unit 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 derived from an assessment of the evolution of external indebtedness and trends in the current account. The following eight variables are used in assessing this risk: the ratio of total external debt to GDP, the total debt-service ratio, the interest payments ratio, the ratio of current account to GDP, the 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, zero represents the lowest risk, and 5 (or 10 for the interest payments ratio) represents the highest risk. Thus, a maximum weight of 45 points is possible for this category, indicating maximum risk.²¹

Political and economic policy risk, which carries a maximum weight of 40 points, is more difficult to quantify than the medium-term lending risk. Economic policy risks relate to the quality and consistency of economic management, as well as to the un-

²⁰ 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.

²¹ For each of the above variables, the scores are obtained by using the average of the ratings over the preceding two years.

derlying performance of the economy. Fiscal, monetary, and exchange rate policies, attitudes toward foreign investment, and the size and performance of the public sector are given ratings such as “very good” or “poor” and receive a quantitative score.

Political and strategic risks are the most subjective of all the creditworthiness factors considered by the Economist Intelligence Unit. 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 variables 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 toward foreign creditors.

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

APPENDIX II

Definitions of Explanatory Variables Used in Regressions

Measures of External Shocks

| | |
|--------------|---|
| <i>TOT</i> | Terms of trade in the year prior to the year of the rating. |
| <i>TBILL</i> | Three-month U.S. treasury bill rate. |

Measures of External Sector Performance

| | |
|--------------------|---|
| <i>EXG</i> | Growth of exports in the year prior to the year of the rating. |
| <i>CUR</i> | Current account balance as a proportion of GDP for the year prior to the year of the rating. |
| <i>RES</i> | International reserves as a ratio of imports for the year prior to the year of the rating. |
| <i>HI-DEBT DUM</i> | Intercept dummy: 1 if debt-to-GDP ratio greater than 47 percent (100 percent for <i>Institutional Investor</i>); 0 otherwise. |
| <i>HI-DEBT SLP</i> | Slope dummy: debt-to-GDP ratio in high-debt countries (i.e., countries with debt-to-GDP ratio greater than 47 percent (100 percent for <i>Institutional Investor</i>)); 0 otherwise. |
| <i>LO-DEBT SLP</i> | Slope dummy: debt-to-GDP ratio in low-debt countries (i.e., countries with debt-to-GDP ratio less than 47 percent (100 percent for <i>Institutional Investor</i>)); 0 otherwise. |
| <i>REER</i> | Real exchange rate in the year prior to the rating. |

Measures of Domestic Economic Performance

| | |
|-------------------|---|
| <i>GR</i> | Growth rate in GDP for the year prior to the year of the rating. |
| <i>HI-INF DUM</i> | Intercept dummy: 1 if annual inflation greater than 300 percent; 0 otherwise. |

HI-INF SLP Slope dummy: inflation rate in high-inflation countries (i.e., countries with annual inflation greater than 300 percent); 0 otherwise.

LO-INF SLP Slope dummy: inflation rate in countries with annual inflation less than 300 percent.

Measures of Regional and Structural Characteristics (Intercept Dummies)

Regional categories

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.

WESTHEM 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 exporter of manufactured goods; 0 otherwise.

SERVPRIV 1 if country is exporter of services and recipient of private transfers; 0 otherwise.

DIVERSEX 1 if country has diversified export base; 0 otherwise.

Financial classification

DIVERS BOR 1 if country borrows from diverse sources; 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.

Other Variable

LDV Lagged dependent variable.

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