

Country Risk Analysis: A Survey^{*}

First Draft: July 2, 1998
Current Version: March 2004

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Abstract : In view of the rapid growth of international lending and foreign direct investments, the country risk analysis has become extremely important for the international creditors and investors. This paper traces the history of country risk analysis and briefly discusses the methods used by banks, agencies and researchers for evaluating country risk. Both qualitative and quantitative methods have evolved over time and constant research has contributed to the richness and sophistication of these techniques. This paper also reviews some of the statistical/econometric studies on country risk appraisal. While these studies display a distinct chronological pattern of gradual improvements in terms of technique and analytical competence none of them is complete in terms of scope and coverage.

^{*} This is a revised version of a report on country risk analysis which was a part of the Summer Graduate Research Workshop at the Department of Economics, Southern Methodist University. Financial Support from the Richard B. Johnson Center is gratefully acknowledged. I am grateful to Prof Tom Fomby for introducing me to the topic and for guiding me through the project. I would also like to thank other members of workshop for their comments and discussions.

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1. Introduction

Country risk is the risk associated with `those factors which determine or affect a country's ability and willingness to pay on schedule interest and amortization on its external debt'[‡]. More specifically, it is `the credit risk of borrowers in a country as a whole viewed from a specific country perspective'[§]. It differs from sovereign risk in that the latter is the credit risk of a sovereign government as a borrower. Thus country risk analysis consists mainly of the assessment of the political and economic factors of a borrowing country which may interrupt timely repayment of principal and interest. Country risk needs to be treated as a separate risk - different from the credit risk of individual borrowers - because the borrowers don't have any control over these factors.

The country risk analysis results are used as pre-lending as well as post-lending decision tools. Prior to lending, decisions such as whether or not to lend, how much to lend, and how much risk premium it should charge, are based on the measured risk. After lending, periodic country risk analysis serves as a monitoring device, providing a pre-warning system. The result of the analysis is also used to determine the need for bank loan portfolio adjustment and the discount prices of loans when they are sold in the secondary market.

This paper is intended to give a brief overview of various methods used for evaluating country risk. It also reviews some of the statistical and econometric studies on

[‡] Saini et al, 1984. This definition of country risk is narrow in the sense that it focuses only on international lending, thus leaving aside the risk associated with foreign direct investment. Since the country specific factors affecting the success and failure of FDIs are not different from those affecting repayment of debt the same set of country risk analysis results might provide important guide to FDI decisions.

this subject. The rest of this paper is organized as follows. Section 2 gives a brief historical background of country risk analysis. Section 3 briefly describes various techniques used for the analysis. A brief review of selected studies is presented in section 4. Section 5 summarizes and concludes the discussion.

2. Historical Background of Country Risk Analysis

The history of country risk analysis goes back to the late sixties when Avramovic et al (1968) at the World Bank undertook a systematic examination of factors that affect a country's balance of payments and, hence, its ability to service external debt. They suggested a combination of short-term and long-term indicators for evaluating a country's debt servicing capacity. They considered the following short-term indicators which are related to liquidity aspects of a country's ability to service its external debt: [1] growth rate of export volume, [2] the ratio of debt service payments to exports, and [3] the ratio of foreign exchange reserves to imports. The long-term indicators which were considered mainly to determine the conditions under which economic growth financed in part by foreign capital can succeed and thus provide for continuous servicing of external debt, included : [1] growth rate of GDP, [2] the ratio of investment to GDP, [3] the ratio of exports to GDP, and [4] the rate of price increases. Prior to the first oil price shock (1973-74), most developing countries received foreign funds largely in the form of long-term, mostly concessional and project-related, loans from multilateral and bilateral official sources. After the first oil price shock, the resources of the official institutions

[§] Kim, T.1993, pp. 382

proved insufficient to meet the large external imbalances developing countries began to experience and the commercial banks had to step in to meet these increasing needs.[find out the share from BIS...it was one third in 1972]. After the second oil price shock of 1979-80, most countries with large external debts experienced debt servicing problems. Since then the country risk analysis has increasingly become the focus of attention of not only banks and international institutions, but also governments and the general public. At present most international banks and several independent agencies undertake country risk analysis.

3. Methods Used for CRA

The methods used by the banks and other agencies for country risk analysis can broadly be classified as qualitative or quantitative. However many agencies amalgamate both qualitative and quantitative information into a single index or rating. A survey conducted by the US Eximbank categorized the various methods of country risk appraisal used mainly by the banks into one of four types : (1) fully qualitative method, (2) structured qualitative method, (3) checklist method, and (4) other quantitative method.

3.1 Fully Qualitative Method

The fully qualitative method usually involves an in-depth analysis of a country without a fixed format. It usually takes the form of a report that includes a general discussion of a country's economic, political, and social conditions and prospects. It is more of an ad hoc approach which makes it difficult for users to compare one country

with another. One advantage of this method is that it can be adapted to the unique strengths and problems of the country undergoing evaluation.

3.2 Structured Qualitative Method

The structured method uses some standardized format with specifically stipulated scope and focus of analysis. Since it adheres to a uniform format across countries and is augmented by economic statistics it is easier to make comparisons. Still, considerable subjective judgment has to be made by analysts. This method was the most popular among the banks during the late seventies. The political risk index provided by Business Environment Risk Intelligence (BERI) S. A. is an example of country risk rating by structured qualitative method. Chart I shows the components of this index.

Chart I: Example of Structured Qualitative Method

The BERI Political Risk Index

<i>Components</i>
Political Factionalization
Linguistic/Ethnic/Religious Tension
Coercive Measure to Maintain Regime
Mentality : Nationalism, Corruption, Nepotism
Social Conditions : Population, Income Distribution
Radical Left Strength
Dependence on Outside Major Power
Regional Political Forces
Social Conflict
History of Regime Instability

Source: Harvey, Campbell 1996.

3.3 Checklist Method

The checklist method involves scoring the country under consideration with respect to specific variables that can be either quantitative - in which case the scoring requires no personal judgment or even first-hand knowledge of the country being scored - or qualitative - in which case the scoring requires subjective determinations. Each item is scaled from the lowest to the highest score. The sum of scores is then used as a measure of country risk. It is possible to vary the influence that each component variable has on the final score by assigning a weight to each indicator; this is the weighted checklist approach. An example of the weighted checklist method is shown in chart II. The main advantage of this method is that the final summary score it yields is amenable to sophisticated quantitative treatment. Such exercises could provide valuable insight into the checklist's past accuracy in evaluating country risk. In recent years, this method has become popular with the banks and other country rating agencies.

Chart II: Example of Checklist Method

The ICRG Composite Rating System

<i>Political</i>	<i>Weight</i>	<i>Financial</i>	<i>Weight</i>
Economic expectations versus reality	6%	Loan default or unfavorable loan restructuring	5%
Economic planning failures	6%	Delayed payment of suppliers' credits	5%
Political leadership	6%	Repudiation of contracts by government	5%
External conflict	5%	Losses from exchange controls	5%
Corruption in government	3%	Expropriation of private investments	5%

Military in politics	3%	Total Financial Points	25%
Organized religion in politics	3%	Economic	
Law and order tradition	3%	Inflation	5%
Racial and nationality tension	3%	Debt service as a % of exports of goods and services	5%
Political terrorism	3%	International liquidity ratios	3%
Civil War	3%	Foreign trade collection experience	3%
Political party development	3%	Current account balance as % of goods and services	8%
Quality of bureaucracy	3%	Parallel foreign exchange rate market indicators	3%
Total Political Points	50%	Total Economic Points	25%
Overall Points			100%

Source: Harvey, Campbell 1996.

3.4 Other Quantitative Methods

The quantitative models used in econometric/statistical studies of country risk analysis can broadly be categorized into four groups: Discriminant Analysis, Principal Component Analysis, Logit Analysis and Classification and Regression Tree Method.

3.4.1 Discriminant Analysis

This method is used to classify countries into debt rescheduling and non-rescheduling countries by choosing appropriate variables. Let X_1, X_2, \dots, X_m be a set of m explanatory variables. These m variables are assumed to have a multivariate normal distribution in each population. The discriminant function $Y = \sum_{i=1}^m B_i X_i, i = 1, 2, \dots, m$ is a linear combination of the explanatory variables. B_i 's are to be estimated in such a way that the ability of Y to differentiate between members of the two groups is maximized.

This is done by maximizing the ratio of the weighted between-groups variance to the pooled within-groups variance of Y. Using the observations on X_i 's, one can then obtain the estimates of Y for each country. Performing this operation for each rescheduling and non-rescheduling country yields a frequency distribution of Y-values for each group from which mean Y-values are computed. Then a country is assigned to one group or to the other looking at the proximity of its Y-value to the respective mean values of the two groups. In most instances, there may be a few overlaps and statistical type I and type II errors may occur. Type I error occurs when debt rescheduling countries are incorrectly classified as non-rescheduling countries, whereas type II error occurs when non-rescheduling countries are incorrectly classified as rescheduling countries. Hence the next task is to determine the optimal cutoff or critical value for Y so that type I error or a combination of two errors can be minimized. This is an example of predictive use of discriminant analysis. One major criticism of this approach is that the variables are assumed to have a multivariate normal distribution, which may not be true. In practice, the data may not often arise from a population having multivariate normal distribution.

3.4.2 Principal Component Analysis

In this approach, a large number of variables or indicators are replaced by a smaller set of composite indicators, known as principal components with special properties in terms of variances. For example, the first principal component is the normalized linear combination with maximum variance. Since the objective of the studies using this approach is to describe and analyze how countries differ with respect to various indicators which may be large in number, one way of reducing the number of

variables to a manageable quantity is to discard the linear combinations which have small variances. The principal components give a new set of linearly combined variables, which show considerable variation. Formally, suppose that we have k explanatory variables : X_1, X_2, \dots, X_k . Then we consider linear functions of these variables :

$$Z_i = \sum_{j=1}^k B_j X_j, \quad i = 1, 2, \dots, \text{etc.}$$

Suppose we choose the B 's so that the variance of Z_1 is maximized subject to the condition that

$$\sum_{i=1}^k B_i^2 = 1$$

This is the normalization condition. Z is then said to be the first principal component. This maximization exercise produces k solutions. Corresponding to these, we construct k linear functions Z_1, Z_2, \dots, Z_k . These are called the principal components of the X 's. They are then ordered so that

$$\text{var}(Z_1) > \text{var}(Z_2) > \dots > \text{var}(Z_k)$$

Z_1 with the highest variance is called the first principal component, Z_2 with the next highest variance is called the second principal component, and so on. One important property of Z 's is that the sum of the variances of Z s is equal to the sum of the variances of X s. Now if, for example, this analysis shows that two principal components account for a large part of the variation in the explanatory variables then by looking at the coefficients, we can identify the countries whether they are rescheduling debt or not. One problem with this method is that often it becomes difficult to interpret the principal components or the composite indicators.

3.4.3 Logit Analysis :

The basic assumption of this approach is that the probability of rescheduling is related to the variables by the functional form

$$\Pr(Y_i = 1) = P_i = \frac{1}{(1 + e^{-w_i})} \quad , \quad i = 1, 2, 3, \dots, N$$

where $W_i = b_0 + \sum_{j=1}^M b_j X_{ij}$ is a linear combination of explanatory variables and a set of coefficients $B = (b_0, b_1, \dots)$ which are to be estimated, $Y_i = 1$ for rescheduling cases and $Y_i = 0$ for non-rescheduling cases, M is the number of explanatory variables, and N is the total number of observations. It is assumed that there is some linear combination W of independent variables that is positively related to the probability of rescheduling. In other words, the higher values of W_i indicate a higher probability of rescheduling, conditional on the country's values for explanatory variables. The coefficient vector B must be inferred from the known values of explanatory and dependent variables since it is not known a priori. Of all the models discussed above, this approach has more desirable statistical properties for empirical work involving a binary-valued dependent variable for rescheduling and non-rescheduling cases. One serious limitation of this approach is that a common B is used for all countries. That is we assume that the countries are homogeneous in nature, which may not be the case. To overcome this lacuna Oral et al [1992] suggested what they called Generalized Logit.

Generalized Logit

Let there be n countries which are evaluated by Institutional Investor with respect to m factors or indicators. Let x_{ij} be the score of country i with respect to factor j . The

contribution of x_{ij} to country risk rating is assumed to be given by $u_{ij} = f_j(x_{ij}) = \beta_{ij}x_{ij}$. Let r_i be the country risk rating assigned to country i by Institutional Investor using the Generalized Logit Model :

$$r_i = \frac{\exp(u_0 + \sum_j u_{ij})}{1 + \exp(u_0 + \sum_j u_{ij})} ,$$

where u_0 is a constant. The only difference with the Logit model is that in this model the coefficients are allowed to be different for different countries. Then Oral et al have developed a mathematical programming model to estimate the parameters β 's. This model produces estimates of r_i 's by minimizing various errors. This model seems to be doing better than the Logit model or the CART model in terms of reproducing the Institutional Investor's country risk ratings.

3.4.4 Classification and Regression Tree (CART) Method

In this approach, estimates are obtained through a series of sequential binary splits of a given set of countries, based on critical values of independent variables. To start with, a factor or an indicator is identified to split the countries into two distinct groups. This involves comparing a given country's score with the critical value of the discriminatory factor. These two groups are further split on the basis of other discriminatory factors and their critical values. This process continues until the current group of countries is completely decomposed into purer or homogeneous groups. The final tree thus obtained is then used to estimate the country risk ratings of the countries. The country risk estimate for a given country is simply taken to be equal to the mean of the actual rating scores of the countries in the subgroup to which the country in question

belongs. More specifically, let C_1, C_2, \dots, C_p be the disjoint subgroups of countries identified by CART. Then the country risk estimate \hat{r}_i for country i is given by

$$\hat{r}_i = \left\{ \sum_{j \in C_h} r_j \right\} / |C_h| ,$$

for $i \in C_h$ and $h = 1, 2, \dots, p$

where $|C_h|$ is the number of countries in C_h .

4. Review of Quantitative Studies

In this section, we briefly review some of the studies which used one or the other of the techniques discussed in section 3.4. The studies that used the discriminant analysis approach includes : Frank and Cline (1971), Grinols (1976), Abassi and Taffler (1982). The explanatory variables selected by Frank and Cline included : debt service ratio, index of export fluctuations, compressibility of imports, imports/GNP ratio, imports/reserves ratio, amortization/debt ratio, per capita GNP, and growth of exports. They did the analysis for 26 countries using data on these variables for the period 1960-68 and concluded that three short-term variables, namely debt service ratio, imports reserve ratio and amortization ratio, were significant in determining whether or not a country rescheduled its debt. The Grinols study build upon the Frank and cline study using the same technique. However he considered twenty variables for a sample of 64 countries with observations covering the 1961-74 period. He found five variables to be statistically significant : debt service payments/reserve ratio, disbursed external debt/debt service

payments ratio, debt service payments/imports ratio, external debt/GDP ratio, and external debt/exports ratio. Overall, however, this study did not add significantly to the state of the art.

Abassi and Taffler (1982) used the discriminant analysis to a sample of 1140 observations on 95 countries for the period 1967-1978. The sample contained 55 rescheduling cases. They considered 42 indicators in their analysis. Their study was an improvement over the earlier studies in the following respects : first, they used principal components analysis to identify the degree of intercorrelation among variables. Second, to correct for serial correlation and to obtain an unbiased estimate of the true classification error rate, the model was calculated using a step-wise Fisher discriminant approach to select variables. They found four variables statistically significant : new loan commitments per capita, external debt exports ratio, the rate of inflation and domestic credit GDP ratio. The fact that their dependent variable only includes cases of rescheduling as indicative of debt servicing problems it leaves wide open the possibility of other cases of, for example, balance of payments difficulties.

The studies using the principal components technique includes the study by Dhonte(1975). He considered 13 cases of debt rescheduling between 1959 and 1971, and compared them with a sample of 69 non-rescheduling countries in 1969. Dhonte examined ten indicators and found four of them to be the most significant for the first principal component, which explained about 35 percent of the variation in the sample data. The second principal component explained another 18 percent of the variation and two more indicators were found to be the most significant. He then selected variables

from each of these groups and concluded that to avoid debt servicing problems a balance must be maintained between a debtor's 'involvement' in debt and the terms on which debt is accumulated. Dhonte's results are less convincing.

Using logit analysis and nine economic indicators, which includes seven considered by Frank and Cline, for the time period 1965-72, Feder and Just (1977) found twice as many significant explanatory variables for the 21 instances of rescheduling. The variables include the debt-service ratio, the ratio of debt amortization to total debt outstanding, the ratio of imports to international reserves, income per capita, the ratio of capital inflows to debt service payments, GDP growth, and export growth. Unlike Frank and Cline they included medium-term and long term economic variables

Mayo and Barrett (1977) used the logit analysis to design a model of debt early warning. Their analysis covers 48 countries for the period 1960-1975 and examines a larger set of indicators. They also investigated instances of debt servicing difficulty other than formal rescheduling. Their model attempted to predict debt servicing difficulties five years into the future. Six indicators - disbursed external debt exports ratio, reserves imports ratio, gross fixed capital formation GDP ratio, imports GDP ratio, reserve position in the IMF imports ratio, and the rate of increase in consumer prices - were found to have the best predictive use among the statistically significant indicators.

Muhittin Oral et al (1992) applied to a group of 70 countries a procedure that employs the G-logit model to link country risk rating and political-economic indicators. The indicators they considered included : reserves imports ratio, net foreign debt exports ratio, GNP per capita, current account balance to GNP ratio, investment to GNP ratio,

export variability, export growth rate, political instability indicator, country group indicator. The countries were classified into seven groups according to some common political and economic indicators. However this study didn't add anything new to the empirical literature on the subject except that their model did better than the Logit model and the CART model in reproducing Institutional Investor's country risk ratings.

The study by Claude B Erb et al (1996) is an investigation into a new direction. They tried to measure the economic content of five different measures of country risk : The International Country Risk Guide's political risk, the financial risk, economic risk and composite risk indices and Institutional Investor's country credit ratings. First, they conducted trading simulations to explore whether any of these measures contain information about future expected stock returns. The ICRG composite, financial and economic ratings were found to contain considerable information. Then they confirm these results by using cross-sectional regressions. They also found that economic and financial risk measures, in fact, can predict the cross-section of expected returns. This is most strongly evidenced in the developed markets in their sample.

As it is clear from the above discussion, most studies have very narrow focus. Broadly these studies can be classified as having addressed one of the three issues : classifying the countries as debt rescheduling or non-rescheduling country; reproducing the country risk ratings of different agencies by using econometric/statistical models; and examining whether these country risk ratings can provide important guides to know about the financial market. These studies provide in sample analysis of the issue they address. This considerably limits their usefulness for time series forecasting purposes.

5. Conclusion

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