

## THE COUNTRY RISK RATINGS: A QUANTITATIVE CLASSIFICATION OF THEORETICAL COUNTRY RISK MODELS

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### Abstract:

Country risk has become a topic of major concern for the international financial community over the last three decades. Various risk rating agencies employ different methods to determine country risk ratings, combining a range of qualitative and quantitative information regarding alternative measures of political, economic and financial risk into associated composite risk ratings.

### 1. INTRODUCTION

Following the rapid growth in the international debt of less developed countries in the 1970s and the increasing incidence of debt rescheduling in the early 1980s, country risk, which reflects the ability and willingness of a country to service its financial obligations, has become a topic of major concern for the international financial community. Political changes resulting from the fall of communism, and the implementation of market-oriented economic and financial reforms, have resulted in an enormous amount of external capital flowing into the emerging markets of Eastern Europe, Latin America, Asia, and Africa. These events have alerted international investors to the fact that the globalisation of world trade and open capital markets are risky elements that can cause financial crises with rapid contagion effects, which threaten the stability of the international financial sector. Given these new developments, the need for a detailed assessment of country risk and its impact on international business operations is crucial.

A primary function of country risk assessment is to anticipate the possibility of debt repudiation, default or delays in payment by sovereign borrowers. Country risk assessment evaluates economic, financial, and political factors, and their interactions in determining the risk associated with a particular country. Perceptions of the determinants of country risk are important because they affect both the supply and cost of international capital flows.

Risk rating agencies provide an independent analysis of country risk and a consistent method of risk assessment. The leading risk rating agencies are Standard & Poor's, Moody's, Euromoney, Institutional Investor, Economist Intelligence Unit, and the International Country Risk Guide, all of which employ different methods in determining country risk ratings. These rating agencies combine a range of qualitative and quantitative information regarding alternative measures of political, economic and financial risk into associated composite risk ratings.

The plan of the paper is as follows. Section 2 provides a quantitative classification of empirical country risk models. Various theoretical and empirical model specifications used in the literature are reviewed analytically and empirically in Section 3. Some concluding remarks are presented in Section 5.

## 2. CLASSIFICATION OF COUNTRY RISK MODELS

For purposes of evaluating the significance of empirical models of country risk, it is necessary to analyse such models according to established statistical and econometric criteria. The primary purpose of each of these empirical papers is to evaluate the practicality and relevance of the economic, financial and political theories pertaining to country risk.

This paper reviews 50 published empirical studies on country risk. A classification of the 50 empirical studies is given according to the model specifications examined, the choice of dependent and explanatory variables considered, the number of explanatory variables used, issues concerning the recognition, type and number of omitted explanatory variables, and the number and type of proxy variables used when variables are omitted.

Scrutiny of the ECONLIT software package and the Social Science Citation Index for the most widely cited articles in the Country Risk literature yields at least 50 published empirical papers over the last four decades in refereed journals.

## 3. THEORETICAL AND EMPIRICAL MODEL SPECIFICATIONS

The general country risk model is typically given as:

$$f(Y_t, X_t, u_t, \beta) = 0$$

in which  $f(\cdot)$  is an unspecified functional form,  $Y$  is the designated (vector of) endogenous variables,

$X$  is the (vector of) exogenous variables,

$u$  is the (vector of) errors,

$\beta$  is the vector of unknown parameters,

$t = 1, \dots, n$  observations.

As will be discussed below, equation (1) is typically given as a linear or log-linear regression model, or as a logit, probit or discriminant model. The elements of  $Y$  and  $X$  will also be discussed below. Defining the information set at the end of period  $t-1$  as

$I_{t-1} = [Y_{t-1}, Y_{t-2}, Y_{t-3}, \dots; X_{t-1}, X_{t-2}, X_{t-3}, \dots]$ , the assumptions of the classical model are typically given as follows:

(A1)  $E(ut) = 0$  for all  $t$ ;

(A2) Constant variance of  $ut$ ;

(A3) Serial independence (namely, no covariation between  $ut$  and  $us$  for  $t \neq s$ );

(A4)  $X$  is weakly exogenous (that is, there is no covariation between  $Xt$  and  $us$  for all  $t$  and  $s$ );

(A5)  $u$  is normally distributed;

(A6) Parameters are constant;

(A7)  $Y$  and  $X$  are both stationary processes, or are cointegrated if both are non-stationary.

There is, in general, little or no theoretical basis in the literature for selecting a particular model. In empirical analysis, however, computational convenience and the ease of interpretation of models are primary considerations for purposes of model selection. Of the 70 models in the 50 studies, which are reported in Table 1, all but six are univariate models. The most popular model in the literature is the logit model, which is used 23 times, followed by the probit, discriminant, and Tobit models, which are used 10, 7, and 3 times, respectively.

**Table 1:** Classification by Type of Model \*

Model	Frequency
Only linear single equations	4
Only log-linear single equations	2
Both linear and log-linear single equations	2
Logit	23
Probit	10
Discriminant model	7
Tobit	3
System of equations	6
Artificial neural network model	12
Others**	11
TOTAL	70

\*More than one model was used in some studies.

The artificial neural network is used only twice. Thus, more than half of the models used in the literature are probability-based models. Given the popularity of the linear and log-linear regression models in empirical economic research, it is surprising to see that the linear regression model is used four times.

The dependent variable for purposes of analyzing country risk is broadly classified as the ability to repay debt. Of the different types of dependent variables used, with more than one dependent variable being used in some studies, the most frequently used variable is debt rescheduling, which is used 36 times. This dependent variable is defined as the probability of general, commercial, and official debt rescheduling or debt default (in the current year or in the future), and discriminant score of whether a country belongs to a rescheduling or non-rescheduling group. The second most frequently used variable is agency country risk rating, which is used 18 times. This dependent variable is defined as Institutional Investor, Euromoney, S&P's, Moody's, and Economist Intelligence Unit country or municipality risk ratings, and the average of agency country risk ratings. These agency ratings are available only annually or semi-annually.

There are three types of explanatory variables used in the various empirical studies, namely economic, financial and political. Treating country risk variables as economic and/or financial, and regional differences as political, Tables 2 and 3 present the numbers of each type of variable and their frequency. In Table 3, the absence of any political variable occurs 30 times in the 50 studies. Hundreds of different economic, financial and political explanatory variables have been used in the 50 separate studies.

**Table 2:** Classification by Number of Economic and Financial Explanatory Variables \*

Number	Frequency
2	3
3	3
4	4
5	2
6	7
7	3
8	5
9	2

10	2
11	1
12	6
13	3
14	1
15	1
16	3
18	1
20	1
23	1
32	1
TOTAL	50

\*Country risk indicators are treated as economic and/or financial variables.

**Table 3:** Classification by Number of Political Explanatory Variables\*

Number	Frequency
0	30
1	4
2	4
3	1
4	2
5	2
6	3
8	1
10	1
11	1
13	1
TOTAL	50

\*Regional differences are treated as political variables.

The unavailability of the required data means that proxy variables have frequently been used in place of the unobserved variables. Tables 4 and 5 are concerned with the important issue of omitted explanatory variables in each of the 50 studies. It is well known that, in general, omission of relevant explanatory variables from a linear regression model yields biased estimates of the coefficients of the included variables, unless the omitted variables are uncorrelated with each of the included explanatory variables. In some studies, there is an indication of the various types of variables that are recognised as being important. Nevertheless, some of these variables have been omitted because they are simply unavailable. The classification in Table 4 is by recognition of omitted explanatory variables, where the recognition is explicitly stated in the study.

**Table 4:** Classification by Recognition of Omitted Explanatory Variables\*

Number Omitted	Frequency
0	30
1	13
2	2
3	2
4	2
8	1

TOTAL	50
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\*The classification is based on explicit recognition of omitted explanatory variables, and is used primarily as a check of consistency against the number of proxy variables used in the corresponding studies.

Such an explicit recognition of omitted explanatory variables is used primarily as a check of consistency against the number of proxy variables used.

The classification in Table 5 is given according to the type of omitted explanatory variable, which is interpreted as predominantly economic and financial or political. More than two-thirds of the omitted explanatory variables are predominantly economic and financial in nature, and the remaining one-third is predominantly political.

**Table 5:** Classification by Type of Omitted Explanatory Variables\*

Omitted Variable	Frequency
Economic and financial factors	28
Political factors	11
TOTAL	39

\*The various omitted variables are classified according to whether they are predominantly economic and financial or political in nature.

As some important economic, financial and political explanatory variables have been omitted from two-fifths of the 50 studies (see Table 4), proxy variables have been used in most of these studies. Tables 6 and 7 are concerned with the issues of the number and type of proxy variables used.

**Table 6:** Classification by Number of Proxy Variables Used\*

Number	Frequency
0	2
1	7
2	4
3	2
4	1
5	1
6	2
7	1
TOTAL	20

\*Two studies explicitly recognized the omission of explanatory variables but used no proxy variables.

By comparison with Table 4, in which 13 of the 20 studies explicitly recognised the omission of a single explanatory variable, Table 6 shows that only 7 studies used a single proxy variable. Otherwise, the results in Tables 4 and 6 are reasonably similar.

**Table 7:** Classification by Type of Proxy Variables Used\*

Proxy Variables	Frequency
Economic and financial factors	34
Political factors	15
TOTAL	49

\*Some studies used economic, financial and political proxy variables.

The classification in Table 7 is given according to the type of proxy variable used. More than two thirds of the proxy variables are predominantly economic and financial in nature, and the remaining one-third is predominantly political, which is very similar to the results in Table 5.

#### 4. CONCLUSION

This paper evaluated the significance of 50 published empirical papers in the country risk literature according to established statistical and econometric criteria..

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