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SEARCHING FOR COUNTRY RISK CLASSES: THE RELEVANT VARIABLES*

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Abstract

The purpose of this paper is twofold. To begin with, depending on the variables considered most relevant in the perception of country risk, it seeks to establish whether countries with similar characteristics as regards this kind of risk can be classified into homogeneous groups. Secondly, it aims to determine whether the groups of variables relevant for discriminating between such groups are identical or different.

To this end, the paper is based on a sample of six-monthly values for each of the 9 variables used in the country risk rating published by *Euromoney* for 149 countries, in the period between September 1992 and September 2002. First, a cluster analysis was made of this sample to identify the groups of countries with homogenous risk characteristics. Discriminant analyses were subsequently applied in a bid to identify the variables with the greatest capacity for distinguishing between such groups.

Key words: Country risk, country risk appraisal, country risk ratings, international investment, international finance.

1. INTRODUCTION[1]

As the process of economic globalization continues, companies, institutional investors, major financial organizations, small and medium enterprises,

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individual investors and, in general, all the players in the financial scenario, are being forced to go further down the path of internationalization. This means they often have to move in what is for them virtually uncharted territory, significantly increasing the degree of uncertainty they have to endure. Which is why country risk analysis (Lessard, 1993; Erb, Harvey and Viskanta, 1996; Rodríguez, 1997; Zopounidis, Pentaraki and Doumpos, 1998; Oetzel, Bettis and Zenner, 2001) has become an issue of interest for general and financial company management as much as for investment analysts. And, as a result, the search has intensified for tools that evaluate and quantify such risk for non-specialist decision-makers and which facilitate country-to-country comparisons (Cosset, Siskos and Zopounidis, 1992; Oral et al., 1992; Cook and Hebner, 1993; Ayala, Iturralde and Rodríguez, 1998a, 1998b, 1999, 2000a, 2000b; Zopounidis and Doumpos, 1998; Rodríguez, Ayala and Iturralde, 1999; Doumpos, Pentaraki and Zopounidis, 2001; Doumpos and Zopounidis, 2001; Becerra-Fernández, Zanakis and Walczak, 2002; Rodríguez, Iturralde and Ayala, 2002).

It is also becoming increasingly apparent that international investors must have a certain amount of confidence in a country if there are to be any guarantees that economic development there will move ahead at a suitable pace. National authorities clearly need to pay close attention to the way international financial markets perceive the risk associated with their country, and this for two main reasons:

A) First, because such perception may augur major financial problems for the country in question, including the suspension of payments servicing its external debt. Although the capacity of country risk indicators to anticipate financial or exchange rate crises is arguable (Eichengreen, Rose and Wyplosz, 1995; Oetzel, Bettis and Zenner, 2001) and the possibility that, on occasions, market perception of specific country risk may have been incorrect or biased cannot be ruled out (Cook and Hebner, 1993; Somerville and Taffler, 1995; Soussanov, 2002), it does not appear reasonable for national authorities to remain indifferent to the gradual deterioration in the markets' perception of risk of their country, as indicated by a fall in their ratings.
B) Second, because a deterioration in their country risk indicators, despite there being no apparently "objective" reasons for it, usually means an automatic increase in the marginal cost of financing the external debt, which, if very high, can strangle the chances of sustained development (Somerville and Taffler, 1995, Ramacharran, 1999). In other words, "to be is to be perceived": if the international financial markets, with or without objective reason, "perceive" problems in a country, then

that country already has a problem (Kaminsky and Schmukler, 2002). The crises in Asian countries in 1997 (Goldstein, 1998; Radelet and Sachs, 1998; Agénor *et al.*, 1999; Hunter, Kaufman and Krueger, 1999; Corsetti, Pesenti and Roubini, 2000; Woo, Sachs and Schwab, 2000; Cartapanis, Dropsi and Mametz, 2002; Dekle, Hsiao and Wang, 2002; García, 2002; Ito and Hashimoto, 2002) and the subsequent contagion in Latin American countries (Salama, 2001), in particular Argentina (Bustelo, 2001; Campos, 2002), and the associated problems encountered by Brazil and other countries (Fitch Ratings, 2002a; 2002b) and, more recently, the Dominican Republic (Feng and Sher, 2004: 1 and 9) corroborate the foregoing statements.

Identifying the economic and other variables with a decisive influence on the perception of country risk, as shown in measurement tools like technical statistics, indexes, ratings, classification methods and so on, is clearly of paramount interest. A large group of researchers (Poon, Firth and Fung, 1999; Siller, 2001; Simpson, 2001; Ayala, Iturralde and Rodríguez, 2002; Rodríguez, Ayala and Iturralde, 2003a, 2003b) have spent a lot of time on the problem.

However, one of the major drawbacks of such instruments is the sheer range of factors affecting country risk; a large number of variables are used in the attempt to determine such risk in a suitable way (Erb, Harvey and Viskanta, 1996; Doumpos and Zopounidis, 2001). However, it seems clear by now that the information provided by the majority of these variables is redundant, as it is contained in other variables (Cosset, Siskos and Zopounidis, 1992; Oral, *et al.*, 1992; Ayala, Iturralde and Rodríguez, 1998a, 1998b, 1999, 2000a, 2000b; Oetzel, Bettis and Zenner, 2001). Furthermore, Rodríguez, Ayala, and Iturralde (2003a) found that, in respect of American countries, the sets of variables significant for discriminating between different groups of countries were, in general, different. Cook and Hebner (1993) argue that specific country risk variables cannot be treated as equally important in all countries.

With these antecedents in mind, the present paper seeks to establish whether, depending on the variables considered most relevant in the perception of country risk, it is possible to establish groups of countries with homogeneous country risk characteristics and to see if the sets of variables relevant for discriminating between such groups are the same or different.

To this end, the following section looks at the methodology used herein: once the hypotheses for testing has been established, we present the database used in the analysis, i.e. the information on country risk variables considered by *Euromoney* journal between September 1992 and September 2002, and justify its selection. Finally, the analyses and validation of hypotheses are shown, involving a cluster analysis and three discriminant analyses by phases.

The third section sets out the results of these analyses, clearly favourable to the hypotheses formulated, followed by our conclusions and references.

2. METHODOLOGY

2.1. Hypothesis

In line with the above, two hypotheses were formulated for testing:

H1: countries can be classified in homogeneous groups according to their perceived country risk characteristics
The idea was to find groups or conglomerates of countries with a certain stability over time and which were statistically significant, using a set of variables relevant to the perception of country risk by the international financial community to group them together. The null hypothesis is that it is not possible to find such homogeneous groups.

H_2: the sets of variables significant for discriminating between homogeneous groups of countries according to their perceived country risk are different
This hypothesis is formulated as per Cook and Hebner (1993), and takes into account the results obtained for American countries by Rodríguez, Ayala and Iturralde (2003a). The idea is to test whether such results can be applied to all countries in the world. Clearly, the null hypothesis is that the sets of variables that enable us to discriminate between groups of countries are not different.

2.2. Data

The sample used in this research corresponds to the 149 countries for which the *Euromoney* journal published country risk indexes every semester from September 1992 to September 2002[2]. For each country in each semester, we took the values of the 9 variables used in the *Euromoney* index.

We have, therefore, a matrix consisting of nine variables and 3,116 individuals, as each individual corresponds to a country/period combination. In other words, 149 countries × 21 semesters – 13 cases without data = 3,116.

[2] For a range of reasons — usually to do with war situations— some countries were not included in some periods. This occurred in thirteen cases in all. In global terms, the Euromoney index may be taken as covering virtually all the countries in the world.

One reason for using the information from the *Euromoney* rating (Ramacharran, 1999) is that it is sufficiently well known and appreciated in international financial circles. Another reason is that the variables included are, to a great extent, the result of a prior synthesis, and even cover the results of other methods of analysis, such as the risk ratings awarded by the main international agencies. Finally, it has been published for a large group of countries over a sufficiently long period, which facilitated the application of certain statistical techniques.

The method used to prepare the index involved obtaining, for each reference period — the semester — the weighted sum of the values of nine variables, two of which, known as analytical indicators, were subjective or opinion-based, being based on results of surveys or the appraisals of a group of experts. The others are observational[3]. Variable weightings were established subjectively by the experts who draw up the index. Table 1 shows the index variables and the respective weightings at the present time, together with the symbols used to denote these variables in this paper.

To begin with, each variable takes a value between zero and ten. Subsequently, and before introducing their values in the index, their respective weightings are applied. As these are different for each variable, and owing to the fact that they changed in September 1994, the variables were "standardized" by dividing the value of each one in the index of the country in question by its corresponding weight in the index. This way each variable, in a specific semester and for a specific country, has values between zero and one.

2.3. Analysis and testing

Groups of countries were established and the hypotheses tested as follows:

a) The process began with a cluster analysis of individuals to find a classification of countries into groups that was sufficiently homogeneous as regards the perception of their country risk;
b) This classification was then validated by discriminant analyses by phases, the discriminant functions of which enabled us to establish the sets of variables with the greatest 'classificatory' capacity, i.e. the ones with the greatest capacity for discriminating between the previously obtained groups or classes of countries. The definitive test for the hypotheses formulated involved testing the capacity of the discriminant functions to classify countries correctly, particularly in the test samples.

[3] By "observational" variables we mean those whose values can be obtained from statistical information published by the relevant institutions.

TABLE 1

Components of the country risk rating used by *Euromoney*

COMPONENTS	Initials	Weighting(%)
Analytical indicators:		**50**
– Economic performance (according to *Euromoney* global economic forecasts)	EP	25
– Political risk (expert opinion)	PR	25
External debt indicators:		**30**
– Synthetic indicator (Debt indicators) [(External debt/GDP) + 2(Debt servicing/Exports) – – 10 (Current bal./GDP)]	DI	10
– Unpaid or renegotiated debt (Debt in default or rescheduled)	DDR	10
– Ratings (average of Moody's, Standard & Poor's and Fitch sovereign ratings)	CR	10
Access to international financing:		**20**
– Access to bank lending (%/GDP of total paid of private or syndicated long-term loans, according to World Bank)	ABF	5
– Access to short-term finance	AST	5
– Access to international bond and syndicated loan markets (Access to capital markets)	ACM	5
– Access to and discount on forfaiting (maximum term less differential over/discount rate for no-risk countries)	DF	5

Source: own preparation based on Euromoney semester country risk reports.

3. RESULTS

3.1. Classifying countries according to country risk: a cluster analysis

The first step in assigning countries to homogeneous risk classes involved a cluster analysis of the individuals[4] using the agglomerative hierarchization method and the Euclidean distance squared as a measure of similarity[5].

To determine the number of clusters, the change in the agglomeration coefficient was used as the **stopping rule** (Hair *et al.*, 1998). To help identify major relative increments in cluster homogeneity, the percentage of change in

[4] Remember that in this case the individuals are country/period combinations.

[5] On the analyses used in the present research, see, for example, Uriel (1995) and Hair et al. (1998).

the agglomeration coefficient was calculated in all steps from ten clusters to two. The most spectacular increase in the value of the coefficient occurred in the move from four to three clusters. A four-cluster solution was therefore considered as the best solution.

The results of the cluster analysis and of the corresponding descriptive statistics[6] suggested there were four basic categories of countries. The classification of individuals into different groups is synthesized in Table 2, where each country is assigned to a specific group if the analysis classified it in that group in most periods (semesters).

Group I countries share the following characteristics: a) little or no political risk; b) they usually return high values for the Economic performance variable; c) they have no problems in accessing financial markets, and rating agency qualifications of their sovereign debt are very good. Indeed, the average value for this group of each variable considered in the *Euromoney* index is clearly higher than for the other countries. They are, therefore, countries with a solid international reputation.

Except for Slovenia, Portugal and Cyprus, these countries were in this leading group in all periods, a fact that clearly sets them apart from the rest. This "select" group of 35 countries comprises:

- In Europe: the 15 "old" member states of the European Union, plus Switzerland, Norway, Iceland, Cyprus and Slovenia, the latter two, new members of the European Union, not yet fully settled in the group.
- In Asia: Japan, Taiwan, Hong Kong, Singapore, Israel, and the "oil monarchies" (Saudi Arabia, United Arab Emirates, Kuwait, Bahrain and Brunei).
- In America: USA, Canada and Bahamas.
- In Oceania: Australia and New Zealand.

Countries in Group II have the following characteristics: a) average values for economic performance (.53) and political risk (.6) are clearly lower than those in the previous group (.75 and .85, respectively), although still relatively high; b) their external debt indicators have fairly high average values, very close to the ones in the previous group, which suggest not too many problems in this regard; c) qualifications of sovereign debt are in general fairly low, lower than 0.5, with the rating agencies showing a certain lack of confidence in the countries in question; d) major problems in accessing to international bank lending, probably due to the low value of their political risk variable, which for

[6] For reasons of space, we have excluded the descriptive statistics and some of the statistical tables for the analyses performed. All data excluded are available from the authors on request.

TABLE 2

Groupings of countries according to their country risk characteristics.

Group I	G. I	G. II	G. III	G. IV
Australia	21			
Austria	21			
Bahamas	19		1	
Bahrain	21			
Belgium	20	1		
Brunei	21			
Canada	21			
Cyprus	12	9		
Denmark	21			
Finland	21			
France	21			
Germany	21			
Greece	21			
Hong Kong	21			
Iceland	21			
Ireland	21			
Israel	21			
Italy	21			
Japan	21			
Kuwait	21			
Luxembourg	21			
Netherlands	21			
New Zealand	21			
Norway	21			
Portugal	16	5		
Saudi Arabia	21			
Singapore	21			
Slovenia	10	4	6	1
Spain	21			
Sweden	21			
Switzerland	21			
Taiwan	21			
U. Arab Emir.	21			
United King.	21			
USA	21			

Group II	G. I	G. II	G. III	G. IV
Argentina		14	7	
Brazil		11	10	
Chile	8	13		
China		20	1	
Colombia		17	4	
Croatia		10	7	4
Czech Republic	1	17	3	
Egypt		11	10	
Estonia		10	6	5
Hungary	7	14		
India		14	7	
Indonesia	2	12	7	
Korea, S.	5	16		
Latvia		12	2	7
Lithuania		12	2	7
Malaysia	6	13	2	
Malta	1	20		
Mexico		20	1	
Philippines		13	8	
Poland		18	3	
Slovak Republic	2	10	9	
South Africa	3	18		
Thailand	8	13		
Tunisia	1	15	5	
Turkey	2	12	7	
Uruguay		16	5	

some authors is the variable exercising most influence over the capacity to obtain international banking loans (Ramcharran, 1999). In short, they are countries that, according to observational type indicators at least, encounter little difficulty in complying with their external debt or in accessing non-banking international financing (the exception being bank-related international financing). However, this relatively favourable situation is countered by the appraisals of the Euromoney experts and the rating agencies.

This group comprises 26 countries. Unlike the previous one, this group is rather more permeable, as all the members belonged, for one period at least, to Group I or Group III (occasionally to both) and even Group IV. Current group members are:

- In Europe: the other new members of the European Union.
- In Asia: China, India and the "Asian tigers": Indonesia, South Korea, Malaysia, Philippines and Thailand.
- In Africa: Egypt, Tunisia and South Africa.
- In America: Mexico, Colombia, Argentina, Brazil and Chile.

Group III countries have clearly lower mean variable values —between 1/2 and 1/3, and even less– than those in Group II, except for ID and RPD, where mean values (.858 and .941 respectively, for Group III), are only slightly lower than in Group II (.905 and .945 respectively). So Group III members share certain characteristics with the previous group, as, while the external debt indicators do not suggest major difficulties here, the appraisals of the experts (and, for this group, of the international financial markets in general, given the problems encountered in accessing them) are quite unfavourable.

As is the case with Group II countries, the appraisals of the experts tend to reduce their final country risk rating. This appears to support Somerville and Taffler (1995)'s observation that experts tend to be pessimistic about the "credit" or "the capacity to comply" of less developed countries.

With 74 member countries, this is by far the most numerous group. Nineteen of them belonged to the group in all periods: apart from Bangla Desh, Bolivia, Fiji, Nepal and Sri Lanka, the rest of this subgroup are African countries. The rest of the group spent one or more periods in other groups, particularly Group IV.

Group IV countries have lower average values for all variables than the previous group. This was especially noticeable for external debt indicators, highlighting the serious, ongoing problems these countries face in this respect.

Only 14 countries were assigned to this group. Six of them, Cuba, Iraq, North Korea, Libya, Namibia and Somalia, belonged to the group in all periods; observing this subgroup, we find that, excepting Namibia, these are countries that, serious economic problems apart, have major political difficulties with the international community, including in some cases repudiation of their sovereign external debt. The other eight countries are:

- In Europe: Albania, Azerbaijan, Georgia, Ukraine and Yugoslavia.
- In America: Antigua and Barbuda, and Nicaragua.

TABLE 3 (Cont.)

Groupings of countries according to their country risk characteristics.Cluster analysis

Group II	G. I	G. II	G. III	G. IV
Angola			17	4
Algeria			20	1
Armenia			15	6
Bangladesh			21	
Barbados			12	8
Belarus			15	6
Belize			20	1
Benin			20	1
Bolivia			21	
Botswana		3	18	
Bulgaria			19	2
Bhutan			17	4
Cent. Afr. Rep.			18	3
Cambodia			16	5
Cameroon			21	
Cape Verde			20	1
Chad			21	
Congo			18	3
Costa Rica		5	16	
Dom. Republic			20	1
Ecuador		2	16	3
El Salvador		5	16	
Ethiopia			18	3
Fiji			21	
Macedonia			12	9
Gabon			21	
Gambia			17	4
Ghana			19	
Grenada			16	5
Guatemala			20	1
Guinea			21	
Guinea Bissau			19	2
Haiti			19	2
Honduras			20	1
Iran			17	4
Jamaica			20	1
Kenya			21	
Laos			12	4
Lesotho			21	
Madagascar			19	2
Malawi			19	
Mali			21	
Mauritania			21	
Mauritius	2	9	10	
Moldova			15	6

Group II	G. I	G. II	G. III	G. IV
Mongolia			16	5
Morocco		9	12	
Mozambique			18	3
Nepal			21	
Niger			21	
Nigeria			18	3
Panama		4	14	3
Papua New Guinea			11	
Paraguay		1	19	1
Peru		6	12	3
Rep. Dem. Congo			11	10
Romania		2	19	
Russia			12	9
Rwanda			21	
Senegal			21	
Sierra Leone			20	1
Sri Lanka			21	
St Lucia			20	1
Sudan			14	7
Tanzania			18	3
Togo			21	
Trinidad & Tobago		2	19	
Uganda			21	
Vanuatu	1		19	1
Venezuela		4	17	
Vietnam		1	15	5
Yemen			19	2
Zambia			13	8
Zimbabwe			17	4

Group IV	G. I	G. II	G. III	G. IV
Albania			9	12
Ant. & Barbuda				20
Azerbaijan			9	12
Cuba				21
Georgia			9	12
Iraq				21
Korea, N.				21
Liberia			2	19
Libya				21
Namibia				21
Nicaragua			7	12
Somalia				21
Ukraine			8	13
Yugoslavia			4	11

3.2. Discriminant analysis by phases

Although the results of the previous section are clearly favourable to the acceptance of hypothesis H_1, since four clearly defined homogeneous groups of individuals (to which groups of countries are associated) appear to have been detected, this cannot strictly speaking be described as a test favourable to the hypothesis. This is because cluster analyses, although very useful, are purely descriptive: the groups to be obtained ultimately depend on the criteria used in the analysis. To validate the hypothesis, explanatory techniques like the discriminant analysis using validation samples, are needed. This way one can show whether the groups obtained are consistent, besides establishing which variables contribute most to classifying individuals into groups.

In light of the results of the cluster analysis, which gave four groups, a discriminant analysis by phases was chosen for validation. The first phase verifies the correctness of the separation between Group I and the other three. The second phase analyzes the differentiation between Group IV and the rest and the third phase tests the separation between Groups II and III.

3.2.1. Phase 1: Group I and the rest

In the light of the results of the cluster analysis, 756 individuals belonged to Group I and 2,343 belonged to the other three groups[7]. Two groups were therefore established, one comprising Group I, with the other consisting of the remaining groups.

After running a multivariate analysis of variance (MANOVA) in which the nine country risk variables considered by *Euromoney* were dependent variables, with "allocated group" acting as a dependent variable, it was found that the mean vector of the nine dependent variables did not perform the same in the two groups established for the random variable ($F_{9,\ 3,089} = 5{,}411.697$; $p < 0.001$).

As Table 4 makes clear, the univariate tests show that the mean values of all the variables are different for each group. In other words, the differences between the two groups are due to each single random variable considered. Consequently, differentiation between the two groups may be described as statistically significant.

To profile the characteristics of each cluster, a discriminant analysis was then performed. The dependent variable took the value 1 for Group I, and 0 for the rest. The random variables were the nine *Euromoney* country risk factors. First the total sample was divided into two groups: the analysis sample, used to construct the discriminant function, and the validation sample, used to

[7] Seventeen outliers were eliminated from the initial set of individuals.

TABLE 4

Group I and the rest. Univariate F-tests

	Wilks' Lambda	F	Sig.
RP	.396	4,719.264	,000
DE	.491	3,216.770	,000
ID	.892	374.601	,000
RPD	.949	168.120	,000
CR	.375	156.068	,000
APB	.063	45,915.377	,000
ACP	.428	4,137.254	,000
AMC	.410	4,452.366	,000
DF	.508	2,999.905	,000

validate this function. The procedure used consisted in taking at random 90.6% (2,808) of the observations as the analysis sample, with the remaining 291 observations forming the validation sample.

The stepwise method was used to calculate the discriminant function, which includes the random variables within the discriminant function one by one, according to their discriminant capacity. The following function was obtained as a result:

$$D = -2.651 + 9.837\ APB + .946\ CR - .647\ AMC + .360\ ACP + 0.594\ DE - .977\ DF - .209\ ID$$

Table 5 shows the tolerance of the variables included in the discriminant function before their inclusion, the standarised value of their coefficients and their discriminant charges or structure correlations. As is clear from both the table and the discriminant function, the APB variable has the greatest discriminant charge, and is also the one with the greatest positive coefficient in the function. The mean value of this variable is very high in Group I and virtually null in the rest, so it would seem clear that the individuals of Group I have access to international bank loans far superior to the rest. Although CR was the variable with the next greatest discriminant charge, its —positive— coefficient in the discriminant function is much lower; indeed, the individuals in Group I also have credit qualifications that are clearly superior to the rest. Despite AMC being the third variable according to discriminant charge, doubts arise because of its negative coefficient in the discriminant function, since the mean value of this variable is also greater in Group I than in the rest, which means that its coefficient should be positive. However, the low tolerance rating value for this variable (lower than .4), which suggests a strong colinearity with the other variables, and its relatively low discriminant charge, would seem to

point to AMC lacking, by itself, sufficient explanatory capacity of the separation between Group I and the rest. The other variables have very low discriminant charges and consequently their capacity to discriminate Group I from the rest is also low.

TABLE 5

Group I and the rest. Discriminant function. Tolerance, standardised coefficients and discriminant charges

	Tolerance	Standardised coefficient	Discriminant charge
APB	.801	1.033	.969
CR	.513	.206	.328
AMC	.369	–.149	.304
ACP	.664	.077	.293
DE	.555	.108	.260
DF	.399	–.271	.251
ID	.884	–.060	.087

Using the Wilks' Lambda we tested the null hypothesis that stated the centroides of the groups are equal, as it measures the deviations of the discriminant scores in the groups with respect to the total deviations without group distinctions. As table 6 shows, the hypothesis may be rejected, which means that the information provided by the function, in classifying cases, is statistically significant at .1%.

TABLE 6

Group I and the rest. Discriminant function. Wilks' Lambda

Wilks' Lambda	Chi-Squared	Sig.
0.060	7,895.679	.000

Bearing in mind that in the analysis sample the groups are different sizes (out of 2,808 individuals, 681 belong to Group I, and 2,127 belong to the rest), in accordance with the proportional randomness criterion (Hair *el al.*, 1998: 273), the percentage of correct random classifications is 63.26%. However, for the analysis sample, the effectiveness indicator of the discriminant function takes a value of 99%, an increase of 35.74% over the value to be expected from a random classification. In the validation sample, 75 out of 291 individuals belong to Group I and 216 to the others, which means that the percentage of correct guesses in random classification stands at 61.74%. As the effectiveness indicator of the discriminant function for this sample takes a value of 99.7%, the increase on the value to be expected from a random

classification is 37.96%. Therefore, Group I is clearly characterized and differentiated from the other individuals, with APB and CR being the most relevant variables in this regard.

3.2.2. Phase 2: Group IV and the rest

With Group I differentiated, the next step involved identifying the variables capable of discriminating between Group IV and the rest. Groups I, II and III were brought together in a single group of 2,676 individuals, while the group comprising Group IV had 423 individuals.

The multivariate analysis of variance (MANOVA) showed that, on this occasion as well, the means vector of the nine dependent variables does not behave in the same way in the two groups established for the independent variable ($F_{9,\ 3,089} = 1{,}113.171$; $p < 0.001$).

Univariate trials (table 7) show once again that the mean values of all variables are different in each group, which means that the differences between the two groups are due to every single independent variable considered.

TABLE 7

Group IV and the rest. Univariate F-tests

	Wilks' Lambda	F	Sig
RP	.875	440.822	.000
DE	.913	294.548	.000
ID	.316	6,711.132	.000
RPD	.677	1,477.168	.000
CR	.914	290.437	.000
APB	.933	223.403	.000
ACP	.882	414.998	.000
AMC	.911	303.680	.000
DF	.899	347.581	.000

The determinant function was extracted by the same method as the previous case. The analysis sample was formed by taking 2,808 individuals at random, leaving the remaining 291 as the validation sample. In the discriminant function, the dependent variable took the value 0 for Group IV, and 1 for the rest, the nine variables considered being the independent variables. The function was again obtained by stepwise method, with the following result:

$$D = -7.212 + 5.711\ ID + 2.952\ RPD + .435\ ACP - .923\ CR$$

Compared with the previously obtained discriminant function, the variables APB, AMC, DE and DF have disappeared, apparently having lost their power

to discriminate Group IV countries, while RPD enters. The ID variable acquires a high, positive coefficient, while CR has a negative coefficient.

TABLE 8

Group IV and the rest. Discriminant function. Tolerance, standardised coefficients and discriminant charges

	Tolerance	Standardised coefficient	Discriminant charge
ID	.853	.982	.819
RPD	.932	.580	.383
ACP	.414	.133	.210
CR	.395	–.315	.172

Table 8 shows prior tolerance, the standarised value of coefficients and the discriminant charges for the previous variables. From the analysis of the means and typical deviations of the variables in the groups, and of the results appearing in the table and in the discriminant function, it can be deduced that ID is the variable with the greatest discriminant charge and the largest positive coefficient in the function, with a very low mean for Group IV and one that is fairly high for the rest. So it seems clear the individuals in Group IV face a situation as regards the level of their external debt and the size of its servicing that is a good deal less favourable than the rest. RPD is the variable with the next highest discriminant charge, although its coefficient in the discriminant function, though positive, is a good deal lower; in fact, individuals in Group IV have levels of unpaid or renegotiated debt substantially worse than the rest. In this respect, as noted in the previous section, the results of the discriminant analysis coincide with the results gleaned from observing this group's descriptive statistics. ACP and CR have very low discriminant charges, accompanied by fairly low tolerances, which suggest that, on their own, they have little capacity for discriminating Group IV from the rest.

The results show that the discriminant function clearly fulfils its task (canonical correlation coefficient of .872 and associated autovalue of 3.17), Wilks' Lambda has a value of .24, and its associated p-value is lower than .001, which enables us to reject the null hypothesis that the centres of the groups are equal.

Taking into account the fact that the groups are different sizes, 380 of the 2,808 individuals in the analysis sample belonging to Group IV and 2,428 to the rest, according to the proportional randomness criterion, correct random guesses should stand at 76.6%. However, the effectiveness indicator of the discriminant function takes a value of 96.8% for the analysis sample, an increase of 20.2% on the value to be expected from random classification. In

the validation sample, 43 out of 291 individuals belong to Group IV and 248 to the rest, which means that the percentage of correct random classifications is 74.81%. But the effectiveness indicator of the discriminant function for the enlargement of the sample takes a value of 96.9%, giving a 22.09% increase over the value to be expected from random classification. Therefore, Group IV is also significantly differentiated from the other individuals, ID and RPD being the most relevant variables in this regard.

3.2.3. Phase 3: Groups II and III

Since Groups II and III are intermediate, there is no point in comparing each one with the rest of the individuals when differentiating them; the correct thing to do is to take the individuals in both groups and discriminate between them. There are 443 individuals in Group II and 1,447 in Group III.

The MANOVA results in Table 9 highlight the fact that the values of all the statistics are significant. The means vector can therefore be described as different for the two subpopulations.

TABLE 9

Groups II and III. Multivariate tests using Wilks' Lambda

	Wilks' Lambda	F	Hypothesis fd	Error fd	Sig.
Independent term.	.012	17,134.799	9	1,910	.000
Country risk	.253	625.561	**9**	1,910	.000

From the results of the univariate analysis, given in Table 10, it is clear that the differences between the means of the variables for the two groups are significant at .1% in all variables except for RPD, representative of the amount of external debt not paid or in renegotiation, which suggests that in the analysis sample the individuals in either group do not present significant differences with regard to this variable.

Once again, estimation by phases was the method chosen to obtain the discriminant function for profiling the characteristics of the two selected conglomerates. A random analysis sample of 1,734 individuals (90.3%) was chosen, with the remaining 186 (9.7%) acting as validation sample. In the discriminant function the dependent variable took the value 1 for Group II and 0 for Group III. This function was also obtained through estimation by phases, with the following result:

$$D = -.606 + 5.262\ CR + 2.6\ DF + 1.649\ AMC - .912\ RP + 1.398\ APB - .942\ RPD$$

TABLE 10

Groups II and III. Univariate F-tests

	Wilks' Lambda	F	Sig
RP	.542	1.621.760	.000
DE	.721	741.326	.000
ID	.969	60.556	.000
RPD	1.000	.251	.617
CR	.380	3,128.910	.000
APB	.817	429.4260	.000
ACP	.756	619.7240	.000
AMC	.441	2,428.130	.000
DF	.411	2,743.590	.000

With the exception of RP, all the variables included here appeared in the other two functions, although their importance in accordance with the value of coefficients and discriminant capacity differs substantially. Taking into account the previous tolerances, the standarised coefficients and discriminant charges (table 11), and the means of the variables for the two groups, CR has the largest positive coefficient value and the greatest discriminant capacity, which shows that Group II has, in general, credit ratings that, without being particularly good, are substantially higher than those for Group III. The variable with the next highest positive coefficient, DF, is also the one with the next greatest discriminant capacity, showing that in Group II access to forfaiting, and the related discount rate obtained, are clearly much more favourable than in Group III. AMC has the third highest positive coefficient and a discriminant capacity similar to the previous one; any comments on AMC values in either group would be similar to those for the preceding variable.

Doubts arise in the interpretation of the coefficient of RP because it is negative, despite a relatively high discriminant charge and not especially low tolerance. However, a glance at the descriptive statistics shows that the mean value of this variable in Group II is significantly higher than its mean value in Group III, similar to what occurred with the previous variables. Taking into account the values of the dependent variable of the function for Groups II and III, RP ought to be positive in its coefficient. One explanation of this apparently contradictory result is that, although this variable's tolerance is relatively high, it is in fact strongly correlated to the previous variables (Rodríguez, Ayala and Iturralde, 2003b), leading to a problem of colinearity.

The last two variables in the function, APB and RPD, have a very low discriminant capacity.

TABLE 11

Groups II and III. Discriminant function. Tolerance, standardised coefficients and discriminant charges

	Tolerance	Standardised coefficient	Discriminant charge
CR	803	.650	.749
DF	.754	.517	.697
AMC	.635	.278	.639
RP	.576	–.126	.531
APB	.967	.159	.276
RPD	.952	–.124	.011

Once again, as Table 12 shows, Wilks' Lambda, used for testing the null hypothesis stating that the centres of the groups are equal, is low (.252); and the p-value associated with the statistic less than .001, meaning the information provided by the function for classifying individuals is statistically significant.

TABLE 12

Groups II and III. Discriminant function. Wilks' Lambda

Wilks' Lambda	Chi-Squared	Sig.
0,252	2.380,543	0,000

In the analysis sample 96.3% of individuals were correctly classified and 93.5% in the validation sample. As, *a priori*, 64.45% of the cases could have been classified correctly at random in the analysis sample and 65.04% in the validation sample, a major improvement was obtained with the analysis. The differentiation between Groups II and III is likewise statistically significant.

4. CONCLUSIONS

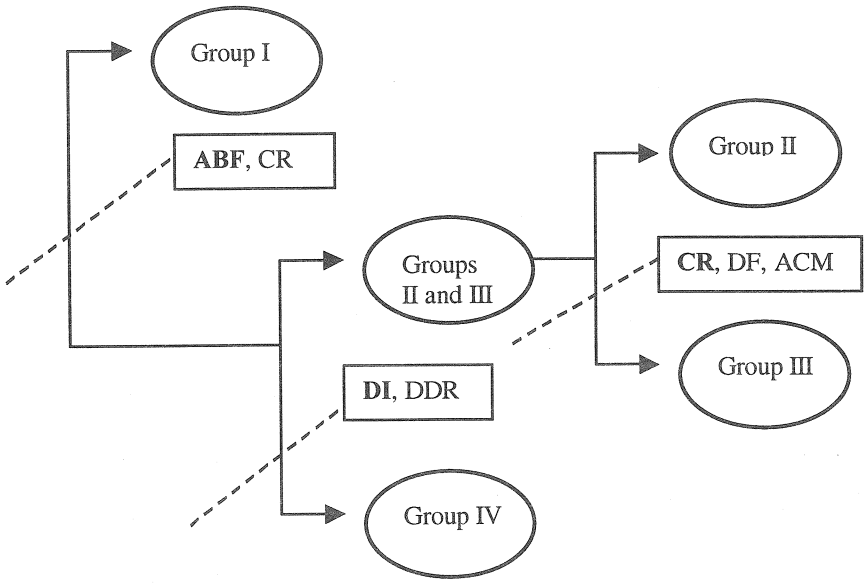
The results of this paper clearly support the two hypotheses formulated. With regard to H_1, the discriminant analyses corroborated the existence of four groups of individuals to which groups of countries are associated, homogeneous within each group but differentiated between groups in a statistically significant manner.

Figure 2, which gives a synthesis of the results obtained in the previous section, clearly shows that H_2 is also corroborated. Variables with a discriminant

charge above .3, tolerance higher than 0.4 and a consistent sign for the coefficient were taken into account. The sets of variables with greatest capacity for discriminating between groups are seen to be quite different.

FIGURE 2

Generation structure of groups of countries in the cluster analysis. Variables with greatest discriminant capacity.



So what would most clearly seem to differentiate Group I from the rest is, in the first place, access to bank loans and credit qualifications —both observational variables. However, the former is representative of access to mid-term international bank financing and, consequently, of a solid reputation with international banking organizations, indicating the superiority in this respect of the individuals assigned to Group I. Although in principle observational as well, the latter reflects the "opinions" that rating agencies issue on different countries. Although such opinions are based to a great extent on the analysis of objective data, they also take into account aspects concerning the "prospects" or the "reputation" of different countries. In light of these results, it seems appropriate to suggest that the authorities of certain countries, particularly those in Group II, ought to consider the possibility of embarking on "image strategies" to improve their reputation regarding rating agencies and international financial markets.

A glance at the variables with the greatest capacity for discriminating Group IV —countries in the worst position— from the rest shows that both

refer to the situation as regards external debt. Although this comes as no surprise, the results point up the fact that problems with external debt make a very bad letter of introduction to the international financial markets for any country.

All three variables that most clearly discriminate between Groups II and III are observational, although CR indicates an "opinion". The other two, indicative of access to mid- and long-term international financing, are also representative of the "reputation" of the countries in question with the international financial markets. These results seem once again to show that the authorities of countries belonging to Group III need to adopt image strategies to improve the way analysts and the international financial markets perceive their risk levels.

These results also corroborate, at world level, the ones obtained by Rodríguez, Ayala and Iturralde (2003a) for American countries, and help to give further support to the idea that the importance of country risk varies according to the group of countries under consideration (Oral *et al.*, 1992; Cook and Hebner, 1993). This suggests that ordering countries by applying a single index with the same variables, all with the same weight, to all countries may produce distortions in the ordering. Classifying the countries into homogeneous groups of risk, and then ordering the countries within each group by applying specific indexes, would seem to be a better idea. Analysis for the future should revolve around establishing orderings of countries according to the indexes proper to each risk group.

Another line of analysis awaiting researchers involves the introduction of "social" variables indicating human development in both the construction of indexes and country classification. Except for PR (political risk), the variables used by *Euromoney* to construct its index are all economic or financial. Although a high correlation between economic variables and country risk has been demonstrated (Simpson, 2001), a country risk index, or classificatory method, considering economic factors exclusively, although indirectly incorporating the effects of political and social factors, do not appear capable of capturing such effects as precisely as others that take account of them explicitly. The authors have already begun work on this approach, and we hope to be in a position to offer significant results in the near future.

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