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40 YEARS OF SOVEREIGN DEBT CRISES

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ABSTRACT

40 years of sovereign debt crises*

The paper compiles a new data base, based on the earlier work by Kray and Nehu, to assess the determinants of sovereign debt crises over the last forty years. A simple statistical analysis of the cause of the crises is performed. It shows that neither the serial defaulter nor the "global crisis" theories of sovereign crises explain much. Sovereign debt crises owe mostly to the level of indebtedness of the countries. About half the risk factor such as we shall compute it originates from this term. The remainder owes for another 25% to the quality of governance of the country, such as captured by the CPIA index which measures indirectly the ability of countries to wither external bad shock. On these fronts, we show that the bulk of countries which were at the center of previous crises are now below the danger zone, which explains why, for them, this crisis was different.

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1. Introduction

In a famous story of Sherlock Holmes, the clue to the drama was in the fact that the dog did not bark. This time, none of the usual suspects, the "serial defaulters" of the previous sovereign debt crises have run into trouble: neither Mexico nor Brazil, Indonesia or Thailand came to the forefront of bad news.

What caused this outcome? Is it likely to last? We shall offer the simplest answer: the so-called serial defaulters were much better managed this time. Ahead of the crisis, their debt ratios were substantially reduced, allowing them to move down significantly the ladder of risk. In a very straightforward manner, they learnt the lessons of the previous crises, and were all able to smooth the outcome of one of the most formidable financial crises of all time.

In order to quantify this result, we shall first revisit the history of the sovereign crises of the last forty years. We shall see that neither the serial defaulter nor the "global crisis" theories of sovereign crises explain much. Sovereign debt crises owe mostly to the level of indebtedness of the countries. About half the risk factor such as we shall compute it originates from this term. The remainder owes for another 25% to the quality of governance of the country, such as captured by the CPIA index which measures indirectly the ability of countries to wither external bad shock. On these two fronts, the bulk of countries which were at the center of previous crises are now below the danger zone.

Among the factors of risk that we quantify, world credit shocks have accounted, over the past 40 years, for the lowest part of risk, explaining around 7% of the overall factors. Yet, on that last front, this crisis is exceptional. Indeed, its strength, such as we capture it econometrically, has a magnitude comparable to all other sources of risk in earlier episodes. Because of this shock, we find that a large number of countries find themselves in what we characterize as high risk categories, although they would have appeared on the lowest risk categories had the world shock been 'normal'. Two conflicted forces are at work today: low debt on the one hand, bad financing conditions on the other. Extrapolating previous default events, the latter should win the case. Yet, as of early 2010, it appears that the first factor appears to have the higher hand. A race is engaged. Can countries build upon their low debt base to resist the built up of risk that arise from terrible financing condition, until the latter improve? Such is the challenge for the time to come.

2. Forty years of sovereign debt crises

a) A database on debt distress events

We use a slightly modified version of Kraay and Nehru (KN)'s database: it is extended up to 2007 and a country is said to experience a debt crisis in a year if one of the following conditions holds:

- The sum of its interest and principal arrears on long-term debt outstanding to all creditors is larger than 5% of the total debt outstanding. But countries that are unable to service their external debt need not necessarily fall into arrears; they can also obtain balance of payments support from the IMF and, in addition, seek debt rescheduling or debt reduction from the Paris Club. This is why we include as well the two following criteria:

- The country receives debt relief from the Paris Club: we excluded events such as HIPC initiative exits (completion points) as they are usually the sign the country is doing better and not the contrary.
- The country receives substantial balance-of-payment support from the IMF in the form of StandBy Arrangements and Extended Fund Facility. The amount of financing a member can obtain from the IMF (its access limit) is based on its quota. Currently, under Stand-By and Extended Arrangements, a member can borrow up to 100 percent of its quota annually and 300 percent cumulatively. However, access may be higher in exceptional circumstances. We define exceptional support by the IMF the event where a country actually *uses* more than 50% of its quota in one year. KN just looked at events where the IMF extended resources to the country in excess of 50% of its quota, regardless of the fact that it actually used it. Our definition only takes into account the real instances of debt distress, defined here as defaults that have been avoided thanks to IMF support.

Our database has information on 126 countries throughout the period 1970-2007, on an annual basis.

b) Descriptive statistics on debt distress events: a historical view

When we look at the unconditional probability for a country in the annual database to experience a debt crisis in any given year (mean of the debt crisis dummy on the whole sample) we find a very high number (37%) as shown by table 1 below:

Table 1: Events of defaults and non defaults

	number	%
default events	1464	37%
non-default events	2495	63%
total	3959	100%

One plausible explanation for this high number could be that some countries are driving the mean up, (call it the "serial defaulters" theory) or that there are years where everybody experiences a crisis (the "global crisis" theory).

We investigate both possibilities to find out that none of them is really convincing to explain the whole story of debt crises.

Graph 1 shows the number of years where a country is considered to be in debt distress (defined as the number of years where at least one of the three indicators presented above is positive) in the considered time period (1970-2007). The picture here, confirmed below by econometric checks, seems to be that we can't really identify two groups of countries, one with a high default rate and one with a very low default rate.

Graph 1

Number of Defaults By Country
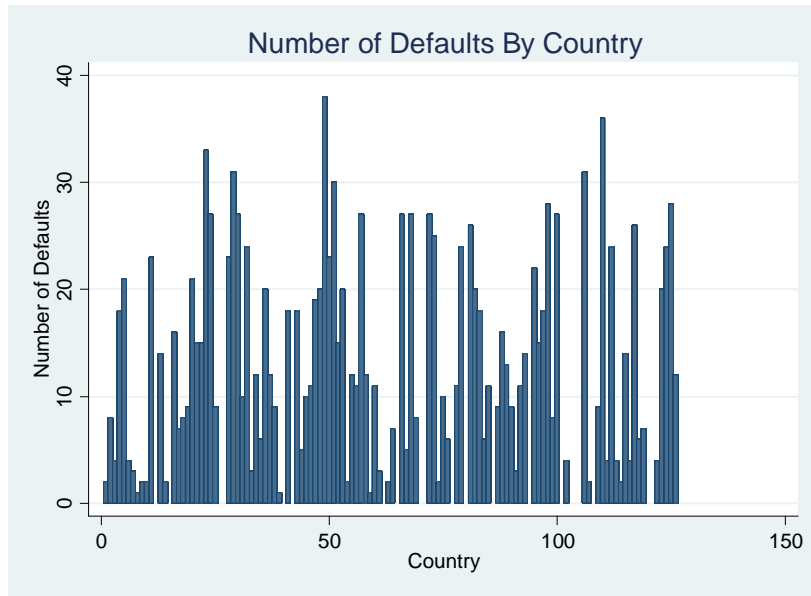
We can also investigate the extent to which debt crises are influenced by global events, such as the Volcker shock of the early eighties, or the contagion effects of the Thailand crisis in the late nineties. Graph 2 shows the number of countries which are actually experiencing a default in each given year and therefore presents the time profile of the debt crisis. We see that there is a gradual increase in the number of reported defaults up to the early nineties, then a decline, which does seem to warrant a time profile to sovereign crises. We return, however, below, on the key distinction to be made between new and ongoing debt crises.

Graph 2

Number of Defaults By Year

Table 2 below sheds light on the default probabilities on a country-by-country and on a year-by-year basis.

Table 2

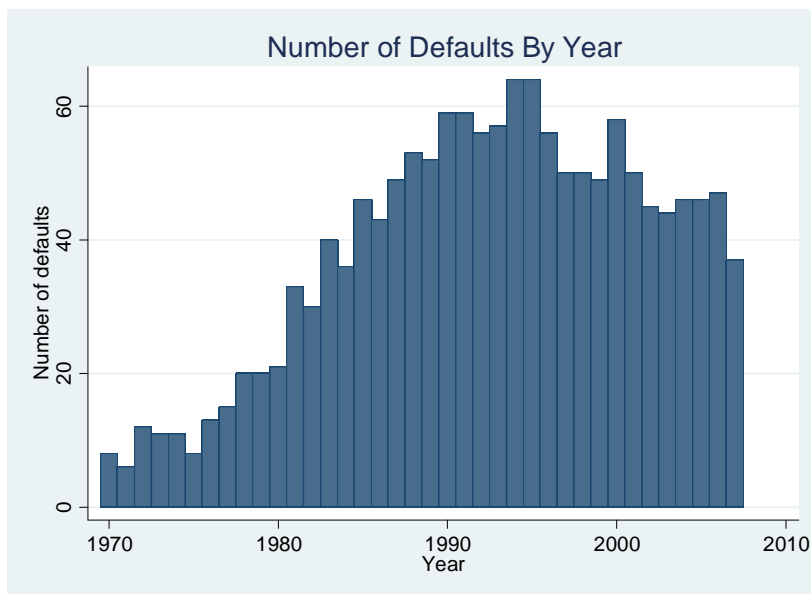|	mean	p90	p75	p50	p25	p10
number of years in which a given country is in debt distress	11,6	27	20	9,5	2	0
number of countries which are in debt distress on a given year	38,5	59	52	45,5	20	11

On average a given country in our sample is considered to be in debt distress one third of the time (11,6 years out of 38 years available). On a given year, one third of the countries (38,5 out of 126) are in debt distress on average.

In order to see whether these average numbers are in fact hiding a great deal of heterogeneity between years (some of them might proxy for global shocks and drive the mean up), we exclude the years where more than 52 countries are in debt crisis (the 4th quartile). When doing so, the mean annual probability of a debt crisis does not change that much as it goes from 37% to 32%.

We then exclude the countries which spend more than 20 years out of 38 in a debt crisis, the "serial defaulters", in order to see if they're responsible for the high unconditional default rate in our sample. Doing so we see that the mean annual probability of a debt crisis only goes to 0,24.

We try to see if other measures could help corroborate the "serial defaulters" or the "global shocks" theories by looking at countries with and without market access. A country is defined as a market access borrower in a given year if total net flows in the form of bonds and commercial bank loans to the public sector are positive that year (source: Global Development Finance database). Table 3 below shows that, even if there seems to be a significant difference in unconditional default probabilities between market and non-market access countries this is not enough to explain the high default rate in our sample. Market access countries tend to default less but not that less. We will see below that in fact there is no real difference between market and non-market access countries' default probabilities, but that we are only capturing differences in the length of their crises.

Table 3

	default probability
market access countries	27%
non-market access countries	43%

We then look at years of global crises proxied by years where there is a recession in the US (source: NBER) and here again, there is no evidence of a difference between average probabilities of debt crises in years of recession versus other years.

	default probability
years where there is a recession in the US	33%
years where there is no recession in the US	38%

c) A new definition of debt distress events

One critical problem with these raw statistics is due to the fact that they do not distinguish between ongoing crises and new crises. The high number of debt distress occurrence comes from just that. We are counting several consecutive years of crisis as different debt distress events which we shouldn't.

In order to address this problem, we construct a new debt distress classification. We now only count distress episodes as years where a country experiences a debt crisis, while this crisis is preceded by three years without crisis. Similarly, we define normal times as a year without crisis preceded by three years without crisis. It allows us to identify "real" debt distress episodes (for example, we only count once a debt crisis that may last for ten years during which a country never experiences three consecutive years of non-crisis).

Doing the same for normal times allows us to treat events of crisis and non-crisis symmetrically in our econometric estimations and to control for covariates in t-2, knowing for sure a country isn't in a debt crisis (to avoid simultaneity problems).

Kraay and Nehru went some way into redefining debt distress events to correct for the fact that multiple years of distress aren't really independent observations. They started by eliminating all seemingly temporary distress episodes that are less than three years long and then they eliminated all distress episodes that are preceded by periods of distress in any of the three previous years. Normal times are then defined as non-overlapping periods of five consecutive years in which *none* of the three indicators of debt distress are observed. This procedure allows them to identify a total of 94 episodes of debt distress and 286 normal times' episodes over the period 1970-2001. Note that their definition leads to a very high unconditional default probability (even if they cannot be interpreted easily in annual terms) as it is just above 20% in their sample. We departed from their methodology for two main reasons: i) we don't want to treat default events (cells of at least three years in KN) and normal times (cells of five years in KN) asymmetrically, as they do, to the extent that we want to be able to infer annual default probabilities from our statistical analysis. ii) As all covariates are taken in t-2 with respect to the first year of a cell (whether it is a default or normal times cell), it may very well be that such observation is measured during a crisis prior to a normal times episode, which could bias the estimation. With our definition, all covariates are measured in normal times (as both default and normal years are preceded by three years without default).

Admittedly, we may have too many non-default events as they are defined as one-year events, which implicitly makes the assumption that normal years are independent observations when they might not be. While acknowledging this potential bias, we take comfort in the fact that our annual default probability is still quite high (see table 5), with

respect to common measures of default probability such as spreads. This tends to suggest that conditional on experiencing three years without default there is still a substantial risk of defaulting in the 4th year.

Table 5: Occurrence of new sovereign debt crises

	number	%
default events	128	6,9%
non-default events	1735	93,1%
total	1863	100%

Out of 1863 episodes in our database, we have 128 sovereign debt crises and 1735 episodes identified as "normal times".

Using this definition of a "new" debt crisis, the previous graphs look quite different:

Graph 3
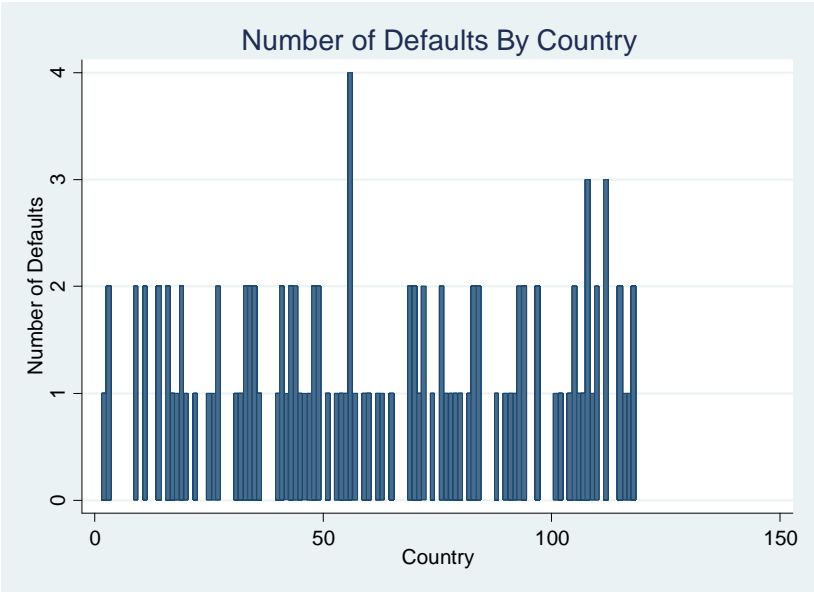
We now see that most countries experience at most one or two episodes of debt distress. Only a few countries are outliers in this respect and have suffered debt distress episodes more

than two times: <u>The Gambia (3 times), Ghana (3), Grenada (3), Kenya (4), Turkey (3) and Uruguay (3)</u>.

Similarly, when analyzing the time pattern of defaults under this new classification, we see that only a few peaks emerge, in the early eighties and 2000s, but with no rising trends, of the sort that was shown in graph 2.

<u>Graph 4</u>
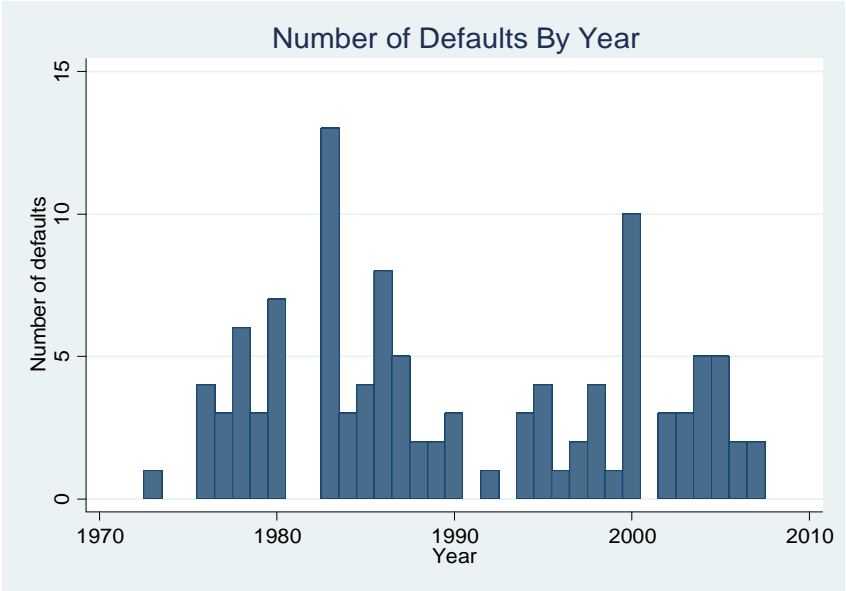
Finally, there does not seem to be a significant difference between market and non-market access unconditional default probabilities, when using this stricter definition of debt distress, as shown in graph 5.

<u>Graph 5</u>
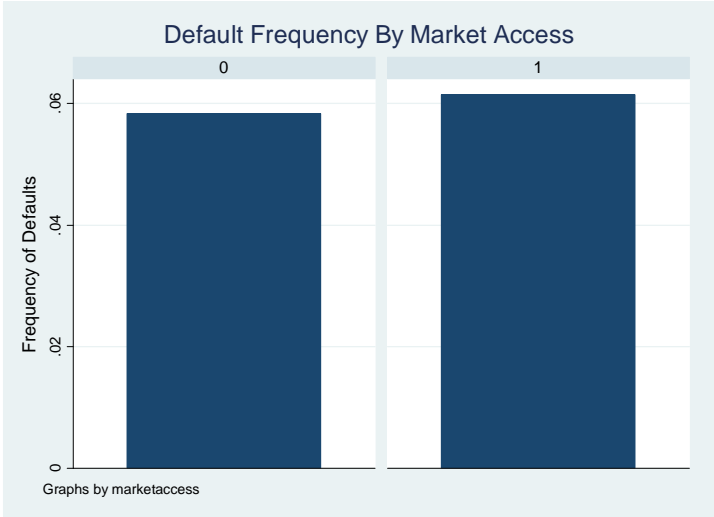
On the whole, the comparison between both databases seems to show that countries experience long episodes of debt distress (as illustrated by the fact that the annual probability of debt distress drops significantly once we take out consecutive years of debt crises), and that

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neither the "serial defaulters" theory nor the "global crisis" theory seems to entirely explain the data patterns.

d) Debt crises, Currency crises and Banking crises

Using our new definition of debt crises we look at currency crises and systemic banking crises to see how they correlate with debt crises.
We follow the definitions of Laeven and Valencia (2008) to identify both currency crises and banking crises. A country is said to experience a currency crisis in a given year if the two following conditions hold:

- the exchange rate against the USD has fallen by more than 30% compared to the previous year
- this rate of depreciation must be at least 10% greater than that of the previous year. This second condition is specifically designed for countries constantly experiencing high inflation rates.

In order to measure exchange rate depreciation, they use the percent change of the end-of-period official nominal bilateral dollar exchange rate from the World Economic Outlook (WEO) database of the IMF. For countries that meet the criteria for several continuous years, they use the first year of each 5-year window to identify the crisis. This definition yields 179 currency crises during the period 1970-2007 for our sample of countries. This list also includes large devaluations by countries that adopt fixed exchange rate regimes.

Systemic banking crises are defined as follows: "In a systemic banking crisis, a country's corporate and financial sectors experience a large number of defaults and financial institutions and corporations face great difficulties repaying contracts on time. As a result, non-performing loans increase sharply and all or most of the aggregate banking system capital is exhausted. This situation may be accompanied by depressed asset prices (such as equity and real estate prices) on the heels of run-ups before the crisis, sharp increases in real interest rates, and a slowdown or reversal in capital flows". This definition leads us to identify 106 systemic banking crises over the period 1970 to 2007 in our sample of countries.

Graphs 6 and 7 report the frequency of both types of crises (banking and currency) for each year (to be compared with graph 4).

<u>Graph 6</u>
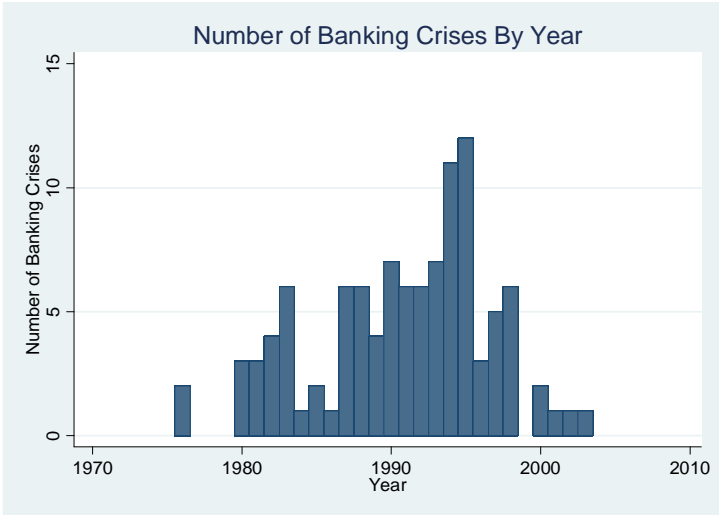
Graph 7
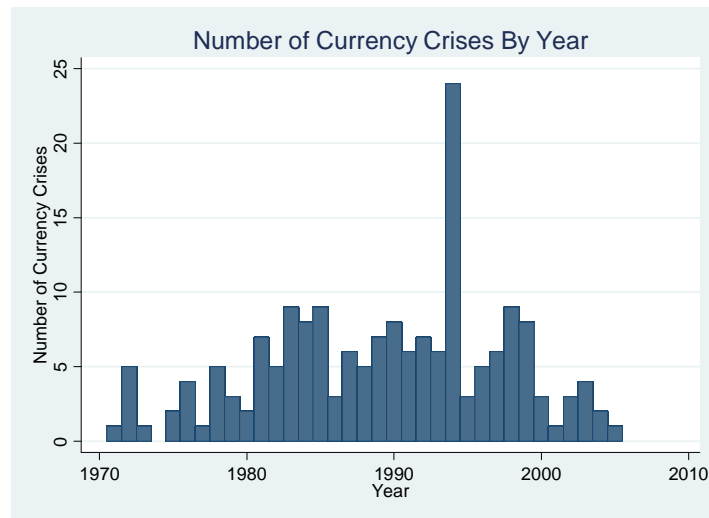
Following Laeven and Valencia, we define a twin crisis (sovereign and currency/ sovereign and banking/currency and banking) in year t as a debt crisis in year t (resp. a currency crisis), combined with a currency crisis (resp. a banking crisis) during the period [t-1, t+1]), and we define a triple crisis in year t as a debt crisis in year t, combined with a currency crisis during the period [t-1, t+1]) and a banking crisis during the period [t-1, t+1]. In our sample, we are able to identify 36 simultaneous sovereign and currency crises, 19 simultaneous sovereign and banking crises, 40 simultaneous currency and banking crises and 10 triple crises. The detailed list of these crises is available in table A1 in appendix 1.

On the whole, this tends to show that debt crises are not so often correlated with other kinds of crises but are rather crises of their own (we have 128 debt crises in our sample). When we change the observation window from [t-1; t+1] to [t-2; t+2], which is a quite substantial expansion of the range of observation, we obtain 49 simultaneous sovereign and currency crises, 24 simultaneous sovereign and banking crises and 54 simultaneous currency and banking crises. The number of triple crises almost doubles (17 events) but still remains quite low, compared to the overall number of sovereign debt crises (128).

3. The sources and risk categories

a) The macroeconomic determinants of debt crises

The literature on the determinants of debt defaults usually estimates the contribution of various explanatory variables to the probability of a debt crisis using the following model:
$P(y_{ct}=1) = G(\beta'X_{ct})$, where y_{ct} is a dummy variable equal to 1 when country c experienced a debt crisis at time t and 0 otherwise. X_{ct} is a vector of explanatory variables, β is the vector of estimated coefficients and G is usually taken as the cumulative distribution function of the logistic distribution (logit estimation). Therefore, we ran a logit regression to explain the risk of a debt crisis by the following variables: logarithm of Debt-to-GDP, total debt service over exports, GDP per capita, the country's CPIA and a year-fixed variable which measures the spread between the yield of corporate bonds in the US rated Baa by Moody's and the yield of 10-year US Treasury bonds in order to proxy for worldwide financial shocks. In our regressions, we measure each of the covariates two years before the debt distress event in order to mitigate the potential

simultaneity bias, except for the Baa US corporates spread which measures current financial conditions. The results are shown in table 6 below.

Table 6: Determinants of default

	debt distress=1
ln (debt/gdp)	0,523***
	(0.199)
total debt service/exports	3,943***
	-0,795
real gdp per capita	-0,379***
	-0,148
cpia	-0,577***
	-0,181
Baa US corporates spread	0,611***
	-0,236
intercept	0,718
	-1,12
Number of observations	1159
Pseudo R²	0,0987
Prob>Chi 2	0

standard errors are between brackets
*** *denotes 1% significance,* ** *denotes 5% significance,* * *denotes 10% significance*

As expected, we see that all key variables are highly significant. The debt-to-GDP and the debt service ratios each have a sizable impact, as well as the CPIA and our measure of the global financial shock, the spread of US risky securities over riskless rates. The income level is also significant, as usually the case in the literature. This is clearly a proxy for many hidden variables, such as other risks (domestic or external) than those captured by the CPIA index. In order to allow for the serial defaulters' hypothesis to be more formally tested, we tried to include several dummy variables which were equal to 1 when the country had defaulted at least one time in the respectively 30, 20, 10 previous years. None of these dummies entered significantly in the regression.

We now proceed to use this regression to see the empirical weight that each factor carries in explaining the class of risk of each country.

b) Classification into quintiles

Fitted values of the logit regression presented in table 6 allow us to rank all events in our database (defaults and normal times) according to their default probabilities. We have then classified them in five categories A, B, C, D, E, which correspond to the five quintiles of risk. We chose to have a discontinuous classification of this kind in order to convey more easily than with a continuous ranking the extent to which a country changes from one risk category to another or remains at the same level of risk.

-   The *very low risk* category (A) is composed of countries whose probability of default is less that 2.5%,
-   The *low risk* category (B) stands between 2.5% and 4.4%
-   The *median* category (C) is in between 4.4% and 7.1%
-   The *risky* category (D) is between 7.1 % and 11.3%
-   The *high risk* group (E) stands above 11.3% (and in practice never exceeds 60% which is, in our sample, the upper limit of risk).

Table 7: Definition of five risk categories

	default probability
A	p < 0,025
B	0,025< p <0,044
C	0,044< p <0,071
D	0,071< p <0,113
E	0,113< p

The following table summarizes the situation, splitting episodes of defaults and non defaults.
Table 8

	A	B	C	D	E	**TOTAL**
Default events (number)	4	10	16	16	42	**88**
Non-Default events (number))	227	222	216	216	190	**1071**
TOTAL	**231**	**232**	**232**	**232**	**232**	

The median defaulter is in category D (with a default probability of 10.6%), and the median non-defaulters are in category C, around 5% of risk. Note however that about 25% of non defaulters stand in category D, and about the same number of defaulters were in category B.

In order to analyze the stability of each group, we analyze how many defaulters at time t changed category over the course of the three previous years. Due to data availability, out of the 88 debt distress episodes identified in the above table, we are able to compute estimated probabilities at time t for 81 events (some covariates are missing for 7 events) and for 77 events at time t-3.

Table 9: Dynamics of risk categories

		1	2	3	4	5	
		At-3	Bt-3	Ct-3	Dt-3	Et-3	TOTAL
1	Defaulters At	0	0	0	2	0	2
2	Defaulters Bt	4	0	1	1	0	6
3	Defaulters Ct	0	1	2	3	1	7
4	Defaulters Dt	1	4	2	4	1	12
5	Defaulters Et	0	5	11	10	22	48
	TOTAL	5	10	16	20	24	75

How to read the table:
Line 2: Out of 6 defaulters that are in class B at the time t of their default, 4 were in class A, 1 was in class C and 1 was in class D at time t-3.
Column 2: Among defaulters at time t, 10 were in risk category B at time t-3. Among these, 1 ended up in category C, 4 in category D and 5 in category E at the time of default.

We see from this table that the bulk of defaulters were in categories D or E at the time of their default (60 cases out of 75) and that they were already in a risky category three years before (44 out of 75). A number of C countries three years before have turned into D or E category group however. The most striking change comes from the 11 of the 16 C group countries three years ahead of the crisis that have turned into E countries at the time of the crisis. Clearly, between t-3 and t, the distribution of our sample of defaults which was quite evenly spread in t-3 between categories C, D and E has been distorted towards the E category at time t.

In only 10 cases, however, an event of default has been the result of a strong deterioration of the risk index (defaulters in category A or B at time t-3 ending up in category D or E at time t) and among those who default while belonging to the intermediary class C at time t, 4 out of 7 were former class D and E. This is anecdotal evidence going against Merton's view (2008) that risks can accumulate gradually and then suddenly erupt in a full-blown crisis as a result of non-linearities. More precisely, for Merton, random changes in financial flows and market prices cause uncertainty on the value of a country's assets and liabilities and could lead to the point where the total value of assets could decline to below the level of promised payments on the debt, causing distress or default. However it is hard to really grasp why stochastic volatility as the one induced by a simple Brownian motion can explain by itself the eruption of crises as there seems that in continuous time there should always be room for adjustment before the crisis.

What we learn from the previous table is that in fact, defaulters were already bad performers in terms of risk three years before the default and that, non-linearities (i.e. sudden deterioration of the risk index) only happened in few cases. Default events where it actually happened are: Cameroon (1981), Costa Rica (1981), The Gambia (1982), Grenada (1981), India (1982), Tunisia (1987), Turkey (2000), Uruguay (1983, 2002), Zimbabwe (1983).

c) Country risk over the last forty years

The median country in our sample belongs to category B, and exhibits an exposure to risks of about 5%, on an annual basis. This number which may look rather low, but is in fact very high

when combined over 40 years. Indeed, the probability of not defaulting over such long period of time is estimated to be 14% only.

Indeed countries that are present most of the time in our sample (at least 30 years out of 38) and have never defaulted are quite few: Botswana, Colombia, Fiji, Lao PDR, Lesotho, Malaysia, Nepal, Papua New Guinea and Samoa.

d) The sources of risk

Let us now measure the weight carried by each factor of risk in the classification that has been presented. Four factors stood out in our estimation of the likelihood of a debt distress episode:
- Debt and Debt service
- GDP per capita
- Governance quality (CPIA)
- World shock (Baa-Treasury Bonds spread)

Let's call z the risk index corresponding to the linear combination of these risk factors weighted by the coefficients of the baseline regression. The default probabilities we estimate are simply G (z) where G is the cumulative distribution function of the logistic distribution. The z factor has the merit to be additive, as far as the cause of risk is concerned. We can then directly weight the influence of such or such terms on the probability of risk through its direct influence on z, in a way which can be directly compared to other factors.

In order to measure the influence of each variable on the default probability, we computed the average value of each variable (weighted by its coefficient in the regression) for each risk category A, B, C, D and E for each observation in our regression sample (default events and normal times). For convenience reasons we only report the z index and its decomposition for each of the 88 default episodes in table A2 in appendix 1).

Table 10: Sources of risk (z factor)

	A	B	C	D	E
Debt+Debt service	-0,5	-0,2	0,05	0,3	0,8
Governance quality	-2,3	-2,1	-1,9	-1,8	-1,6
GDP per capita	-3,2	-3,1	-3	-2,9	-2,8
World shock	1,2	1,3	1,3	1,3	1,4
Intercept	0,7	0,7	0,7	0,7	0,7
z	**-4,1**	**-3,4**	**-2,8**	**-2,4**	**-1,5**

We see that the bulk of the discrepancy between high risk (score -1.5 in the aggregate) and low risk (score -4.1) comes directly from the debt variable, which explain 46% of the gap (1.3 out of 2.6). The CPIA index comes second, explaining another 25% of the gap between the best and the worst performers. GDP explains 14% of the gap (0.4 out of 2.6). Finally the world shock

explains 7% of the gap (0.2 out of 2.6). Of course one should mention that there are two types of information in table 10: (i) some variables have large influence on the risk factor -and ultimately on default probabilities- in all the risk categories (e.g. GDP per capita has values around -3 and governance quality has values around -2); and (ii) some variables vary across risk categories and explain variation in risk factors -and ultimately in default probabilities- (e.g. in Table 10, debt burden indicators have values ranging from -0.5 to 0.8). This restores the relevance of institutional variables without diminishing that of debt burdens.

In terms of corresponding probabilities, we have performed the following exercise. We start from the average of the worst performer (group E) and look for the default probabilities that would be achieved if the performances were modified one by one. In other words, we take the average values of each variable for class E countries as a numeraire and we can compute the role of each factor in explaining the overall risk. We measure by how much the risk in decreased when switching the average of each of the five variables in E to the average in A, B, C and D respectively. Compared to the global effect z, we can measure the contribution of each factor to total risk.

In this table we compute for each cell $P(x_i+v_E)$ where $x_i+v_i =z_i$. All x, v and z are averaged over i=A, B...E

Table 11

	i=A	i=B	i=C	i=D	i=E
x= Debt+Debt service	0,06	0,08	0,10	0,12	0,18
x= Governance quality	0,10	0,12	0,14	0,15	0,18
x= GDP per capita	0,13	0,14	0,15	0,17	0,18
x= World shock	0,15	0,17	0,17	0,17	0,18
z	**0,02**	**0,03**	**0,06**	**0,08**	**0,18**

Although in a non additive way this time, we see the strength of the mechanisms highlighted above. For instance, on sees that the first factor of risk from one class to another is the debt build-up. The risk of default would be reduced from 18% to 6%, if the ratio of debt of the high risk group was brought down to the A level.

4. Making predictions on sovereign risk today

Let us now turn to the critical question: what are the looming risks today? We start by analyzing the risk categories that sovereign countries are now belonging to.

a) Risk categories today

Let us first see the map of the risk today. Using our prediction of risk, we plot the countries today in each of our five categories, using predictors based on data lagged by two years. We only have 48 countries for which we have data on the covariates in 2007. For the other countries, we have conducted a risk analysis based on the latest values available.

For the 115 countries, for which we have raw data from at least 2000 on, the risk distribution for 2009 goes as follows:

Table 12: Country risk categories in 2009

Risk Category	Number of Countries
A	5
B	10
C	17
D	46
E	37

As one can see from this table, countries are not really better ranked than they were over the last 40 years. The bulk of the countries are still in categories D and E.

We present in table 13 the determinants of the average z factor (and its explanation) in each class of risk, averaged over the countries such as they appear in 2009. The table shows that the classification is almost entirely driven by the "world shock" risk factor, given the high spread faced by Baa US corporates in 2009.

Table 13: Sources of risk in 2009 (z factor)

	A	B	C	D	E
Debt+Debt service	-0,8	-0,7	-0,5	-0,2	0,6
Governance quality	-2,6	-2,3	-2,1	-2,1	-1,9
GDP per capita	-3,6	-3,5	-3,4	-3,2	-3
World shock	2,5	2,5	2,5	2,5	2,5
Intercept	0,7	0,7	0,7	0,7	0,7
z	**-3,9**	**-3,3**	**-2,8**	**-2,3**	**-1,1**

Compared to table 10 above, in which the same decomposition has been performed over the past 40 years, one can notice the following evolutions that have taken place up to 2009: the debt risk factor has considerably decreased for all categories of countries. It is striking to see that category C countries in 2009 have the same debt risk index than category A countries over the last 40 years (-0,5). The GDP risk factor plays a greater role nowadays than it used to in the last 40 years for all categories of risk (a country in category E in 2009 has a GDP risk index almost equal to the one of a category C country before). The governance risk factor stays approximately at the same level for countries in 2009 and during the 40 years of the sample.

The great change apart from the amelioration of the risk factor due to higher levels of GDP per capita and lower levels of debt is the huge increase of the world shock risk factor, which has been multiplied by two compared to the previous situation (1,2 to 2,5).

b) Sources of risk for today

We list in table A2 the risk classification for all the countries in our sample as of 2009 and based on the latest information available. Most of them have resisted the crisis so far. In italics, we indicate countries already experiencing a crisis. We saw that the world shock factor explains a great deal of the risk classification for countries as of 2009. However, as the bulk of the financial crisis is now behind us, we also show in table A2 the risk category in which countries would stand if the world shock factor is set to be equal to its early 2010 level (average of daily spreads for January, February and March). We can see below that most countries are currently in lower risk categories than in 2009.

Table 15: Country risk categories (with world shock factor set at its early 2010 level)

Risk Category	Number of Countries
A	21
B	47
C	27
D	5
E	15

Out of the 20 countries being in categories D or E in 2010, 10 are not already experiencing an ongoing debt crisis. They are: Lebanon, Solomon Islands, Belize, Eritrea, Guinea-Bissau, Kazakhstan, Lao PDR, Mauritania, Niger and Samoa. Their risk factors are shown in table 16 below.

Table 16: Risk factors for D and E countries as of 2010

country	debt factor	governance	GDP	World Shock	Intercept	z
Belize	2,6	-1,7	-3,5	1,6	0,7	-0,3
Eritrea	-0,1	-1,4	-2,4	1,6	0,7	-1,7
Guinea-Bissau	2,0	-1,5	-2,5	1,6	0,7	0,3
Kazakhstan	1,9	-2,1	-3,7	1,6	0,7	-1,6
Lao PDR	0,6	-1,8	-3,0	1,6	0,7	-1,8
Lebanon	0,7	-1,7	-3,4	1,6	0,7	-2,1
Mauritania	0,7	-1,9	-3,0	1,6	0,7	-1,9
Niger	0,3	-1,9	-2,6	1,6	0,7	-1,9
Samoa	1,5	-2,2	-3,3	1,6	0,7	-1,8
Solomon Islands	-0,3	-1,6	-2,7	1,6	0,7	-2,3

One can see from this table and by comparison with table 10, that the main risk factor for these countries lies with the debt level. In fact, for Belize, Guinea-Bissau, Kazakhstan and Samoa, the weight of the debt factor is huge compared to historical averages for D and E countries. For Eritrea and Solomon Islands, the main risk factor is the per capita GDP growth.

c) New debt distress events in 2008/2009

By lack of any information on arrears on principal or interest payments from 2008 and 2009, we shall only look at the other two indicators to identify recent episodes of debt distress.

In 2008, six countries have borrowed from the IMF through StandBy Arrangements or Extended Fund Facility in excess of 50% of their quota: Georgia, Latvia, Ukraine, Liberia, Pakistan, and Seychelles. In 2009, they were ten: Armenia, Belarus, Bosnia, Mongolia, Romania, Angola, Maldives, Seychelles, Sri Lanka and Dominican Republic

In 2008, five countries benefitted from debt relief by the Paris Club (leaving outside the HIPC Initiative exits): Congo, Djibouti, Guinea, Liberia, and Togo. Three benefitted from debt relief by the Paris Club in 2009: Comoros, Côte d'Ivoire and Seychelles.

If we use our previous definition of a debt crisis (a debt distress event which is preceded by three years without crisis), of these 21 debt distress events, only 9 qualify as new debt crises (the remainder are ongoing crises): Armenia (2009), Belarus (2009), Bosnia (2009) , Mongolia (2009), Romania (2009), Ukraine (2008), Maldives (2009), Sri Lanka (2009) and Pakistan (2008).

Table 17 below shows the expected risk classification of these newly distressed countries as of 2009 and 2010:

Table 17: Newly distressed countries (2008-2009)

Country	Estimated Distress Probability (2009)	Risk Category with 2009 world shock factor	Risk Category with 2010 world shock factor
Armenia	0,04	B	A
Belarus[1]	0,04	B	A
Bosnia and Herzegovina	0,08	D	B
Maldives	0,08	D	B
Mongolia	0,09	D	B
Romania[1]	0,1	D	B
Sri Lanka	0,09	D	B
Ukraine[2]	0,1	D	C
Pakistan	0,08	D	B

[1] CPIA 2006 used for the projection
[2] CPIA 2005 used for the projection

Non-surprisingly, most of these countries were risky two years before their crises. One can notice that 6 countries out of 9 are former Eastern European countries. This is reminiscent of the Russian crisis of 1998, when Russia defaulted with almost no debt. The new underlying factor here at work is the world crisis. For current values of spreads, these countries would all belong to the lowest risk categories, as shown in the last column.

Conclusion

The severity of the financial crisis of 2008-2009 is unprecedented, on a post war basis. Its magnitude is such that most sovereign should have been in dire difficulties, when gauged on the metric of financial crises of the last forty years.

Yet, few new cases emerged. The straightforward interpretation that we offered in the text is that a very large number of countries, even among the class of sovereign defaulters, were much better managed this time in all previous crisis episodes. The countries most vulnerable were for their large majority countries without access to financial markets, which clearly insulated them form world turbulence.

A group of countries, however, did experience financial stresses, it is mostly a group composed of former East European countries. Their crisis resembles somehow the Russian default of 1998, which occurred at the surprise of most observers, while the country itself was without much debt, due to the turbulence of an economy in transition, both politically and economically.

Two other countries, Sri Lanka and Pakistan, entered into our list of distressed case, in both instance, these are cases of countries at war, domestically or in state of tension with its neighbours.

In other words, the countries in crises, in 2008-2009, were all instances where important domestic turbulences were at hand, probably poorly evaluated by standard CPIA methods

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Table A1: Twin and triple crises: 1970-2007

Year	Country	Sovereign and Currency Crises	Sovereign and Banking Crises	Currency and Banking Crises	Triple Crises
1994	Algeria	1			
1981	Argentina			1	
2000	Argentina		1		
2002	Argentina			1	
1994	Armenia			1	
1994	Azerbaijan			1	
1994	Belarus			1	
1980	Bolivia	1			
1983	Brazil	1			
1998	Brazil	1			
1996	Bulgaria			1	
1987	Cameroon		1		
1994	Cameroon			1	
1994	Central African Republic			1	
1982	Chile			1	
1983	Chile	1			
1976	Congo, Dem. Rep.	1			
1983	Congo, Dem. Rep.			1	
1994	Congo, Dem. Rep.			1	
1981	Costa Rica	1			
2003	Dominican Republic			1	
2004	Dominican Republic	1	1		1
1982	Ecuador			1	
1983	Ecuador	1	1		1
1999	Ecuador			1	
2000	Ecuador	1			
1979	Egypt, Arab Rep.			1	
1990	El Salvador		1		
2003	Gambia, The	1			
1992	Georgia			1	

Year	Country	Sovereign and Currency Crises	Sovereign and Banking Crises	Currency and Banking Crises	Triple Crises
1983	Ghana	1	1	1	1
2001	Ghana	1			
1986	Guatemala	1			
1981	Guinea-Bissau	1			
1994	Guinea-Bissau			1	
2004	Haiti	1			
1997	Indonesia	1	1		1
1998	Indonesia			1	
1978	Jamaica	1			
1989	Jordan	1	1	1	1
1998	Kazakhstan	1			
1992	Kenya	1	1		1
1993	Kenya			1	
1990	Lebanon			1	
1998	Malaysia			1	
1984	Mauritania		1		
1982	Mexico			1	
1983	Mexico	1			
1995	Mexico			1	
1980	Morocco	1	1		1
1981	Morocco			1	
1987	Mozambique			1	
1979	Nicaragua	1			
1990	Nicaragua			1	
1983	Niger		1		
1983	Peru		1		
1983	Philippines			1	
1984	Philippines	1	1		1
1998	Philippines			1	
1991	Romania		1		
1998	Russian Federation			1	
1986	Sao Tome and Principe	1			
1992	Sao Tome and Principe			1	
1989	Sierra Leone			1	
1977	Sri Lanka	1			
1997	Thailand	1	1		1
1998	Thailand			1	
1994	Togo			1	

Year	Country	Sovereign and Currency Crises	Sovereign and Banking Crises	Currency and Banking Crises	Triple Crises
1991	Tunisia		1		
1978	Turkey	1			
1995	Turkey	1			
2000	Turkey	1	1		1
2001	Turkey			1	
1998	Ukraine			1	
1983	Uruguay	1			
2002	Uruguay		1		
1985	Venezuela, RB	1			
1990	Venezuela, RB	1			
1994	Venezuela, RB			1	
1988	Vietnam	1			
1995	Yemen, Rep.			1	
1996	Zambia			1	
1983	Zimbabwe	1			

Table A2: Default events and sources of risk: 1970-2007

country	year	default probability	risk class	z	*debt factor*	*country factor*	*world shock factor*
Argentina	1983	0,18	E	-1,50	*1,39*	*-5,10*	*1,50*
Argentina	2000	0,12	E	-2,03	*1,85*	*-6,03*	*1,43*
Bangladesh	1981	0,14	E	-1,80	*-0,08*	*-3,73*	*1,30*
Benin	1983	0,10	D	-2,14	*-0,34*	*-4,03*	*1,50*
Benin	2000	0,09	D	-2,31	*0,18*	*-4,64*	*1,43*
Bolivia	1980	0,38	E	-0,51	*1,78*	*-4,38*	*1,37*
Bolivia	2004	0,10	D	-2,17	*0,84*	*-5,03*	*1,30*
Brazil	1983	0,29	E	-0,89	*2,00*	*-5,10*	*1,50*
Brazil	1998	0,09	D	-2,27	*0,86*	*-5,05*	*1,20*
Burkina Faso	1987	0,15	E	-1,72	*-0,18*	*-3,60*	*1,34*
Burundi	1998	0,61	E	0,44	*2,27*	*-3,74*	*1,20*
Cameroon	1987	0,13	E	-1,88	*0,69*	*-4,62*	*1,34*
Cameroon	2005	0,06	C	-2,76	*0,41*	*-4,97*	*1,08*
Cape Verde	1988	0,06	C	-2,69	*-0,04*	*-4,58*	*1,21*
Chile	1983	0,27	E	-0,97	*2,17*	*-5,36*	*1,50*
Comoros	1987	0,30	E	-0,85	*0,43*	*-3,34*	*1,34*
Congo, Rep.	1986	0,34	E	-0,66	*1,01*	*-4,05*	*1,66*
Costa Rica	1981	0,07	C	-2,59	*1,04*	*-5,64*	*1,30*
Cote d'Ivoire	1981	0,08	D	-2,49	*0,45*	*-4,96*	*1,30*
Djibouti	1994	0,07	C	-2,63	*-0,15*	*-4,13*	*0,94*
Dominica	2005	0,04	B	-3,11	*0,48*	*-5,40*	*1,08*
Dominican Republic	1983	0,17	E	-1,57	*0,31*	*-4,10*	*1,50*
Ecuador	1983	0,31	E	-0,82	*1,52*	*-4,56*	*1,50*
Ecuador	2000	0,18	E	-1,50	*0,96*	*-4,61*	*1,43*
Egypt, Arab Rep.	1984	0,12	E	-1,99	*0,73*	*-4,50*	*1,06*
El Salvador	1990	0,13	E	-1,88	*0,30*	*-4,01*	*1,11*
Ethiopia	1991	0,48	E	-0,07	*1,41*	*-3,39*	*1,19*
Gambia, The	1982	0,14	E	-1,83	*-0,05*	*-4,39*	*1,90*
Ghana	1983	0,14	E	-1,79	*0,03*	*-4,04*	*1,50*
Ghana	1996	0,10	D	-2,19	*0,93*	*-4,82*	*0,98*
Ghana	2001	0,14	E	-1,78	*0,57*	*-4,86*	*1,79*
Grenada	1981	0,04	B	-3,10	*-0,52*	*-4,60*	*1,30*
Grenada	1985	0,10	D	-2,24	*0,16*	*-4,40*	*1,28*
Guatemala	1986	0,15	E	-1,71	*0,13*	*-4,23*	*1,66*
Guinea-Bissau	2005	0,27	E	-0,97	*1,24*	*-4,01*	*1,08*
Haiti	1986	0,10	D	-2,15	*-0,17*	*-4,37*	*1,66*
Honduras	1979	0,07	C	-2,64	0,29	-4,42	0,77

country	year	default proba	risk class	z	*debt factor*	*country factor*	*world shock factor*
Honduras	2004	0,05	C	-2,97	*0,09*	*-5,08*	*1,30*
India	1982	0,08	D	-2,44	*-0,77*	*-4,29*	*1,90*
Indonesia	1997	0,06	C	-2,71	*0,93*	*-5,28*	*0,93*
Jordan	1989	0,04	B	-3,20	*0,91*	*-5,87*	*1,03*
Kazakhstan	1998	0,02	A	-4,06	*-0,85*	*-5,12*	*1,20*
Kenya	1980	0,08	D	-2,45	*0,08*	*-4,62*	*1,37*
Kenya	1992	0,18	E	-1,49	*1,29*	*-4,71*	*1,20*
Kenya	2000	0,11	D	-2,10	*0,14*	*-4,40*	*1,43*
Kenya	2004	0,09	D	-2,34	*0,23*	*-4,59*	*1,30*
Kyrgyz Republic	2002	0,26	E	-1,05	*1,30*	*-5,02*	*1,95*
Macedonia, FYR	2000	0,04	B	-3,29	*-0,05*	*-5,39*	*1,43*
Madagascar	1981	0,11	D	-2,12	*-0,47*	*-3,66*	*1,30*
Malawi	1980	0,14	E	-1,83	*0,53*	*-4,45*	*1,37*
Malawi	2001	0,23	E	-1,23	*0,78*	*-4,52*	*1,79*
Mauritania	1980	0,30	E	-0,85	*0,78*	*-3,72*	*1,37*
Mauritania	1984	0,23	E	-1,22	*0,95*	*-3,94*	*1,06*
Mauritius	1985	0,04	B	-3,12	*0,59*	*-5,71*	*1,28*
Mexico	1983	0,17	E	-1,57	*1,22*	*-5,01*	*1,50*
Moldova	2003	0,16	E	-1,62	*0,75*	*-4,77*	*1,68*
Morocco	1980	0,13	E	-1,88	*0,56*	*-4,53*	*1,37*
Nicaragua	1979	0,06	C	-2,71	*0,28*	*-4,49*	*0,77*
Nicaragua	1983	0,28	E	-0,94	*1,51*	*-4,68*	*1,50*
Niger	1983	0,26	E	-1,06	*0,85*	*-4,13*	*1,50*
Nigeria	1986	0,39	E	-0,44	*1,06*	*-3,87*	*1,66*
Pakistan	1981	0,20	E	-1,40	*0,22*	*-3,64*	*1,30*
Pakistan	1999	0,17	E	-1,62	*0,98*	*-4,68*	*1,36*
Panama	1985	0,03	B	-3,48	*0,20*	*-5,68*	*1,28*
Peru	1983	0,22	E	-1,26	*1,77*	*-5,24*	*1,50*
Philippines	1984	0,17	E	-1,62	*1,46*	*-4,86*	*1,06*
Romania	1991	0,04	B	-3,12	*-1,24*	*-3,79*	*1,19*
Rwanda	1994	0,08	D	-2,49	*0,31*	*-4,46*	*0,94*
Senegal	1980	0,10	D	-2,18	*0,05*	*-4,31*	*1,37*
Seychelles	1990	0,07	D	-2,54	*0,08*	*-4,45*	*1,11*
Solomon Islands	1995	0,06	C	-2,70	*-0,10*	*-4,31*	*1,00*
Solomon Islands	2002	0,13	E	-1,90	*-0,06*	*-4,50*	*1,95*
Somalia	1981	0,13	E	-1,93	*0,07*	*-4,02*	*1,30*
Sri Lanka	2005	0,02	A	-3,74	*-0,02*	*-5,52*	*1,08*
Swaziland	2005	0,02	A	-4,16	*-0,78*	*-5,18*	*1,08*
Thailand	1981	0,04	C	-3,08	*0,03*	*-5,13*	*1,30*
Thailand	1997	0,02	A	-3,99	*0,19*	*-5,82*	*0,93*

country	year	default probability	risk class	z	debt factor	country factor	world shock factor
Togo	2000	0,12	E	-2,00	*0,26*	*-4,41*	*1,43*
Tonga	2003	0,06	C	-2,80	*-0,29*	*-4,92*	*1,68*
Tunisia	1987	0,06	C	-2,67	*0,70*	*-5,43*	*1,34*
Tunisia	1991	0,06	C	-2,75	*0,69*	*-5,34*	*1,19*
Turkey	1995	0,06	C	-2,74	*0,44*	*-4,89*	*1,00*
Turkey	2000	0,05	C	-2,86	*0,42*	*-5,42*	*1,43*
Uganda	1986	0,19	E	-1,43	*0,56*	*-4,37*	*1,66*
Uruguay	1983	0,03	B	-3,43	*-0,21*	*-5,43*	*1,50*
Uruguay	1998	0,03	B	-3,41	*-0,04*	*-5,29*	*1,20*
Uruguay	2002	0,06	C	-2,67	*0,63*	*-5,96*	*1,95*
Zimbabwe	1983	0,04	B	-3,19	*-0,72*	*-4,69*	*1,50*

Table A2: Risk classification of countries as of 2009 and when the world financial shock is set at its early 2010 level

country	risk class with world shock factor set at 2009 level	risk class with world shock factor set at 2010 level
Albania	C	B
Angola	D	C
Argentina	D	B
Armenia	B	A
Azerbaijan	A	A
Bangladesh	D	B
Belarus	C	A
Belize	E	E
Benin	D	B
Bolivia	D	C
Bosnia and Herzegovina	D	B
Botswana	A	A
Brazil	D	B
Bulgaria	D	B
Burkina Faso	E	C
Burundi	E	E
Cambodia	D	C
Cameroon	D	B
Cape Verde	C	A
Chile	A	A
China	B	A
Colombia	D	B
Congo, Rep,	E	C
Costa Rica	B	A
Cote d'Ivoire	E	D
Croatia	E	C
Djibouti	E	C
Dominica	E	C
Dominican Republic	C	B
Ecuador	E	C

country	risk class with world shock factor set at 2009 level	risk class with world shock factor set at 2010 level
Egypt, Arab Rep,	C	B
El Salvador	C	B
Eritrea	E	E
Ethiopia	D	B
Fiji	B	A
Gabon	D	B
Gambia, The	E	E
Georgia	B	A
Ghana	D	B
Grenada	D	B
Guatemala	C	A
Guinea	E	D
Guinea-Bissau	E	E
Guyana	E	C
Haiti	E	C
Honduras	C	B
India	C	B
Indonesia	D	B
Iran, Islamic Rep,	B	A
Jamaica	E	C
Jordan	D	B
Kazakhstan	E	E
Kenya	D	B
Kyrgyz Republic	E	C
Lao PDR	E	E
Latvia	E	E
Lebanon	E	D
Lesotho	E	C
Liberia	E	E
Macedonia, FYR	D	C
Madagascar	D	C
Malawi	E	C
Malaysia	A	A
Maldives	D	B
Mali	D	C
Mauritania	E	E
Mauritius	B	A
Mexico	B	A
Moldova	E	C

country	risk class with world shock factor set at 2009 level	risk class with world shock factor set at 2010 level
Mongolia	D	B
Morocco	D	B
Mozambique	D	B
Nepal	D	C
Nicaragua	E	C
Niger	E	E
Nigeria	B	A
Pakistan	D	B
Panama	C	B
Papua New Guinea	E	C
Paraguay	D	B
Peru	D	B
Philippines	D	C
Poland	D	B
Romania	D	B
Russian Federation	C	A
Rwanda	D	B
Samoa	E	E
Sao Tome and Principe	E	E
Senegal	D	B
Seychelles	E	E
Sierra Leone	D	B
Solomon Islands	E	D
South Africa	A	A
Sri Lanka	D	B
St, Kitts and Nevis	D	B
St, Lucia	C	A
St, Vincent and the Grenadines	D	B
Sudan	E	D
Swaziland	C	A
Tajikistan	D	B
Tanzania	D	C
Thailand	B	A
Togo	E	E
Tonga	D	B
Tunisia	D	B
Turkey	E	C
Turkmenistan	D	B
Uganda	C	B

country	risk class with world shock factor set at 2009 level	risk class with world shock factor set at 2010 level
Ukraine	D	C
Uruguay	D	B
Vanuatu	C	B
Venezuela, RB	C	B
Vietnam	C	B
Yemen, Rep,	E	C
Zambia	D	B