Modelling Sovereign Debt Rescheduling Probabilities in Emerging Markets

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Abstract

Sovereign debt default rates are used by all major international investors and banks to price sovereign bonds and loans as well as to determine country risk exposure. Therefore, it is important to adequately model default probabilities. This study utilizes a panel logit models to estimate default probabilities of 127 emerging countries for the period 1981-2002 as a function of a set of macroeconomic and political variables. The study finds that the most important determinants of sovereign debt default/rescheduling are debt policy, political risk, past repayment performance, trade activity, fiscal policy and liquidity of a country.

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1. Introduction

This study performs a new investigation into determinants of sovereign default with the purpose of developing a model that will predict sovereign debt default/rescheduling. Determining sovereign default probabilities is useful since they can be used to monitor financial vulnerability of emerging markets. The threat of possible default problems in emerging markets is often a source of financial market turbulence in both emerging markets and globally. The recent literature on the determinants of financial crises usually focuses on currency and banking crises and only indirectly on sovereign debt crises. We aim to fill this gap.

Furthermore, all major international banks and international investors use default probabilities in their pricing models for bonds and loans as well as credit risk management models to determine country risk exposure limits. According to the new version of the Basel Capital Accord (Basel Committee 2003) banks are allowed to use their internal credit ratings and associated default rates in determining their required regulatory capital against credit risk.

This study aims to answer the following questions: (1) What are the most important determinants of sovereign default/rescheduling? (2) How accurately those determinants predict sovereign default/rescheduling? (3) How to specify a model in order to predict sovereign default/rescheduling with a higher accuracy?

2. Empirical Research on the Determinants of Sovereign Debt Rescheduling

An extensive body of theoretical and empirical research has been developed on the topic of sovereign default in response to the debt crises, since the 1970s until present.

A large number of econometric studies have tested models that predict debt service difficulties with a high degree of accuracy. Studies mainly used panel logit and probit analysis, where the dependent variable is transformed in event probability, i.e. the event of rescheduling, see e.g. Rivoli and Brewer (1997). Table 1 summarizes 25 key studies performed in this area. The period analysed by these studies mainly covers early 1970s to 1990s, except for Detragiache and Spilimbergo (2000) which cover the period from 1971-1998. This provides us with an opportunity to contribute towards the debt servicing difficulties literature for a more recent period.

The commonality of all empirical papers lies in the structure of the dependent variable[2]. All of them formulate the dependent variable as a binary outcome that can take the value of 1 if default (rescheduling) and 0 if non-default (non-rescheduling) event. However, the difference in the empirical studies centres around what constitutes a default or rescheduling event.[3]

With regards to the explanatory variables, only three financial ratios that have been most often tested are found to be systematically significant in most of the studies performed, namely: (i) Reserves to imports, which are consistently found to have significant negative

[2] Debt repayment difficulty, default, rescheduling e.t.c.

[3] Some studies define that a country is in default if there is a debt rescheduling agreement or negotiations. Other studies consider sovereign default if there are arrears on principal or interest payments towards private or official creditors, or a country concludes an upper-tranche IMF agreement.

impact on probability of default/rescheduling[4] ; (ii) Total external debt to GDP, which in all of the studies exhibits positive relationship with probability of default and (iii) Total debt service due to exports shows somewhat mixed results as in most of the studies it is found to have positive impact on default/rescheduling probability[5], while Elmore and McKenzie (1992) determine a significant negative impact of this variable. Macroeconomic stability and policy indicators also exhibit mixed results, namely GDP growth, inflation and indicators of exchange rate overvaluation have been found significant variables in explaining debt service difficulties in some studies, but insignificant in others. All studies that tested the significance of the past repayment history as an explanatory variable for debt repayment difficulties have found it significant. Finally, political factors which intuitively play a very significant role in determining probability of default/rescheduling, have been included in a limited number of studies due to data unavailability and difficulty to quantify political factors. Nevertheless, in studies in which this variable was used, it was found to be an important determinant.

More details on political variables can be found in the recent empirical literature in the field of sovereign debt, which clearly makes a distinction between the country's 'ability' to service its debt and its 'willingness' to do so. This distinguishes between macroeconomic factors and political factors that explain debt service difficulty, see e.g. Schwartz and Zurita (1992). However, due to data limitation and vaguely defined political variables, these are mainly found insignificant. A study by Rivoli and Brewer (1997) indicates that armed conflict was a significant predictor of debt rescheduling in the early and late 1980s. However, other political variables such as governmental regime changes were found not to be significant and had no predictive power.

Other studies[6] such as McFadden et al., (1985) and Hajivassiliou, (1989) specify a model[7] of loan demand and supply as an estimation technique for sovereign default, where the external loan demand is determined by a country's intertemporal welfare function modelled as a function of net international reserves, current account and debt service due. The models suggest that rescheduling occurs when the new loan demand by less developed countries or developed countries exceeds the new loan supply by developed or industrialized countries. Thus, if the demand and supply curves intersect below or at the interest rate ceiling, the country is able to borrow funds in order to service its debt i.e. not to default.

Studies by Reinhart (2002), Rojaz-Suarez (2001) and Larrain et al. (1997) indicate that credit ratings for sovereign defaults and currency crises have very poor predictive power, which became particularly apparent during the Asian crisis as well as the more recent Argentinean crisis. Additionally, Reinhart (2002) indicates that variable that predicts currency crises should have an explanatory power in the models for debt crises.

Data limitations have prevented the close examination of predictive power of sovereign spreads for sovereign defaults. The data for sovereign spreads became available during the 1990s when the debt of commercial banks was securitized and converted into Bradies and Eurobonds that were easily traded. However, most of the debt default occurred in the 1980s when spreads data were not available.

[4] See for example Balkan (1992) and other studies as outlined in Table 1
[5] See for example Solberg (1989), McFadden et al (1985) and others as outlined in Table 1
[6] See also Cline (1984), Hajivassiliou (1987) and Hajivassiliou (1994)
[7] So called 'ability-to-pay' approach

Several studies question the use of debt ratios rather than macroeconomic variables in an empirical analysis of the probability of default as to whether debt ratios are symptoms of debt repayment difficulties rather than causes. However, debt ratios indeed yield more consistent results in explaining the differences in the repayment performance by countries, see e.g. Berg and Sachs (1998). Even though the factors that lead a country into default may differ from another country, it was observed that, when at the edge of default, all countries have common foundation of low reserves and high debt burden.

An important question posed by McFadden et al. (1985) intrigues the issue of sovereign default modelling. They question whether it is possible and reasonable through the econometric analysis of debt repayment difficulties to establish a macroeconomic pattern that will be stable across time and countries. In reality, country heterogeneity means that given a certain level of threshold variables, one country may default while another one may not. In econometric terms, the presence of persistent country heterogeneity violates the assumptions about the randomness of the error term, thus weakening the reliability of the estimated coefficients. McFadden et al. (1985) and Hajivassiliou (1989) find that country's past repayment records is a strong determinant of current repayment behaviour. They suggest that exclusion of the lagged dependent variable in the sovereign debt model may exclude supply side information that reflects the attitude of suppliers of credit to the debtor country, and explains country differences in repayment behaviour.

As for the quality of the empirical models, measured by the goodness-of-fit, Aylward and Thorne's (1998) model performs superior by classifying 94.78% of in-sample defaults and non-defaults correctly, with 8% type I[8] error and 3% type II[9] error. By including political variables Balkan (1992) also achieves high percentage of correct classifications of defaults and non-defaults (94.6%), with type I and II error 7.3% and 5.2% respectively. Moreover, studies such as Reinhart (2002) indicate that often debt crisis is preceded by a currency crisis. Indeed, the author finds that 84% of the sample debt cases indeed were preceded by a currency crisis.

-- Insert Table 1 here -

3. Empirical Model Specification

3.1 Defining the Dependent Variable – Rescheduling Event

One major problem in estimating a sovereign debt rescheduling model is the interpretation of the rescheduling process and the definition of the dependent variable or the rescheduling event. Most of the studies define rescheduling event in the year a rescheduling agreement is finalized.[10] Due to data limitations on the number and the individual rescheduling arrangements, we use the 'total amounts of debt rescheduled' in US dollars from the World Bank *Global Development Finance* 2004 (GDF). By taking an aggregate figure for debt rescheduling we do not distinguish between multilateral, bilateral or private creditors in different years. However, since the purpose of this study is to estimate the country's probability of rescheduling from a portfolio point of view, then rescheduling arises from the same financial disequilibrium in the country, regardless of the type of creditor.

[8] Actual defaults that are classified by the model as non-defaults
[9] Actual non-defaults that are classified by the model as defaults
[10] However, before a rescheduling agreement is finalized there is an extended process of negotiations after the country incurs arrears of debt service payments that can last for months or even years. Therefore, it is problematic to identify a rescheduling year to what most probably is a multi-year process.

Therefore, the dependent variable is a dichotomous variable that is binary-valued in the sample i.e.

$$\textbf{Rescheduling}_{it} = \begin{cases} 1 & \text{if country } i \text{ reschedules its external debt in year } t \\ 0 & \text{if country } i \text{ does not reschedule its external debt in year } t \end{cases}$$

3.2 Selecting the Explanatory Variables

The selection of the explanatory variables in this study was influenced by the reviewed literature on sovereign debt. We identified and analysed 35 variables that can potentially explain counties' sovereign debt rescheduling (see Appendix 1 for further details). We grouped the variables into five categories: solvency variables; liquidity variables; variables used in currency crises models; macroeconomic control variables; and political variables. By performing a principal component analysis, in order to reduce the dimension of our data, we have selected nine most important variables that fulfil the following criteria: (1) the variables are individually and jointly significant in the econometric model; (2) the coefficients of the variables included in the model show their expected sign; and (3) the variables included in the model best fit and maximize the model. Thus, the nine variables selected that fit our specification can be summarized as follows:

(1) Solvency Variables:

- **Total Debt/GNP -** If a country increases its external debt in relation to its resources, the probability that the debt is unsustainable will increase and thus the probability of rescheduling will increase.
- **Arrears/Exports -** The probability of rescheduling and even default is higher when total arrears on both interest and principal to both private and official creditors increase.
- **Exports/GDP -** The higher this ratio, the lower the need for the government to adjust foreign exchange rate and the lower the probability of rescheduling.

(2) Liquidity Variable:

- **International Reserves/GDP -** This ratio measures the level of international liquidity by a country. Higher international reserves relative to the size of the economy reduce the likelihood of external debt rescheduling.

(3) Macroeconomic Variables:

- **Current Account Balance/GDP -** A large current account deficit will induce the problem of servicing maturing debt if there is a shock that will disturb the country from accessing the international financial market. On the other hand, a positive change in the current account will reduce the country's dependence on foreign savings, which will reduce the foreign debt stock and thus reduce the probability of rescheduling foreign debt.
- **Imports/GDP (degree of openness) -** The higher the imports in relation to the size of the economy the more open is the country, thus more vulnerable to foreign shocks, and more likely to external debt rescheduling.
- **GDP Growth -** A higher growth of the GDP results in a lower probability of debt rescheduling.

(4) Political Variable:

- **ICRG Composite Index Rating -** Rating by PRS Group where the political risk rating contributes 50% of the composite rating, while the financial and economic risk ratings each contribute 25%. The index is measured on a scale 0-100, where the higher the ranking the lower the country risk. One could expect a negative relationship between the ICRG Composite Index and the country's default/rescheduling probability.

We also included the **lagged dependent variable** (rescheduling event) as an explanatory variables since it is an indicator of the past repayment performance of a country. The expected relationship between the past repayment performance and the probability of rescheduling is positive.

3.3 Sample and Data[11]

The econometric model developed in this study analyses 127 emerging countries over the period 1981-2002. Table 2 summarizes all the countries included in our analysis, the period examined for each country and the actual rescheduling observations during those periods for each country. Our final sample is comprised of 1509 observations and 519 rescheduling events. See Appendix 2 for Descriptive Statistics.

-- Insert table 2 here --

3.4 Principal Component Analysis – PCA

Principal component analysis is utilized in this study to identify the relationships amongst the explanatory variables. Issues such as multicollinearity and the dimension of the data are examined by the PCA. PCA identifies unit-length linear combinations of the variables with the greatest variance. Thus, each component explains independently the variation of the variance and the components that have eigenvalues greater than 1 account for a larger percentage of the total variability of the data. More specifically, PCA computes a new set of orthogonal values from a unit-length linear combination of the explanatory variables, see e.g. Solberg (1988). PCA can be defined as:

$$L_i = \alpha_1 X_1 + \cdots\cdots + \alpha_n X_n, \qquad (1)$$

where $\sum_{n=1}^{n} \alpha = 1$ and the variance of the equation is maximized and L_i the explanatory variable is orthogonal. Variables determined to be highly correlated and members of the same factor (component) will be expected to have similar profiles in our cross-sectional time series panel analysis.[12] Therefore, our objective is to summarize and reduce most of the original information (variance) in a minimum number of factors for prediction purposes. Using latent root and scree test criterions one can determine the number of important factors to be extracted from all considered variables[13].

For the full set of 35 explanatory variables, it was found that 10 components (factors) have eigenvalues greater than 1, accounting for 78.72% of the total variability in the data. From the

[11] Data on external debt and amounts rescheduled are from *Global Development Finance 2004* CD-ROM. Data on economic variables used in the study are from: *World Development Indicators 1999 and 2004* CD-ROMs, *Global Development Finance Country Tables from 1998, 1999, 2000, 2001, 2002, 2003, 2004* from World Bank; IMF's (*IFS) International Financial Statistics*; and *OECD's* various publications. Data on political risk indicators are obtained from various issues of *International Country Risk Guide* published by PRS (Political Risk Services) Group. All explanatory variables used in the econometric model are lagged by 1 year.

[12] PCA analysis is more appropriate than other factor analysis when the primary concern is about prediction or the minimum number of factors needed to account for the maximum portion of the variance represented in the original set of variables. (See e.g. Hair et al. 2003)

[13] The rational for latent root technique is that any individual factor should account for the variance of at least a single variable if it is to be retained for interpretation. Thus, only factors having latent roots or eigenvalues greater than 1 are considered significant. The scree test is used to identify the optimum number of factors that can be extracted before the amount of unique variance begins to dominate the common variance structure. (See e.g. Hair et al. 2003).

identification of the most significant factor loadings for each variable on each factor, we have determined the dimension of each of the 10 factors (components). Thus, from each dimension (component), we have selected no more than two to three variables to include in the model, which are sufficient in explaining the whole dimension. For further details on 10 dimensions identified in the PCA refer to Appendix 3.

3.5 The Model

We are using panel logit model in order to estimate the sovereign debt rescheduling probabilities of 127 emerging market countries as a function of a number of variables. The use of panel data model is for the purpose of controlling for unobserved individual country characteristics and thus to account for persistent heterogeneity[14] between countries, see e.g. Hajivassiliou (1989).

To define a panel logit model, consider a sovereign country *i* observed over T periods of time, where $t = 1,\ldots,T$ and $i = 1,\ldots,N$. For this sovereign country there exists an unobservable[15] random variable y^*_{it} indicating whether a country reschedules its sovereign debt in a year *t*. y^*_{it} is a function of lagged explanatory variables $\mathbf{X}_{it}$, constant unobserved individual county effects α and random error term $\boldsymbol{u}_{it}$. The use of only lagged explanatory variables is for the purpose of avoiding simultaneity effects and to reflect direct causation. The following equation represents the above:

$$y^*_{it} = \alpha + \mathbf{b}' \mathbf{X}_{it} + \boldsymbol{u}_{it} \qquad (2)$$

y^*_i is a dummy variable defined by

$$\boldsymbol{y^*_i} = \begin{cases} 1 & \text{if } y^*_i > 0 \\ 0 & \text{otherwise} \end{cases}$$

b is a (k x 1) vector of parameters, and the error term $\boldsymbol{u}_{it}$ is independent and identically distributed (i.i.d.) with zero mean and unit variance, and follow a logistic distribution. α_i represents the unobserved country specific characteristics[16].
The core equation or the probability that a sovereign *i* will reschedule its debt at time t can be represented as follows:

$$\text{Prob}(\textit{Rescheduling}_{it} = 1) = \frac{\exp(\alpha + \boldsymbol{\beta}' \mathbf{X}_{it})}{1 + \exp(\alpha + \boldsymbol{\beta}' \mathbf{X}_{it})} \qquad (3)$$

where $\alpha = \frac{\pi}{\sqrt{3}}\alpha$ and $\beta = \frac{\pi}{\sqrt{3}}\mathbf{b}$, which can be estimated through the maximization of the likelihood function and through iteration solving for the parameters. (Greene, 2003)

The determinants $\mathbf{X}_{it}$ that a country *i* will reschedule its sovereign debt can be stretched over time *t* or *t+1*, *t+2*, and the above expressions can be rewritten accordingly.

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[14] Differences between countries in terms of political, financial, religious and colonial histories.
[15] "Latent" variable
[16] One problem that exists with this component is that countries that are homogeneous in terms of their characteristics will be heterogeneous in terms of response probabilities. A failure to treat these effects may result in inconsistent and biased estimates. A typical problem raised by economists is whether to treat these effects as fixed or random. Later on in our econometric model we test this assumption and conclude that random-effect model is preferred over fixed-effect.

4. Results

After extensive exhaustion of the importance of all variables, we have obtained three different reduced models that explain the probability of sovereign debt rescheduling. Model 1 includes at least one variable from each component found in our PCA analysis. These variables were also frequently tested in the previous studies and all 127 countries had the data for the full set of variables considered in this model. Model 2 substitutes the variables used in Model 1 with variables from the same PCA component dimension, in order to asses whether substituting variables from the same set of components would yield even better model of sovereign debt rescheduling. Finally, Model 3 considers the most relevant and significant variables obtained from Models 1 and Model 2 and assesses the importance of a political variable in determining the probability of sovereign rescheduling. Table 3 shows our estimation results.

-- Insert Table 3 here - -

Model 1 is structured in two sub-models. Model 1a includes the lagged dependent variable (rescheduling) and Model 1b excludes the lagged dependent variable to determine whether there is a true state dependence (cross-period correlation) or heterogeneity (fixed country effect) in the model. All tested variables in Model 1a are statistically significant except for GDP growth whilst in Model 1b it is significant at 10 percent significance level. All variables in model 1a have the expected sign except for the lagged GDP growth, however this variable is not significant in our model. Both models and the explanatory variables are jointly statistically significant. The likelihood ratio test[17] of the σ^2_u is significant for the model 1b where the lagged dependent variable is excluded while it is not significant in model 1a where the lagged dependent variable is included. This indicated that the true state dependency in the model comes only from the lagged dependent variable and not any other variable, thus one could freely use a random-effect logit model since we already determined the cause of state dependency[18]. The results from Model 1a confirm the findings of earlier studies that state dependence appears to be very important in case of sovereign debt rescheduling i.e. emerging countries that have defaulted (rescheduled) in recent past are more likely to default (reschedule) in the near future[19].

A close look at the marginal effects[20] of each variable in Model 1a indicates that although the current account balance/GDP is a significant variable only at 10%, in economic terms it has significant impact on the probability of rescheduling. For instance, a 1 unit increase in current account/GDP ratio will result in 2.72% increase in the probability of rescheduling (default). Two other very important determinants of the probability of rescheduling are the lagged rescheduling and imports/GDP. A country that has rescheduled its debt has increased probability of future rescheduling by 1.19%. Moreover, the more open the country, as measured by imports/GDP, the less likely it is to reschedule: one unit increase in imports/GDP leads to 1.99% decrease in probability of rescheduling. Another equally important determinant of debt rescheduling is the total debt/GNP ratio indicating that 1 unit increase in this ratio would increase the probability of rescheduling by 1.84%.

[17] H_0: $\sigma^2_u = 0$; H_1: $\sigma^2_u \neq 0$ – random effect; LR test is Chi-Squared with 1 degree of freedom.

[18] The Hausman test was used to confirm the choice of random over fixed effects model. The chi-squared statistic obtained in the Hausman test had a negative value and according to Greene (2003) this result can be ignored which is equivalent to accepting random over fixed effect model.

[19] See e.g. Aylward and Thorne (1998), Hajivassiliou (1989, 1994), McFadden et al. (1985), Rivoli and Brewer (1997)

[20] The coefficients obtained by the model are not the marginal effects since the logit model is non-linear.

The cut-off point for classifying a probability as rescheduling or non-rescheduling is determined to maximize the percentage of correct predictions and minimize type I and type II error[21]. Comparing the performance of Model 1a and Model 1b, one can clearly observe a significant drop in the percentage correct classifications (from 82.66% to 73.58%) only by excluding the lagged dependent variable. Also type I and type II error increase significantly from 9.99% to 16.12% for type I error and from 7.34% to 10.3% for type II error. Thus, the lagged dependent variable significantly yields to the explanatory power of the model.

By retaining the most significant variable in economic terms from Model 1 and adding the international reserves/GDP and replacing the imports/GDP ratio with the exports/GDP ratio we have modelled and obtained predicted rescheduling from substitute explanatory variables in Model 2. Even though the lagged dependent variable and the total debt/GNP are the most significant variables in Model 2, the current account balance/GDP ratio has again the greatest economic importance measured by the marginal effect. Thus, a one unit increase in current account balance/GDP will result a 4.44% increase in the probability of rescheduling/default. The two other most important variables in economic sense are lagged dependent variable and international reserves/GDP with 2.14% and -2.68% marginal effects respectively.[22]

By including the ICRG composite index to account for possible political risk factors, and including the most significant variables from the previous models we have developed a third model of sovereign rescheduling. Model 3 and the explanatory variables are jointly and individually statistically very significant. The proxy political risk factor included in this model is significant at 5% level. Additionally, by comparing its marginal effects with the other variables in this model we can see that in economic terms it is the most significant variable. Thus, a one unit increase in the ICRG index (a one unit improvement in the country's risk) will result in a 3.78% decrease in the country's probability of rescheduling. These findings are in accordance with the findings by Balkan (1992).

Comparison of the three models presented in Table 3 in terms of their percentage correct classifications indicates that model 2 dominates. However, taking into consideration type I and II errors none of the three models outperforms since either one model outperforms in terms of type I error and under-performs in terms of type II error or vice versa. Thus, we can not simply choose model by comparing the type I and II error. Yet since type I error and percent correct predictions are more important for international lenders, thus the model that maximizes the percentage correct predictions and minimizes the type I error would be preferred. Table 3 suggests that model 2 maximizes the percent correct classifications and that Model 3 minimizes the type I error better than the other two models.

5. Conclusions and Recommendations

This study estimates sovereign default/rescheduling probabilities using panel logit models on a sample of 127 emerging countries over the period 1981-2002. Compared to previous studies performed in this area, the estimated models are quite comprehensive in terms of number of observations and perform well or better, all achieving an average accuracy of just over 82.50% correct predictions whilst minimising type I and type II errors. Since international

[21] Type I error occurs when actual defaults/reschedulings are classified by the model as non-reschedulings/defaults. Type II error occurs when actual non-defaults/reschedulings are classified by the model as defaults/reschedulings.

[22] One important insight for this model is that by substituting imports/GDP from model 1a with exports/GDP in model 2 to account for the trade activity dimension of a country, we have reduced the marginal effect of the dimension, thus imports/GDP is used in Model 3 to account better for this dimension.

lenders are mostly concerned with type I error where the model predicted non-rescheduling whereas actual rescheduling occurred, we can say that our models minimizes type I error better than most of the studies performed as tested on a comprehensive sample of countries over the last two decades.

This study provides new empirical evidence about the determinants and importance of international and country specific macroeconomic indicators of sovereign default/rescheduling. The most important country specific indicators of sovereign default/rescheduling appear to be country's past repayment performance, current account balance/GDP ratio, imports/GDP ratio, and political risk with the highest marginal effect in our models.

Some specific results from the three models indicate the following. A country's debt default/rescheduling in the past increases the probability of future rescheduling by 3.31% measured by its marginal effect. A one unit increase in the current account balance/GDP ratio increases the probability of rescheduling by 4.44% in Model 2. In Model 1b, a one unit increase in the imports/GDP ratio decreases the probability of rescheduling by 3.1%. Also, the political risk factor is significant in our study, suggesting that one unit improvement in the political risk will result in a 3.78% decrease in the probability of rescheduling, as in Model 3. Other significant determinants of sovereign default/rescheduling with lower marginal effects are: total debt/GNP, interest arrears/exports, exports/GDP, GDP growth, and international reserves/GDP.

The results about the determinants of sovereign default/rescheduling clearly suggest that developing countries that want to reduce debt yield premiums that stem form their probabilities of default/rescheduling, and to achieve better access to international capital markets should generally:
(i) have a good repayment performance, i.e. do not default on sovereign debt – related to unwillingness rather than inability to repay; (ii) control and reduce their current account deficit, e.g. by increasing their exports compared with their imports or by implementing a strategic trade policy; (iii) improve their political arena by limiting corruption, improving government stability etc.; (iv) keep close control of international reserves relative to the GDP, specifically important for countries with weak banking system; and (v) limit the size of the external debt compared to their resource base (GNI) and exports earnings.

One recommendation for further research is an analysis of whether rating agencies underestimate emerging counties' default risk and if so whether such underestimation can lead to debt crises. Another recommendation for future research concerns the specification of the econometric model itself.[23] Finally, one could improve the model by including a more specific political factor as an explanatory variable.[24]

[23] E.g. one could model a dynamic discrete choice model, in order to account formally for state dependency effects.

[24] E.g. an armed conflict in the country during the sample period or how many times during the period the government changed.

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APPENDIX 1 – Main Variables Used in the Study

(1) Solvency Variables:

- **Total Debt/GDP or GNP -** If a country increases its external debt stock in relation to its resources (GDP) the probability that the debt is unsustainable will increase and thus the probability of rescheduling will increase. Thus we expect a positive relationship between this ratio and the probability of rescheduling, which is also suggested by Sachs and Cohen (1982).
- **Total Arrears/Total External Debt -** The probability of rescheduling and even default is higher when total arrears on both interest and principal to both private and official creditors increase. Positive relationship is expected.
- **Credit to Private Sector/GDP –** If the private sector indebtedness increases relative to the overall economy, the probability of private[25] rescheduling increases, which may induce banking crisis forcing the government to bail-out large banks which increases the probability of rescheduling external debt. Positive relationship is expected between these variables.
- **Variability of GDP(GNP)-per-Capita Growth (Standard deviation) -** The higher the variability of the country's output, the higher the probability that in a given year the country will be unable to meet its debt service obligations, thus the higher the probability of debt rescheduling. The expected relationship between this variable and the probability of rescheduling is thus positive.
- **Real Interest Rate on International Lending -** This factor affects all countries since a higher cost of borrowing a higher probability of rescheduling. Thus, a positive sign.
- **Exports/GDP or GNP -** The higher this ratio, the lower the need for the government to adjust foreign exchange and the lower the probability of rescheduling. Thus a negative relationship.
- **Exports Growth Rate -** The higher the growth of exports the more likely is a country to earn revenues required to service its debt, thus the lower the probability that its will reschedule its external debt. Negative coefficient is expected.
- **Growth Rate of OECD Countries -** Used as a proxy for credit availability in international capital market, the higher the growth of OECD countries the lower the probability of rescheduling by emerging countries. Thus, a negative sign is expected.

(2) Liquidity Variables:

- **Debt Service due/Exports -** A higher indebtedness relative to country's exports may induce a country into liquidity problems, thus increase the probability of external debt rescheduling. Thus the expected relationship is positive.
- **International Reserves/GNP or GDP -** This ratio measures the level of international liquidity by a country. Higher international reserves relative to the size of the economy reduces the likelihood of external debt rescheduling. Thus a negative sign for the coefficient of this ratio is expected. (Edwards, 1983)
- **Variability of International Reserves (Standard Deviation) -** The higher the variation of foreign fund flows the higher the likelihood of a balance of payment crisis, thus the higher the probability of external debt rescheduling. The expected sign of this variable will be positive.
- **Reserves/Imports –** This ratio indicates how long a country can finance its imports from the reserves before incurring a higher levels of external borrowing. The larger are foreign exchange reserves to imports more reserves are available in order to

[25] Rescheduling of debt by large banks or companies

service debt, thus the likelihood of debt rescheduling is lower. We expect a negative coefficient for this ratio.

(3) Variables used in currency crises models:

- **Money[26]/Gross International Reserves -** The un-backed government or central bank liabilities can be measured by this ratio when a country has fixed or managed floating exchange rate regime, which implies that a higher ratio the higher the loss of confidence in the country's currency. This further may induce currency crisis and external debt crisis. We expect a positive relationship between the probability of rescheduling and this ratio.
- **Real Exchange Rate Squared Percentage Deviation -** This variable measures the exchange rate overvaluation. Thus, if a currency is overvalued the probability of currency crisis increases, thus the probability of debt rescheduling increases. We expect a positive relationship between this variable and the probability of external debt rescheduling. (Frankel and Rose, 1996)
- **Devaluation Rate -** The higher the devaluation rate the higher the probability of governments willingness to use exchange rate adjustments in order to avoid currency crisis, thus the higher the probability of rescheduling external debt. We expect a negative coefficient.(Edwards, 1983)

(4) Macroeconomic Variables:

- **Current Account Balance/GDP -** If a country experiences a large current account deficit, this will induce the problem of servicing maturing debt if there is a shock that will disturb the country from accessing the international financial market. On the other hand, a positive change in the current account will reduce the country's dependence on foreign savings, which will reduce the foreign debt stock and thus reduce the probability of rescheduling foreign debt. (Sachs, 1981) The expected relationship of this variable with rescheduling is thus negative.
- **Rate of Inflation -** A higher rate of inflation particularly induced by increase of the money supply will reduce outstanding domestic debt, which increases the probability of rescheduling external debt as a result of government's policy mis-management or inability to inflate the foreign debt. (McDonald, 1982)
- **Investment/GNP or GDP -** This ratio indicates the country's potential for future growth. Edwards (1983) indicates that the higher this ratio the lower the probability of external debt rescheduling, and thus we expect a negative relationship.
- **Imports/GNP or GDP (degree of openness) -** The higher the imports in relation to the size of the economy the more open is the country, thus more vulnerable to foreign shocks, and more likely to external debt rescheduling. Thus the expected coefficient of this variable is positive. (Frenkel, 1983)
- **GDP per Capita Growth -** A higher growth of the GDP per capita will result in a lower probability of external debt rescheduling. Thus, the expected coefficient is negative.
- **GDP or GNP per Capita -** As a measure of the relative size of a country's economy it has been argued by many authors that should have a negative relationship with the probability of rescheduling external debt. (Feder and Just, 1977)
- **Government Expenditure/GNP or GDP -** The higher the size of the government sector in emerging economy the higher is the probability of balance of payment crisis, thus higher probability of rescheduling. Indeed, Cline (1983) argues that the main

[26] M2

cause of the Mexican debt crisis in 1982 was the increase of the fiscal deficit. Thus, we expect a positive coefficient for this ratio.

- **Domestic Savings Rate -** This rate indicates the country's ability to finance its future economic growth by means of domestic sources. Thus the higher this rate, the lower the probability of debt rescheduling. We expect a negative coefficient.

(5) Political Variables:

Description of ICRG Composite Political, Financial, and Economic Risk Rating

The political risk rating contributes 50% of the composite rating, while the financial and economic risk ratings each contribute 25%. The highest overall rating (theoretically 100) indicates the lowest risk, and the lowest rating (theoretically zero) indicates the highest risk. As a general guide to grouping countries on the basis of comparable risk, the individual risk of individual countries can be estimated using the following fairly broad categories of Composite Risk.

Very High Risk	00.0 to 49.5 points
High Risk	50.0 to 59.5 points
Moderate Risk	60.0 to 69.5 points
Low risk	70.0 to 79.5 points
Very Low Risk	80.0 to 100 points

Where the POLITICAL RISK RATING is determined by the following components and weights:

Component	Weight
Government Stability	12
Socio-economic Conditions	12
Investment Profile	12
Internal Conflict	12
External Conflict	12
Corruption	6
Military in Politics	6
Religion in Politics	6
Law and Order	6
Ethnic Tensions	6
Democratic Accountability	6
Bureaucracy	4

Source: ICRG Ratings, PRS Group, sited at http://www.icrgonline.com/page.aspx?page=icrgmethods#Background_of_the_ICRG_Rating_System

Variables Codes and Their Description:

Variable	Code	Variable	Code
Lagged Rescheduling	L_rsch	Inflation rate (consumer prices)	L_inflcons
Total Debt/GNP	L_tdgnp	Inflation rate (GDP deflator)	L_infldefl
ICRG Rating Assigned	L_icrgrating	Devaluation of Exchange rate	L_exchdev
Total Debt/Exports	L_tdexp	Interest arrears on LDOD/Exports	L_iaexp
Short-term Debt/Total Debt	L_sdtd	Principal arrears on LDOD/Exports	L_paexp
Interest Service due/Exports	L_isexp	Interest arrears on LDOD/Debt	L_iad
PNG, total private nonguaranteed/Exports	L_pngexp	Principal arrears on LDOD/Debt	L_pad
PPG, official creditors/Exports	L_ppgoexp	Domestic Saving Rate	L_dsr
PPG, total public and publicly guaranteed/Exports	L_ppgexp	Government Expenditure/GDP	L_gegdp
Debt Service due/Exports	L_dsexp	US 1-YEAR US DEP. LONDON OFFER	L_uslibor
Reserves/Imports	L_resexp	UK 3-MONTH LIBOR:OFFER PARIS	L_uklibor
Exports/GDP	L_expgdp	IMF RATE 0F REMUNERATION	L_imfremr
Imports/GDP	L_impgdp	IMF SDR INTEREST RATE	L_imfsdrr
Current Account Balance/GDP	L_cargdp	IC CHANGES IN CONSUMER PRICES	L_icppi
International Reserves/GDP	L_iresgdp	OECD CHANGES IN CONSUMER PRICES	L_oecdcpi
Credit to private sector/GDP	L_cpsgdp		
Log GDP per capita (constant 1995 $US)	L_logGDPPC		
GDP per capita growth(constant 1995 $US)	L_gdppcg95		
GDP growth rate	L_gdpgr		
Exports growth rate	L_expgr		

APPENDIX 2 – Descriptive Statistics

Table 3: Sample Descriptive Statistics

	All Countries			*Countries that have rescheduled*			*Countries that did not reschedule*		
Variable	**Observations**	**Mean**	**Std. Dev.**	**Observations**	**Mean**	**Std. Dev.**	**Observations**	**Mean**	**Std. Dev.**
rsch	1509	0.344	0.475	502	0.769	0.422	1007	0.132	0.339
icrgrating	1045	0.612	0.108	418	0.574	0.094	627	0.638	0.110
tdgnp	1502	0.804	0.836	495	1.195	1.156	1007	0.612	0.524
tdexp	1444	2.900	4.330	470	4.497	5.652	974	2.129	3.252
sdtd	1509	0.125	0.120	502	0.108	0.098	1007	0.134	0.129
isexp	1444	0.063	0.053	470	0.083	0.061	974	0.053	0.046
pngexp	1444	0.119	0.299	470	0.141	0.410	974	0.108	0.227
ppgoexp	1443	2.007	3.450	470	3.262	4.714	973	1.401	2.409
ppgexp	1444	2.355	3.663	470	3.769	5.020	974	1.673	2.514
dsexp	1494	0.163	0.140	497	0.202	0.161	997	0.143	0.124
resexp	1396	0.035	0.031	457	0.031	0.024	939	0.038	0.033
expgdp	1444	0.412	0.239	470	0.372	0.246	974	0.431	0.233
impgdp	1491	0.508	0.275	497	0.475	0.275	994	0.524	0.273
cargdp	1453	-0.056	0.103	477	-0.062	0.106	976	-0.053	0.102
iresgdp	1459	0.139	0.145	485	0.105	0.089	974	0.156	0.163
cpsgdp	1509	0.037	0.081	502	0.038	0.095	1007	0.037	0.072
gdppcg95	1477	0.021	0.251	489	0.008	0.051	988	0.028	0.305
gdpgr	1383	0.052	0.156	456	0.053	0.178	927	0.051	0.144
expgr	1315	0.084	0.197	421	0.086	0.221	894	0.083	0.185
inflcons	1409	0.664	4.242	463	1.240	6.478	946	0.382	2.460
infldefl	1249	0.765	4.265	421	1.334	6.471	828	0.476	2.436
exchdev	1490	0.183	0.450	498	0.276	0.614	992	0.136	0.329
iaexp	1444	0.149	0.688	470	0.227	0.553	974	0.111	0.741
paexp	1444	0.334	1.185	470	0.597	1.348	974	0.208	1.075
iad	1506	0.023	0.045	499	0.036	0.044	1007	0.016	0.044
pad	1506	0.058	0.097	499	0.089	0.100	1007	0.043	0.092
dsr	1460	0.139	0.148	497	0.120	0.136	963	0.149	0.154
gegdp	1458	0.150	0.064	494	0.137	0.056	964	0.156	0.067
uslibor	1509	0.059	0.016	502	0.060	0.016	1007	0.059	0.015
uklibor	1509	0.079	0.031	502	0.082	0.032	1007	0.077	0.030
imfremr	1509	0.051	0.018	502	0.053	0.018	1007	0.050	0.017
imfsdrr	1509	0.051	0.018	502	0.053	0.019	1007	0.050	0.017
iccpi	1509	0.026	0.011	502	0.027	0.011	1007	0.025	0.011
oecdcpi	1509	0.169	0.063	502	0.169	0.061	1007	0.169	0.064
logGDPPC	1493	6.906	1.067	497	6.560	0.990	996	7.079	1.063

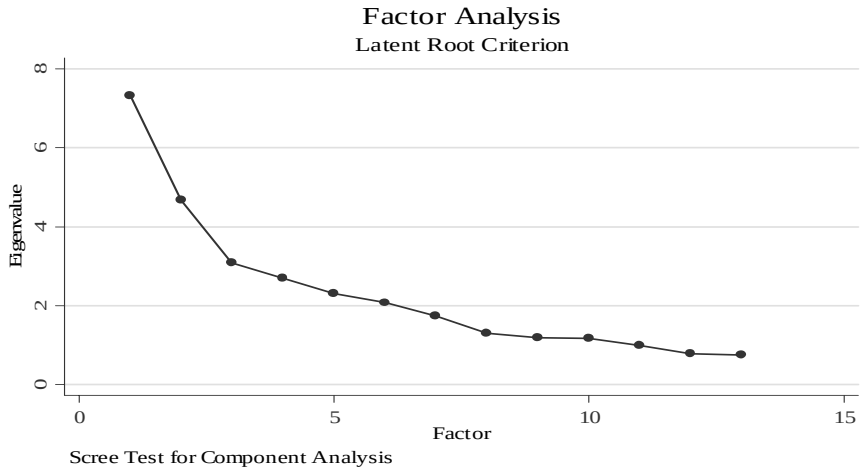
APPENDIX 3 – Principal Component Analysis (PCA)

Table 4: Results for the Extraction of Component Factors (principal component factors; 10 factors retained)

Factor	*Eigenvalue*	*Difference*	*Proportion*	*Cumulative*
1*	**7.32127**	**2.64547**	**0.2092**	**0.2092**
2*	**4.6758**	**1.58556**	**0.1336**	**0.3428**
3*	**3.09023**	**0.39506**	**0.0883**	**0.4311**
4*	**2.69518**	**0.39474**	**0.077**	**0.5081**
5*	**2.30044**	**0.22545**	**0.0657**	**0.5738**
6*	**2.07498**	**0.33541**	**0.0593**	**0.6331**
7*	**1.73958**	**0.44233**	**0.0497**	**0.6828**
8*	**1.29724**	**0.11007**	**0.0371**	**0.7198**
9*	**1.18717**	**0.01792**	**0.0339**	**0.7538**
10*	**1.16925**	**0.18339**	**0.0334**	**0.7872**

* factors with eigenvalues above 1

Graph 1:



From the identification of the most significant factor loadings for each variable on each factor, we have determined the dimension of each of the 10 factors (components) Table 5 reports the unrotated factor matrix that is computed in order to assist us in obtaining a preliminary indication for the number of factors to be extracted. The matrix contains factor loadings[27] for each variable and each factor. This will assist us in reducing the data and adequately interpreting the variables. In determining which factor loadings are significant we have used a cut-off point of ± 0.20 simply due to our sample size (see e.g. Hair et al. 2003)

[27] Factor loading enables one to interpret the role that each variable plays in defining each factor. Simply, the correlation of each variable with each factor. Thus higher loadings make the variable more representative of the factor.

Moreover, we have also rotated[28] the factor matrix (table 6) in order to obtain a more meaningful factor structure and improve the interpretation of the factors. From the identification of the most significant factor loadings for each variable on each factor, we have determined the dimension of each of the 10 factors (components) which were previously indicated by latent root criterion and scree test. The columns in tables 5 and 6 represent the 10 dimensions and the rows represent the variables contributing in each dimension (factor loadings). Table 6 represents rotated factor matrix which was completed in order to obtain a more meaningful factor structure and improve the interpretation of the factors The extracted 10 dimensions are separate factors that explain the variability of the total set of variables, namely: 1. solvency or debt, 2. interest rates, 3. trade activity, 4. inflation, 5. credit to private sector, 6. economic growth, 7. liquidity related to reserves, 8. 'immediacy' dimension or simply the country's ability to service its debt and interest due by exports, 9. short term debt and finally, 10. the last component includes the current account balance/GDP and the domestic savings rate.

The above analysis is beneficial for determining which variables should be included in our econometric model as to avoid multicollinearity and over-fitting the model. Thus, from each dimension (component), we have selected no more than 2-3 variables to include in the model, which are sufficient in explaining the whole dimension.

[28] We have used orthogonal rotations in which the axes are maintained at 90 degrees.

Table 5: Unrotated Component Analysis Factor Matrix (Unrotated factor loadings)

	Factors										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	
Variables	***Debt Related (Solvency) Dimension***	***Interest Rates***	***Trade Activity (exports-imports) Dimension***	***Inflation***	***Credit to Private Sector Dimension***	***GDP***	***Liquidity Dimension related to Reserves***	***Dimension Not Identified***	***Short-Term Debt Dimension***	***Dimension Not Identified***	Uniqueness
l_rsch	**0.38872****	0.01992	0.03309	-0.05905	0.15491	-0.06267	-0.04821	0.33495*	0.05955	0.0394	0.69638
l_icrgrating	**-0.70117****	-0.24142*	0.01406	0.07724	0.05203	0.25835*	-0.01635	0.22077*	0.10126	0.19213	0.27828
l_tdgnp	**0.70184****	-0.30939*	0.24206*	-0.12608	0.37771*	0.03483	0.02777	0.17518	0.06192	-0.10126	0.1478
l_tdexp	**0.9009****	-0.20428*	-0.14676	-0.00859	0.01244	0.20491*	0.1473	0.02282	0.08967	-0.00549	0.0526
l_sdtd	-0.11261	-0.00232	0.30707*	0.1697	0.0532	0.32546*	-0.3664*	-0.26366*	**-0.56652****	0.13386	0.21284
l_isexp	0.3669*	0.31797*	**-0.52359****	-0.00284	0.34276*	0.21329*	-0.06548	0.32804*	-0.17805	0.24856*	0.12177
l_pngexp	-0.06065	-0.04333	-0.46391*	0.16052	**0.4705****	0.40141*	-0.17628	-0.32794*	0.05868	-0.32983*	0.12011
l_ppgoexp	**0.86001****	-0.22527*	-0.126	-0.07989	-0.0634	0.13445	0.22048	0.05803	0.1372	-0.06116	0.09074
l_ppgexp	**0.88748****	-0.19602	-0.12908	-0.04363	-0.03134	0.154	0.1992	0.07261	0.11317	-0.00621	0.07289
l_dsexp	0.31746*	0.25198*	**-0.58813****	0.01284	0.35508*	0.17733	-0.02872	0.30904*	-0.15624	0.17123	0.18207
l_resexp	-0.34826*	0.02023	-0.00969	0.11568	-0.1942	0.5531*	**0.59143****	-0.12446	0.02553	0.18296	0.12179
l_expgdp	-0.36823*	-0.2155*	**0.6755****	-0.17576	0.46255*	-0.03369	0.00021	0.11658	0.1523	-0.0487	0.07652
l_impgdp	-0.1281	-0.3144*	**0.6886****	-0.23408*	0.46809*	-0.03018	0.03309	0.20252*	-0.01157	-0.1774	0.06205
l_cargdp	-0.4787*	0.29729*	-0.11277	0.10295	-0.15855	-0.03239	0.03445	-0.211	**0.50438****	0.24362*	0.2735
l_iresgdp	-0.35984*	-0.0863	0.32852*	-0.04757	-0.03089	0.50164*	**0.62354****	-0.10387	-0.03895	0.02471	0.09856
l_cpsgdp	-0.19169	-0.07469	-0.3191*	0.09982	**0.57688****	0.32847*	-0.18959	-0.36186*	0.16581	-0.35148*	0.08728
l_gdppcg95	-0.22226*	-0.08651	0.11835	-0.10324	-0.33374*	**0.52046****	-0.20201*	0.15453	0.02139	-0.22555*	0.42017
l_gdpgr	-0.04135	0.12337	0.18575	0.03247	-0.42449*	**0.4573****	-0.32602*	0.30774*	0.01451	-0.14151	0.33696
l_expgr	-0.04549	0.08128	0.18615	-0.0779	-0.33685*	**0.38407****	-0.31102*	0.2357*	0.18558	-0.14626	0.48151
l_inflcons	0.11088	0.2862*	0.19665	**0.87118****	0.00057	-0.04132	0.07519	0.15541	0.03295	-0.18321	0.042
l_infldefl	0.10979	0.28311*	0.19177	**0.87677****	-0.00166	-0.03747	0.07467	0.15909	0.03144	-0.18272	0.03563
l_exchdev	0.168	0.24393*	0.08712	**0.78645****	0.09685	-0.15056	0.16816	0.03477	-0.00831	-0.02556	0.22393
l_iaexp	**0.74597****	-0.29026*	0.17163	0.12031	-0.01235	0.25643*	-0.09303	-0.15642	0.05421	0.21442*	0.16741
l_paexp	**0.83009****	-0.32276*	0.1092	0.06869	-0.01899	0.24875*	0.03819	-0.09132	0.12058	0.13362	0.0857
l_iad	**0.53222****	-0.17649	0.46952*	0.20617	0.03049	0.01706	-0.30619*	-0.23038*	-0.01627	0.28635*	0.19233
l_pad	**0.60993****	-0.2614*	0.44308*	0.14214	-0.01256	-0.03604	-0.1907	-0.21652*	0.0424	0.16452	0.22956
l_dsr	-0.40826*	0.07578	0.05928	0.07821	0.41374*	0.03316	-0.16159	0.10822	**0.51127****	0.36389*	0.21404
l_gegdp	-0.21063*	-0.06283	0.25394*	-0.08134	0.36841*	0.02817	**0.44385****	0.08961	-0.23881*	-0.07654	0.47615
l_uslibor	0.08733	**0.58273****	0.14215	-0.13468	0.07367	0.10944	-0.06549	-0.02285	0.21348*	-0.17289	0.51678
l_uklibor	0.27*	**0.85986****	0.20073*	-0.21018*	0.08417	0.04445	0.03154	-0.08896	0.008	-0.02904	0.0844
l_imfremr	0.30084*	**0.86631****	0.20712*	-0.20787*	0.05998	0.04743	0.03618	-0.06086	-0.02031	0.00858	0.06155
l_imfsdrr	0.30122*	**0.86804****	0.2053*	-0.20815*	0.0623	0.04702	0.03451	-0.0619	-0.02133	0.00936	0.05864
l_iccpi	0.27771*	**0.7545****	0.20999*	-0.15746	-0.0127	0.09594	-0.01598	0.04343	0.01218	0.01377	0.27287
l_oecdcpi	-0.14721	**-0.51127****	-0.09096	0.09155	-0.06673	-0.00427	-0.07133	0.2231*	0.02091	-0.07086	0.63549
l_logGDPPC	**-0.59036****	0.12194	0.05844	0.21025*	0.28452*	0.30777*	-0.13841	0.12248	-0.14023	0.37542*	0.21854

*significant factor loadings ≥ ± 0.20

**highest significant factor loading for each variable

Table 6: Rotated Component Analysis Factor Matrix (Rotated Factor Loadings)

	Factors										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	
Variables	***Debt Related (Solvency) Dimension***	***Interest Rates***	***Trade Activity (exports-imports) Dimension***	***Inflation***	***Credit to Private Sector Dimension***	***GDP***	***Liquidity Dimension related to Reserves***	***Immediacy Dimension***	***Short-Term Debt Dimension***	***Current Account Related to Savings Rate***	Uniqueness
l_rsch	**0.31494****	0.10207	0.1733	0.04961	-0.13964	0.03532	-0.22315*	0.27405*	0.12461	0.0187	0.69638
l_icrgrating	**-0.46589****	-0.425*	0.18421	-0.05665	0.02298	0.2312*	0.32278*	0.09642	-0.04827	0.3422*	0.27828
l_tdgnp	**0.74692****	0.01799	0.46793*	-0.01245	0.03449	-0.06312	-0.1926	0.13734	0.05081	-0.10564	0.1478
l_tdexp	**0.92701****	0.03977	-0.12876	0.0067	0.04107	-0.01905	-0.0287	0.18717	0.111	-0.14007	0.0526
l_sdtd	-0.11684	0.02396	0.07475	0.04549	0.10646	0.13537	0.06722	-0.01105	**-0.84212****	-0.1477	0.21284
l_isexp	0.18729	0.22391*	-0.2014*	0.00029	0.12402	-0.0486	-0.10071	**0.85038****	-0.00311	0.03751	0.12177
l_pngexp	0.00742	-0.08991	-0.10477	0.01698	**0.90911****	-0.00379	0.0214	0.17829	-0.04176	-0.00151	0.12011
l_ppgoexp	**0.89242****	0.02581	-0.1096	-0.03363	-0.03078	-0.01265	-0.01419	0.11305	0.23229*	-0.17604	0.09074
l_ppgexp	**0.9084****	0.04599	-0.11643	-0.00338	-0.03657	-0.02199	-0.01991	0.17151	0.18154	-0.14712	0.07289
l_dsexp	0.15469	0.13985	-0.20854*	0.00316	0.18582	-0.0818	-0.09958	**0.8214****	0.07153	0.00144	0.18207
l_resexp	-0.10408	-0.05518	-0.15806	0.03508	0.01623	0.06809	**0.90727****	-0.01742	0.00776	0.09859	0.12179
l_expgdp	-0.18651	-0.04743	**0.87966****	-0.06372	0.00731	-0.00665	0.06942	-0.21951*	-0.06252	0.22708*	0.07652
l_impgdp	0.01629	-0.0633	**0.94951****	-0.07782	-0.02639	0.01016	0.01119	-0.14394	-0.05929	-0.02973	0.06205
l_cargdp	-0.40493*	0.10377	-0.30472*	0.03078	0.04057	-0.02364	0.17103	-0.23906*	0.17925	**0.58071****	0.2735
l_iresgdp	-0.08473	-0.01315	0.25205*	-0.03223	0.00058	0.0514	**0.89487****	-0.15707	-0.02274	-0.02997	0.09856
l_cpsgdp	-0.08248	-0.08741	0.07931	-0.02066	**0.9361****	-0.04554	0.00144	0.05452	-0.01363	0.10021	0.08728
l_gdppcg95	-0.08901	-0.08613	0.01338	-0.12119	0.07429	**0.69466****	0.20487*	-0.09827	-0.0652	-0.07526	0.42017
l_gdpgr	-0.02258	0.08394	-0.06101	0.07548	-0.10696	**0.78625****	0.0433	-0.00831	-0.11712	-0.0279	0.33696
l_expgr	0.00948	0.09422	0.00277	-0.02994	-0.04274	**0.70087****	0.00013	-0.09335	-0.00465	0.08273	0.48151
l_inflcons	0.00879	0.07968	-0.02974	**0.9732****	0.00044	0.05298	-0.00211	-0.01334	-0.02396	0.00263	0.042
l_infldefl	0.00873	0.07349	-0.03356	**0.97667****	0.00115	0.05659	-0.0003	-0.00892	-0.02447	0.00223	0.03563
l_exchdev	0.06076	0.06561	-0.08441	**0.84431****	-0.01162	-0.20834*	0.00428	0.04118	-0.04188	0.03281	0.22393
l_iaexp	**0.85238****	-0.02486	-0.03552	0.04369	-0.01684	0.03297	-0.03461	-0.02905	-0.30535*	0.07476	0.16741
l_paexp	**0.9459****	-0.0331	-0.02933	0.02893	-0.0188	0.02063	0.00356	-0.00302	-0.12537	0.01614	0.0857
l_iad	**0.57337****	0.05442	0.12189	0.15136	-0.13414	-0.03469	-0.22291*	-0.21806*	-0.53957*	0.17497	0.19233
l_pad	**0.66746****	0.01293	0.13623	0.11864	-0.14091	-0.05711	-0.21351*	-0.28258*	-0.3708*	0.07802	0.22956
l_dsr	-0.26809*	-0.02981	0.25384*	0.02519	0.13861	-0.03147	-0.00574	0.114	0.0525	**0.78239****	0.21404
l_gegdp	-0.14641	0.00211	**0.49942****	0.02354	-0.0003	-0.25538*	0.3713	0.10125	0.02166	-0.19656	0.47615
l_uslibor	-0.04899	**0.63258****	0.04275	0.0593	0.13632	0.16445	-0.04529	-0.03843	0.13338	0.09155	0.51678
l_uklibor	0.00025	**0.95305****	-0.01995	0.05101	-0.01795	-0.01119	-0.02145	0.05739	0.00411	-0.00895	0.0844
l_imfremr	0.0225	**0.95959****	-0.03301	0.05492	-0.06869	-0.00521	-0.01748	0.0863	-0.0165	-0.01604	0.06155
l_imfsdrr	0.02182	**0.96102****	-0.03376	0.05434	-0.0669	-0.00675	-0.01918	0.08825	-0.01779	-0.01563	0.05864
l_iccpi	0.04271	**0.82493****	-0.02817	0.08017	-0.11259	0.12015	-0.02352	0.09815	-0.01023	0.01297	0.27287
l_oecdcpi	0.00052	**-0.56792****	0.0918	-0.01612	-0.02293	0.15291	-0.04752	0.01868	0.07731	-0.02838	0.63549
l_logGDPPC	**-0.50434****	-0.08747	0.15801	0.09526	0.08711	0.08659	0.26818*	0.32054*	-0.39233*	0.37647*	0.21854

*significant factor loadings ≥ ± 0.20

**highest significant factor loading for each variable

Table 2: Sample and Data

Country	Period Examined	Reschedulings during the period	Country	Period Examined	Reschedulings during the period	Country	Period Examined	Reschedulings during the period
Albania	1993-2002	5	Georgia	1998-2002	2	Paraguay	1990-2002	1
Algeria	1990-2002	6	Ghana	1990-2002	3	Peru	1990-2002	10
Angola	1990-2002	7	Grenada	1990-2002	0	Philippines	1981-2002	10
Argentina	1990-2002	9	Guatemala	1990-2002	3	Poland	1991-2002	5
Armenia	1994-2002	4	Guinea	1990-2002	9	Romania	1991-2002	0
Azerbaijan	1994-2002	1	Guinea-Bissau	1990-1997	8	Russian Federati	1995-2002	8
Bangladesh	1990-2002	0	Guyana	1993-2002	6	Rwanda	1990-2002	5
Belarus	1994-2002	3	Haiti	1990-2002	2	Samoa	1990-2002	0
Belize	1990-2002	1	Honduras	1990-2002	12	Sao Tome and Pri	1990-2002	7
Benin	1990-2002	10	Hungary	1990-2002	0	Senegal	1990-2002	11
Bhutan	1990-2002	0	India	1990-2002	0	Seychelles	1990-2002	0
Bolivia	1990-2002	9	Indonesia	1990-2002	4	Sierra Leone	1990-2002	8
Botswana	1990-2002	0	Iran, Islamic Re	1990-2002	4	Slovak Republic	1994-2002	0
Brazil	1990-2002	9	Jamaica	1990-2002	7	Solomon Islands	1990-2002	1
Bulgaria	1992-2002	6	Jordan	1990-2002	12	South Africa	1995-2002	1
Burkina Faso	1990-2002	8	Kazakhstan	1996-2002	2	Sri Lanka	1990-2002	0
Burundi	1990-2002	1	Kenya	1990-2002	4	St. Kitts and Ne	1990-2002	0
Cambodia	1994-2002	3	Kyrgyz Republic	1994-2002	6	St. Lucia	1990-2002	0
Cameroon	1990-2002	11	Lao PDR	1990-2002	1	St. Vincent and	1990-2002	0
Cape Verde	1990-2002	3	Latvia	1994-2002	0	Sudan	1990-2002	0
Central African	1990-2002	8	Lebanon	1990-2002	0	Swaziland	1990-2002	0
Chad	1990-2002	9	Lesotho	1990-2002	0	Syrian Arab Repu	1990-2002	1
Chile	1990-2002	4	Lithuania	1994-2002	0	Tajikistan	1998-2002	4
China	1990-2002	0	Macedonia, FYR	1997-2002	3	Tanzania	1990-2002	12
Colombia	1990-2002	1	Madagascar	1990-2002	7	Thailand	1990-2002	0
Comoros	1990-2002	5	Malawi	1990-2002	2	Togo	1990-2002	11
Congo, Rep.	1990-2002	11	Malaysia	1990-2002	0	Tonga	1990-2002	0
Costa Rica	1990-2002	5	Maldives	1990-2002	0	Trinidad and Tob	1990-2002	4
Cote d'Ivoire	1990-2002	12	Mali	1990-2002	7	Tunisia	1990-2002	0
Croatia	1994-2002	4	Mauritius	1990-2002	0	Turkey	1990-2002	0
Czech Republic	1994-2002	0	Mexico	1990-2002	5	Turkmenistan	1994-1998	0
Dominica	1990-2002	0	Moldova	1995-2002	3	Uganda	1990-2002	9
Dominican Republ	1990-2002	10	Mongolia	1994-2002	0	Ukraine	1995-2002	6
Ecuador	1990-2002	10	Morocco	1990-2002	5	Uruguay	1990-2002	2
Egypt, Arab Rep.	1990-2002	10	Mozambique	1990-2002	11	Uzbekistan	1996-2002	1
El Salvador	1990-2002	4	Nepal	1990-2002	0	Vanuatu	1990-2002	0
Equatorial Guine	1990-2002	1	Nicaragua	1990-2002	13	Venezuela, RB	1990-2002	1
Eritrea	1999-2002	0	Niger	1990-2002	12	Vietnam	1997-2002	4
Estonia	1994-2002	0	Nigeria	1990-2002	6	Yemen, Rep.	1991-2002	7
Ethiopia	1990-2002	8	Oman	1990-2002	0	Zambia	1990-2002	12
Fiji	1990-2002	0	Pakistan	1990-2002	3	Zimbabwe	1990-2002	0
Gabon	1990-2002	12	Panama	1990-2002	6			
Gambia, The	1990-2002	0	Papua New Guinea	1990-2002	0	**Total**	**1981-2002**	**519**

Table 3:Estimation Results

dependent variable - rescheduling

	Model 1a			***Model 1b***			***Model 2***			***Model 3***		
	(1)		**(2)**	**(3)**		**(4)**	**(5)**		**(6)**	**(7)**		**(8)**
Variable	**Odds ratio (z-stat)**		**Marginal Effects % (dy/dx)[(a)]**	**Odds ratio (z-stat)**		**Marginal Effects % (dy/dx)[(a)]**	**Odds ratio (z-stat)**		**Marginal Effects % (dy/dx)[(a)]**	**Odds ratio (z-stat)**		**Marginal Effects % (dy/dx)[(a)]**
l_rsch	7.2591	***	1.9823				8.4674	***	2.1362	10.1028	***	2.3128
	(9.14)						(10.21)			(10.07)		
l_tdgnp	6.3043	***	1.8412	17.9555	***	2.8879	5.9149	***	1.7775	4.5033	***	1.5048
	(6.57)			(9.19)			(6.62)			(4.88)		
l_icrgrating										0.0228	**	-3.7790
										(-3.16)		
l_iaexp										0.5933	*	-0.5220
										(-1.98)		
l_impgdp	0.1373	***	-1.9858	0.0451	***	-3.0998				0.1745	**	-1.7459
	(-3.45)			(-4.86)						(-2.65)		
l_expgdp							0.1815	**	-1.7065			
							(-2.74)					
l_cargdp	15.2099	*	2.7219	52.1423	**	3.9540	84.4973	**	4.4367			
	(1.98)			(2.73)			(3.15)					
l_gdpgr	1.4520		0.3729	3.5863	*	1.2771						
	(0.69)			(2.39)								
l_iresgdp							0.0689	*	-2.6750			
							(-2.1)					
constant	-2.1921	***		-1.9336	***		-2.0439	***		0.3026		
sigma_u	1.1404			2.1667			1.0222			0.7966		
σ^2_u cons	0.2627			1.5464	***		0.0438			-0.4547		
Log-Likelihood	-525			-569.55			-526.31			-418.79		
LR Statistic (degrees of freedom)	(5) 204.39			(4) 115.19			(5) 222.79			(5) 215.75		
P-value of LR stat	0.0000			0.0000			0.0000			0.0000		
Model Chi-Squared	200.9			88.05			231.12			207.8		
Cut off point	0.475			0.3			0.45			0.475		
Correct Classifications (%)	82.66			73.58			82.68			82.54		
Type I Error (%)	9.99			16.12			9.13			8.33		
Type II Error (%)	7.34			10.3			8.19			9.13		
No. of Observations	1321			1321			1380			1008		
No. of Countries Analysed	127			127			124			91		
Period Analysed	1981-2002			1981-2002			1981-2002			1981-2002		

(a) Marginal effects are calculated at the sample means of the independent variables except for the dummy lagged rescheduling variable where the marginal effect is calculated for discrete change from 0 to 1

*significant at 10% level of significance

**significant at 5% level of significance

***significant at 1% level of significance