Why Heavily Indebted Poor Countries Have Failed to Pay Their Debt?
An empirical investigation

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„The debt crisis can be studied as a problem in epidemiology. A powerful virus, high world interest rate, hit the population of capital importing developing countries in the 1980s. Some countries succumbed to the virus, having to reschedule their debt on an emergency basis, while others did not. And of those countries that arrived for emergency treatment, some recovered sufficiently to enter the period of quiet convalescence, while others are still suffering from febrile seizures in the IMF's intensive care unit."

(Sachs – Berg, 1988, p. 1)

1. Introduction

The external debt crisis of developing countries' is believed to be one of the major challenges of the new millennium. As Eatwell and Taylor (2000, in: (Dymski, 2002)) express it, "international debt crisis has become a defining feature of the contemporary world economy".[1] In this regard, McFadden, et al. (1985, in (Smith, et al., 1985)) among others, argue that the primary question in international debt crisis is why indebted countries failed to meet their debt-service obligations. The late 1980s and the 1990s witness that developing countries in general and HIPCs (heavily indebted poor countries) in particular have suffered from chronic debt-servicing difficulties.[2] Though it is generally believed that external debt helps countries that are suffering from capital deficiency to achieve accelerated economic growth, once this financial gap becomes unmanageable, the past-accumulated external debt is likely to provoke further external borrowing, creating a vicious circle. This obviously creates a gloomy picture on future growth pro-

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[1] As they put it, „the past 8 years, a period of virtually unregulated cross-border financial flows, have witnessed 8 major episodes of international debt and financial crises: the 1994–95 Mexican "Tequila" crisis, the 1997–98 Asian financial crises, the 1998–99 run on the Brazilian real, the 1998–99 Russian ruble (long-term credit crisis), the 2000 Turkish crisis, the 2001–02 meltdown of the Argentine economy, the 2002 attack on the Brazilian real, and the 2002 Uruguayan collapse".

[2] The debt-servicing difficulty in fact became apparent in August 1982, after Mexico's official announcement that it could no longer manage to continue servicing its external debt. This was the end to creditworthiness of most poor countries. Fafchamps (1996, p. 315) defines debt crises in terms of the ability to pay, where he argues that a country defaults on its debt because it has run out of foreign exchange.

TABLE 1   Arrears and Rescheduling (in % of total external debt (EDT) and GNP)

Debt crisis indicators	Heavily indebted poor countries		All developing countries	
	1984–90	1991–98	1984–90	1991–98
Total amount of debt rescheduled (% of EDT)	3.05	2.12	4.75	2.68
Principal rescheduled	1.60	0.98	1.46	0.90
Principal forgiven	0.65	1.01	0.22	0.20
Interest rescheduled	n.a.	0.57	n.a.	0.54
Interest forgiven	0.07	0.26	0.03	0.04
Debt stock rescheduled	0.38	0.21	2.78	1.08
Debt stock reduction	0.08	0.65	0.61	0.50
Interest arrears on LDOD	4.77	8.34	1.91	2.21
Principal arrears on LDOD	8.25	19.22	2.87	4.37
Total amount of debt rescheduled (% of GNP)	2.65	2.80	1.66	1.00
Principal rescheduled	1.38	1.31	0.50	0.33
Principal forgiven	0.65	1.36	0.08	0.07
Interest rescheduled	n.a.	0.76	n.a.	0.20
Interest forgiven	0.07	0.34	0.01	0.01
Debt stock rescheduled	0.33	0.27	0.99	0.41
Debt stock reduction	0.08	0.82	0.21	0.18
Interest arrears on LDOD	4.36	11.30	0.65	0.82
Principal arrears on LDOD	7.65	25.96	0.99	1.64
Total external debt (EDT) to GNP ratio	87.95	134.36	34.13	37.53

Source: own calculations based on (World Bank, 2000)
(World Bank, 2001)

spects and reduces the likelihood of developing countries to meet their debt--service obligations, which is exactly the current experience of the poorest nations of the world, earning the new name „HIPCs".

The debt-servicing difficulties of indebted poor countries are remarkable. For instance, based on the (World Bank, 2000), interest arrears as a ratio to total long-term debt outstanding for SSA (Sub-Saharan Africa) and HIPCs in 1989 represent 5.3 % and 7 %, respectively. In 1998, this ratio increased to 11 % and 9 % respectively. In 1989, principal arrears as a share of total long-term outstanding for SSA and HIPCs were around 10 % and 13 % respectively. In 1998, this ratio rose to 11 % for SSA and nearly 24 % for HIPCs. This is in contrast to 3 % for EAP (East Asia and the Pacific) 1.2 % for LAC (Latin America and the Caribean) – see *Table 1*.

From Table 1 it is also apparent that HIPCs average principal arrears on loans reached more than 8 % of its total external debt in 1984–90, which rose to nearly 20 % in the 1991–98 period. In contrast, other developing countries have lower problems by far. Similarly, this ratio on average reached about 26 % of HIPCs' GNP, a clear indication that this group has not managed to meet its international debt obligations. This ratio for other developing countries, again, on average, was around 1 % in 1984–90 and around 1.5 % in the 1991–98 periods, respectively. Similarly, interest arrears on loans are higher for HIPCs relative to other low and middle-income countries. The ratio of interest arrears to GDP reached around 5 % in the 1984–89, that nearly doubled in the 1991–98 period.

TABLE 2   Definitions of the Variables and Their Sources

Variables	Definitions	Sources
TDSX	Total debt service (scheduled) to exports ratio (lagged by one year)	Global Development Finance, CD-ROM, 2000, World Bank
RESIMP	Reserves to imports ratio (lagged by year)	Global Development Finance, CD-ROM, 2000, World Bank
LGDP	Log of real GDP (PPP-adjusted) (lagged by one year)	Database for Global Development Network, World Bank, Easterly William and Mirvat Sewadeh (2002)
GDPG	Annual growth rate GDP (PPP, and deflated by 1990 US CPI) (lagged by one year)	Database for Global Development Network, World Bank, Easterly William and Mirvat Sewadeh (2002)
IMPGDP	Ratio of imports to GDP (lagged by one year)	Global Development Finance, CD-ROM, 2000, World Bank
OECDG	Growth of OECD trade partners (lagged by one year)	Database for Global Development Network, World Bank, Easterly William and Mirvat Sewadeh (2002)
LTOTG	The percentage change in the terms of trade (lagged by one year)	Database for Global Development Network, World Bank, Easterly William and Mirvat Sewadeh (2002)
CAPTDS	The share of aggregate net resource flows to total debt service (a proxy for capital inflows) lagged by one year	Global Development Finance, CD-ROM, 2000, World Bank

The objective of this paper is to empirically address the reasons behind the failure of indebted countries in the 1980s and 1990s to fully service their contractual external debt obligations.[3] The remainder of the paper is divided into seven parts: Part 2 presents a brief summary of the factors that drive countries to debt crises situations. Part 3 summarizes some of the past empirical studies in this area. Part 4 discusses the empirical specification of the model used to figure out the factors that cause the debt crisis. Part 5 briefly introduces the data and variables that are included in the regression. Part 6 presents results and the coresponding discussion. Finally, part 7 concludes and presents the possible policy implications of this study.

2. Factors Affecting Debt-repayment Capacity: A Theoretical Review

Following McFadden, et al. (1985, in (Smith – Cuddington, 1985, p. 188)), among others, generally a country is said to be in a debt repayment crisis if it has arrears on principal or interest, higher-tranche IMF arrangements, or rescheduling requests. From the figures in *Table 2*, it is apparent that

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[3] Most of the theoretical explanations on the debt crisis in the preceding chapter are relevant to this chapter. We will mainly focus on the empirical counterpart of the explanation for the debt payment difficulties of indebted nations in the past two decades.

HIPC's have failed to convert the resources they obtained through overseas borrowing into growth and ultimately service their external debt. However, although many of the indebted poor countries were in extremely difficult situations, they in principle remained committed to repay their external debt obligations. This is in contrast to the debt crisis in the 1930s, where virtually every Latin American country unilaterally suspended servicing its external bond obligations (Sachs, 1986)[4]. It appears that rescheduling rather than default is mutually beneficial both for debtors and for creditors. Marchesi (2000, p. 3) argues in this line. Rescheduling is "a mechanism which not only allows debtors not to default on their loans and remain in the international financial system but also prevents creditors from facing the whole consequences of a financial crisis". However, it appears that the hidden reason behind rescheduling rather than default is something more than that. As Sachs (1986, p. 398) argues, the rescheduling in the 1980s was indeed in the interest of creditors, where he stresses that creditors during these periods used the leverage of multilateral financial institutions to make sure that debtors wouldn't interrupt servicing their debt. In effect, the creditor governments have endorsed debt rescheduling rather than debt relief.

While this is generally true, the main thing left unexplained is why developing countries fail to pay back their external debt in the first place. The factors that are chosen vary from author to author. McFadden et al. (1985, in (Smith – Cuddington, 1985, p. 186)) summarize the broader group of factors on which we base our empirical analysis (see Table 2).

2.1 Factors in the World Economy

These are factors identified as beyond the help of developing countries that may to a great extent increase the likelihood of indebted countries to reschedule their contractual debt obligations. Following McFadden (1985) such factors may include but not be limited to a price increase in "non-compressible" imports, the deterioration in the terms of trade of developing countries' major export items, recession in industrialized countries, and volatility in trade.

2.2 Domestic Factors

These are factors that are in the full control of indebted countries themselves. These may include shock to the productive capacity of developing nations as the result of economic or non-economic factors, poor economic management by the government of an indebted country (which may include all forms of economic distortions), poor investment strategies (where the returns of the investment are by far lower than the cost of foreign capital), unsustainable growth strategies, and speculation and capital flight. These

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[4] Sachs (1986, p. 410) points out that the major difference between the 1930s and 1980s seems to be the absence of "hegemonic" power in the 1930s, while this gap was filled by the United States in the 1980s. In this context default in the 1980s would mean sanctions, seizure of assets and other forms of punishments (a cut in foreign aid and trade sanctions, for instance).

factors may directly or indirectly disrupt production, decrease export revenues, and ultimately wipe out the repayment potential of indebted countries.

2.3 Factors Affecting the Supply of Credit

These are factors that directly or indirectly affect the supply of credit to indebted countries. Such factors include: A rise in interest payments due to higher real interest rates in industrialized countries, an increase in amortization due to a decline in maturities and an increase in the ratio of the short term debt, an increase in competition from other developed and oil exporting countries, limited capacity of governments to guarantee debt, and erratic behavior of creditors induced by institutional rules on exposure, and distortion in incentives of loan managers and panics are all believed to be detrimental to the repayment capacity of indebted nations.

There obviously are reverse causality issues across some of the factors that are just mentioned. For instance, among the external factors, the recession in industrialized countries may be the cause for the deterioration in the terms of trade of developing countries key export items. Similarly, this may also be the case that the fall in the terms of trade will force developing countries to reschedule rather than fully service their contractual debt obligation and demand for further borrowing, which may reduce the financial transfers to the industrialized countries. Under the assumption of substantially larger debtors, this may also cause economic slow down in industrialized countries themselves. Moreover, it is not always easy to distinguish precisely some of the domestic and external factors, as external factors may also influence domestic ones. However, this gives a good general theoretical background to the empirical part of the analysis concerning the repayment difficulties of indebted countries in the past two decades.

3. A summary of Previous Empirical Studies

Sachs and Berg (1988) are among those who investigate the likelihood of default and the factors that cause a debt crisis. Their attempt was to find a structural explanation to the debt crisis in the 1980s. They argue that the change in the terms of trade, the structure of foreign trade (share of manufacturing vs. primary goods in total exports and the degree of commodity diversification), the level of per capita income, and geographical location of a country (to capture "contagion effect" in pure commercial bank lending), and openness, are the main factors that determine the likelihood of default. The dependent variable is rescheduling of external debt owed to commercial banks during the period 1982–87. They have 15 countries, which rescheduled their debt and 20 countries that did not in their regression.

Using a probit model, their findings indicate the following: The more open economies tend to have a low ratio of total debt service to exports ratio due to rapidly growing export revenues and therefore are less likely to reschedule. Higher income inequality increases the probability of debt service difficulties. High-income countries are less likely to reschedule since the costs of doing so (less access to new loans at friendly terms) are high. Moreover,

high-income countries have more effective political and institutional structures (Sachs – Berg, 1988, p. 24). The surprising result is that the terms of trade turned out insignificant. This is in constrast to the theoretical argument that a loss in the terms of trade may lead to debt repayment difficulties.

Woller and Philips (1996) empirically investigate the debt-servicing difficulties of 29 developing countries, most of them from Latin America during the period between 1985 and 1993. The dependent variable is total debt reduction. Using a logit model, they show that debt reduction is inversely related to the rate of inflation, ratio of exports of goods and services to GDP, the change in the terms of trade, interest arrears, and positively to GDP per capita, ratio of exports to GDP, and ratio of current account balance to GDP. Some of their covariates appear to be suffering from a multicolinearity problem. For instance, taking the ratio of exports to GDP and current account to GDP may lead to a serious problem as these variables are highly related.

McFadden et. al. (1985, in (Smith – Cuddington, 1985)) examined the determinants of debt-service difficulties across 93 developing countries in the period 1971–82. Using a probit model, they find out that the probability of rescheduling is a decreasing function of total reserves to GDP ratio, GNP per capita, and its real growth. In contrast, the likelihood of rescheduling is an increasing function of imports to GDP ratio, debt service due to exports ratio, and the change in the real exchange rate.[5]

Marchesi's (2000) empirical strategy was aimed at testing the existence of the effect of adopting the IMF programme on the subsequent concession of a debt rescheduling. The central hypothesis is that those countries that adopt an IMF programme will be more likely to obtain debt rescheduling possibilities than those that do not.[6] The period under investigation is 1985–94 and this is because, as she puts it "international debt strategy has shifted towards a policy more oriented to concede restructuring (respect to one more oriented to providing new loans) only in the eighties" (p. 15). The dependent variable chosen is total debt rescheduled. Using a bivariate probit model, Marchesi (2000) finds that rescheduling is negatively and strongly related to the rate of growth of the government consumption, the level of investment, the level of exports, and the disequilibrium in the balance of payments. In contrast, there is a strong and positive relation between rescheduling and the two dummy variables that are included: The adoption of the IMF programme and participation in the Baker and Brady Plan. Finally, the total external debt turns out to be negatively and significantly related to rescheduling, implying that "the more a country is indebted, the smaller the probability that it will obtain an arrangement with the Fund" (p. 23).

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[5] The change in the real exchange was used as a proxy for capital flight, where they give the value of 0 for country observations with flexible exchange rate regime, while they take the growth of the real exchange rate for those with pegged exchange rate regime. See also (Hadjivassiliou, 1987) for debt repayment problem discussion.

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Ngassam (1992), using a logit model and 45 African countries during the 1976–87 period, examines the determinants of rescheduling (or simply the factors that affect debt repayment capacity). His results seem to suggest that debt service ratio, reserve to imports ratio, the debt service payments to capital inflow ratio, the growth rate of GDP, the rate of domestic inflation, and the ratio of net government deficit to GDP ratio are important determinants of debt repayment capacity.

4. Econometric Specification and Data Description

In order to measure the likelihood of debt service difficulties, we estimated the parameters using a logit model. As a comparison a probit model is used.[7] Later we switch to a fixed effects logit model to control for country-specific factors and time-specific factors that account for debt service difficulties. The notations and procedure of estimation of the logit model that we use here is adapted from Pindyck and Rubinfeld (1998).[8] This method is basically a multivariate regression technique which is used to make predictions if we have a binary (dichotomous) dependent variable.

In the logit model, our focus is to figure out the probability of debt service difficulties (total debt rescheduled used as a proxy for debt servicing difficulties) and the factors that are responsible for this difficulty to occur. Like in (Pindyck – Rubinfeld, 1998), using a logit approach, the probability of rescheduling total external debt (P_i) can be estimated as:

$$p_i = \frac{1}{1 + e^{-(\alpha + \beta X_i)}} \tag{1}$$

Here the individual P_i cannot be observed but from the (World Bank, 2000), it is possible to have information about countries that have rescheduled their external debt and those that do not. Unfortunately, such data is available only between the periods 1989–98. X is a vector of variables that impact on the debt capacity of debtor countries and e is the base of natural logarithm of both sides of the equation. The dependent variable, Y_i, is composed of two values: 1 for a country that has for some reason rescheduled its total debt payment and 0 for the one that was lucky to escape rescheduling during a given year. α and β are unknown parameters that should be estimated by the model. Following Pindyck and Rubinfeld (1998), Maddala (1983) and Ngassam (1992), among others, if the logit model with individual observations has been chosen, the maximum likelihood estimation (MLE) would be the most appropriate estimation technique to be used.[9]

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[7] The two models should produce similar results, except that the scale of the coefficients will differ.

[8] However, a broader discussion of this and other limited dependent variable can be found in (Pindyck – Rubinfield, 1998) and (Maddala, 1983). Ngassman (1992) also follows exactly the same procedure.

[9] All parameter estimators are consistent, and asymptotically efficient. In addition, all parameter estimators are known to be (asymptotically) normal, so that the analogy of the regression t test can be applied (Pindyck – Rubinfeld, 1998).

Using Pindyck and Rubinfelds' (1998) notation, the sample here consists of $n1$ countries that have rescheduled their external debt and $n2$ countries that managed to pay back their external debt. Therefore, we have $(n1 + n2 = N)$ countries in total. We ordered the data in such a way that the $n1$ observations are associated with rescheduling and the $n2$ countries with non-rescheduling. The maximum likelihood function that is subject to maximization will then have the following form:

$$L = Prob(Y1,...., YN) = Prob(Y1)....Prob(YN) \tag{2}$$

Recognizing that the probability of a country falling in the non-rescheduling group is simply 1 minus the probability of its being in the rescheduling group, and using n to stand for the product of a number of independent variables, the likelihood function reduces to:

$$L = P_1....P_n \, (1 - P_{n1+1})...(1 - P_N) = \prod_{i=1}^{n1} P_i \prod_{i=n_1+1}^{N} (1 - P_i) = \prod_{i=1}^{N} P_i^{Y_i} \, (1 - P_i)^{(1-Y_i)} \tag{3}$$

The last expression indicates that $Y_i = 1$ for the $n1$ observations, and 0 for the $n2$ observations. It is now time to maximize the logarithms of L by substituting the logistic probability function from the equation (1). It is first necessary to note that

$$1 - P_i = 1 - \frac{1}{1 + \ell^{-(\alpha+\beta x_i)}} = \frac{1 + \ell^{-(\alpha+\beta x_i)} - 1}{1 + \ell^{-(\alpha+\beta x_i)}} = + \frac{\ell^{-(\alpha+\beta x_i)}}{1 + \ell^{-(\alpha+\beta x_i)}} = \frac{1}{1 + (1/\ell^{-(\alpha+\beta x_i)})} = \frac{1}{1 + \ell^{(\alpha+\beta x_i)}}$$

Following Ngassam (1992, p. 11), this implies that:

$$\log L = \sum_{i=1}^{n1} \log P_i + \sum_{i=n1+1}^{N} \log (1 - P_i)$$

In order to obtain the slope estimators of $\hat{\alpha}$, and $\hat{\beta}$ there is a need for a partial differentiation of $\log L$ with respect to the two unknown parameters (α, and β), and setting the outcome equal to zero, and solve:

$$\frac{\partial(\ln L)}{\delta\alpha} = \sum_{i=1}^{n} \frac{\partial P_i/\partial\alpha}{P_i} - \sum_{i=n1+1}^{N} \frac{\partial P_i/\partial\alpha}{1 - P_i} = 0$$

$$\frac{\partial(\ln L)}{\partial\beta} = \sum_{i=1}^{n} \frac{\partial P_i/\partial\beta}{P_i} - \sum_{i=n1+1}^{N} \frac{\partial P_i/\partial\beta}{1 - P_i} = 0$$

To test the significance of all or a subset of the coefficients in the MLE logit model, we use the standard χ-square distribution and likelihood ratio tests.

TABLE 3   Descriptive Statistics of the Determinants on Debt Servicing Difficulties (1989–98)

Variable	Observation	Mean	Std. Dev.	Min	Max
TDSX	600	21.22	13.42	0	152
RESIMP	594	3.25	3.15	0	25
LGDP	599	7.43	0.82	5.61	9.22
GDPG	600	3.67	5.61	−50.2	34.4
IMPGDP	600	36.67	20.83	4.6	129.8
OECDG	570	1.85	1.22	−1.67	4.78
LTOTG	599	0.01	2.72	−15.84	18.02
CAPTDS	600	341.91	2 012.16	−210.54	45 923

TABLE 4   Correlation Matrix

Variable	RESCDT	TDSX	RESIMP	LGDP	GDPG	IMPGDP	OECDG	LTOT	CAPTDS
RESCDT	1.00								
TDSX	0.1813* (0.000)	1.00							
RESIMP	−0.155* (0.000)	−0.08* (0.04)	1.00						
LGDP	−0.159* (0.000)	−0.053 (0.19)	0.215* (0.000)	1.00					
GDPG	−0.01* (0.009)	−0.017 (0.68)	0.136* (0.000)	0.131* (0.001)	1.00				
IMPGDP	−0.126* (0.002)	−0.331* (0.000)	−0.114* (0.08)	0.071 (0.14)	0.059 (0.14)	1.00			
OECDG	−0.032 (0.43)	0.044 (0.28)	−0.032 (0.43)	0.016 (0.69)	0.075 (0.07)	0.022 (0.59)	1.00		
LTOT	−0.002 (0.95)	−0.034 (0.40)	0.017 (0.67)	0.000 (0.99)	−0.024 (0.55)	−0.031 (0.44)	0.004 (0.30)	1.00	
CAPTDS	0.076 (0.06)	−0.109* (0.00)	−0.037 (0.36)	−0.152* (0.000)	−0.198* (0.000)	−0.016 (0.68)	0.028 (0.49)	0.068 (0.09)	1.00

Notes: *significant at 5% level
Numbers in parentheses are standard errors.

5. Data Description and Samples

The data consists of 48 countries that have rescheduled during the 1989–98 period and 14 countries that have not rescheduled their external debt service obligation. The number of countries chosen for this analysis purely depended on the availability of data. The dependent variable is the total amount rescheduled in the 1989–98 period. The explanatory variables, their definitions and sources are in Table 2. Unlike most previous researchers, we use lagged values of all the covariates to avoid the notoriously known simultaneity problem. Interest payments and total debt service payments have been deflated by exports. While capital inflows have been deflated by total debt services payments due, reserves are deflated by

imports and imports are deflated by GDP to take account of heterogeneity in the size of developing countries. *Tables 3* and *4* contain descriptive statistics and a correlation matrix for the covariates included in this study, respectively.

6. Results of the Regression and Discussion

In order to measure the likelihood of debt service difficulties, we estimated the parameters using a logit model. As a comparison a probit model was used. Later we switch to a fixed effects logit model to control for country-specific and time-specific factors that may account for debt service repayment capacity. The reason is that a countrys' debt repayment potential may also be influenced by factors other than those that current empirical literature focuses on. The second reason is that in a simple cross-section approach, it is not possible to control for time-specific factors that may hamper the repayment capacity of indebted countries. To our knowledge, these have not been taken care of by current empirical literature.

The empirical results for the causes of the debt crisis in the 1980s and 1990s have been presented in *tables 5 to 8*. In *Table 5* we presented the results for the cross-section pooled time series logit and probit models, where columns 1–4 stand for the logit while 5–8 stand for the probit model. The results of Table 5 suggest the following: Higher total debt service to exports ratio (TDSX) increases the probability of debt-service difficulties and leads to rescheduling. This is because higher debt service exhausts the amount of resources and little is left over for investment and growth. A higher amount of reserves to imports ratio (RESIMP) decreases the probability of debt rescheduling since now an indebted country has enough foreign exchange to meet its external debt obligation. Higher real income per capita (LGDP) and growth in real income (GDPG) and import to GDP ratio (IMPGDP) decrease the probability of rescheduling. The reason is that higher income per capita and GDP growth that are indicators of creditworthiness should enable an indebted country to generate resources to meet its foreign obligation.[10] On the other hand, the significance of IMPGDP variable is, to a great extent, linked to the degree of openness of an indebted country to international trade. An indebted country that is open to international trade is unlikely to default or demand for rescheduling as the penalty (trade sanction, embargo and trade credit) might be too damaging. In column 2, we added the growth of OECD trade partners (OECDG) to capture the impact of this on the debt-servicing behavior of indebted countries. The results suggest, though not statistically significant, that higher growth of OECD trade partners decreases the probability of rescheduling (debt-servicing difficulties).[11]

Putting aside the statistically insignificance of the coefficient on OECDG

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[10] All covariates are lagged by one year to minimize possible simultaneity problem.

[11] As McFadden, et al. (1985, p. 188, in (Smith – Cuddington, 1985)) rightly puts it, "the significance of income may reflect both the ability to pay and the presence of a government infrastructure adequate to control trade and exchange activities".

TABLE 5   Regression Results for Cross–section Pooled Analysis (1989–98)
            (dependent variable 1 for countries that rescheduled and 0 otherwise in all
            the regressions)

Variable	Logit Model Estimates				Probit Model Estimates			
	1	2	3	4	5	6	7	8
CONST	2.336*** (2.8)	2.34*** (2.8)	2.339*** (2.8)	1.266 (1.29)	1.44*** (2.8)	1.459*** (2.8)	1.453*** (2.8)	0.782 (1.3)
TDSX	0.022*** (2.9)	0.021*** (2.8)	0.218*** (2.8)	0.027*** (3.3)	0.014*** (3.0)	0.013*** (2.8)	0.013*** (2.9)	0.017*** (3.3)
RESIMP	−0.107 (−2.8)	−0.069 (−1.6)	−0.07* (−1.6)	−0.079* (−1.8)	−0.066*** (−2.9)	−0.043* (−1.6)	−0.044* (−1.6)	−0.049* (−1.9)
LGDPC	−0.301*** (−2.8)	−0.337*** (−3.1)	−0.336*** (−3.1)	−0.221* (−1.8)	−0.181*** (−2.8)	−0.209*** (−3.1)	−0.209*** (−3.1)	−0.137 (−1.8)
GDPG	−0.029* (−1.8)	−0.027* (−1.7)	−0.027* (−1.6)	−0.025 (−1.4)	−0.018* (−1.8)	−0.018* (−1.7)	−0.017* (−1.6)	−0.015 (−1.4)
IMPGDP	−0.01** (−2.1)	−0.0001 (−0.2)	−0.0001 (−0.00)	0.0001 (0.1)	−0.006** (−2.2)	−0.0002 (−0.0)	−0.0001 (−0.0)	0.0002 (0.0)
OECDG		−0.07 (−1.1)	−0.08 (−1.1)	−0.088 (−1.22)		−0.048 (−1.1)	−0.049 (−1.1)	−0.054 (−1.2)
TOTG			0.003 (0.52)	0.02 (0.6)			0.002 (0.53)	0.012 (0.6)
CAPTDS				0.0004** (1.9)				0.0003* (1.9)
Pseudo R^2 N	0.06 593	0.04 563	0.04 563	0.04 563	0.06 593	0.04 563	0.04 563	0.05 563

Notes: The asterisks *, **, and *** represent significance at 10% level, 5% level, and 1% level, and are applied
        to all the regressions in this paper.
        In all regressions, the numbers in paranthesis are *t*-statistics.
        All the variables are lagged by one year.

Sources: Except the annual GDP growth that was taken from (Easterly et al., 2002), all the other covariates have
           been own calculations of the author.

for a moment, the result may be interpreted from two viewpoints: First,
higher growth of OECD trade partners would mean higher export revenue
for indebted countries which should enable them to pay their external debt
back when due. Second, the growth of this group could also create a better
economic environment for debt relief.[12] In column 3, we added the percen-
tage change in terms of trade (LTOTG) that captures the welfare loss or
gain in international trade, which affects export revenue. The positive sign
on LTOTG (though not statistically significant) may suggest that an im-
provement in the terms of trade increases the probability of debt-service
difficulties, hence the demand for rescheduling, a result that should be in-
terpreted rather as anomalous. Finally, the ratio of capital inflows to total
debt service due (CAPTDS) may indicate that higher inflows of capital re-
lative to the amount of scheduled debt service payment decreases the pro-
bability of rescheduling.

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[12] However, as Hajivassiliou (1987) argues, higher growth in OECD countries may reflect
the level of investment in these countries which may crowd out lending to developing countries.

TABLE 6   Regression Results for the Likelihood of Debt–service Difficulties (1989–98)
(Dependent variable is 1 for countries that have rescheduled and 0 otherwise.)

Variable	Logit Model Estimates				Probit Model Estimates			
	1	2	3	4	5	6	7	8
CONST	2.269*** (2.7)	2.288*** (2.8)	2.291*** (2.8)	1.115 (1.1)	1.406*** (2.8)	1.421*** (2.8)	1.415*** (2.8)	0.697 (1.2)
INTX	0.11*** (5.6)	0.111*** (5.5)	0.111*** (5.6)	0.123*** (5.9)	0.068*** (5.7)	0.069*** (5.7)	0.069*** (5.7)	0.077*** (6.1)
RESIMP	−0.117*** (−2.9)	−0.085* (−1.9)	−0.086* (−1.9)	−0.099** (−2.2)	−0.07*** (−2.9)	−0.053** (−1.97)	−0.054** (−2.0)	−0.062** (−2.3)
LGDPC	−0.387*** (−3.4)	−0.426 (−3.7)	−0.427*** (−3.7)	−0.301** (−2.4)	−0.240*** (−3.5)	−0.265*** (−3.8)	−0.265*** (−3.8)	−0.188** (−2.4)
GDPG	−0.024 (−1.5)	−0.021 (−1.3)	−0.021 (−1.3)	−0.018 (−1.0)	−0.015 (−1.5)	−0.013 (−1.3)	−0.013 (−1.3)	−0.011 (−1.0)
IMPGDP	0.004 (−0.7)	0.007 (1.2)	0.007 (1.2)	0.008 (1.1)	−0.002 (−0.8)	0.004 (1.1)	0.004 (1.2)	0.005 (1.3)
OECDG		−0.091 (−1.2)	−0.094 (−1.3)	−0.010 (−1.4)		−0.055 (−1.2)	−0.057 (−1.3)	−0.062 (−1.4)
TOTG			0.018 (0.6)	0.027 (0.8)			0.003 (0.6)	0.016 (0.8)
CAPTDS				0.0005** (2.1)				0.0003** (2.2)
Pseudo R^2 N	0.10 593	0.08 563	0.08 563	0.08 563	0.10 593	0.07 563	0.08 563	0.09 563

Table 6 is similar to that of Table 5 except that we now use interest pay-
ments to exports ratio (INTX) instead of total debt service ratio (TDSX).
The reason is that it is actually interest payment ratios that capture
the pure (net) impact of swings in the interest rate and represents the ac-
tual cost of external debt. While most of the covariates remain the same as
that of Table 5, the results for INTX suggest that higher interest payments
strongly increase the likelihood of rescheduling.

While the discussion so far suggests that the covariates in Tables 5 and 6
(interest payments, total debt service ratio, income per capita and growth
in income, capital inflows to scheduled debt service payments and reserves
to imports ratio) are key determinants of external debt service difficulties,
there are some caveats that need to be addressed. The crux of the matter
here is that countries may encounter debt-service difficulties because of se-
veral other problems. As many argue, there are substantial economic, so-
cial and institutional differences across developing countries, which may
affect their debt service capacities. Moreover, developing countries are dif-
ferent in their colonial heritage, geopolitical and strategic significance, po-
litical stability and other factors that may determine their creditworthiness
and the potential bargaining power to manage debt-servicing difficulties.

The most usual empirical strategy to address the issues mentioned above
is to use the fixed-effects model and in this case, the fixed-effects logit model
that allows to control for country-specific factors. The results of the re-
gression for the fixed-effects logit model are presented in *Tables 7* and *8*.

TABLE 7   Regression Results for Fixed–effects Logit Model (1989–98)
(Dependent variable is 1 for countries that have rescheduled and 0 otherwise.)

Variable	1	2	3	4	5	6	7	8
TDSX	0.039*** (2.5)	0.028* (1.79)	0.401*** (2.5)	0.028* (1.81)	0.042*** (2.6)	0.031* (1.92)	0.051*** (3.10)	0.039** (2.35)
RESIMP	0.152 (1.5)	0.302*** (2.62)	0.150 (1.4)	0.306*** (2.66)	0.135 (1.30)	0.291*** (2.51)	0.130 (1.20)	0.279** (2.38)
LGDP	−3.53** (−2.3)	−3.15** (−2.01)	−3.51** (−2.3)	−3.09** (−1.98)	−3.38** (−2.20)	−2.99* (−1.93)	−2.32 (−1.50)	−1.79 (−1.10)
GDPG	0.017 (0.7)	0.023 (1.01)	0.017 (0.7)	0.022 (1.00)	0.019 (0.8)	0.025 (1.12)	0.047* (1.90)	0.049** (2.01)
IMPGDP	−0.043* (−1.7)	0.013 (0.47)	−0.042* (−1.9)	0.028 (0.77)	−0.039 (−1.50)	0.029 (0.94)	−0.059** (−2.20)	0.005 (0.15)
OECDG			−0.024 (−0.2)	−0.014 (−0.85)	−0.036 (0.40)	−0.014 (−0.85)	−0.055 (−0.60)	−0.009 (−0.56)
TOTG					0.036 (0.80)	0.009 (1.03)	0.036 (0.8)	0.009 (0.95)
CAPTDS							0.0006*** (2.60)	0.0005** (1.97)
dummy90		−1.313 (−0.26)		−0.139 (−0.27)		−0.117 (−0.83)		−0.128 (−0.24)
dummy91		−0.307 (−0.58)		−0.307 (−0.58)		−0.330 (−0.62)		−0.314 (−0.58)
dummy92		−0.354 (−0.65)		−0.366 (−0.67)		−0.344 (−0.63)		−0.342 (−0.61)
dummy93		−0.501 (−0.88)		−0.513 (−0.90)		−0.497 (−0.87)		−0.468 (−0.80)
dummy94		−1.64*** (−2.83)		−1.66*** (−2.86)		−1.64*** (−2.80)		−1.57*** (−2.63)
dummy95		−1.130* (−1.88)		−1.139* (−1.89)		−1.171* (−1.94)		−1.375** (−2.22)
dummy96		−1.272** (−2.08)		−1.191* (−1.93)		−1.237** (−1.98)		−1.174* (−1.87)
dummy97		−1.783*** (−2.84)		−1.745*** (−2.78)		−1.759*** (−2.79)		−1.719*** (−2.67)
dummy98		−1.69*** (−2.65)		−1.685*** (−2.64)		−1.717*** (−2.68)		−1.622** (−2.46)
No. Obs.	425	425	425	425	425	425	425	425

The results seem to suggest that TDXS, INTX, income per capita (LGDP) and IMPGDP are indeed major determinants of debt-service difficulties, hence the level of rescheduling across developing countries in the 1980s and 1990s. It is also important to note that INTX and income per capita (LGDP) continued to be the strongest explanation for debt-servicing difficulty across countries. The marginal effects (*Table 9*) also confirm that debt service (mainly interest payments), reserves to GDP ratio, income per capita and imports to GDP ratio be the core determining factors behind the failure of indebted countries to service their contractual international debt obligations.

TABLE 8   Regression Results for Fixed–effects Logit Model (1989–98)
(Dependent variable is 1 for countries that have rescheduled and 0 otherwise.)

Variable	1	2	3	4	5	6	7	8
INTX	0.192*** (4.20)	0.153*** (3.28)	0.193*** (4.41)	0.154*** (3.29)	0.200*** (4.50)	0.157*** (3.37)	0.221*** (4.8)	0.179*** (3.68)
RESIMP	0.171 (1.6)	0.277** (2.34)	0.166 (1.5)	0.283** (2.39)	0.141 (1.3)	0.264** (2.19)	0.137 (1.2)	0.251** (2.05)
LGDP	−2.884* (−1.9)	−2.602* (−1.63)	−2.872* (−1.8)	−2.555 (−1.61)	−2.722* (−1.70)	−2.449 (−1.55)	−1.518 (−0.9)	−1.246 (−0.75)
GDPG	0.015 (0.6)	0.019 (0.86)	0.016 (0.7)	0.019 (0.85)	0.019 (0.8)	0.022 (1.0)	0.048* (1.9)	0.046* (1.88)
IMPGDP	−0.022 (−0.8)	0.016 (0.55)	−0.022 (−0.8)	0.026 (0.84)	−0.017 (−0.6)	0.032 (1.01)	−0.038 (−1.3)	0.007 (0.21)
OECDG			−0.035 (−0.41)	−0.014 (−0.87)	−0.051 (−0.5)	−0.015 (−0.87)	−0.071 (−0.7)	−0.009 (−0.56)
TOTG					0.010 (1.1)	0.01 (1.1)	0.047 (0.9)	0.009 (0.97)
CAPTDS							0.0006*** (2.4)	0.0004* (1.93)
dummy90		−0.087 (−0.17)		−0.098 (−0.19)		−0.082 (−0.16)		−0.094 (−0.18)
dummy91		−0.143 (−0.27)		−0.139 (−0.26)		−0.164 (−0.3)		−0.122 (−0.22)
dummy92		−0.189 (−0.34)		−0.199 (−0.36)		−0.181 (−0.32)		−0.173 (−0.3)
dummy93		−0.255 (−0.44)		−0.263 (−0.45)		−0.237 (−0.4)		−0.191 (−0.32)
dummy94		−1.345** (−2.23)		−1.362** (−2.26)		−1.328** (−2.19)		−1.225** (−1.97)
dummy95		−0.757 (−1.21)		−0.767 (−1.22)		−0.800 (−1.27)		−0.998 (−1.55)
dummy96		−0.872 (−1.36)		−0.783 (−1.21)		−0.831 (−1.28)		−0.741 (−1.13)
dummy97		−1.331** (−2.01)		−1.289** (−1.95)		−1.289* (−1.94)		−1.193* (−1.75)
dummy98		−1.244* (−1.85)		−1.238* (−1.84)		−1.272* (−1.88)		−1.150* (−1.65)
No. Obs.	425	425	425	425	425	425	425	425

7. Conclusion and the Policy Implication of This Study

This paper was aimed at empirically addressing the factors accounting for the debt repayment difficulties of indebted developing countries in the 1980s and 1990s. In this respect, the main objective was to empirically explore the factors that increase the likelihood of debt rescheduling.

To answer this question, several empirical strategies were employed. Using the cross-section pooled time series probit, and logit, models and fixed effects logit model, empirical findigs suggest that the core factors behind poor nations' debt-servicing difficulties are the scheduled external debt service payments (or interest payments), the amount of international reserves

TABLE 9   Marginal Effects after Logit (Cross–section Pooled Time Series) (1989–98)
(Numbers in parantheses are *t*–statistics.)

Variable	1	2	3	4	5	6
INTX				0,029*** (5,89)	0,03*** (5,93)	0,031*** (5,89)
TDSX	0,007*** (3,38)	0,007*** (3,41)	0,007*** (3,29)			
RESIMP	–0,028*** (–2,92)	–0,028*** (–2,93)	–0,022** (–1,95)	–0,031*** (–3,05)	–0,031*** (–3,07)	–0,027** (–2,33)
LGDP	–0,047 (–1,57)	–0,046 (–1,54)	–0,006 (–1,49)	–0,066** (–2,16)	–0,065** (–2,12)	–0,065** (–2,04)
GDPG	–0,006 (–1,52)	–0,007 (–1,54)	–0,006 (–1,49)	–0,005 (–1,17)	–0,005 (–1,20)	–0,005 (–1,13)
IMPGDP	–0,006** (–1,98)	–0,002** (–1,96)	0,002 (1,00)	–0,001 (–0,68)	–0,001 (–0,66)	0,004* (1,88)
CAPTDS	0,0001* (1,89)	0,0001* (1,93)	0,0001* (1,73)	0,0001** (2,8)	0,0001** (2,14)	0,0001* (1,97)
LTOTG		0,004 (0,52)	0,004 (0,6)		0,005 (0,67)	0,006 (0,78)
OECDG			–0,002 (–1,33)			–0,02 (–1,40)

they have at disposal, the level of income per capita, the growth rate in income, the ratio imports to GDP, and the amount of capital inflows relative to the total debt service payments due ratio. It is important to note that the level of income per capita (which captures the level of poverty, among other things) and interest payments (which represent the actual cost of external debt and capture swings in international interest rates) are the most profound determinants of debt-servicing difficulties across developing nations in the 1980s and 1990s.

The policy implications of this study are relatively straightforward: The results here and other studies seem to suggest that poverty and past accumulated debt are the cardinal factors responsible for the failure of poor nations in meeting their contractual debt obligations. This may seem to support the call for debt relief for poor nations, as further supply of loans to these nations would simply lead them to a notoriously known problem of „circular financing“, hence, taking more expensive fresh loans to pay back cheaper old ones, leaving the circle unbroken, and poor nations poor forever. In this context, the new HIPCs' initiative by the IMF and World Bank should be recognized as a plausible start towards a real solution to the debt crisis of poor nations. Nevertheless, without a sincere policy change both in developing and developed countries, debt relief on its own will not guarantee a sustainable economic recovery across indebted poor nations in the decades ahead.

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SUMMARY

Why Heavily Indebted Poor Countries Have Failed to Pay Back Their Debt?
An empirical investigation

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This paper, in using cross-section pooled logit, probit, and fixed-effects logit models, empirically explores the main factors affecting the rescheduling of contractual debt-service payments by heavily indebted poor countries (HICPs) in the late 1980s and the 1990s. The results seem to suggest that HIPCs past external debt, per-capita income level, GDP growth rate, trade openness, foreign-currency reserves, and capital inflows are core factors affecting debt servicing