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Debt repudiation by developing countries in the 1980s: a cross-country analysis of major determinants

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DEBT REPUDIATION BY DEVELOPING
COUNTRIES IN THE 1980s

A Cross-Country Analysis of
Major Determinants

by

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**DEBT REPUDIATION BY DEVELOPING COUNTRIES IN THE 1980s:
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I. Introduction

In the literature, the persistent debt crisis of the 1980s has mainly been interpreted as the consequence of mounting difficulties of developing countries to service their external debt as formerly agreed. Consequently, the default issue was raised in terms of the debt-servicing capacity of debtor countries, i.e. their ability to pay. Various models were built along these lines¹. Applying logit analysis, discriminant analysis or principal component analysis, financial indicators such as the debt-service ratio, the ratio of external debt to exports and/or GDP, and external reserves to imports, as well as economic performance variables such as export growth and domestic inflation proved to be statistically significant in explaining debt-service problems. However, most of these models failed as an early-warning device.

Among the reasons for this failure the missing sovereign-risk perspective of the models addressing the debtor's ability to pay can be supposed to figure prominently. Default is not only a matter of debt-servicing capacity, but also of the debtor's willingness to pay. The issue of willful default or debt repudiation has been taken up only recently². Contrary to credit contracts in the national realm, debt servicing is hardly enforceable by creditors in the international context. After the contract is concluded and the capital is transferred, a substantial range of discretion accrues to the debtor [Jensen, Meckling, 1976, pp. 308f.]. The honouring of contractual obligations becomes a matter of cost-benefit calculus.

Basically, the relationship between creditors and debtors can be characterized by a principal-agent situation, where the agent (debtor) has the choice between cooperative and non-cooperative strategies (e.g., servicing or repudiating foreign debt). The

¹ See e.g. Feder, Just [1977]; Abassi, Taffler [1982]; Schmidt [1984]; Cline [1984]; for an overview on these and other studies on debt-servicing problems, see Amelung, Mehlretter [1986].

² See e.g. Eaton, Gersovitz [1981a; 1981b]; Sachs [1983]; Sachs, Cohen [1982]; Lächler [1985].

principal (creditor) may react by embarking on non-cooperative strategies as well, for example by foreclosing future access to capital. Probably, the recent congestion of defaults in various developing countries and the refusal of commercial banks to provide fresh money to problem borrowers indicate a shift towards non-cooperative principal-agent relations. In the following analysis, an attempt is made to address this question empirically by testing the relevance of the notion of willful default. This is done by subjecting major hypotheses on debt repudiation to logit analysis, which allows to identify the impact of different factors on the probability of default¹.

The relevance of this analysis stems from the fact that in the longer run both borrowers and creditors would be better off in a cooperative situation². A commitment to cooperative behaviour by the debtors reduces the credit risk faced by the lenders; this, in turn, allows the borrowers a better bargain on the credit terms. Otherwise, the existence of sovereign risk may have as a consequence that the amount of capital transferred to developing countries remains below its optimal level [Allen, 1983; Eaton, Gersovitz, 1981a; 1981b]. Moreover, it was argued that the investment level of debtors is higher under cooperative conditions [Lächler, 1985, pp. 25-28], which would help to prevent future debt crises. In order to pave the way for the return to more cooperative borrower-creditor relations, the major economic incentives and disincentives for willful default have to be analysed in the first place.

This article proceeds with the presentation of some hypotheses on willful default which have been raised in the literature (Section II), the description of the basic logit model (Section III), and the specification of the estimation equations and the data applied (Section IV). In Section V, the empirical results are presented. Finally, some preliminary conclusions are drawn, and the next steps required to improve the financial relations between debtors and creditors are outlined.

¹ This approach was also applied in an earlier paper by one of the authors [Picht, 1988].

² For a detailed presentation, see Lächler [1985].

II. Hypotheses on Willful Default

The notion of willful default on debt, as applied in the following, implies rationality on the part of the borrowers, i.e., the Third-World governments. Their decisions are supposed to depend on the specific set of incentives they face. The incentive structure prevailing in country A may render debt repudiation an attractive option; whereas country B may face a situation where punctually servicing its obligations is in the country's best interest. Basically, we assumed that governments of developing countries seek the country's benefit, rather than their own benefit. The hypotheses on willful default largely concentrate on macro-economic variables. Public-choice reasoning would suggest, in turn, that the government agents are not eager to maximize the public welfare, but rather take decisions that improve their own well-being. It is left open in the present analysis to which extent the government's and the country's interests differ in the case of default decisions. This limitation should be kept in mind when interpreting the empirical results.

The hypotheses on willful default address the potential costs and benefits from debt repudiation for the country in question. In general terms, it would be rational to default on debt if the benefits arising from such a decision exceed the costs¹. As far as the benefits are concerned, we may reasonably expect that the gains to be reaped from debt repudiation depend on the degree of foreign indebtedness, respectively the debt-service burden². The higher the (discounted) net value of the contractual obligations

¹ For the pioneering work in this respect, see Eaton, Gersovitz [1981a; 1981b], Sachs [1983], and Sachs, Cohen [1982].

² On the other hand, it may be reasoned that high foreign indebtedness reflects a favourable credit standing of the country in question in international financial markets. If this were the case, governments may speculate to get hold of even more external resources before willful default becomes an attractive policy option. However, recent experience renders this argument rather implausible for most of the heavily indebted Third-World economies. Especially for Latin-American borrowers, the credit standing has deteriorated dramatically; these countries face severe difficulties to raise fresh money.

is that are refused to be paid, the higher the benefit is for borrowers which otherwise would have to forgo domestic resources when the credits are due [Eaton, Gersovitz, 1981b, p. 302].

However, it is not only the amount of foreign resources the borrower can get hold of, on which the decisions to default may be based on. According to an argument advanced by Lächler [1985, pp. 29ff.], countries are more inclined to repudiate their debt when national income is lower than previously expected by both lenders and borrowers. In this case, the benefits from default rise relative to the potential costs; whereas the benefit-cost relation declines when national income is unexpectedly high. In contrast to dividend payments due to obligations from direct foreign investments which vary according to the host country's economic performance, debt contracts involve a pre-fixed payment schedule. The debt-service profile previously agreed on by the borrower and the lender is based on forecasts on the country's future capacity to meet its obligations. If the assumptions on the income growth to be achieved prove over-optimistic, the borrower has to transfer a higher share of the incremental income to the creditor. This is likely to strengthen the resistance to punctually servicing the debt. Furthermore, the costs of default are supposed to be positively related to the actual income level, whatever form the penalties from the creditor side may take; i.e., the costs are lower in situations of unexpected income drops. The likelihood of willful default is thus hypothesized to be higher (lower), when national income is unexpectedly low (high).

As far as the costs of default are concerned, the borrowers have to consider possible sanctions imposed by their creditors or by related parties as well. Creditor countries may agree on trade embargos as a retaliatory measure against borrowers that default willfully [Sachs, 1983, p. 20; van Eden, Herken-Krauer, Vasic, 1985, p. 16]. This possibility threatens to affect the economic prospects of borrowers negatively, particularly if developing countries depend heavily on imports of essential investment and intermediate goods. The likelihood of willful default is thus supposed to be negatively related to the relative importance of

imports in domestic absorption. Even without outright trade embargos, this hypothesis retains its plausibility. High import dependence typically implies high dependence on short-term trade credits provided by exporters. In the case of willful default, exporters may be prepared to continue trade relations on a cash or pre-payment basis only, because they fear that export credits will be subject to default as well. This is likely to severely affect external trade transactions. The threat of retaliatory actions is also high for aid-dependent developing countries. Donor governments may refuse further bilateral aid payments and press international organisations to stop multilateral assistance for defaulting borrowers¹. This weakens the incentive to repudiate foreign debt. High aid figures indicate the amount of subsidized capital that would be available in the future provided that the borrower strived for cooperative relations to its creditors. Consequently, the costs of default - i.e., the external assistance forgone - are the greater, the higher the reliance on aid inflows is.

The borrowers are supposed to take into account that additional costs may arise from willful default. Most importantly, defaulting countries, in the presence of cross-default clauses, are likely to be cut off from international capital markets; i.e., it would be extremely difficult to obtain fresh money from the banking community [Folkerts-Landau, 1985, p. 330]. The potential costs involved depend on whether or not borrowers want to attract foreign capital on a commercial basis in the future as well. This is likely to be the case if favourable growth prospects indicate that foreign capital inflows can be used productively. High economic growth rates typically reflect high marginal productivity of capital. If the latter exceeds the interest rate to be paid in international capital markets, the borrowing country is able to improve its economic welfare by raising further credits. The larger the difference between capital productivity and credit

¹ For the United States, explicit reference can be made to the Hickenlooper Amendment to the Foreign Assistance Act of 1961; see the Appendix in Knudsen [1972, pp. 326-327] and, for a critical discussion, Gilbert [1977, pp. 515-550].

costs is, the larger the amount of foreign resources is that can be absorbed productively. According to this reasoning, a favourable growth performance weakens the incentive to default willfully. Alternatively, it may be argued that "rapidly growing countries may have less incentive to repay loans, since they do not expect to enter the market again after the period in which a net payment of loans is necessary" [Eaton, Gersovitz, 1981a, p. 16]. In other words, the non-repayment would save the country resources, and the threat of foreclosing future access to credit markets by commercial banks would not do much harm under such circumstances.

A further hypothesis on the costs of debt repudiation relates to short-term fluctuations in economic activity [Eaton, Gersovitz, 1981a, pp. 8f.]. Borrowing abroad can smooth domestic absorption intertemporarily. For example, the government may be inclined to raise credits in international financial markets when national consumption is suppressed due to cyclical downswings; this is because the marginal utility of consumption of its constituency can be assumed to be high when income is relatively low. During the subsequent upswing, the marginal utility decreases and the credits can be paid back. Governments which intend to smooth the impact of cyclical swings on domestic consumption in the future will be reluctant to repudiate their debt. In the case of willful default, the banks will probably refuse to play their role in this mechanism any longer. A similar reasoning refers to short-term variations in investment and export earnings. The willingness of commercial banks to extend credits in order to stabilize investment and to compensate for temporary export shortfalls may save the country considerable adjustment and transition costs. It can thus be hypothesized that the incentive to default is negatively related to the degree of fluctuations in economic activity typically prevailing in a borrowing country.

The borrowers may try to reduce the potential costs of default arising from the creditors' threat to foreclose future access to the international capital market by counterthreats. A single borrower's odds to get away with no or only modest costs are

higher if it is decided to default when other borrowers do so as well. Parallel behaviour of a number of developing countries may create fairly large problems for the liquidity and solvency position of the commercial banks involved, even if a default by each single debtor country would not affect the banks seriously. Faced by the counterthreat of a debtors' cartel, the creditors may be prepared to compromise on sanctions. The likelihood for a specific country to default is thus expected to increase if other countries decide to repudiate their debt as well (bandwagon effect)¹. But even a single large borrower may be powerful enough to match the potential penalties of creditors by counterthreats. Largeness may refer to the amount of total debt accumulated by a country. The huge sum of outstanding credits can be used as an instrument to press for concessions by the commercial banks; because otherwise, i.e., in the case of an outright debt repudiation, the stability of the international financial system may be affected negatively. Creditor countries may also be willing to refrain from retaliatory measures if the debtor country represents an important export market for them. It can thus be hypothesized that the likelihood of willful default varies positively with the economic and political weight of borrowers.

III. The Test Format: Logit Model

The coverage of possible explanations of default seems fairly complete, if measured on what has been advanced as empirically testable conjectures in the literature. Each of the hypotheses presented above deals with partial explanations of debt repudiation by developing countries. We did not aim at including all of them in a comprehensive and consistent theoretical model; we

¹ This reasoning differs from the argument of Eaton, Gersovitz [1981a, p. 14], who pointed to high economic interdependence between different borrowers which might explain simultaneous defaults. According to our hypothesis, parallel debt repudiation may even occur if the economic ties between debtors are rather weak.

rather put the theoretically meaningful partial hypotheses together in a multivariate framework, which allows to single out the most relevant variables with respect to the developing countries' decisions on debt repudiation.

We applied logit analysis on the basis of cross-country data. This technique is well-suited for the case in question, where the phenomenon to be explained, i.e., the existence or non-existence of default, can only be measured as [0/1] alternatives. Logit analysis has several advantages as compared to other methods. OLS-regression analysis is inadequate when the dependent variable is restricted to the [0/1] space. Simple linear regressions may generate probabilities below 0 and above 1 for the dependent variable [Pindyck, Rubinfeld, 1981, pp. 275ff]. The non-linear transformations suggested by logit, or else, by probit models avoid this problem. The estimation results of logit and probit analyses for equal data sets are quite comparable [Altman et al., 1981, pp. 31 ff.]; but the former offers computational advantages due to the iterative technique implied. Multiple discriminant analysis represents a possible alternative, which was applied in comparable studies [e.g. Frank, Cline, 1971]. The major advantages of the logit approach are that it avoids a-priori classifications into defaulting and non-defaulting countries and that it provides straightforward testing of the significance of the various coefficients¹.

Logit analysis allows to assess the likelihood (P) of default as a function of a set of explanatory variables (X):

$$(1) P(1) = [1 + \exp -(a+bX)]^{-1}$$

Thereby, a and b represent the estimation coefficients. Eq. (1) is subjected to maximum likelihood estimation procedure. It is important to note that the coefficient b must not be confounded

¹ For a detailed discussion of the application and the conceptual limits of discriminant and logit analysis, see Klecka [1975] and Altman et al. [1981].

with the partial derivative. The latter is given by:

$$(2) \quad dP(1)/dX = P(1) [1-P(1)]b,$$

where P stands for a chosen base level of the probability of default. This formula can be used to calculate predicted changes in the probability of default for a given change in the independent variable [Altman et al., 1981, p. 33].

IV. Specification of the Model and Data Base

In moving from the basic-model level to empirical testing, it had to be decided as to how to define the dependent variable, and appropriate indicators had to be identified for the explaining variables. As concerns the dependent variable, we referred to World-Bank data on multilateral debt renegotiations [World Bank, 1985, p. 28]. The analysis covers 53 developing countries. Principally, "1" was attached to countries that renegotiated part of their debt with the Paris Club, other aid consortia, or commercial banks in the 1981-1984 period; if no renegotiations took place, the variable was set as "0"¹. This procedure involves methodological problems insofar as the rescheduling events do not present a complete picture on willful defaults. Other forms of default may not be captured; this refers mainly to unilateral debt repudiation by the borrower. However, this restriction of the analysis, which is due to data limitations, is unlikely to distort the empirical results. In the 1981-1984 period covered in the following analysis, no cases are known to us where defaulting countries did not reach a rescheduling agreement with their creditors finally. Hence, it can be argued that the dependent variable is "1" for all countries that refused to service their debt unilaterally.

¹ Alternatively, "1" was attached to countries where the total amount of debt rescheduled in the 1981-1984 period exceeded 15 per cent of outstanding debt. This is because countries that renegotiated only marginal proportions of their debt might be considered as non-default cases rather than default cases; this applied to Pakistan (2.7 per cent), Guyana (5 per cent), Honduras (10 per cent), and Uganda (11 per cent). However, the estimation results did not change considerably when this adjustment was made. Consequently, the detailed results of this variant are not presented in Section V.

More importantly, the rescheduling events may not only reflect willful default, i.e., an unwillingness to pay, but also an inability to pay due to exogenously created insolvency or illiquidity¹. To avoid biased results, the latter possibility had to be taken into account in the empirical estimations. This was done by supplementing the set of hypotheses on willful default by a variable which captures the influence of external shocks on the rescheduling event. The equation estimated can then be written as²:

$$(3) \hat{P}(1) = [1 + \exp - (a_0 + a_1 X_1 + \dots a_n X_n + a_{n+1} ES)]^{-1},$$

where:

$X_1, \dots X_n$ = variables that indicate possible influences on willful default;

ES = external-shock variable.

By ES, the balance-of-payments impact of world-market developments which were assumed to be beyond the control of individual debtor nations was measured³. ES encompasses terms-of-trade effects, real world-demand effects and interest-rate effects, all as a percentage share of the sum of the country's exports and imports⁴. Since the reschedulings of the 1981-1984 period are to be explained, the balance-of-payments impact was calculated for the preceding three years, i.e. 1978-1980. The 1975-1977 period represented the reference period for price and interest-rate changes; the difference between actual world demand in 1978-1980 and its hypothetical trend volumes was estimated on the basis of projections applying the average growth rate observed in 1971-1977 (in what follows, the external-shock variable is denoted as N).

As concerns the partial hypotheses on willful default presented above, the following indicators were considered⁴:

¹ For the distinction between repudiation, insolvency and illiquidity, see Sachs [1983]; Aliber [1980].

² In all cases, the constant term a_0 was included to make sure that, if the explaining variables were zero, the likelihood estimated is not preset to either 0 or 1.

³ For a detailed discussion of the methodological issues involved, see Nunnenkamp [1986, Chapter 5].

⁴ For the calculation procedures and exact definitions, see the detailed presentation in the Appendix.

- Different proxies indicate the potential benefits from default, i.e. the amount of resources saved by not servicing foreign debt. We referred to three alternatives: outstanding debt in per cent of the debtor's gross national product (in the following B), debt per capita of the borrowing country's population (A), and total debt-service payments relative to GNP (C).
- The empirical test of the hypothesis that borrowers were more inclined to default when national income was unexpectedly low required to make assumptions on the expected income growth. We tried two variants: Firstly, the unforeseen change in economic growth was calculated as the difference between actual average GDP-per-capita growth in the 1981-1984 period (in real terms) and the long-term growth trend experienced throughout the 1970s (E). Alternatively, a shorter and more recent reference period was chosen, i.e. 1978-1980 (F).
- The debtors' exposure to possible sanctions of creditor countries was measured in terms of the borrowers' imports, as a percentage share of gross domestic product (K), and in terms of foreign aid inflows per capita of the borrowers' population (I).
- Average growth in per-capita incomes in the 1970-1980 period was supposed to capture the conflicting hypotheses on the impact of the longer-term economic performance on the likelihood of default (D).
- The standard deviations of the residuals of, first, GDP per capita (G) and, second, exports (H), derived from trend estimates for the 1970s, represent alternative measures of the degree of short-term fluctuations in economic activity. According to the reasoning in Section II, they were expected to be negatively related to the likelihood of default.
- The chances of individual borrowers to match possible penalties of creditors by counterthreats were measured by the total US\$-value of outstanding debt (M) and by the share of developed countries' exports shipped to the respective debtor country (L)¹.

¹ The hypothesis that parallel behaviour of debtors increased the likelihood of debt repudiation could not be tested in the context of the following cross-country analysis.

Table 1 summarizes the partial hypotheses on default and presents the expected signs of the explaining variables that entered our empirical analysis.

Table 1 - Expected Relationship between the Likelihood of Default and Explaining Variables

Explaining variable	Expected sign	Explaining variable	Expected sign
Debt outstanding, 1980		Fluctuations ^b in:	
US\$ billion	+	GDP, 1970-80	-
per capita	+	exports, 1970-80	-
per cent of GNP	+	Development aid	
		per capita,	-
Debt-service burden ^a , 1978-80	+	1978-80	
		Imports, in per	
Per-capita growth in		cent of GDP,	-
real GDP, 1970-80	-/+	1978-80	
		Share in developed	
Change in per-capita		countries' exports ^c	+
growth in GDP		1978-80	
1981-84 vis-à-vis		External shocks, in	
1970-80	-	per cent of imports	
1981-84 vis-à-vis		plus exports ^d ,	+
1978-80	-	1978-80	

^a Total debt service to GNP. - ^b Standard deviation of residuals.
^c Imports of the sample countries from the European Community, Japan, and the United States, as a percentage share of the latter countries' total exports. - ^d Balance-of-payments impact of changes in the terms of trade, interest rates, and real world-market demand in 1978-1980, vis-à-vis 1975-1977; the calculation of the external-shock variable was so that it is the more positive, the stronger negative external shocks were (such as declining export prices, rising import prices, and rising interest rates); for details of calculations, see the Appendix.

To perform our cross-country analysis, we referred to a sample of 53 developing economies for which the required informations were available. The data base is presented in Table A1. The sample covered a wide spectrum of developing countries in terms of income levels, economic growth, foreign indebtedness, the structure of capital imports, and the relative success or failure to service foreign debt on schedule. All 53 countries entered the empirical estimates in the first step. Subsequently, we imposed

various restrictions, mainly in terms of income levels and the relative importance of different types of creditors, in order to consider important subgroups of the sample specifically.

Table A2 reveals that the empirical analysis on the determinants of default was subject to some multicollinearity problems. Relatively high correlations between independent variables did not create difficulties in those cases where alternative indicators for the same explaining factor are involved (e.g., outstanding debt per capita, debt in per cent of GNP, and debt-service burden). High Pearson-correlation coefficients may distort the empirical results only if the variables in question were supposed to enter the logit analysis simultaneously (e.g., development aid per capita and the import/GDP ratio). In such cases, multicollinearity problems were avoided by excluding specific variables from the estimation. Section V presents estimates for different combinations of explaining variables where multicollinearity problems were minimized in this way.

V. Empirical Results

Before running the multivariate estimations, we applied logit analysis to each of the aforementioned explaining variables separately. All partial default estimates, presented in Table A3, show the expected signs for the coefficients of the independent variables. For the long-term growth indicator, where competing hypotheses were raised in the literature, the coefficient is negative. The argument that rapidly growing countries opted for default since they did not expect to rely on further capital imports in the future is, thus, not supported. However, the explanatory power of the partial calculations remains extremely limited. The average likelihood of the estimates hardly exceeds 50 per cent¹. Moreover, only the coefficient of the development-aid variable is statistically significant at the 10 per cent level.

¹ Since the phenomenon to be explained, i.e., the existence or non-existence of default, could only be measured as [0/1] alternatives, the bottom line of the probability estimated by logit analysis was given by 50 per cent.

The quality of the estimations in terms of correctly identifying default and non-default cases improved only slightly when the multivariate approach was applied to all 53 sample countries; the highest average likelihood reported in Table 2 amounts to 56 per cent. The evidence on some of our hypotheses is considerably stronger, however, as compared to the partial calculations. With only two exceptions (for variable H, i.e., the fluctuations in exports, in equations 9 and 10), all coefficients reveal the expected signs. Among the variables that are significant at the 10 per cent level or better, long-term growth of GDP (variable D) figures prominently. In five out of six equations where D was included, the coefficient is significantly negative. Thus, the hypothesis that a favourable growth performance weakened the incentive to default is strongly supported. Apparently, fast-growing economies were prepared to attract further capital inflows in the future, since foreign capital could be absorbed productively. These countries faced strong incentives to refrain from willful default, because otherwise they might be cut off from international capital markets and their economic performance was likely to suffer from the creditors' sanctions.

For the remaining variables, the evidence is not as strong. This refers particularly to variables A, B, and C, which were supposed to capture the economic benefits of debt repudiation. All coefficients of the debt indicators and the debt-service burden remained insignificant. It may be concluded that willful defaults were motivated by other than macro-economic considerations, e.g. by internal political pressures that were not related to social cost-benefit calculus. This reasoning is supported by the observation that variables L and M, indicating the debtors' potential to match possible sanctions of the creditors by counter-threats, remained insignificant as well. In this instance, however, other economic factors should also be irrelevant, which was not the case. Countries seemed more inclined to repudiate their debt when national income was lower than previously expected. According to the argument raised by Lächler [1985], this behaviour is economically rational, since the benefits from default rise relative to the potential costs. Variable F is significant in equation 9 exclusively, however. Apart from the aforementioned

Table 2 - Logit Estimates of the Probability of Default for all 53 Sample Countries^a

Explaining variables included ^a	Constant term	Debt outstanding		Debt-service burden	Per-capita growth of real GDP, 1970-80	Change in per-capita growth of GDP		Fluctuations in:		Development aid per capita	Imports in per cent of GDP	Share in developed countries' exports	Outstanding debt, US\$ billion	External shocks in per cent of exports plus imports	Average likelihood	Number of iterations
		per capita	per cent of GNP			1981-84 vis-à-vis 1970-80	1981-84 vis-à-vis 1978-80	GDP	exports							
		A	B	C	D	E	F	G	H	I	K	L	M	N		
1) C,F,I	0.08 (0.17)			0.093 (1.00)			-0.042 (-0.68)			-0.019 (-1.34)					0.52	5
2) C,D,F	0.09 (0.19)			0.063 (0.68)	-0.23* (-1.92)		-0.100 (-1.45)								0.53	5
3) C,F,L	-0.24 (-0.51)			0.048 (0.58)			-0.061 (-1.00)					0.17 (0.21)			0.51	4
4) C,D,N	-0.29 (-0.53)			0.104 (1.11)	-0.18 (-1.59)								0.041 (1.39)		0.53	5
5) C,D,F, I,N	0.14 (0.22)			0.194 (1.47)	-0.30** (-2.16)		-0.054 (-0.72)			-0.035* (-1.81)			0.055* (1.69)		0.56	6
6) C,E,G,N	-0.60 (-0.89)			0.097 (1.07)		-0.103 (-1.31)		-6.0 (-0.88)					0.044 (1.41)		0.53	10
7) B,D,F, H,L,N	-0.55 (-0.57)		0.007 (0.60)		-0.35** (-2.13)		-0.118 (-1.57)		-0.8 (-0.17)			1.82 (1.52)		0.047 (1.36)	0.55	5
8) A,F,I	0.25 (0.49)	0.051 (0.17)					-0.056 (-0.94)			-0.014 (-1.12)					0.52	4
9) D,F,H, K,N	0.67 (0.65)				-0.32** (-2.15)		-0.154* (-1.93)		2.6 (0.58)		-0.036* (-1.68)		0.045 (1.33)		0.55	5
10) D,F,H, I,N	0.14 (0.15)				-0.28** (-2.04)		-0.094 (-1.29)		2.2 (0.48)	-0.023 (-1.55)			0.053 (1.52)		0.55	5
11) C,E,G, M,N	-0.89 (-1.21)			0.092 (1.02)		-0.097 (-1.19)		-4.6 (-0.66)					0.030 (1.03)	0.046 (1.45)	0.53	7

^aFor the exact definition of variables, see the text as well as Tables A1 and A2; t-statistics in parentheses; * significant at the 10 per cent level; ** significant at the 5 per cent level (two-tailed t-test). Estimates for which the algorithm did not converge in 20 steps are not reported. - Due to multicollinearity problems, all variables could not be considered in the analysis simultaneously; different sets of explaining variables were selected for which multicollinearity problems were negligible. Several variables (such as A, B, and C) were considered as alternative indicators of the relevance of a specific hypothesis.

Source: Table A1. - Own calculations.

evidence on the long-term growth variable, other cost factors were relevant as well. This refers mainly to variables I and K, notwithstanding that the coefficients are significant in some equations only. Negative signs of I indicate that the likelihood of default decreased with higher dependency on foreign development aid; the incentive to repudiate debt was stronger when the possible refusal of creditor governments to grant further assistance involved only small amounts of aid. Similarly, the higher the potential of sanctions in the form of trade embargos and foreclosure of export credits was (indicated by K), the greater the debtors' reluctance was to willfully stop servicing foreign debt.

The rather poor results as concerns the overall explanatory power of the aforementioned logit estimates are not surprising. They are typical for cross-country analyses based on a fairly heterogeneous set of sample economies. In our case, the group of 53 countries consisted of extremely poor African and South-Asian economies with per-capita incomes below 300 US\$ in 1980 on the one hand, and advanced Latin-American countries with incomes of more than 2000 US\$ on the other hand; or else, we referred to debtors for whom private creditors were of no importance at all (such as Bangladesh, El Salvador, Guatemala, India, and Somalia, where private creditors accounted for less than 3 per cent of total debt in 1980), and debtors for whom the relations with commercial banks were of overriding importance (such as Algeria, Argentina, Brazil, and Mexico, where the respective shares exceeded 80 per cent; for details, see Table A1). We thus decided to reduce the sample heterogeneity by imposing restrictions in terms of income levels and the structure of foreign indebtedness.

Table 3 reports the logit estimates achieved on the basis of the 36 sample countries for which the credits from private sources accounted for more than 25 per cent of total (public and publicly guaranteed) debt. It was to be expected that the cost-benefit calculus with respect to defaults on commercial-bank credits played a significant role within this subgroup, when deciding on

Table 3 - Logit Estimates of the Probability of Default for 36 Developing Countries with Considerable Debt from Private Sources^a

Explaining variables included	Constant term	Debt outstanding		Debt- service burden	Per-capita growth of real GDP, 1970-80	Change in per-capita growth of GDP		Fluctuations in:		Development aid per capita	Imports in per cent of GDP	Share in developed countries' exports	Outstanding debt, US\$ billion	External shocks in per cent of exports plus imports	Average likeli- hood	Number of iterations
		per capita	per cent of GNP			1981-84 vis-à-vis 1970-80	1981-84 vis-à-vis 1978-80	GDP	exports							
		A	B	C	D	E	F	G	H	I	K	L	M	N		
1) B,D,G	1.15 (1.01)		0.009 (0.51)		-0.22 (-1.32)			-7.5 (-0.69)							0.58	3
2) D,G,K	5.13** (2.58)				-0.61** (-2.23)			-10.8 (-0.61)			-0.070* (-1.99)				0.62	9
3) C,F,I	0.30 (0.43)			-0.060 (-0.53)			-0.124 (-1.31)			0.018 (0.63)					0.54	5
4) C,D,F	1.21 (1.50)			-0.031 (-0.28)	-0.29* (-1.91)		-0.103 (-1.05)								0.57	5
5) C,F,L	0.61 (0.81)			-0.026 (-0.27)			-0.103 (-1.23)					-0.28 (-0.30)			0.54	5
6) C,D,N	0.93 (1.10)			-0.003 (-0.03)	-0.28* (-1.71)									0.073* (1.83)	0.60	6
7) C,D,F, I,N	1.17 (1.04)			0.036 (0.23)	-0.38* (-1.79)		-0.074 (-0.66)			-0.029 (-0.70)				0.076* (1.85)	0.61	6
8) C,E,G,N	-0.18 (-0.18)			0.068 (0.55)		-0.163 (-1.33)		-10.3 (-0.94)						0.080* (1.79)	0.59	9
9) B,D,F, H,L,N	0.52 (0.34)		0.019 (0.90)		-0.44* (-1.83)		-0.134 (-1.19)		-7.2 (-1.25)			2.32 (1.40)		0.078* (1.74)	0.64	11
10) A,F,I	0.49 (0.54)	-0.184 (-0.53)					-0.111 (-1.21)			0.007 (0.28)					0.54	5
11) D,F,H, K,N	4.90** (2.27)				-0.66** (-2.19)		-0.173 (-1.29)		-2.6 (-0.50)		-0.092** (-2.23)			0.070 (1.54)	0.67	9
12) D,F,H, I,N	2.05 (1.38)				-0.37* (-1.74)		-0.088 (-0.82)		-4.3 (-0.83)	-0.022 (-0.63)				0.064 (1.55)	0.62	6

^aShare of private creditors in total (public and publicly guaranteed) debt > 25 per cent. For the exact definition of variables, see the text as well as Tables A1 and A2; t-statistics in parentheses; *significant at the 10 per cent level; **significant at the 5 per cent level (two-tailed t-test). Estimates for which the algorithm did not converge in 20 steps are not reported. - Due to multicollinearity problems, all variables could not be considered in the analysis simultaneously; different sets of explaining variables were selected for which multicollinearity problems were negligible. Several variables (such as A, B, and C) were considered as alternative indicators of the relevance of a specific hypothesis.

Source: Table A1. - Own calculations.

debt repudiation¹. Actually, the explanatory power of the logit estimates improved for this less heterogeneous sample; the estimated likelihood increased to up to 67 per cent in equation 11. However, even this outcome is insufficient to serve as a basis for predictions on willful default. Apparently, other than the economic factors considered here had an important impact on the borrowers' default decisions as well. In particular, the bandwagon effect as a potential means to reduce the costs from default may be relevant. In a pooled analysis for 10 developing countries and the 1976-1985 period, Picht [1988] found this factor to be statistically significant. The governments of debtor countries were encouraged to opt for default when large borrowers such as Argentina, Brazil, and Mexico took the lead.

All in all, Table 3 confirms the results for the specific variables, as presented in Table 2 for all 53 sample countries. This refers particularly to the fairly strong evidence on the long-term growth variable D. The following differences between the two sets of estimations are noteworthy:

- Not surprisingly, the development-aid variable I is no longer significant in any equation run for the restricted sample. For the countries which strongly relied on commercial debt, the threat to be cut off from further aid payments in the case of default was not very effective².
- Contrary to I, the threat of trade sanctions of creditors was somewhat stronger for countries with considerable debt from private sources. In both cases where K as a measure for import dependency was included (equations 2 and 11), the coefficient is significantly negative.
- The impact of exogenously created liquidity and solvency problems on default, as captured by the external-shock variable

¹ With the exception of Zaire, this subgroup did not include any country that renegotiated its public debt with aid consortia exclusively ("aid" in Table A1).

² The significance level of the negative coefficients of I improved when the logit estimates were based on the 45 countries with shares of private creditors in total debt of more than 10 per cent (rather than more than 25 per cent). Since other results remained largely unaffected, these estimations are not presented here separately.

N, remained fairly modest in the case of all 53 sample countries; whereas N is significantly positive in four out of six equations in Table 3.

In a second attempt to reduce the sample heterogeneity, we excluded the countries with very low per-capita incomes from the logit analysis (Table 4)¹. The relevance of cost considerations in deciding on default is largely the same as in Table 3. This refers to the significantly negative coefficients of variables D and K, as well as the insignificance of short-term fluctuations in GDP and exports (G and H, respectively) and development aid (I). Similarly, the potential of counterthreats by borrowers, indicated by variables L and M, continues to lack significance. The picture is somewhat different as far as the indicators on the benefits to be reaped from default are concerned. For the relatively advanced debtors (per-capita income > 500 US\$ in 1980), some evidence exists that the higher the amount of foreign resources was the borrower could get hold of by default, the higher the likelihood of debt repudiation was. However, this relationship is only significant in the case of B, i.e., debt outstanding in per cent of GNP. As concerns the relative benefits from default as reflected in E, Table 4 provides support to the hypothesis that the likelihood of willful default was higher, when national income was unexpectedly low. The negative coefficients of variable E reveal that the resistance to punctually servicing foreign debt was strengthened, when the borrower had to transfer a higher share of its national income to the creditors due to unforeseen income drops.

VI. Conclusions and Open Questions

The empirical evidence on the various hypotheses on willful default differed considerably. Hardly any support was provided for

¹ When the criterion applied was per-capita income > 400 US\$ (1980), 38 countries entered the analysis; in the case of per-capita income > 500 US\$, the sample was reduced to 32 debtors. In Table 4, only those estimates are reported which reveal additional informations, or which had to be excluded from Table 3 since the algorithm did not converge.

Table 4 - Logit Estimates of the Probability of Default for Developing Countries of Medium and Higher Per-Capita Income^a

Income group/ explaining variables included	Constant term	Debt outstanding per capita per cent of GNP	Debt- service burden	Per-capita growth of real GDP, 1970-80	Change in per-capita growth of GDP 1981-84 vis-à-vis 1970-80	Change in per-capita growth of GDP 1981-84 vis-à-vis 1978-80	Fluctuations in: GDP	Exports	Development aid per capita	Imports in per cent of GDP	Share in developed countries' exports	Outstanding debt, US\$ billion	External shocks in per cent of exports plus imports	Average likeli- hood	Number of iterations
		A	B	C	D	E	F	G	H	I	K	L	M	N	
Per-capita income > 500 US\$															
1) B,E,G,L,N	-4.26* (-1.75)		0.060* (1.98)			-0.407* (-1.87)		-8.0 (-0.72)				0.64 (0.58)		0.089 (1.62)	0.62 19
2) C,E,K,M,N	-1.27 (-0.91)			0.104 (0.78)		-0.189 (-1.29)		-7.2 (-0.68)					0.038 (0.95)	0.072 (1.46)	0.57 8
Per capita income > 400 US\$															
1) C,E,G,N	-1.20 (-1.14)			0.089 (0.74)		-0.234* (-1.75)		-7.2 (-0.76)						0.078* (1.88)	0.57 6
2) D,F,H,K,N	1.89 (1.33)				-0.36* (-1.90)		-0.142 (-1.39)	0.0 (0.00)			-0.050* (-1.71)			0.081* (1.88)	0.59 6
3) D,F,H,I,N	1.18 (0.95)				-0.36* (-1.87)		-0.063 (-0.63)	-0.1 (-0.01)	-0.033 (-1.62)					0.093* (2.03)	0.60 6
4) E,G,I,M,N	-1.17 (-0.99)					-0.206 (-1.45)		1.2 (0.13)	-0.015 (-0.98)				0.030 (0.77)	0.101** (2.13)	0.58 6

^aOnly those estimates are presented which either did not enter Table 3 (since the algorithm did not converge in 20 steps) or which reveal additional informations. Number of countries included: 38 in the case of per-capita income > 400 US\$; 32 in the case of per-capita income > 500 US\$. For the exact definition of variables, see the text as well as Tables A1 and A2; t-statistics in parentheses; *significant at the 10 per cent level; **significant at the 5 per cent level (two-tailed t-test). - Due to multicollinearity problems, all variables could not be considered in the analysis simultaneously; different sets of explaining variables were selected for which multicollinearity problems were negligible. Several variables (such as A, B, and C) were considered as alternative indicators of the relevance of a specific hypothesis.

Source: Table A1. - Own calculations.

those factors which indicated the amount of resources the borrower could get hold of by repudiating its debt. Somewhat better results were achieved with respect to the variables reflecting the benefits relative to the potential costs of default. As far as specific cost factors were concerned, the highly significant long-term growth variable underlined the effectiveness of the threat to be cut off from international capital markets in the case of willful default. Other factors such as the dependency on imports provided further evidence in this respect. Possible sanctions in the form of reduced public-aid inflows proved to be relevant for low-income developing countries in the first place. The explanatory power of the logit analysis applied remained limited. The overall quality of the estimations was insufficient to serve as a basis for predictions on willful default.

The preceding analysis was based on the assumption that the decisions on debt repudiation were rational in terms of an economic calculus of the overall benefits and costs for the developing countries in question. Moreover, Third-World governments were supposed to act in the country's best interest, rather than seeking to maximize their own benefit. Both assumptions appear to be fairly restrictive, considering our empirical results. Apparently, willful defaults were not only motivated by aggregate welfare considerations. Further research must show how effective internal political pressures by specific interest groups were in inducing the governments to default on foreign debt¹.

For example, Western commercial banks were sometimes blamed to be responsible for the severe economic problems of debtor countries, because the banks insisted on debt-service payments. Public sentiments about foreign banks exploiting the developing economies may have created a climate where willful default was called for, irrespective of the social costs involved. In this context, the role of governments has to be analysed in the first place. The

¹ The resistance of influential segments of the debtor countries' population against macro-economically required adjustment programs, especially if imposed by foreign parties such as the International Monetary Fund, demonstrates the relevance of such a political-economy approach.

authorities may have strong incentives to strengthen hostile sentiments against commercial creditors. Such a strategy may be well-suited to divert the public attention from the government's own responsibility for economic crises. A principal-agent situation does not only prevail with respect to the relations between foreign creditors and borrowing countries. Within the latter, the population can be considered as the principal, i.e., the owner of the national productive potential; whereas the government represents the agent which is able to decide at its discretion as to how to make use of this potential. In the national context, the interests of principals and agents are thus likely to differ in a similar way as it was argued for international creditor-borrower relations.

In order to arrive at conclusions about possible avenues to return to more cooperative terms in the international transfer of capital, both the internal and the external principal-agent relations must be taken into account. Moreover, the analysis on willful default has to be supplemented by the discussion of sovereign risk in the case of foreign direct investments, as the principal alternative to debt financing. It has to be assessed if it is easier to come to cooperative terms when equity is substituted for debt. Such a restructuring of development finance may be favourable since foreign direct investment is essentially private in nature, on both the investor's and the host country's side; whereas Third-World governments are strongly involved in debt financing, either by direct state borrowing or by public guarantees for foreign credits. The shift from public to private debt and foreign direct investment may foster an efficient use of the resources transferred [Picht, 1988]. However, recent evidence also suggests that the shift towards equity finance is not costless [Huss, Nunnenkamp, 1987]; it was shown that the financial restructuring involves a trade-off between risk reduction for the borrower and overall economic growth as well as domestic savings performance [Lächler, Nunnenkamp, 1987]. Thus, a broader empirical analysis of the net effects is required in order to judge the validity of the present euphoria with respect to debt-equity swaps and similar financial innovations.

Appendix: Definition of Variables

As far as the independent variable is concerned, i.e. the incidence of debt default, we referred to World-Bank informations on debt reschedulings in the 1981-1984 period [World Bank, 1985, p. 28]¹. The variable is "1" for countries for which Table A1 reports multilateral debt renegotiations with the Paris Club and other aid consortia (aid), commercial banks (com), or private and public creditors (both); otherwise the variable is "0".

Data on debt outstanding in 1980 and on the average ratio of total debt service to GNP in 1978-1980 are from the World Bank's World Debt Tables. If not otherwise stated, the figures cover public and publicly guaranteed credits, as well as non-guaranteed private debt. The share of private creditors in total debt, applied as a measure to discriminate between important subgroups of our sample of 53 countries, was calculated on the basis of public and publicly guaranteed debt. Per-capita incomes of 1980 (US\$), as the second discriminating variable, are presented in World Bank, World Development Report 1982 (Statistical Annex, Table 1). Growth rates in GDP per capita (period averages, in real terms) were taken from UNCTAD, Handbook of International Trade and Development Statistics, 1986 Supplement. The standard deviations of the residuals, considered as indicators of the degree of short-term fluctuations in per-capita income and nominal exports, were derived from trend estimates for the 1970-1980 period; the underlying data on GDP per capita (in constant prices of domestic currency) and merchandise exports (in US\$, fob) as published in IMF, International Financial Statistics.

The remaining three variables supposed to explain willful default were defined as period averages for 1978-1980:

- Development aid per capita of the debtor country's population includes grants and net loans of official development assistance, both bilateral and multilateral, as presented in OECD, Geographical Distribution of Financial Flows to Developing

¹ For the methodological problems involved, see Section IV.

Countries¹.

- Import dependency was calculated as the percentage share of (nominal) imports in (nominal) GDP. For both variables, we referred to the national-accounts section in IMF, International Financial Statistics, where both imports and GDP are given in national currency²; consequently, we need not to convert GDP data into US\$.
- The shares of the sample countries in developed countries' total exports were proxied by the imports of each of the 53 developing economies from the European Community, Japan, and the United States, expressed as a percentage share of the latter countries' total exports (as published in IMF, Direction of Trade Statistics).

The calculation of the external-shock variable (ES) has to be explained in some more detail³. In order to separate exogenous world-market effects on the balance-of-payments situation of our sample countries from influences arising from domestic policies, the sample countries were assumed to be "small economies"; i.e., the determination of export and import prices, international interest rates, as well as real world-market demand could not be influenced by any individual debtor country. Thus, ES encompasses terms-of-trade effects (ES_{tot}), interest-rate effects (ES_{ir}), and real world-demand effects (ES_{wd}) on the country's balance of payments, all expressed as a percentage share of the sum of the country's nominal exports (X) and nominal imports (M)⁴.

¹ For Venezuela, see Bundesministerium für wirtschaftliche Zusammenarbeit [1980; 1983].

² If necessary, the World Bank's World Tables of January 1984 served as a supplementary source.

³ For further methodological procedures, see Balassa [1981, pp. 142ff.]; Nunnenkamp [1986, pp. 51ff.].

⁴ ES was calculated relative to the value of external trade since the absolute US\$-amount of external shocks was likely to depend strongly on the overall size of the sample countries. Principally, it seemed more appropriate to relate ES to the debtors' GDP, since this measure presents a better indication of the exposure to external shocks. Nevertheless, we selected the former measure since multicollinearity problems were reduced in this way.

$$(A1) \quad ES/(X + M) = (ES_{tot} + ES_{wd} + ES_{ir})/(X + M)$$

The three elements of ES were calculated for the 1978-1980 period; the preceding years served as the reference period. The terms-of-trade effects were defined as follows:

$$(A2) \quad ES_{tot} = \sum_{t=1978}^{1980} (MV_t \cdot \Delta P_t^M - XV_t \cdot \Delta P_t^X)$$

$$(A3) \quad \Delta P_t^M = P_t^M - P_{75/7}^M$$

$$(A4) \quad \Delta P_t^X = P_t^X - P_{75/7}^X$$

where¹: MV = import volume;

XV = export volume;

P^M = import prices (unit values);

P^X = export prices (unit values);

$P_{75/7}$ = reference prices; average of the 1975-1977 period.

The world-demand effects can be written as:

$$(A5) \quad ES_{wd} = \sum_{t=1978}^{1980} [WMS_{75/7} \cdot (XVW_t^{tr} - XVW_t^{act})]$$

where²: XVW^{act} = actual export volume of all world-market suppliers;

XVW^{tr} = trend export volume of all world-market suppliers; calculated on the basis of average annual growth of world-export volumes in the 1971-1977 period (6.6 per cent);

$WMS_{75/7}$ = average world-market shares of the sample countries in the 1975-1977 period; calculated on the basis of export values.

Finally, the third element, i.e. interest-rate effects, was calculated as follows:

¹ Export and import values of merchandise trade, as given in IMF, International Financial Statistics, deflated by unit-value indices of exports and imports (1980=100), as presented in UNCTAD, Handbook of International Trade and Development Statistics, 1986 Supplement.

² Merchandise exports of sample countries and all world-market suppliers, as given in IMF, International Financial Statistics.

$$(A6) \quad ES_{ir} = \sum_{t=1978}^{1980} (\Delta i_t D_{t-1})$$

$$(A7) \quad \Delta i_t = i_t - i_{75/7}$$

where¹: i = average interest rate on foreign debt; calculated as interest payments in t , relative to debt outstanding and disbursed at the end of $t-1$;

D = debt outstanding and disbursed at end of period.

¹ All data are from World Bank, World Debt Tables; since sufficient informations on private non-guaranteed debt were not available for the mid-1970s, the calculations were based on public and publicly guaranteed debt exclusively.

Table A1 - Debt Situation, Structural and Economic Performance Variables for 53 Selected Developing Countries

	Outstanding debt ^a , 1980		Debt-service burden ^b , 1978-80 (per cent)	Debt renegotiations 1981-84		Share of private creditors in total debt ^e , 1980 (per cent)	Development aid in per cent of GDP, 1978-80 ^f	Per-capita income, 1980 (US\$)	Per-capita growth in GDP, real ^g		Fluctuations ^h in: GDP exports		Imports in per cent of GDP, 1978-80 ^g	Share in developed countries' exports ⁱ , 1978-80 ^g (per cent)	External shocks in per cent of GDP, 1978-80
	US\$ billion	per cent of GNP		type ^c	amount in per cent of outstanding debt ^d				1970-80	1981-84	1970-80	1970-80			
Algeria	18.6	47.2	8.0			84.6	0.41	1870	5.6	1.7	0.051	0.27	34.6	0.75	-4.6
Argentina	27.2	51.1	2.0	com	85.6	81.3	0.03	2390	0.6	-2.9	0.019	0.15	8.6	0.54	1.7
Bangladesh	4.0	31.4	0.9			2.0	10.12	130	0.8	1.0	0.028	0.11	18.9	0.10	3.1
Benin	0.4	33.6	0.6			34.0	8.38	310	0.8	0.6	0.052	0.15	48.1	0.03	6.4
Bolivia	2.7	94.6	6.5	com	36.3	47.1	3.60	570	2.3	-7.2	0.053	0.19	25.9	0.05	-0.6
Brazil	70.2	29.0	2.8	both	19.0	82.9	0.05	2050	5.8	-2.1	0.041	0.12	9.4	0.92	2.6
Burma	1.5	25.9	1.6			19.7	6.00	170	2.0	3.8	0.037	0.15	11.3	0.05	1.5
Central African Rep.	0.2	22.7	0.4	aid	37.5	23.1	11.93	300	0.0	-2.4	0.036	0.13	35.2	0.01	-0.1
Chad	0.2	40.6	0.7			28.0	13.51	120	-0.2	-9.1	0.127	0.22	60.5	0.00	1.3
Chile	12.1	45.5	6.5	com	28.1	71.3	-0.05	2150	-0.2	-2.3	0.091	0.19	25.7	0.22	4.3
Colombia	6.9	20.9	2.2			41.5	0.25	1180	3.1	-0.2	0.016	0.07	14.3	0.29	1.3
Congo, People's Rep.	1.4	86.2	6.7			35.5	6.98	900	0.0	8.7	0.090	0.25	55.9	0.03	-8.5
Costa Rica	2.7	59.7	6.0	both	48.7	53.2	1.38	1730	2.9	-2.4	0.023	0.09	36.7	0.07	5.9
Dominican Rep.	2.0	33.0	3.0	com	25.3	35.0	1.50	1160	3.9	0.2	0.041	0.23	26.8	0.10	13.0
Ecuador	6.0	53.8	6.1	both	18.4	60.1	0.56	1270	5.9	-1.4	0.060	0.25	25.9	0.17	-0.6
Egypt	17.3	70.4	6.2			13.8	8.00	580	4.1	4.7	0.076	0.15	43.6	0.62	4.8
El Salvador	0.9	26.0	1.1			2.2	2.10	660	1.2	-5.8	0.044	0.12	36.6	0.06	2.0
Ethiopia	0.8	19.5	0.8			5.4	4.62	140	0.2	-1.0	0.077	0.13	18.0	0.04	3.0
Gabon	1.6	41.3	12.4			72.7	1.41	4000	8.7	-0.2	0.312	0.28	33.0	0.05	-11.7
Ghana	(1.1)	(25.6)	0.6			20.3	1.20	420	-2.0	-4.5	0.062	0.14	9.5	0.06	-1.3
Guatemala	1.2	14.9	0.5			2.8	1.01	1080	2.9	-4.1	0.019	0.10	26.0	0.09	4.3
Guyana	0.8	137.3	13.9	com	5.0	39.0	6.61	680	0.0	-4.6	0.054	0.21	71.3	0.02	18.3
Honduras	1.5	62.5	4.2	com	10.1	28.5	4.40	560	1.3	-3.0	0.047	0.07	42.5	0.06	2.9
India	19.2	11.8	0.7			2.9	1.12	240	1.4	2.4	0.033	0.08	9.2	0.57	1.9
Indonesia	20.9	27.9	3.7			36.5	1.31	430	5.4	3.1	0.013	0.25	20.2	0.58	-3.8
Jamaica	1.9	80.2	8.3	both	18.6	35.5	4.53	1040	-2.7	-0.2	0.049	0.17	48.0	0.05	8.3
Kenia	3.5	51.1	2.9			42.6	5.38	420	1.5	-1.9	0.040	0.12	37.0	0.13	6.1
Korea, Rep.	29.8	49.3	4.3			59.9	0.25	1520	7.2	5.8	0.037	0.18	36.5	1.32	4.6
Liberia	0.7	64.1	5.1	both	22.5	28.4	8.81	530	-0.5	-6.4	0.051	0.04	68.2	0.07	10.1
Madagascar	1.3	38.9	1.3	both	44.8	34.3	5.07	350	-1.4	-4.0	0.033	0.09	29.6	0.04	5.1
Mauritania	0.8	122.2	7.5			18.3	30.21	440	-0.8	-1.0	0.078	0.20	59.2	0.02	10.8
Mexico	57.5	31.9	6.0	both	128.6	86.9	0.04	2090	3.2	-1.2	0.021	0.18	16.0	1.59	0.8
Morocco	(7.1)	(39.0)	5.1	both	24.7 ^k	50.6	3.40	900	4.2	-0.5	0.025	0.23	29.1	0.28	8.2
Nigeria	8.9	10.3	0.4	com	21.6	77.5	0.05	1010	1.9	-7.9	0.061	0.29	23.6	0.98	-4.8
Pakistan	9.9	38.7	2.3	aid	2.7	6.5	3.75	300	1.9	2.6	0.168	0.14	21.2	0.24	6.1
Panama	3.0	89.6	17.2			74.5	1.25	1730	1.9	0.2	0.044	0.46	47.1	0.26	11.2
Peru	10.0	53.8	7.1	both	32.5	49.3	1.30	930	0.5	-3.4	0.040	0.20	19.9	0.18	3.1
Philippines	17.5	49.6	2.4	both	32.0	57.5	0.92	690	3.7	-1.6	0.009	0.14	24.6	0.46	5.3
Sierra Leone	0.4	39.7	4.7	both	26.6	34.4	7.32	280	0.3	-1.5	0.024	0.11	32.5	0.02	6.6
Somalia	0.8	69.7	0.4			0.0	20.61	350	-1.6	1.2	0.079	0.14	27.0	0.03	5.6
Sri Lanka	1.9	48.1	2.5			10.6	10.26	270	3.0	3.1	0.014	0.10	46.7	0.07	6.5
Sudan	4.7	67.3	1.2	both	33.3	21.5	6.38	410	3.6	-1.5	0.088	0.13	19.5	0.10	2.0
Syria	2.7	20.6	3.1			7.0	10.71	1340	6.1	-0.9	0.067	0.22	34.2	0.20	4.0
Tanzania	2.5	48.4	1.0			22.2	12.04	280	1.1	-2.2	0.041	0.10	27.3	0.08	4.9
Thailand	8.3	25.2	1.1			43.7	1.28	670	4.6	3.5	0.019	0.12	28.4	0.42	3.3
Togo	1.0	93.2	5.2	both	32.4	45.8	10.22	410	0.0	-6.2	0.042	0.24	62.5	0.03	23.2

Table A1 continued

	Outstanding debt ^a , 1980		Debt-service burden ^b , 1978-80		Debt renegotiations 1981-84		Share of private creditors in total debt ^e , 1980		Development aid in per cent of GDP, 1978-80 ^f		Per-capita income, 1980 (US\$)		Per-capita growth in GDP, real ^g		Fluctuations ^h in: GDP		Imports in per cent of GDP, 1978-80 ^j		Share in developed countries' exports, 1978-80 ^k		External shocks in per cent of GDP, 1978-80	
	US\$ billion	per cent of GNP	(per cent)	type ^c	amount in per cent of outstanding debt ^d	(per cent)	(per cent)	(per cent)	(per cent)	(US\$)	1970-80	1981-84	1970-80	1970-80	1970-80	1970-80	1978-80 ^j	(per cent)	(per cent)	(per cent)	(per cent)	
Trinidad & Tobago	0.8	11.7	1.9			67.2	0.09	4370	3.3	-4.7	0.028	0.26	39.5	0.11	-3.2							
Turkey	19.5	33.5	1.1	com	15.9	34.6	0.98	1470	3.9	2.8	0.074	0.14	11.5	0.33	2.6							
Uganda	0.7	2.1	0.1	aid	11.0	21.2	0.31	300	-5.2	3.5	0.047	0.19	5.5	0.02	0.1							
Uruguay	1.7	16.5	4.1	com	49.1	70.5	0.15	2810	2.8	-4.6	0.034	0.09	20.8	0.05	2.3							
Venezuela	29.6	50.2	3.4	com	70.1	96.1	0.02	3630	1.3	-4.4	0.030	0.25	30.7	0.82	-4.1							
Zaire	(4.3)	(42.8)	3.6	aid	44.1 ^k	37.4	6.07	220	-3.2	-1.0	0.054	0.22	28.2	0.09	-0.1							
Zambia	3.2	90.2	8.8	both	15.7	50.3	7.53	560	-2.1	-0.4	0.040	0.23	39.6	0.05	0.5							

^aTotal debt, i.e., private non-guaranteed debt included; in parentheses: public and publicly guaranteed debt. - ^bTotal debt service to GNP; period averages. - ^ccom = commercial-bank renegotiation; aid = Paris-Club or other aid-consortia renegotiation; both = both commercial-bank and aid-consortia renegotiation. - ^dDouble counting if foreign obligations were re-scheduled more than once. - ^ePublic and publicly guaranteed debt only. - ^fODA loans and grants; period averages. - ^gPeriod averages. - ^hStandard deviation of residuals. - ⁱImports of the country in question from the European Community, Japan, and the United States as a percentage share in total exports of EEC, Japan and US. - ^jBalance-of-payments impact of changes in the terms of trade, interest rates and real world-market demand in 1978-1980, vis-à-vis 1975-1977; for details of calculations, see the Appendix; "-" indicates a balance-of-payments alleviation through favourable world-market developments. - ^kIn per cent of public and publicly guaranteed debt.

Source: World Bank, World Debt Tables. Washington, var. iss.; World Bank, World Development Report. Washington, var. iss.; UNCTAD, Handbook of International Trade and Development Statistics. 1986 Supplement. New York 1987; OECD, Geographical Distribution of Financial Flows to Developing Countries. Paris, var. iss.; IMF, Direction of Trade Statistics. Washington, var. iss.; IMF, International Financial Statistics. Washington, var. iss.; own calculations.

Table A2 - Pearson Correlation Coefficients among Explaining Variables^a

	Debt outstanding, 1980 US\$ billion per capita per cent of GNP			Debt-service burden ^b 1978-80	Per-capita growth in real GDP, 1970-80	Change in per-capita growth of GDP 1981-84 vis-à-vis 1970-80 1981-84 vis-à-vis 1978-80		Fluctuations ^c in: GDP 1970-80 exports 1970-80		Development aid, per capita, 1978-80	Imports, in per cent of GDP 1978-80	Share in developed countries' exports ^d , 1978-80	External shocks in per cent of imports plus exports ^e , 1978-80
Debt outstanding, 1980													
US\$ billion	1	0.34	-0.15	-0.01	0.38	-0.14	-0.10	0.16	0.01	-0.33	-0.38	0.85	0.00
per capita		1	-0.13	0.30	0.44	-0.41	-0.20	0.21	0.35	-0.18	-0.09	0.32	-0.31
per cent of GNP			1	0.67	-0.20	0.09	-0.12	0.10	0.25	0.52	0.65	-0.20	0.16
Debt-service burden ^b , 1978-80				1	0.12	-0.05	-0.22	0.26	0.57	0.25	0.47	0.00	-0.09
Per-capita growth in real GDP, 1970-80					1	-0.50	-0.24	0.16	0.14	-0.12	-0.14	0.45	-0.08
Change in per-capita growth of GDP													
1981-84 vis-à-vis 1970-80						1	0.63	-0.07	-0.07	0.14	-0.06	-0.15	0.10
1981-84 vis-à-vis 1978-80							1	0.27	-0.07	0.15	-0.26	-0.12	-0.14
Fluctuations ^c in: GDP, 1970-80								1	0.24	0.24	0.12	-0.19	-0.24
exports, 1970-80									1	0.09	0.21	0.16	-0.28
Development aid, per capita 1978-80										1	0.51	-0.34	0.12
Imports in per cent of GDP, 1978-80											1	-0.29	0.04
Share in developed countries' exports ^d , 1978-80												1	-0.14
External shocks in per cent of imports plus exports ^e , 1978-80													1

^aNumber of observations: 53; coefficients of more than 0.32 (0.27; 0.23) are significant at the 1 (2.5; 5) per cent level. - ^bTotal debt service to GNP. - ^cStandard deviation of residuals. - ^dImports of the sample countries from the European Community, Japan, and the United States, as a percentage share of the latter countries' total exports. - ^eBalance-of-payments impact of changes in the terms of trade, interest rates, and real world-market demand in 1978-1980, vis-à-vis 1975-1977; for details of calculations, see the Appendix.

Source: Table A1. - Own calculations.

Table A3 - Partial Default Estimates: Logit-Analysis Results^a

	Constant a_0	t-stat.	a_1	X t-stat.	Average likeli- hood	Number of iterations
Debt outstanding, 1980						
US\$ billion	-0.14	(-0.42)	0.0318	(1.23)	0.51	5
per capita	-0.01	(-0.02)	0.0001	(0.43)	0.50	4
per cent of GNP	-0.43	(-0.78)	0.0117	(1.12)	0.51	7
Debt-service burden ^b , 1978-80	-0.14	(-0.34)	0.0650	(0.80)	0.50	4
Per-capita growth of GDP, real, 1970-80	0.42	(1.21)	-0.1666	(-1.53)	0.51	4
Change in per-capita growth of GDP, 1981-84						
vis-à-vis 1970-80	-0.12	(-0.36)	-0.082	(-1.14)	0.51	4
vis-à-vis 1978-80	-0.03	(-0.89)	-0.070	(-1.17)	0.51	4
Fluctuations ^c in:						
GDP, 1970-80	0.41	(0.92)	-5.6561	(-0.83)	0.50	4
exports, 1970-80	0.28	(0.40)	-0.9547	(-0.26)	0.50	3
Development aid in per cent of GDP, 1978-80	0.60	(1.54)	-0.1057*	(-1.71)	0.52	5
Imports in per cent of GDP, 1978-80	0.49	(0.79)	-0.0121	(-0.68)	0.50	3
Share in developed coun- tries' exports ^d , 1978-80	0.04	(0.13)	0.2701	(0.33)	0.50	3
External shocks in per cent of exports plus imports ^e , 1978-80	-0.20	(-0.55)	0.040	(1.38)	0.51	4

^aThe equation estimated can be written as: $\hat{P}(1) = [1 + \exp - (a_0 + a_1 X)]^{-1}$; X denotes the various explaining variables as given in the first column. t-statistics in parentheses; *significant at the 10 per cent level; number of observations: 53. - ^bTotal debt service to GNP. - ^cStandard deviation of residuals. - ^dImports of the sample countries from the European Community, Japan, and the United States, as a percentage share of the latter countries' total exports. - ^eBalance-of-payments impact of changes in the terms of trade, interest rates, and real world-market demand in 1978-1980, vis-à-vis 1975-1977; for details of calculations, see the Appendix.

Source: Table A1. - Own calculations.

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