

An International Comparison of the Causes of Changes in the Debt Service Ratio 1980-1985*

Introduction

The debt crisis of the 1980s officially originates from the summer of 1982 when Mexico suspended the payment of interest on private debt, but the debt difficulties of developing countries had been building up long before that. The manifestation of the crisis was a rising ratio of debt service payments to export earnings, which reduces the ability of countries to import (and therefore to grow), and which increases the vulnerability of countries to fluctuations in export earnings, leading to the possibility of default. There is no objective way of defining a critical debt service ratio beyond which trouble can be predicted with certainty in terms of the slowdown of economic growth or the likelihood of default which dries up further borrowing. The critical ratio will vary from country to country according to the nature of the debt, its reserve position, its ability to continue borrowing, its future economic prospects, and so on. There was a consensus in the early 1980s, however, that some countries, particularly in Latin America and Africa, were reaching the limits of their debt servicing capacity as a result of the conjunction of at least three adverse economic circumstances, and that the threat of bankruptcy, default and a collapse of the international banking system was a real possibility. These adverse circumstances were a rise in interest rates; a fall in export prices of primary commodities both absolutely and in terms of manufactured goods, and world recession leading to a fall in the demand for the exports of indebted countries. Table 1 below shows the movement in real

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commodity prices; interest rate measured by the London Interbank Offer Rate (LIBOR), and world activity, measured by industrial production, during the 1980s. It can be seen that in the early years of the 1980s, compared with the decades of the 1960s, compared to the 1970s, real commodity prices fell by over 20 percent; interest rates more than doubled, and in 1981 and 1982 there was a severe contraction of world economic activity. In addition, many indebted countries continued to accumulate new debt, in order to service old debt, as well as to convert old debt falling due into new (shorter term) debt on more unfavourable terms.

TABLE 1

AGGREGATE WORLD MACROECONOMIC INDICATORS

	Real Commodity Prices (1980=100)	LIBOR % p.a.	World Industrial Production (% change p.a.)
1960-69	115	5.2	6.2
1970-79	115	8.0	3.4
1980	100	14.4	0.0
1981	96	16.5	-7.0
1982	89	13.1	-3.3
1983	98	9.6	3.3
1984	101	10.8	6.5
1985	88	8.3	3.0
1986	72	6.9	1.0
1987	63	6.8	2.2

Source: IMF Financial Statistics.

Given the definition of the debt service ratio, as the ratio of debt service payments to export earnings, it is possible in principle to disaggregate any change in a country's debt service ratio into five component parts, namely the effect of:

(i) a change in the volume of debt, (ii) a change in the rate of interest, (iii) a change in the rate of amortisation (that may arise, for example, through the bunching of debt repayments), (iv) a change in the volume of exports, and (v) a change in the price of exports. In practice, this decomposition has not been systematically carried

out for a wide range of countries, and thus the relative importance of these five factors in contributing to the 1980s debt crisis remains unknown for most countries.¹ Was it rising interest rates, the need for repayment, the accumulation of new debt on which interest had to be paid, or falling export earnings that were largely responsible? Was there any systematic difference in the factors responsible between continents or types of country *e.g.* according to whether the debt was predominantly public or private, or according to the level of per capita income and industrial structure? Of particular interest is the extent to which countries have been caught in a "debt trap"; that is, the extent to which new borrowing, partly to repay old debt, has actually *increased* the debt service ratio. For this not to happen, the interest and amortisation rate must fall sufficiently to reduce annual debt service payments by an amount at least equal to new borrowing (holding export earnings constant). Answers to these questions are important not only for an understanding of the past, but also from a policy point of view if debt service difficulties are to be minimised in the future. In this study, we look at 96 countries identified in the World Bank Debt Tables over the period 1980 to 1985, during which the average debt service ratio for all countries rose from 12.6 percent to 20.2 percent.

The decomposition of changes in the debt service ratio

The debt service ratio may be written as:

$$S = \frac{(i + a) D}{P_x X} \quad (1)$$

where *i* is the rate of interest; *a* is the rate of amortisation; *D* is the volume of debt; *P_x* is the price of exports and *X* is the volume of exports.

¹ The closest work we know of is CLINE's (1984) attempt to calculate the impact on the external debt position of the non-oil developing countries of the rise in real interest rates; the rise in oil prices; the fall in commodity prices and the fall in export volume in the early 1980s.

Taking discrete rates of change of equation (1) gives:

$$\frac{dS}{S} = \frac{di}{i} \left(\frac{I}{P}\right) \pm \frac{da}{a} \left(\frac{A}{P}\right) + \frac{dD}{D} - \frac{dP_x}{P_x} - \frac{dX}{X} \pm \text{Interaction Term} \quad (2)$$

where I/P is the share of interest payments in total debt service payments, and A/P is the share of amortisation payments in total payments.

The volume of debt includes both public and private long term debt. The implicit interest rate being paid in any one year is calculated as the ratio of interest repayments to the total volume of outstanding debt. Likewise, the implicit amortisation rate is calculated as the ratio of amortisation repayments to the total volume of outstanding debt. The published price and volume data for exports refer only to visible trade, whereas the denominator in equation (1) is total export earnings. In calculating the effect of changes in export earnings arising from price and volume changes, we therefore make two calculations: one which assumes that the recorded price index applies to all transactions, leaving the export volume index as a residual; the second assuming that the recorded volume index applies to all transactions, leaving the price index as a residual. All variables are measured as averages over the period under review in order to avoid index number problems associated with the use of either base or terminal year figures.

From equation (2) we can decompose dS (the change in the debt service ratio) into five component parts:

- (i) the effect of interest rate changes: $\frac{di}{i} \left(\frac{I}{P}\right) S$
- (ii) the effect of changes in the rate of amortisation: $\frac{da}{a} \left(\frac{A}{P}\right) S$
- (iii) the effect of changes in the volume of debt: $\left(\frac{dD}{D}\right) S$
- (iv) the effect of changes in export prices: $\left(\frac{dP_x}{P_x}\right) S$
- (v) the effect of changes in the volume of exports: $\left(\frac{dX}{X}\right) S$,

plus an interaction term arising when discrete changes are taken.

Results 1980-1985

Our primary interest is to see whether there are any systematic differences between continents and groups of countries in the magnitude of these effects, and also between countries according to four criteria: (i) the proportion of export earnings derived from primary commodities; (ii) the level of debt per head; (iii) the size of the debt service ratio, and (iv) the level of per capita income. The overall results of the decomposition are shown in Table 2, where the countries are ranked in descending order of the change in the debt service ratio. It will be noticed at the bottom of the table that in a handful of countries the debt service ratio fell over the period 1980-85, including countries such as Peru and Brazil, although the debt service ratio remained high in several instances (see column 2). If we simply take the column averages for all countries, the prime sources of the increase in the overall debt service ratio of 7.6 percentage points have been the sheer increase in the volume of debt itself and the fall in export earnings. Interest and amortisation rates have, on average, fallen to reduce the debt service ratio, reflecting aspects of debt relief, particularly through rescheduling. Without these negative effects, the effect of new debt creation would by itself have increased the debt service ratio by 8.7 percentage points, while the effect of the fall in export earnings by itself was to increase the debt service ratio by 1.1 percentage points.²

There is, however, a wide variety of experience between countries. On the export front there are some dramatic cases where the fall in commodity prices and/or export volume had the effect of raising the debt service ratio by 6 percentage points (p.p.) or more e.g. in Bolivia (12.9 p.p.); Nigeria (12.7 p.p.); Chile (12.1 p.p.); Zambia (9.2 p.p.); Burma (8.9 p.p.); Tanzania (7.5 p.p.); Senegal (6.2 p.p.), and Peru (6.1 p.p.) to mention some of the more significant countries.

There are some equally dramatic cases where the repayments of principal caused debt service difficulties, while in other cases the relief of amortisation payments contributed significantly to a fall in

² The separate effects of price and volume changes cannot be given overall because separate price and volume data are not available for all countries.

Effect of Changes (Measured in Percentage Points) in:

Country	Change in Debt Service Ratio	Debt Service Ratio 1985	Interest Rate	Amortisation Rate	Debt Volume	Export Prices (A)	Export Volume (H)	Export Volume (A) = Actual (H) - Hypothetical	Export Prices (H)	Export Earnings	Interaction Term
Somalia	34.0	38.4	3.6	17.4	12.9	*	*	*	*	9.9	-9.8
Sao Tome & Principe	31.3	36.2	5.3	-5.2	19.3	*	*	*	*	16.9	-7.0
Nigeria	29.4	32.1	-0.9	11.0	16.1	*	*	*	*	12.7	-9.5
Portugal	27.2	43.0	7.1	6.6	19.1	*	*	*	*	-4.4	-1.2
Yemen Arab Republic	27.0	33.0	2.2	7.6	13.7	*	*	*	*	8.6	-5.1
Burma	26.3	46.4	-3.5	-1.3	22.6	2.4	6.6	1.4	7.6	9.0	-0.5
Colombia	25.3	35.1	1.9	2.0	18.3	*	*	*	*	-3.1	-1.6
Congo	25.0	33.8	5.1	13.5	11.1	*	*	*	*	1.1	0.1
Papua New Guinea	24.7	36.0	-2.2	0.8	24.9	3.3	-6.4	-2.6	-0.5	-3.1	-3.1
Malaysia	24.6	29.2	1.6	10.5	18.7	*	*	*	*	3.3	-0.9
Argentina	24.5	36.3	8.2	-19.6	33.5	*	*	*	*	4.8	-0.6
Uruguay	20.5	36.3	2.1	-5.8	18.0	*	*	*	*	22.4	0.0
Niger	19.3	38.4	-10.3	-3.7	10.9	*	*	*	*	7.8	-0.4
Nigeria	18.8	29.9	-1.8	-3.4	16.6	*	*	*	*	8.3	-1.1
Madagascar	17.7	25.8	5.7	7.3	16.6	*	*	*	*	2.8	-2.0
Togo	17.3	32.9	-1.5	-0.1	16.2	*	*	*	*	4.0	0.0
Jamaica	16.9	22.5	-0.4	4.3	11.0	*	*	*	*	3.5	0.0
El Salvador	15.5	29.3	0.1	4.3	16.2	-17.7	21.2	-3.4	6.9	-2.9	-0.7
Greece	15.2	23.1	1.6	6.0	11.2	*	*	*	*	5.4	-0.3
Jordan	15.1	22.6	-2.1	2.6	13.8	-10.1	16.0	1.8	4.1	5.9	-0.6
Guatemala	14.0	26.2	-1.4	5.4	4.7	4.5	8.4	11.1	1.8	12.9	0.0
Kenya	13.7	44.1	-10.7	-6.0	17.5	*	*	*	*	1.4	-1.9
Bolivia	13.2	16.8	2.2	4.9	6.6	*	*	*	*	0.3	-0.5
Mali	12.5	18.3	-0.9	3.3	10.3	*	*	*	*	1.8	-0.2
Ethiopia	12.4	25.1	-0.3	1.5	9.6	5.7	-3.9	-0.9	2.7	1.8	-0.3
Indonesia	12.3	26.8	-1.7	3.7	6.3	*	*	*	*	4.3	1.1
Mexico	12.0	50.0	-1.2	-11.7	32.1	32.1	4.3	-8.3	5.1	-3.2	0.1
Pakistan	11.7	31.7	0.2	9.4	5.2	-7.5	5.2	-4.6	4.3	-0.3	-0.2
Hungary	10.9	24.7	-1.1	3.8	8.7	-3.3	3.0	-4.6	4.1	-3.5	0.6
Thailand	10.8	25.4	-1.2	-0.7	15.6	0.2	-3.7	-7.6	4.1	-1.0	-0.3
India	10.7	20.5	2.5	8.0	15.6	*	*	*	*	*	0.1
Uganda	10.7	17.4	3.7	1.5	8.0	*	*	*	*	-1.3	0.1
Costa Rica	10.6	38.0	1.6	-9.2	19.4	*	*	*	*	-1.3	0.4
Burundi	10.6	18.0	1.7	1.4	12.6	*	*	*	*	5.4	-0.5
Burkina Faso	10.1	16.8	-0.3	-0.4	5.9	*	*	*	*	-4.9	1.5
Cameroon	10.0	21.1	0.4	12.0	1.0	*	*	*	*	-2.9	-0.1
Burkina Faso	9.8	17.6	1.0	5.3	6.5	-13.5	17.7	1.3	2.9	4.2	0.0
Bangladesh	9.0	29.3	-3.8	3.1	5.5	3.3	-5.6	-6.6	4.3	-2.3	0.0
Malawi	8.9	28.5	2.8	-0.1	8.5	4.1	2.0	-3.5	1.4	-2.1	-0.1
Israel	8.6	14.9	2.1	0.8	7.9	-4.1	*	*	*	-1.5	0.3
Sri Lanka	8.1	8.8	2.6	3.6	3.3	*	*	*	*	*	-2.7
Maldives	8.1	8.8	2.9	3.0	2.8	*	*	*	*	*	0.2
Central African Republic	8.1	18.9	0.8	4.2	8.9	-5.5	-1.2	-10.2	3.5	-6.3	-6.7
Malawi	7.8	18.3	-0.8	4.5	4.2	*	*	*	*	*	0.2
Fiji	7.2	10.6	1.4	1.9	3.6	*	*	*	*	*	1.0
Egypt	6.8	25.5	0.3	-1.1	9.6	*	*	*	*	*	-2.1
Cyprus	6.7	12.1	0.0	1.4	6.9	-2.1	0.5	-0.5	-1.1	-1.6	0.0
Rwanda	6.6	8.9	0.4	2.6	3.8	-3.5	3.9	-3.6	4.0	0.4	-0.6
Algeria	6.5	33.1	1.0	9.1	5.3	*	*	*	*	1.6	0.1
Chile	6.4	44.4	-1.1	-24.7	25.0	*	*	*	*	12.1	-4.9
Grenada	5.8	9.2	0.2	0.6	6.4	*	*	*	*	-1.6	0.2
Philippines	5.8	19.6	-0.8	-3.7	9.9	-11.5	11.7	0.5	-0.3	0.2	0.2
Swaziland	5.6	8.3	-0.1	2.8	0.5	*	*	*	*	2.7	-0.3
Mauritius	5.5	12.5	0.0	3.3	2.2	*	*	*	*	0.0	0.0
Benin	5.3	9.2	1.0	0.7	4.4	*	*	*	*	-0.6	-0.2
Tanzania	5.0	15.5	4.5	-2.6	4.8	*	*	*	*	7.5	-0.2
Seychelles	4.8	5.0	1.6	2.4	2.0	*	*	*	*	-0.4	-0.8
Lesotho	4.7	6.1	0.1	1.2	3.3	*	*	*	*	0.7	-0.6
Ghana	4.5	12.2	-0.6	-1.3	4.8	*	*	*	*	5.7	0.0
Romania	4.1	13.6	2.3	4.8	-2.4	*	*	*	*	-0.8	0.2
Chad	4.0	7.5	1.3	5.0	-1.5	*	*	*	*	-32.4	1.0
Turkey	3.8	33.5	10.3	19.0	7.7	*	*	*	*	0.0	-0.3
Botswana	3.8	5.5	0.8	1.2	2.7	*	*	*	*	-0.9	0.0
Nepal	3.6	5.3	0.4	0.4	3.7	*	*	*	*	0.5	0.5
Barbados	2.9	5.4	-0.1	-0.7	4.0	0.6	-0.5	-4.9	3.8	-1.1	0.1
Western Samoa	2.7	20.7	-3.7	4.0	3.4	*	*	*	*	1.1	0.7
Honduras	2.5	20.2	-4.4	-6.2	12.3	*	*	*	*	*	0.0
Solomon Islands	2.5	2.6	1.5	0.5	1.4	*	*	*	*	*	-0.9
China	1.6	7.0	-0.4	-0.4	4.5	*	*	*	*	*	0.2
Comoros	1.4	1.7	0.4	0.2	1.0	*	*	*	*	-2.3	0.2
Singapore	1.4	2.4	0.1	1.1	0.5	*	*	*	*	0.1	-0.3
The Gambia	1.3	2.5	-0.2	0.9	1.0	*	*	*	*	-0.3	0.0
Bahamas	1.1	3.3	0.2	-0.3	1.9	*	*	*	*	-0.8	0.1
Malta	1.1	1.4	0.0	0.8	0.0	-0.1	0.4	-0.1	0.4	0.0	0.0
Ecuador	0.8	31.3	3.7	-13.2	14.6	5.6	-9.2	-14.3	10.7	-3.6	-0.7
Trinidad & Tobago	0.7	7.1	0.3	-4.6	3.7	3.1	3.6	0.4	1.3	1.7	-0.4
Syrian Arab Republic	0.6	12.2	-0.7	-2.4	5.1	-1.9	0.4	*	*	0.6	0.0
Panama	0.5	6.6	-0.8	-4.4	6.2	0.9	-2.5	-2.4	0.8	-1.6	0.2
Oman	-0.3	4.8	-0.7	-3.4	4.2	*	*	*	*	-0.6	-0.1
Haiti	-0.6	6.1	-0.7	-7.6	11.2	*	*	*	*	-0.4	-0.3
Dominican Republic	-1.4	18.1	-0.3	-6.4	6.5	*	*	*	*	0.1	-0.9
Sudan	-1.4	11.2	4.7	-6.4	2.3	*	*	*	*	1.3	-0.5
Liberia	-2.4	3.9	-3.3	-2.2	2.3	*	*	*	*	3.1	-2.3
Ivory Coast	-3.5	20.5	-3.3	-13.0	12.0	*	*	*	*	4.9	-2.7
Venezuela	-3.7	16.3	-3.8	-13.0	10.9	-9.7	1.4	-7.8	-0.5	-8.3	0.0
Paraguay	-4.3	13.8	-0.9	-6.2	11.1	*	*	*	*	1.1	-0.7
Morocco	-5.4	30.6	-13.3	-10.6	18.1	*	*	*	*	*	1.1
Nicaragua	-5.4	10.6	-8.5	-9.9	12.8	*	*	*	*	*	3.3
Yugoslavia	-6.0	19.0	2.0	-9.5	2.9	*	*	*	*	*	-1.0
Gabon	-6.2	10.6	-1.6	-1.0	5.5	*	*	*	*	*	1.9
Zambia	-6.6	11.2	-6.6	-11.3	4.7	*	*	*	*	*	9.2
Guyana	-7.5	9.4	-5.5	-9.4	3.6	*	*	*	*	*	-2.6
Sierra Leone	-8.2	6.2	-2.5	-10.6	1.2	*	*	*	*	*	-1.8
Senegal	-9.0	11.6	-5.7	-13.4	11.2	*	*	*	*	*	5.5
Peru	-14.5	22.3	-11.1	-19.9	13.5	13.9	-7.8	0.6	5.5	6.1	-2.6
Brazil	-23.3	33.2	-9.2	-21.9	20.8	10.0	-20.3	-21.5	11.2	-10.3	-2.7
Column Averages	7.6	20.1	-0.5	-0.8	8.7						1.1

the debt service ratio. The former category of countries, where the effect of the rise in the amortisation rate was to increase the debt service ratio by more than 9 percentage points (p.p.), include: Turkey (19.0 p.p.); Nigeria (11.0 p.p.); Malaysia (10.5 p.p.); Pakistan (9.4 p.p.), and Algeria (9.1 p.p.). The latter category of countries include many of the Latin American countries where debt servicing difficulties have been most acute and where debt relief programmes have been in operation *e.g.* Chile (-24.7 p.p.); Brazil (-21.9 p.p.); Peru (-19.9 p.p.); Argentina (-19.6 p.p.); Ecuador (-13.2 p.p.); Venezuela (-13.0 p.p.), and Mexico (-11.7 p.p.).

The effect of changes in the rate of interest has been less dramatic and varied, except in a few cases such as Peru where a deliberate policy was pursued to limit debt service payments to no more than 10 percent of export earnings.

The effect of changes in the volume of debt has been positive in virtually every country, and is by far the most important factor contributing to the rise in the debt service ratio in the majority of countries. If we take the thirteen largest debtors in 1985, the following picture emerges (see Table 3). For these countries, the change in the volume of debt by itself increased the debt service ratio by, on average, 17.3 percentage points. There was some relief in the form of above average reductions in the rates of amortisation and interest, but even so, the debt service ratio on average rose by 7.9 percentage points. This highlights the debt trap or debt bondage that countries may get into: that new borrowing to meet debt service difficulties will actually increase the debt service ratio unless there is an equivalent offset in the interest and amortisation rate through delayed repayments and borrowing on more favourable terms. This did not happen in the early years of the 1980s either overall or in the most indebted countries.

If we examine the rank correlation matrix of the various contributory factors to changes in the debt service ratio in relation to the characteristics of countries, some interesting conclusions emerge. All four components of the change in the debt service ratio correlate strongly with the actual change in the debt service ratio across countries (at the 95 percent confidence level and above). The highest rank correlation ($r = 0.521$) is with changes in the rate of amortisation. Some of the components of change are also strongly correlated with each other. There is strong positive intercorrelation between the contribution of changes in the amortisation rate and

TABLE 3

THE DECOMPOSITION OF CHANGES IN THE DEBT SERVICE RATIO FOR THE THIRTEEN LARGEST DEBTOR COUNTRIES 1980-85

	1985 Debt \$ million	Changes in the Debt Service Ratio	The Effect of Changes in:			
			Interest Rate	Amortisation Rate	Volume of Debt	Export Earnings
Brazil*	91,095	-23.3	- 9.2	-21.9	+20.8	-10.3
Mexico*	88,715	+12.0	- 1.2	-11.7	+32.1	- 8.3
Argentina*	40,204	+24.5	+ 8.2	-19.6	+33.5	+ 3.3
S. Korea	35,341	+ 7.3	- 0.8	+ 3.5	+11.1	- 6.7
India	30,960	+10.7	+ 2.5	+ 1.5	+ 8.0	- 1.0
Indonesia	30,465	+12.4	- 0.3	+ 1.5	+ 9.6	+ 1.8
Venezuela*	25,760	- 3.7	- 3.8	-13.0	+10.9	+ 4.9
Malaysia	18,056	+24.6	+ 1.6	+10.5	+18.7	- 3.1
Chile*	17,665	+ 6.4	- 1.1	-24.7	+25.0	+12.1
Philippines*	16,582	+ 5.8	- 0.8	- 3.7	+ 9.9	+ 0.2
Nigeria*	14,459	+29.4	- 0.9	+11.0	+16.1	+12.7
Thailand	13,207	+10.8	- 1.2	- 0.7	+15.6	- 3.5
Peru*	11,808	-14.5	-11.1	-19.9	+13.5	+ 6.1
Average		+ 7.9	- 1.4	- 6.7	+17.3	+ 0.6

* Means rescheduling country.

interest rate, and a strong negative intercorrelation between the contributions of changes in the amortisation rate and the volume of debt. In other words, countries where the growth in the volume of debt has affected the debt service ratio the most appear to have received the most rescheduling relief. On the other hand, there is a strong negative relation between the effect of export earnings on the debt service ratio and the contribution of changes in the rate of interest ($r = -0.365$) and amortisation ($r = -0.228$), indicating that countries worst hit by falls in export earnings have received least relief in the form of rescheduling and softer borrowing. As might be expected, there is a significant positive correlation between the share of primary exports in total exports and the contribution of export earnings to changes in the debt service ratio ($r = 0.386$). As might also be expected, the size of the debt service ratio correlates strongly with the growth of debt but not with any of the other components of change in the debt service ratio. Interestingly, there is also a strong association between the level of debt per head and the contribution of the growth of debt to changes in the debt service ratio — another dimension of the debt trap. Finally, there is no systematic relationship between any of the contributory factors to changes in the debt service ratio and the level of per capita income. Poorer countries have received no more relief in the form of lower interest rates or more favourable repayment terms than richer countries.

The experience by continent

What has happened in different "continents" (or areas of the world) is shown in Table 4. The debt service ratio rose in all parts of the world, by the most in South East Asia (12.7 p.p.), and by the least in Latin America (4.7 p.p.). While the growth of debt by itself in Latin America would have increased the debt service ratio by 15.9 p.p., the effect of this was partly offset by a small fall in the implicit interest rate and a large fall in the implicit amortisation rate, which together had the effect of reducing the debt service ratio by 11.9 p.p. No other region experienced such relief. The effect of changes in the rate of interest and amortisation has been

TABLE 4

SOURCES OF CHANGES IN THE DEBT SERVICE RATIO 1980-85
(MEASURED IN PERCENTAGE POINTS) "CONTINENT"

	Change Debt Service Ratio	Effect of Changes in:				
		Interest Rate	Amortisation Rate	Debt Volume	Export Earnings	Interaction Term
All Countries (% contribution)	+7.6	-0.5 (-6.6)	-0.8 (-10.5)	+8.7 (+114.5)	+1.1 (+14.5)	-0.9 (-11.7)
Africa (% contribution)	+8.0	-0.7 (-8.0)	+1.0 (+12.5)	+5.8 (+72.5)	+3.1 (+38.7)	-1.2 (-14.9)
Latin America (% contribution)	+4.7	-2.4 (-31.1)	-9.5 (-202.1)	+15.9 (+338.3)	+2.0 (+42.5)	-1.3 (-27.6)
South East Asia (% contribution)	+12.7	-0.7 (-5.5)	+1.6 (+12.6)	+12.6 (+99.2)	-0.4 (-3.2)	-0.4 (-3.2)
Middle East (% contribution)	+9.3	+0.8 (+8.6)	+1.0 (+10.8)	+8.5 (+91.4)	-0.2 (-2.2)	-0.8 (-8.6)
Eastern Europe (% contribution)	+3.0	+1.0 (+33.3)	-0.3 (-10.0)	+3.1 (+103.3)	-0.7 (-23.3)	-0.1 (-3.3)
Other Countries (% contribution)	+8.9	+1.2 (+13.5)	+3.5 (+21.6)	+6.3 (+97.3)	-2.0 (-28.4)	-0.1 (-2.7)
Indian Sub-Continent (% contribution)	+8.9	+1.2 (+13.5)	+3.5 (+39.3)	+6.3 (+70.8)	-2.0 (-22.5)	-0.1 (-1.1)

relatively small in all other areas. In Africa, this is largely accounted for by the fact that the vast bulk of debt is non-private, and contracted from the outset on very concessional terms.

Africa appears to have been the worst hit by falls in export earnings. Latin America also suffered, but in other regions export earnings rose over the period under review. The effect of falling export earnings in Africa raised the debt service ratio by 3.1 p.p., and in Latin America by 2.0 p.p. Countries in Africa particularly badly hit have been Somalia, Sao Tome and Príncipe, Nigeria, Niger and Zambia.

We now distinguish between the countries in Africa and Latin America where the debt service ratio has risen and where it has fallen to see whether any significant differences in experience emerge. The results are shown in Table 5.

TABLE 5

COUNTRIES CATEGORISED ACCORDING TO WHETHER THAT SERVICE RATIO ROSE OR FELL 1980-1985
(measured in percentage points)

	Change in Debt Service Ratio (dS)	Effect of Change in:			
		Interest Rate	Amortisation Rate	Debt Volume	Export Earnings
Africa ↑ dS	+11.61	+0.33	+3.57	+5.68	+3.20
Africa ↓ dS	-5.34	-4.63	-8.56	+6.31	+2.96
Latin America ↑ dS	+12.4	-0.26	-7.7	+17.3	+2.6
Latin America ↓ dS	-8.6	-6.20	-12.6	+12.0	+0.15
South East Asia ↑ dS	+12.70	-0.70	+1.6	+12.6	-0.4

In Africa, export earnings deteriorated in both sets of countries by virtually the same extent in terms of their impact on the debt service ratio. Moreover, there is little difference between countries according to the share of primary exports in total exports. Also the effect of the growth of debt is virtually the same in both sets of countries. The major explanation of the decline in the debt service ratio in certain African countries has been the decline in the rate of interest and amortisation, reflecting rescheduling agreements reached by these countries, by Zambia and Sudan in particular.

In Latin America, the experience has been broadly the same, except that in the countries where the debt service ratio fell, the impact

of export earnings was virtually zero. Both sets of countries suffered a decline in export prices, but in some countries there was a compensating increase in export volume. These countries can be found in both sets of countries where the debt service ratio rose and fell. The pattern of response is in some degree associated with the share of primary exports in total exports, which is to be expected if the price elasticity of primary commodities is generally lower than for other tradeable goods. In Brazil and Mexico, for example, where the share of primary exports in total exports is much smaller than the average for Latin America, export earnings rose to reduce the debt service ratio by 10.3 p.p. and 8.3 p.p., respectively. At the other extreme, Bolivia and Chile, where the ratio of primary exports is higher than average, registered the highest positive contributions of falling export revenues to increases in the debt service ratio. If all countries are divided according to whether primary exports constitute more or less than 80 percent of total exports, we find that in the former set of countries there was a fall in export earnings which increased the debt service ratio by 4.1 p.p., while in the latter set of countries there was a rise in export earnings which had the effect of reducing the debt service ratio by 0.7 p.p.

In South East Asia, the debt service ratio rose in all countries, largely as a result of the growth of debt volume. Export earnings played a neutral role, although again there is a difference between countries according to the importance of primary exports in total exports. Taking the ratio of 70 percent as the dividing line between countries, in the three countries with a ratio of primary exports in excess of 70 percent there was a fall in export earnings which increased the debt service ratio by 2.6 p.p., while in four countries with a ratio less than 70 percent, there was a rise in export earnings which reduced the debt service ratio by the same amount.

A comparison between the periods 1980 to 1982 and 1982 to 1985

Debt repayment problems started on a widespread basis in 1982, and since then sovereign lending has been highly managed. To facilitate a discussion of policy issues arising from our results, and of the management of the crisis, we have applied the same exercise done for the period 1980 to 1985 to the two sub-periods 1980 to 1982 and 1982

to 1985 to compare the factors contributing to the change in the debt service ratio before and after 1982. Table 6 shows the results which are broadly consistent with those for the period 1980 to 1985 as a whole.

TABLE 6

DECOMPOSITION OF CHANGES IN THE DEBT SERVICE RATIO: 1980-2 AND 1982-5 (measured in percentage points)

	Change in Debt Service Ratio	Effect of the Change in:				
		Interest Rate	Amortisation Rate	Debt Volume	Export Earnings	Interaction Term
Africa:						
1980-2	+3.9	-0.2	+0.1	+2.0	+2.3	-0.3
1982-5	+4.1	-0.8	+0.6	+3.9	+0.7	-0.3
Latin/Central America:						
1980-2	+8.8	+1.1	-3.0	+8.3	+2.6	-0.2
1982-5	-4.1	-4.4	-7.9	+9.8	-0.5	-1.1
S.E. Asia:						
1980-2	+3.9	+0.3	-0.7	+4.3	0.0	0.0
1982-5	+8.8	-1.1	+2.9	+7.7	-0.6	-0.1

There are, however, three interesting insights. Firstly, as we would expect, the fall in interest rates had its greatest impact in the second sub-period (1982-85), when US interest rates were falling (see Table 1). Latin and Central American countries benefited most from this fall compared to the other regions. This result reflects the fact that a greater proportion of Latin and Central American debt is variable interest rate debt.³

Secondly, Latin and Central American countries, on average, experienced a *fall* in the debt service ratio between 1982 and 1985. This was the result of the decline in US interest rates and in amortisation rates, which offset the continued build-up in the volume of debt. Nonetheless this result should not disguise the fact that there

³ 48.2% of the public debt of Latin and Central American countries is on variable interest rate terms. This compares with 30.9% for South East Asia and 9.7% for African countries. (Source: calculated from WORLD BANK, *World Debt Tables*, 1987-8).

was a wide variety of experience in Latin and Central America in the second sub-period. Whilst nine of the countries experienced declines in their debt service ratios, the remaining ten countries did not, and of these ten, six were rescheduling.

Thirdly, it is interesting to highlight the experience of the African and South East Asian countries with that of the Latin/Central American countries, especially in the post-1982 period. The former two regions experienced increasing debt service ratios, on average, in both sub-periods. African countries did not benefit from the decline in US interest rates because a smaller proportion of their debt was at variable interest rates.⁴ Neither did they experience an improvement in export earnings. This lends further support to our earlier argument that poorer countries have, on average, had no more relief than richer ones. Indeed, it indicates that poorer countries have had less relief. In the case of South East Asian countries, their increased debt service ratios in the post-1982 period in part reflects their increased popularity with the banks (the rise in debt volume contributed 7.7 percentage points to the rise in the debt service ratio) and, in part, a possible bunching of debt repayments (the rise in the amortisation rate contributed 2.9 percentage points to the rise in the debt service ratio).⁵

Policy implications

We now turn to examine the policy implications of our results, focusing in particular on the management of the crisis and the various proposals aimed at a solution to the international debt problem, in the light of the causes.⁶

⁴ See previous footnote.

⁵ The Philippines is the only exception. Its debt service ratio fell by 3.8 percentage points in the period 1982-85, following the pattern of many other rescheduling countries (*i.e.* rising debt volume offset by falls in interest and amortisation rates).

⁶ There have been numerous proposals (see, for example, *Amex Bank Review*, June 1984 for an outline). The aim here is not to examine the details of individual proposals so much as to look at the broad principles contained in various proposals. See GRIFFITH-JONES (1986) for a detailed evaluation of many of the proposals.

Management of the crisis has involved a case-by-case approach, whereby countries which get into repayment difficulties individually negotiate a rescheduling agreement with the lenders involved. In the case of official lending, rescheduling is negotiated with the countries involved through the Paris Club; in the case of private lenders, rescheduling is negotiated with the banks involved and with the IMF. The average change in the debt service ratio for all rescheduling countries (including both private and official debt) over the period 1982-85 was -4.9 percentage points. This fall was mainly the result of a reduction in interest and amortisation rates

TABLE 7

THE EXPERIENCE OF RESCHEDULING COUNTRIES: 1982-5
(measured in percentage points)

Country	Change in Debt Service Ratio	Contribution of Change in:				
		Interest Rate	Amortisation Rate	Debt Volume	Export Earnings	Interaction Term
Liberia	-2.8	-11.7	-2.9	+1.7	+0.4	-0.3
Nigeria	+19.0	+0.6	+11.4	+7.4	-0.2	-0.2
Zambia	-6.0	-6.6	-5.9	+3.7	+3.6	-0.8
Sudan	-5.6	+6.9	-11.0	+3.7	-2.5	-2.7
Ivory Coast	-13.4	-4.4	-12.1	+7.3	-2.9	-1.3
Senegal	+4.8	-1.2	+3.3	+4.2	-1.6	+0.1
Togo	+16.2	+4.4	+8.2	-0.4	+4.6	-0.6
Morocco	-15.3	-9.7	-15.1	+12.9	-2.7	-0.7
Ecuador	-38.8	-5.6	-30.7	+11.8	-10.4	-3.9
Venezuela	-5.5	-5.4	-9.8	+7.6	+3.3	-1.2
Bolivia	+10.0	-9.5	+1.1	+10.0	+8.5	-0.1
Chile	-17.8	-14.7	-18.4	+12.3	+5.3	-2.3
Honduras	-5.9	-5.9	-5.1	+9.2	-4.1	0.0
Peru	-21.9	-11.1	-21.0	+10.4	+2.1	-2.3
Nicaragua	-25.2	-21.9	-12.8	+14.6	+3.0	-8.1
Panama	0.0	-1.0	-2.3	+0.9	+2.6	-0.2
Argentina	+14.8	+7.0	-7.4	+17.7	-2.6	+0.1
Dominican Rep.	-8.6	-2.5	-9.9	+7.9	-3.6	-0.5
Mexico	+5.5	-6.2	-3.5	+18.4	-3.4	+0.2
Costa Rica	+17.9	+13.4	-2.0	+9.3	-3.1	+0.3
Uruguay	+8.4	+1.8	-12.1	+11.6	+7.6	-0.5
Brazil	-38.5	-15.6	-21.3	+11.2	-11.6	-1.2
Philippines	-3.8	-3.0	-7.3	+6.6	+0.2	-0.3
<i>Regional Averages</i>						
Africa	-0.4	-1.5	-3.0	+5.1	-0.2	-0.8
Latin America	-7.5	-5.5	-11.1	+10.9	-0.5	-1.4
S.E. Asia	-3.8	-3.0	-7.3	+6.6	+0.2	-0.3
Overall Average	-4.9	-4.0	-8.1	+8.7	-0.4	-1.1

and an improvement in export earnings which offset the effect of the rise in debt volume (see Table 7). However, this overall average hides a wide diversity of experience, which we noted earlier for the case of Latin and Central American countries. Firstly, African countries have not gained as much from rescheduling as Latin and Central American countries (see regional averages, Table 7). This reflects a phenomenon already mentioned, namely the fact that African countries gained less from the fall in world interest rates because the vast bulk of their borrowing was official on concessional terms.

Secondly, individual country experience within both these regions is diverse. Some countries, such as Nigeria (+19.0 p.p.), Togo (+16.2 p.p.), Argentina (+14.8 p.p.) and Costa Rica (+17.9 p.p.) have had large increases in their debt service ratios over the period, while others such as Ecuador (-38.8 p.p.), Brazil (-38.5 p.p.) and Nicaragua (-25.2 p.p.) have had relatively large decreases. It is difficult to estimate the impact of rescheduling terms on the debt service ratio of these countries. This difficulty arises because the debt service ratio is calculated using data for interest and amortisation payments that have actually been paid out in any one year (as opposed to debt service payments that were due to be made under the loan agreement). The more debt service that a country refuses to meet, the greater will be the fall in the debt service ratio over any period of time, other things being equal. In the case of those countries which experienced a fall in their debt service ratio between 1982 and 1985, the fall in interest payments they experienced is likely to be almost entirely due to the fall in US interest rates over the period rather than to non-repayment of interest due⁷ or to any concessions on the part of the international banks or official borrowers. Average spreads over LIBOR improved by about only 0.5% on rescheduled loans and new money under rescheduling agreements over the period 1982-5. By contrast the fall in amortisation payments is almost entirely due to suspension of principal repayments and their subsequent rescheduling. However, although the

⁷ Suspension of interest payments by countries is far more unusual than suspension of principal repayments. US banks are supposed to call countries into default if interest payments are not met within a certain period. However, there are some exceptions - Argentina, Mexico, Peru, Sudan and Bolivia have had interest arrears on private debt over the period under review. Interest arrears are much less of a problem on official debt.

maturities of rescheduled private debt have increased from an average of 7 years in 1983 to 10 years in 1985, the problem has been arguably postponed.

Evidence of some success in the management of the crisis is the fact that in the post-1982 period debt volume continued to increase (albeit at a slower rate). This was true even of countries whose debt service ratio declined, with the decline resulting from falls in interest and amortisation rates that were sufficient to offset the rise in the debt service ratio that would have resulted from the accumulation of new debt. This reflects the policy of the IMF to "persuade" banks to continue to lend to countries with debt repayment difficulties. However, two factors tend to temper the success of this policy. Firstly, the continued negative transfers from developing countries, which have been well-documented elsewhere.⁸ Secondly, evidence of a "debt trap" situation in which countries use the new money facilities to repay existing commitments rather than for productive investments.

The main conclusion which emerges from our analysis of the management of the crisis is that there has been a wide variety of experience among rescheduling countries. These diverse experiences may reflect the lack of a set of policy guidelines for rescheduling, resulting in a relatively uncoordinated approach. This suggests that there is room for improvement even within the current method of debt management. In particular, there is a need for more uniform improvement in rescheduling and new money terms.

However, more realistic maturities, and lower and more stable interest rates, may not be sufficient. There would need to be a significant improvement in debt service ratios in order to end the negative transfers which have been detrimental to the growth and development of these economies. The relationship between debt service ratios and negative transfers is a complex one. High and increasing debt service ratios may not imply negative transfers because the former may be the result of a large increase in debt volume, something that would tend to reduce negative transfers in the short run. Thus whilst an increase in the volume of new lending may help to ease the negative transfer problem, it would ultimately lead to rising debt service ratios unless it were accompanied by a

⁸ See, for example, LEVER and HUHNE (1985).

fall in interest and amortisation rates or some debt relief. Indeed, our results indicate that rising debt volume has made the largest contribution to debt service ratio increases. Yet this rise in volume has not been sufficient to stem the negative transfers.

There are basically two ways to reduce the flow of service payments. The first is to reduce the volume of outstanding debt. The second is to reduce the annual rate of flow. There have been many proposals of both types. To reduce the volume of outstanding debt, there would be several possibilities: *e.g.* the buy-back of debt by the debtor countries; the conversion of debt into equity; debt forgiveness. The possibility of debt relief has received little attention from those directly involved in debt rescheduling (*i.e.* the IMF, developed country governments or the banks), in spite of many proposals in the literature (*e.g.* see Soros, 1984; Rohatyn, 1983; and Kenen, 1983, to name but a few). However, in recent months, it figured on the agenda for the first time at the IMF and World Bank meeting in Berlin, September 1988. To reduce the flow of debt service payments, there would also be several possibilities: extending the maturity of debt; capping interest payments; debt conversion at lower rates of interest (including zero coupon bonds); the payment of debt service in local currency or commodities.

Our own view is that rather than opting for a "single solution", action ought to take place on all fronts at once. Whatever options are resorted to, however, the burden of adjustment should be shared by the creditors, debtors and the world community which benefitted from the creation of debt in the 1970s to the extent that the on-lending process buoyed up the whole world economy. In particular, our results provide evidence of the need for a three-pronged policy: firstly, an attempt to mitigate the effect of interest rate instability; secondly, a reduction of export earnings instability; and thirdly, debt relief.

It is widely acknowledged (see, for example, Allsopp and Joshi, 1986; and Cline, 1984) that the rise in interest rates in the early 1980s was instrumental in precipitating the debt crisis (see Table 1). International banks had originally moved to variable interest rate lending in order to remove the interest rate risk inherent in maturity mismatching. The risk was not, however, eliminated from banks' balance sheets by this policy, but rather took on a different form. It increased the risk of the borrower experiencing debt servicing difficulties when interest rates rose. Our results show the benefits of the

fortuitous fall in interest rates in the post-1982 period. Nonetheless, this easing of the interest rate problem should not disguise the fact that any future rises in interest rates would again impose a heavy burden on countries who are already having debt servicing difficulties. Proposals to deal with this problem include Solomon's plan to capitalise the increase in interest payments if market rates rise above a certain level (Solomon, 1983) and the Economist's plan to extend the Compensatory Financing Facility to interest rate fluctuations (*The Economist*, 1983).⁹ Without full compensation the developing countries will still be highly vulnerable to adverse changes in world interest rates, as well as other shocks.

At the same time as interest rates rose, export earnings deteriorated due to falling primary commodity prices and world recession (Table 1). Moreover, in the period 1982-85, some countries continued to suffer from export earnings deterioration – notably the African countries, but also some Latin American countries (e.g. Bolivia and Uruguay, see Table 7). Our results show that those which were most affected by export earnings deterioration over the whole period were those countries for whom primary exports formed a higher percentage of total exports. In addition, the negative correlation between the contribution of export earnings and the contribution of interest and amortisation rates suggests that those most affected by a decline in export earnings have had the least relief. These results point to the need for a reappraisal of policy relating to export earnings and prices instability. There are several possible methods for dealing with the primary commodities problem. Firstly, buffer stock schemes seek to reduce price fluctuations in individual primary commodities. By buying the commodity when the price is at a designated floor level, and by selling it when the price is at its designated ceiling level, price fluctuations can be ironed out.¹⁰ From the point of view of developing country debt servicing, however, the promotion of export price stabilisation may not be the solution. It is export earnings which are the key factor determining the ease with which debt servicing obligations can be met. Stabilising export prices only sta-

⁹ This has now been done on a partial basis with the new IMF Compensatory and Contingency Financing Facility (CCFF) announced in August 1988. For Solomon's plan, see GRIFFITH-JONES (1986).

¹⁰ Keynes's "Commod Control Scheme" put forward in 1942 was designed for this purpose, which would have been financed through his proposal for an International Clearing Union. Today, buffer stocks could be financed by SDRs.

bilises export earnings when the cause of the instability is variations in demand. Where the product is subject to supply variations, stabilising price will not stabilise earnings, and may even lead to greater instability, exacerbating the country's debt servicing difficulties.

For this reason, the second method of dealing with earnings fluctuations is often preferred – a compensatory financing scheme.¹¹ These schemes seek to offset export earnings fluctuations by offering loans in the event of earnings shortfalls which are repaid when earnings are above trend. The IMF's Compensatory Financing Facility (CFF) operates in this way. However, its usefulness as presently operated is limited.¹² Firstly, its method of estimating earnings shortfall is unsatisfactory. Indeed, as a result of inaccurate earnings forecasts, the CFF has failed to achieve its aim of stabilising export earnings. Secondly, access is restricted by quota limits, thus preventing full compensation from being paid out. Finally, countries may have to make repayments even if export earnings do not improve. As a result of these three factors, the success of the CFF in stabilising export earnings has been limited. Reform of the CFF in these areas would increase its usefulness and help to prevent the debt servicing difficulties resulting from earnings shortfall.

A more serious problem with respect to export earnings is the recognition that the export earnings of developing countries may no longer be unstable around a *growing* trend as they were in the 1950s and 1960s. Instead the trend may be reversing itself. Therefore, there might also be a case for intervening to influence relative prices to attempt to reverse this decline. Such an aim is not easily achieved through a compensatory financing scheme. Rather, it requires a combination of a buffer stock system and export quotas to control the supply of the commodity. Policies aimed at *improving* (rather than simply stabilising) export earnings have the added advantage that they would help the poorest developing countries who have had the least relief in the 1980s.

Finally, there is the question of debt relief. This is required to move many of the countries examined here out of the debt trap, a

¹¹ For example, the EEC's STABEX scheme and the IMF's Compensatory Financing Scheme. It should be noted that buffer stock and compensatory financing schemes are by no means mutually exclusive. Indeed CUDDY (1978) concludes that when storage costs are low, a combination of a buffer stock and compensation schemes are a superior method of stabilising earnings than either on their own.

¹² See, for example, FINGER and DEROSA (1980) and GRIFFITH-JONES (1983).

situation which is not conducive to the long-term prospects for development and debt repayment. There is some evidence that we have got to the stage where developing countries are stagnating under the burden of debt repayments which is preventing any return to growth conditions and making it unlikely that they will be able to regenerate their economies sufficiently to meet the rescheduled debts when they begin to become due for payment. Even those countries where debt service ratios fell between 1982 and 1985 are still experiencing debt servicing difficulties. This is reflected in the fact that they continue to require rescheduling of debt falling due, and that most of the fall in debt service was a result of non-repayment rather than a fall in the debt service that should have been paid.

The relief on official debt owed by some African countries, proposed by Britain and France, and accepted at the IMF meeting in Berlin by those involved in Paris Club reschedulings, is to be welcomed. However, it is likely that such an approach is also needed to reduce the debt overhang faced by some Latin American countries in particular. One aim of debt relief should be not just the removal of negative transfers but also the promotion of a positive transfer of resources from industrialised to developing countries. Thus any debt relief scheme must incorporate proposals to deal with the future flow of funds to developing countries both for development finance and for balance of payments finance. In other words, a short-term solution to the problem of the debt overhang must also incorporate long-term considerations. In particular, an important question relates to the role of commercial banks in any future lending. Studies have shown that commercial banks are not ideally suited to sovereign lending.¹³ The combination of the highly competitive environment of international banking and the market failures (particularly related to information failures) which characterise banking markets tends to lead to an underestimation of the risks involved. Any proposals must therefore be based on a much greater role for public institutions.

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¹³ See, for example, GUTTENTAG and HERRING (1985, 1986) and GIBSON (1989).

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