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Aspects of the Growth of Budgetary Interest Payments, 1974-81 <sup>1/</sup>

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## I. Introduction

Much attention has been devoted in recent years to the impact of high nominal and real interest rates in world capital markets on the external payments positions of borrowers. <sup>1/</sup> Many countries have experienced a rising burden of interest payments on their external debt that has resulted from the combination of high nominal interest rates and, for dollar-denominated debt, the sharp appreciation of the U.S. dollar against most other currencies. High international interest rates, however, not only pose challenges for the management of a country's external liquidity but also have domestic financial consequences. In particular, rising interest payments on government debt (whether domestic or external) have an adverse impact on the government budget that requires discretionary action on revenues or on other expenditures if overall budgetary objectives, such as those adopted under Fund-supported financial programs, are to be achieved. Owing to the contractual nature of interest obligations, there is little scope for their reduction through discretionary action in the short term other than through renegotiation of external debt service (which requires the consent of the foreign creditors) or by lowering the domestic cost of government borrowing (which may prejudice other aspects of adjustment policies).

To provide some quantitative background for discussion of these issues, this paper examines various aspects of the growth of aggregate budgetary interest payments in a sizable group of countries during the period 1974-81, using data provided in the Fund's Government Finance Statistics Yearbook (GFS). <sup>2/3/</sup> Measures are presented of the growth of interest payments over time and in relation to gross domestic product (GDP) and major budgetary aggregates such as total expenditure and revenue;

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<sup>1/</sup> The literature on debt capacity of developing countries is surveyed in McDonald (1982).

<sup>2/</sup> While the Yearbook constitutes the best available source of comparable data for a large sample of countries, there are some limitations. First, the GFS data do not provide a disaggregation between domestic and external interest payments, preventing a direct estimate of the relative contributions of these sources to the growth in the total. Second, the GFS data, compiled on a cash basis, exclude accumulation of interest arrears, leading to a possible understatement of the budgetary burden of interest payments in countries where such arrears have become substantial. Third, in some countries, budgetary expenditures on interest payments covered by the GFS may not provide a complete coverage of the Government's interest obligations, for example, if the Government makes payments to public enterprises in the form of transfers or loans (i.e., not classified as interest payments) in order to finance interest payments on government-guaranteed debt.

<sup>3/</sup> Where available, 1982 data are also presented in the Appendix tables.

the statistical contribution of interest payments to the growth of overall budgetary deficits; the relative role of the various factors contributing to the growth of interest payments, including changes in average interest rates and in the stock of government debt (domestic and foreign); and the impact of inflation on interest payments, budget deficits, and government debt. Sources of data and methods of calculation are described in Annex A.

## II. Measures of the Changing Impact of Interest Payments

Table 1 summarizes broad trends in budgetary interest payments during 1974-81 for 58 countries (consisting of 18 industrial and 40 developing countries) for which unbroken time series data on the relevant variables were available throughout the period. <sup>1/</sup> For comparison purposes, three indicators of the relative magnitude of interest payments are presented. The first, interest payments as a percentage of GDP, shows the proportion of total domestic resources that must be mobilized by the Government through taxes or borrowing just to meet its interest obligations; the second, interest payments as a proportion of total expenditure, indicates the size of this mobilization effort relative to the Government's absorption of resources in total; and the third, interest payments as a ratio of revenue and grants, shows the share of total current receipts from the Government's resource mobilization efforts which is pre-empted by interest payments and, by implication, unavailable for other expenditures without an increase in government borrowing.

On the basis of each of these indicators, the burden of interest payments increased almost without interruption through the period. Relative to GDP, average interest payments <sup>2/</sup> for all countries included in the sample increased in each year between 1974 and 1981, and over the whole period more than doubled from 1.02 percent to 2.24 percent. Moreover, the growth of interest payments accelerated significantly at the end of the period, with one fourth of the total increase occurring in 1981 alone. On the basis of the countries included in this sample, the increase in interest rates relative to GDP has been somewhat sharper in the industrial countries (from 1.17 percent to 2.65 percent) than in the group of developing economies (from 0.95 percent to 2.06 percent). As might be expected, averages across country groups conceal a considerable range of variation among individual countries (Appendix Table 5); for the industrial countries, the change in the interest payments/GDP ratio, although uniformly positive with one exception, ranged from -0.1 percentage point for Luxembourg to 3.9 percentage points for Belgium, with Sweden and Denmark also registering more than 3 points. In terms of

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<sup>1/</sup> The same sample is used for Section III below. Sections IV and V are based on a subsample of 34 countries for which appropriate data on government debt were available (see Annex A for details).

<sup>2/</sup> All the averages presented in this paper are on an unweighted basis.

Table 1. Government Interest Payments, 1974-81

	1974	1975	1976	1977	1978	1979	1980	1981	<u>Change</u> <u>1974-81</u>
<u>(In percent of GDP)</u>									
All countries	1.02	1.17	1.28	1.44	1.60	1.79	1.94	2.24	+1.22
Industrial	1.17	1.31	1.40	1.59	1.79	2.04	2.26	2.65	+1.48
Developing	0.95	1.10	1.22	1.37	1.52	1.68	1.80	2.06	+1.11
<u>(In percent of expenditure and net lending)</u>									
All countries	4.13	4.26	4.63	5.23	5.70	6.36	6.59	7.24	+3.11
Industrial	3.80	3.89	4.24	4.79	5.30	6.01	6.48	7.34	+3.54
Developing	4.28	4.42	4.81	5.43	5.88	6.52	6.64	7.20	+2.92
<u>(In percent of revenue and grants)</u>									
All countries	4.74	5.22	5.88	6.33	6.97	7.63	8.16	9.31	+4.57
Industrial	4.05	4.62	4.95	5.61	6.28	7.06	7.61	8.61	+4.56
Developing	5.05	5.49	6.30	6.66	7.28	7.89	8.40	9.63	+4.58

Sources: Appendix Tables 5, 6, and 7.

absolute levels of this ratio, the highest in 1981 was that of Belgium (6.6 percent), followed by the United Kingdom (4.6) and Sweden (4.3), while Denmark reached 4.5 percent in 1982. <sup>1/</sup> Among the group of developing countries, notable increases in the interest payments/GDP ratio occurred in Panama (4.1 percentage points), Mauritius (3.7), Peru (3.3), Morocco, Malawi, and Argentina (each 3.0); only the Islamic Republic of Iran and Chile registered declines. The highest level of interest payments/GDP in 1981 was recorded by Panama (6.8 percent), followed by Mauritius (4.9 percent), Peru (4.6 percent), Sri Lanka (4.5 percent), and Malawi (4.4 percent). <sup>2/</sup>

Interest payments have also accounted for a steadily rising share of total budgetary outlays (Table 1). For all countries in the sample, the average ratio of interest payments to total expenditure and net lending increased each year, and by 1981 was well over half again as large as in 1974 (7.24 percent compared with 4.13 percent). The increase in interest payments relative to GDP, described in the preceding paragraph, does not therefore just reflect the general tendency of government expenditures to absorb an increasing proportion of GDP, but also an increasing relative share of interest payments within total expenditures. As before, the increasing burden of interest payments was somewhat more pronounced for the industrial country group (from 3.80 percent of expenditures in 1974 to 7.34 percent in 1981) than for the developing countries (from 4.28 percent to 7.20 percent over the same period). Among the 18 industrial countries interest payments grew faster than total expenditure in all but Luxembourg (Appendix Table 6); the most pronounced increases of the share of interest payments in total outlays were recorded by Japan (10.4 percentage points), Canada and Denmark (both 7.2), and Sweden (6.0). In 1981, interest payments accounted for 10 percent or more of expenditure in six industrial countries: Japan, 14.7 percent; Canada, 13.0 percent; Belgium, 11.8 percent; United Kingdom, 11.1 percent; United States, 11.0 percent; and New Zealand, 10.1 percent. By contrast, in 1974 the highest ratio was only 8.2 percent (United States), and 10 percent was not exceeded in any country of this group until 1978.

Among the 40 developing countries studied, interest payments declined as a share of total outlays in just five cases between 1974 and 1981--the Islamic Republic of Iran, Botswana, the Yemen Arab Republic, Chile, and Guatemala. Notable increases were registered by Peru (13.7 percentage points), Argentina (11.5), Panama (10.6), and Mauritius (9.0). In 1981, interest absorbed over 10 percent of total outlays in Peru (21.3 percent--although declining from 24.1 percent in 1979), Panama

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<sup>1/</sup> For Ireland (not included in the sample), the ratio of interest payments to GDP reached 6.8 percent in 1980.

<sup>2/</sup> In Israel (also not included), interest payments were equivalent to 6.2 percent of GDP in 1980, having been as high as 10.1 percent in 1977.

(19.4 percent), Mauritius (13.7 percent—rising to 17.5 percent in 1982), Malawi (13.6 percent), Sri Lanka and Argentina (both 13.5 percent), and Mexico (13.1 percent); in 1974, this level had been exceeded only by Sri Lanka, with 10.8 percent.

The increasing burden of interest payments, coupled with their contractual nature, poses major challenges to governments in their management of scarce budgetary resources. <sup>1/</sup> Statistically, this is indicated by the third of the summary measures—the ratio of interest payments to receipts from revenue and grants (Table 1). Averaged over all countries, this ratio almost doubled between 1974 and 1981, from 4.74 percent to 9.31 percent; of this increase, more than a full percentage point occurred in 1981 alone. For this indicator, the average percentage point increase was virtually the same for both industrial and developing countries. Within the former group, again all countries except Luxembourg registered increases, of which the largest were recorded by Japan (17.5 percentage points), Denmark (8.8), Canada (8.3), Sweden (7.7), and Belgium (7.6) (Appendix Table 7). In 1981, interest payments absorbed more than 20 percent of revenue and grants in Japan and more than 10 percent in 7 other countries (Belgium, Canada, the United Kingdom, the United States, New Zealand, Sweden, and Denmark); the highest ratio in 1974 had been only 8.9 percent, in the United Kingdom. As with the other measures, the pattern was more diverse among the developing countries: the ratio of interest payments to budgetary receipts declined in 5 of the 38 countries (the Islamic Republic of Iran, Botswana, Pakistan, the Yemen Arab Republic, and Chile). Of the others, large increases were recorded by Argentina (17.3 percentage points), Peru (17.0), Mauritius (15.5), and Panama (14.2). Interest payments absorbed more than 10 percent of budgetary receipts in 15 countries of this group in 1981, the highest being Peru (25.8 percent); in 1974, only 6 countries had exceeded 10 percent, with the highest level recorded by Sri Lanka with 12.6 percent.

### III. Interest Payments and Overall Budget Deficits

This section briefly examines the relationship between interest payments and changes in overall budget deficits. Causation between the two can be in both directions: given revenues and noninterest expenditures, higher interest payments imply a higher deficit as a matter of simple arithmetic; in the reverse direction, higher deficits imply higher government borrowing and thus, ceteris paribus, increased interest payments in the future. The contribution of increased government debt to the subsequent growth of interest payments is examined in Section IV below; here we consider only the direct impact of interest payments on the overall deficit.

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<sup>1/</sup> For a theoretical analysis of the links between external borrowing policy and domestic resource mobilization capacity, see Kharas (1981).

Summary data on the contribution of interest payments to changes in overall deficits are shown in Table 2: during 1974-81, the average overall deficit for the 58 countries included in this study almost tripled relative to GDP, increasing from 1.78 percent to 5.22 percent. Of this 3.44 percentage point increase, 1.22 percentage points (35 percent) was accounted for (in an arithmetic sense) by the increased burden of interest payments. For the industrial country subgroup, interest payments accounted for 1.48 percentage points (57 percent) out of an increase of 2.61 percentage points in the overall deficit/GDP ratio; for developing countries, interest payments increased by 1.11 percentage points of GDP, 29 percent of the increase in the overall deficit/GDP ratio of 3.82 percentage points. While these figures provide a useful measure of the relative magnitude of increases in interest payments, not too much inferential weight can be placed on them because of the restrictive nature of the implied *ceteris paribus* conditions. Thus, the proposition that "if the growth of interest payments had been 1 percentage point of GDP lower in country X than it actually was, the overall deficit would have been correspondingly reduced" has only limited usefulness since it begs the question of how the growth of interest payments could have been so contained. Taking the cost of servicing government debt as being largely beyond the control of the authorities, increases in interest costs can only be contained through undertaking less new borrowing, most obviously by running lower deficits. At this point the argument becomes virtually circular, implying that the way to run lower deficits is to run lower deficits. What the data do show, rather, is the extent of adjustment that would have been required elsewhere in the budget (i.e., on revenues or on noninterest expenditures) to maintain a constant overall deficit/GDP ratio in the face of a growing burden of interest payments. In addition, it appears that the growth of interest payments played a bigger role, on average, in the widening of overall deficits in industrial than in developing countries.

The role of budgetary developments other than those related to interest payments is underscored by the absence of a close correlation across countries between changes in interest payments and in overall budget deficits, especially for developing economies: the rank correlation coefficient between these two variables is only +0.22 for all 58 countries together, +0.18 for the developing country subgroup, and +0.44 for the industrial countries. Thus, while on average changes in interest payments accounted for more than one third of the increase in overall deficits (see above), the experiences of individual countries actually differed quite widely (Appendix Table 8).

Table 2. Contribution of Government Interest Payments to  
Changes in Overall Budget Deficits, 1974-81

(In percent of GDP)

	Interest Payments			Overall Deficits			Change in Interest Payments/Change in Overall Deficit, 1974-81 (In percent)
	1974	1981	Change 1974-81	1974	1981	Change 1974-81	
All countries	1.02	2.24	1.22	1.78	5.22	3.44	35.5
Industrial	1.17	2.65	1.48	1.12	3.73	2.61	56.7
Developing	0.95	2.06	1.11	2.07	5.89	3.82	29.0

Source: Appendix Table 8.

#### IV. Determinants of Changes in Interest Payments

The discussion in Section III referred to the two-way link between interest payments and overall budget deficits, whereby on the one hand interest payments, as part of government outlays, add to the overall deficit, while on the other hand overall deficits lead to an increase in outstanding debt and so add to future interest payments. In this section we examine the second aspect of this relationship for those countries from the earlier sample of 58 which also reported data on government debt for the time period under study; this smaller sample comprises 34 countries, of which 13 are classified as industrial and 21 as developing.

For each country, the available data permit a decomposition of changes in the ratio of interest payments to GDP, first into two components: the change in interest payments as a ratio to initial debt outstanding and the change in debt outstanding as a ratio to GDP. <sup>1/</sup> Second, movements in total outstanding debt relative to GDP are subdivided between domestic debt and foreign debt, including an estimate in the latter case of the impact of exchange rate movements. While these measures provide an indication, in an ex post arithmetic sense, of the relative contributions of different elements to the growth of interest payments, the results must be interpreted with some caution. First, changes in the ratio of interest payments to outstanding debt, while obviously closely related to interest rate developments, also reflect other factors, notably: the rate at which fixed interest debt is rolled over and refinanced at prevailing interest rates; the proportion of debt serviced at variable interest rates (such as overseas commercial bank borrowing) compared with that to which fixed rates apply (for example, if interest rates on domestic borrowing are administratively controlled rather than market-determined); <sup>2/</sup> and changes in the composition of debt between high-interest and low-interest sources. This last factor also affects the interpretation of the contribution of changes in debt and its components: because disaggregated data on interest payments classified by components of debt are not available, the contribution of changes in debt to the growth of interest payments must be calculated at the average interest cost of the entire stock of debt in the previous year. If the terms of new borrowing differ substantially from this average interest cost, then the calculated contribution of new debt will understate or overstate the true impact, depending on whether new debt is at higher or lower rates than the average rate of the previous year. For instance, the contribution to interest payments would be overstated in the case of an expansion of foreign debt on very concessional terms; by contrast, in the case of a country which borrows abroad on commercial terms in order to acquire foreign exchange, the contribution may be somewhat understated. In the case of a government which is borrowing

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<sup>1/</sup> For full details, see Annex A.

<sup>2/</sup> See International Monetary Fund (1983).

mainly for domestic liquidity purposes and attempts to equalize the marginal cost of borrowing from all sources, the bias would be likely to be small. In view of these considerations, the calculations reported here should be regarded as illustrative of broad trends rather than as precise magnitudes.

For this smaller group of countries, interest payments as a ratio to GDP (Table 3) increased by 1.25 percentage points during 1974-81 (compared with 1.22 percentage points for the larger group discussed in Sections II and III); of this amount, 0.61 percentage point (49 percent of the total increase) was accounted for by increases in the government debt/GDP ratio and the remainder by increases in interest payments as a proportion of outstanding debt. The contribution of higher debt/GDP ratios was split almost evenly between domestic debt and foreign debt in domestic currency terms, with the latter reflecting increased borrowing in foreign currency and exchange rate changes in virtually equal amounts.

Table 3. Contributions to Changes in Government Interest Payments, 1974-81

(In percent of GDP)

	All Countries	Industrial Countries	Developing Countries
Change in interest payments	<u>1.25</u>	<u>1.62</u>	<u>1.02</u>
Contributed by:			
Average interest cost	0.64	0.81	0.53
Total debt	0.61	0.81	0.49
Domestic	(0.33)	(0.53)	(0.21)
Foreign	(0.28)	(0.28)	(0.28)
Dollar debt	0.12	0.09	0.14
Exchange rate	0.16	0.19	0.14

Source: Appendix Table 9.

The overall averages conceal, however, a wide range of country experiences. For the industrial country subgroup, the change in interest payments/GDP was higher than for developing countries (1.62 percentage points compared with 1.02), with average interest costs and growth of debt both contributing larger amounts. The contribution of growth of foreign debt in domestic currency terms was the same for the two subgroups (0.28 percentage point), but whereas for the industrial countries about two thirds of this was due to exchange rate changes and only one third to expansion of debt in foreign currency (dollar) terms, for the developing countries, foreign borrowing and exchange rate changes played equal roles. 1/ Regarding growth of domestic debt, its contribution was markedly higher in the industrial countries (0.53 percentage point, compared with 0.21 percentage point for developing countries), no doubt reflecting their greater recourse to domestic borrowing at market-determined rates.

Estimates of the magnitude of contributions to changes in interest payments for the 34 individual countries are presented in Appendix Table 9. 2/ Although in the great majority of cases higher average interest costs on government debt did contribute to an increase in the interest payments/GDP ratio, this was not universally so: in Iceland, Bahrain, and Costa Rica average interest costs fell during the period under review, while in Finland, Switzerland, and Uruguay they were virtually unchanged.

One possible source of reductions in average interest costs is a rescheduling of debt service payments such as those arranged with increasing frequency in recent years under the auspices of the Paris Club. 3/ Typically, such reschedulings entail the consolidation of debt service (both principal and interest) due in a given period (normally 12 months) and arrears from earlier periods into new long-term debt. To the extent that this procedure converts interest that would have been due in the absence of rescheduling into new debt, average interest costs are reduced during the consolidation period. Depending on the exact terms of rescheduling it is, however, possible that this may be offset by moratorium interest payments on the newly consolidated debt, especially if the consolidation includes a relatively large overhang of accumulated arrears. 4/ Bank debt restructurings generally affect principal only

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1/ It should also be noted that some large foreign borrowers (such as Brazil, Argentina, and Mexico) are not included in this subsample.

2/ Changes in the ratios of total, domestic, and foreign debt to GDP for individual countries are shown in Appendix Table 10.

3/ See Brau and others (1983).

4/ See Annex B for examples of the impact of debt rescheduling on interest payments due.

and so may also increase the burden of interest payments, since interest will be payable on consolidated principal obligations in addition to that originally due prior to rescheduling. 1/

The data used in this study do not permit a detailed quantitative assessment of the impact of debt restructuring on interest payments. During 1974-81, only 5 countries among the 58 examined in the paper restructured their debt with official creditors (Chile in 1975; Zaïre in 1976, 1977 (twice), 1979, and 1981; Turkey in 1978 and 1979; Peru in 1978; and Liberia in 1980 and 1981); 4 countries renegotiated their commercial bank debt (Peru in 1978 (twice) and 1980; Turkey in 1979 (twice); Zaïre in 1980; and Bolivia in 1980 and 1981). After 1981, reschedulings became much more common.

Developments during 1974-81 in average interest costs (interest payments as a ratio of the stock of debt outstanding at the beginning of each year) for each country are shown in Appendix Table 11. Average interest costs for all 34 countries surveyed increased by 2.7 percentage points during the period, from 5.5 percent to 8.2 percent. The average increases for the industrial and developing country groups were broadly similar (2.9 and 2.5 percentage points, respectively), but this implied a continuation of the higher level of borrowing costs in the industrial group, which remained more than 2 percentage points above those of the developing country group. This differential, no doubt, reflects such factors as the developing countries' access to concessional external finance and the typically relatively limited role of market borrowing in their domestic financing operations. As before, however, country group averages conceal substantial variations, with Sweden recording the highest increase in average interest rates (7.4 percentage points), followed by Korea and Venezuela (each with 6.6 percentage points).

#### V. Inflation, Interest Payments, and Overall Deficits 2/

The role of interest rate variability in conjunction with the extent of rollover of fixed interest government debt as a determinant of changes in actual interest payments was already noted in Section IV. A significant source of such variability in recent years has been that ascribed to inflation, on the argument that investors in financial markets require an inflation premium in addition to the real return anticipated on their asset holdings; with rising actual inflation rates during the

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1/ Even in cases where interest relief is provided, it has been argued (Bhatia and Tahari (1984)), that the interest payments originally due should be charged to the budget and deposited in a blocked account at the central bank. If this is done, then rescheduling will not reduce budgetary interest payments.

2/ For a comprehensive discussion of relationships between inflation, interest rates, and taxation, see Tanzi (1984).

1970s, expected inflation accelerated, and the inflation premium implicit in nominal yields on financial assets increased correspondingly. 1/ In effect, such an inflation premium would serve to maintain the expected real value of financial assets denominated in nominal terms. However, since the premium is payable throughout the maturity period of the asset, rather than at the redemption date, its existence is equivalent to early amortization of debt in real terms; for if inflation and the associated interest rate premium were zero, the real value of the financial claim would be reduced only by actual cash repayments of principal.

In conditions where the inflation premium on financial asset yields accurately forecasts actual inflation developments, inflation has no redistributive impact between lenders and borrowers. Where those conditions do not hold, either because of unanticipated inflation or because interest rates are not freely determined in a market that can establish an inflation premium, higher inflation benefits borrowers in real terms at the expense of lenders. Borrowers enjoy a reduction in the real value of their liabilities, which in this case is not offset by a higher level of nominal interest payments inclusive of an inflation premium. Real interest costs in this instance are reduced by inflation, and may well even be negative.

The impact of inflation on the real value of a borrower's liabilities and on interest costs expressed in real terms has prompted considerable interest in the derivation of appropriately inflation-adjusted fiscal accounts. 2/ Typically, the proposed adjustment is derived by multiplying the level of debt outstanding by a measure of the inflation rate to compute the erosion in the real value of the government's financial liabilities due to inflation 3/ and is subtracted from the conventionally measured overall deficit to provide an inflation-adjusted deficit that corresponds to the change in the government's net financial position in real terms. The counterpart adjustment in the accounts above the line may be applied to interest payments, so that interest payments are shown in real terms, net of the inflation-induced reduction in real liabilities. 4/

These considerations are relevant for the purposes of this paper in that it could be argued that the increase in interest payments relative to GDP documented in previous sections may have been distorted by the

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1/ In some countries with high inflation (e.g., Brazil), indexing has been applied to government securities to reduce the lender's risk associated with incorrect anticipation of inflation (see Jud (1978)).

2/ Taylor and Threadgold (1979), Siegel (1979), Miller (1982), and Bitter (1983).

3/ A modified form of this procedure is required for foreign liabilities (see Annex A).

4/ In cases where interest rates are less than the inflation rate, the resulting real losses to lenders (equal to the government's gain as borrower) could alternatively be accounted above the line as capital revenue for the government.

effects of inflation. For example, an increase in inflation that is incorporated into nominal interest rates in a higher inflation premium would raise the interest payments/GDP ratio while leaving the real burden of debt servicing unchanged. If this were so, one might conclude that the apparent problem of an increasing interest rate burden could be "solved" by changes in accounting procedures; for budgetary purposes, the problem would entail merely a challenge to effective cash management rather than a reduced availability of real resources for noninterest expenditures. 1/

Illustrative estimates of the changing impact of consumer price inflation on real interest payments and overall deficits between 1974 and 1981 are presented in Table 4 and Appendix Table 12. 2/ In each table, the first two series presented show changes in interest payments and overall budget deficits relative to GDP, prior to adjustment. The third, termed "inflation adjustment" shows the change relative to GDP between the two end years of the period in the estimated reduction in the real value of government debt due to inflation in those years; 3/ in the case of foreign liabilities, a correction is also made for exchange rate changes. The inflation adjustment would be zero if the ratio of debt to GDP was unchanged over the period, and the rates of inflation in the beginning and end years were also the same (not necessarily zero). However, since in many countries inflation rates by 1981 were below those experienced in 1974, the inflation adjustment declined in 22 countries out of 34, and on average, fell by 1.44 percentage points of GDP; thus on an inflation-adjusted basis, the average overall deficit as a ratio to GDP increased by 4.8 percentage points (compared with an unadjusted increase of 3.4 percentage points), and interest payments rose by 2.7 percentage points (1.2 percentage points unadjusted). On the basis of these estimates, the increase in both the burden of interest payments and the size of overall budget deficits during the period 1974-81 were "real" phenomena which are not diminished (in fact, the reverse) after adjusting for the effects of inflation.

A similar conclusion is even more applicable for the developing countries considered separately. For this group as a whole, the inflation adjustment declined by 2.2 percentage points between 1974 and 1981, so that on an inflation-adjusted basis, interest payments and the overall

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1/ The rationale for this view is that lenders are concerned with the real value of their claims on government and will thus willingly increase their nominal holdings of government paper at higher inflation rates, permitting the government to run a higher nominal deficit. For a detailed analysis of this topic, see Mackenzie (1984).

2/ Details of the methods of calculation employed are presented in Annex A.

3/ To the extent that inflation rates are volatile from year to year, as was often the case during the period under review, these calculations are sensitive to the choice of end-years and therefore should be viewed as illustrative rather than definitive.

Table 4. Impact of Consumer Price Inflation on the Real Value  
of Interest Payments and Government Deficits, 1974-81

(In percent of GDP)

	All Countries	Industrial Countries	Developing Countries
Change in interest payments	1.25	1.62	1.02
Increase in overall deficit	3.45	2.28	4.10
Change in inflation adjustment	-1.44	-0.22	-2.20
Change in adjusted interest payments	2.69	1.84	3.22
Change in adjusted deficit	4.85	2.50	6.30

Source: Appendix Table 12.

deficit rose by significantly more (3.2 and 6.3 percentage points, respectively) than in nominal terms (1.0 and 4.1 percentage points, respectively). Within the group, estimates differed very widely, however, demonstrating the sensitivity of the calculations to the rates of inflation (and, in the case of foreign debt, currency depreciation) in the terminal years. For example, the inflation adjustment declined by 12 percentage points of GDP in Pakistan, where the inflation rate used to compute the adjustments contracted from 33 percent in 1974 to 15 percent in 1981. By contrast, in Iceland and Singapore, the increase in the inflation adjustment was considerably larger than the actual increase in nominal interest payments, implying that inflation-adjusted interest payments declined during the period. <sup>1/</sup>

## VI. Conclusion

This paper has examined trends in government interest payments for 58 countries for which comparable data are available for the period 1974-81. The data show that for each of various measures, the relative burden of interest payments increased steadily for most countries during the middle and late 1970s and accelerated during 1980-81; interest payments rose significantly relative to GDP, to total government expenditure, and to government revenue and grants. On average, the growth in interest payments was a little higher in industrial than in developing countries, although there was substantial variation within the two groups. In a statistical sense, higher interest payments accounted for more than half of the expansion of overall budget deficits in industrial countries, but less than a third for developing economies.

For a subgroup of 34 countries for which appropriate data on government debt were available, about half of the increase in interest payments relative to GDP was accounted for by higher average interest costs and the remainder by higher ratios of debt to GDP. As far as the latter contribution is concerned, domestic debt played the preponderant role in industrial countries, whereas in developing economies higher foreign borrowing had relatively greater significance. During the period under review, reschedulings of official debt owed to the Paris Club and to commercial banks were not a major factor influencing interest payments, although that may not be so for years after 1981. Finally, adjustment of interest payments for the effects of inflation actually reinforces the overall conclusion that the budgetary burden of interest payments did increase significantly.

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<sup>1/</sup> Note that the inflation adjustment computed here does not, in general, constitute an estimate of the extent to which interest payments actually did rise on account of inflation; this would be so only if average interest rates paid on outstanding debt remained constant in real terms, as would happen if debt is fully rolled over at nominal rates reflecting current inflation (see Annex A for elaboration of this point).

The implications for budgetary policy of the increased burden of interest payments are discouraging. At a time when policymakers in many countries are engaged in efforts to reduce budgetary deficits as part of their overall stabilization efforts, a rising burden of interest payments over time requires revenue or expenditure measures elsewhere in the budget simply to prevent existing imbalances from becoming larger. While a decline in the general level of international interest rates could provide some relief from this burden, the most effective means of curtailing interest payments in the long run would be to control the level of government debt, for example, by progressively reducing it relative to GDP. Just as the present levels of government debt represent the accumulated results of borrowing over the years, however, such a reduction would have to be achieved by observing considerable fiscal restraint for an extended period.

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Table 5. Government Interest Payments, 1974-82

(In percent of GDP)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	Change 1974-81
<b>Industrial countries</b>										
United States	1.7	1.7	1.8	1.8	1.7	2.0	2.4	2.8	3.2	+1.1
Canada	1.3	1.6	1.6	1.7	2.4	2.3	2.6	2.9	...	+1.6
Australia	1.4	1.4	1.3	1.7	1.8	1.9	1.9	2.0	1.9	+0.6
Japan	0.6	0.8	1.0	1.3	1.6	2.0	2.4	2.8	...	+2.2
New Zealand	2.2	2.4	2.7	3.0	3.4	3.6	3.7	4.2	...	+2.0
Austria	0.6	0.8	1.1	1.3	1.6	1.7	1.8	2.0	...	+1.4
Belgium	2.7	2.7	2.8	3.2	3.6	4.1	5.1	6.6	...	+3.9
Denmark	0.5	0.5	0.7	1.1	1.3	2.4	2.7	3.7	4.5	+3.2
Finland	0.3	0.3	0.2	0.3	0.4	0.6	0.6	0.7	...	+0.4
France	0.5	0.8	0.7	0.8	0.8	0.9	1.0	1.5	1.5	+1.0
Germany, Federal Republic of	0.5	0.6	0.6	0.8	0.8	0.8	1.0	1.2	...	+0.7
Iceland	1.1	2.0	1.6	1.7	2.2	2.4	1.8	2.0	...	+0.9
Luxembourg	0.8	0.8	0.8	0.9	1.0	0.9	0.9	0.7	...	-0.1
Netherlands	1.3	1.3	1.7	1.7	1.6	1.7	2.0	2.5	3.2	+1.2
Norway	1.1	0.9	1.6	1.9	2.2	2.6	2.8	2.6	...	+1.5
Sweden	1.1	1.4	1.3	1.5	1.8	2.0	3.0	4.3	4.6	+3.2
Switzerland	0.3	0.4	0.4	0.6	0.5	0.5	0.5	0.6	...	+0.3
United Kingdom	3.2	3.3	3.4	3.4	3.7	4.1	4.4	4.6	4.4	+1.4
<b>Developing countries</b>										
Indonesia	0.3	0.3	0.6	0.6	1.0	1.2	0.8	0.8	...	+0.5
Iran, Islamic Republic of	0.9	0.9	0.6	0.7	0.2	0.6	0.6	0.3	...	-0.6
Oman	0.6	0.8	0.9	1.2	1.8	1.7	1.2	0.7	...	+0.1
Venezuela	0.2	0.2	0.5	0.6	1.2	1.6	1.7	1.9	2.1	+1.7
Botswana	0.6	1.2	1.1	1.1	1.0	0.8	0.7	0.8	...	+0.2
Kenya	1.3	1.3	1.5	1.4	1.7	2.0	2.0	2.4	...	+1.1
Liberia	0.8	0.8	1.7	0.7	1.4	2.2	3.1	2.4	...	+1.6
Malawi	1.4	1.5	1.3	1.5	1.9	2.2	3.1	4.4	...	+3.0
Mauritius	1.2	0.9	1.3	1.6	2.2	2.7	4.0	4.9	...	+3.7
Morocco	0.8	0.9	1.2	1.6	1.9	2.2	2.5	3.8	...	+3.0
Tunisia	1.1	0.9	0.9	1.0	1.2	1.6	1.4	1.6	...	+0.5
Zaire	1.8	1.8	2.9	2.7	2.2	2.3	2.3	2.9	...	+1.1
Zambia	1.9	2.7	3.2	3.7	3.6	3.5	3.4	3.3	...	+1.4

Table 5 (concluded). Government Interest Payments, 1974-82

(In percent of GDP)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	Change 1974-81
Fiji	1.2	1.0	1.2	1.3	1.6	2.1	1.5	1.8	...	+0.6
India	1.1	1.3	1.5	1.5	1.7	1.8	1.8	1.9	...	+0.8
Korea	0.4	0.5	0.7	0.8	0.8	1.0	1.2	1.3	...	+0.9
Malaysia	2.2	2.7	2.9	3.0	2.9	2.8	3.0	3.6	...	+1.4
Pakistan	1.7	1.5	1.6	1.8	1.8	2.0	2.1	2.0	...	+0.3
Philippines	0.4	0.9	0.6	0.6	0.7	0.9	0.9	0.8	...	+0.4
Singapore	1.4	1.6	2.1	2.7	3.1	3.3	3.3	2.9	...	+1.5
Sri Lanka	2.4	2.6	2.8	2.8	3.2	3.2	3.4	4.5	...	+2.1
Thailand	1.2	1.3	1.1	1.1	1.2	1.4	1.5	1.8	2.0	+0.6
Cyprus	0.8	1.2	1.2	1.6	1.5	1.7	1.9	2.3	...	+1.5
Turkey	0.6	0.6	0.6	0.6	0.5	0.6	0.6	1.1	...	+0.5
Bahrain	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.2	0.1	+0.1
Jordan	0.9	1.0	0.9	1.6	1.4	1.7	1.4	1.8	...	+0.9
Yemen Arab Republic	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.3	...	+0.1
Argentina	0.4	0.8	1.6	1.8	2.0	2.0	1.7	3.4	...	+3.0
Bolivia	0.3	0.3	0.3	0.3	0.4	0.3	1.5	0.8	...	+0.5
Brazil	0.9	1.2	1.3	1.8	2.0	1.9	1.7	1.8	...	+0.9
Chile	0.7	2.9	2.2	2.7	1.7	1.1	0.8	0.4	0.5	-0.3
Costa Rica	1.3	1.2	1.1	1.2	1.8	1.8	2.2	1.6	...	+0.3
Dominican Republic	0.2	0.2	0.2	0.2	0.3	1.0	1.0	1.0	...	+0.8
El Salvador	0.2	0.3	0.2	0.2	0.3	0.3	0.5	1.1	1.8	+0.9
Guatemala	0.6	0.5	0.6	0.6	0.6	0.6	0.6	0.7	...	+0.1
Mexico	1.2	1.2	1.5	1.7	1.8	1.7	1.8	2.9	...	+1.7
Panama	2.7	2.3	2.7	3.2	3.3	4.5	5.9	6.8	...	+4.1
Paraguay	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	...	+0.1
Peru	1.3	1.9	1.4	2.2	3.5	3.8	4.1	4.6	4.0	+3.3
Uruguay	0.3	0.4	0.2	0.3	0.9	0.6	0.4	0.3	1.0	--

Sources: International Monetary Fund, Government Finance Statistics Yearbook, 1983, and International Financial Statistics, various issues.

Table 6. Government Interest Payments, 1974-82

(In percent of expenditure and net lending)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	Change 1974-81
<b>Industrial countries</b>										
United States	8.2	7.2	7.5	8.0	7.3	9.1	10.0	11.0	12.5	+2.8
Canada	5.8	7.1	7.0	7.8	11.0	10.9	11.9	13.0	...	+7.2
Australia	5.6	4.8	4.3	5.7	6.0	6.6	6.8	6.9	6.8	+1.3
Japan	4.3	5.2	6.9	8.3	9.3	10.9	13.0	14.7	...	+10.4
New Zealand	6.2	5.8	7.5	7.8	8.3	9.5	9.5	10.1	...	+3.9
Austria	1.9	2.1	3.0	3.5	4.0	4.3	4.6	4.9	...	+3.0
Belgium	6.9	6.1	6.2	6.8	7.2	8.1	9.8	11.8	...	+4.9
Denmark	1.4	1.5	1.9	3.1	3.4	6.1	6.6	8.6	10.1	+7.2
Finland	1.1	0.8	0.8	1.1	1.4	1.9	2.1	2.4	...	+1.3
France	1.3	2.0	1.8	2.0	2.1	2.2	2.5	3.4	3.3	+2.1
Germany, Federal Republic of	1.8	1.8	2.2	2.5	2.6	2.9	3.1	3.7	...	+1.9
Iceland	3.2	5.6	5.0	5.2	6.9	7.4	5.7	6.2	...	+3.0
Luxembourg	2.4	1.9	1.8	1.9	2.0	2.0	1.8	1.8	...	-0.6
Netherlands	2.7	2.6	3.2	3.3	3.1	3.2	3.7	4.4	5.4	+1.7
Norway	2.8	2.3	3.6	4.1	4.8	5.7	6.3	6.3	...	+3.5
Sweden	3.0	3.6	3.2	3.6	3.8	4.3	6.1	9.0	9.5	+6.0
Switzerland	1.8	2.1	2.0	2.6	2.5	2.4	2.5	2.8	...	+1.0
United Kingdom	7.9	7.6	8.3	8.9	9.5	10.5	10.6	11.1	10.3	+3.5
<b>Developing countries</b>										
Indonesia	1.7	1.4	2.5	3.1	4.6	5.3	3.5	3.1	...	+1.4
Iran, Islamic Republic of	2.2	2.1	1.4	1.6	0.4	1.8	1.5	0.8	...	-1.4
Oman	0.9	1.3	1.3	2.0	3.1	3.5	2.6	1.4	...	+0.5
Venezuela	0.5	0.6	1.4	1.8	3.7	6.5	6.1	5.3	6.1	+4.8
Botswana	1.8	3.5	3.2	3.1	2.8	2.3	1.7	1.7	...	-0.1
Kenya	5.6	5.1	5.6	6.2	6.0	6.5	6.6	7.6	...	+2.0
Liberia	3.9	3.8	6.1	2.4	3.9	4.9	8.8	5.9	9.8	+2.0
Malawi	6.4	5.7	6.4	6.4	6.3	7.0	9.1	13.6	...	+7.2
Mauritius	4.7	3.7	4.0	4.5	6.0	7.8	12.0	13.7	17.5	+9.0
Morocco	2.9	2.7	2.9	3.8	5.5	6.2	7.1	9.4	...	+6.5
Tunisia	4.0	3.0	2.9	2.8	3.4	4.4	4.1	4.5	...	+0.5
Zaire	3.6	5.0	7.0	8.4	8.1	8.6	7.9	9.0	...	+5.4
Zambia	6.1	5.3	8.3	9.1	8.7	10.5	7.6	7.7	...	+1.6

Table 6 (concluded). Government Interest Payments, 1974-82

(In percent of expenditure and net lending)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	Change 1974-81
Fiji	5.4	4.9	4.9	5.2	6.0	8.1	5.9	6.6	...	+1.2
India	7.8	7.6	8.4	8.7	9.1	9.0	8.9	9.5	...	+1.7
Korea	2.6	2.8	3.8	4.0	4.3	4.8	5.6	5.6	...	+3.0
Malaysia	8.3	8.6	10.0	9.4	9.9	10.6	9.0	8.4	...	+0.1
Pakistan	8.6	6.4	7.0	7.8	8.1	7.9	9.1	8.8	...	+0.2
Philippines	3.0	5.2	3.6	4.0	5.0	6.5	6.1	5.0	...	+2.0
Singapore	7.0	6.7	9.2	11.5	13.8	14.5	13.0	9.6	...	+2.6
Sri Lanka	10.8	10.3	10.2	12.0	8.0	8.5	8.1	13.5	...	+2.7
Thailand	9.0	8.2	6.3	6.4	6.6	7.6	7.7	9.9	9.9	+0.9
Cyprus	3.1	3.2	4.0	5.5	5.2	6.1	6.4	7.8	...	+4.7
Turkey	3.0	2.8	2.6	2.1	2.1	2.4	2.5	4.9	...	+1.9
Bahrain	0.1	0.2	0.2	0.4	0.7	0.6	0.4	0.6	0.4	+0.5
Jordan	1.6	1.6	1.9	2.4	2.4	2.9	2.7	3.5	...	+1.9
Yemen Arab Republic	1.0	0.5	1.0	0.7	0.6	0.4	0.4	0.5	...	-0.5
Argentina	2.0	3.6	8.4	10.7	10.5	10.1	8.1	13.5	...	+11.5
Bolivia	3.2	2.9	2.2	2.5	2.9	2.0	10.8	6.5	...	+3.3
Brazil	5.4	6.0	6.6	9.0	9.3	8.5	7.3	7.3	...	+1.9
Chile	2.3	9.9	8.2	9.1	5.1	3.6	2.8	1.3	1.5	-1.0
Costa Rica	6.6	5.8	5.3	6.1	6.2	7.2	8.6	7.7	...	+1.1
Dominican Republic	1.2	1.0	1.6	1.3	1.6	5.4	5.7	6.3	...	+5.1
El Salvador	1.7	1.9	1.7	1.6	2.0	2.0	2.9	5.7	9.1	+4.0
Guatemala	5.4	5.5	5.0	5.1	5.2	4.9	3.7	3.9	5.7	-1.5
Mexico	8.3	7.2	8.7	10.5	10.7	9.7	9.3	13.1	...	+4.8
Panama	8.8	7.2	8.3	9.9	10.6	11.9	18.1	19.4	...	+10.6
Paraguay	2.1	1.9	1.8	2.7	2.5	3.0	3.0	2.6	...	+0.5
Peru	7.6	10.0	7.6	12.0	20.5	24.1	19.3	21.3	21.1	+13.7
Uruguay	1.1	1.8	0.8	1.4	3.6	3.0	1.6	1.3	3.2	+0.2

Sources: International Monetary Fund, Government Finance Statistics Yearbook, 1983, and International Financial Statistics, various issues.

Table 7. Government Interest Payments, 1974-82

(In percent of revenue and grants)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	Change 1974-81
Industrial countries										
United States	8.3	8.5	9.3	9.1	8.4	9.8	11.4	12.4	14.8	+4.1
Canada	6.2	8.2	8.2	9.8	14.1	13.3	14.1	14.5	...	+8.3
Australia	5.8	5.6	5.2	6.4	6.9	7.5	7.3	7.1	6.9	+1.3
Japan	5.2	7.9	10.5	13.4	14.2	17.2	20.2	22.7	...	+17.5
New Zealand	7.1	7.7	8.6	9.0	10.4	11.1	11.3	12.3	...	+5.2
Austria	2.0	2.4	3.5	4.0	4.5	4.8	5.0	5.3	...	+3.3
Belgium	7.3	6.8	7.1	7.7	8.3	9.6	11.6	14.9	...	+7.6
Denmark	1.3	1.6	2.0	3.2	3.5	6.2	7.1	10.1	12.4	+8.8
Finland	1.1	0.9	0.8	1.1	1.5	2.1	2.3	2.5	...	+1.4
France	1.3	2.2	1.8	2.0	2.2	2.3	2.5	3.6	3.5	+2.3
Germany, Federal Republic of	1.8	2.1	2.4	2.7	2.8	3.1	3.3	4.0	...	+2.2
Iceland	3.7	6.7	5.5	6.1	7.6	8.0	5.9	6.4	...	+2.7
Luxembourg	2.1	1.8	1.8	1.8	1.9	2.0	1.9	1.9	...	-0.2
Netherlands	2.7	2.7	3.4	3.4	3.2	3.5	4.0	4.9	6.2	+2.2
Norway	2.9	2.5	4.1	4.8	5.6	6.6	6.6	6.0	...	+3.1
Sweden	3.4	4.0	3.4	3.8	4.5	5.3	7.8	11.1	11.8	+7.7
Switzerland	1.8	2.2	2.0	2.7	2.5	2.5	2.5	2.8	...	+1.0
United Kingdom	8.9	9.2	9.7	9.8	11.0	12.2	12.1	12.5	11.2	+3.6
Developing countries										
Indonesia	1.9	1.7	3.1	3.4	5.4	5.9	3.8	3.4	...	+1.5
Iran, Islamic Republic of	2.0	2.0	1.4	1.8	0.5	2.1	2.5	1.0	...	-1.0
Oman	1.0	1.4	1.5	1.8	3.7	3.0	2.6	1.4	...	+0.4
Venezuela	0.5	0.6	1.6	2.3	4.7	6.4	6.4	5.7	7.3	+5.2
Botswana	2.0	3.4	4.0	3.2	3.0	2.1	1.7	1.8	...	-0.2
Kenya	6.5	6.4	7.3	7.5	7.0	8.4	7.9	9.7	...	+3.2
Liberia	3.7	3.7	6.6	2.7	5.1	7.9	12.2	8.6	13.9	+4.9
Malawi	8.9	8.4	8.6	8.5	8.9	9.4	13.5	20.6	...	+11.7
Mauritius	6.8	4.7	4.8	6.2	9.5	12.6	17.9	22.3	28.1	+15.5
Morocco	3.4	3.6	5.1	6.2	7.8	8.6	10.0	14.2	...	+10.8
Tunisia	4.2	3.1	3.3	3.3	3.8	5.1	4.5	4.8	...	+0.6
Zaire	5.5	7.2	14.6	12.9	13.3	10.6	8.3	10.9	...	+5.4
Zambia	5.5	9.2	13.1	13.6	13.7	14.6	13.0	11.9	...	+6.4

Table 7 (concluded). Government Interest Payments, 1974-82

(In percent of revenue and grants)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	Change 1974-81
Fiji	6.4	5.2	5.9	6.6	7.2	9.1	6.6	7.6	...	+1.2
India	10.3	10.2	11.4	11.5	12.6	12.8	13.6	13.9	...	+3.6
Korea	3.0	3.1	4.1	4.5	4.6	5.2	6.3	6.6	...	+3.6
Malaysia	10.4	11.7	13.2	12.2	12.5	12.0	11.0	12.9	...	+2.5
Pakistan	12.2	11.5	11.6	12.6	12.2	12.6	12.2	11.7	...	-0.5
Philippines	2.8	5.7	4.1	4.5	5.5	6.6	6.7	6.6	...	+3.8
Singapore	6.5	6.5	9.2	11.2	13.7	13.5	12.2	9.6	...	+3.1
Sri Lanka	12.6	13.8	14.7	15.0	11.5	12.5	14.2	21.5	...	+8.9
Thailand	8.4	9.6	8.3	8.0	8.4	9.6	10.3	12.2	14.2	+3.8
Cyprus	4.0	4.4	5.2	6.2	6.7	7.9	8.3	10.0	...	+6.0
Turkey	3.3	3.0	2.9	2.7	2.5	3.0	2.9	5.3	...	+2.0
Bahrain	0.1	0.2	0.3	0.5	0.7	0.5	0.4	0.5	0.4	+0.4
Jordan	1.8	1.8	2.4	3.3	4.0	3.4	3.4	4.4	...	+2.6
Yemen Arab Republic	1.2	0.4	0.9	0.6	0.6	0.5	0.7	0.7	...	-0.5
Argentina	2.6	6.9	13.2	12.8	12.6	11.7	9.8	19.9	...	+17.3
Bolivia	2.9	2.8	2.3	2.8	3.4	2.8	17.2	9.7	...	+6.8
Brazil	5.0	6.2	6.7	9.3	10.0	8.7	8.1	8.0	...	+3.0
Chile	2.7	9.9	7.8	9.4	5.2	3.1	2.3	1.2	1.5	-1.5
Costa Rica	6.9	6.5	6.3	7.2	7.8	9.9	12.2	9.0	...	+2.1
Dominican Republic	1.3	0.9	1.6	1.3	1.8	7.8	6.8	7.5	...	+6.2
El Salvador	1.8	2.2	1.8	1.5	2.2	2.2	4.4	9.0	14.8	+7.2
Guatemala	6.2	6.0	6.3	5.5	5.8	6.0	4.9	6.3	8.4	+0.1
Mexico	11.3	10.1	12.0	13.2	12.8	11.9	11.1	18.8	...	+7.5
Panama	11.5	9.5	12.1	12.0	13.4	18.3	21.7	25.7	...	+14.2
Paraguay	1.9	2.0	1.9	2.6	2.3	2.8	2.9	3.0	...	+1.1
Peru	8.8	12.0	9.7	14.5	20.9	21.6	20.0	25.8	22.6	+17.0
Uruguay	1.3	2.2	0.9	1.4	3.8	3.0	1.6	1.4	4.7	+0.1

Sources: International Monetary Fund, Government Finance Statistics Yearbook, 1983, and International Financial Statistics, various issues.

Table 8. Contribution of Interest Payments to Changes in Government Deficits, 1974-81

(In percent of GDP)

	<u>Interest Payments</u>			<u>Overall Deficits</u>			(A)/(B)
	1974	1981	<u>Change</u> 1974-81 (A)	1974	1981	<u>Change</u> 1974-81 (B)	
<b>Industrial countries</b>							
United States	1.7	2.8	1.1	0.3	2.8	2.5	0.44
Canada	1.3	2.9	1.6	1.3	2.4	1.1	1.45
Australia	1.4	2.0	0.6	0.5	0.8	0.3	2.00
Japan	0.6	2.8	2.2	2.4	6.7	4.3	0.51
New Zealand	2.2	4.2	2.0	4.1	7.3	3.2	0.62
Austria	0.6	2.0	1.4	1.5	2.9	1.4	1.00
Belgium	2.7	6.6	3.9	2.2	11.4	9.2	0.42
Denmark	0.5	3.7	3.2	-0.7	6.1	6.8	0.47
Finland	0.3	0.7	0.4	-0.8	1.0	1.8	0.22
France	0.5	1.5	1.0	-0.5	2.7	3.2	0.31
Germany, Federal Republic of	0.5	1.2	0.7	0.6	2.3	1.7	0.41
Iceland	1.1	2.0	0.9	4.6	0.8	-3.8	-0.24
Luxembourg	0.8	0.7	-0.1	-3.9	1.4	5.3	-0.02
Netherlands	1.3	2.5	1.2	—	6.5	6.5	0.18
Norway	1.1	2.6	1.5	1.4	-2.0	-3.4	-0.44
Sweden	1.1	4.3	3.2	3.3	9.4	6.1	0.52
Switzerland	0.3	0.6	0.3	-0.7	—	0.7	0.43
United Kingdom	3.2	4.6	1.4	4.6	4.7	0.1	14.00
<b>Developing countries</b>							
Indonesia	0.3	0.8	0.5	1.5	2.1	0.6	0.83
Iran, Islamic Republic of	0.9	0.3	-0.6	-4.5	9.2	13.7	-0.04
Oman	0.6	0.7	0.1	9.9	-2.1	-12.0	-0.01
Venezuela	0.2	1.9	1.7	-2.2	2.7	4.9	0.35
Botswana	0.6	0.8	0.2	2.8	2.5	-0.3	-0.67
Kenya	1.3	2.4	1.1	3.2	7.1	3.9	0.28
Liberia	0.8	2.4	1.6	-1.3	12.6	13.9	0.12
Malawi	1.4	4.4	3.0	6.1	10.9	4.8	0.62
Mauritius	1.2	4.9	3.7	7.5	13.6	6.1	0.61
Morocco	0.8	3.8	3.0	4.0	13.9	9.9	0.30
Tunisia	1.1	1.6	0.5	1.0	2.6	1.6	0.31
Zaire	1.8	2.9	1.1	18.0	5.6	-12.4	-0.09
Zambia	1.9	3.3	1.4	-3.4	14.8	18.2	0.08

Table 8 (concluded). Contribution of Interest Payments to Changes in Government Deficits, 1974-81

(In percent of GDP)

	Interest Payments			Overall Deficits			(A)/(B)
	1974	1981	Change 1974-81 (A)	1974	1981	Change 1974-81 (B)	
Fiji	1.2	1.8	0.6	3.6	3.6	—	...
India	1.1	1.9	0.8	3.4	6.1	2.7	0.30
Korea	0.4	1.3	0.9	2.2	3.6	1.4	0.64
Malaysia	2.2	3.6	1.4	5.5	15.3	9.8	0.14
Pakistan	1.7	2.0	0.3	5.9	5.8	-0.1	-3.00
Philippines	0.4	0.8	0.4	-0.5	4.0	4.5	0.09
Singapore	1.4	2.9	1.5	-1.6	—	1.6	0.94
Sri Lanka	2.4	4.5	2.1	3.2	12.5	9.3	0.23
Thailand	1.2	1.8	0.6	-1.0	3.5	4.5	0.13
Cyprus	0.8	2.3	1.5	5.6	6.8	1.2	1.25
Turkey	0.6	1.1	0.5	1.7	1.7	—	...
Bahrain	0.1	0.2	0.1	-26.8	-6.9	19.9	—
Jordan	0.9	1.8	0.9	7.8	9.6	1.8	0.50
Yemen Arab Republic	0.2	0.3	0.1	2.7	21.2	18.5	0.01
Argentina	0.4	3.4	3.0	5.3	8.1	2.8	1.07
Bolivia	0.3	0.8	0.5	-0.9	4.2	5.1	0.10
Brazil	0.9	1.8	0.9	-1.2	2.2	3.4	0.26
Chile	0.7	0.4	-0.3	5.1	-2.6	-7.7	0.04
Costa Rica	1.3	1.6	0.3	0.7	2.9	2.2	0.14
Dominican Republic	0.2	1.0	0.8	1.4	2.6	1.2	0.67
El Salvador	0.2	1.1	0.9	0.7	7.5	6.8	0.13
Guatemala	0.6	0.7	0.1	1.5	6.2	4.7	0.02
Mexico	1.2	2.9	1.7	3.8	6.7	2.9	0.59
Panama	2.7	6.8	4.1	7.2	8.6	1.4	2.93
Paraguay	0.2	0.3	0.1	-1.0	1.5	2.5	0.04
Peru	1.3	4.6	3.3	2.2	3.8	1.6	2.06
Uruguay	0.3	0.3	—	3.8	1.5	-2.3	—

Sources: International Monetary Fund, Government Finance Statistics Yearbook, 1983, and International Financial Statistics, various issues.

Table 9. Contributions to Changes in Government  
Interest Payments, 1974-81

(In percent of GDP)

	Changes in Interest Payments (1=2+3)	Average Interest Rate (2)	Components of Changes				
			Debt		Foreign		
			Total (3=4+5)	Domestic (4)	Total (5=6+7)	Dollar debt (6)	Exchange rate (7)
<b>Industrial countries</b>							
United States	1.1	1.0	0.1	0.1	—	—	—
Canada	1.6	1.2	0.4	0.3	0.1	0.1	—
Japan	2.2	0.2	2.0	2.0	—	—	—
New Zealand	2.0	1.8	0.2	-0.5	0.7	0.4	0.3
Austria	1.4	0.1	1.3	0.8	0.5	0.6	-0.1
Belgium	3.9	2.3	1.6	1.2	0.4	0.4	—
Finland	0.4	—	0.4	0.1	0.3	0.3	—
Iceland	0.9	-0.5	1.4	0.7	0.7	-1.6	2.3
Netherlands	1.2	0.5	0.7	0.7	—	—	—
Norway	1.5	0.8	0.7	0.2	0.5	0.5	—
Sweden	3.2	1.6	1.6	0.9	0.7	0.7	—
Switzerland	0.3	—	0.3	0.3	—	—	—
United Kingdom	1.4	1.5	-0.1	0.1	-0.2	-0.2	—
<b>Developing countries</b>							
Indonesia	0.5	0.6	-0.1	—	-0.1	-0.5	0.4
Venezuela	1.7	0.4	1.3	—	1.3	1.3	—
Mauritius	3.7	1.9	1.8	1.0	0.8	0.5	0.3
Morocco	3.0	1.8	1.2	0.3	0.9	0.8	0.1
Tunisia	0.5	0.1	0.4	0.3	0.1	0.2	-0.1
Fiji	0.6	0.2	0.4	0.3	0.1	0.1	—
Korea	0.9	0.7	0.2	0.1	0.1	-0.2	0.3
Malaysia	1.4	0.9	0.5	0.3	0.2	0.3	-0.1
Pakistan	0.3	0.7	-0.4	—	-0.4	-0.4	—
Philippines	0.4	0.1	0.3	-0.1	0.4	0.4	—
Singapore	1.5	0.3	1.2	1.2	—	—	—
Sri Lanka	2.1	1.3	0.8	—	0.8	-0.3	1.1
Thailand	0.6	0.6	—	-0.1	0.1	0.1	—
Cyprus	1.5	—	1.5	0.7	0.8	0.8	—
Turkey	0.5	0.5	—	—	—	-0.2	0.2
Bahrain	0.1	-0.2	0.3	0.1	0.2	0.2	—
Jordan	0.9	1.0	-0.1	-0.1	—	—	—
Costa Rica	0.3	-0.2	0.5	0.4	0.1	—	0.1
El Salvador	0.9	0.3	0.6	0.3	0.3	0.3	—
Paraguay	0.1	0.1	—	-0.1	0.1	0.1	—
Uruguay	—	0.1	-0.1	-0.1	—	-0.5	0.5

Sources: International Monetary Fund, Government Finance Statistics Yearbook, 1983, and International Financial Statistics, various issues.

Table 10. Government Debt, 1974-81 <sup>1/</sup>

(In percent of GDP)

	Total Debt		Domestic Debt		Foreign Debt	
	1974	1981	1974	1981	1974	1981
<b>Industrial countries</b>						
United States	28.0	29.6	23.3	24.8	4.7	4.8
Canada	23.5	27.3	23.3	26.0	0.2	1.4
Japan	11.8	40.8	11.6	40.5	0.2	0.3
New Zealand	41.2	48.2	36.1	30.7	5.1	17.6
Austria	10.4	26.2	8.7	18.9	1.7	7.3
Belgium	42.5	54.7	42.0	50.3	0.5	4.4
Finland	4.6	9.6	2.6	4.1	2.0	5.5
Iceland	12.5	26.4	4.3	11.1	8.2	15.3
Netherlands	22.1	29.1	22.1	29.1	—	—
Norway	26.8	37.0	25.6	26.5	1.2	10.5
Sweden	16.7	32.3	16.7	25.8	—	6.5
Switzerland	7.7	14.3	7.7	14.3	—	—
United Kingdom	51.4	47.1	43.8	42.6	7.6	4.5
<b>Developing countries</b>						
Indonesia	29.5	17.9	1.5	0.6	28.0	17.3
Venezuela	3.1	13.9	1.5	1.2	1.5	12.7
Mauritius	33.8	53.4	25.3	35.9	8.5	17.5
Morocco	27.4	44.0	10.6	14.5	16.8	29.5
Tunisia	37.0	44.5	12.5	18.9	24.5	25.6
Fiji	21.8	25.3	14.0	16.1	7.8	9.2
Korea	14.7	15.1	3.7	4.3	11.0	10.8
Malaysia	40.7	44.7	33.8	35.3	6.9	9.4
Pakistan	75.0	53.9	26.6	24.0	48.3	29.9
Philippines	11.9	15.5	9.9	7.0	2.0	8.5
Singapore	39.9	66.4	35.5	62.6	4.5	3.8
Sri Lanka	62.9	78.4	46.6	44.2	16.2	34.2
Thailand	26.3	24.1	24.4	19.8	1.9	4.3
Cyprus	8.3	28.5	6.3	16.6	2.0	11.9
Turkey	21.6	20.7	13.2	13.3	8.4	7.4
Bahrain	2.9	6.8	—	1.4	2.9	5.4
Jordan	51.8	47.4	22.8	19.8	29.0	27.6
Costa Rica	23.8	31.5	15.7	20.8	8.1	10.7
El Salvador	7.8	17.2	2.4	7.7	5.3	9.6
Paraguay	9.2	7.5	3.4	0.8	5.8	6.7
Uruguay	12.4	11.6	5.4	4.3	7.0	7.3

Sources: International Monetary Fund, Government Finance Statistics Yearbook, 1983, and International Financial Statistics, various issues.

<sup>1/</sup> Beginning of period.

Table 11. Average Interest Costs, 1974-82

(In percent of outstanding debt)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	Change 1974-81
All countries	5.5	6.4	6.4	6.5	7.2	7.3	7.7	8.2	...	+2.7
Industrial countries	6.9	8.3	7.8	8.2	8.6	8.6	9.1	9.8	...	+2.9
United States	6.7	7.1	7.2	7.0	6.1	7.5	9.2	10.6	11.7	+3.9
Canada	6.3	8.3	7.8	8.5	11.0	9.3	10.9	12.2	...	+5.9
Japan	6.0	6.9	7.5	7.4	7.0	6.9	7.4	7.3	...	+1.3
New Zealand	5.9	6.4	6.6	7.4	7.9	8.6	8.6	10.3	...	+4.4
Austria	6.7	8.2	8.0	7.6	8.1	7.8	7.6	7.9	...	+1.2
Belgium	7.6	7.7	8.1	8.6	8.8	9.5	10.9	12.5	...	+4.9
Finland	8.2	9.7	7.9	9.5	9.2	7.9	7.9	8.7	...	+0.5
Iceland	12.7	20.6	11.8	12.6	16.1	15.7	11.7	11.6	...	-1.1
Netherlands	6.6	7.0	8.7	8.5	7.6	7.6	8.4	8.9	9.9	+2.3
Norway	4.7	4.3	7.2	7.5	7.3	7.5	7.8	8.0	...	+3.3
Sweden	7.5	8.5	7.9	9.9	10.6	10.6	12.9	14.9	13.0	+7.4
Switzerland	4.3	4.8	4.1	4.4	4.1	3.9	3.9	4.2	...	-0.1
United Kingdom	7.0	8.1	8.0	7.7	8.2	9.6	11.1	10.7	10.7	+3.7
Developing countries	4.7	5.2	5.6	5.5	6.3	6.5	6.8	7.2	...	+2.5
Indonesia	1.5	1.6	3.2	3.6	5.9	5.7	5.2	5.5	...	+4.0
Venezuela	9.2	12.6	17.0	7.6	9.5	10.2	13.4	15.8	14.2	+6.6
Mauritius	5.6	4.6	4.9	6.0	7.1	7.6	10.3	10.6	11.0	+5.0
Morocco	4.2	4.6	5.5	5.8	6.0	6.4	7.1	9.5	...	+5.3
Tunisia	3.9	3.4	3.5	3.5	3.8	5.0	3.7	4.1	...	+0.2
Fiji	7.0	6.8	7.4	7.2	7.3	10.1	7.3	8.0	...	+1.0
Korea	4.0	4.4	6.3	7.1	8.1	9.6	12.3	10.6	...	+6.6
Malaysia	6.5	6.8	7.4	7.4	7.2	7.4	7.7	8.8	...	+2.3
Pakistan	3.0	3.0	3.7	3.7	3.7	3.9	4.2	4.4	...	+1.4
Philippines	4.5	7.7	4.6	4.7	5.6	7.0	6.2	5.8	...	+1.3
Singapore	4.1	4.2	5.0	5.4	5.8	5.9	5.9	5.1	...	+1.0
Sri Lanka	5.0	5.5	5.6	5.6	5.3	5.4	6.3	7.4	...	+2.4
Thailand	5.9	6.6	5.7	5.5	5.9	6.7	7.3	8.8	8.8	+2.9
Cyprus	9.0	9.2	10.4	10.1	10.1	10.1	9.8	9.5	...	+0.5
Turkey	3.4	4.2	4.1	3.8	3.5	4.6	5.5	8.0	...	+4.6
Bahrain	2.4	3.1	4.1	5.4	8.1	2.2	1.9	2.7	2.1	+0.3
Jordan	2.0	2.5	2.5	4.2	3.7	4.0	3.8	4.6	...	+2.6
Costa Rica	7.0	6.9	7.4	8.4	9.4	9.2	9.7	7.0	...	--
El Salvador	3.4	3.8	3.6	4.0	4.8	3.6	5.3	6.4	6.3	+3.0
Paraguay	3.1	4.0	3.9	5.1	5.0	5.4	5.9	5.2	...	+2.1
Uruguay	3.8	4.1	1.8	2.4	7.2	6.8	4.6	3.8	8.8	--

Source: International Monetary Fund, Government Finance Statistics Yearbook, 1983.

Table 12. Adjustments of Interest Payments and Government Deficits for Changes in the Real Value of Government Debt Due to Inflation, 1974-81

(Changes during period in percent of GDP)

	Interest Payments (1)	Overall Deficit (2)	Inflation Adjustment (3)	Adjusted Interest (4=1-3)	Adjusted Deficit (5=2-3)
<b>Industrial countries</b>					
United States	1.1	2.5	0.1	1.0	2.4
Canada	1.6	1.1	0.5	1.1	0.6
Japan	2.2	4.3	-0.4	2.6	4.7
New Zealand	2.0	3.2	-1.2	3.2	4.4
Austria	1.4	1.4	-0.4	1.8	1.8
Belgium	3.9	9.2	-1.3	5.2	10.5
Finland	0.4	1.8	-0.6	1.0	2.4
Iceland	0.9	-3.8	3.7	-2.8	-7.5
Netherlands	1.2	6.5	-0.2	1.4	6.7
Norway	1.5	-3.4	0.2	1.3	-3.6
Sweden	3.2	6.1	1.1	2.1	5.0
Switzerland	0.3	0.7	0.3	--	0.4
United Kingdom	1.4	0.1	-4.6	6.0	4.7
<b>Developing countries</b>					
Indonesia	0.5	0.6	-3.9	4.4	4.5
Venezuela	1.7	4.9	1.1	0.6	3.8
Mauritius	3.7	6.1	-0.9	4.6	7.0
Morocco	3.0	9.9	-4.2	7.2	14.1
Tunisia	0.5	1.6	-4.3	4.8	5.9
Fiji	0.6	--	-1.1	1.7	1.1
Korea	0.9	1.4	0.4	0.5	1.0
Malaysia	1.4	9.8	-0.8	2.2	10.6
Pakistan	0.3	-0.1	-12.4	12.7	12.3
Philippines	0.4	4.5	-1.8	2.2	6.3
Singapore	1.5	1.6	3.2	-1.7	-1.6
Sri Lanka	2.1	9.3	2.1	--	7.2
Thailand	0.6	4.5	-2.3	2.9	6.8
Cyprus	1.5	1.2	-0.7	2.2	1.9
Turkey	0.5	--	-1.8	2.3	1.8
Bahrain	0.1	19.9	--	0.1	19.9
Jordan	0.9	1.8	-3.7	4.6	5.5
Costa Rica	0.3	2.2	-12.6	12.9	14.8
El Salvador	0.9	6.8	0.9	--	5.9
Paraguay	0.1	2.5	-0.6	0.7	3.1
Uruguay	--	-2.3	-2.7	2.7	0.4

Sources: International Monetary Fund, Government Finance Statistics Yearbook, 1983, and International Financial Statistics, various issues.

Data Sources and Methods of Calculation1. Countries included

Appendix Tables 5 through 8, showing government interest payments as a ratio of GDP, of expenditure and net lending, and of revenue and grants, and the contribution of interest payments to changes in government deficits, include data for the 58 countries for which unbroken time series on these variables for the period 1974-81 inclusive were available in International Financial Statistics (GDP and exchange rates) or Government Finance Statistics Yearbook (fiscal data). Appendix Tables 9 through 12, showing contributions to changes in interest payments, levels of government debt, average interest costs, and the impact of inflation on the real value of interest payments and overall deficits, cover the subgroup of 34 countries for which time series data for the whole period were also available for government debt (in total and disaggregated into domestic and external components).

2. Notes on methods of calculation

GDP data, originally available on a calendar year basis, were adjusted when necessary to a fiscal year basis by interpolation between adjacent calendar years.

a. Contributions to changes in interest payments (Appendix Table 9)

- $I_t$  - interest payments in year t
- $D_t$  - debt outstanding at the beginning of year t
- $DL_t$  - domestic debt outstanding at the beginning of year t, in local currency
- $FL_t$  - foreign debt outstanding at the beginning of year t, in local currency
- $FF_t$  - foreign debt outstanding at the beginning of year t, in U.S. dollars
- $e_t$  - exchange rate at the beginning of year t, in units of local currency per U.S. dollar
- $i_t$  - interest payments in year t as a ratio of debt outstanding at the beginning of the year
- $Y_t$  - GDP in year t

Note that

$$D_t = DL_t + FL_t$$

$$FF_t = \frac{FL_t}{e_t}$$

$$i_t = \frac{I_t}{D_t}$$

The change in the interest payments/GDP ratio from year t-1 to year t may be written as

$$\begin{aligned} \frac{I_t}{Y_t} - \frac{I_{t-1}}{Y_{t-1}} &= \left( \frac{D_t}{Y_t} - \frac{D_{t-1}}{Y_{t-1}} \right) i_{t-1} + (i_t - i_{t-1}) \frac{D_{t-1}}{Y_{t-1}} \\ &\quad + (i_t - i_{t-1}) \left( \frac{D_t}{Y_t} - \frac{D_{t-1}}{Y_{t-1}} \right) \end{aligned}$$

The first term on the right-hand side is the change attributable to changes in the total debt/GDP ratio (the third column of Appendix Table 9); the second and third terms together, that is, including the second-order interaction term, give the change due to movements in average interest rates (the second column of Table V). These terms were calculated year by year from 1974 and then cumulated to yield relative contributions during the whole period 1974 to 1981. Time series data for  $i_t$  are shown in Appendix Table 11.

The debt term can be further decomposed as follows:

$$\begin{aligned} \left( \frac{D_t}{Y_t} - \frac{D_{t-1}}{Y_{t-1}} \right) i_{t-1} &= \left( \frac{DL_t}{Y_t} - \frac{DL_{t-1}}{Y_{t-1}} \right) i_{t-1} \\ &+ \left[ \frac{FF_t}{Y_t} - \frac{FF_{t-1}}{Y_{t-1}} \right] e_{t-1} i_{t-1} \\ &+ [e_t - e_{t-1}] \frac{FF_{t-1}}{Y_{t-1}} \cdot i_{t-1} \\ &+ \left[ \frac{FF_t}{Y_t} - \frac{FF_{t-1}}{Y_{t-1}} \right] [e_t - e_{t-1}] i_{t-1} \end{aligned}$$

The first term on the right-hand side of this expression represents the impact of changes in the domestic debt/GDP ratio (column four of Appendix Table 9); the remaining three terms together show the impact of changes in the foreign debt/GDP ratio in local currency terms (column five). Of these three terms, the first gives the impact of changes in debt in dollar terms (column six), while the second and third, including the second-order interaction term, together give the impact of changes in

the U.S. dollar/local currency exchange rate (column seven). This decomposition is provided as a rough means of distinguishing flow changes in foreign debt from valuation changes due to exchange rate movements; it is exact only when all foreign debt is denominated in U.S. dollar terms.

- b. Adjustment of interest payments and government deficits for changes in the real value of government debt due to inflation (Appendix Table 12)

The calculations presented in Appendix Table 12 are based on estimates of the impact of inflation on changes in the real value of government debt held by the nongovernment and overseas sectors.

For a given year, the inflation adjustment is computed according to the formula:

$$ADJ = DL \cdot p + FL (p - e^*)$$

where  $p$  is the proportionate rate of increase in the national consumer price index during the fiscal year, based on data in International Financial Statistics (where monthly data are available, the increase is calculated between end-months of the preceding and current years; otherwise estimates are based on quarterly or annual observations interpolated to an end-year basis), and  $e^*$  is the rate of change during the fiscal year of the exchange rate  $e$ .

The rationale for this formula is the following. In the case of domestic debt whose value is fixed in local currency terms, the reduction during the year in its real value is equal to the initial stock of debt,  $DL$ , multiplied by the domestic rate of inflation during the year,  $p$ .<sup>1/</sup> For foreign debt the situation is more complicated. The government's liability is fixed in foreign currency terms, and so its liability in domestic currency depends on exchange rate movements. Specifically, the government's real liability in domestic currency terms in respect of a given foreign currency liability  $FF$  will change during the period from

$$e_t^{FF} \text{ to } \frac{e_{t+1}^{FF}}{1 + p}$$

at the end, or equivalently from

$$FL \text{ to } \frac{(1 + e^*)FL}{1 + p}$$

---

<sup>1/</sup> In principle, such an adjustment should not be applied to indexed debt, whose nominal capital value is linked to movements in a price index rather than fixed in nominal terms. However, our sample does not include those countries, such as Brazil and Israel, which have had significant recourse to indexed obligations. We also ignore possible complications resulting from fluctuations in the market value of traded government debt.

Hence, the reduction in the real value of the government's liability due to exchange rate changes and domestic inflation is

$$FL \left[ 1 - \frac{1 + e^*}{1 + p} \right]$$

$$\approx FL (p - e^*) \text{ disregarding second-order terms.}$$

Thus, the erosion in the real value of the government's liabilities due to domestic inflation is offset by the extent to which the exchange rate depreciates. <sup>1/</sup>

Now consider the position of the foreign creditor; the reduction due to inflation in the real value to him of his claim, whose nominal value is FF, is  $FF \cdot p_f$  in foreign currency terms, or  $e_t FF p_f = FL p_f$  in local currency terms converted at the initial exchange rate  $e_t$ . Note that if purchasing power parity holds, exchange rate movements will offset inflation differentials so that

$$e^* = p - p_f$$

implying

$$FL \cdot p_f = FL(p - e^*)$$

(i.e., that the real loss to the creditor due to inflation is equal to the government's real gain from domestic inflation net of exchange rate depreciation. If, by contrast,

$$p - e^* > p_f$$

implying a real exchange rate appreciation, then the government's real gain exceeds the real loss experienced by the creditors.

#### c. Interest payments, debt rollovers, and inflation adjustment

As noted in footnote 1 on page 15, the inflation adjustment for the reduction in the real value of the government's liabilities provides an estimate of the impact of inflation on actual interest payments only under rather restrictive conditions.

Let the real rate of interest be  $r$ , so that in steady state

$$i = r + p$$

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<sup>1/</sup> The calculations in the text implicitly assume that all foreign debt is U.S. dollar-denominated. More accurate estimates of the changing real value of foreign liabilities would be obtained by disaggregating foreign debt by currency of denomination and applying the appropriate exchange rate changes to the disaggregated data.

and actual interest payments are equal to

$$iD = (r + p)D$$

(for simplicity, we assume here that all debt is domestic). Suppose the rate of inflation changes from  $p$  to  $p^*$  and that a proportion  $\beta$  ( $0 < \beta < 1$ ) of debt falls due for refinancing each year at an interest rate which fully reflects the new rate of inflation; then cash interest payments become

$$\beta(r + p^*)D + (1 - \beta)(r + p)D = [r + p^*\beta + p(1 - \beta)]D$$

The inflation adjustment term is  $p^*D$ , so that "real" interest payments, that is, cash payments net of the inflation adjustment, can be written as

$$[r + p^*\beta + p(1 - \beta)]D - p^*D = [r + (p - p^*)(1 - \beta)]D$$

In this expression "real" interest payments are independent of the inflation rate only if  $\beta = 1$ , that is, if all debt is refinanced each year. More generally, however, the government experiences a reduction in real interest payments when inflation accelerates, since cash interest outlays do not rise *pari passu* with the inflation rate.

Debt Rescheduling and Interest Payments

1. Rescheduling of principal and interest

Let debt outstanding at the beginning of the period be  $D$ , of which, prior to rescheduling, a proportion  $k$  is due to be amortized during the current period; if interest due is  $I$ , then debt service due consists of

$$\text{Principal: } P = kD$$

$$\text{Interest: } I = iD$$

where  $i = \frac{I}{D}$  represents the average interest cost of the debt.

Suppose a proportion  $\alpha$  of debt service due is rescheduled into new debt subject to a grace period of one year or longer and that interest on this new debt is charged at a rate  $i_m$  from the beginning of the consolidation period; debt service due after rescheduling then comprises

$$\text{Principal: } (1 - \alpha)P$$

$$\text{Interest: } (1 - \alpha)I + \alpha i_m(P + I)$$

where the interest payable comprises two elements--interest due on nonrescheduled obligations and moratorium interest due on newly consolidated debts. Interest costs post rescheduling are thus

$$I' = (1 - \alpha)I + \alpha i_m(P + I) = [(1 - \alpha)i + \alpha i_m(k + i)] \cdot D$$

The proportionate change in interest costs due to rescheduling is

$$\frac{I' - I}{I} = \alpha \left[ \frac{i_m k}{i} + i_m - 1 \right]$$

In the case  $i_m = i$ , where moratorium interest is charged at the same rate as the average rate of interest on existing debt, this expression becomes:

$$\frac{I' - I}{I} = \alpha (k + i - 1)$$

which is negative so long as  $k + i < 1$ . For example, with an interest rate of 10 percent, that is,  $i = 0.10$ , rescheduling reduces interest costs as long as  $k < 0.9$ , that is, if the average maturity of existing debt ( $1/k$ ) exceeds 1.11 years.

Suppose instead that existing debt was on more favorable terms ( $i = 0.05$ ) but is rescheduled at higher interest ( $i_m = 0.10$ ); then, interest costs will be reduced as long as  $k < 0.45$ , that is, if the average maturity of existing debt exceeds 2.22 years.

In summary, unless existing debt is very short term, so that rescheduling results in a high burden of interest on consolidated principal payments, or if the moratorium interest rate is much higher than the terms on which rescheduled debt was originally contracted, a rescheduling of current principal and interest payments will reduce average interest costs. Note that the proportion of debt service that is rescheduled ( $\alpha$ ) has no effect on the sign of the change in interest payments attributable to rescheduling.

## 2. Rescheduling of principal only

The above expressions assume rescheduling of the same proportion ( $\alpha$ ) of both principal and interest. While such terms are often agreed in Paris Club reschedulings, restructurings of commercial bank debt typically provide for deferment only of principal payments. In general, the impact of rescheduling on interest payments when different proportions of principal and interest are consolidated can be written as

$$\frac{I' - I}{I} = \alpha_p \frac{i_m}{i} k - \alpha_i (1 - i_m)$$

If  $\alpha_i = 0$ , that is, no interest payments are consolidated, then the impact of rescheduling on interest payments is unambiguously positive, since no relief is provided on interest due but additional interest is now payable on deferred principal payments.

More generally, and if  $i_m = i$ , then interest costs will decline if

$$\alpha_i > \alpha_p \cdot \frac{k}{1-i}$$

For example, with an average maturity of five years and a 10 percent interest rate, that is,  $k = 0.2$  and  $i = 0.1$ , this condition states that the proportion of interest rescheduled must exceed 0.22 times the proportion of principal that is rescheduled.

## 3. Rescheduling debt service and arrears

Debt restructuring, in addition to deferment of debt service payments falling due within the consolidation period, may also entail the conversion of previously accumulated arrears into new debt. If no interest was being paid on such arrears prior to rescheduling, then consolidation of arrears will increase interest payments. If the stock of arrears so consolidated as a ratio of existing debt is denoted by  $a$ , the total impact of rescheduling on interest payments is now

$$\frac{I' - I}{I} = \alpha_p \frac{i_m}{i} k - \alpha_i (1 - i_m) + a \frac{i_m}{i}$$

On the right hand side, the first term represents the impact of moratorium interest on rescheduled principal; the second, interest relief net of moratorium interest on rescheduled interest; and the third, moratorium interest on consolidated arrears.

The net impact of rescheduling on interest payments is a reduction if

$$a < \frac{\alpha_i i(1 - i_m)}{i_m} - \alpha_p k$$

This condition may not be satisfied if the outstanding stock of arrears to be consolidated is relatively large. For example, suppose 80 percent of principal and interest payments are rescheduled ( $\alpha_i = \alpha_p = 0.8$ ), that the interest rate is 10 percent ( $i = i_m = 0.10$ ), and the average maturity of debt is five years ( $k = 0.2$ ), then interest payments will be reduced if  $a < 0.56$ , that is, if arrears amount to less than 56 percent of the debt outstanding. With a 20-year average maturity ( $k = 0.05$ ), the critical proportion becomes 68 percent.

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