

THE INTERNATIONAL DEBT SITUATION AND LINKAGES BETWEEN DEVELOPING COUNTRIES AND THE OECD

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INTRODUCTION

The worsening financial situation of a number of developing countries which were large borrowers in private markets came to a head in **1982** at the time when Mexico was unable to continue its payments. The crisis brought about a reconsideration of the debt situation, led to a spreading out of repayments and began a process of adjustment. The purpose of rescheduling was to overcome the liquidity problems of countries such as Mexico in an orderly way. It was envisaged that during the breathing space that was provided there might be some reversal of the major factors underlying the debt crisis – high interest rates, weak commodity prices and hence depressed export earnings (reflecting the world recession) and inappropriate policies in some debtor countries. In the ensuing years there has been some improvement in the situation; there was a generally sharp external adjustment, forced on such countries by the reduced availability of external funds, and interest rates have declined. Exports recovered as the world economy picked up, while import volumes dropped dramatically in **1982** and **1983**, so that large trade surpluses have emerged. Internal adjustment in debtor countries has generally proceeded more slowly, although policies in a few debtor countries did improve markedly. Four years on, the picture is not uniform and the situation of the developing countries remains sensitive to the performance of the world economy, especially in the trade and financial spheres.

This paper analyses the extent to which the ability of indebted countries both to service their obligations and to achieve growth objectives is dependent upon external conditions. It does so by examining the linkages between the debt situation of the developing countries and conditions in OECD countries. It develops and uses a simple accounting model which links developing country debt to OECD growth, prices, interest rates and other key variables. The analysis is conducted in terms of the way in which key financial ratios for specified groups of debtor countries could develop over the next five years on the basis of certain assumptions about world economic developments. The paper focuses on changes in external conditions and therefore does not address directly the ways in which internal adjustment in debtor countries might contribute to their economic performance within the financial constraints that they face. The potential for structural change in these countries is

enormous, given the dynamism of some of the countries, and their success in this area will prove decisive for their future development and hence for the management of debt problems. The paper also does not address the situation of another group of developing countries – those which have encountered debt servicing difficulties with official credits, but which are not large borrowers in private markets. These countries, generally poorer than the large borrowers from private markets, have also faced major adjustments in the first half of the **1980s**.

The nature of the debt problem is discussed in Part I below. Recent developments in the trade and debt position of certain groups of debtor countries are then described in Part II. The links between developing countries and the OECD are discussed in Part III, where the debt model is set out and the key assumption on imports is explained. The model is then used in Part IV to provide some illustrative projections to **1990** for the key financial ratios of the various debtor groups, on the basis of different assumptions about external conditions. The debt accounting model results are supplemented by simulations on the OECD's INTERLINK world model which indicate the magnitude of OECD–developing country linkages and feedbacks. The final section then discusses these results and draws some conclusions about the relationship between external conditions and the possible improvement in or deterioration of the debt situation.

I. THE INTERNATIONAL DEBT PROBLEM

Developing countries have traditionally acquired external capital in order to supplement domestic savings available for investment so as to realise economic potential and thus increase living standards. For many years there was no dispute that there should be a net flow of resources from the industrialised countries, notably the OECD, to the developing countries, given the potentially greater productivity of capital in the developing countries (and hence the ability to repay debt at a later stage out of the incremental production made possible by borrowing). The import of foreign savings or net inflow of resources to the developing countries is conventionally approximated by their deficit on external current account. Until **1982** there was also a net financial transfer to virtually all developing countries, in the sense that net new borrowings plus grants and net direct investment inflows exceeded payments of interest and dividends on outstanding liabilities. But since then this situation has been reversed for many large debtors as new borrowings have slackened.

The debt crisis of **1982**, which arose from a **loss** of confidence in the debtor countries and a consequent fall in commercial lending, was triggered by what was essentially a financial liquidity crisis in Mexico – the inability to meet immediate debt servicing payments. It led to a reconsideration of medium-term aspects of the debt process alongside the efforts to manage the problems of payments coming due. This focused in particular on the more economic issue of solvency – whether and how the debt burdens built up by the developing countries can be serviced and contained over time if the immediate liquidity problems are managed and at what cost. The fall in capital inflows and the import adjustments which were forced on the debtor countries led to a **slowdown** and in some cases a reversal of the net flow of resources. Thus, today some capital-poor debtor countries are even exporting domestic savings to the capital-rich creditor countries, as reflected in the surplus on the current account of the balance of payments.

This turnaround in the flow of resources between certain debtor countries and the industrialised countries has increased the concern about how growth can be restored and sustained in the debtor countries. The "Baker proposals" represent an effort to reflect these concerns in a strategy for dealing with the debt problem. The initial proposals made by the U.S. Treasury Secretary at the **1985** Annual Meetings of the **IMF/World Bank** have evolved into four broadly recognised requirements:

- i)* appropriate domestic macroeconomic and structural policies in the debtor countries designed to result in renewed growth;
- ii)* increased lending by multilateral development banks in support of growth-oriented structural adjustment policies;
- iii)* increased lending by commercial banks; and
- iv)* policies in the industrial countries aimed at continuing adequate growth rates, keeping markets open to developing-country exporters and encouraging further declines in interest rates.

The first point – the domestic policies needed to encourage growth in developing countries – is not considered in this paper. The debt projections in Part IV provide indications of aggregate financing requirements [points *ii)* and *iii)*], but do not address how they can be met. But point *iv)*, the link between the developing and industrialised countries, is central to the paper and taken up in detail in the following sections.

The major issue addressed is whether and how the tensions in the system arising from the recent growth in the debt burden might be alleviated over time without a **writedoff** of debt. Are the debt positions of borrowers likely to worsen indefinitely? How much import compression would be required to avoid this outcome? How do the answers to these questions depend on **OECD** economic variables – growth, interest rates and exchange rates?

II. THE DEBTOR GROUPS AND THE MOVEMENT OF DEBT RATIOS

A. The debtor groups

In attempting to form a comprehensive view of the debt situation, it is not easy to find a happy medium between the richness of detail and realism of individual country analysis and the more tractable and general analysis of debtor countries in aggregate. Studies that concentrate on individual countries may highlight the uniqueness of each case and can draw on specialised information on the financial and economic position of each country. Such analysis must provide the foundation of specific financial programmes. But general statements about the debt situation are difficult to make without some aggregation. On the other hand, too high a level of aggregation risks grouping together countries with rather different trade and financial characteristics, thus complicating the interpretation of summary trade and financial statistics on a group-wide basis. This study strikes this balance by choosing to focus on a sample of twelve large debtor countries, chosen on the grounds of the size of their outstanding debt, and then grouping them according to common characteristics. This sampling technique allows one to say something about the aggregate picture for several relatively homogeneous groups, while keeping the data requirements within feasible bounds.

The twelve debtor countries selected – Algeria, Argentina, Brazil, Chile, Indonesia, Malaysia, Mexico, Nigeria, Philippines, South Korea, Thailand and Venezuela – accounted in 1984 for more than 55 per cent of the external debt of the capital-importing developing countries, but for less than 40 per cent of their exports of goods and services. The twelve are split into two groups in two different ways reflecting the criteria of:

- i)* financial position – "reschedulers" or not;
- ii)* trade structure – energy exporters or not.

The *financial* criterion is whether the country has rescheduled or defaulted on a large part of its debt service since 1982. The subset of seven which have done so are classified as "problem debtors", while the other five are classified as "stable debtors" (see table below for the subsets). In 1985, these seven problem debtors were the seven largest issuers of external debt outstanding among developing countries that have rescheduled debt since 1982 (with the exception of Yugoslavia), while the five stable debtors were the largest debtors among capital-importing, non-rescheduling developing countries. The table below indicates that the problem debtors are largely Latin American countries while the stable debtors are largely Asian ones, a factor brought out in previous work by Sachs (1985). The *trade*

criterion splits the countries between those which in 1982 earned more than half of their export revenues from energy ("oil debtors") and the others, which have a more diversified export base ("non-oil debtors") although they may depend on oil for a share of export earnings (Malaysia) or may be roughly self-sufficient in oil (Argentina). Taking account of different trade structures allows differences in past experience and future prospects between them to be highlighted.

The debtor groups

| Problem | Stable | Oil | Non-oil |
|-------------|-------------|-----------|-------------|
| Argentina | Algeria | Algeria | Argentina |
| Brazil | Indonesia | Indonesia | Brazil |
| Chile | Malaysia | Mexico | Chile |
| Mexico | South Korea | Nigeria | Malaysia |
| Nigeria | Thailand | Venezuela | Philippines |
| Philippines | | | South Korea |
| Venezuela | | | Thailand |

B. Recent trade developments for the debtor groups

The evolution of the debt situation and the economic performance of the different debtor groups is summarised in Tables 1 to 3. The recent history of the debt-ratios is also shown in Chart 1. In broad terms, there have been improvements in net export volumes for all the debtor groups since the height of the debt crisis in 1982 (Table 1). The movement of the terms of trade has been rather mixed, depending on the group involved, but the trade balance has improved substantially for each group in the period 1982-85, though the oil debtors are suffering a substantial reverse in 1986 with the collapse of the oil price. Notwithstanding the amount of import adjustment that has occurred, the financial situation of the different groups – in terms of debt/export and interest/export ratios – has only stabilized, rather than improved. This indicates the difficulties involved in reversing a worsening debt situation once it has reached a certain threshold, especially while real interest rates remain relatively high.

The main feature of the trade developments is the import compression forced on the problem debtors, especially in 1982 and 1983, despite the recovery in export volumes from 1983 (Table 1). For some of them, notably Mexico, Nigeria and Venezuela, their difficulties were compounded by the fall in the export value of oil. The import volumes of the problem debtors were reduced by a cumulative 40 per

Table 1. Trade developments for different debtor groups, 1980-1985

| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | Index for 1985 (1979 = 100) |
|-----------------------------|------------------|------|------|------|------|------|--------------------------------|
| | Per cent changes | | | | | | |
| Export volume | | | | | | | |
| Problem debtors | 4 | -4 | -8 | 9 | 11 | -1 | 110 |
| Stable debtors | 2 | 6 | 1 | 10 | 12 | 3 | 137 |
| Oil debtors | -7 | -8 | -9 | 7 | 11 | -4 | 89 |
| Non-oil debtors | 10 | 11 | 1 | 12 | 12 | 5 | 161 |
| Import volume | | | | | | | |
| Problem debtors | 7 | 8 | -19 | -24 | -2 | -1 | 68 |
| Stable debtors | 10 | 16 | 6 | 8 | 8 | 5 | 166 |
| Oil debtors | 10 | 25 | -12 | -21 | 4 | 2 | 102 |
| Non-oil debtors | 7 | 0 | -5 | 3 | 3 | 2 | 111 |
| Export value | | | | | | | |
| Problem debtors | 39 | 0 | -13 | 0 | 12 | -7 | 125 |
| Stable debtors | 30 | 7 | -5 | 2 | 13 | -2 | 148 |
| Oil debtors | 49 | -1 | -13 | -5 | 9 | -7 | 124 |
| Non-oil debtors | 20 | 8 | -6 | 7 | 15 | -3 | 147 |
| Import value | | | | | | | |
| Problem debtors | 32 | 11 | -22 | -27 | -3 | -4 | 77 |
| Stable debtors | 23 | 15 | 0 | 2 | 2 | -1 | 146 |
| Oil debtors | 31 | 22 | -14 | -25 | -1 | 0 | 103 |
| Non-oil debtors | 26 | 5 | -12 | -3 | 0 | -4 | 109 |
| Terms-of-trade ^a | | | | | | | |
| Problem debtors | 8 | 2 | -2 | -5 | 1 | -3 | 100 |
| Stable debtors | 14 | 2 | 0 | -1 | 7 | 1 | 123 |
| Oil debtors | 35 | 10 | -2 | -7 | 3 | -1 | 137 |
| Non-oil debtors | -7 | -6 | 0 | 2 | 5 | -2 | 93 |
| | \$ billion | | | | | | 1980-85 |
| Trade balance | | | | | | | |
| Problem debtors | 11 | 1 | 10 | 30 | 42 | 38 | 132 |
| Stable debtors | 9 | 5 | 1 | 1 | 9 | 8 | 33 |
| Oil debtors | 31 | 15 | 14 | 27 | 35 | 29 | 151 |
| Non-oil debtors | -11 | -9 | -3 | 4 | 16 | 17 | 14 |

a) Export unit value index divided by import unit value index.

cent during 1982-85. The stable debtors, with slightly greater export growth, were not subject to the same import compression experienced by the problem debtors (their import volumes continuing to increase by an average of about 7 per cent in the four years 1982-85). In general, countries in this group experienced less sharp swings in import volumes than countries in the problem debtor group. Large falls in import volumes of problem debtors after 1981 often followed the largest import volume increases during the late 1970s when, with the benefit of hindsight, these countries overextended themselves. Turning to the other debtor groups, the most striking feature is the sharp increase and subsequent cutback in the import volumes of the oil debtors over the period 1980-83 whereas the non-oil group, having relatively buoyant exports through this period, experienced very modest changes in import volumes. The terms of trade has moved against the problem and oil debtors through this period, and is moving further against them during 1986, but the stable debtors have experienced an improved terms of trade.

The different trends in trade performance in recent years are in part explained by the geographical and commodity composition of the exports of the debtor groups (Table 2). Exports of the problem debtors, with the exception of Nigeria, are highly concentrated in the North American market with the Japanese market being of little importance. Exports of the stable debtors are more oriented towards Japan. As regards commodity structure, the problem debtors depend more on primary commodities than the stable debtors, while having similar energy export shares on

Table 2. **Geographical and commodity composition of exports of debtor groups**

| Destination of exports to OECD (excluding Oceania), 1984 | | | |
|----------------------------------------------------------|------------------------|-------------|--------------------|
| | Japan | OECD Europe | North America |
| Problem debtors | 0.09 | 0.38 | 0.53 |
| Stable debtors | 0.37 | 0.33 | 0.30 |
| Oil debtors | 0.19 | 0.33 | 0.48 |
| Non-oil debtors | 0.24 | 0.40 | 0.36 |
| Commodity composition of exports to OECD, 1982 | | | |
| | Food and raw materials | Energy | Manufactured goods |
| Problem debtors | 0.37 | 0.50 | 0.13 |
| Stable debtors | 0.23 | 0.46 | 0.31 |
| Oil debtors | 0.11 | 0.85 | 0.04 |
| Non-oil debtors | 0.52 | 0.08 | 0.40 |

Sources: IMF, Direction of Trade, and United Nations, Handbook of *International Trade and Development Statistics*.

Table 3. Financial situation of debtor groups

| | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 |
|----------------------------------------|-------|-------|-------|-------|-------|-------|------|
| Debt/export ratio | | | | | | | |
| Problem debtors | 2.01 | 1.76 | 2.10 | 2.87 | 3.04 | 2.81 | 3.05 |
| Stable debtors | 1.09 | 0.97 | 1.04 | 1.24 | 1.35 | 1.31 | 1.44 |
| Oil debtors | 1.51 | 1.19 | 1.42 | 1.89 | 2.07 | 1.88 | 2.04 |
| Non-oil debtors | 1.73 | 1.73 | 1.92 | 2.37 | 2.42 | 2.32 | 2.49 |
| Interest/export ratio | | | | | | | |
| Problem debtors | 0.16 | 0.17 | 0.24 | 0.35 | 0.33 | 0.32 | 0.32 |
| Stable debtors | 0.07 | 0.08 | 0.10 | 0.11 | 0.10 | 0.11 | 0.12 |
| Oil debtors | 0.11 | 0.11 | 0.14 | 0.20 | 0.19 | 0.21 | 0.20 |
| Non-oil debtors | 0.13 | 0.16 | 0.22 | 0.28 | 0.24 | 0.24 | 0.24 |
| Reserves/imports (months) ratio | | | | | | | |
| Problem debtors | 5.0 | 3.8 | 2.8 | 2.1 | 3.3 | 5.4 | 5.3 |
| Stable debtors | 3.5 | 3.4 | 2.9 | 2.4 | 2.4 | 2.6 | 3.0 |
| Oil debtors | 3.8 | 3.9 | 2.7 | 1.8 | 3.1 | 4.2 | 4.2 |
| Non-oil debtors | 4.8 | 3.5 | 3.0 | 2.6 | 2.5 | 3.6 | 3.9 |
| Current balance, (\$ billion) | | | | | | | |
| Problem debtors | -18.3 | -22.2 | -41.0 | -39.3 | -8.1 | 3.3 | -0.1 |
| Stable debtors | -6.0 | -4.6 | -10.2 | -13.4 | -13.6 | -7.2 | -7.6 |
| Oil debtors | -4.9 | 2.4 | -18.3 | -22.1 | -0.7 | 6.8 | 0.9 |
| Non-oil debtors | -19.3 | -29.1 | -32.9 | -30.6 | -20.9 | -10.8 | -8.7 |
| Debt, (\$ billion) | | | | | | | |
| Problem debtors | 180 | 216 | 268 | 310 | 319 | 331 | 339 |
| Stable debtors | 71 | 81 | 95 | 110 | 122 | 131 | 143 |
| Oil debtors | 114 | 132 | 162 | 183 | 189 | 189 | 192 |
| Non-oil debtors | 136 | 166 | 201 | 237 | 253 | 273 | 289 |

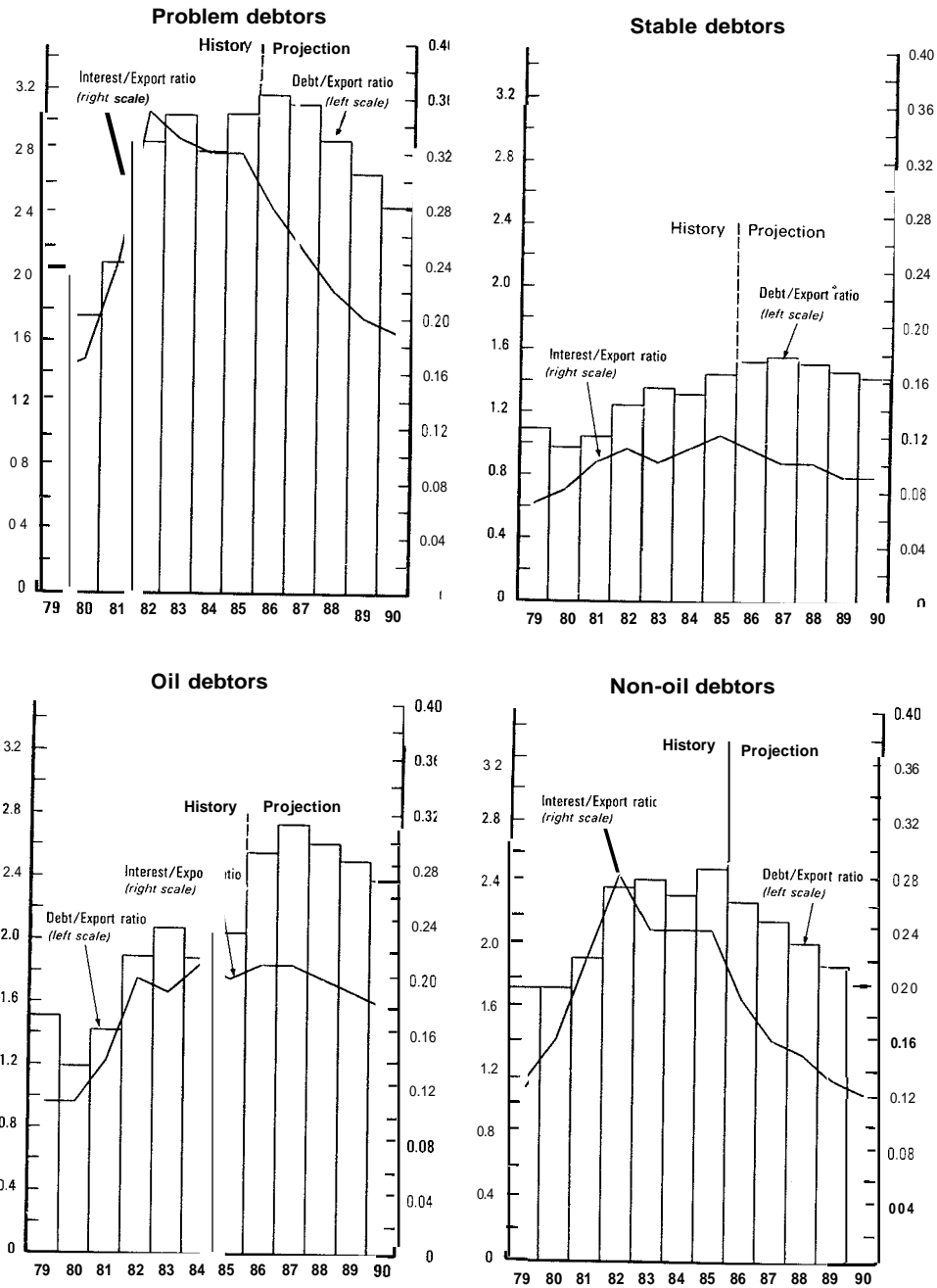
average. Exports of the non-oil group are evenly split between primary commodities and manufactures.

The current account numbers shown in the last panel of Table 3 give an idea of the extent to which adjustment has taken place in response to manifest or impending financing constraints. The problem group, which lost access to voluntary commercial lending in **1982**, has made the largest adjustment with, as indicated in Table 1, the adjustment owing more to import restraint than to the expansion of export revenues.

C. The evolution of debt ratios

The debt situation is usually assessed by focusing on certain financial statistics, most often ratios of interest payments and debt to exports and **GDP**. Rising ratios

CHART 1
DEBT/EXPORT AND INTEREST/EXPORT RATIOS



are clearly unsustainable indefinitely. It is less clear whether there are identifiable threshold levels below which normal financial activity can be maintained. Nevertheless, declines in these ratios have been equated with an improvement in the situation and a return to the levels of such ratios which were prevalent before 1982 has been looked for as offering the possibility that voluntary commercial bank lending might be resumed.

The movements of the various financial ratios have been large since 1979 (Table 3). As one might expect, however, given the dynamics involved in the accumulation of debt, the relevant ratios rose far more rapidly from 1979 to 1982 than it has been possible to unwind them since 1982. In terms of liquidity, all four debtor groups had falling reserves/imports ratios from 1979 to 1982, followed by a recovery from 1983 to 1985. For the problem debtor group, this recovery was achieved primarily through the massive import cutbacks discussed above, while the stable debtor group was able to combine import moderation with reserve build-up financed through continued borrowing. The debt/export ratio rose to a peak in 1983 in all debtor groups. It then fell back in 1984, a year in which export volume expanded rapidly and commodity prices recovered, and rose again to, or close to, historical peaks in 1985 as OECD import demand slowed and commodity and oil prices again weakened. But movements in the debt/export ratio have also been influenced by movements in interest rates and exchange rates. The deterioration in the stable debtor group's debt/export ratio in 1985 was due not only to a fall in nominal export values, but also to a write-up of the non-dollar portion of debt in dollar terms as a result of dollar depreciation.

The interest/exports ratio has been even more volatile than the debt/export ratio owing to large swings of interest rates that have reinforced trends in indebtedness. Interest rates rose to record levels in the early 1980s when debts were building up. Since 1982 they have declined in nominal terms. Once again, the level and change of this ratio differs substantially between the problem and stable debtor groups, and in currencies other than the dollar where interest rates have been somewhat less volatile.

The interpretation of such ratios and projections of them have figured prominently in discussions of whether the debt crisis should be addressed as one of illiquidity or insolvency (e.g. Cline, 1984). Although this distinction cannot be made precisely, because pure economic insolvency in the sense that the term is applied to an individual or firm is unlikely to arise for a sovereign state (e.g. Allsopp and Joshi, 1986), it has served to focus attention on two key issues. The first is whether the debt crisis involves mainly an inability to meet obligations in a timely way. The second is whether the problem is not merely one of timing but more fundamental, with the possibility that debtors could not or would not maintain debt service over

the longer run, implying that losses to creditors might be deferred but could not be avoided indefinitely. It should be noted that the distinction between illiquidity and insolvency is not clear-cut. For one thing, a perceived situation of insolvency is likely to precipitate a liquidity crisis owing to the unwillingness of lenders to roll over maturing credits. Furthermore it would be wrong to make a close analogy with the position of the private firm, which may be liquidated in a bankruptcy procedure and disappear; countries go on, with debtor and creditor nations continuing to have trading and other relations.

The two ratios highlighted in the debt-accounting model presented below are the debt/export and interest payments/export ratios. The outlook for the first of these relates more closely to certain solvency aspects of debt problems while the second combines aspects of both liquidity and solvency. The latter is chosen in preference to the more liquidity-oriented debt service/export ratio since amortization payments fluctuate with rescheduling arrangements in ways that are difficult to predict (OECD, 1986a).

III. DEVELOPING COUNTRY–OECD LINKAGES AND THE DEBT MODEL

The behaviour of the OECD economies influences the developing countries in a variety of ways. Most importantly, OECD demand influences the export volumes and prices of the developing countries. The movement of exchange rates affects both trade developments and the cost of debt. The latter is also affected importantly by interest rates which are determined largely within OECD economies. These factors are the predominant external influences on the debt position of the developing countries. Each of these factors is built into the debt accounting model described below and used in the following section to make projections of debt ratios.

A. The debt model

The structure of the debt accounting model is a set of simple behavioural equations and identities that yield projections of export revenues, debt and interest due as functions of OECD growth, trade prices, the effective dollar exchange rate and interest rates. The model is summarised in the two accompanying panels. The key element is the assumption that import volumes respond to changing circumstances in such a way that the current account net of investment income

remains constant. Changes in the overall current account are thus due entirely to changes in debt interest. This assumption is relaxed in one set of simulations where import growth is allowed to increase in such a way that the current balance net of investment income is zero by the end of the projection period (1990).

The determination of imports in this way, effectively as a residual, is one of several ways in which the system could be closed. The rationale for this particular assumption is as follows. The recent, post-1982 crisis surpluses on current account net of interest payments represent a transfer from debtors to creditors. By sustaining these transfers, borrowing countries have avoided the disruption of their commercial affairs that might otherwise have followed and have made a contribution to the stability of the international financial system. They have sought thereby to enhance their prospects for once again having access to private credits. But these transfers are costly to countries in the short run as they limit foreign exchange available for current imports. There is no optimal level of transfer to work out debt problems, either from the point of view of the borrower or the lender. Rather than attempt to project the future course of such transfers, which will be determined by the interplay of economic, financial and political considerations, they are held constant in the simulations of the debt model. This allows one to examine how other indicators of tension – debt ratios, reflecting liquidity and solvency, and imports of borrowing countries – could evolve, holding the transfers at 1985 levels. Whether the resulting simulations are regarded as realistic depends partly on how the various ratios turn out using this assumption and partly on an interpretation of the political situation in the debtor countries. The behaviour of the banks and multinational agencies involved as the creditors in the system will also affect the outcome.

The model building blocks are presented in the two panels in the logical order entailed by the import assumption. The first panel presents the modelling of trade developments, culminating in the determination of imports in such a way that the current balance net of investment income remains unchanged. The second panel then takes this as given and works through the implications for the debt position and the development of debt ratios through time. The key linkages between the developing countries and the OECD countries which underlie the model are described below.

B. Export volumes and OECD growth

The relationship between developing country export volumes and OECD real income growth is summarised in the elasticities of developing country export volumes with respect to OECD growth as presented in Table 4. The geographical

coverage and the time period varies, but two observations emerge from the sample of elasticities presented:

- i)* there is a range of about 1½ to 3 for the overall elasticity of non-oil developing country average export volume with respect to OECD GDP growth; the highest elasticities relate to the manufacturing export group;
- ii)* the elasticity estimates tend to increase over time, perhaps as a result of the increasing share of the higher income-elasticity manufactured goods in total non-oil developing country exports (Goldstein and Khan, 1982);

Table 4. Estimates of elasticity of developing country export volume growth with respect to OECD GDP growth

| Study | Developing country group | Period | Elasticity ^a |
|---------------------------|--------------------------|-----------|-------------------------|
| Cline (1984) | Developing countries | — | 3.0 |
| Bond (1985) | Oil exporters | 1967–1981 | 2.0 ^b |
| | Major manufacturers | | 2.9 ^b |
| | Low-income | | 1.36 |
| | Middle-income | | 1.4 ^b |
| | Non-oil | | 2.4 ^b |
| Dornbusch (1985) | Non-oil | 1960–1983 | 1.7 |
| | Non-oil | | 3.2 ^c |
| | Major manufacturers | | 2.7 |
| | Major manufacturers | | 4.7 ^c |
| Goldstein and Khan (1982) | Non-oil | 1963–1980 | 1.3 |
| | Non-oil | 1973–1980 | 2.3 |
| | Major manufacturers | 1963–1980 | 1.8 |
| | Major manufacturers | 1973–1980 | 2.6 |
| | Net oil exporters | 1963–1980 | 0.8 |
| | Net oil exporters | 1973–1980 | 1.6 |
| | Middle-income | 1963–1980 | 0.1 |
| | Middle-income | 1973–1980 | 2.3 |
| | Low-income | 1963–1980 | 0.1 |
| | Low-income | 1973–1980 | 1.1 |
| Larsen et al. (1983) | All non-OECD countries | — | 1.5–1.75 |

a) These elasticities are marginal elasticities. In many cases, use of a negative constant term lowers the 'average' elasticity (measured at the 'steady state' rate of growth of OECD of 3 per cent). For example, Cline has a constant term of –3, which yields an average elasticity of 2.

b) Bond's dependent variable is each debtor's exports in volume terms to industrial countries, as opposed to total export volume.

c) Includes dummy for the 1970s.

Table 5. Estimates of elasticity of export volume growth for different debtor groups with respect to OECD GDP growth, 1965-1985

| Methods | Debtor groups | | | |
|------------------------------------------------|---------------|---------|---------|---------|
| | Problem | Stable | Oil | Non-oil |
| OLS, unweighted | 0.8 | 1.7 | 0.5 | 2.4 |
| OLS, weighted indep. vars | 0.9 | 2.3 | 0.7 | 2.8 |
| OLS, weighted indep. and dep. vars | 1.6 | 2.1 | 0.8 | 2.4 |
| AR1, weighted indep. and dep. vars. | 1.8 | 2.6 | 0.7 | 3.1 |
| OLS, weighted indep. and dep. vars, dummy 70's | 1.8 | 2.6 | 0.9 | 2.9 |
| OLS, weighted indep. and dep. vars, dummy 80's | 1.8 | 3.1 | 1.1 | 2.7 |
| RANGE | 0.8-1.8 | 1.7-3.1 | 0.5-1.1 | 2.4-3.1 |

although the elasticities used in the model are assumed not to change they should not of course be viewed as unchangeable since they can certainly be influenced by development strategies; the elasticities issue is discussed in Marquez and McNeilly (1986) and in Suttle (1986).

For the present study, equations relating export volume growth for each debtor group to the relevant deflated export unit value indices and OECD GDP volumes were estimated. The results are presented in Table 5 with the estimation details being given in an appendix. Overall, these disaggregated results appear to accord with the elasticities in the literature as summarised in Table 4. But there are important differences between the groups, which have implications for export prospects and, when incorporated in the debt model below, for the debt projections. In particular, the stable debtor group's elasticity is above that of the problem debtors, regardless of estimation method, while the non-oil debtors' elasticity is above that of the oil debtors. It proves difficult to find a significant relative price term, although both economic theory and some empirical evidence suggest that prices as well as OECD growth matter for developing country exports. It should be noted that the volume of non-oil developing country exports going outside the OECD area is about one-third, highlighting the partial character of any analysis that focuses exclusively on OECD activity.

C. Trade prices

Trade prices form another link between OECD economies and debtor countries. The division of goods exports into three categories – primary commodities, energy, and manufactured goods – brings out the situation of the different debtor groups. The recent weakness of primary commodity and energy prices versus the relative strength of manufactured goods prices has had the most negative impact upon export revenues of the problem and oil-exporting groups, as can be seen in Table 1. The terms of trade of the problem and oil-exporting groups deteriorated every year from 1982 to 1985 with the exception of 1984, while they improved for the other groups.

Primary commodities (defined as SITC sections 0 to 4 excluding energy) make up an important part of the exports of all the groups except the oil-exporting group. Thus movements in commodity prices strongly affect debtor country export revenues, especially in cases where a country depends on a single commodity or a small number of commodities for a large share of its export receipts. Supply and demand interact to determine commodity prices, but for the present model it is changes in demand which are the main focus. As OECD countries account for a large share of consumption for many primary commodities, demand developments in the OECD have a strong effect on commodity prices. Hence studies of primary commodity prices have concentrated on OECD demand-side factors such as changes in OECD activity and inflation, exchange rates and interest rates (as, for example, in Chu and Morrison, 1984; Hartman, 1985 and Holtham et al., 1985). Single equation estimates of real commodity price equations explain a relatively small part of aggregate commodity price movements, although a range of studies are in broad agreement on the magnitudes of the effects of several key variables on commodity price movements:

- an elasticity with respect to OECD activity of about 2;
- an elasticity with respect to the effective dollar exchange rate which is negative and less than one;
- an elasticity with respect to real interest rates which is negative and small but often with insignificant coefficients.

In the debt model, OECD GDP growth and the effective dollar exchange rate are used as explanatory variables with coefficients taken from a variety of studies.

The two other trade prices included in the model – energy prices and manufactured goods prices – are taken as exogenous. Manufactured goods export prices are largely determined by cost developments in the OECD, and it is assumed that non-OECD manufacturers follow competitors' prices. It should be noted,

however, that in particular circumstances prices of developing country manufactured exports may rise or fall relative to prices of competitors. For example, in 1986 the depreciation of the dollar *vis-à-vis* the yen and the major European currencies has been followed by a number of developing country exporters of manufactured goods. As a result, their prices have declined against the average prices of OECD country manufactured exports. Oil prices expressed in dollars are subject to a wide range of influences, of which exchange rate changes among OECD countries is one. But the uncertainty and instability of the effects, which involve a broad range of interactions, suggest that it is more illuminating to treat oil prices as exogenously given.

D. Financial linkages

The amount of interest paid by debtor countries is a function of movements in interest rates, which are largely determined in the OECD economies, but there are other factors to be considered. The first is the share of debt which is subject to fixed rates of interest as compared with floating rates of interest. For non-oil developing countries in total, about half of liabilities and about three-quarters of assets were at floating rates at the end of 1984 (OECD, 1986a), but for the major debtors of this study the proportion of liabilities at floating rates was much higher, ranging from about 50 per cent to 90 per cent depending upon the country. The share of floating-rate debt in total debt is much higher now than it was in 1978, especially for the problem debtors, but the share has been fairly steady for the last couple of years. The second factor is the spread over LIBOR charged by commercial banks to non-oil developing countries, which has fallen over the past couple of years [the absolute amount of the spread fell in 1985 to its lowest level since 1979 (IBRD, 1986)]. As Dornbusch (1985) points out, there are actually two "spreads" involved here – one, a spread between a "risk-free" rate like the **U.S.** Treasury bill rate and LIBOR, and, secondly, a spread between LIBOR and the rate actually charged on debtor-country loans including fees and commissions. The debt accounting model assumes a constant proportional spread between the risk-free rate and the rate charged to debtor groups, thus abstracting from changing country risk (actual rate minus LIBOR) and OECD financial market developments (LIBOR minus risk-free rate). However, data on spreads and fees should be interpreted carefully, since new syndicated market loans have been shrinking in recent years and since rescheduling fees are charged on debt relief operations. Among problem debtors, the variable interest rate portion of debt has declined slightly in recent years as new commercial bank lending has slowed particularly sharply. Among the stable debtors, Algeria, Malaysia, South Korea and Thailand had bond issues in 1984-85 (OECD, 1986b)

THE MODEL – TRADE EQUATIONS

Export volume growth of goods

$$XGV \% = a_1 \cdot \sum_{i=1}^3 WXC_{OM_i} E_i \cdot \sum_{j=1}^3 WVGEO_j GDPV \%_j$$

is a function of the share of commodity group i in a debtor group's total exports (WXC_{OM_i}) and the elasticity (E_i) of commodity group i with respect to OECD real income growth ($GDPV \%_j$), weighted by the share ($WVGEO_j$) of a debtor group's total goods exports to the OECD going to region j . The weights WXC_{OM_i} and $WVGEO_j$ are shown in Table 2.

Index of export price of goods

$$PXG = \sum_{i=1}^3 WXC_{OM_i} PCOM_i$$

is a weighted average of the price index of the three commodity groups ($PCOM_j$) using the relevant shares (WXC_{OM_j}). The prices of energy ($PENG$) and manufacturing ($PMAN$) are taken to be exogenous while primary commodity prices ($PMAT$) are derived as below.

Primary commodity price growth

$$PMAT \% = PGDP \% \cdot a_1 \cdot a_2 GDPV \% \cdot a_3 EXCH \cdot ADCOM$$

is a function of the growth of the OECD GDP deflator ($PGDP \%$), OECD GDP growth ($GDPV \%$) and the percentage rate of change of the effective dollar exchange rate ($EXCH$) with an add-factor ($ADCOM$) being generated to make the path of prices match the baseline projections of the OECD *Economic Outlook 39* of May 1986. A positive movement in $EXCH$ represents a depreciation of the dollar.

Export value of goods

$$XG = XG_{-1} \cdot (XGV/XGV_{-1}) \cdot (PXG/PXG_{-1})$$

Export value of services net of investment income

$$XSNi = XSNi_{-1} \cdot (XGV/XGV_{-1}) \cdot (PMAN/PMAN_{-1})$$

is assumed to be a function of the rate of goods exports volume growth and the growth of manufactured export prices.

Export value of goods and services net of investment income

$$XGS = XG \cdot XSNi$$

Import value of goods and services net of investment income

$$MGS = MGS_{-1} \cdot (XGS - XGS_{-1})$$

is determined by a simple but key assumption that imports can change by the same amount by which export revenue changes

Import value of goods

$$MG = MG_{-1} \cdot (MGS/MGS_{-1})$$

changes at the same rate as the total value of imports of goods and services.

Import value of services net of investment income

$$MSNi = MGS - MG$$

Index of import price of goods

$$PMG = \sum_{i=1}^3 WMC_{OM_i} \cdot PCOM_i$$

is a weighted average of the three world commodity group prices

Index of import price of goods and services net of investment income

$$PMGS = (MG/MGS) \cdot PMG \cdot (1 - MG/MGS) \cdot PMAN$$

is a weighted average of the price of imports of goods and the price of world manufactured prices, which proxies the price of service imports.

Index of import volumes of goods and services net of investment income

$$MGSV = MGS/PMGS$$

Current balance net of investment income

$$CBNi = XG \cdot XSNi - MG - MSNi \cdot NT$$

is determined by identity with net transfers (NT), which are assumed to be exogenous, also playing a role.

THE MODEL – INVESTMENT INCOME AND DEBT

Floating rate of interest

$$R = IRSUS * (R_{-1} / IRSUS_{-1})$$

is set equal to the market rate of interest, in this case threemonth U.S. Treasury bills (*IRSUS*) multiplied by the ratio of the floating rate to the market rate in the previous period, giving an unchanged spread in proportional terms.

Investment income debits and credits

$$IIDEB = RC * WDF * DEBT_{-1} \pm R * (1 - WDF) * DEBT_{-1} + AFD$$

$$IICRD = RC * WAF * ASSET_{-1} \pm R * (1 - WAF) * ASSET_{-1} + AFC$$

are a function of previous period debts and assets times the relevant current period nominal rate of interest; *RC* is the fixed rate of interest (assumed to be exogenous), *R* the floating rate of interest (determined above) and *WDF* and *WAF* are the weights of fixed rate debt and assets; the add factors (*AFD* and *AFC*) are necessary to account for the gap between fitted and actual historical values due to several factors, including the timing of loan repayments and changes in the share of fixed versus floating debt.

Current account

$$CB = CBNI \pm IICRD - IIDEB - IIDOTH$$

is the normal identity with the elements previously determined and a final element, investment income debits which are not interest payments (*IIDOTH*), which are a small share of total investment income debits and are assumed exogenous.

Debt and asset determination

$$DEBT = DEBT_{-1} * (1 \pm (1 - RHO_{-1}) * EXCH) - CB \pm DRES$$

$$ASSET = ASSET_{-1} * (1 \pm (1 - RHOA_{-1}) * EXCH) \pm AFA$$

are normal identities where *RHO* and *RHOA* are the shares of debt and assets that are dollar-denominated, and *DRES* and *AFA* are add-factors, required because of factors such as capital flight, reschedulings and changes in currency-denomination. It is assumed that current balance flows represent solely changes in debt.

Changing shares of dollar-denominated debt and assets

$$RHO = RHO_{-1} / (1 \pm (1 - RHO_{-1}) * EXCH)$$

$$RHOA = RHOA_{-1} / (1 \pm (1 - RHOA_{-1}) * EXCH)$$

Debt/export ratio

$$D/E = DEBT / (XG \pm XSNI \pm IICRD \pm NT)$$

Interest payments/export ratio

$$I/E = IIDEB / (XG \pm XSNI \pm IICRD \pm NT)$$

that reduced the dependence on new commercial loans, although the amounts involved were generally small in relationship to total outstanding commercial loans.

In the model of debt determination, it has been important to take note of the share of debt which is denominated in dollars as well as the share which is at floating rates. In the first half of the 1980s dollar interest rates were normally higher than interest rates on other major international currencies. This is less the case in 1986, but as the dollar has depreciated, the valuation of non-dollar-denominated debt has

grown. For most of the problem debtors, the share of non-dollar-denominated debt is small, so dollar depreciation does little to the value of debt outstanding. This is not the case, however, for Nigeria and a number of the stable debtors, which have a significant share of liabilities in non-dollar-denominated trade and other credits. In 1984, total developing country debt was about 60 per cent dollar-denominated. For the debtor country groups in this study, the share was higher, in the 60 to 90 per cent range. Other things being equal, the recent fall in both dollar interest rates and the exchange rate for the dollar will help to improve the ratios most for those borrowers who have debt portfolios that are heavily weighted towards floating-rate dollar-denominated instruments: namely, the problem debtors as a group. This shows up in the projected ratios as an offset to the negative effects of the oil price decline suffered by several of the problem debtors. The share of debt denominated in dollars changes as the dollar changes in value and is endogenous in the debt accounting model. The currency composition of additions or reductions to debt are assumed to match the distribution of outstanding debt.

IV. DEBT SIMULATIONS

The model described in the previous section has been used to develop projections for the different debtor groups for the period up to 1990. The key assumptions of the model, notably the modelling of developing country imports as a residual, have already been pointed out. The principal exogenous variables are real GDP growth in three OECD regions, the short-term U.S. interest rate, the price of oil, OECD manufactured goods export prices and the OECD GDP deflator. In constructing a baseline, the values of these variables for 1986 and 1987 have been taken from *OECD Economic Outlook 39* (May 1986). For the years 1988 to 1990 the relevant levels, rates and growth rates are projected to be maintained as in 1987 (Table 6). Thus the assumed rate of growth for OECD GDP is $3\frac{1}{4}$ per cent and the rate of inflation is assumed to be 3 per cent. These should not be taken as considered medium-term projections for the OECD area, but rather as rough and ready benchmarks.

The major movements in the exogenous variables are related to changes in exchange rates and energy prices that occurred in the first half of 1986. The price of oil assumed for the Economic Outlook projections of \$15 a barrel has been retained for these projections. Exchange rates are also assumed to remain unchanged in nominal terms. But the fall in the dollar through 1985 and 1986 has a marked

Table 6. Assumed baseline values for exogenous variables

| | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 |
|---------------------------------------|-------|------|------|------|------|------|
| Real GNP or GDP | | | | | | |
| OECD Europe | 2.4 | 2.75 | 2.5 | 2.5 | 2.5 | 2.5 |
| Japan | 4.6 | 3.25 | 3.0 | 3.0 | 3.0 | 3.0 |
| North America | 2.4 | 3.0 | 3.75 | 3.75 | 3.75 | 3.75 |
| Total OECD | 2.8 | 3.0 | 3.25 | 3.25 | 3.25 | 3.25 |
| U.S. 3-month T-Bill Rate | 7.5 | 6.1 | 5.5 | 5.5 | 5.5 | 5.5 |
| U.S. effective exchange rate | -11.0 | -7.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| OECD GDP deflator | 4.7 | 4.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| OECD manufactured goods exports price | 0.0 | 16.2 | 1.2 | 1.5 | 1.5 | 1.5 |
| Commodity prices | -9.4 | 8.3 | 2.0 | 2.0 | 2.0 | 2.0 |
| Oil price (\$ per barrel) | 26.4 | 17.5 | 15.0 | 15.0 | 15.0 | 15.0 |

Note: Growth rates and prices are in per cent changes. The dollar exchange rate is expressed at end-year values in per cent changes. The 1985 values are given for comparative purposes; the model is solved from 1986 onwards.

impact upon **OECD** manufactured goods export prices in dollars, which are assumed to rise over 16 per cent in 1986, due almost entirely to lagged exchange rate effects. Given the importance of the various assumptions, alternative simulations are carried out in order to investigate the sensitivity of the results to the baseline assumptions. In general, however, these alternative simulations fail to capture the range of feedbacks that are present in an international linkage model. The final section therefore reports simulations on the **OECD's INTERLINK** world model which take greater account of the two-way nature of the links between developing countries and the rest of the world.

A. The baseline projections

Summary results of the baseline scenario, using the model and key exogenous assumptions as described above, are presented in Chart 1 and Tables 7 and 8. A range of historical data are provided for 1980-85 (Table 7) to provide a comparison with the model projections for 1986-90 (Table 8). Some of the key trade developments are as follows:

- In 1985 all the debtor groups ran substantial surpluses on the *current account net of investment income*, after having all faced deficits in 1982; by assumption, these surpluses remain throughout the projection period in the baseline scenario;

Table 7. **Historical data.**

| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 |
|----------------|--------|--------|--------|--------|--------|--------|
| Problem | | | | | | |
| Exports | 116.14 | 118.30 | 101.81 | 100.39 | 111.49 | 104.72 |
| Imports | 119.20 | 132.45 | 104.58 | 75.75 | 73.44 | 73.04 |
| Int. Pay. | 21.12 | 30.67 | 37.74 | 34.21 | 37.94 | 35.27 |
| CB | -22.20 | -40.99 | -39.33 | -8.12 | 3.28 | -0.13 |
| Debt | 216.30 | 267.75 | 309.80 | 319.20 | 330.80 | 338.71 |
| D/E | 1.76 | 2.10 | 2.87 | 3.04 | 2.81 | 3.05 |
| I/E | 0.17 | 0.24 | 0.35 | 0.33 | 0.32 | 0.32 |
| Stable | | | | | | |
| Exports | 80.28 | 86.58 | 84.10 | 86.22 | 95.84 | 94.33 |
| Imports | 77.13 | 88.06 | 88.24 | 90.47 | 91.44 | 90.00 |
| Int. Pay. | 6.64 | 8.85 | 9.36 | 9.13 | 10.86 | 11.42 |
| CB | -4.58 | -10.23 | -13.38 | -13.57 | -7.20 | -7.60 |
| Debt | 81.22 | 95.36 | 110.30 | 122.30 | 131.10 | 142.74 |
| D/E | 0.97 | 1.04 | 1.24 | 1.35 | 1.31 | 1.44 |
| I/E | 0.08 | 0.10 | 0.11 | 0.10 | 0.11 | 0.12 |
| Oil | | | | | | |
| Exports | 106.92 | 107.25 | 91.85 | 87.27 | 95.12 | 88.96 |
| Imports | 89.76 | 109.14 | 94.21 | 69.51 | 68.01 | 69.89 |
| Int. Pay. | 12.21 | 16.56 | 19.14 | 17.71 | 20.68 | 18.83 |
| CB | 2.36 | -18.27 | -22.13 | -0.74 | 6.84 | 0.94 |
| Debt | 131.70 | 162.10 | 183.10 | 188.70 | 188.60 | 192.19 |
| D/E | 1.19 | 1.42 | 1.89 | 2.07 | 1.88 | 2.04 |
| I/E | 0.11 | 0.14 | 0.20 | 0.19 | 0.21 | 0.20 |
| Non-oil | | | | | | |
| Exports | 89.49 | 97.63 | 94.05 | 99.33 | 112.21 | 110.10 |
| Imports | 106.57 | 111.37 | 98.62 | 96.71 | 96.87 | 93.14 |
| Int. Pay. | 15.55 | 22.95 | 27.95 | 25.63 | 28.12 | 27.86 |
| CB | -29.14 | -32.94 | -30.59 | -20.95 | -10.77 | -8.67 |
| Debt | 165.82 | 201.01 | 237.00 | 252.80 | 273.30 | 289.26 |
| D/E | 1.73 | 1.92 | 2.37 | 2.42 | 2.32 | 2.49 |
| I/E | 0.16 | 0.22 | 0.28 | 0.24 | 0.24 | 0.24 |

For explanation of variables, see Appendix.

- Export values fall in 1986 for the problem and oil groups, due primarily to the sharp fall in oil prices, and then grow at an average annual rate of between 5 and 9 per cent from 1987 to 1990 (the range reflecting the commodity and regional composition of each group's export structure);
- Given these export prospects, the period of import compression, which was most serious for the problem and oil debtors from 1982 onwards but never so severe for the stable debtors, comes to an end by 1986 (non-oil debtors), 1987 (problem and stable debtors) or 1988 (oil debtors).

For the *problem* and *oil-exporting groups*, the size of the net investment income deficit in 1985 was about equal to the size of the surplus on current account net of investment income, yielding a current account balance of roughly zero. Assuming a small amount of net inflows as well as some currency revaluation effects, the debt stock increases by about \$4 billion for each of these two groups in 1986. With the sharp fall in export revenues expected for 1986, this translates into a large debt/export ratio increase for these groups – from 3.05 in 1985 to 3.17 in 1986 for the problem group, from 2.04 to 2.55 for the oil-exporting group. However, falling interest rates, together with only small increments to the

Table 8. **Baseline simulation**

| | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 |
|----------------|--------|--------|--------|--------|--------|--------|
| Problem | | | | | | |
| Exports | 104.72 | 102.53 | 104.04 | 111.38 | 119.26 | 127.69 |
| Imports | 73.04 | 70.84 | 72.35 | 79.70 | 87.57 | 96.01 |
| Int. Pay. | 35.27 | 30.01 | 26.80 | 26.10 | 25.36 | 25.04 |
| CB | -0.13 | 4.28 | 7.14 | 7.94 | 8.80 | 9.18 |
| Debt | 338.71 | 342.85 | 340.21 | 336.77 | 332.47 | 327.79 |
| D/E | 3.05 | 3.17 | 3.11 | 2.88 | 2.67 | 2.46 |
| I/E | 0.32 | 0.28 | 0.25 | 0.22 | 0.20 | 0.19 |
| Stable | | | | | | |
| Exports | 94.33 | 95.85 | 98.28 | 105.84 | 113.99 | 122.77 |
| Imports | 90.00 | 91.52 | 93.94 | 101.50 | 109.65 | 118.44 |
| Int. Pay. | 11.42 | 11.15 | 10.25 | 10.65 | 11.10 | 11.58 |
| CB | -7.60 | -7.68 | -6.91 | -7.37 | -7.79 | -8.26 |
| Debt | 142.74 | 152.56 | 158.56 | 165.43 | 172.72 | 180.48 |
| D/E | 1.44 | 1.52 | 1.55 | 1.51 | 1.46 | 1.42 |
| I/E | 0.12 | 0.11 | 0.10 | 0.10 | 0.09 | 0.09 |
| Oil | | | | | | |
| Exports | 88.96 | 72.60 | 67.72 | 70.92 | 74.28 | 77.80 |
| Imports | 69.89 | 53.53 | 48.65 | 51.85 | 55.21 | 58.73 |
| Int. Pay. | 18.83 | 16.22 | 14.81 | 14.71 | 14.50 | 14.48 |
| CB | 0.94 | 2.75 | 3.97 | 4.13 | 4.27 | 4.32 |
| Debt | 192.19 | 196.03 | 196.06 | 195.93 | 195.66 | 195.34 |
| D/E | 2.04 | 2.55 | 2.73 | 2.61 | 2.50 | 2.38 |
| I/E | 0.20 | 0.21 | 0.21 | 0.20 | 0.19 | 0.18 |
| Non-oil | | | | | | |
| Exports | 110.10 | 125.78 | 134.60 | 146.30 | 158.97 | 172.67 |
| Imports | 93.14 | 108.83 | 117.64 | 129.35 | 142.01 | 155.71 |
| Int. Pay. | 27.86 | 24.94 | 22.24 | 22.04 | 21.95 | 22.14 |
| CB | -8.67 | -6.15 | -3.74 | -3.56 | -3.26 | -3.40 |
| Debt | 289.26 | 299.38 | 302.71 | 306.27 | 309.53 | 312.93 |
| D/E | 2.49 | 2.28 | 2.16 | 2.02 | 1.88 | 1.76 |
| I/E | 0.24 | 0.19 | 0.16 | 0.15 | 0.13 | 0.12 |

For explanation of variables, see Appendix.

debt stock, lead to sharply lower interest payments and hence to lower interest/export ratios. In addition, falling net interest payments combined with a current balance net of investment income that is in large surplus produce positive current account balances, which in turn reinforce the eventual fall in the size of the debt stock. *So*, after reaching an historical peak in 1986-87, the debt/export ratios of these two groups fall. By 1990, the debt/export ratio of the problem debtors has fallen back to its level of 1981-82, and the interest/export ratio has gone back to its level of 1980-81. Due to the magnitude of the export revenue loss expected for the oil-exporting group, the debt/export ratio for this group of countries, although declining rapidly after 1987, remains above its 1985 level at the end of the projection period. The interest/export ratio, on the other hand, declines to 1981-82 levels.

For the *stable* and *non oil-exporting groups*, the relative size of the net investment income deficit in 1985 means that the overall current account balance is in deficit by about \$8 billion for each group in 1985. This contributes to an increase in the debt stock that is compounded by dollar revaluation effects. The debt stock grows about \$4 billion a year for the non-oil exporting group and about \$7 billion a year for the stable debtor group. The magnitude of the fall in interest rates, however, allows for steady or falling net investment income deficits for both groups over the projection period. The stable debtor group's debt/export ratio increases to a peak in 1987 and declines thereafter. The non-oil exporting group, on the other hand, has a debt/export ratio that declines throughout the projection period. For both groups, the interest/export ratios fall sharply and reach pre-1981 levels by the end of the projection period.

In the baseline scenario the stock of debt of all twelve debtor countries increases by over \$25 billion between 1985 and 1990, or about \$5 billion per year, which would need to be financed through net new official and commercial flows and other forms of financing. At the same time, the overall current account balance of the twelve countries improves by \$8 billion (due to a shrinking net investment income deficit). This result flows from the assumption of a constant current account net of investment income throughout the forecast period. The fall in export revenues in 1986 experienced by the problem and oil-exporting groups is met by further import value cutbacks. In terms of imports of goods and services, this implies that by 1990 import volumes may be only 16 and 21 per cent above their depressed 1985 level for the problem and stable debtors, respectively. The constant current account balance net of investment income assumption means that oil exporters would have 1990 import volume 30 per cent *below* their 1985 level, whereas the non-oil exporters would have import volume growth of 55 per cent over the period.

Table 9. Simulation with higher import growth

| | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 |
|----------------|--------|--------|--------|--------|--------|--------|
| Problem | | | | | | |
| Exports | 104.72 | 102.53 | 104.04 | 111.38 | 119.26 | 127.69 |
| Imports | 73.04 | 78.84 | 88.35 | 103.70 | 119.57 | 128.44 |
| Int. Pay. | 35.27 | 30.01 | 27.37 | 27.88 | 29.00 | 31.26 |
| CB | -0.13 | -3.72 | -9.44 | -17.84 | -26.84 | -29.48 |
| Debt | 338.71 | 350.85 | 364.79 | 387.12 | 418.47 | 452.45 |
| D/E | 3.05 | 3.24 | 3.34 | 3.32 | 3.36 | 3.40 |
| I/E | 0.32 | 0.28 | 0.25 | 0.24 | 0.23 | 0.23 |
| Stable | | | | | | |
| Exports | 94.33 | 95.85 | 98.28 | 105.84 | 113.99 | 122.77 |
| Imports | 90.00 | 93.02 | 96.94 | 106.00 | 115.65 | 124.67 |
| Int. Pay. | 11.42 | 11.15 | 10.35 | 10.95 | 11.72 | 12.64 |
| CB | -7.60 | -9.18 | -10.01 | -12.17 | -14.41 | -15.55 |
| Debt | 142.74 | 154.06 | 163.16 | 174.84 | 188.75 | 203.79 |
| D/E | 1.44 | 1.54 | 1.59 | 1.59 | 1.60 | 1.61 |
| I/E | 0.12 | 0.11 | 0.10 | 0.10 | 0.10 | 0.10 |
| Oil | | | | | | |
| Exports | 88.96 | 72.60 | 67.72 | 70.92 | 74.28 | 77.80 |
| Imports | 69.89 | 58.53 | 58.65 | 66.85 | 74.68 | 78.20 |
| Int. Pay. | 18.83 | 16.22 | 15.16 | 15.79 | 16.72 | 18.23 |
| CB | 0.94 | -2.25 | -6.38 | -11.95 | -17.41 | -18.88 |
| Debt | 192.19 | 201.03 | 211.41 | 227.37 | 248.78 | 271.66 |
| D/E | 2.04 | 2.61 | 2.94 | 3.03 | 3.17 | 3.32 |
| I/E | 0.20 | 0.21 | 0.21 | 0.21 | 0.21 | 0.22 |
| Non-oil | | | | | | |
| Exports | 110.10 | 125.78 | 134.60 | 146.30 | 158.97 | 172.67 |
| Imports | 93.14 | 113.33 | 126.64 | 142.85 | 160.55 | 174.92 |
| Int. Pay. | 27.86 | 24.94 | 22.56 | 23.04 | 24.00 | 25.67 |
| CB | -8.67 | -10.65 | -13.06 | -18.05 | -23.84 | -26.14 |
| Debt | 289.26 | 303.88 | 316.54 | 334.59 | 358.44 | 384.58 |
| D/E | 2.49 | 2.31 | 2.26 | 2.21 | 2.18 | 2.16 |
| I/E | 0.24 | 0.19 | 0.16 | 0.15 | 0.15 | 0.14 |

For explanation of variables, see Appendix.

The degree of sustained import adjustment suggested above may be unrealistic, especially for oil importers, given the degree of economic distress that could ensue and political sensitivity about further import compression. An alternative scenario is therefore presented in which, with no change in export earnings, imports are assumed to be higher so that the current account surplus net of investment income is reduced to zero in 1989-90. Not surprisingly, the effect is to seriously worsen the debt situation while providing only modest relief in the form of higher import volumes. The compounding of interest payments on a more

rapidly-increasing stock of debt (the result of an increasingly negative current account balance including interest payments) results in substantial increases in both of the debt ratios, since the denominators of both ratios are assumed unchanged from the baseline case (Table 9). The accumulations of debt are large: \$1 14 billion for the problem debtor group between 1985 and 1990 – nearly as much as the \$122 billion accumulated by the same group between 1980 and 1985. An increase in the debt stock of this magnitude raises questions about the feasibility of it being financed.

B. Alternative projections

The importance of some of the key assumptions on the value of exogenous variables is tested in order to gauge to what extent conditions which are largely external to the debtor countries and therefore out of their hands might offer some relief to their debt position. The alternatives simulated involve higher OECD growth, higher US interest rates, a combination of the two, a dollar depreciation, higher oil prices and lower non-oil commodity prices. The simulations are discussed in turn below with the results being presented in Chart 2 and in the appendix (Tables A 1 to A6).

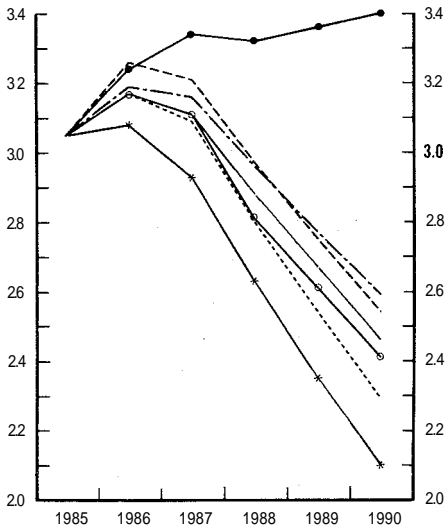
- i) Higher OECD growth.* The impact of 1 percentage point higher OECD real growth over the forecast period is presented in Table A 1. With, by assumption, no changes in prices, exchange rates, interest rates or the current balance, the simulation leads to much stronger export growth and hence, by assumption, import growth. The stock of debt remains unchanged but the increase in export values, by an annual average of between 2¹/₄ and 3¹/₄ per cent, leads to a strong improvement in the debt/export and interest/export ratios.
- ii) Higher interest rates.* The impact of US short-term interest rates being 1 percentage point higher is presented in Table A2. In this case, exports and imports remain unchanged from the baseline, but the higher effective interest rate on debt increases interest payments, the overall current balance and debt accumulation. By 1990, the debt stock of all twelve debtors has increased by \$24 billion over baseline. Assuming the same level of exports as in the baseline, no further cuts in imports and no net reserve movements, this could entail an additional capital inflow equal to the entire capital inflow assumed in the baseline. Looked at in another way, a decline of 1 per cent in the level of dollar interest rates would make as large a contribution to managing the problems as would \$24 billion of lending.

CHART 2

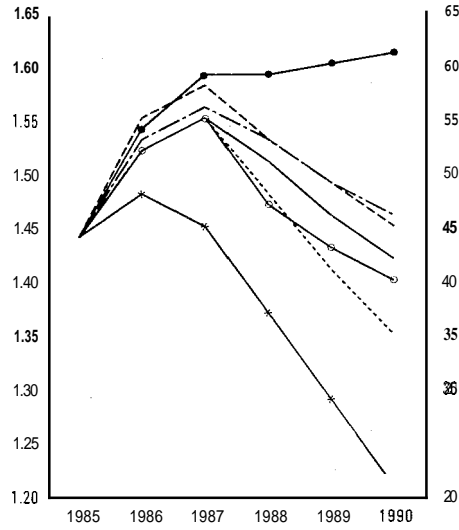
ALTERNATIVE PROJECTIONS FOR THE DEBT/EXPORT RATIO

- Baseline
- Higher import growth
- *— Higher OECD growth
- Higher U.S. interest rate
- ⋯ Dollar depreciation
- Higher oil prices
- - - Lower commodity prices

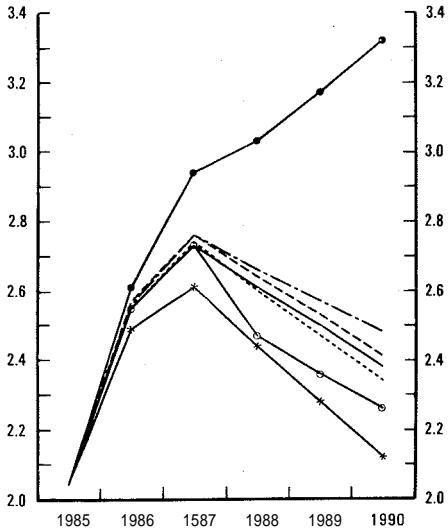
Problem debtors



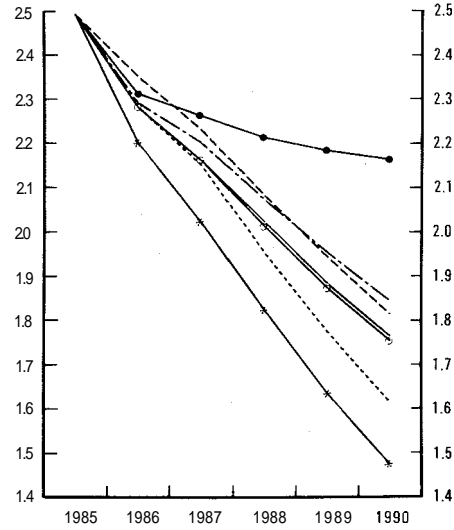
Stable debtors



Oil debtors



Non-oil debtors



- iii) Higher OECD growth and interest rates.* The results of a combined scenario are presented in Table A3. Debt/export ratios are lower than in the baseline for all groups since debt/export ratios worsen in the higher interest rate scenario by less than they improve in the higher **OECD** growth scenario. But interest/export ratios are generally the same as the baseline or only slightly higher. Because imports react to the change in exports, not to changes in the overall current balance, the overall current balance is the same as in the higher interest rate scenario (Table A2). In both of the scenarios involving higher **OECD** real GDP growth, import volume picks up considerably from the baseline, although not by enough to allow 1990 oil-exporter import volumes to come back up to their 1985 level.
- iv) Dollar depreciation.* The impact of a 5 per cent effective depreciation of the dollar in each of the years 1987 to 1990 is presented in Table A4. Export and import prices increase with lags of varying length. By 1990 export receipts have increased by 12 per cent for the twelve debtors compared with the baseline. The depreciation of the dollar also increases the dollar value of non-dollar denominated debt and, consequently, increases the share of total debt that is not denominated in dollars. This share goes from 17 per cent in 1986 to 20 per cent in 1990 for the problem debtors and from 32 to 36 per cent for the stable debtors. The estimated revaluation effects result in a 5 per cent increase in debt in dollar terms for the twelve countries as a whole. Thus there is an improvement in the key ratios which flows from a large improvement in export earnings resulting from the assumed depreciation-induced increase in export prices, offset somewhat by revaluation effects which increase the total stock of dollar-denominated debt, and hence debt payments. Although the value of imports increases compared with the baseline, the incremental increase in dollar prices means that import volumes fall slightly.
- v) Higher oil prices.* The impact of a 10 per cent higher oil price from 1988 is presented in Table A5. In this scenario some other feedbacks are assumed; **OECD** growth is assumed to be 0.1 per cent lower in 1988-89 (based on INTERLINK simulations with real government expenditure unchanged as reported in *OECD Economic Outlook 39*), and the prices of manufactures and non-oil commodities are assumed to respond sympathetically to oil prices so that **OECD** inflation is assumed to increase by a further 0.2 per cent in each year. The debt/export and interest/export ratios improve from the baseline for all the groups, even though there are

likely to be some individual countries (net oil importers) where some deterioration occurs. The main benefits accrue to the oil debtors for whom the debt/export ratio improves significantly.

- vi) **Lower non-oil commodity prices.** The impact of non-oil commodity prices in dollar terms being flat in 1986, rather than rising by the 8 per cent assumed in the baseline (as projected in OECD *Economic Outlook 39*), and remaining on a lower path in the future is presented in Table A6. In this case the value of exports is substantially reduced, especially for the problem and non-oil debtors with their high reliance on food and raw material exports (Table 2). By assumption, imports are lowered accordingly and the current balance is not affected. Although debt and interest payments are not affected, the debt/export and interest/export ratios deteriorate compared with the baseline. The question of whether the assumed import compression is feasible is again pertinent.

These alternative scenarios are roughly symmetrical for increases rather than decreases, and approximately proportional for larger or smaller changes over a range of exogenous disturbances. However, for large changes, and for impacts in the later years, interactions and the effects of compounding would decrease their usefulness as rules of thumb. In addition, two other caveats apply. First, the simple debt accounting model ignores a whole range of linkages that come into play, but with uncertain force and timing, when exogenous variables change. Some illustrative simulations involving a number of feedbacks are presented below. Second, actions that critically affect the debt situation such as reschedulings, building up of arrears and movements in reserves are not specifically treated here. As interest rates, exchange rates, prices and income change, these variables change, too. To the extent that these factors are not accounted for, the usefulness of the projections diminishes. Nevertheless, the sensitivity analysis is suggestive of the combination of developments that would produce a sustained improvement in debt indicators. A mixture of increased real OECD growth and a lower dollar, with the latter leading to higher export prices as measured in dollars, would produce lower ratios, as would lower interest rates. Continued adjustment efforts based solely upon import compression would also improve the key ratios, but probably at the expense of growth of debtor country economies and certainly with reduced OECD exports to those economies.

C. Further links between debtor countries and the OECD

The main focus of the scenarios presented above is the effect on key financial ratios of changing external conditions. But the model used is properly described as a debt accounting model. There are some basic behavioural relations, involving the determination of trade prices and export volumes, but there are few feedbacks to the rest of the world from developments in the debtor countries and the debt side of the model is made up wholly of identities. One implication is that no account is taken of how developments in the debtor countries might affect the OECD area.

Import behaviour, especially, needs to be examined more carefully as borrowing country imports feed back on economic activity in the OECD area as well as on activity in the borrower countries. In a period when voluntary net syndicated commercial lending is unavailable to many of the countries in this sample, the assumption that changes in import value are constrained to track changes in export value may not be unrealistic. However, the pressures to reverse a trend towards import compression that has lasted, in the case of the problem debtors, since 1982, are strong and have been perceived as such by creditors and governments. The levels of import volume implicit in each scenario are shown in Table 10. The import volume growth rates differ quite substantially between scenarios. For example, in the baseline scenario, problem debtor import volume is projected to grow at an average of about 7 per cent per year from 1987 to 1990. With the extra export revenue available from 1 per cent higher OECD real GDP growth, import volumes might grow at an average 10 per cent per year over the same period. Finally, under the assumption that the means were found to finance import expansion such that the problem debtor current balance equalled zero in 1989-90, import volume might expand at an average of 12 per cent per year from 1987 to 1990.

These differences in import volumes are also important to OECD countries, since 25 per cent of the value of their exports of goods was to developing countries in 1985. There is a double feedback on the debtor countries from the import cutbacks prevalent since 1982. First, lower OECD income as a result of lower export volume to debtor countries leads to lower OECD demand for debtor country exports. Second, intra-debtor country trade, which was growing until quite recently, is slowed down by cuts in import volume.

The process of debtor country import volume reductions (increases) leading to lower (higher) OECD real income growth and hence to lower (higher) debtor country exports may be examined using the OECD INTERLINK model. The INTERLINK model aggregates non-OECD countries into groups. There are five developing-country groups that are different from the groups used in the debt accounting model: low-absorptive OPEC members, high-absorptive OPEC members, oil-producing

Table 10. import volume index in the different scenarios^a
1985 = 100

| | 1986 | 1987 | 1988 | 1989 | 1990 | | 1986 | 1987 | 1988 | 1989 | 1990 |
|---------------------------------|-------|-------|-------|-------|-------|-------------------------------------------------|-------|-------|-------|-------|-------|
| A. Baseline | | | | | | F. 5% \$ depreciation per year from 1987 | | | | | |
| Problem debtors | 89.5 | 91.6 | 99.4 | 107.7 | 116.3 | Problem debtors | 89.5 | 91.7 | 99.4 | 107.5 | 115.7 |
| % change | -10.5 | 2.3 | 8.5 | 8.4 | 8.0 | % change | -10.5 | 2.5 | 8.4 | 8.1 | 7.6 |
| Stable debtors | 95.2 | 98.2 | 104.6 | 111.4 | 118.5 | Stable debtors | 95.2 | 97.9 | 103.6 | 109.6 | 115.9 |
| % change | -4.8 | 3.2 | 6.5 | 6.5 | 6.4 | % change | -4.8 | 2.8 | 5.8 | 5.8 | 5.7 |
| Oil debtors | 68.3 | 61.6 | 64.7 | 67.8 | 71.0 | Oil debtors | 68.3 | 60.9 | 62.5 | 64.1 | 65.7 |
| % change | -31.7 | -9.8 | 5.0 | 4.8 | 4.7 | % change | -31.7 | -10.8 | 2.6 | 2.6 | 2.5 |
| Non-oil debtors | 112.8 | 123.7 | 134.2 | 145.3 | 157.2 | Non-oil debtors | 112.8 | 124.1 | 135.3 | 147.0 | 159.2 |
| % change | 12.8 | 9.7 | 8.5 | 8.3 | 8.2 | % change | 12.8 | 10.0 | 9.0 | 8.6 | 8.3 |
| B. Higher import growth | | | | | | G. 10% energy price rise in 1988 | | | | | |
| Problem debtors | 99.6 | 111.8 | 129.4 | 147.0 | 155.6 | Problem debtors | 89.5 | 91.6 | 102.1 | 109.8 | 118.5 |
| % change | -0.4 | 12.2 | 15.7 | 13.6 | 5.8 | % change | -10.5 | 2.3 | 11.4 | 7.6 | 7.9 |
| Stable debtors | 96.8 | 101.3 | 109.2 | 117.5 | 124.8 | Stable debtors | 95.2 | 98.2 | 106.0 | 112.4 | 119.6 |
| % change | -3.2 | 4.6 | 7.8 | 7.6 | 6.2 | % change | -4.8 | 3.2 | 7.9 | 6.1 | 6.4 |
| Oil debtors | 74.7 | 74.3 | 83.4 | 91.7 | 94.6 | Oil debtors | 68.3 | 61.6 | 69.8 | 72.8 | 76.2 |
| % change | -25.3 | -0.5 | 12.2 | 10.0 | 3.2 | % change | -31.7 | -9.8 | 13.3 | 4.3 | 4.6 |
| Non-oil debtors | 117.5 | 133.2 | 148.2 | 164.3 | 176.5 | Non-oil debtors | 112.8 | 123.7 | 133.1 | 143.5 | 155.3 |
| % change | 17.5 | 13.4 | 11.3 | 10.8 | 7.4 | % change | 12.8 | 9.7 | 7.6 | 7.9 | 8.2 |
| C. 1% higher OECD growth | | | | | | H. Lower commodity prices in 1986 | | | | | |
| Problem debtors | 93.4 | 99.9 | 112.7 | 126.7 | 141.8 | Problem debtors | 86.9 | 88.8 | 96.5 | 104.6 | 113.1 |
| % change | -6.6 | 7.0 | 12.8 | 12.4 | 11.9 | % change | -13.1 | 2.2 | 8.7 | 8.4 | 8.1 |
| Stable debtors | 98.1 | 104.4 | 114.6 | 125.7 | 137.9 | Stable debtors | 94.9 | 97.9 | 104.2 | 111.0 | 118.1 |
| % change | -1.9 | 6.4 | 9.8 | 9.7 | 9.7 | % change | -5.1 | 3.2 | 6.4 | 6.5 | 6.4 |
| Oil debtors | 70.3 | 65.4 | 70.5 | 76.0 | 81.6 | Oil debtors | 68.3 | 61.5 | 64.5 | 67.7 | 70.9 |
| % change | -29.7 | -7.0 | 7.8 | 7.8 | 7.4 | % change | -31.7 | -10.0 | 4.9 | 5.0 | 4.7 |
| Non-oil debtors | 117.4 | 133.7 | 150.5 | 168.9 | 189.1 | Non-oil debtors | 110.3 | 121.1 | 131.4 | 142.3 | 154.0 |
| % change | 17.4 | 13.9 | 12.6 | 12.2 | 11.9 | % change | 10.3 | 9.8 | 8.5 | 8.3 | 8.2 |

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a) Imports of goods and services excluding investment income. The import volumes associated with scenarios D and E (higher U.S. short-term interest rates 1986-90 and a combination of higher OECD GDP growth and higher U.S. short-term interest rates, respectively) are not shown. This is because the import volumes implicit in scenario D (higher interest rates) are the same as the baseline and those in scenario E (higher interest rates and growth) are the same as those in scenario C. These results flow from the assumption that changes in imports of goods and services depend solely upon changes in exports of goods and services net of investment income. Higher interest payments change the current account and hence the debt stock, but not imports.

non-OPEC members, newly-industrialising countries, and all other low- and middle-income non-OECD developing countries. Of the twelve debtor countries studied here, eleven belong to three of these non-OECD groups. Algeria, Indonesia, Nigeria and Venezuela belong to the high-absorptive OPEC group; Malaysia and Mexico belong to the oil-producing non-OPEC group; and Argentina, Brazil, Korea, the Philippines, and Thailand belong to the newly-industrialising countries group.

The non-OECD regions in INTERLINK each have a set of equations determining the major elements of the current account. Export volumes are primarily a function of OECD real income growth and export prices are a function of internationally-traded commodity and energy prices as well as manufactured prices that are determined by competitors' prices. Import volumes are a function of real export revenue. The other items of the current account are either given exogenously, such as net transfers, or are endogenously determined, such as investment income (a function of debt and asset stocks and interest rates). Thus the structure of the non-OECD portion of the INTERLINK model is similar to the structure of the current account portion of the debt-accounting model, but they do not correspond precisely.

A simulation of the INTERLINK model makes explicit the relationship between a change in non-OECD import volume and developments in the OECD economies. Between the baseline debt scenario and the higher OECD real GDP scenario there is a difference of 3 per cent per year in debtor country import volume. Thus, an exogenous reduction of 3 per cent per year in non-OECD import volume within the INTERLINK model would show the worldwide implications of the difference between the two debt-accounting model scenarios, at least in terms of changes in national income components in the OECD (and current account developments outside of the OECD).

An earlier study which touched upon the same subject (Larsen *et al.*, 1983) employed a 2 per cent reduction of non-OECD import volume in performing a similar simulation. Since this type of simulation has roughly proportionate results (the effects of a 2 per cent shock are roughly two-thirds the effects of a 3 per cent shock), and since it is interesting to see how model multipliers change over time, a 2 per cent reduction in import volume is used in this simulation. An exogenous reduction of 2 per cent per year in import volume of goods and services is imposed upon the high-absorptive OPEC, the non-OPEC oil-producers, and the newly-industrialising country groups over a period of three years, and it is assumed that fiscal policy in OECD countries is held constant in real terms and that monetary policy maintains monetary growth unchanged.

Since exports from the OECD to the three groups in question make up about 20 per cent of total OECD exports, and since exports account for about 20 per cent of OECD income, the initial reduction of 2 per cent in import volume results in a fall of

Table 11. **Simulation of 2 per cent per year lower volume of imports of goods and services of three non-OECD Interlink groups**

Difference from baseline levels in per cent changes

| | Year 1 | Year 2 | Year 3 |
|-------------------------------------------|--------|--------|--------|
| Total OECD | | | |
| Real GDP | -0.1 | -0.2 | -0.2 |
| Export volume ^a | -0.4 | -0.7 | -0.7 |
| Import volume ^a | -0.2 | -0.3 | -0.4 |
| Current balance change (in \$ billion) | -3.6 | -9.8 | -18.9 |
| Non-OECD | | | |
| High-absorptive OPEC | | | |
| Export volume ^a | -0.4 | -0.6 | -0.7 |
| Import volume ^a | -1.4 | -2.4 | -2.8 |
| Oil-producing non-OPEC | | | |
| Export volume ^a | -0.4 | -0.8 | -0.8 |
| Import volume ^a | -1.4 | -2.3 | -2.6 |
| Newly-industrialising | | | |
| Export volume ^a | -0.4 | -0.8 | -0.8 |
| Import volume ^a | -1.5 | -2.4 | -2.8 |
| Current balance change (in \$ billion) | 3.7 | 9.9 | 19.1 |

a) Imports and exports of goods and services on a national accounts basis.

OECD real GDP of about 0.08 per cent. After the initial shock, a series of secondary effects take place. Lower OECD GDP leads to lower OECD imports and hence lower non-OECD exports to the OECD. This lowers non-OECD export revenue and therefore non-OECD imports from the OECD and from non-OECD regions. Also, the fall in OECD real GDP exerts downward pressure on commodity prices which further reduces non-OECD export revenue and import volume. The sum of these effects over three years is shown in Table 11. The 2 per cent reduction in import volume for these three non-OECD developing country regions eventually results in 0.2 per cent lower OECD real GDP, 0.7 per cent lower OECD export volume, and 0.4 lower OECD import volume. The exports of the three non-OECD developing country regions are 0.8 per cent lower than baseline. The current balance deterioration of the OECD about matches that of the improvements of the three regions.

The magnitudes involved are not trivial. The difference between debtor-country import volumes associated with baseline OECD real GDP growth versus the import volumes associated with 1 per cent higher OECD GDP growth is 0.3 per cent of OECD GDP (i.e. 0.2 for a 2 per cent import volume decrease scaled up for a 3 per

cent decrease). This is an underestimate, since it is based upon an import volume reduction on the part of only three of the five non-OECD developing country groups in the INTERLINK model. If all non-OECD groups are included in the simulation, the OECD real GDP reduction would be closer to 0.4 per cent.

The specific magnitudes depend on the parameters specified in the INTERLINK system, which are subject to uncertainty. They also depend on the specific policy reactions assumed for the simulation. But the general observation that lower import volume paths in developing countries, of which the debtor countries are a pertinent example, affect not only the development prospects of these countries, but also the growth path of the OECD and *vice versa* would follow from a range of parameter values and policy assumptions.

CONCLUSIONS

The financial situation of the heavily-indebted developing countries is closely linked to economic developments in the OECD although developments within the debtor countries are also critical. The OECD's demand for imports, the prices of internationally-traded goods, exchange rates, and interest rates all affect the current account of developing countries. This in turn determines the stock of their debt and assets and ultimately the amount of financing flows. The behaviour of lending institutions is critical in determining financial flows to debtor countries, but is not examined in this article.

A simple model that relates the financial ratios of groups of debtor countries to projected economic developments in the OECD shows that, on a set of baseline assumptions, the interest/export ratio of these debtor groups might decline over the next five years. The debt/export ratio of these groups (with the exception of the non-oil exporting group) might increase in **1986** and into **1987**, and might decline thereafter. These results, however, depend upon the assumption of continued slow import growth in these countries. Several possible developments in the OECD, including higher real GDP growth, lower interest rates and a weaker effective exchange rate of the dollar, might permit an initial impulse to debtor country import volume growth and an improvement in financial ratios. An acceleration of these trends would further improve the situation.

Continued slow import volume growth in debtor countries translates into lower OECD income growth. Greater import volume growth in debtor countries through increased financing flows would feed back onto OECD growth and then back onto

debtor country export volume, greater import volume and so on, though the process is rapidly damped. Similarly, an initial impulse to **OECD** real income growth would increase debtor country export and import volumes and hence further stimulate **OECD** income growth. Without an increase in export earnings through the linkages discussed above or a sustained further fall in interest rates, debtor country import volume cannot grow strongly without a deterioration in financial ratios. Similarly, an increase in financing flows in the absence of rising export revenues would allow for an expansion of imports but at the expense of the financial ratios. Greater debtor country export revenues combined with increased financing flows would give the possibility of higher debtor country import volume but with lower debt/export and interest/export ratios.

APPENDIX

1. Regression results for the elasticity of developing country export volume with respect to OECD real income.

The basic equation estimated is of the form

$$\ln(XVi) = a + b \cdot \ln(PXi/PGBP) + c \cdot \ln(GDPV) + d \cdot DUM$$

where XVi = export volume of debtor group i , PXi = export unit value index of debtor group i , $PGBP$ is the OECD GDP deflator, $GDPV$ is an index of OECD real GDP, and DUM is a dummy variable that carries a value of 1 in the 1970s and 0 elsewhere or a value of 1 in the 1980s and zero elsewhere. For a couple of the groups, either a positive trend for the 1970s or a negative trend for the 1980s is identifiable through a significant coefficient on the dummy term, but the value of the coefficient is not large and the effect upon the primary coefficient of interest, c , is also not large.

As mentioned in the text, some modifications have been made to the variables XVi , $PGBP$ and $GDPV$. For all groups, PXi is calculated as the export unit value for each country in the group weighted by each country's share in total exports. XVi , in the first instance, is calculated in the same way: each country's total export unit value index is weighted together using export shares. In its modified form, XVi is calculated by taking total exports to the OECD for a particular debtor group and then deflating by PXi . $PGBP$ and $GDPV$ in their original form are standard OECD aggregates weighted together using base year dollar GDP weights. In their modified form, they are created by weighting together individual OECD country $PGBP$ and $GDPV$ variables by the weight of each OECD country in the particular debtor groups' exports to the OECD. The table below shows the results of two regressions for each group, excluding dummies and serial correlation corrections. The first regression for each group uses the modified XV variable and the original $PGBP$ and $GDPV$ variables, while the second regression in each group uses the modified XV variable and the modified $PGBP$ and $GDPV$ variables. The regressions are run using annual data over the period 1965-1984; the variables are in log level form. The t-statistics are in parentheses.

Several points are applicable to the regressions in the table. First, the coefficient on the relative price term is often perversely signed or statistically insignificant or both. This is not unusual in export volume equations of this kind. Second, there is pronounced serial correlation, indicating the omission of key variables. One of these might be supply factors, which could be especially important in those countries such as Korea that have significantly expanded their export capacity in the last twenty years. The addition of dummy variables tends to lessen this problem, although it does not eliminate it. Third, the value of the constant term differs quite a lot between groups. Instead of using the estimated constant term for each group in the debt accounting model export volume equation, it was decided to impose a constant term of -3 which comes from equations

| Coefficient: | <i>a</i> | <i>b</i> | <i>c</i> | \bar{R}^2 | <i>DW</i> |
|------------------|-----------------|---------------|---------------|-------------|-----------|
| Problem debtors: | | | | | |
| standard | -3.8 (-7.8) | .2 (1.3) | 1.6 (13.0) | .95 | 1.4 |
| modified | -4.4 (-10.3) | .15 (1.2) | 1.8 (14.5) | .96 | 1.5 |
| Stable debtors: | | | | | |
| standard | -6.7 (-14.3) | .4 (3.4) | 2.1 (11.8) | .97 | 0.6 |
| modified | -9.2 (-8.7) | .4 (2.4) | 2.6 (7.2) | .95 | 0.3 |
| Oil debtors: | | | | | |
| standard | 1.4 (3.2) | -.8 (-1.9) | .8 (5.9) | .82 | 1.6 |
| modified | .2 (.3) | -.7 (-1.6) | 1.0 (5.1) | .79 | 1.3 |
| Non-oil debtors: | | | | | |
| standard | -5.6 (-6.3) | -.2 (-1.3) | 2.4 (23.2) | .97 | 0.4 |
| modified | -8.2 (-9.8) | -.1 (-.5) | 2.8 (28.3) | .98 | 0.7 |

estimated for non-oil developing countries as a whole. The commodity elasticities weighted together to form the group elasticities in the export volume equation in the debt-accounting model also come from equations estimated for all non-oil developing countries.

2. Explanation of key variables reported in Tables 7-9 and additional simulation results

The variables reported in the tables are expressed in billions of dollars (first five) or as ratios (last two) and are as follows:

| | |
|-----------|--------------------------------------------------------|
| Exports | Exports of goods and services net of investment income |
| Imports | Imports of goods and services net of investment income |
| Int. Pay. | Interest payments |
| CB | Current balance |
| Debt | Stock of debt |
| D/E | Debt/export ratio |
| I/E | Interest/export ratio |

Table A1. 1% higher OECD real GDP growth 1986-1990

| | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 |
|----------------|--------|--------|--------|--------|--------|--------|
| Problem | | | | | | |
| Exports | 104.72 | 105.87 | 111.06 | 122.89 | 136.02 | 150.60 |
| Imports | 73.04 | 74.18 | 79.37 | 91.21 | 104.34 | 118.91 |
| Int. Pay. | 35.27 | 30.01 | 26.80 | 26.10 | 25.36 | 25.04 |
| CB | -0.13 | 4.28 | 7.14 | 7.94 | 8.80 | 9.18 |
| Debt | 338.71 | 342.85 | 340.21 | 336.77 | 332.47 | 327.79 |
| D/E | 3.05 | 3.08 | 2.93 | 2.63 | 2.35 | 2.10 |
| I/E | 0.32 | 0.27 | 0.23 | 0.20 | 0.18 | 0.16 |
| Stable | | | | | | |
| Exports | 94.33 | 99.01 | 104.94 | 116.82 | 130.07 | 144.85 |
| Imports | 90.00 | 94.68 | 100.61 | 112.49 | 125.73 | 140.51 |
| Int. Pay. | 11.42 | 11.15 | 10.25 | 10.65 | 11.10 | 11.58 |
| CB | -7.60 | -7.68 | -6.91 | -7.37 | -7.79 | -8.26 |
| Debt | 142.74 | 152.56 | 158.56 | 165.43 | 172.72 | 180.48 |
| D/E | 1.44 | 1.48 | 1.45 | 1.37 | 1.29 | 1.21 |
| I/E | 0.12 | 0.11 | 0.09 | 0.09 | 0.08 | 0.08 |
| Oil | | | | | | |
| Exports | 88.96 | 74.33 | 71.05 | 76.23 | 81.80 | 87.81 |
| Imports | 69.89 | 55.26 | 51.98 | 57.16 | 62.74 | 68.74 |
| Int. Pay. | 18.83 | 16.22 | 14.81 | 14.71 | 14.50 | 14.48 |
| CB | 0.94 | 2.75 | 3.97 | 4.13 | 4.27 | 4.32 |
| Debt | 192.19 | 196.03 | 196.06 | 195.93 | 195.66 | 195.34 |
| D/E | 2.04 | 2.49 | 2.61 | 2.44 | 2.28 | 2.12 |
| I/E | 0.20 | 0.21 | 0.20 | 0.18 | 0.17 | 0.16 |
| Non-oil | | | | | | |
| Exports | 110.10 | 130.55 | 144.95 | 163.49 | 184.29 | 207.63 |
| Imports | 93.14 | 113.60 | 128.00 | 146.53 | 167.34 | 190.68 |
| Int. Pay. | 27.86 | 24.94 | 22.24 | 22.04 | 21.95 | 22.14 |
| CB | -8.67 | -6.15 | -3.74 | -3.56 | -3.26 | -3.40 |
| Debt | 289.26 | 299.38 | 302.71 | 306.27 | 309.53 | 312.93 |
| D/E | 2.49 | 2.20 | 2.02 | 1.82 | 1.63 | 1.47 |
| I/E | 0.24 | 0.18 | 0.15 | 0.13 | 0.12 | 0.10 |

Table A2. 1% higher U.S. short-term interest rate 1986-1990

| | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 |
|----------------|--------|--------|--------|--------|--------|--------|
| Problem | | | | | | |
| Exports | 104.72 | 102.53 | 104.04 | 111.38 | 119.26 | 127.69 |
| Imports | 73.04 | 70.84 | 72.35 | 79.70 | 87.57 | 96.01 |
| Int. Pay. | 35.27 | 33.67 | 30.76 | 30.33 | 29.86 | 29.84 |
| CB | -0.13 | 1.07 | 3.65 | 4.20 | 4.80 | 4.90 |
| Debt | 338.71 | 346.06 | 346.91 | 347.21 | 346.91 | 346.51 |
| D/E | 3.05 | 3.19 | 3.16 | 2.96 | 2.77 | 2.59 |
| I/E | 0.32 | 0.31 | 0.28 | 0.26 | 0.24 | 0.22 |
| Stable | | | | | | |
| Exports | 94.33 | 95.85 | 98.28 | 105.84 | 113.99 | 122.77 |
| Imports | 90.00 | 91.52 | 93.94 | 101.50 | 109.65 | 118.44 |
| Int. Pay. | 11.42 | 12.25 | 11.49 | 12.01 | 12.59 | 13.22 |
| CB | -7.60 | -8.52 | -7.88 | -8.46 | -9.01 | -9.62 |
| Debt | 142.74 | 153.40 | 160.38 | 168.34 | 176.85 | 185.96 |
| D/E | 1.44 | 1.53 | 1.56 | 1.53 | 1.49 | 1.46 |
| I/E | 0.12 | 0.12 | 0.11 | 0.11 | 0.11 | 0.10 |
| Oil | | | | | | |
| Exports | 88.96 | 72.60 | 67.72 | 70.92 | 74.28 | 77.80 |
| Imports | 69.89 | 53.53 | 48.65 | 51.85 | 55.21 | 58.73 |
| Int. Pay. | 18.83 | 18.12 | 16.87 | 16.91 | 16.84 | 16.97 |
| CB | 0.94 | 1.24 | 2.32 | 2.35 | 2.35 | 2.26 |
| Debt | 192.19 | 197.54 | 199.23 | 200.88 | 202.53 | 204.27 |
| D/E | 2.04 | 2.56 | 2.76 | 2.66 | 2.57 | 2.48 |
| I/E | 0.20 | 0.23 | 0.23 | 0.22 | 0.21 | 0.21 |
| Non-oil | | | | | | |
| Exports | 110.10 | 125.78 | 134.60 | 146.30 | 158.97 | 172.67 |
| Imports | 93.14 | 108.83 | 117.64 | 129.35 | 142.01 | 155.71 |
| Int. Pay. | 27.86 | 27.80 | 25.39 | 25.44 | 25.61 | 26.08 |
| CB | -8.67 | -8.70 | -6.55 | -6.60 | -6.56 | -6.98 |
| Debt | 289.26 | 301.92 | 308.07 | 314.67 | 321.23 | 328.21 |
| D/E | 2.49 | 2.29 | 2.20 | 2.07 | 1.95 | 1.84 |
| I/E | 0.24 | 0.21 | 0.18 | 0.17 | 0.16 | 0.15 |

Table A3. Higher growth and higher interest rate

| | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 |
|----------------|--------|--------|--------|--------|--------|--------|
| Problem | | | | | | |
| Exports | 104.72 | 105.87 | 111.06 | 122.89 | 136.02 | 150.60 |
| Imports | 73.04 | 74.18 | 79.37 | 91.21 | 104.34 | 118.91 |
| Int. Pay. | 35.27 | 33.67 | 30.76 | 30.33 | 29.86 | 29.84 |
| CB | -0.13 | 1.07 | 3.65 | 4.20 | 4.80 | 4.90 |
| Debt | 338.71 | 346.06 | 346.91 | 347.21 | 346.91 | 346.51 |
| D/E | 3.05 | 3.09 | 2.97 | 2.70 | 2.44 | 2.21 |
| I/E | 0.32 | 0.30 | 0.26 | 0.24 | 0.21 | 0.19 |
| Stable | | | | | | |
| Exports | 94.33 | 99.01 | 104.94 | 116.82 | 130.07 | 144.85 |
| Imports | 90.00 | 94.68 | 100.61 | 112.49 | 125.73 | 140.51 |
| Int. Pay. | 11.42 | 12.25 | 11.49 | 12.01 | 12.59 | 13.22 |
| CB | -7.60 | -8.52 | -7.88 | -8.46 | -9.01 | -9.62 |
| Debt | 142.74 | 53.40 | 160.38 | 168.34 | 176.85 | 185.96 |
| D/E | 1.44 | 1.48 | 1.47 | 1.39 | 1.32 | 1.25 |
| I/E | 0.12 | 0.12 | 0.11 | 0.10 | 0.09 | 0.09 |
| Oil | | | | | | |
| Exports | 88.96 | 74.33 | 71.05 | 76.23 | 81.80 | 87.81 |
| Imports | 69.89 | 55.26 | 51.98 | 57.16 | 62.74 | 68.74 |
| Int. Pay. | 18.83 | 18.12 | 16.87 | 16.91 | 16.84 | 16.97 |
| CB | 0.94 | 1.24 | 2.32 | 2.35 | 2.35 | 2.26 |
| Debt | 192.19 | 197.54 | 199.23 | 200.88 | 202.53 | 204.27 |
| D/E | 2.04 | 2.50 | 2.64 | 2.49 | 2.35 | 2.21 |
| I/E | 0.20 | 0.23 | 0.22 | 0.21 | 0.20 | 0.18 |
| Non-oil | | | | | | |
| Exports | 110.10 | 130.55 | 144.95 | 163.49 | 184.29 | 207.63 |
| Imports | 93.14 | 113.60 | 128.00 | 146.53 | 167.34 | 190.68 |
| Int. Pay. | 27.86 | 27.80 | 25.39 | 25.44 | 25.61 | 26.08 |
| CB | -8.67 | -8.70 | -6.55 | -6.60 | -6.56 | -6.98 |
| Debt | 289.26 | 301.92 | 308.07 | 314.67 | 321.23 | 328.21 |
| D/E | 2.49 | 2.21 | 2.05 | 1.86 | 1.69 | 1.54 |
| I/E | 0.24 | 0.20 | 0.17 | 0.15 | 0.13 | 0.12 |

Table A4. U.S. dollar depreciation of 5% per year 1987-1990

| | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 |
|----------------|--------|--------|--------|--------|--------|--------|
| Problem | | | | | | |
| Exports | 104.72 | 102.53 | 105.68 | 116.76 | 129.09 | 142.82 |
| Imports | 73.04 | 70.84 | 74.00 | 85.07 | 97.40 | 111.13 |
| Int. Pay. | 35.27 | 30.01 | 26.80 | 26.31 | 25.79 | 25.72 |
| CB | -0.13 | 4.28 | 7.14 | 7.84 | 8.59 | 8.86 |
| Debt | 338.71 | 342.85 | 343.09 | 342.75 | 341.78 | 340.66 |
| D/E | 3.05 | 3.17 | 3.09 | 2.80 | 2.54 | 2.29 |
| I/E | 0.32 | 0.28 | 0.24 | 0.22 | 0.19 | 0.17 |
| Stable | | | | | | |
| Exports | 94.33 | 95.85 | 99.97 | 111.41 | 124.25 | 138.66 |
| Imports | 90.00 | 91.52 | 95.64 | 107.08 | 119.91 | 134.32 |
| Int. Pay. | 11.42 | 11.15 | 10.25 | 10.81 | 11.44 | 12.13 |
| CB | -7.60 | -7.68 | -6.91 | -7.47 | -8.02 | -8.63 |
| Debt | 142.74 | 152.56 | 160.98 | 170.59 | 180.99 | 192.27 |
| D/E | 1.44 | 1.52 | 1.55 | 1.48 | 1.41 | 1.35 |
| I/E | 0.12 | 0.11 | 0.10 | 0.09 | 0.09 | 0.08 |
| Oil | | | | | | |
| Exports | 88.96 | 72.60 | 68.27 | 72.70 | 77.49 | 82.66 |
| Imports | 69.89 | 53.53 | 49.20 | 53.63 | 58.42 | 63.59 |
| Int. Pay. | 18.83 | 16.22 | 14.81 | 14.85 | 14.78 | 14.92 |
| CB | 0.94 | 2.75 | 3.97 | 4.08 | 4.17 | 4.17 |
| Debt | 192.19 | 196.03 | 197.98 | 199.92 | 201.87 | 203.93 |
| D/E | 2.04 | 2.55 | 2.74 | 2.60 | 2.47 | 2.34 |
| I/E | 0.20 | 0.21 | 0.20 | 0.19 | 0.18 | 0.17 |
| Non-oil | | | | | | |
| Exports | 110.10 | 125.78 | 137.38 | 155.47 | 175.85 | 198.81 |
| Imports | 93.14 | 108.83 | 120.43 | 138.52 | 158.90 | 181.86 |
| Int. Pay. | 27.86 | 24.94 | 22.24 | 22.27 | 22.44 | 22.92 |
| CB | -8.67 | -6.15 | -3.74 | -3.71 | -3.60 | -3.93 |
| Debt | 289.26 | 299.38 | 306.09 | 313.41 | 320.90 | 329.01 |
| D/E | 2.49 | 2.28 | 2.15 | 1.95 | 1.77 | 1.61 |
| I/E | 0.24 | 0.19 | 0.16 | 0.14 | 0.12 | 0.11 |

**Table A5. 10% higher nominal oil prices 1988-1990
with some OECD feedbacks**

| | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 |
|----------------|--------|--------|--------|--------|--------|--------|
| Problem | | | | | | |
| Exports | 104.72 | 102.53 | 104.04 | 114.32 | 122.13 | 130.72 |
| Imports | 73.04 | 70.84 | 72.35 | 82.63 | 90.44 | 99.04 |
| Int. Pay. | 35.27 | 30.01 | 26.80 | 26.10 | 25.36 | 25.04 |
| CB | -0.13 | 4.28 | 7.14 | 7.94 | 8.80 | 9.18 |
| Debt | 338.71 | 342.85 | 340.21 | 336.77 | 332.47 | 327.79 |
| D/E | 3.05 | 3.17 | 3.11 | 2.81 | 2.61 | 2.41 |
| I/E | 0.32 | 0.28 | 0.25 | 0.22 | 0.20 | 0.18 |
| Stable | | | | | | |
| Exports | 94.33 | 95.85 | 98.28' | 108.27 | 116.35 | 125.28 |
| Imports | 90.00 | 91.52 | 93.94 | 103.93 | 112.02 | 120.95 |
| Int. Pay. | 11.42 | 11.15 | 10.25 | 10.65 | 11.10 | 11.58 |
| CB | -7.60 | -7.68 | -6.91 | -7.37 | -7.79 | -8.26 |
| Debt | 142.74 | 152.56 | 158.56 | 165.43 | 172.72 | 180.48 |
| D/E | 1.44 | 1.52 | 1.55 | 1.47 | 1.43 | 1.40 |
| I/E | 0.12 | 0.11 | 0.10 | 0.09 | 0.09 | 0.09 |
| Oil | | | | | | |
| Exports | 88.96 | 72.60 | 67.72 | 75.30 | 78.70 | 82.41 |
| Imports | 69.89 | 53.53 | 48.65 | 56.23 | 59.64 | 63.34 |
| Int. Pay. | 18.83 | 16.22 | 14.81 | 14.71 | 14.50 | 14.48 |
| CB | 0.94 | 2.75 | 3.97 | 4.13 | 4.27 | 4.32 |
| Debt | 192.19 | 196.03 | 196.06 | 195.93 | 195.66 | 195.34 |
| D/E | 2.04 | 2.55 | 2.73 | 2.47 | 2.36 | 2.26 |
| I/E | 0.20 | 0.21 | 0.21 | 0.19 | 0.18 | 0.17 |
| Non-oil | | | | | | |
| Exports | 110.10 | 125.78 | 134.60 | 147.29 | 159.77 | 173.60 |
| Imports | 93.14 | 108.83 | 117.64 | 130.33 | 142.82 | 156.65 |
| Int. Pay. | 27.86 | 24.94 | 22.24 | 22.04 | 21.95 | 22.14 |
| CB | -8.67 | -6.15 | -3.74 | -3.56 | -3.26 | -3.40 |
| Debt | 289.26 | 299.38 | 302.71 | 306.27 | 309.53 | 312.93 |
| D/E | 2.49 | 2.28 | 2.16 | 2.01 | 1.87 | 1.75 |
| I/E | 0.24 | 0.19 | 0.16 | 0.14 | 0.13 | 0.12 |

**Table A6. Lower commodity price growth
in 1986**

| | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 |
|----------------|--------|--------|--------|--------|--------|--------|
| Problem | | | | | | |
| Exports | 104.72 | 99.61 | 100.89 | 108.00 | 115.60 | 123.76 |
| Imports | 73.04 | 67.92 | 69.21 | 76.31 | 83.92 | 92.07 |
| Int. Pay. | 35.27 | 30.01 | 26.80 | 26.10 | 25.36 | 25.04 |
| CB | -0.13 | 4.28 | 7.14 | 7.94 | 8.80 | 9.18 |
| Debt | 338.71 | 342.85 | 340.21 | 336.77 | 332.47 | 327.79 |
| D/E | 3.05 | 3.26 | 3.21 | 2.97 | 2.75 | 2.54 |
| I/E | 0.32 | 0.29 | 0.25 | 0.23 | 0.21 | 0.19 |
| Stable | | | | | | |
| Exports | 94.33 | 94.18 | 96.46 | 103.87 | 111.86 | 120.46 |
| Imports | 90.00 | 89.85 | 92.13 | 99.54 | 107.52 | 116.13 |
| Int. Pay. | 11.42 | 11.15 | 10.25 | 10.65 | 11.10 | 11.58 |
| CB | -7.60 | -7.68 | -6.91 | -7.37 | -7.79 | -8.26 |
| Debt | 142.74 | 152.56 | 158.56 | 165.43 | 172.72 | 180.48 |
| D/E | 1.44 | 1.55 | 1.58 | 1.53 | 1.49 | 1.45 |
| I/E | 0.12 | 0.11 | 0.10 | 0.10 | 0.10 | 0.09 |
| Oil | | | | | | |
| Exports | 88.96 | 71.83 | 66.90 | 70.05 | 73.36 | 76.83 |
| Imports | 69.89 | 52.76 | 47.83 | 50.99 | 54.29 | 57.76 |
| Int. Pay. | 18.83 | 16.22 | 14.81 | 14.71 | 14.50 | 14.48 |
| CB | 0.94 | 2.75 | 3.97 | 4.13 | 4.27 | 4.32 |
| Debt | 192.19 | 196.03 | 196.06 | 195.93 | 195.66 | 195.34 |
| D/E | 2.04 | 2.57 | 2.76 | 2.64 | 2.53 | 2.41 |
| I/E | 0.20 | 0.21 | 0.21 | 0.20 | 0.19 | 0.18 |
| Non-oil | | | | | | |
| Exports | 110.10 | 121.97 | 130.46 | 141.82 | 154.10 | 167.39 |
| Imports | 93.14 | 105.01 | 113.50 | 124.86 | 137.15 | 150.44 |
| Int. Pay. | 27.86 | 24.94 | 22.24 | 22.04 | 21.95 | 22.14 |
| CB | -8.67 | -6.15 | -3.74 | -3.56 | -3.26 | -3.40 |
| Debt | 289.26 | 299.38 | 302.71 | 306.27 | 309.53 | 312.93 |
| D/E | 2.49 | 2.35 | 2.23 | 2.08 | 1.94 | 1.81 |
| I/E | 0.24 | 0.20 | 0.16 | 0.15 | 0.14 | 0.13 |

3. Analysis of the components of the **debt/export** ratio

i) The decomposition of the *debt/export* ratio

The *debt/export* ratio can be decomposed in a way that separates movements in the ratio into four parts:

- a) the contribution of the current account net of interest due;
- b) the contribution of interest due;
- c) the contribution of export growth;
- d) the contribution of all other recorded balance of payments items, errors and omissions, and other transactions including capital flight, reserve increases, direct investment inflows, and revaluations due to currency realignments.

This decomposition, which is derived below, may be summarised by the following identity:

$$\frac{D_t}{X_t} - \frac{D_{t-1}}{X_{t-1}} = -\frac{(X_t - M_t)}{X_t} + \frac{R_t}{X_t} - \frac{(X_t - X_{t-1})}{X_{t-1}} * \frac{D_{t-1}}{X_t} + \frac{F_t}{X_t}$$

where D_t is the stock of debt, X_t exports of goods, services, and net transfers, M_t is imports of goods and services less investment income, R_t is investment income debits, and F_t is all other flows. The first term on the right-hand side of the identity represents the current balance net of interest due. A surplus reduces the ratio. The second term, interest due, raises the ratio when positive. The third term, export growth scaled by the size of the debt stock, lowers the ratio when positive. The final term is a residual, the components of which act in different directions. For example, reserve increases and capital flight raise the ratio, direct investment inflows reduce it.

This decomposition is most useful in illustrating the contribution of factors external to the debtor countries versus factors internal to the debtor countries in causing movements in the *debt/export* ratio. Of course none of the four terms are purely internal or purely external to the debtor countries. The interest due term is moved by market interest rates, which are external to the debtor countries. However, interest payments are based upon the existing stock of debt, which is the outcome of past internal as well as external factors. The current account net of interest due is influenced by a combination of internal factors (import growth) and external factors (export growth). The export growth rate term is external in nature, although it is scaled by the prior-period *debt/export* ratio, which is a function of all the factors that have been mentioned. In addition, export growth may be influenced by domestic policies. Finally, the residual term contains factors that are internal yet subject to changes in the external situation (reserve changes, capital flight), factors that are a mixture of internal and external (direct investment flows), and factors that are purely external (changes in the value of currencies against the dollar). This term also contains errors and omissions; it should therefore be interpreted with caution.

Despite all the qualifications involved, the decomposition of the *debt/export* ratio shows how different factors have changed the ratio over time and also provides a framework for assessing the way in which projected external developments will move the ratio. Table A7 presents the decomposition over the recent historical period and then over the projection period, using the baseline scenario.

Table A7. Decomposition of the debt/export ratio

| | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Problem debtors | | | | | | | | | | |
| Change in ratio | 0.34 | 0.77 | 0.17 | -0.23 | 0.24 | 0.12 | -0.06 | -0.23 | -0.22 | -0.21 |
| Due to: | | | | | | | | | | |
| Interest due | 0.24 | 0.35 | 0.33 | 0.32 | 0.32 | 0.28 | 0.25 | 0.22 | 0.20 | 0.19 |
| Export growth | -0.06 | 0.38 | 0.08 | -0.33 | 0.17 | 0.08 | -0.03 | -0.20 | -0.19 | -0.17 |
| Current account | 0.04 | -0.03 | -0.28 | -0.38 | -0.34 | -0.34 | -0.34 | -0.32 | -0.30 | -0.28 |
| Other | 0.13 | 0.07 | 0.04 | 0.15 | 0.10 | 0.11 | 0.07 | 0.07 | 0.06 | 0.06 |
| Stable debtors | | | | | | | | | | |
| Change in ratio | 0.07 | 0.20 | 0.11 | -0.05 | 0.14 | 0.08 | 0.02 | -0.04 | -0.04 | -0.04 |
| Due to: | | | | | | | | | | |
| Interest due | 0.10 | 0.11 | 0.10 | 0.11 | 0.12 | 0.11 | 0.10 | 0.10 | 0.09 | 0.09 |
| Export growth | -0.08 | 0.03 | -0.02 | -0.13 | 0.02 | -0.02 | -0.03 | -0.11 | -0.10 | -0.10 |
| Current account | -0.04 | -0.01 | 0.00 | -0.09 | -0.09 | -0.09 | -0.08 | -0.08 | -0.07 | -0.07 |
| Other | 0.10 | 0.07 | 0.03 | 0.07 | 0.09 | 0.07 | 0.04 | 0.04 | 0.04 | 0.04 |
| Oil debtors | | | | | | | | | | |
| Change in ratio | 0.23 | 0.47 | 0.19 | -0.19 | 0.16 | 0.51 | 0.18 | -0.12 | -0.11 | -0.11 |
| Due to: | | | | | | | | | | |
| Interest due | 0.14 | 0.20 | 0.19 | 0.21 | 0.20 | 0.21 | 0.21 | 0.20 | 0.19 | 0.18 |
| Export growth | -0.04 | 0.25 | 0.13 | -0.19 | 0.12 | 0.46 | 0.18 | -0.12 | -0.11 | -0.11 |
| Current account | -0.05 | -0.03 | -0.24 | -0.32 | -0.26 | -0.30 | -0.32 | -0.31 | -0.30 | -0.28 |
| Other | 0.17 | 0.05 | 0.10 | 0.11 | 0.09 | 0.14 | 0.12 | 0.11 | 0.11 | 0.10 |
| Non-oil debtors | | | | | | | | | | |
| Change in ratio | 0.19 | 0.46 | 0.04 | -0.10 | 0.18 | -0.21 | -0.12 | -0.12 | -0.14 | -0.13 |
| Due to: | | | | | | | | | | |
| Interest due | 0.22 | 0.28 | 0.24 | 0.24 | 0.24 | 0.19 | 0.16 | 0.15 | 0.13 | 0.12 |
| Export growth | -0.15 | 0.10 | -0.11 | -0.27 | 0.04 | -0.29 | -0.14 | -0.17 | -0.16 | -0.15 |
| Current account | 0.06 | -0.01 | -0.08 | -0.18 | -0.20 | -0.17 | -0.16 | -0.15 | -0.14 | -0.13 |
| Other | 0.06 | 0.09 | -0.02 | 0.11 | 0.09 | 0.06 | 0.02 | 0.02 | 0.02 | 0.02 |

Movements in the components of the debt/export ratio over the period 1981-85 bring out the difference between the problem and stable debtors. The contribution of interest payments towards the problem debtor ratio is three times as large as it is for the stable debtors, a result of a relatively larger stock of debt with a larger share of floating rate debt in total debt. The contribution of export growth has been more volatile for the problem debtors than for the stable debtors: the 1982 recession and 1984 recovery in the OECD had greater impacts upon the problem debtor ratio than upon the stable debtor ratio. The import volume cutbacks that followed the onset of the 'debt crisis' in 1982 have led to current account net of investment income contributions that have tended to lower the debt/export ratio. The contribution of this item towards changes in the debt/export ratio is more important for the problem debtors than for the stable debtors because of

the much greater import cutbacks undertaken by the former. Turning to the oil and non-oil exporting groups, the major difference between the evolution of their respective debt/export ratios has been the contribution of export growth and the current account. As oil prices have declined after their 1980-81 peak, the oil exporters have relied more upon import cutbacks, or the current account, whereas the non oil-exporting group has seen stronger export growth, especially in 1983-84.

The behaviour of the debt/export ratio over the projection period may be divided into two periods: one of deterioration in 1986-87, and one of improvement thereafter. The interest due component (which tends to raise the ratio) declines steadily in all four groups over the projection period, while the improvement due to the current account net of interest due component also declines slowly. The residual contribution is fairly steady, leaving export growth as the component that changes significantly over the projection period. For all groups, except the non-oil exporting group, the effect of export growth is either neutral or tends to increase the debt/export ratio in 1986-87, as was the case in 1985, and to reduce the ratio thereafter. For the non-oil exporting group, export growth tends to lower the ratio throughout the projection period.

The alternate scenarios result in different configurations for the components of the debt/export ratio with the contribution of the components changing as expected. In the higher OECD growth scenario, export growth pulls the ratio down; in the higher interest rate scenario, the interest due component rises sharply; and in the higher import growth scenario, the current account component turns positive (for the first time since 1981 or earlier, depending upon the group).

ii) Derivation of the decomposition

The derivation of the decomposition of the debt/export ratio, which is due to Jeffrey Shafer, is as follows. First, changes in the stock of debt can be defined as changes in the current account net of interest due plus interest due plus other flows:

$$D_t - D_{t-1} = -(X_t - M_t) + R_t + F_t \quad (1A)$$

where X_t is exports of goods and services plus net transfers, M_t is imports of goods and services less interest payments due, R_t is interest payments due, and F_t is other flows (including currency valuation changes). The change in the debt/export ratio, $D_t/X_t - D_{t-1}/X_{t-1}$, can be expressed as

$$\frac{D_t}{X_t} - \frac{D_{t-1}}{X_{t-1}} = \frac{D_t - D_{t-1}}{X_t} - \frac{X_t - X_{t-1}}{X_{t-1}} * \frac{D_{t-1}}{X_t} \quad (2A)$$

Substituting 1A into 2A yields the following decomposition:

$$\frac{D_t}{X_t} - \frac{D_{t-1}}{X_{t-1}} = \frac{-(X_t - M_t)}{X_t} + \frac{R_t}{X_t} - \frac{X_t - X_{t-1}}{X_{t-1}} * \frac{D_{t-1}}{X_t} + \frac{F_t}{X_t} \quad (3A)$$

The four terms of the identity are, from left to right, the effect of the current account net of interest payments, the effect of interest payments, the effect of export growth (scaled by the ratio of prior-period debt to exports), and the effect of other outflows.

The relationship between the nominal effective rate of interest and nominal export growth in terms of the debt/export ratio can be seen more clearly by an extension of **3A**. Define the effective interest rate, rt , as R_t/D_{t-1} , and gt , the growth rate of exports, as $(X_t - X_{t-1})/X_{t-1}$. Substituting these definitions into **3A** yields

$$\frac{D_t}{X_t} - \frac{D_{t-1}}{X_{t-1}} = \frac{-(X_t - M_t)}{X_t} + \frac{F_t}{X_t} + (rt - gt) \frac{D_{t-1}}{X_t} \quad (4A)$$

In this formulation, it is evident that, with a given current account position, the debt/export ratio can be improved only if the growth rate of nominal exports exceeds the effective nominal interest rate. The contribution of each of these factors is proportional to the level of the ratio measured with prior-period debt and current-period exports.

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