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Tariffs and the Macroeconomy: Some Empirical Evidence

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Abstract

This paper examines the macroeconomic impact of tariffs. Existing theoretical models do not provide clear-cut predictions concerning the co-movement between unilateral tariff changes and a set of macroeconomic variables consisting of the real exchange rate, the trade balance, and the level of output. Three different data sets are found to be consistent with the hypothesis that tariffs have no statistically significant impact on the trade balance, the real exchange rate, or the level of output.

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Summary

This paper examines the macroeconomic impact of tariffs. The first part reviews the effects of tariffs in a variety of theoretical models, emphasizing their impact on output, the real exchange rate, and the real trade balance. A review of the literature suggests that a wide range of effects (including no effect at all) is consistent with the predictions of theory. In particular, the macroeconomic effects of tariffs are shown to depend inter alia on: the exchange rate regime, the effect of changes in the terms of trade on savings (the Laursen Metzler effect), the stance of fiscal policy, the degree of capital mobility, and agents' expectations concerning the timing and duration of tariff policies.

The second part of the paper employs three data sets to test the hypothesis that tariff rates have no statistically significant impact on a system consisting of the real exchange rate, the real trade balance, and real output (both foreign and domestic). It finds that this hypothesis cannot generally be rejected by using (1) bilateral monthly data for the period 1967-88 on trade between the United States and the other major industrial countries; (2) a century of annual data on trade between the United States and the United Kingdom; or (3) a panel of annual data for the period 1978-85 for 38 countries (including both OECD and developing countries). The empirical results show themselves to be robust to a variety of perturbations to the methodology.

While tariffs may have effects on economic welfare insofar as they shrink the volume of international trade, they appear to have had no statistically significant effects on such macroeconomic variables as the real exchange rate, the trade balance, and economic activity.

I. Introduction

This paper is concerned with the macroeconomic impact of tariffs. We emphasize two points. First, a review of the theoretical literature indicates that the macroeconomic effects of tariffs are ambiguous; there is no presumption that an increase in the tariff rate is likely, e.g., to raise output or to improve the trade balance. Second, there is little evidence that fluctuations in tariff rates have actually had significant effects on such important macroeconomic variables as the trade balance, the exchange rate, and the level of economic activity.

Our analysis is motivated in part by the lack of empirical research on the macroeconomic impact of tariffs; we are aware of almost no econometric analysis which addresses the matter. ^{1/} However, the subject is also of current policy concern. For instance, Branson (1987) suggests an across-the-board tariff increase to reduce the size of current U.S. trade deficits; ^{2/} proposals of trade restrictions against countries whose bilateral trade deficits with the United States exceed some critical value have also been widely discussed (e.g., the 1988 Gephardt Amendment). The infamous Smoot-Hawley Tariff Act was passed in part because of congressional beliefs that tariffs would be expansionary. ^{3/}

In the next section, we review some popular theoretical models which have been used to analyze the macroeconomic effects of tariffs. Section III describes the data and the methodology used in the empirical analysis, while the main empirical results are presented in Section IV. The final section concludes.

II. Theoretical Overview

1. A Keynesian model

The usual textbook analysis of the macroeconomic effects of a tariff considers a small country, with fixed prices, flexible output, and a fixed exchange rate. ^{4/} Output is demand determined and world prices are given; the model is completely static. The domestic country produces good Y at price P (supply is perfectly elastic), but consumes both the domestic good and a foreign good. The price of the foreign good in domestic currency is eP^* , where e is the exchange rate (defined

^{1/} Helkie et al. (1988) use simulation techniques on a large macroeconomic model and conclude that protectionist policies are ineffective in reducing trade imbalances while avoiding recession.

^{2/} See also Dornbusch (1987).

^{3/} See, e.g., Mann (1987). Kindleberger (1986) argues that the macroeconomic effects of Smoot-Hawley were in fact contractionary.

^{4/} The exposition that follows is drawn from Dornbusch (1980, pp. 65-66) although a similar analysis may be found in other texts.

as units of domestic currency per unit of foreign currency) and P^* is the price in foreign currency of a unit of the foreign good. Imports are a function of relative prices, $q = eP^*/P$, and real income in terms of domestic goods, Y , while foreign imports (our exports) are a function of relative prices only, foreign output being assumed constant (or rather unaffected by shocks emanating in the domestic country). The trade balance equals the excess of the value of exports over the value of imports. Measured in terms of the domestic good, the balance of trade, BT , may therefore be written as:

$$BT = M^*(q) - qM(q, Y) \quad (1)$$

where M^* denotes foreign imports and M denotes domestic imports from the rest of the world. Output equals the sum of domestic expenditure $E(Y)$, and net exports:

$$Y = E(Y) + BT(q, Y) \quad (2)$$

Consider the imposition of an ad valorem tariff on imports at rate τ . The domestic relative price of imports rises to $q(1+\tau)$ while the world relative price is unchanged. If the tariff revenues are not redistributed (so that the government runs a budget surplus), then (2) becomes:

$$Y = E(Y) + BT(q, \tau, Y) - \tau qM(q(1+\tau), Y) \quad (2')$$

Net exports depend on the tariff rate because imports are a function of the internal relative price, $q(1+\tau)$, while exports are a function of the world relative price, q . The last term in (2') reflects the negative demand for domestic goods by the government (i.e., the budget surplus).

Differentiating equation (2') around an initial equilibrium of free and balanced trade yields:

$$dY/d\tau = M^*(\alpha-1)/(1-E_y + m) \quad (3)$$

where: α is the absolute value of the price elasticity of import demand; m is the marginal propensity to import; and $0 < 1-E_y < 1$ is the marginal propensity to save.

Output rises if import demand is sufficiently price elastic (i.e., α exceeds unity) but falls otherwise. The intuition is straightforward. Because the tariff revenue is not redistributed, the tariff is a combination of an expenditure-switching policy and an expenditure-reducing policy. The expenditure-switching part serves to raise demand, and hence supply, of the domestic good. However, because the government does not redistribute the tariff revenue, there is in addition an income effect which tends to reduce demand for domestic goods. Only if import demand is sufficiently price elastic will the substitution effect dominate and the overall effect of the tariff be expansionary.

Differentiating the expression for the trade balance and using (3) yields:

$$dBT/d\tau = \{[\alpha(1-E_y)+m]/(1-E_y+m)\}M^* > 0 \quad (4)$$

A tariff switches domestic expenditure from foreign to domestic goods; the trade balance necessarily improves as a result. The improvement in the trade balance exceeds, falls short of, or is equal to the budget surplus, according to whether the tariff induces a rise, fall, or no change in output.

Several aspects of the analysis are noteworthy. First, the revenue-redistribution scheme adopted by the government will affect the magnitude, and possibly even the sign of the comparative static results. If the tariff proceeds are redistributed to consumers, then the only effect of the tariff is a pure substitution effect in favor of the domestic good, so that the output effect of a tariff is necessarily expansionary. At the same time, the trade balance effect will be lower (but still positive).

Second, the assumption that the exchange rate is fixed is crucial for the comparative static results. Suppose that the exchange rate adjusts to maintain external balance, so that $BT(.) = 0$. Then it can be shown ^{1/} that a tariff which would improve the trade balance, were the terms of trade to stay constant, instead leads to a real appreciation (improvement in the terms of trade) to maintain external balance. In this case, (2) reveals that the tariff has no effect on the level of output.

Third, the analysis above assumed that the level of expenditure, $E(.)$, is independent of relative prices. In general, however, there is no particular reason for this to be the case. There are two conflicting forces at work. A deterioration in the terms of trade serves to reduce expenditure on relatively more expensive foreign goods and hence raise spending on domestic goods via a substitution effect. In addition, however, the deterioration in the terms of trade lowers real income and this tends to reduce spending on domestic goods. The net effect is therefore ambiguous but is thought by some (e.g., Laursen and Metzler (1950) and Mundell (1961)) to be dominated by the substitution effect.

Suppose that the expenditure function in (2) is replaced by the more general function $E(q, Y)$, in which expenditure (in terms of domestic goods) depends on both relative prices and income, with $E_q > 0$ (the Laursen-Metzler assumption). If the exchange rate adjusts to maintain external balance, a tariff leads to an improvement in the terms of trade, i.e., to a fall in q , the effect of which is to raise real income and hence saving out of any given level of nominal income. The

^{1/} We assume in what follows that the government runs a balanced budget.

lower demand for domestic goods causes a fall in domestic production. 1/ This result (originally proved by Mundell (1961)) stands in sharp contrast to the case in which relative prices are fixed so that higher tariffs have an expansionary effect on output.

Further, a tariff may have contractionary effects even in the absence of a Laursen-Metzler effect on saving. In the Mundell-Fleming model of flexible exchange rates and perfect capital mobility, the interest rate is exogenous; therefore the imposition of a tariff cannot have any lasting effect on the value of nominal income. Redistributed tariff revenues raise disposable income; therefore income from production must fall when tariffs rise. Moreover, since the marginal propensity to spend is less than unity by assumption, the tariff engenders a trade deficit and corresponding capital account surplus. The intuition is simply that the tariff leads to an incipient interest rate differential which causes a real appreciation; the latter crowds out net exports. Eichengreen (1981) and Krugman (1982) have shown that, while these results are suggestive of the long-run effects of permanent tariffs, temporary tariffs in general have ambiguous effects on macro-economic variables of interest, at least in the short run.

Fifth, the model of equations (1) and (2) can be expanded to include repercussion effects due to changes in foreign output. Suppose that domestic exports, $M^*(.)$, depend on the level of foreign output, Y^* , and relative prices, q , and that the domestic country is no longer "small" in the world economy so that changes in the tariff have effects on the level of foreign output. It is easily shown that the (domestic) output effect of a tariff is smaller in this case than in the original case in which Y^* is exogenous. The intuition is simply that a tariff that increases domestic net exports has a negative effect on foreign output. The fall in Y^* reduces demand for domestic exports so that the repercussion effect on Y is negative.

Finally, the analysis thus far has assumed that foreigners do not respond to the tariff. If the foreign country retaliates by raising its own tariff, the effects on output (both foreign and domestic), the trade balance, and the real exchange rate are in general ambiguous. 2/

To sum up, tariffs do not have clear-cut effects on the macro-economy in Keynesian models. Comparative static results depend

1/ The presumption of a contractionary effect is strengthened when money is introduced into the model, since the redistributed tariff revenue creates an additional demand for money, requiring a fall in income from production to clear the money market (see Chan (1978), Eichengreen (1981) and Krugman (1982)).

2/ Krugman (1982) argues that, even in those circumstances in which a tariff raises output and improves the terms of trade when other countries are passive, "symmetric retaliation" will result in lower output and unchanged terms of trade.

critically on assumptions concerning inter alia fiscal policies (especially whether tariff revenue is redistributed); the exchange rate regime; the Laursen-Metzler effect; the degree of capital mobility; and repercussion and retaliation effects.

2. A monetary model

An alternative approach to the analysis of the macroeconomic effects of tariffs is provided by the monetary approach to the balance of payments; see Mussa (1974).

The monetary approach assumes that the economy's long-run real equilibrium is given by the standard two-sector (Heckscher-Ohlin) model of international trade. In such a model, a tariff raises the internal relative price of import-competing goods and therefore leads to an increase in production and a fall in consumption of importables. Thus a tariff reduces the volume of imports. The tariff also increases consumption and reduces production of exportables, so that the volume of exports also declines. In fact, the main effect of a tariff in such a model is to reduce the volume of trade, leaving the trade balance unchanged. The interesting issue is therefore distributional; i.e., how does the tariff affect income distribution between the factors of production? 1/

Although the long-run equilibrium is characterized by the condition of balanced trade, the adjustment path toward this long-run equilibrium is characterized by changes in the economy's net borrowing position. Mussa (1974) shows that the dynamic trade balance effects of the tariff are ambiguous. Consider the case in which the economy is completely specialized in the production of the export good. Suppose further that the government raises a (pre-existing) tariff on imports and redistributes the proceeds to consumers in a nondistortionary fashion. Finally, suppose that the demand for nominal money balances is proportional to the value of income in terms of the domestic good and that the monetary authorities hold the domestic component of the money supply fixed.

As long as the domestic economy is a price taker in world markets, the income of consumers (measured in terms of the domestic good) varies only according to the redistribution of the tariff proceeds. Income will rise, fall, or remain constant depending on whether the original tariff rate falls short of, exceeds, or is equal to that tariff rate which maximizes revenue (i.e., the product of the tariff rate and the initial value of imports). Consequently, the excess flow demand of money (i.e., the trade surplus) will increase if the initial tariff rate is initially below the revenue-maximizing rate. Succinctly, both (disposable) income and the trade balance may either rise or fall when the tariff is raised.

1/ Standard trade theory shows that the tariff will tend to benefit the factor used intensively in the import-competing sector.

3. An optimizing model

A third approach to the analysis of the open economy has recently been developed. In this work, agents' spending and saving decisions are viewed as solutions to the problem of maximizing an intertemporal utility function subject to lifetime solvency constraints. Razin and Svensson (1983) consider a model of a small open economy which produces and consumes two goods in each period, and faces fixed world prices and interest rates. Firms maximize profits subject to the economy's endowment of productive factors and given technology. Consumers maximize lifetime utility subject to the constraint that the present value of their spending not exceed the present value of their income. From the point of view of the economy, this constraint is equivalent to the condition that the present value of the sum of the economy's current and future trade surpluses equal the economy's historically given external debt commitment.

Razin and Svensson emphasize that the effects of tariffs on saving, and therefore (*ceteris paribus*) the trade balance, depend crucially on the timing and expected duration of changes in the tariff rate. A temporary tariff will have very different effects on the trade balance from those of a tariff which is expected to be permanent. A temporary tariff raises the price of current consumption relative to future consumption. Agents will substitute consumption intertemporally (consuming less today and more in the future) by lending in the international capital market, i.e., by running a trade balance surplus. Thus, tariffs which are viewed as temporary lead to a trade surplus.

In contrast, a tariff which is expected to be in place permanently will not induce such an intertemporal substitution effect. In fact, if the initial equilibrium is stationary (in the sense that expenditure shares are constant through time), a permanent tariff will leave intertemporal consumption decisions, and hence the trade balance, completely unaffected.

The Razin-Svensson model has since been extended in a number of directions. Edwards (1989) and Ostry (1988) consider the issue of how tariffs affect the real exchange rate and, in turn, the trade balance. The dynamic behavior of the real exchange rate after a change in the tariff depends upon the ease with which agents substitute consumption within a period (i.e., the elasticity of substitution between tradables and nontradables in a given period) versus the degree of substitution in aggregate consumption across time periods (the intertemporal elasticity of substitution in consumption or the reciprocal of the coefficient of relative risk aversion). Depending on the parameter values, a temporary tariff may improve, worsen, or leave the trade balance unchanged.

Van Wijnbergen (1987) has extended the Razin-Svensson framework to include contract-based real wage rigidities. If nominal wages are indexed to consumer prices (which depend on the prices of both domestic and foreign goods), then a small country which raises a tariff

temporarily will experience an increase in the internal price of the foreign good, although the domestic price of the domestic good will not be changed. The tariff therefore leads to a higher real product wage; if employment is demand determined, unemployment will consequently rise. This (transient) unemployment reduces real income temporarily; agents smooth their consumption by borrowing in the international capital market, i.e., by running a trade deficit. Thus, with real wage rigidities, a temporary tariff may worsen the trade balance, in contrast to the Razin-Svensson result. A similar finding is obtained by Ostry (1988) without the assumption of real wage rigidities by considering the case in which the government raises an initially positive tariff.

To summarize, a careful reading of the theoretical literature does not lead to a clear conclusion about the effect of a tariff on, e.g., the trade balance or the level of output. The effect depends on the timing and expected duration of the tariff shock, on the behavior of real wages and exchange rates, and on the values of a variety of elasticities, as well as on institutional factors such as the degree of capital mobility and the exchange rate regime. Any presumption that tariffs tend, e.g., to improve the trade balance and raise output, must therefore be based on empirical rather than theoretical knowledge. With this in mind, we turn to the data.

III. Empirical Framework

1. Data

The tariff data which we use are available through the Census Bureau, and are seasonally adjusted. Data are available on the values of: duty-free imports, dutiable imports, and calculated duties. These variables are available on a monthly basis from 1967 through 1988 (when the data were discontinued). The data exist on a bilateral basis, so that the value of, e.g., dutiable U.S. imports from Japan is known, as are the relevant duties. We have collected data for bilateral trade between the United States and the six other countries in the "Group of Seven" (G-7): the United Kingdom, Canada, France, the Federal Republic of Germany, Italy, and Japan. ^{1/}

Two measures of the tariff rate are immediately available from our data: tariff revenues divided by the value of dutiable imports (denoted τ_1 below); and tariff revenues divided by the sum of both dutiable and nondutiable imports (denoted τ_2). We focus on the latter measure below, but use both measures in our empirical work.

^{1/} We choose the G-7 countries for intrinsic interest, noting that they account for over half of U.S. imports (both dutiable and duty-free) and tariff revenues during the sample in question. However, the bilateral tariff data exist for other countries, and it would be interesting to extend the results to, e.g., developing countries.

Both measures of the tariff rate show a persistent downward trend throughout the period (a result of the Kennedy and Tokyo GATT rounds). A typical tariff rate (τ_2 for Japanese imports) is depicted in Figure 1. 1/ The tariff rates vary considerably from country to country as well as over time. For instance, in November 1988, the second measure of the tariff rate (τ_2) ranged from 1 percent for Canadian imports to 5.7 percent for Italian imports; in January 1967, the comparable rates were 2.3 percent and 15.3 percent. 2/ The growth rates of the tariff rates have positive but low correlations across countries.

Both measures of the tariff rate are clearly imperfect proxies for the ideal variable, which is the effective marginal tax on imports. Two considerations of particular interest are: (a) substitution bias; and (b) bias from the effect of nontariff barriers (NTBs).

Substitution bias arises from the fact that a tax on a given product leads both foreign production and domestic consumption of that good to fall; goods with high tariffs tend not to be imported. 3/ Succinctly, the (observed) average tariff rate is not the marginal rate. Our tariff rate measures will therefore tend, ceteris paribus, to understate the actual tariff rate; consequently, the estimated tariff rate elasticity will tend to be biased upward, and the null hypothesis of no effect of the tariff rate will tend to be rejected too frequently. 4/

The second consideration is more subtle: the tariff rate may be a poor proxy for the actual level of protection. Protection of imported intermediates implies that the effective rate of protection may differ considerably from our tariff rate. More importantly, for a variety of (mainly political) reasons, NTBs have recently been used for protection instead of tariffs. Particularly over the last part of our sample, our proxies for the tariff rate will therefore understate the actual rate of protection. Because fluctuations in the tariff rate may be (negatively) correlated with the unobservable "NTB rate," the former may not be statistically exogenous, at least during the latter portion of our sample. We attempt to address this difficulty by examining a variety of countries facing differing degrees of NTB protection, and also by examining the stability of our results over time.

1/ There does not appear to be any fundamental explanation of the apparent outlier in August 1978.

2/ The volatilities of the growth rates of the tariff measures also vary noticeably, both across countries and tariff rate measures.

3/ If there is incomplete specialization, there will be additional effects on domestic production and foreign consumption which may also contribute to substitution bias.

4/ As our empirical work below indicates that the null hypothesis cannot generally be rejected, this bias strengthens our results, so long as standard errors are not substantially biased.

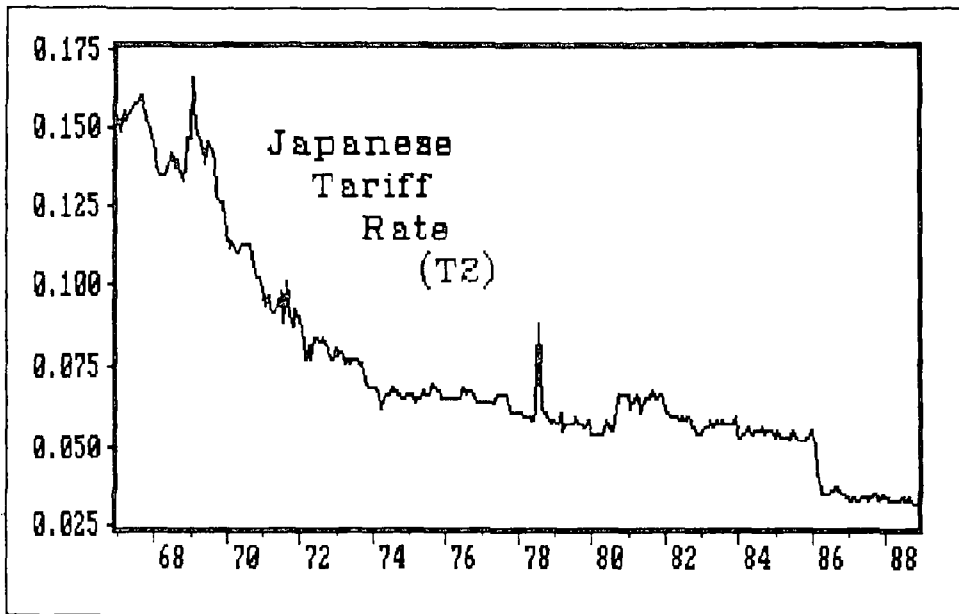


Figure 1: Japanese Tariff Rate

Another potentially serious econometric problem results from the fact that changes in the U.S. tariff rate may be highly correlated with foreign tariff rates (data which, to the best of our knowledge, are not readily available). This could result either from foreign retaliation, or from coordinated rounds of GATT tariff reduction. We attempt to handle this issue by comparing our results with those obtained from the pre-GATT period.

Despite the imperfect nature of our data, we note in passing that the latent variable in question ("the tariff rate") is more likely to be econometrically exogenous than most variables traditionally used by macroeconomists. Since tariff rates tend to be set either in GATT rounds or on the basis of microeconomic issues, the rates are not likely to be influenced by cyclical considerations. Broadly speaking, tariffs can be characterized as nondiscretionary fiscal policy. ^{1/}

The other variables needed for estimation are more conventional and are fully described in the data appendix. They include measures of: foreign and domestic industrial production; the real bilateral exchange rate (CPIs are used as the price deflators); and the real trade balance. Trade flows are measured both at U.S. and at foreign borders; consequently, two measures of the trade balance are available (denoted by the superscripts "D" and "F," respectively).

2. Methodology

We use a nonstructural methodology to examine the impact of fluctuations of tariff rates on four aggregate variables which theory indicates to be of particular interest. In particular, we estimate vector autoregressions (VARs), which model domestic and foreign output, the real balance of trade, and the real exchange rate as functions of lags of the (four) endogenous variables. We then test the hypothesis that (lags of) the tariff rate do not add statistically significant explanatory power to this system. Our data do not reject this hypothesis at traditional significance levels.

A VAR is a convenient representation which incorporates dynamic feedback from each variable included in the vector to every other variable. It is similar to a reduced-form model in that the regressors can be treated as exogenous; however, a VAR is based on fewer assumptions than a traditional structural model in that all variables are treated symmetrically. Since we are interested in the impact of tariffs on four macroeconomic variables (the trade balance, exchange rate and domestic and foreign output), it is appropriate to use a VAR to link these variables to the tariff rate.

^{1/} The data indicate that tariff revenues do not seem to be redistributed. In particular, the tariff rate, and, to a much smaller degree, tariff revenues, have positive but small correlations with the federal budget surplus.

The fact that a VAR does not deliver structural parameter estimates is both an advantage and a disadvantage. On the one hand, using an atheoretical statistical methodology implies that our inferences are not based on possibly fallacious auxiliary assumptions about the relevant data generation process. That is, our inferences are not restricted by the validity of secondary hypotheses concerning, e.g., the appropriate structural models of trade flows, the exchange rate, or output. On the other hand, our tests may be sensitive to the information set considered. ^{1/} We attempt to account for this problem by checking the robustness of our results extensively. Further, some loss of power is inherent in the estimation of a nonparsimonious VAR system. Bayesian priors are used in some of the estimates in an attempt to improve statistical efficiency.

It is important to state from the outset that our goal is not to test a specific structural model of the transmission mechanism between tariffs and the macroeconomy. Rather, we attempt to discover the existence of a stable relationship consistent with any of the theoretical models discussed in Section II.

3. Preliminary diagnostics

We begin our empirical analysis by examining the time series properties of our data. In particular, we test for unit roots in the univariate representations of the variables and a cointegrating relationship between the four key macroeconomic variables and the tariff rate. For a recent survey on unit roots and cointegration, see Stock and Watson (1988).

Many macroeconomic variables tend to drift over time in a manner that loosely resembles a random walk (technically, such variables are said to have a unit-root). For instance, consumption (like the stock market) can be predicted "well" by its current level; the growth rate of consumption (like the return on stocks) is random. Equivalently, innovations to the level of consumption do not tend to be reversed over time, i.e., shocks are permanent. If a number of such variables (e.g., consumption and income) tend to drift in a similar fashion so that they do not diverge "too much" over time, the series are said to be cointegrated; they share a common trend. If two (or more) variables each have a unit-root, but are not cointegrated, there is no steady state relationship linking the variables.

Testing for the presence of cointegration between the tariff and our remaining set of macroeconomic variables is important for two reasons. From an economic standpoint, cointegration is a prerequisite for the existence of a stable, long run relationship among our variables. Second, the presence (or not) of cointegration has important

^{1/} This statement is true of all tests of Granger "Causality."

statistical implications for the form of the VARs; the absence of cointegration implies that a VAR can be consistently estimated if each of the variables is first-differenced.

The null hypothesis that each of the variables (the real trade balance, domestic and foreign real output, the real exchange rate, and the tariff rate) has a unit root cannot generally be rejected at conventional significance levels with standard tools. The Dickey-Fuller tests displayed in Table 1 have a constant and are augmented by four lags of the difference; the sample period is 1967:6 through 1988:10, for a sample size of 257 observations. A departure from the null hypothesis of a unit root at the 0.05 (0.01) level is indicated by an (two) asterisk(s). All variables except the trade balance are initially transformed by natural logarithms.

Table 1. Augmented Dickey-Fuller Unit Root Tests

	United Kingdom	Canada	France	Germany	Italy	Japan
BT ^D	-3.25*	-2.54	-2.59	-1.39	-1.38	-0.46
BT ^F	-3.84**	-2.15	-2.47	-1.40	-1.31	-0.20
q	-1.62	-1.21	-1.86	-1.67	-1.90	-0.97
Y*	-1.26	-1.13	-2.37	-3.53**	-1.57	-1.96
τ_1	-1.62	-2.66	-1.67	-2.03	-2.15	-1.29
τ_2	-1.63	-2.78	-1.02	-1.87	-2.06	-1.03
Critical value 0.05	-2.88					
Critical value 0.01	-3.46					

The unit root tests are consistent with the presence of unit root nonstationarity in most of the variables. The exceptions are both U.S. and foreign measures of the bilateral U.S.-U.K. real trade balance. ^{1/} In addition, the German industrial production index does not appear to have a unit root (although this result is extremely sensitive to the sample size). The results for the tariff rates are particularly important, as they are inconsistent with the hypothesis that most tariff shocks are expected to be temporary in nature (a matter to which we shall return below). This accords both with common sense and with the results of Gardner and Kimbrough (1988). In the context of the inter-

^{1/} In all cases, the hypotheses that imports and exports separately, as well as the nominal trade balance, have unit roots cannot be rejected at traditional significance levels.

temporal approach to the trade balance, the apparently permanent nature of tariff shocks also leads to the presumption that tariffs will have only minor effects (see Section II.3).

The primary questions of interest in this paper are multivariate rather than univariate in nature; we are interested in examining the impact of the tariff rate on a variety of variables, including domestic and foreign output, the real exchange rate, and the balance of trade. Given the presence of unit root nonstationarity in our variables taken one at a time, the existence of stable relationships between our variables depends on whether they are jointly cointegrated. A vector of variables is (most commonly) said to be cointegrated if each element of the vector has a single unit root, but some linear combination of the variables does not.

We tested for cointegration using the augmented Dickey-Fuller statistics recommended by Engle and Yoo (1987). These tests are augmented Dickey-Fuller tests for a unit root in the residual of the "cointegrating equation." The latter is merely an OLS regression of one variable (e.g., the tariff rate) on the other variables (e.g., the real exchange rate, domestic and foreign output, and the real trade balance). The tests are augmented by four lags of the differenced residual, and contain a constant. The sample is again the 257 observations from 1967:6 through 1988:10. The tests are reported in Table 2 for both measures of the trade balance; the regressands are the tariff rates.

Table 2. Augmented Dickey-Fuller Cointegration Tests

Regressand	United Kingdom	Canada	France	Germany	Italy	Japan
U.S. trade balance measure						
τ_1	-2.76	-2.87	-4.71*	-3.32	-3.12	-4.25
τ_2	-2.88	-3.50	-3.60	-3.09	-3.18	-4.13
Foreign trade balance measure						
τ_1	-2.58	-3.05	-4.50*	-3.54	-3.14	-4.10
τ_2	-2.48	-3.20	-3.40	-3.31	-3.05	-4.00
Critical value 0.05	-4.50					
Critical value 0.01	-4.96					

The cointegration tests show relatively little evidence of cointegration between the relevant variables. 1/ The very weak signs of cointegration have also been confirmed in two additional ways: by cointegration tests of the "reverse" regressions; 2/ and by the tests for cointegration proposed by Johansen (1988). 3/ However, no method delivers strong evidence of cointegration. This finding is consistent with the hypothesis that there is no steady-state relationship between the tariff rate and the four macroeconomic variables of interest.

IV. Results

Given the relatively strong evidence of unit roots in our variables, and the weak evidence of cointegration, we estimate our VARs in differences, but include the residual from a cointegrating equation as a regressor to ensure consistent estimation. 4/ To check the robustness of our findings, we also estimate our VARs in levels.

Most of our empirical results arise from a VAR of the form:

$$\Delta X_t = \alpha + \beta(L) \Delta X_{t-1} + \delta U_{t-1} + \Phi(L) \Delta \tau_{jt} + \varepsilon_t \quad (5)$$

where: L is the lag operator, $Lz_t = z_{t-1}$; Δ denotes the difference

operator $(1-L)$; $X_t' = (BT^i, q, y, y^*)$; BT^i is one of the two measures of the real bilateral trade balance; q is the logarithm of the real bilateral exchange rate; y is the logarithm of the domestic (U.S.) industrial production index; y^* is the logarithm of the foreign industrial production index; τ_j is the logarithm of the j th measure of the

1/ Using the nominal trade balance in place of the real trade balance does not change results.

2/ There is no reason for the tariff rate to be used as the sole regressand; the "reverse" regression with, e.g., the trade balance as the dependent variable (and the remaining four variables as regressors), can also be used as the cointegrating equation. We have calculated the augmented Dickey-Fuller cointegration tests for all 96 (six countries x two measures of trade balance x two measures of tariff rate x four alternative regressands) reverse regressions. Almost uniformly (in 92 out of 96 cases), they are consistent with the hypothesis that there is no cointegration between the trade balance, the exchange rate, domestic and foreign output, and the tariff rate.

3/ The Johansen tests--which are valid under more general conditions than the standard Dickey-Fuller tests--indicate that there is one and possibly two cointegrating vectors in the five-variable system. This result is robust to various measures of the trade balance and the tariff rate.

4/ The results do not change if the cointegrating residual is dropped.

bilateral tariff rate; u is the residual from a (cointegrating) regression of BT^i on a constant, q , y , y^* , and τ_i ; and ε is a random disturbance term which represents omitted factors, assumed to be iid.

The hypothesis of interest to us is that the tariff rate has no effect on any of the four macroeconomic variables of interest, i.e., $\phi(L) = 0$.

We include 24 (monthly) lags in our basic VAR results. While standard likelihood ratio tests indicate that the systems could be reduced to 12th-order systems, we are wary of an excessive reduction in the lag length, given the existing literature which stresses the long lag length of price variables in international trade flow equations, e.g., Goldstein and Khan (1985). Allowing for two years' worth of lags sets our sample period of estimation at 1969:2 through 1988:9. There are no indications that more than two years' worth of lags is warranted.

The relevant test statistics appear in Table 3. Under the null hypothesis that the tariff rate does not affect any of the variables of interest, the test statistics are distributed as chi-squares, with 96 degrees of freedom.

Table 3. Chi-Square Tests of the Joint Impact of Tariff Rates

	United Kingdom	Canada	France	Germany	Italy	Japan
Domestic trade balance measure						
τ_1	105	86	61	101	88	109
τ_2	98	88	98	98	99	108
Foreign trade balance measure						
τ_1	97	78	76	78	96	87
τ_2	96	76	84	76	99	89
Critical value 0.10	114					

The data are manifestly unable to reject the hypothesis that the tariff rate has not had a stable and statistically discernible joint effect on the four variables of primary interest.

While the evidence presented in Table 3 presents the impact of the tariff rate on the system of four endogenous variables, it is of

interest to examine the impact of the tariff rate on each of the four variables of interest. Indeed, the negative results of Table 3 could conceal a strong and consistent impact of the tariff rate on (say) one of the variables of interest, or a variety of important but transient effects.

Table 4 presents some evidence relevant to this issue. F-tests are tabulated for the hypothesis that 24 lags of the (difference of the) bilateral tariff rate have no joint impact on the macroeconomic variable in question, once the effects of (24) lags of all four macroeconomic variables have been partialled out (these F-tests are the single equation analogues to the system wide chi-square tests of Table 3). Also tabulated are the point estimates of the cumulative impact of the 24 lags of the tariff rate. Test statistics which are significantly different from zero at the 0.05 significance level (thereby rejecting the null hypothesis of no effect of the tariff rate) are denoted by an asterisk. None of the test statistics is significant at the 0.01 level. The tests were computed using the U.S. measure of the trade balance and the τ_2 measure of the tariff rate.

Table 4. Hypothesis Tests of $\phi = 0$ by Variable

	United Kingdom	Canada	France	Germany	Italy	Japan
Trade balance						
F (24,114)	1.80*	0.96	0.75	1.50	1.00	1.51
$\Sigma\phi$	26.59	13.48	-49.66	14.00	-3.31	-11.55
Exchange rate						
F (24,114)	1.49	1.39	0.86	1.10	0.67	1.10
$\Sigma\phi$	0.38	0.07	-0.52	-0.46	0.11	-1.09*
Output						
F (24,114)	0.84	1.00	0.59	1.39	1.20	1.53
$\Sigma\phi$	0.08	-0.03	-0.05	0.09	0.20	-0.30*
Foreign output						
F (24,114)	0.70	0.55	0.50	0.64	1.23	1.03
$\Sigma\phi$	0.09	-0.05	0.30	-0.16	-0.74	-0.21
* denotes significance at the 0.05 level						

There is little evidence that (lags of) the tariff rate have a consistent but transitory impact on the macroeconomic variables, or that the tariff rate tends to have a noticeably stronger impact on some of

the macroeconomic variables than on others. The F-tests do not typically reject the hypothesis that 24 monthly lags of the tariff rate jointly have no significant impact on each of the four variables of interest. The cumulative impact of the tariff lags varies considerably by country; that is, the tariff rate does not appear to affect any of the variables in a uniform way across countries. Increases in the tariff rate are associated with worsening of the bilateral trade balances vis-à-vis France, Italy, and Japan, but with improvements for the other countries; increases are also associated with appreciations for France, Germany, and Japan. Virtually none of the cumulative point estimates are statistically distinguishable from zero. The economic size of the tariff rate coefficients is generally reasonable, but varies widely by both variable and country. The (cumulative) exchange rate elasticities are typically less than unity, while the output elasticities tend to be much smaller.

1. Robustness

We have extensively checked the sensitivity of the results of Tables 3 and 4 to a variety of economic and statistical perturbations of our basic methodology. In this section of the paper, we describe briefly these checks for robustness. However, there is no evidence that our results are affected by changes in the way in which our system is estimated.

We estimated our VAR systems with both more (36) and less (12) lags to test the sensitivity of the results. However, the results do not seem to be affected by the lag length. ^{1/}

We have argued that the tariff rate can be treated as an exogenous variable. If this is appropriate, the reduced form of the structural system which leads to (5) would include the contemporaneous values of the tariff rate, as well as lagged values. However, when the contemporaneous values of the tariff rate are added to our system, the results are not changed.

Theory suggests that the effects of tariffs may depend on the exchange rate regime. We have changed our period of estimation in a variety of ways to ensure that our results do not depend on the fact that our sample spans fixed and flexible exchange rate regimes. Our results are quite insensitive to the exact choice of a sample period (e.g., test statistics are similar when only the post-Bretton Woods regime of floating rates is used in estimation).

Estimating our system in (logarithms of) levels instead of differences does not lead to different results.

^{1/} The only exception occurs when the lag length is reduced to one year and the U.S. measure of trade with Italy is used, in which case

(lags of) τ_2 are statistically significant.

Using the PPI instead of the CPI does not change any results. Also, using employment in place of industrial production does not affect the results. ^{1/}

As stated in the previous section, the theoretical effects of a tariff depend on whether the tariff is expected to be temporary or permanent. We used the Beveridge and Nelson (1981) technique to decompose the tariff into temporary and stationary components. This technique makes an important and potentially restrictive identifying assumption, namely, that the two unobserved components are perfectly correlated; for a survey of related issues, see Stock and Watson (1988). ^{2/} Negative results are again obtained when we estimate the system in levels and replace the actual tariff rate with either the temporary or permanent component of the tariff rate.

Our results do not change when the effects of the real U.S. federal budget deficit are taken into account. ^{3/} Thus, controlling for possible effects of the revenue redistribution scheme does not seem to make a difference.

Finally, we have used a variety of Bayesian priors in an attempt to improve the precision of the fit of our system by using non-sample information. Our priors take the form of maintaining that the VAR system can be well approximated as a first-order univariate autoregression. That is, we use non-sample information to specify zero coefficients and moderate standard deviations for the coefficients of the lagged non-dependent variables. However, our use of Bayesian techniques does not affect the finding that the tariff rate has no discernible impact on the variables of interest. This negative result does not depend on the exact number of lags used in the system.

2. Aggregate results

Our negative results are characteristic not only of bilateral trade between the United States and other G-7 countries; they also hold true for aggregate trade flows between the United States and its trading partners collectively.

We have estimated our system with aggregate variables, using the U.S. real net trade balance; an effective exchange rate in place of the bilateral rate; and global indices of the CPI, industrial production,

^{1/} The relevant data is available for three countries: Canada, Germany, and Japan.

^{2/} To implement the Beveridge and Nelson methodology, we assumed that (the logs of the) tariff rates follow IMA (1,6) processes, univariate models which appear to fit the data reasonably well.

^{3/} Use of national accounts data necessitates estimation at the quarterly frequency.

and the tariff rates, in place of their bilateral counterparts. The methodology used on the bilateral data yields similar results when applied to aggregate data. In particular, two years' worth of lags of the aggregate tariff rate have no statistically discernible impact on the four variables of interest. This result is true of both measures of the tariff rate, and is insensitive with respect to the lag length, estimation in levels or differences, and the exact sample period chosen.

3. Annual U.S.-U.K. evidence

We now confirm the relevance of our monthly results by using a long span of historical evidence on U.S.-U.K. trade flows. We test and cannot reject the hypothesis that our system is not affected by the tariff rate when annual data from 1889 to 1970 are used in place of the monthly postwar data.

There are a number of advantages to using long historical series. NTBs are likely to be less of a problem during the pre-GATT era. Further, the stochastic nature of foreign tariff rates may have changed dramatically as a result of GATT, which coordinates tariff reductions internationally. If tariffs have the same observable effects on macro-economic variables before and after GATT, it is less likely that GATT is responsible for our negative results. Finally, many economic time series appear to be more variable in the prewar period (although this has been the source of much recent debate). Tariff rates were certainly both high and volatile during the period in question. Figure 2 provides a plot of both measures of the tariff rate against time.

Data on bilateral trade flows between the United States and a variety of its trading partners are available on an historical basis from the early 19th century to the present. Measures of real output and prices for both the United Kingdom and the United States are available from the late 19th century to the present, as is the bilateral exchange rate (consistent data for other countries does not appear to be available). However, to the best of our knowledge, no data on bilateral tariff rates is available until 1967. We therefore use measures of the aggregate U.S. tariff rate in place of the unknown U.S.-U.K. bilateral tariff rate. Clearly, these measures will be poor proxies for the relevant bilateral tariff rate if U.S.-U.K. trade differed significantly in composition from aggregate U.S. trade ^{1/} or if the U.S. tariff structure discriminated against the United Kingdom. During the period in question, U.S. imports from the United Kingdom averaged 10 percent of

^{1/} In principle, the hypothesis that U.S.-U.K. trade is similar in composition to aggregate U.S. trade is testable on the basis of existing data. In particular, bilateral data exist at the annual frequency on an historical basis from Foreign Commerce and Navigation of the United States, but only at the commodity level.

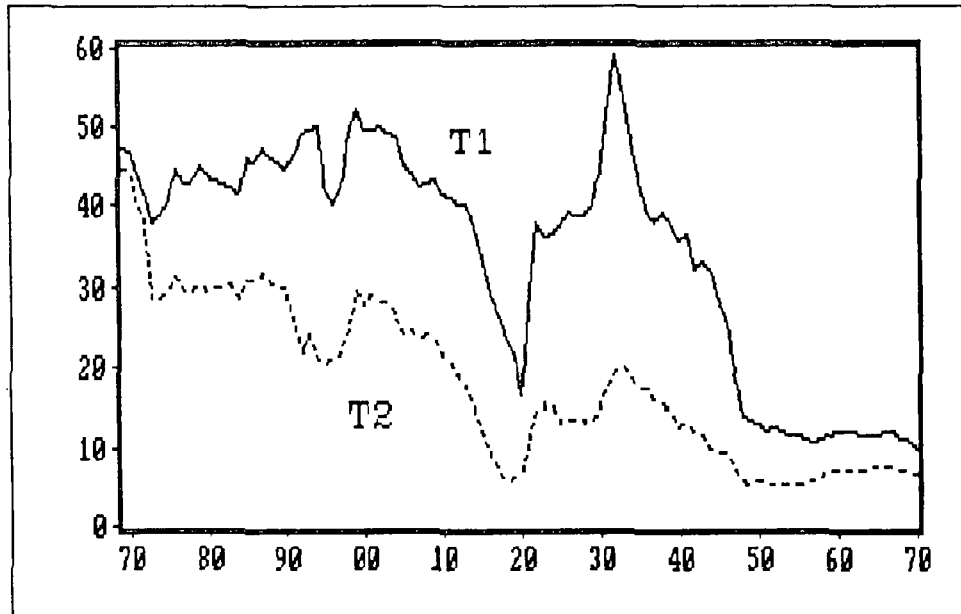


Figure 2: Historical Tariff Rates

total U.S. imports (the maximum was 24 percent), while 23 percent of all U.S. exports were sold in the United Kingdom (at the beginning of the sample over half of all U.S. exports went to the United Kingdom).

We employ the same techniques as were used on our monthly data. In particular, we estimate VARs, treating real bilateral trade balances, U.S. and U.K. real output, and the bilateral real exchange rate as the variables of interest. The VARs are estimated from 1882 through 1970, with two (annual) lags, a constant term, and the residual from a cointegrating equation. We also check the robustness of our results by: estimating the equations in levels; increasing the lag length to three years; and changing the sample size. As in Table 3, we test the hypothesis that the tariff rate has no significant impact on the system; under the null hypothesis, the test statistics are distributed as chi-squares, with tabulated degrees of freedom. The actual test statistics (together with their marginal significance levels in parentheses) are reported in Table 5.

Table 5. Historical Chi-Square Tests of the Impact of Tariff Rates

Sample	Transformation	Lags	DF	τ_1 Test	τ_2 Test
1892-70	Differences	2	8	8.5 (0.39)	10.2 (0.25)
1891-70	Levels	2	8	14.9 (0.06)	2.1 (0.98)
1893-70	Differences	3	12	20.2 (0.06)	14.9 (0.24)
1892-45	Differences	2	8	7.3 (0.51)	9.3 (0.31)

In no case is the null hypothesis of no impact of the tariff rate on our system rejected at the 0.05 significance level. Further, the impact of the tariff rate on each of the dependent variables appears to be small. Finally, the result is robust with respect to changes in the number of lags, the levels/differences transformation, and, most importantly, to changes in the sample size. Our sample period covers a number of different exchange rate and fiscal regimes, as well as differing degrees of capital mobility. As summarized above, theory suggests that results may be sensitive to such factors. However, our results are in fact insensitive to the choice of sample period. For instance, when the postwar (GATT) period is excluded, the tariff rate still does not have any discernible impact. The latter evidence seems inconsistent with the view that the coordinated tariff reductions fostered by GATT are wholly responsible for our negative monthly findings.

4. Evidence from a panel of data

As a final check, we now test our results on a third data set. This data set is a panel of annual data spanning 38 countries from 1978 through 1985. Again we find that our null hypothesis of no significant impact of the tariff rate on our system of macroeconomic variables cannot be rejected.

The data is taken from Government Finance Statistics (GFS) and International Financial Statistics (IFS), both IMF publications. We collect data on both "import duties" 1/ and the more narrowly defined "customs duties" 2/ from GFS; IFS data is used for: imports, exports, nominal and real output, and the real effective exchange rate. Our choice of countries 3/ and sample period was dictated by data availability. Our sample includes a number of developing countries that use tariff revenues as a major source of government revenue.

The equations that we estimate take the form:

$$\Delta x_{i,t} = \alpha + \beta(L)\Delta x_{i,t-1} + \phi(L)\Delta \tau_{i,t} + \epsilon_{i,t} \quad (5')$$

where x is now a vector of three variables (the real exchange rate, the real trade balance, and real domestic output), and all other notation remain unchanged.

We note that (5') is expressed in growth rates, so that country-specific "fixed-effect" intercepts are consistent with the setup. We are forced to drop the cointegrating residual because of the time series size of the sample, although results are not changed if (5') is estimated in levels.

We estimate (5') and use a likelihood ratio statistic to test the hypothesis $\phi(L)=0$. When two lags of the regressors are included, the test statistics indicate that the hypothesis cannot be rejected even at the 50 percent significance level. The same result is true of each of the variables taken one by one; tariffs do not have noticeable effects on any of the variables of interest. These results are robust with respect to: choice of tariff rate measure; choice of lag length and

1/ All levies collected on goods because they enter the country.

2/ Duties levied under the customs tariff schedule and annexes, but excluding consular fees, tonnage charges, statistical taxes, fiscal duties, and other taxes.

3/ The countries included are (listed by IFS code): the United Kingdom, Austria, Denmark, the Federal Republic of Germany, Italy, the Netherlands, Norway, Sweden, Switzerland, Canada, Japan, Finland, Greece, Iceland, Ireland, Malta, Portugal, Spain, Australia, New Zealand, Colombia, Costa Rica, the Dominican Republic, Nicaragua, Paraguay, Venezuela, Guyana, Cyprus, Nepal, the Philippines, Burundi, Cameroon, Zaïre, Malawi, Morocco, Uganda, Zambia, and Fiji.

sample period; addition of time-specific dummies; addition of a measure of global output; and estimation in levels. In other words, there is no evidence that tariffs have a discernible impact on real exchange rates, output, and trade balances, even after pooling data across both countries and time.

V. Summary and Conclusion

Economic theory does not deliver strong implications about the macroeconomic effects of a tariff. Depending upon the nature of the economy, a given change in the tariff rate is consistent with a wide range of fluctuations in the trade balance, output, and the exchange rate, including no effect at all.

In actual fact, we are unable to isolate statistically significant effects of the tariff rate on bilateral trade flows, real exchange rates, or output, either domestically or abroad. These results appear to be quite robust statistically.

However, we certainly do not wish to claim that tariffs do not have potentially important effects on economic welfare. Trade theory predicts that the primary impact of a tariff is to shrink the volume of international trade, rather than, e.g., the balance of trade. While we are not concerned in this paper with modeling the volume of international trade, Rose (1989) has found that tariffs are in fact strongly negatively correlated with the volume of international trade, using a panel of 12 countries over 35 years.

Our inability to isolate significant macroeconomic effects of a tariff is consistent with a number of hypotheses. For instance, tariffs on imported intermediates or NTBs may render the effective rate of protection small and stable, despite fluctuations in measured tariff rates. Alternatively, the behavior of foreign tariff rates may be responsible for our results. "Pricing to market," which results in low pass-through of exchange rate changes to import prices may also account for negligible effects of tariffs, if firms treat exchange rate and tariff changes symmetrically.

However, given that three very different data sets yield similar results, we are most attracted to the conclusion that the important effects of the tariff are not macroeconomic, but instead are distributional in nature (as documented by, e.g., Hufbauer et al. (1986)). We conclude that there is little evidence that tariffs have important effects on the macroeconomic variables considered in this paper, and believe that further research on tariffs should focus on microeconomic aspects.

Description of the Data

The data and programs used in this project are available upon request. The data has been carefully checked through a variety of diagnostic procedures, including descriptive statistics on the levels and differences of the data, and plotting the levels and differences. Numerous errors in the IFS data have been corrected.

Most of the relevant monthly data was collected from the IMF's International Financial Statistics data base. The bilateral variables (IFS mnemonics) are as follows: period average bilateral (US\$ PFX) exchange rates (rf and rh); industrial production index (66..c); CPI (64); PPI (63); and employment (67, 67..c, 67ey and 67eyc). The additional aggregate variables are: the U.S. MERM effective exchange rate (amx); the U.S. net merchandise trade balance (70-71); the global CPI (001..64x); and the industrial country industrial production index (110..66).

The monthly nominal bilateral trade data (all measured in U.S. dollars) is taken from the IMF's Direction of Trade data base; mnemonics for exports and imports are given by xy...ZDz where "x" represents the country doing the trade; "z" represents the trading partner; and "y" is 71 for imports, 70 for exports. It is interesting and distressing that the data for, e.g., German exports to the United States are quite different from U.S. imports from Germany. The two variables are highly correlated in levels, but their growth rates have only a low (and, in the case of the United Kingdom, negative) correlation.

The monthly tariff data is available from Highlights of U.S. Export and Import Trade (FT 990), published by the U.S. Department of Commerce, Bureau of the Census. The data is taken from Section B, "Imports for Consumption--World Area and Country of Origin" (the exact table number varies over time). "Imports for consumption" measures total merchandise cleared through customs, either because it directly enters consumption channels, or because it is withdrawn for consumption from warehouses under customs' custody. The data is available on a "customs value basis," which represents the price actually paid for merchandise when sold for exportation to the United States, excluding U.S. import duties, freight, insurance, and other charges incurred in bringing the merchandise to the United States. Relationships between buyers and sellers should not influence the customs value.

Much of the annual data is available in Historical Statistics of the United States. This includes both measures of the tariff rate, bilateral imports and exports, and real GNP. The U.K. measure of real output is spliced from a variety of series, mostly taken from the Abstract of British Historical Statistics. Jeff Frenkel kindly provided us with the bilateral exchange rate and both U.K. and U.S. net national product price deflators (the data is mostly taken from Friedman and Schwartz). Further documentation is available along with the data.

References

- Beveridge, S., and C. R. Nelson (1981), "A New Approach to Decomposition of Economic Time Series into Permanent and Temporary Components," Journal of Monetary Economics 7, 151-74.
- Boyer, R. S. (1977), "Commercial Policy under Alternative Exchange Rate Regimes," Canadian Journal of Economics X-2, 218-32.
- Branson, W. H. (1987), "Comments on 'Macroeconomics and Protection'," U.S. Trade Policies in a Changing World Economy (Stern, ed.) (MIT, Cambridge).
- Chan, K. (1978), "The Employment Effects of Tariffs under a Free Exchange Rate Regime" Journal of International Economics 8, 414-24.
- Dornbusch, R. (1980), Open Economy Macroeconomics (Basic, NY).
- (1987), "External Balance Correction: Depreciation or Protection?" Brookings Papers on Economic Activity 1, 249-69.
- Edwards, S. (1989), "Tariffs, Terms of Trade and the Real Exchange Rate," Economica, forthcoming.
- Eichengreen, B. (1981), "A Dynamic Model of Tariffs, Output, and Employment under Flexible Exchange Rates," Journal of International Economics 11, 341-59.
- Engle, R. F., and Yoo (1987), "Forecasting and Testing in Co-Integrated Systems," Journal of Econometrics 35, 143-59.
- Gardner, G. W., and K. P. Kimbrough (1989), "The Behavior of U.S. Tariff Rates," American Economic Review 79-1, 211-18.
- Goldstein, M., and M. S. Khan (1985), "Income and Price Effects in Foreign Trade," Handbook of International Economics (R. W. Jones and P. B. Kenen, eds.), North Holland.
- Helkie, W., A. J. Hughes Hallett, G. J. Hutson, and J. Marquez (1989), "Protectionism and the U.S. Trade Deficit," CEPR DP. No. 286.
- Hufbauer, G. C., D. T. Berliner, and K. A. Elliott (1986), Trade Protection in the United States (IIE, Washington).
- Johansen, S. (1988), "Statistical Analysis of Cointegration Vectors" Journal of Economic Dynamics and Control, 12-2/3, 231-54.
- Kindleberger, C. (1986), The World in Depression (University of California, Berkeley).

- Krugman, P. (1982), "The Macroeconomics of Protection with a Floating Exchange Rate," Monetary Regimes and Protectionism (Carnegie-Rochester Series on Public Policy Volume 16, K. Brunner and A. Meltzer, eds.), 141-82.
- Laursen, S., and L. A. Metzler (1950), "Flexible Exchange Rates and the Theory of Employment," Review of Economics and Statistics 32, 281-99.
- Mann, C. (1987), "Protection and Retaliation," Brookings Papers on Economic Activity 1, 311-35.
- Mitchell, B. R., and P. Deane (1962), Abstract of British Historical Statistics, (CUP, NY).
- Mundell, R. A. (1961), "Flexible Exchange Rates and Employment Policy," Canadian Journal of Economics 27, 509-17.
- Mussa, M. (1974), "A Monetary Approach to Balance of Payments Analysis," Journal of Money, Credit, and Banking 6, 333-51.
- Ostry, J. D. (1988), "Intertemporal Optimizing Models of Small and Large Open Economies with Nontradable Goods," unpublished Ph.D. dissertation.
- Razin, A., and L. Svensson (1983), "Trade Taxes and the Current Account," Economics Letters, 13-1, 55-57.
- Rose, A., (1989), "Why has Trade Grown Faster Than Income?" unpublished.
- Stock, J. H., and M. W. Watson (1988), "Variable Trends in Economic Time Series," Journal of Economic Perspectives, 2-3, 147-74.
- Van Wijnbergen, S. (1987), "Tariffs, Employment, and the Current Account," International Economic Review 28-3, 691-706.
- U.S. Department of Commerce, Bureau of the Census (1975), Historical Statistics of the United States, (GPO, Washington).

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Debt Growth and the Prospects for
Debt Reduction: The Case of Sub-Saharan African Countries

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Abstract

This paper analyzes the causes of growth of Africa's debt burden, and discusses the factors that induced African countries to seek external loans as well as the factors affecting the supply of external financing. The paper studies the development of some measures of debt burden for different categories of African debtors, and arrives at a hypothesis regarding feasible levels of debt and debt service ratios. In a final section, the paper discusses the options for debt relief using a simulation of payments ability.

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Summary

Since 1980, Africa's debt burden has increased substantially, to the point where many countries have found it difficult to service the debt in an orderly manner. The growth of the debt has been due to several factors, including deteriorating external terms of trade, inadequate policy response, and the narrow productive base of most of the countries.

This paper analyzes the causes of Africa's debt burden. It discusses the factors that induced African countries to seek external loans, and also examines the sources of external financing of these loans. The paper notes the relatively large involvement of official lenders (as compared with commercial bank lenders) in Africa, and the increasing importance of debt rescheduling in recent years.

The paper studies the developments of some measures of debt burden for different categories of African debtors, and suggests that the maximum sustainable debt service and debt ratios for the sub-Saharan African countries are 25-30 percent and 150-180 percent, respectively.

In order to restore normal external payments relationships and at the same time increase the ability of these countries to pursue income and employment growth, the paper argues that it would be necessary to consider debt relief and to expand exports.

I. Introduction

The debt burden of the poor countries in sub-Saharan Africa is emerging as a concern of creditors and debtors alike. There is a growing consensus that Africa has been at least as affected by the global debt crisis as any other region. The gap between the scheduled debt payments of African debtors and the debt service actually paid shows no tendency to shrink. During the recent past, several observers have suggested that increased concessional support, or even outright debt forgiveness, is required to give a reasonable chance of success to the adjustment efforts of debtors in sub-Saharan Africa (see, for example, Feldstein et al. (1987); U.N. (1988)). The leaders of the seven largest western industrial nations agreed at their summit meeting in Toronto in June 1988 to take specific steps to provide debt relief. In September 1988, their finance ministers endorsed a plan, based on this agreement, that is expected to ease the payments requirements of the poorest debtor nations by up to \$500 million a year.

The economic problems of most countries in sub-Saharan Africa are grave. The industrial output of sub-Saharan Africa has fallen on average by 2.4 percent a year since 1980, and annual growth in both agriculture and services has averaged less than 1 percent during the decade. Real income was no higher in 1980 than in 1970, and it has fallen by more than 5 percent since 1980 (Table 1), resulting in a nominal GDP per capita of \$307 in 1987 (World Bank (1988a)). The prices of Africa's exports have remained on a downward trend since 1980, with the terms of trade dropping by more than 20 percent in just the two years 1986-87. ^{1/}

In the past decade, the deterioration in the external debt position of African countries was "without parallel relative to other country groups experiencing debt service problems" (IMF Survey, June 1988). Total debt outstanding more than doubled from \$47.6 billion in 1980 to \$114.3 billion in 1987. The ratio of debt to exports increased from 85 percent to 330 percent during that period, while the debt service ratio (ratio of interest and amortization payments to exports) rose from 11 percent to 27 percent (Table 2). Although increasing debt obligations caused most of this deterioration, falling nominal export earnings also played a role.

This paper analyzes the causes of growth of the African debt burden, and alternatives for reducing it. The first section analyzes the historical background to the borrowing of sub-Saharan Africa. It emphasizes the demand side of external borrowing: the reasons why these countries found it beneficial or even necessary to supplement domestic

^{1/} These figures exclude Nigeria, Angola, Namibia, and South Africa. Elsewhere in the paper, Nigeria is included in sub-Saharan Africa, unless otherwise stated.

Table 1. Sub-Saharan Africa: Macroeconomic Indicators, 1970-87 ^{1/}

	Average		1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
	1970-80	1980-87																		
(Compound annual rates of change; in percent)																				
Real GDP	2.9	2.0	4.2	4.7	4.2	2.1	5.0	0.7	3.7	1.4	2.0	2.2	2.6	2.9	1.7	-0.6	1.2	3.0	3.6	2.3
Real per capita GDP	—	-0.8	1.3	2.0	1.4	-0.5	2.2	-2.1	0.8	-1.7	-0.6	-0.8	-0.5	-0.1	-1.0	-3.6	-1.5	0.3	0.6	-0.6
Consumer prices	17.6	24.1	4.9	4.6	5.8	11.1	18.4	17.3	19.8	27.9	22.0	27.5	24.8	30.3	18.8	29.1	22.3	19.1	23.6	25.7
Export volume	0.9	2.1	-0.7	1.1	11.3	2.0	-4.6	-2.8	5.3	-5.5	0.6	2.3	0.7	-2.7	3.4	1.8	5.4	-0.3	7.5	0.1
Import volume	2.7	-2.6	11.2	9.2	-4.8	4.0	7.9	-5.1	-0.7	5.4	9.0	-2.3	5.6	—	-4.2	-7.9	-1.3	0.1	-3.2	-1.2
Export unit value	13.1	-3.5	5.3	-4.8	2.3	34.0	40.5	-1.9	9.9	24.5	1.4	19.3	15.1	-8.2	-9.2	-2.8	3.3	-4.1	-5.6	2.6
Import unit value	14.0	0.3	4.4	5.2	10.6	21.9	32.8	14.7	-0.4	9.2	12.7	17.6	18.9	-3.9	-4.9	-4.0	-2.8	-2.6	12.8	9.2
Terms of trade	-0.8	-3.8	0.9	-9.5	-7.5	9.9	5.7	-14.4	10.4	13.9	-10.1	1.5	-3.2	-4.5	-4.5	1.2	6.3	-1.6	-16.3	-6.0
Non-oil commodity prices	10.2	-3.3	2.7	-10.9	6.0	45.4	29.1	-17.7	32.1	36.8	-13.0	14.5	0.9	-17.8	-8.2	7.5	4.9	-8.8	4.0	-2.4
(Percent of GDP)																				
Fiscal balance			-5.5	-7.3	-7.5	-7.3	-6.2	-9.0	-8.8	-6.7	-6.9	-7.7	-7.5	-6.8	-7.1	-5.8	-5.0	-4.9	-5.6	-6.0
Gross capital formation			21.7	23.3	20.8	20.7	23.9	22.9	19.9	21.5	20.5	18.9	19.8	20.5	19.0	16.2	16.1	17.0	17.7	17.6
(Indices; 1980=100)																				
Real GDP			75.4	78.9	82.2	84.0	88.2	88.9	92.2	93.4	95.3	97.4	100.0	102.9	104.7	104.0	105.2	108.4	112.2	114.8
Real per capita GDP			100.0	102.0	103.4	102.9	105.1	103.0	103.8	102.0	101.3	100.5	100.0	99.9	98.9	95.4	93.9	94.2	94.8	94.3
Consumer prices			19.7	20.6	21.8	24.2	28.7	33.6	40.3	51.5	62.8	80.1	100.0	130.3	154.8	199.8	244.4	291.0	359.7	452.3
Export volume			91.2	92.2	102.6	104.6	99.8	97.0	102.1	96.5	97.1	99.3	100.0	97.3	100.6	102.4	107.9	107.6	115.7	115.8
Import volume			76.8	83.9	79.8	83.0	89.5	85.0	84.4	88.9	96.9	94.7	100.0	100.0	95.8	88.2	87.1	87.2	84.4	83.4
Export unit value			29.2	27.8	28.4	38.1	53.5	52.5	57.7	71.8	72.8	86.9	100.0	91.8	83.4	81.1	83.8	80.3	75.8	77.8
Import unit value			27.0	28.4	31.4	38.3	50.9	58.3	58.1	63.4	71.5	84.1	100.0	96.1	91.4	87.8	85.3	83.2	93.8	102.4
Terms of trade			108.2	97.9	90.5	99.5	105.2	90.0	99.4	113.2	101.8	103.3	100.0	95.5	91.2	92.4	98.2	96.6	80.8	76.0
Non-oil commodity prices			37.7	33.6	35.6	51.8	66.9	55.0	72.7	99.5	86.6	99.1	100.0	82.2	75.4	81.1	85.1	77.6	80.8	78.9

Source: IMF, Research Department.

^{1/} Sub-Saharan Africa here excludes Nigeria, Angola, Namibia, and South Africa.

Table 2. Sub-Saharan Africa: Composition of Debt by Creditor, 1970-87 ^{1/}

(In billions of U.S. dollars)

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
I. Medium- and long-term debt, including IMF	5.5	6.5	7.6	10.0	12.9	15.8	19.4	24.4	31.5	40.1	47.6	56.7	63.0	70.3	74.3	85.5	103.7	114.3
Of which: IMF	(0.1)	(0.1)	(0.1)	(0.2)	(0.4)	(0.6)	(1.0)	(1.0)	(1.2)	(1.7)	(2.0)	(3.4)	(4.0)	(5.1)	(5.3)	(6.0)	(6.4)	(7.1)
Medium- and long-term debt, excluding IMF	5.4	6.4	7.5	9.8	12.5	15.1	18.4	23.4	30.3	38.4	45.6	53.2	59.0	65.2	69.1	79.4	97.2	107.2
Publicly guaranteed	5.0	6.0	7.0	9.1	11.5	13.8	16.9	21.6	28.4	36.1	41.9	48.3	53.6	60.0	64.0	74.1	91.7	101.8
Official creditors																		
Of which:																		
International institutions	(0.9)	(1.0)	(1.4)	(1.7)	(2.1)	(2.6)	(3.3)	(4.3)	(5.8)	(7.2)	(8.9)	(10.4)	(12.0)	(13.5)	(15.1)	(17.3)	(20.8)	(24.4)
Bilateral	(2.7)	(3.4)	(3.7)	(4.5)	(5.7)	(6.7)	(8.2)	(9.7)	(11.5)	(15.4)	(17.9)	(21.0)	(24.6)	(27.5)	(30.5)	(36.3)	(46.4)	(51.4)
Private creditors																		
Of which:																		
financial institutions	(0.3)	(0.4)	(0.7)	(1.3)	(1.8)	(2.5)	(3.4)	(4.9)	(7.8)	(10.3)	(11.8)	(13.9)	(13.6)	(14.5)	(13.4)	(14.4)	(17.7)	(18.7)
other	(1.2)	(1.2)	(1.3)	(1.7)	(1.9)	(2.0)	(2.0)	(2.7)	(3.3)	(3.1)	(3.3)	(3.0)	(3.5)	(4.6)	(5.1)	(6.1)	(6.7)	(7.3)
Without public guarantee	0.4	0.4	0.4	0.7	1.0	0.4	1.5	1.8	1.8	2.4	3.7	4.9	5.4	5.3	5.0	5.4	5.5	5.5
II. Short-term debt	0.5	0.5	0.7	0.7	0.9	1.3	1.7	2.3	3.0	5.1	6.1	7.0	9.5	10.8	9.6	9.9	7.2	8.0
III. Debt service, including IMF ^{2/}	0.5	0.5	0.7	0.9	1.1	1.6	1.9	2.4	3.1	4.2	6.2	6.5	7.1	7.8	10.2	11.9	9.8	9.2
Interest payments	0.2	0.2	0.2	0.3	0.4	0.5	0.6	1.1	1.3	1.9	2.6	2.7	3.5	3.8	4.3	5.1	4.2	4.2
Amortization (excluding short-term debt)	0.3	0.3	0.4	0.6	0.7	1.1	1.3	1.3	1.8	2.3	3.6	3.8	3.7	4.0	5.9	6.8	5.6	5.0
IV. Impact of rescheduling ^{3/}	—	—	—	—	—	—	—	—	0.1	1.3	0.8	0.8	1.0	4.1	3.7	2.5	5.8	11.1
Memorandum items:																		
Exports of goods and nonfactor services	8.2	8.9	10.2	14.2	23.8	23.0	27.0	31.7	31.9	42.7	56.1	45.0	37.4	35.3	38.4	37.8	33.0	34.5
Debt ratio ^{4/}	66.4	73.5	74.6	70.1	54.2	68.8	71.8	77.0	98.9	94.1	84.8	125.8	168.4	199.5	193.8	225.8	313.9	330.9
Debt service ratio ^{4/}	5.8	6.1	6.4	6.5	4.8	6.9	7.1	7.7	9.7	9.9	11.0	14.4	19.1	22.1	26.6	31.5	29.6	26.7

Source: IMF, Research Department.

^{1/} Sub-Saharan Africa includes Nigeria but excludes Angola, Namibia, and South Africa.

^{2/} The data on debt service refer to interest and amortizations actually paid, rather than originally contracted.

^{3/} The data on impact of rescheduling are based on (from 1980), Table IV-3 of World Bank (1988), with the timing of the impact allocated according to length of consolidation period; and (before 1980) on data from IMF, Research Department.

^{4/} Percentage of exports of goods and nonfactor services.

resources with external financing. It suggests that unsustainable policies were factors behind the debt growth in the 1970s, and that external shocks, a large debt overhang, and slowness of adjustment were reasons for the continued rapid debt growth in the 1980s.

The second section examines the sources of financing of the external current account deficits of sub-Saharan Africa, especially during the 1980s. It thus emphasizes the supply side of external borrowing. It notes the large involvement of official lenders, especially during the past decade, the declining activity of commercial creditors, and the increasing importance of reschedulings and other types of exceptional financing. It is argued that during 1984-87 the African countries' current account deficits during 1984-87 were in net terms financed entirely through the rescheduling of debt payments due.

The third section studies the development of some measures of debt burden for different categories of African debtors: sub-Saharan Africa as a whole; the countries that are eligible for loans under the Fund's structural adjustment facility compared with the countries that are not; the countries that have experienced payments problems in the 1980s compared with the countries that have not; countries grouped according to main type of borrowing (official, market, or diversified); and countries grouped according to main type of exports (agricultural, mineral, or fuel). Based on comparisons of experiences of various debtor categories, and based on the discussion in Appendix I concerning the interpretation of various measures of debt burden, it is concluded that as a group, the maximum sustainable debt service ratio of the African countries is 25-30 percent, which implies a ceiling on the debt ratio of 150-180 percent. The debt burdens of many African countries are already well in excess of these levels.

The fourth section explores some aspects of debt relief for sub-Saharan African countries. It outlines potential sources of relief. It also indicates potential problems with the implementation of debt relief schemes, once the creditors decide on providing such support. Finally, with the help of a simulation, it raises issues concerning the feasibility of reforming the economies at the same time as external payments relationships are normalized. It concludes that both debt relief and a rapid recovery of exports are prerequisites for reducing the debt burden to a sustainable level.

II. The Causes of Africa's Debt Growth

1. Before 1980: consuming and investing

Up to the Second World War, nonsubsistence economic initiatives primarily consisted of production of cash crops and extraction of mineral resources. Investments in these sectors were mostly financed from abroad with private credits, often with the administrative and financial involvement of colonial governments. Significant investment

activity in infrastructure, education, and health took place beginning in the 1950s when export earnings, which were buoyant as a result of the prolonged commodity price boom after the Korean War, contributed to the financing of the investment expansion. 1/

Government participation and intervention in the economy was substantial at independence and remained so thereafter, since the prevailing view was that the investments necessary for long-term growth and development would not materialize through private initiative alone. During the 1960s, the resulting public expansion was financed chiefly through a widening of the revenue base. Parastatals functioned as effective mechanisms for taxation of the rurally based export sector. Most countries in sub-Saharan Africa experienced generally positive export growth up to 1970 (Svedberg (1988)). In addition, foreign aid receipts rose rapidly during the period, while the African countries had relatively little access to international capital markets until the 1970s. As a result of these factors, the countries generally avoided significant external borrowing in the pursuit of their growth objectives. 2/

The 1973 oil shock, followed by a boom in non-oil commodities, reversed this trend. The prices of many important African commodity exports rose with oil prices, and in the late 1970s, reached record nominal levels (Table 3; Figures 1 and 2). Non-oil commodity prices rose on average by 10.2 percent a year during 1970-80, with particularly strong gains in 1973-74 and 1976-77 (Table 1).

With generally rising export levels, commercial credit was readily available after the first oil shock in 1973, as oil money was recycled. External debt increased almost tenfold between 1970 and 1980, from \$5.5 billion to \$47.6 billion (Table 2), and the share of outstanding debt owed to commercial creditors rose from about 25 percent in 1970 to 40 percent in 1978.

The rapid growth in debt was nevertheless mainly demand driven. The public expansion that had begun before independence continued on the expenditure side throughout the 1970s, but revenues did not keep pace, and external borrowing was required to fill the gap. Borrowing was facilitated by the low level of real interest rates throughout the decade: the average real interest rate on new commitments was minus 21.8 percent in 1973 and rose to only minus 4.6 percent by 1979

1/ The prices of most of the commodities exported by African countries reached levels in the early 1950s that were not surpassed for more than 20 years, even in nominal terms (see IFS (1987), pp. 174-77).

2/ The preceding discussion is based mainly on Young (1986).

Table 3. Prices of Some Major African Export Commodities, 1970-87 ^{1/}

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
(U.S. c/lb., unless otherwise indicated)																		
Oil (U.S. \$/barrel, Libya)	2.6	3.2	3.4	4.8	13.8	11.6	12.3	13.9	13.7	21.1	35.9	39.8	35.5	30.9	30.2	29.7	14.6	18.5
Coffee (Uganda (NY))	41.4	42.3	45.2	49.9	58.7	61.1	127.6	223.8	147.5	165.5	147.2	102.9	111.0	124.1	138.2	121.2	148.2	102.3
Cocoa (Ghana (London))	33.3	25.7	30.5	60.8	95.9	69.1	111.0	213.6	168.8	158.4	126.9	101.4	85.5	101.6	116.1	107.9	99.0	93.9
Copper (London)	64.0	49.0	48.6	80.6	93.2	56.1	63.6	59.4	61.9	89.5	99.1	79.1	67.2	72.2	62.5	64.3	62.1	80.8
Cotton (Sudan)	33.4	27.9	34.0	47.6	71.6	62.6	67.0	89.3	113.7	94.1	101.4	130.6	71.2	69.6	90.1	96.9	77.8	55.3
(Indices; 1973=100)																		
Oil	53.8	66.0	70.2	100.0	288.3	241.5	256.5	289.0	285.6	438.8	747.3	829.8	739.4	643.5	628.1	617.9	304.2	385.8
Coffee	83.1	84.7	90.6	100.0	117.6	122.4	255.8	448.5	295.6	331.7	294.9	206.3	222.6	248.8	277.0	243.0	297.1	205.1
Cocoa	54.7	42.2	50.1	100.0	157.6	113.5	182.5	351.3	277.5	260.4	208.6	166.7	140.6	167.1	190.8	177.4	162.8	154.4
Copper	79.5	60.8	60.3	100.0	115.7	69.6	79.0	73.7	76.8	111.1	123.0	98.1	83.4	89.6	77.5	79.8	77.1	100.3
Cotton	70.1	58.6	71.4	100.0	150.3	131.3	140.7	187.5	238.7	197.6	212.8	274.2	149.5	146.2	189.2	203.5	163.3	116.0
(Indices; 1979=100)																		
Oil	12.3	15.1	16.0	22.8	65.7	55.0	58.5	65.9	65.1	100.0	170.3	189.1	168.5	146.7	143.2	140.8	69.3	87.9
Coffee	25.0	25.5	27.3	30.2	35.5	36.9	77.1	135.2	89.1	100.0	88.9	62.2	67.1	75.0	83.5	73.3	89.6	61.8
Cocoa	21.0	16.2	19.3	38.4	60.5	43.6	70.1	134.9	106.6	100.0	80.1	64.0	54.0	64.2	73.3	68.1	62.5	59.3
Copper	71.6	54.8	54.3	90.0	104.2	62.7	71.1	66.4	69.2	100.0	110.8	88.3	75.1	80.7	69.8	71.8	69.4	90.3
Cotton	35.5	29.6	36.1	50.6	76.0	66.5	71.2	94.9	120.8	100.0	107.7	138.8	75.7	74.0	95.8	103.0	82.7	58.7

Source: International Financial Statistics (1988).

^{1/} Coffee, cocoa, copper, and cotton are the most important non-oil exports of sub-Saharan Africa, accounting for 54 percent of the value of the non-oil primary commodity exports of the region in 1983/84 (Svedberg (1988)).

Figure 1: Commodity Prices, 1970-88
(Index 1973=100)

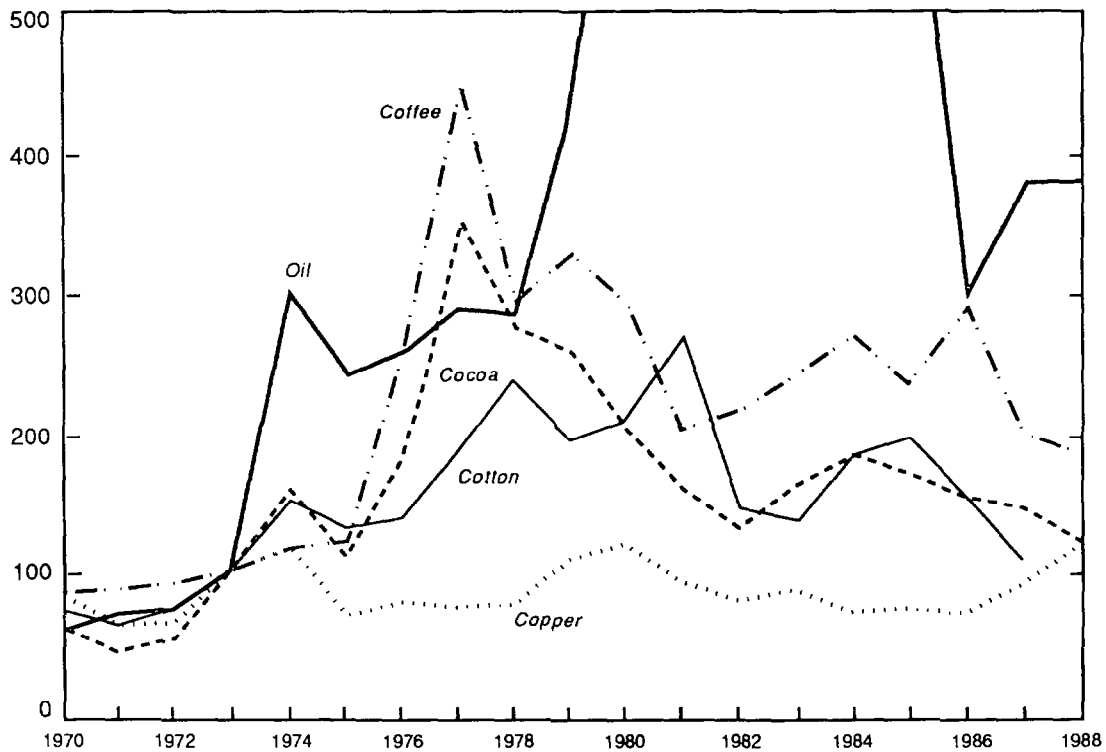
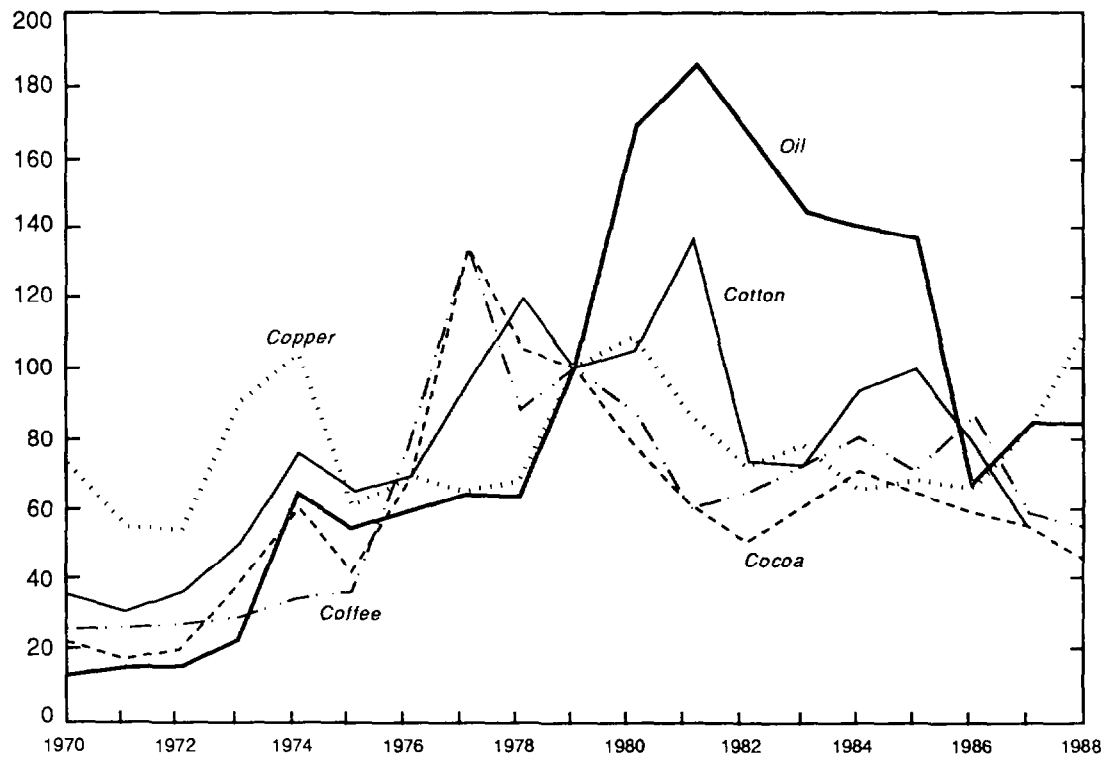


Figure 2: Commodity Prices, 1970-88
(Index 1979=100)



(Table 4; Figure 3). ^{1/} After 1973, oil importers initially increased external borrowing to compensate for oil price increases, and oil exporters borrowed for large investment programs. By the second half of the decade, African countries of all categories had embarked on ambitious public sector programs. Investments often took the form of development projects with active lender input into design and implementation. Imports demanded by urban consumers were subsidized by the governments, sometimes directly, sometimes through overvalued currencies. In addition, external borrowing to some extent paid for imports for private investments either directly through private borrowing or indirectly through the foreign exchange made available from public external borrowing related to the balance of payments. ^{2/} In years of falling export prices, countries borrowed to maintain consumption. In years of rising prices, with improved creditworthiness, these countries tended to borrow even more in order to expand development programs (Krumm (1985)).

One reason revenues did not keep pace with the expansion of public spending was that regulated, low producer prices discouraged the production of export crops in spite of world price increases, and made it difficult to extract additional revenue from the rural sector. At the same time, the urban sector tended to be a major recipient of open or implicit subsidies rather than a source of revenue.

^{1/} The real interest rate is calculated here as the average interest on new commitments deflated by a three-year moving average of the change in the export unit value.

Possible denominators for the real interest rate calculation include the export price index (which emphasizes domestic resources forgone, and is a commonly used deflator), the import price index (which indicates the cost of borrowing in relation to forgone access to external resources), the commodity price index (similar to the export price index, but emphasizes the heavy weight of commodities in Africa's exports), and the OECD or U.S. wholesale or consumer price indices (less useful, since changes in these do not directly affect the relative price between different points in time of the debtor's production and consumption).

In this paper, the export price index has been used and three-year moving averages have been calculated to smooth out the rapid fluctuations that have occurred during the past two decades. Figure 3 indicates that regardless of which measure of nominal interest is used, real interest rates exhibited an upward trend for the ten years 1973-82, and have fallen only slightly since. (Similar patterns appear also when commodity or import prices are used as deflators.) Figure 4 displays the development of the three measures of nominal interest.

^{2/} Capital flight has played a smaller role in sub-Saharan Africa than in Latin America, largely because of the predominance of public borrowing over private borrowing in Africa.

Table 4. Sub-Saharan Africa: Measures of Interest on External Debt, 1970-87 ^{1/}

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Average interest on new commitments ^{2/}	...	...	...	5.5	5.4	5.5	5.4	5.6	6.6	7.6	7.1	8.3	7.6	7.8	5.7	6.1	5.3	...
Deflated by export unit value ^{3/}	...	...	...	-28.5	-35.1	7.4	-4.5	-18.9	5.2	-11.7	-8.0	16.5	16.8	10.6	2.4	10.2	10.9	...
Deflated by three-year moving average of export value	...	...	...	-21.8	-14.7	-8.1	-5.8	-5.5	-7.8	-4.6	-0.2	9.5	14.5	10.9	6.9	8.2	7.8	...
LIBOR (six-month deposits) ^{4/}	...	7.1	6.0	9.4	10.8	7.8	6.1	6.4	9.2	12.2	14.0	16.7	13.6	9.9	11.3	8.6	6.9	7.3
Deflated by export unit value	...	11.9	3.7	-24.6	-29.7	9.6	-3.7	-18.1	7.8	-7.2	-1.1	24.9	22.8	12.7	8.0	12.8	12.4	4.7
Deflated by three-year moving average of export value	...	6.3	-4.4	-17.9	-9.3	-5.9	-5.1	-4.8	-5.2	—	6.7	18.0	20.5	13.1	12.5	10.8	9.3	8.8
Average interest on stock of debt ^{5/}	3.5	3.2	3.0	3.2	3.2	3.4	3.3	3.6	3.9	4.4	4.9	5.9	6.5	6.6	6.7	6.3	6.2	6.0
Deflated by export unit value	-1.8	8.0	0.7	-30.9	-37.2	5.3	-6.6	-20.8	2.5	-14.9	-10.2	14.1	15.7	9.4	3.4	10.5	11.7	3.4
Deflated by three-year moving average of export value	4.3	2.3	-7.5	-24.1	-16.8	-10.2	-7.9	-7.5	-10.5	-7.7	-2.4	7.1	13.4	9.8	7.9	8.5	8.6	7.4

Sources: IMF, Research Department, International Financial Statistics; and World Bank (1988).

^{1/} Sub-Saharan Africa includes Nigeria but excludes Angola, Namibia, and South Africa.

^{2/} Average interest on new commitments is equal to what is stated in the World Debt Tables.

^{3/} The export unit value is based on the price development of a representative basket of African exports, as defined in the World Economic Outlook.

^{4/} LIBOR is equal to the average return in percent per annum on six-month U.S. dollar deposits.

^{5/} Average interest on all debt is based on interest paid by the countries without payments problem as a share of their outstanding debt, which is the only group for which interest paid is equal to interest scheduled. This average interest rate gives a good indication of interest requirements on outstanding debt, to the extent that the terms of these are representative for all debt of sub-Saharan Africa.

Figure 3: Real Interest Rates in Sub-Saharan African Countries, 1970-87
(In percent)

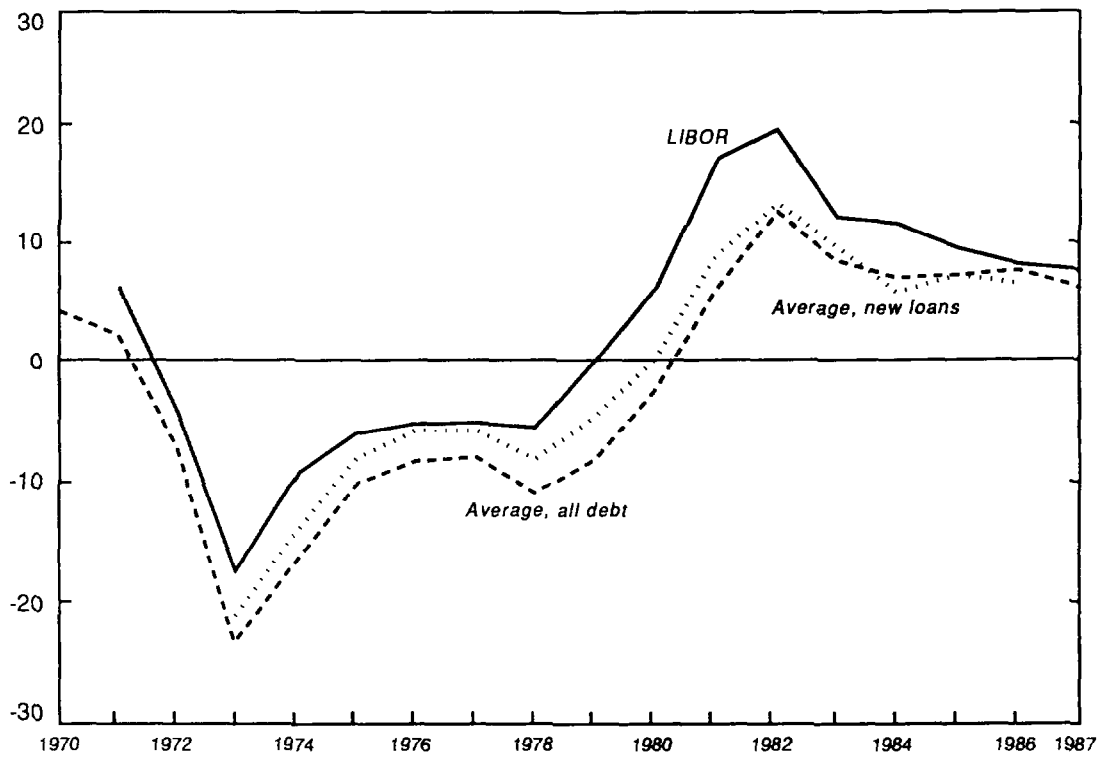
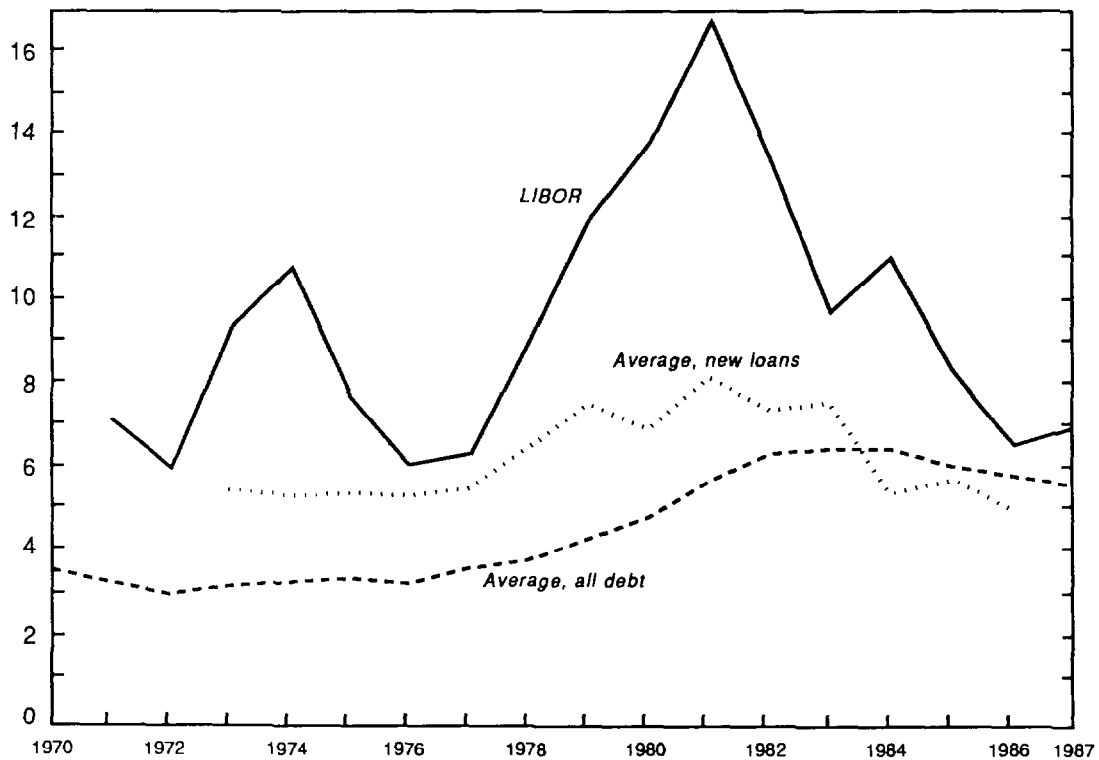


Figure 4: Nominal Interest Rates in Sub-Saharan African Countries, 1970-87
(In percent)



Gross capital formation as a share of GDP was well over 20 percent throughout most of the decade, but the returns on investment were poor. Import volume grew at an annual average rate of almost 3 percent during the 1970s, while export volume rose by less than an average 1 percent a year (Table 1); sub-Saharan Africa's contribution to the total value of exports from all less developed countries fell from 13.5 percent in 1970 to 8.4 percent in 1980 (Svedberg (1988)), indicating that the yield on the investment, in terms of potential foreign exchange earnings or savings, was low. In retrospect, it would seem that an unsustainable policy environment was maintained during the 1970s with the help of foreign credits. 1/

2. External shocks in the 1980s

The 1980s ushered in a new phase in African economic performance in general, and external economic relations in particular. Two related developments at the start of the decade highlighted the vulnerability of the African economies: the beginning of a protracted fall in terms of trade and a large jump in real interest rates. 2/ Commodity prices, some of which had already started to decline in 1978, fell on average by 3.4 percent annually during 1980-87. Oil prices, after large gains in 1979 and 1980, later fell sharply and by 1987 were lower than they had been since 1978, even in nominal terms (Table 3; Figure 2). Terms of trade initially deteriorated less rapidly than export prices, as African import prices also declined during the early years of the 1980s; however, import costs have increased substantially since 1986, leading to a fall in terms of trade of 20 percent in 1986-87 (Table 1).

The decline in export prices has not only reduced the purchasing power of African exports, but has also made the servicing of outstanding debt more costly in terms of domestic resources. The global economic contraction of 1981 affected Africa differently than it did Latin America, where the increase in commercial bank lending rates immediately translated into higher nominal interest payments on outstanding debt. Since a much larger fraction of sub-Saharan Africa's debt was extended on fixed-rate terms [80 percent of total debt in 1981 (World Bank (1988b)), compared with 38 percent for Latin America], nominal interest payments on outstanding debt did not increase significantly. Neither did average terms on new commitments, the interest rates for which rose from 7.0 percent in 1980 to 8.1 percent in 1981.

Nevertheless, real interest on the debt of sub-Saharan Africa rose sharply in 1981. The real interest rate increased from large negative values in the 1970s to large positive values at the end of 1988,

1/ See Krumm (1985) and Lancaster and Williamson (1987) for further discussion of the causes of the debt growth of the 1970s.

2/ Economic conditions were further aggravated by such factors as the severe drought that affected large areas of the continent in the early 1980s.

according to any of several possible deflators. After being negative up to 1980, the real rate (average interest on new commitments deflated by a three-year moving average of the change in the export unit value) jumped to positive 9.5 percent in 1981, rose further to 14.5 percent in 1982, and was still 7.8 percent by 1986 (Table 4; Figure 3). It may be noted that real rates were higher than nominal rates in 1987, reflecting the downward trend in export prices.

Falling nominal interest rates during recent years have also conferred smaller benefits on sub-Saharan Africa than on other borrowers. While the six-month LIBOR (London Interbank Offered Rate) rose from 6.1 percent in 1976 to 16.7 percent in 1981 and then fell to 6.9 percent in 1986, average interest on new commitments of sub-Saharan Africa changed from 5.4 percent to 8.3 percent to 5.3 percent, and average nominal interest on total outstanding debt rose from 3.3 percent to 5.9 percent to 6.2 percent (Table 4). As is borne out in Figure 4, the high market interest rates of the first half of the decade were only gradually translated into harder nominal terms for the African debtors. Similarly, it takes time for the average terms for Africa to decline, and in 1987 the African debtors paid close to market rates on their external debt.

Exchange rate fluctuations also added to the debt burden. The dollar depreciation of the last few years increased the dollar value of outstanding debt even where there was no net borrowing, since the African debt is denominated in a variety of currencies. It is difficult to calculate the effect of this factor on the entire stock of debt, but according to the World Bank (1988b), the dollar value in 1987 of principal repayments of sub-Saharan Africa on World Bank loans was equal to 124 percent of book value (i.e., the dollar value at the time of borrowing). This varied between 92 percent for Madagascar and 215 percent for Guinea.

3. The weak policy response

In the African countries, the response to these changing circumstances was weak. In the early part of the decade, levels of consumption were maintained through increased external borrowing, reduced domestic saving, and eventually, reduced levels of investment. External debt rose from \$47.6 billion in 1980 to \$70.3 billion in 1983, and to \$114.3 billion in 1987. Saving as a share of GDP fell from 16.7 percent in 1980 to as little as 8.5 percent in 1983, and was an estimated 10.9 percent in 1987 (World Bank (1988a)). Gross capital formation as a share of GDP fell from 20.5 percent in 1981 to 16.1 percent in 1983 (Table 1). Consumption increased from 80.3 percent of GDP in 1980 to 88.3 percent in 1983, and was still 84.8 percent in 1987 (World Bank (1988a)). The external balance deterioration occurred even though the volume of imports had actually been compressed continuously during the period: import volume fell by 12 percent between 1981 and 1983 and by an additional 5 percent by 1987 (Table 1). This reduction

in import volume led to low capacity utilization and a reduction of domestic production.

It is only in recent years that some countries have made strong efforts to implement effective adjustment programs. In a comparison of African countries implementing strong reform programs with countries that had weak or no programs, the World Bank (1988a) noted that the average fiscal deficit of the former group fell by several percentage points during the period 1980-87 while it increased for the latter. Moreover, the countries with strong programs managed both to reduce real exchange rates more and to improve agricultural incentives further than did those with weak programs. They reduced inflation somewhat, and achieved positive domestic real interest rates. GDP growth in the reforming countries rose from 1 percent annually in 1980-85 to almost 4 percent in 1986-87, while growth in the countries with weak programs remained at about 1 percent. However, although the outlook is better for the reforming countries, no country in sub-Saharan Africa that has experienced payments problems in this decade can be regarded as having solved its debt problem.

III. The Search for External Financing

During the period 1980-87, when sub-Saharan Africa's debt more than doubled, there was a shift in the sources of financing, relative to the experience of the 1970s. Table 5 provides a breakdown by lender group of the financing of total outstanding debt in 1980 and 1987, and the flow of new lending between those two years. There is also a very rough estimate (based on World Bank (1988b)) of the share of the 1987 debt service of \$9.2 billion that was paid to each creditor category. Three points that stand out are the crucial role of official lenders, the retreat from the continent by commercial lenders, and the rise of exceptional financing.

1. Developments in the 1970s

The 1970s were characterized by the ready availability of external finance. First, a significant amount of resources was provided through non-debt-creating flows. During an average year, the sum of direct foreign investment and official transfers tended to finance approximately half of the current account deficit (when the current account is calculated as excluding official transfers). These flows increased steadily, doubling from about \$1.5 billion a year at the beginning of the decade to \$3 billion annually at the end, although they remained relatively constant in real terms (Table 6). Official transfers (development aid in the form of grants) are typically more concentrated on the poorer countries, while direct investment takes place to a large extent in the countries that have more advanced economies.

Second, official long-term lending grew throughout the period, without large variability in the growth rate. Claims of official

Table 5. Sub-Saharan Africa: Typical Loans

	Private lenders, banks, and suppliers	Bilateral official lenders	Multilateral lenders, including IMF
Share of debt in 1980 and 1987	39 percent and 27.5 percent	38 percent and 45 percent	23 percent and 27.5 percent
Share of increase during 1980-87	19 percent	50 percent	31 percent
Share of debt service paid <u>1/</u>	50 percent	25 percent	25 percent
<u>Concessional loans</u> <u>2/</u>	Not applicable	1. Development loans (ODA): projects and programs. 2. All countries, especially poorer ones. 3. Low fixed interest; long maturities. 4. Paris Club: longer maturities; market interest (now, some- times concessional interest).	1. Development loans (ODA): projects and programs. 2. Poor countries. 3. Low fixed interest; long maturities. 4. Preferred creditors: no rescheduling.
<u>Nonconcessional loans</u> <u>2/</u>	1. Unrestricted. 2. Creditworthy countries. 3. Variable interest; market rate; short to long maturities. 4. London Club: market rate;	1. Projects; rescheduled debt (previously concessional). 2. All countries, especially wealthier ones. 3. Fixed or variable interest; at or just under market rate; short to long maturities. 4. Paris Club: market rate; longer maturities.	1. Projects, often in productive sectors; IMF facilities. 2. All countries, especially wealthier ones. 3. Fixed or variable interest; at or just under market rate; medium-length to long maturities. 4. Preferred creditors: no rescheduling.
1. Use of credit			
2. To whom			
3. Typical terms			
4. Rescheduling			
longer maturities.			

1/ Very approximate.2/ Concessional and nonconcessional loans represented 37 percent and 63 percent, respectively, of total debt in 1986.

Table 6. Sub-Saharan Africa: Balance of Payments, 1970-87 ^{1/}

(In billions of U.S. dollars)

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Current account	-0.8	-1.8	-1.4	-0.9	2.8	-3.9	-2.8	-3.9	-9.2	-3.7	-4.2	-15.7	-15.5	-10.5	-4.2	-2.7	-8.5	-8.4
Trade balance	1.1	0.2	1.0	2.8	7.6	1.6	3.4	2.7	-3.4	3.6	7.5	-5.8	-6.9	-2.8	3.2	4.9	-0.9	-0.5
Merchandise exports	7.1	7.6	8.7	12.5	21.7	20.2	24.0	27.8	27.2	37.3	49.7	39.0	32.1	30.1	33.4	33.1	27.7	28.4
Merchandise imports	-6.1	-7.4	-7.7	-9.7	-14.1	-18.6	-20.6	-25.1	-30.7	-33.7	-42.2	-44.8	-39.0	-33.0	-30.2	-28.3	-28.6	-28.9
Services and transfers balance	-1.9	-2.0	-2.4	-3.7	-4.8	-5.5	-6.2	-6.7	-5.8	-7.3	-11.7	-9.8	-8.5	-7.6	-7.4	-7.5	-7.5	-7.8
Services credits	1.3	1.4	1.6	1.9	2.5	3.5	3.7	4.5	5.3	6.0	7.6	7.4	6.2	5.6	5.5	5.3	5.9	6.8
Service debits	-3.4	-3.8	-4.5	-6.1	-8.0	-10.0	-10.6	-12.2	-12.6	-14.8	-21.1	-19.6	-17.4	-16.3	-16.0	-16.7	-17.8	-19.2
Of which: interest due	(-1.0)	(-1.2)	(-1.3)	(-1.9)	(-1.9)	(-2.1)	(-2.3)	(-2.7)	(-2.5)	(-3.4)	(-5.7)	(-5.4)	(-5.4)	(-5.5)	(-6.3)	(-7.1)	(-7.2)	(-7.9)
New private transfers	-0.4	-0.4	-0.5	-0.5	-0.6	-0.7	-0.7	-0.8	-0.6	-1.0	-1.4	-0.8	-0.5	-0.3	-0.2	0.3	0.3	0.1
Official transfers	0.6	0.8	0.9	1.0	1.3	1.6	1.4	1.8	2.1	2.5	3.2	3.1	3.1	3.4	3.2	3.7	4.1	4.5
Capital account	1.0	1.3	1.1	1.4	1.8	2.9	2.3	3.2	5.9	5.9	5.9	6.4	5.8	2.0	1.6	—	-2.8	-0.2
Direct investment (net)	0.1	0.5	0.6	0.7	0.7	0.9	0.7	0.7	0.7	1.0	-0.1	0.7	1.0	0.8	0.8	0.8	1.1	1.1
Medium- and long-term liabilities, net	0.8	0.4	0.9	1.2	1.8	2.2	1.7	2.1	5.0	5.3	5.9	5.6	7.5	4.1	1.0	-0.3	-0.6	-1.1
Short-term liabilities, net	0.2	0.3	-0.1	0.1	0.2	0.6	1.2	1.6	0.5	0.7	0.9	1.1	0.8	0.1	-0.6	0.8	-1.4	0.3
Other capital transfers (asset transfers, errors and omissions)	-0.1	—	-0.3	-0.6	-1.0	-0.7	-1.3	-1.3	-0.2	-1.1	-0.7	-1.0	-3.5	-3.0	0.5	-1.4	-1.9	-0.5
Overall balance	0.3	-0.5	-0.3	0.4	4.3	-1.5	-0.5	-0.8	-3.2	2.1	1.7	-9.3	-9.7	-8.5	-2.6	-2.7	-11.3	-8.6
Exceptional financing	—	0.1	0.1	0.1	0.4	1.0	0.2	0.3	0.3	—	1.5	1.8	6.1	6.7	3.0	4.1	11.2	8.4
Of which: arrears	(—)	(—)	(0.1)	(—)	(0.2)	(0.2)	(0.3)	(0.3)	(0.4)	(—)	(-0.9)	(0.6)	(5.4)	(4.2)	(-0.1)	(2.5)	(2.3)	(0.9)
rescheduling	(—)	(—)	(—)	(—)	(—)	(—)	(—)	(—)	(—)	(0.1)	(1.7)	(0.7)	(0.5)	(3.7)	(2.3)	(1.2)	(8.8)	(7.3)
Use of Fund credit, net	—	—	—	—	0.2	0.3	0.3	—	0.2	0.4	0.3	1.6	0.7	1.3	0.4	—	-0.4	-0.4
Reserves, SDR allocations, reserve liabilities)	-0.2	0.4	0.1	-0.5	-4.9	0.2	—	0.4	2.7	-2.6	-3.6	5.8	2.9	0.5	-0.8	-1.5	0.4	0.6
Memorandum items:																		
Current account, net of official transfers	-1.3	-2.6	-2.3	-1.9	1.5	-5.5	-4.3	-5.7	-11.3	-6.3	-7.4	-18.8	-18.6	-13.9	-7.4	-6.3	-12.5	-12.9
Current account, net of interest payments ^{2/}	0.3	-0.6	—	1.0	4.7	-1.8	-0.5	-1.3	-6.6	-0.3	1.5	-10.3	-10.1	-5.0	2.1	4.5	-1.2	-0.5
Current account ratio ^{3/}	-9.2	-20.0	-13.5	-6.3	11.8	-17.1	-10.5	-12.5	-28.8	-8.7	-7.5	-34.8	-41.3	-29.8	-10.9	-7.0	-25.7	-24.3
Net long-term flows (long-term capital and rescheduled amounts)	0.8	0.4	0.9	1.2	1.8	2.2	1.7	2.1	5.0	5.4	7.7	6.3	8.0	7.7	3.3	1.0	8.1	6.2

Source: IMF, Research Department.

^{1/} Sub-Saharan Africa includes Nigeria, but excludes Angola, Namibia, and South Africa.

^{2/} "Interest due" includes returns to foreign-held equity. This was a substantial fraction of the category at the beginning of the period, but is much less significant now. However, this means that the size of the category "current account net of interest payments on external debt" should be reduced by \$1 billion to \$1.5 billion per year throughout the period to be more accurate. Note that medium- and long-term liabilities and interest due are expressed on a contractual basis. Actual flows would also include rescheduled amounts. Discrepancies of rescheduled amounts between this table and Table 2 should mainly be a consequence of allocation of timing of impact of rescheduling.

^{3/} Current account, including transfers, as a percentage of exports of goods and nonfactor services.

creditors (bilateral and multilateral) rose from \$3.7 billion in 1970 to \$28.8 billion in 1980 (Table 2). Such lending was mainly in the form of development projects and programs, on concessional as well as on market terms. Part of the increase in multilateral official lending was a result of the emergence during the late 1970s of new multilateral institutions (the OPEC-related funds), which contributed to the recycling of OPEC-member surpluses.

Third, commercial credits were available chiefly to the relatively better-off countries. The quantity of commercial lending jumped as commodity prices began to weaken some time after the first oil shock, causing commercial lending to grow more rapidly than other categories at the end of the 1970s. Significant borrowing took place on the Euro-markets, especially in the years after 1977. Outstanding debt to private creditors rose from \$1.6 billion in 1970 to \$18.8 billion in 1980. The commercial loans were more expensive than other types of credits, but they had the attraction of ready availability and the absence of requirements regarding the economic policies pursued by the borrower.

By 1980, the sub-Saharan African countries had incurred long-term debt (including both nonguaranteed private debt and debt to the Fund) of \$47.6 billion in 1980, of which 38 percent was owed to bilateral official creditors, 23 percent to multilateral creditors, and 39 percent to commercial creditors. During the 1970s, most of the current account deficits were financed on the capital account as the impact of exceptional finance was still small. There were only a few reschedulings and the countries did not generally accumulate significant payments arrears. The situation changed during the following decade.

2. Tightened supply of credit and emerging payments problems: 1980-83

Developments during the 1980s can be divided into two phases: 1980-83 and 1984-87. The access to external financing has been constrained throughout the decade, but there was a break between these two periods, as net financing on the capital account dropped sharply in 1984 and exceptional financing substituted for normal credits.

During the 1980-83 period, the payments situation of sub-Saharan Africa deteriorated sharply after the second oil shock. A majority of countries still expected that the deterioration of external circumstances would be temporary, and therefore attempted to maintain previous economic policies and consumption levels. With falling terms of trade and rising debt service requirements, the lack of response in the form of higher export volumes or lower import volumes resulted in rising current account deficits. The combined current account deficit (net of official transfers) of sub-Saharan African countries rose from \$7.4 billion in 1980 to more than \$18 billion in each of the following two years and to \$13.9 billion in 1983 (Table 7). Many countries with serious payments problems, lacking access to adequate external financing

Table 7. Sub-Saharan Africa: External Financing, 1980-87 ^{1/}

(In billions of U.S. dollars)

	1980	1981	1982	1983	1984	1985	1986	1987
Current account balance, excluding official transfers	-7.4	-18.8	-18.6	-13.9	-7.4	-6.3	-12.5	-12.9
Non-debt-creating flows	3.6	2.8	3.9	4.1	3.9	4.5	5.2	5.6
Official transfers	3.2	3.1	3.1	3.4	3.2	3.7	4.1	4.5
Direct investment, net	-0.1	0.7	1.0	0.8	0.8	0.8	1.1	1.1
SDR allocation, valuation adjustment, gold monetization	0.5	-1.0	-0.2	-0.1	-0.1	--	--	--
Capital account balance, excluding direct investment	6.1	5.7	4.8	1.2	0.8	-0.8	-4.0	-1.3
Medium- and long-term liabilities, net	5.9	5.6	7.5	4.1	1.0	-0.3	-0.6	-1.1
Short-term liabilities, net	0.9	1.1	0.8	0.1	-0.6	0.8	-1.4	0.3
Asset transfers, net	-0.8	-0.5	-0.2	-0.3	-0.3	-0.2	0.1	-0.1
Errors and omissions	0.1	-0.4	-3.3	-2.6	0.7	-1.2	-2.0	-0.4
Net Fund credits	0.3	1.6	0.7	1.3	0.4	--	-0.4	-0.4
Exceptional financing	-4.3	8.3	9.5	8.9	2.8	3.6	8.5	12.6
Rescheduling								
Commercial debt	0.7	0.2	0.3	3.0	1.4	1.4	2.8	3.4
Official debt	0.1	0.6	0.7	1.2	2.3	1.1	3.0	7.7
Arrears	-0.9	0.6	5.4	4.2	-0.1	2.5	2.3	0.9
Net reserve use and reserve-related liabilities	-4.2	6.8	3.0	0.6	-0.7	-1.5	0.4	0.6
Residual	1.7	0.4	-0.3	-1.6	-0.5	-0.9	3.1	-3.6
<u>Memorandum items:</u>								
Interest payments	2.6	2.7	3.5	3.8	4.3	5.1	4.2	4.2
Net transfers	4.4	5.4	5.7	5.7	0.8	-2.8	0.6	5.4
<u>World Debt Table (WDT)</u> definitions: ^{2/}								
Net flows (WEO data)	6.7	6.4	8.5	8.2	4.6	2.3	5.2	10.0
Net flows (WDT data)	7.5	7.5	8.2	7.9	3.0	1.4	3.5	...
Net transfers (WEO data)	4.1	3.7	5.0	4.4	0.3	-2.8	1.0	5.8
Net transfers (WDT data)	5.5	5.4	5.8	5.4	0.1	-1.7	1.1	...

Sources: IMF, Research Department; and World Bank (1988).

^{1/} Sub-Saharan Africa includes Nigeria, excludes Angola, Namibia, and South Africa. This table is chiefly based on the same data as Table 6, but to some extent on Table 2. Here, the current account is taken to exclude official transfers, and the capital account to exclude direct investment and SDR allocations, etc. Amounts rescheduled are calculated from the same source as in Table 2. Since medium- and long-term liabilities are from the balance of payments data, they are on a contractual basis, and thus refer to new lending minus scheduled repayments. Actual flows from creditors to debtors in addition include rescheduled amounts. The residual is caused by the fact that the table is based on sources that are not always consistent. The estimate of arrears is particularly uncertain. Interest payments consist of interest actually paid. Net transfers are calculated by adding net medium- and long-term liabilities to obligations rescheduled and net use of IMF credits; and deducting interest paid.

^{2/} World Debt Table definitions: net flows are disbursements of publicly guaranteed debt minus actual repayments, and are assumed to be equal to net medium- and long-term liabilities plus the impact of rescheduling in the WEO data. Net transfers in the World Debt Table data are net flows minus interest payments, and are assumed to be net medium- and long-term liabilities plus rescheduling minus interest payments in the WEO data.

sources, depleted foreign exchange reserves and accumulated payments arrears.

Official transfers and direct investment remained more or less unchanged in nominal terms through these years. Thus, with growing current account deficits, the share of nondebt-creating flows in financing was reduced considerably from the previous decade. Moreover, official lenders, both multilateral and bilateral, just maintained their nominal levels of new lending, causing the flows both of grants and official development loans to decline in real terms during 1980-83. These donors and lenders were unwilling to increase flows partly as a result of the recession in the developed economies. With increases in debtor countries' contracted repayments of principal, net borrowing from official sources declined, in nominal as well as real terms.

The case of commercial lenders was similar, as their nominal level of new lending was unchanged (at least initially), causing a fall in real net lending. Only four countries (Congo, Côte d'Ivoire, Gabon, and Nigeria) obtained more than two thirds of their borrowing from commercial sources in 1978-82, and most African countries obtained much less than that.

With severe external payments pressures, many countries turned to the Fund for assistance beginning in 1980. The use of IMF credits increased from very low levels during most of the 1970s to an average \$1.2 billion annually in 1981-83. The Fund programs provided financial relief and were intended to permit implementation of policies consistent with a sustainable external payments position. In addition, adjustment programs supported by the IMF have a catalytic effect on the availability of credits from other sources, not least because a Fund program is in practice a prerequisite for obtaining rescheduling of payments in the Paris Club. Almost \$7 billion of payments due on both commercial and official debt were rescheduled during these four years.

The cumulative current account deficit during 1980-83 was \$58.7 billion before non-debt-creating flows, with financing primarily in the form of medium- and long-term borrowing. Net long-term borrowing was \$23.1 billion. 1/ If rescheduled amounts are added, as well as net purchases from the Fund, net medium- and long-term flows were

1/ Net borrowing is disbursements minus contracted repayment of principal. Net flows refers to disbursements minus actual payment of principal, and thus reflects the impact of rescheduling. Net transfers equals net flows minus interest actually paid.

\$33.7 billion. ^{1/} The remaining \$10.6 billion of the cumulative current account deficit was accounted for by payments arrears, use of reserves, and a few other, smaller transactions (Table 7). ^{2/}

3. Falling resource flows and rising debt stock: 1984-87

In 1984-87, as more countries initiated policy reform, rising export volumes and declining import volumes eliminated trade deficits. However, this was only partly reflected in the current account deficits as the service balance remained in deficit, with a rising share of interest payments in the service debits. As a consequence, the current account (net of official transfers) remained in deficit, ranging between \$6.3 billion and \$12.9 billion annually, and resulting in a cumulative deficit of \$39.1 billion (Table 7).

In response to the payments problems of the debtors, some creditors attempted to reduce their exposure, while others increased flows. The net result was a reduction in resource flows to sub-Saharan Africa. On the one hand, after having been nominally unchanged at about \$3 billion for several years, official transfers rose to \$4.5 billion by 1987, representing an increase in total transfers from \$12.8 billion during 1980-83 to \$15.5 billion during 1984-87. On the other hand, net medium- and long-term lending declined sharply from \$23.1 billion in 1980-83 to minus \$1.0 billion in 1984-87 as new long-term lending was more than offset by planned repayment of principal (Table 7).

Estimates from the World Debt Tables (WDT) (World Bank (1988b)) give some indication of the sources of the decline in net lending. While not entirely consistent with the numbers in the World Economic Outlook (WEO) data base, which are otherwise used in this paper, the WDT data provide a breakdown of the changes in disbursements by type of lender. Between 1983 and 1984, according to the WDT, disbursements of new loans from official bilateral creditors dropped from \$3.1 billion to \$2.1 billion, and with an increasing amount of principal actually repaid, net flows fell from \$2.6 billion to \$1.5 billion. Even including the impact of rescheduling, these flows fell slightly in the

^{1/} This is somewhat more than the increase in outstanding medium- and long-term debt from \$40.1 billion at the end of 1979 to \$70.3 billion at the end of 1983 (Table 2). Table 2 is based on stock data, whereas Table 6 is based on flow data. Cumulative net flows do not necessarily add up to changes in outstanding debt, since exchange rate fluctuations have valuation effects on the debt stock. In this period, the dollar appreciation led to a reduction of the dollar value of the debt stock. Furthermore, there are differences in treatment of arrears and of the effects of rescheduling agreements in the different sets of data on which the two tables are based, which may cause further discrepancies. See also Table 7.

^{2/} Deducting interest payments on external debt of \$12.6 billion from net flows gives net transfers of \$21.1 billion during the period.

two following years. Net lending from multilateral creditors rose from 1984, however, particularly in the form of concessional loans to the poorest countries: IDA disbursements (World Bank loans on very concessional terms) more than doubled between 1983 and 1986, rising from \$0.6 billion to \$1.3 billion (World Bank (1988b)). At the same time, lending from private creditors dropped precipitously. New lending fell from \$5.8 billion in 1983 to \$2.6 billion in 1984, and net flows (new lending less actual repayments of principal) fell from \$3.5 billion to minus \$0.3 billion and remained negative after 1984. If interest payments are taken into account, there has been a substantial transfer of resources from sub-Saharan Africa to the banks. ^{1/}

Thus, both the WEO and the WDT data confirm that there was a large decline in resource flows between 1983 and 1984. However, the WDT data reveal that although net borrowing from both official and commercial creditors fell, the reduction in commercial credits was particularly sharp. This, combined with the rise in concessional multilateral lending and official transfers, implied that the impact on the poorer countries of declining resource flows was probably relatively weak. Nevertheless, the fact that scheduled medium- and long-term lending was minus \$1.0 billion in 1984-87, as reflected in the WEO data, and the fact that interest payments due on external debt stood at \$20-\$23 billion in 1984-87 indicate the difficult payments situation of African countries during this period.

The most notable development in the financing of these deficits was the continued rise in importance of rescheduling agreements as a response to the payments shortfalls of the African debtors. A debtor unable to meet its current payments obligations has the option of requesting postponement of payments at the Paris Club (official bilateral debt) and the London Club (commercial debt).

The first African country to reschedule debt in the Paris Club was Zaire, in 1976. Between 1976 and 1980, 10 such agreements involved African countries; in 1981 and 1982 there were 12, and since 1983 there have been on average 10 each year. Between 1976 and June 1986, 57 of 84 Paris Club agreements concerned Africa (Dillon and Oliveros (1987)). For some countries, there have been several rescheduling exercises. For example, by the end of 1987, Zaire's obligations had been rescheduled nine times at the Paris Club. Between 1984 and 1987 obligations of approximately \$23 billion were postponed as a result of reschedulings (Table 2). Of this, about \$14 billion was bilateral official debt, while the rest was commercial debt.

^{1/} In spite of this, there has been an increase in outstanding commercial claims on sub-Saharan Africa since 1984 (Table 2). This is most likely a consequence of valuation effects of the falling dollar, and of rescheduling of payments arrears.

The payments problems of a debtor wishing to reschedule are presumed to be of a temporary nature. The creditor community normally expects that the debtor will show its intentions to honor future obligations by agreeing to adhere to an appropriate adjustment program, in order to remove the causes of the imbalances, restore growth, and normalize payments relationships. The volume of debt service postponed is determined in relation to the size of the estimated financing gap. This gap consists of the difference between financing needs given a successfully implemented reform program on the one hand, and on the other, financing availability, given expected new lending from banks, governments, and international organizations. The rescheduling agreements provide lengthened maturities but are in theory not supposed to reduce the net present value of the debt payments to be made. Non-concessional loans tend to be rescheduled at slightly increased interest rates, and concessional loans are often rescheduled at market rates.

If the financing gap exceeds the debt relief provided for in the rescheduling agreement, it is difficult for the debtor to secure new sources of financing, especially in the short term. This may be a result of insufficiently strong adjustment efforts or of negative external developments. In response, the past few years have seen several innovations in the rescheduling negotiations: the length of consolidation periods has been increased, terms of rescheduling have been made concessional, and arrears and interest have increasingly been covered by the agreements. The June 1988 Toronto proposals for debt reduction provided for some forgiveness to be implemented under the auspices of the Paris Club. There are indications that at least in certain cases, the Paris Club negotiations are in effect being transformed from a procedure which provides temporary payments relief to one which allows a permanent reduction of obligations.

Multilateral institutions are by convention preferred creditors, which means that a significant share of African debt service cannot be relieved through rescheduling. These institutions (including the Fund) accounted in 1988 for about 28 percent of debt service paid. In some individual cases (such as Zambia) the multilateral share exceeded 40 percent. Some of the willingness in recent years of multilateral institutions to provide more new financing can be seen against this background.

The cumulative current account deficit of sub-Saharan African countries during 1984-87 was \$39.1 billion before and \$19.9 billion after non-debt-creating flows. Net long-term borrowing was equal to minus \$1.0 billion (i.e., scheduled repayments exceeded new lending) but with rescheduling of contractual obligations (and subtracting

repurchases from the Fund) net flows were \$21.7 billion. ^{1/} Finally, the cumulative net effect of the use of reserves, arrears, and the other categories of external financing was minus \$1.8 billion (Table 7), with the result that the entire current account deficit after non-debt-creating flows was financed through reschedulings. There was no net financing on the capital account, which on average had been in a small deficit since 1984. On a net transfer basis, the creditors as a group provided sub-Saharan Africa with only \$3.9 billion in 1984-87, while their claims rose by \$44.1 billion. In effect, external borrowing has since 1984 chiefly financed interest payments. ^{2/}

IV. Africa's Excessive Debt Burden

The long-term external debt of sub-Saharan Africa more than doubled during 1980-87, and the decade has been characterized by economic decline. Meanwhile, to take one example, Korea's debt increased from \$19.2 billion in 1980 to \$35.8 billion in 1986 without long-term external payments disturbances and without raising serious questions about the fundamental viability of the economy. The main difference lies in the fact that Korea's ability to service its debts has improved at the same pace as the growth of the debt, whereas the African debtors' ability to pay their debt has not. In the Korean case, a sound economic base and appropriate macroeconomic management made it possible to avoid a deterioration of the external position in the early 1980s (Collins and Park (1987)).

Korea's debt ratio (defined as the ratio of total outstanding external debt to exports of goods and nonfactor services) fell from 132 percent in 1980 to 108 percent in 1986 (World Bank (1988)), while Africa's grew from 85 to 331 percent between 1980 and 1987 (Table 2). Korea's debt service ratio (defined as the ratio of actual interest and amortization payments on external debt to exports of goods and nonfactor services) rose from 12.2 percent to 16.7 percent, while that of sub-Saharan Africa rose from 11.0 to 26.7 percent. The scheduled debt

^{1/} The increase in outstanding debt was \$44.1 billion from end-1983 to 1987. Thus, net flows accounted for only about one half of the increase in debt stock. Some of this discrepancy is accounted for by the depreciating dollar; also, part was due to the increasing impact of rescheduling of arrears. The net flows figure was only slightly larger than interest actually paid on external debt during the period (\$17.8 billion).

^{2/} The differences between the net flows to and from the various categories of creditors should be kept in mind, however. Given the relatively smaller fall in flows from official creditors, and given the increase in official transfers and other non-debt-creating flows during the period, much (though not all) of the drop in net flows is a consequence of the banks having reduced their exposure in the continent.

service ratio of Korea was the same as what was actually paid, while the scheduled debt service ratio of sub-Saharan Africa was about 60 percent.

These two measures are convenient indicators of a debtor's capacity to service its debts. The debt ratio refers to the long-term ability to service debts (the debtor's solvency), while the debt service ratio refers to the ability to meet current payments (the debtor's liquidity). ^{1/} It is not possible to identify unambiguously a certain debt ratio as a "point of insolvency," or a particular debt service ratio as a "point of illiquidity." But there is cause for concern if either measure deteriorates substantially over time, and an attempt can be made to derive rules of thumb for determining the level at which a debt ratio or a debt service ratio may predict imminent payments problems. The following sections discuss the development of these measures of debt burden for various categories of countries in sub-Saharan Africa.

1. Sub-Saharan Africa as a whole

The increasing burden of African debt as expressed through the measures of liquidity and solvency for various debtor categories are summarized in Table 8 and displayed in Figures 5 through 12. After a slow deterioration in the 1970s, the magnitude of the burden has grown rapidly since 1981, when export prices stagnated and a larger share of export earnings was required for debt service payments. At the same time, the share of debt to be amortized started to rise for many debtors. Subsequently, weak export prices and only small gains in export volumes, in conjunction with further debt accumulation, caused an accelerated deterioration in liquidity and solvency.

For the group of 44 countries in sub-Saharan Africa taken as a whole, debt and exports increased at the same rate during the 1970s, leading to a more or less constant debt ratio (Figure 5). Annual growth of export volume was just 0.9 percent during the period (Table 1), but with export prices growing at 13.1 percent annually, there was little increase in the debt burden in spite of the large amount of borrowing. Outstanding debt increased by a factor of nine, and exports by a factor of seven, and thus the debt ratio only rose from 66 percent in 1970 to 85 percent in 1980. With rising export prices, such active borrowing did not appear extravagant.

However, by the end of the decade, the boom had ended in most commodities, and the 1980s brought deflation: export unit values declined on average by 3.5 percent annually for sub-Saharan Africa excluding Nigeria (Table 1), reflating the stock of debt. From 1980 to

^{1/} The use of ratios of debt and debt service to exports of goods and nonfactor services as measures of debt burden is discussed in Appendix I. It is argued there that exports of goods and nonfactor services are a more appropriate proxy for the net present value of current or future income than is GDP.

1987, although debt outstanding no more than doubled, the nominal value of exports of goods and services was halved, and the debt ratio increased by a factor of four, from 85 percent to 331 percent. ^{1/}

The debt service ratio showed slightly different behavior, rising somewhat during the 1970s from approximately 6 percent at the beginning of the decade to slightly over 10 percent towards the end. The main reason for the faster growth of the debt service ratio, compared with the debt ratio, was the increase in bank borrowing and nonconcessional official borrowing, as the share of concessional loans in outstanding debt declined from about 50 percent in 1975 to about 40 percent in 1979 (World Bank (1988b)). Such credits tended to carry higher interest rates and have shorter amortization periods than the soft loans of the period preceding the first oil shock.

After 1980, the rate of increase in the debt service ratio through 1985 was as rapid as that of the debt ratio. Both ratios almost tripled during 1980-85, with the debt ratio rising from 85 percent to 226 percent and the debt service ratio rising from 11 percent to 32 percent (Table 8; Figure 6). This development reflected actual rather than scheduled payments: without payments arrears and reschedulings, the growth of the debt service ratio would have been even more rapid. The debt ratio continued to rise to 331 percent in 1987, but the debt service ratio fell to 27 percent, a result of debt rescheduling. The gap between scheduled and actual payments has tended to grow since the early 1980s.

2. Countries according to SAF-eligibility

The developments for the group of countries eligible for assistance under the IMF's structural adjustment facility (SAF) compared with those that are not, are displayed in Figures 5 and 6. The SAF was established in 1986 with the purpose of providing more concessional support to the lowest-income countries undertaking adjustment programs. ^{2/} This included 34 countries in sub-Saharan Africa (Table 9) that owed approximately 60 percent of the total long-term debt of the region at end-1987. The level of debt burden has been significantly higher for the SAF-eligible countries than for the noneligible countries. The debt

^{1/} This reduction in exports is to a large extent a consequence of the drop in the export earnings of the fuel exporter Nigeria. But the debt ratio for sub-Saharan Africa excluding Nigeria also increased substantially during the period, from 136 percent to 330 percent, as outstanding debt doubled and nominal export earnings declined by 10 percent. Since export volumes increased for sub-Saharan Africa excluding Nigeria (see Table 1), the fall in export earnings was lower than the fall in export prices.

^{2/} The enhanced structural adjustment facility (ESAF), which can provide larger resources than the SAF for the same eligible countries was introduced at the beginning of 1988.

Figure 5: Debt Ratios of Selected African Countries By SAF Eligibility, 1970-87
(In percent)

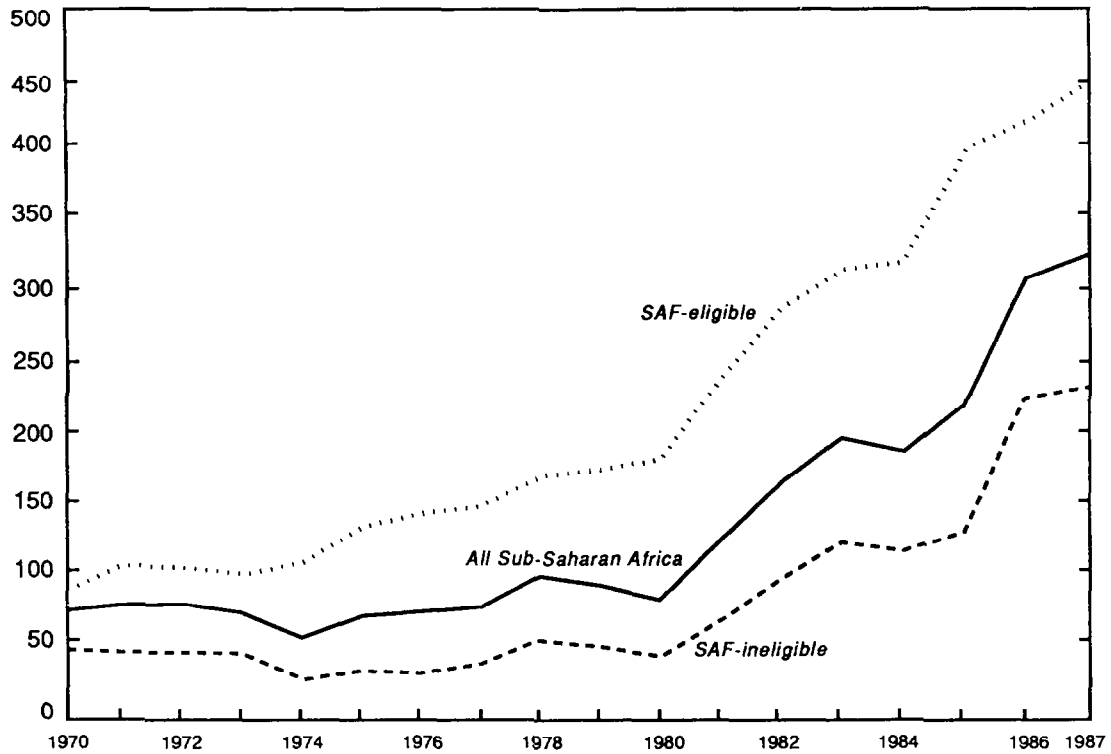


Figure 6: Debt Service Ratios of Selected African Countries
By SAF Eligibility, 1970-87
(In percent)

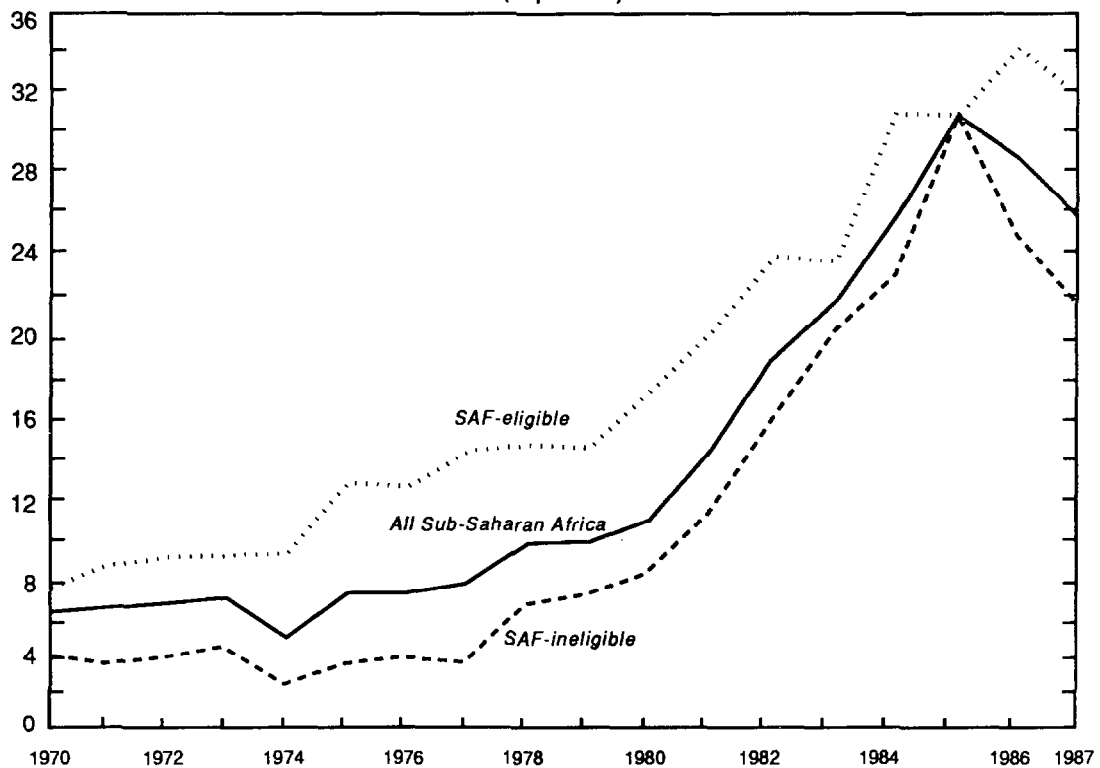


Table 8. Sub-Saharan Africa: Measures of Debt Burden by Country Category, 1970-87 ^{1/}

(In percent)

	Number of countries (of which SAF- eligible)	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Sub-Saharan Africa	44																		
Debt ratio ^{2/}	(34)	66.4	73.5	74.6	70.1	54.2	68.8	71.8	77.0	98.9	94.1	84.8	125.8	168.4	199.5	193.8	225.8	313.9	330.9
Debt service ratio ^{3/}		5.8	6.1	6.4	6.5	4.8	6.9	7.1	7.7	9.7	9.9	11.0	14.4	19.1	22.1	26.6	31.5	29.6	26.7
"Scheduled" debt service ratio ^{4/}		5.8	6.1	6.4	6.5	4.8	6.9	7.1	7.7	10.1	13.0	12.4	16.2	21.8	33.8	36.1	38.2	47.3	60.6
Debt service/total debt ^{5/}		8.7	8.3	8.6	9.3	8.8	10.1	9.9	10.0	9.8	10.5	13.0	11.4	11.3	11.1	13.7	14.0	9.4	8.1
SAF-eligible countries	34																		
Debt ratio	(34)	81.0	99.7	101.9	97.9	105.8	130.7	142.2	149.3	171.5	176.0	182.6	241.6	294.1	320.5	327.1	406.1	427.8	460.3
Debt service ratio		7.0	8.2	8.7	8.8	8.9	12.5	12.3	14.2	14.6	14.5	17.5	20.5	24.3	24.2	31.7	31.7	35.1	32.7
"Scheduled" debt service ratio		7.0	8.2	8.7	8.8	8.9	12.5	12.3	14.2	15.1	23.5	22.1	26.2	32.0	40.5	55.1	47.2	46.1	49.9
Debt service/total debt		8.6	8.2	8.5	8.9	8.4	9.6	8.6	9.5	8.5	8.3	9.6	8.5	8.3	7.5	9.7	7.8	8.2	7.1
SAF-ineligible countries	10																		
Debt ratio	(0)	40.9	40.3	41.7	41.6	23.4	29.8	28.7	33.8	53.1	50.6	43.7	70.9	98.8	126.4	119.5	134.1	230.9	237.8
Debt service ratio		3.8	3.4	3.7	4.3	2.3	3.4	4.0	3.8	6.6	7.4	8.4	11.5	16.2	20.8	23.7	31.4	25.6	22.3
"Scheduled" debt service ratio		3.8	3.4	3.7	4.3	2.3	3.4	4.0	3.8	7.0	7.4	8.4	11.5	16.2	29.7	25.5	33.7	48.2	68.3
Debt service/total debt		9.3	8.5	8.8	10.3	10.0	11.5	13.8	11.3	12.5	14.6	19.1	16.2	16.4	16.4	19.8	23.4	11.1	9.4
Countries with recent payment problems	32																		
Debt ratio	(28)	68.1	76.7	78.5	74.0	54.6	71.4	74.1	79.4	102.4	94.5	84.4	131.3	181.5	221.1	214.7	251.2	388.1	404.3
Debt service ratio		6.1	6.5	6.9	7.1	4.9	7.3	7.6	8.1	10.2	9.8	11.4	14.9	19.6	23.0	28.7	34.0	32.5	27.2
"Scheduled" debt service ratio		6.1	6.5	6.9	7.1	4.9	7.3	7.6	8.1	10.4	13.5	13.0	17.1	23.1	38.4	41.1	42.7	57.6	74.6
Debt service/total debt		8.9	8.4	8.8	9.7	9.0	10.2	10.3	10.2	9.9	10.3	13.5	11.3	10.8	10.4	13.4	13.5	8.4	6.7
Countries without recent payment problems	12																		
Debt ratio	(6)	59.2	60.2	59.1	54.1	52.0	56.3	60.3	65.3	82.8	91.9	86.6	101.7	120.4	128.7	123.5	140.2	136.1	146.9
Debt service ratio		4.7	4.4	4.4	4.1	3.8	5.3	4.8	5.9	7.6	10.4	9.4	12.2	17.1	18.8	19.3	23.2	22.6	25.4
"Scheduled" debt service ratio		4.7	4.4	4.4	4.1	3.8	5.3	4.8	5.9	8.8	10.4	9.4	12.2	17.1	18.8	19.3	23.2	22.6	25.5
Debt service/total debt		7.9	7.3	7.4	7.6	7.4	9.4	7.9	9.1	9.2	11.4	10.8	12.0	14.2	14.6	15.6	16.5	16.6	17.3

Sources: IMF, Research Department; and World Bank (1988).

^{1/} Sub-Saharan Africa includes Nigeria, but excludes Angola, Namibia, and South Africa. See Table 9 for definition of country categories.

^{2/} The debt ratio is the ratio between outstanding debt and export earnings. Export earnings consist of exports of goods and nonfactor services.

^{3/} The debt service ratio is the ratio between debt service payments and export earnings.

^{4/} The "scheduled" debt service ratio is the ratio between actual debt service plus rescheduled amounts and export earnings. Note that it does not include unscheduled arrears. Also, the timing of rescheduled amounts may not always be correct. Debt service/total debt is the ratio between debt service payments and total outstanding debt. Outstanding debt includes long- and medium-term guaranteed and unguaranteed debt, and debt owed to the Fund.

^{5/} Debt service payments consist of actual amortization and interest payments, including Fund obligations.

Table 9. Sub-Saharan Africa: Income and Total Outstanding Debt by Country;
and Country Categorization, 1987 ^{1/}

	GNP per capita US\$ ^{2/}	Total debt US\$ ^{3/}	SAF- eligible	Payment problems ^{4/}	Main export ^{5/}	Borrower type
Benin	280	0.84	x	x	Agriculture	Diversified
Botswana	840	0.51			Mineral	Diversified
Burkina Faso	150	0.72	x	x	Agriculture ^{6/}	Official
Burundi	240	0.71	x		Agriculture	Official
Cameroon	910	2.91			Agriculture	Diversified
Cape Verde	470	0.11	x	x	Agriculture ^{6/}	Official
Central African Republic	290	0.64	x	x	Agriculture	Official
Chad	140	0.27	x	x	Agriculture	Official
Comoros	320	0.15	x	x	Agriculture	Official
Congo	1,040	4.36		x	Oil	Market
Côte d'Ivoire	720	10.11		x	Agriculture	Market
Djibouti	340	0.15	x		Agriculture	Official
Equatorial Guinea	430	0.15	x	x	Agriculture	Official
Ethiopia	120	2.33	x		Agriculture	Diversified
Gabon	3,030	1.64		x	Oil	Market
Gambia, The	230	0.25	x	x	Agriculture	Official
Ghana	400	2.78	x	x	Agriculture	Official
Guinea	430	1.62	x	x	Mineral	Official
Guinea-Bissau	170	0.36	x	x	Mineral	Official
Kenya	300	4.59	x		Agriculture	Diversified
Lesotho	420	0.22	x		Agriculture ^{6/}	Diversified
Liberia	450	1.30	x	x	Mineral	Official
Madagascar	230	3.14	x	x	Agriculture	Official
Malawi	150	1.25	x	x	Agriculture	Official
Mali	170	1.69	x	x	Agriculture	Official
Mauritania	420	1.63	x	x	Mineral	Official
Mauritius	1,200	0.54			Agriculture	Diversified
Mozambique	210	3.59	x	x	Agriculture	Diversified
Niger	270	1.11	x	x	Mineral	Diversified
Nigeria	620	26.56		x	Oil	Market
Rwanda	310	0.43	x		Agriculture	Official
Sao Tomé and Príncipe	340	0.11	x	x	Agriculture	Official
Senegal	420	3.53	x	x	Agriculture	Official
Seychelles	3,010	0.13			Agriculture ^{6/}	Official
Sierra Leone	310	0.66	x	x	Mineral	Official
Somalia	280	1.80	x	x	Agriculture	Official
Sudan	320	12.10	x	x	Agriculture	Official
Swaziland	610	0.27			Agriculture	Official
Tanzania	220	3.67	x	x	Mineral	Official
Togo	240	1.27	x	x	Mineral	Official
Uganda	430	1.82	x	x	Agriculture	Official
Zaire	160	7.97	x	x	Mineral	Official
Zambia	300	6.51	x	x	Mineral	Official
Zimbabwe	630	2.48			Mineral	Diversified

Sources: IMF Survey (June 1988); and World Bank (1987).

^{1/} Countries that obtained at least two thirds of their external credits 1978-82 from commercial lenders are classified as market borrowers; those with at least two thirds from official lenders are classified as official borrowers. The diversified borrowers are the remaining countries.

^{2/} GNP per capita is for 1986 and latest year.

^{3/} Total debt includes short- and long-term debt as well as use of Fund credit.

^{4/} Countries with payments problems are those that had external arrears or that rescheduled during 1980-87.

^{5/} Categorization by export is based on a share of at least 50 percent of export earnings.

^{6/} Classified as service and remittance countries, but have been put in the agricultural category for purposes of this paper.

ratio of the former group was 81 percent in 1970, 242 percent in 1981, and 460 percent in 1987. The corresponding figures for the latter category were 41 percent, 71 percent, and 234 percent, respectively. The debt service ratios of the eligible countries have also been higher throughout the period.

It may be surprising that the poorer countries have been able to incur more debt in relation to their payments ability than the comparatively better off countries. The reason for this is that concessional official development lending has accounted for most of the external financing available to the former group since the 1960s. The share of commercial debt in total debt owed was only 12 percent for the SAF-eligible countries in 1987; it was 38 percent for the noneligible countries, which include all the countries with a significant volume of commercial borrowing. Country risk considerations have a greater effect on commercial lending decisions than on the actions of official lenders.

Although the debt burden has grown at a higher rate for the SAF-eligible countries, the pattern of growth is similar in the two categories. Through 1980, both debt and debt service payments grew slightly faster than exports for both groups of countries. For both groups, debt outstanding has doubled since 1980 and, since 1981 there has been a sharp deterioration in the two debt measures as a result of falling export earnings.

Many countries in both categories have rescheduled payments and accumulated arrears during this decade, implying that the rise in actual debt service ratios in the 1980s would have been larger without arrears or rescheduling. In particular, the debt service ratio of the SAF-noneligible countries would have been higher in 1986 and 1987 had it not been for rescheduling. A rough calculation suggests that the originally scheduled debt service ratio for the SAF-eligible countries was approximately 50 percent in 1987, rather than the actual debt service ratio of 33 percent, while the noneligible countries should have paid 68 percent, rather than 22 percent. ^{1/} Thus, both groups of countries have had similar experiences from worsening payments problems during this decade.

3. Countries with and without recent payments problems

There is a noteworthy difference in the patterns of debt burden growth of countries which have recently experienced payments problems and those which have not (Figures 7 and 8). The former category is

^{1/} The calculations of scheduled debt service ratios do not take payments arrears into account, and they therefore understate contracted obligations (Table 8), in some years substantially. The size of the gap between what was scheduled and what was actually paid is strongly influenced by the impact of a large rescheduling of Nigerian obligations. If Nigeria is left out, the numbers for the noneligible countries fall to 36 percent and 23 percent, respectively.

defined as the 32 countries which owed 80 percent of outstanding African debt at end-1987 that have accumulated payments arrears and/or have rescheduled external debt at least once since 1980. The latter category consists of a rather disparate set of 12 countries: a few low-income agricultural exporters such as Burundi, Ethiopia, Kenya, and Rwanda; middle-income countries such as Botswana and Cameroon, and some very small countries with special circumstances such as Djibouti and Seychelles. The median per capita GNP of this group was \$620, higher than that of the countries with payments problems, which was \$280 (World Bank (1987)). Yet, both groups contain a variety of debtor types and a range of per capita incomes. The structure of debt is not dissimilar between the two categories. In 1987, the countries with payments problems owed about 74 percent of their publicly guaranteed debt to other governments and to multilateral institutions, and 26 percent to banks and other private creditors; the corresponding figures for the group without problems were 80 percent and 20 percent. The factor that distinguishes the two groups is the growth of their debt burdens after 1980.

Up to 1980, both measures of debt burden developed almost identically for countries with and without recent payments problems. The debt service ratios have also remained more or less parallel during the 1980s, but the debt ratios have diverged sharply. Between 1980 and 1987, the debt ratio increased fivefold for the countries with payments problems, from 84 percent to 404 percent, while it less than doubled for those without, from 87 percent to 147 percent. Meanwhile, the debt service ratio rose from 11 percent to 27 percent for the problem countries and from 9 percent to 25 percent for the others.

The difference between scheduled and actual payments explains the differing behavior of the debt ratio and the debt service ratio. The countries without payments problems managed to be more prudent in their external debt management and were therefore able to restrain debt growth and to pay their obligations in full. The countries with problems, however, experienced recurrent payments difficulties as a result of their faster growth of debt and debt service requirements. Arrears and reschedulings have reduced actual debt service payments, which were sometimes capitalized and were reflected in the debt ratio. Had these countries paid in full, their debt service ratios would have risen even more rapidly.

For the group without payments problems, the growth of the debt service ratio after 1981 was twice as rapid as the growth of the debt ratio, since debt serviced rose more rapidly than debt accumulated. The maturity structure of loans taken in the 1970s and early 1980s implied that a given volume of debt required a larger stream of payments at end-1987 than it did in the early part of the decade. The average interest paid on outstanding debt was 6 percent during the period, while the share of outstanding debt amortized grew from 6 percent in 1981 to

Figure 7: Debt Ratios of Selected African Countries
By Payment History, 1970-87
(In percent)

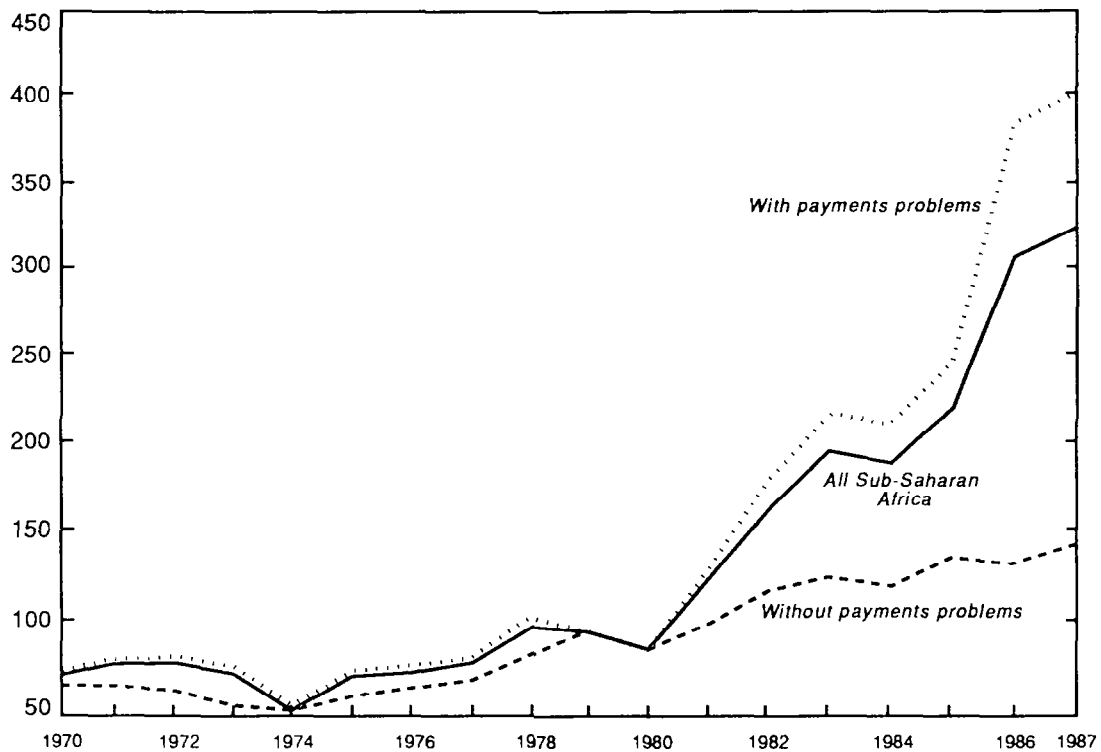
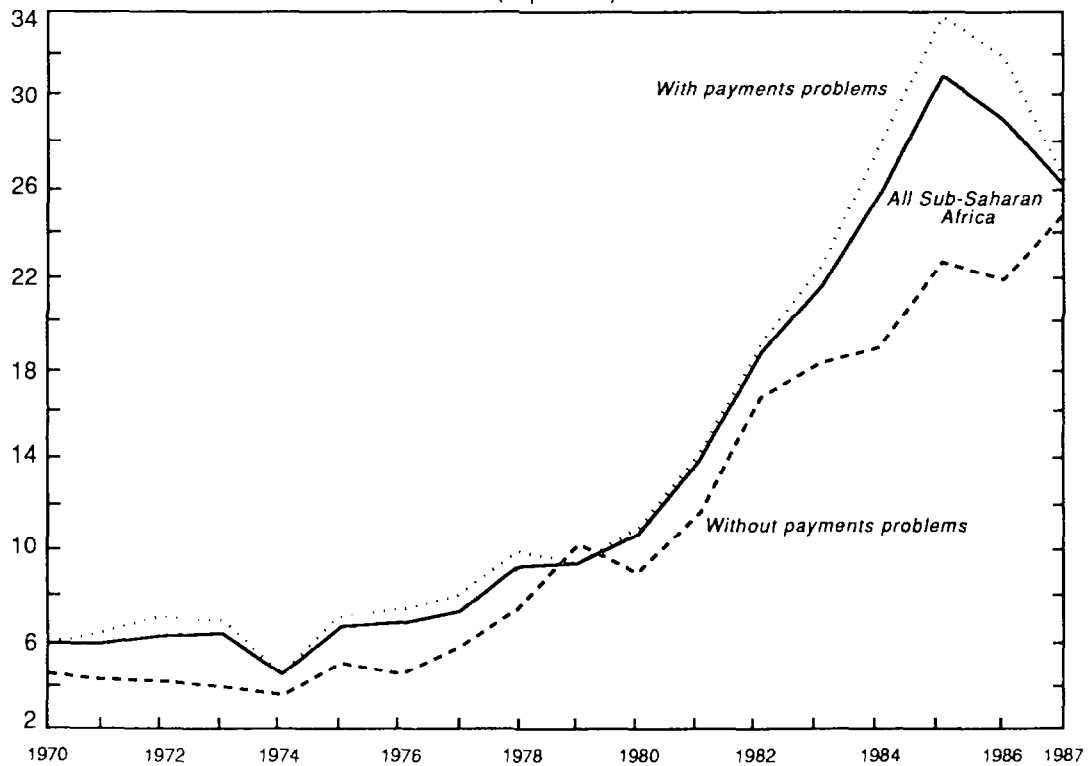


Figure 8: Debt Service Ratios of Selected African Countries
By Payment History, 1970-87
(In percent)



11 percent in 1987, causing the average total debt service payments on outstanding debt to increase from 12 percent in 1981 to 17 percent in 1987 (Table 8).

For the group of countries with payments problems, the ratio of debt service payments to outstanding debt declined during the period, owing to reschedulings and arrearages. The interest and amortization payments were equivalent to approximately 11 percent of total debt in 1981 and had fallen to less than 7 percent in 1987, while contracted payments were equal to about 18 percent of outstanding debt. Average interest actually paid on outstanding debt in 1987 was below its 1981 level, as was the share of outstanding debt amortized. Most of these payments were rescheduled.

The result was that actual debt service payments as a share of exports were approximately equal for the two categories of countries, in spite of the significantly higher debt ratios of the countries with payments problems. In 1987, the debt service ratio of problem countries was 27 percent (30 percent if Nigeria is excluded), while that of countries without payments problems was 25 percent. However, the contracted debt service ratio of the former category was close to 75 percent (if Nigeria is excluded, the ratio was still high at 54 percent). Each time the payments of problem countries were rescheduled they were in effect added to the principal (or, equivalently, not deducted from the principal), adding to future obligations.

A central issue concerns the level of debt service that is sustainable for a country, and, by inference, the feasible ceiling on its debt ratio. The above discussion indicates that apparently few countries are able (or willing) to give up more than 25-30 percent of their export earnings for any extended period of time. This figure approximates the actual debt service ratio of the groups of African debtors both with and without payments problems.

Data for individual countries to some extent confirm this. The median debt service ratio in the year of each country's first rescheduling was 25 percent for 21 African countries that have rescheduled at least once (based on data from the Fund's Research Department). The median debt service ratio in the year prior to the first rescheduling was 24 percent. However, there were large individual variations: the mean debt service ratio in the year of the first rescheduling was 28 percent with a standard deviation of 21; in the year prior to the first rescheduling it was 27 percent with a standard deviation of 17. Thus, some caution is needed in the use of group statistics, and it is necessary to approach each country on a case-by-case basis for detailed country analyses.

As an illustration, one may calculate the amount of adjustment that would be required for the problem countries to normalize payments, or equivalently, the volume of debt that would permit current debt service payments to conform to obligations. Assuming similar maturity

structures of debt and average interest paid for the two categories of debtors (11 percent amortization and 6 percent interest, or a total debt service of 17 percent), and assuming that 25-30 percent is the maximum feasible debt service ratio, then the maximum debt ratio is about 150-180 percent. The countries without payments problems have managed to restrain their ratios to these levels, while the actual debt service ratios of countries with payments problems have been reduced to feasible levels through rescheduling exercises.

If the group of debtors with payments problems were somehow able to reduce its total outstanding debt instantaneously from \$99.8 billion to \$44.5 billion, its debt ratio would be reduced from 404 percent to 180 percent. Equivalently, if export earnings were to increase from \$24.7 billion to \$55.4 billion, the same objective would be reached. In either case, the debt service ratio would remain at 30 percent, but the need to seek rescheduling would be eliminated since actual debt service would be equal to contractual. This example illustrates that even a very large adjustment would lead to little apparent alleviation of actual debt service payments, and that the size of the effort required to normalize external payments relations increases with the debt ratio. As the debt ratio grows, the probability that the problem debtors will be able or willing to achieve such an adjustment declines.

4. Countries according to type of borrowing and type of exports

The growth of debt burden when countries are categorized according to main type of borrowing and according to main export are displayed in Figures 9 through 12. ^{1/} For most of the categories, the patterns of debt burden are similar to those of the whole continent: slow growth in the 1970s, and an acceleration in 1981. The patterns do show a few differences, however.

The debt ratio of exporters of primary products (agricultural and mineral), more or less doubled during the 1970s and have doubled again during the 1980s: in 1987, the figure was 343 percent for agricultural exporters and 320 percent for mineral exporters. Fuel exporters also recorded a debt ratio of well over 300 percent in 1987 (Figure 9). These movements were paralleled by increases in debt service ratios: from 8 percent in 1970 to 18 percent in 1980 and to 28 percent in 1987 for agricultural exporters; from 5 percent to 16 percent to 28 percent for mineral exporters; and from 3 percent to 6 percent to 23 percent for fuel exporters (Figure 10).

Groups of debtors categorized according to main type of borrowing display even larger differences. The debt ratio of official borrowers has been consistently higher than that of diversified borrowers and of

^{1/} The categorization of countries according to type of borrowing or type of export is equivalent to that of the IMF's World Economic Outlook. See Table 9 for definitions.

Figure 9: Debt Ratios of Selected African Countries By Main Export, 1970-87
(In percent)

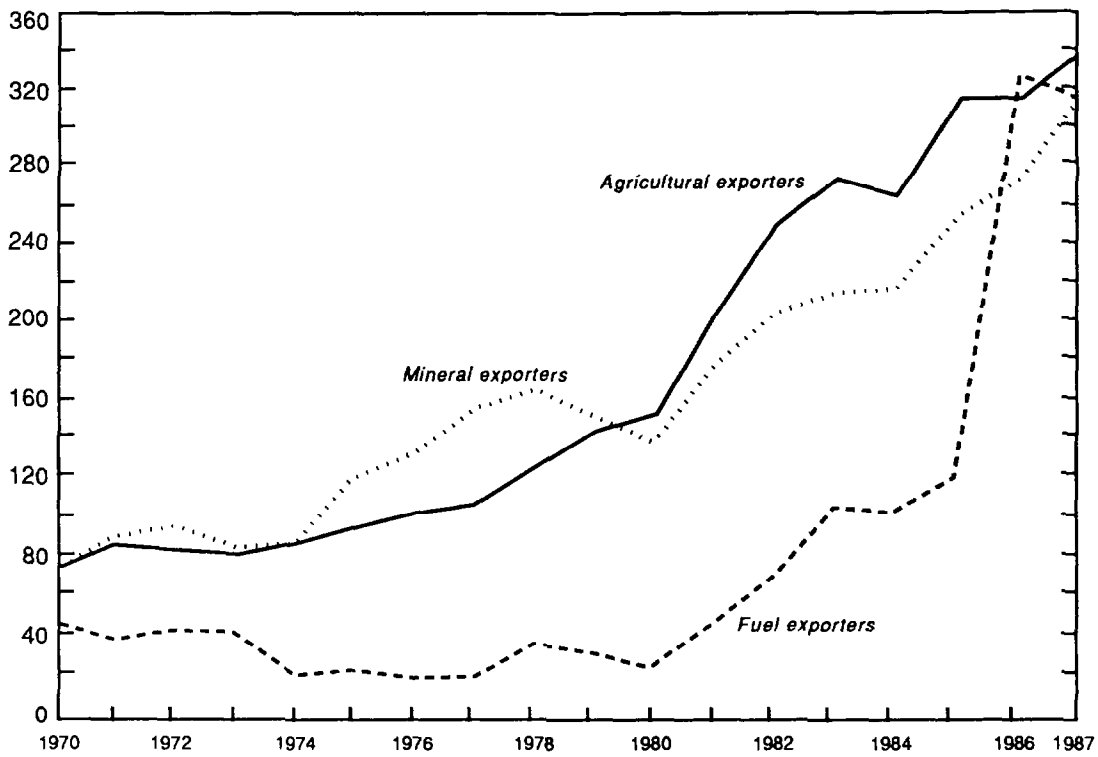
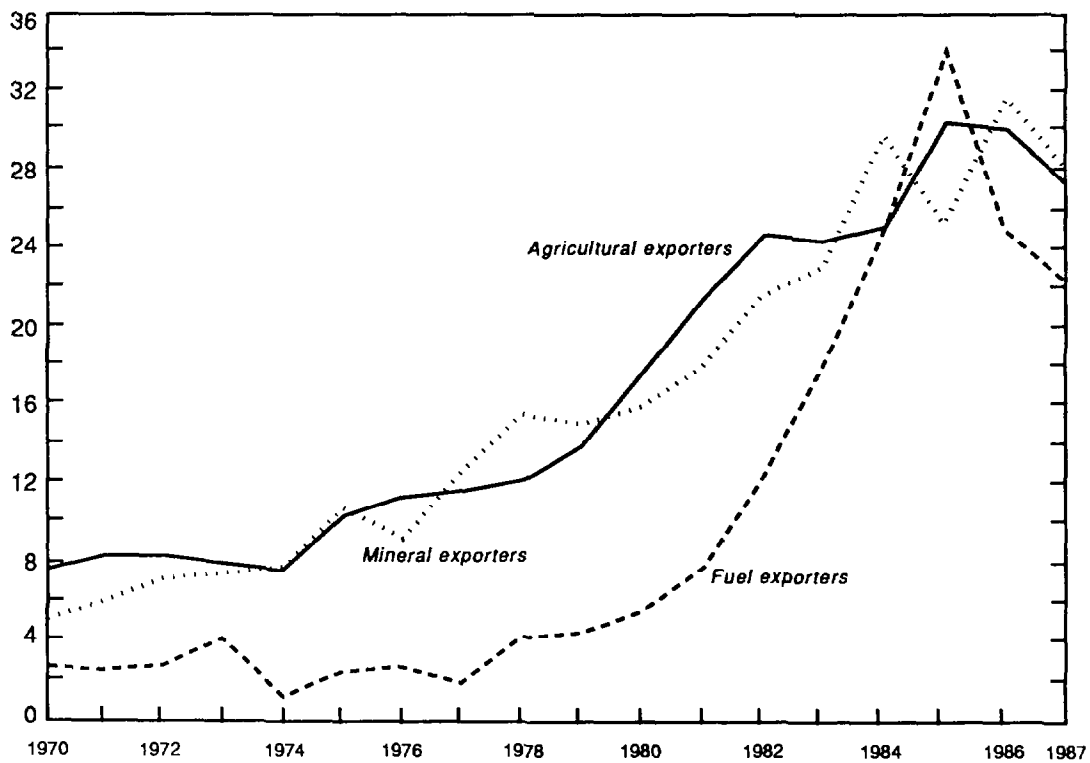


Figure 10: Debt Service Ratios of Selected African Countries
By Main Export, 1970-87
(In percent)



market borrowers, and reached 477 percent in 1987, the highest of any of the categories of countries defined in this paper (Figure 11). Despite the fact that this group has had a higher share of concessional loans than other categories, its debt service ratio has tended to be above that of the others. 1/ The debt ratio of the official borrowers grew from 75 percent in 1970 to 196 percent in 1980, and to 477 percent in 1987; that of diversified borrowers increased from 68 percent to 96 percent to 188 percent; and that of market borrowers changed from 46 percent to 40 percent to 310 percent. Similarly, for the three respective categories, the debt service ratios rose from 7 percent to 18 percent to 32 percent; from 5 percent to 12 percent to 28 percent; and from 5 percent to 8 percent to 22 percent.

The diversified borrowers are defined as those that obtained no more than two thirds of their external borrowing in 1978-82 either from private or from official lenders. Of this small group of ten countries, as many as seven (Botswana, Cameroon, Ethiopia, Kenya, Lesotho, Mauritius, and Zimbabwe) are also part of the group of twelve countries that have not recently experienced payments problems. After 1980, the average debt service ratio of the diversified borrowers grew more quickly than the debt ratio, as in the case of the borrowers without payments problems, since they have tended to service their debts in full. The incidence of reschedulings remained insignificant, as indicated by the small difference between actual and scheduled debt service ratios (Table 8).

As a group, these countries have thus weathered the 1980s better than the other functional categories, at least in terms of remaining reasonably current in their debt payments. It is unclear what accounts for this. While the median income of the group is higher than that of sub-Saharan Africa as a whole, the category is not limited to middle-income countries: it contains poorer economies, and some middle-income countries are left out. And while the composition of the borrowing of the group was mixed in 1980, new borrowing since then has been more concentrated: after 1982, official lenders accounted for 91 percent of the increase in medium- and long-term debt, a share only slightly lower than that for the countries categorized as official borrowers.

The large swings in debt service ratios in recent years for most categories, grouped by type of borrowing or by type of exports, are a function of reschedulings and of some unilateral temporary payments suspensions. The jumps in 1986 in the debt ratios of market borrowers and of fuel exporters are a reflection of the large rescheduling of Nigeria's obligations. On the whole, however, with the exception of

1/ All but two of the official borrowers were SAF-eligible; as discussed in the previous section, these higher ratios can in part be explained by the relatively low weight given to country risk consideration by official lenders.

diversified borrowers, no group of countries as categorized by main export or by main type of borrowing has done better than any other.

5. Scheduled versus actual payments

An alternative way of looking at burden of debt is to examine the difference between the contracted debt service and what is actually paid. An attempt at calculating scheduled debt service ratios is shown in Table 8, and displayed in Figures 13 through 16 for comparison with actual debt service ratios for some of the debtor categories. The calculated numbers on "scheduled" debt service should be treated with care, however, as they do not take arrears into account. Further, since eight countries (out of the 32 countries with recent payments problems) have never rescheduled, their problems are not reflected in the graphs. The difference between what is here calculated to be "scheduled" payments and the actual scheduled payments can in some instances be substantial. The only conclusion that should be drawn is that the gap between scheduled and actual debt service payments has tended to widen for countries with payments problems.

6. Conclusion

Although it is impossible to identify the exact level at which a debt burden becomes excessive, it is clear that many African debtors have passed the point at which they are able or willing to reduce consumption or increase production sufficiently to create the necessary surplus for full debt service. For the countries in sub-Saharan Africa, a debt service ratio of 25 to 30 percent seems to constitute a threshold (with large individual variations), corresponding to a debt ratio of 150 to 180 percent. This appears to be true regardless of the country's borrowing patterns or type of exports. Countries which exceed this threshold find themselves on a path where debt accumulates at a rate which is determined by the difference between scheduled payments and "feasible" debt service. Many countries have been in this position throughout the present decade, and the debt stock has grown without contributing to the debtor's ability to service the old debt or new loans. This is reflected in the lack of improvement of the macro-economic indicators of the continent, the declining trend of the fraction of scheduled debt service that has actually been paid, and the fact that most of the net increase in the debt stock is capitalized interest payments. These facts suggest that many of the countries may in some sense be insolvent (see the discussion of insolvency in Appendix I).

To reduce the debt burden would require a significant increase in the surplus of production over absorption, and/or partial debt cancellation or similar relief provided by the creditors. The next section considers debt relief and presents a simple simulation to illustrate the options available to debtor countries.

Figure 11: Debt Ratios of Selected African Countries
By Type of Borrowing, 1970-87
(In percent)

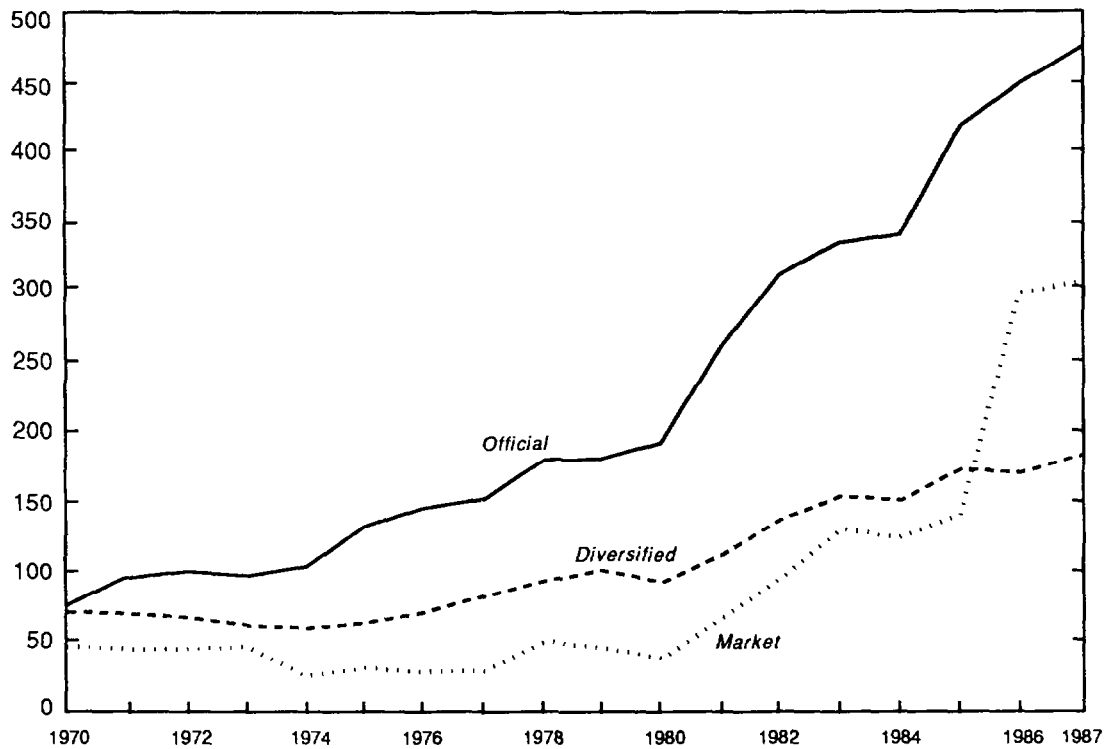


Figure 12: Debt Service Ratios of Selected African Countries
By Type of Borrowing, 1970-87
(In percent)

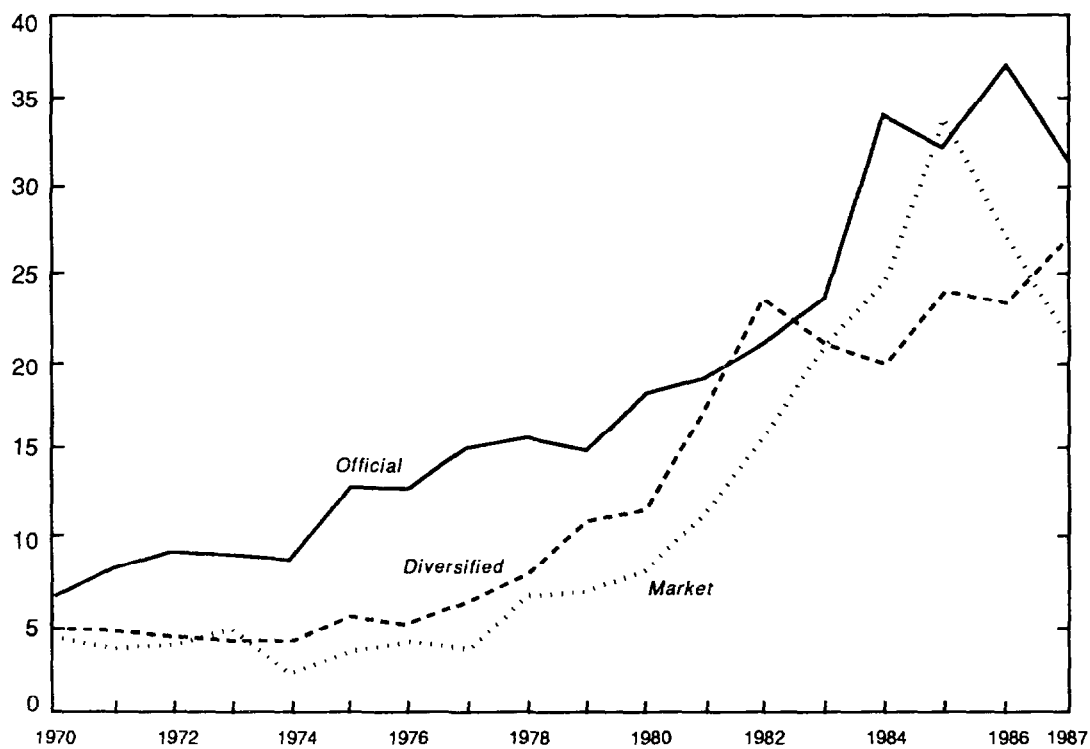


Figure 13: Debt Service Ratios of Sub-Saharan African Countries, 1970-87
(In percent)

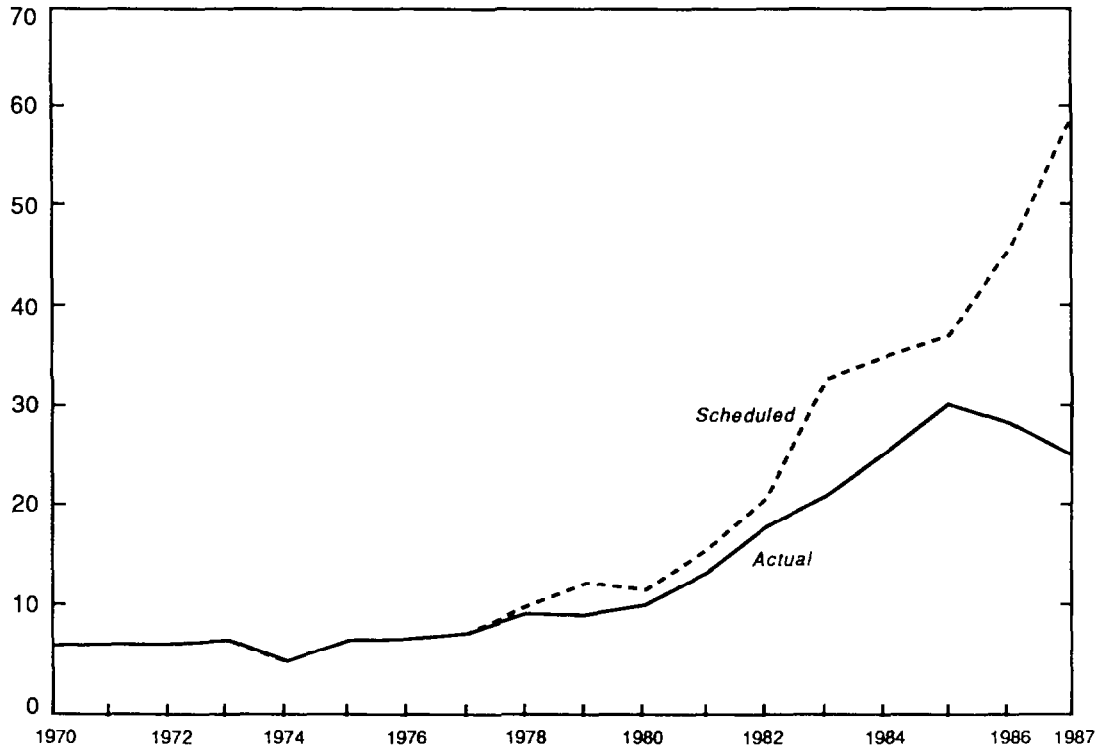


Figure 14: Debt Service Ratios of Sub-Saharan African Countries
with Payments Problems, 1970-87
(In percent)

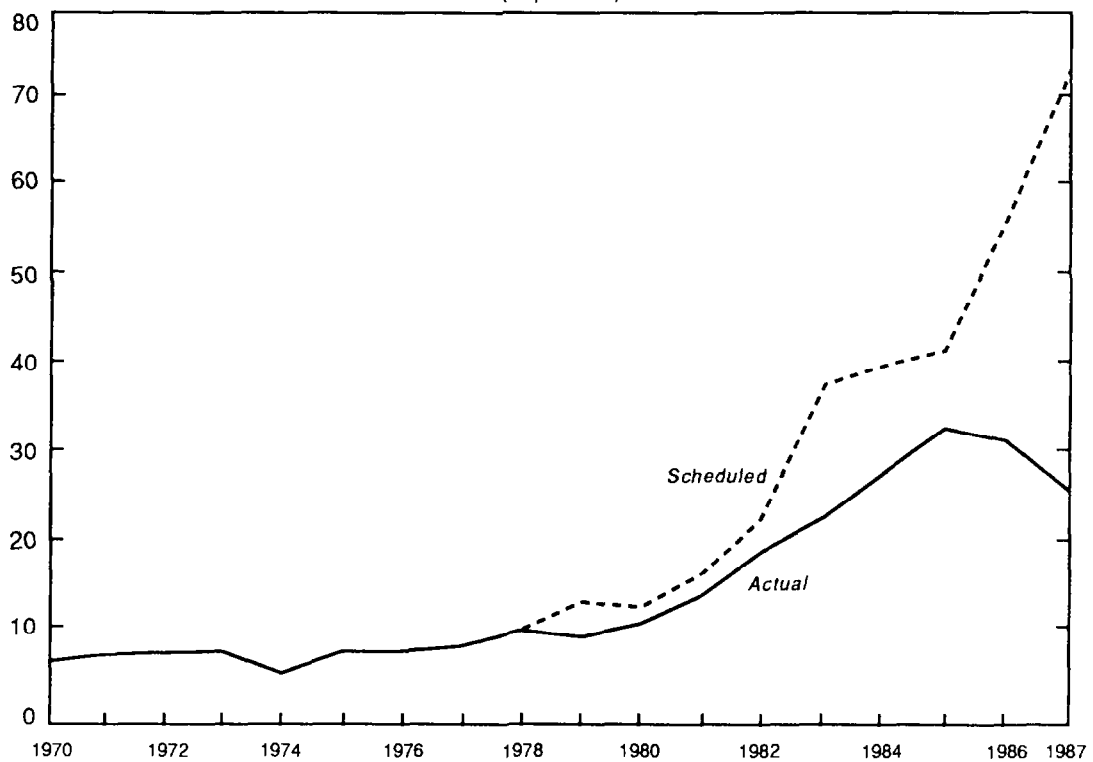


Figure 15: Debt Service Ratios of SAF-Eligible Sub-Saharan Countries, 1970-87
(In percent)

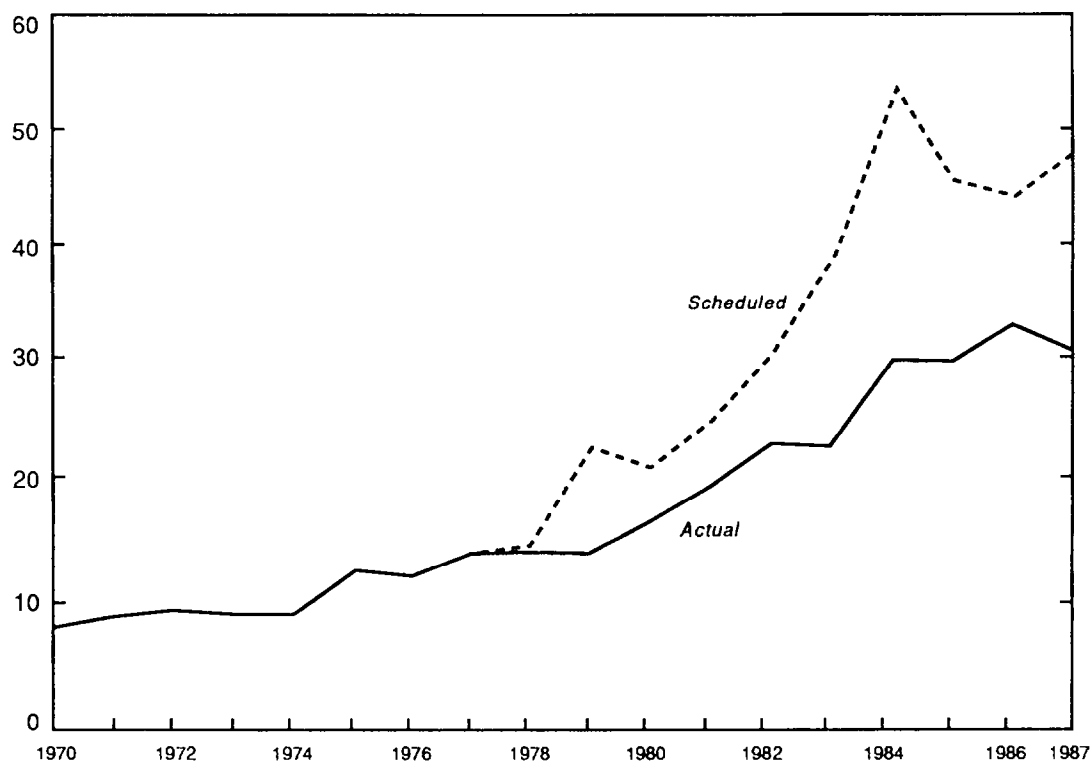
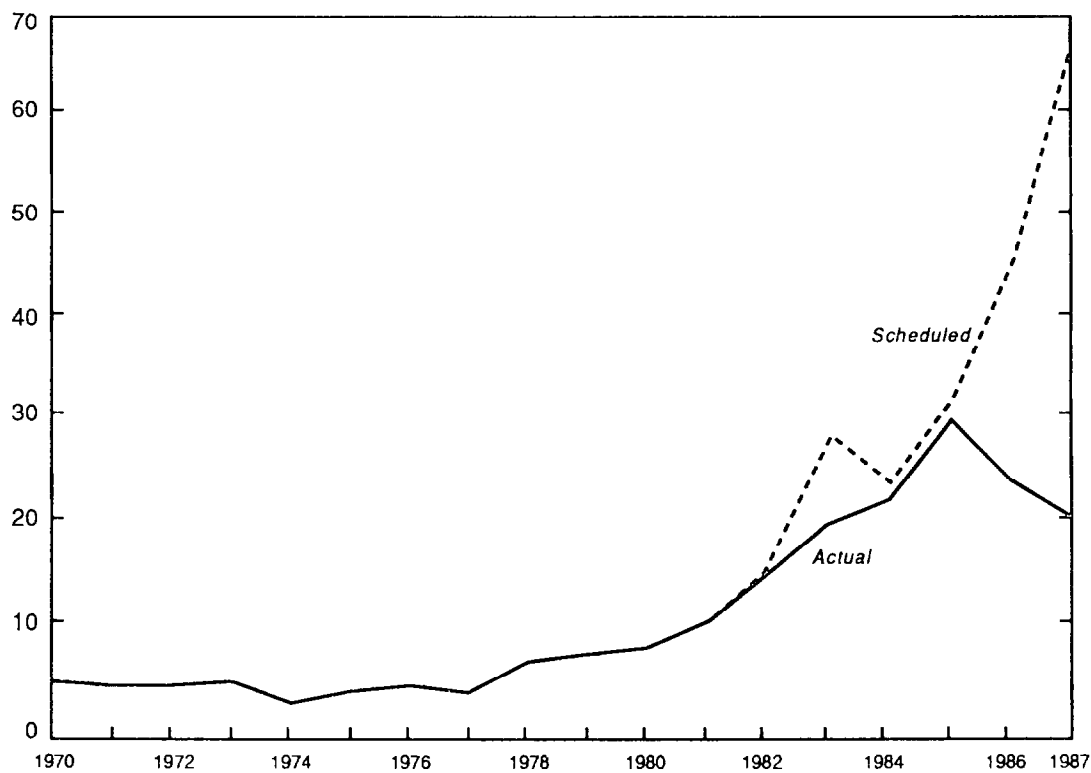


Figure 16: Debt Service Ratios of SAF-Ineligible Sub-Saharan Countries, 1970-87
(In percent)



V. The Effects of Debt Relief

Many African countries are making strong efforts to create a policy environment conducive to long-term growth. At the same time, the debt service requirements of sub-Saharan Africa were \$21.4 billion a year in 1988-89 (IMF Survey (1988)), corresponding to a debt service ratio of 55 percent. In this situation, many countries are likely to request rescheduling of debt payments. However, as the two previous sections have indicated, future normalization of payments will remain difficult as long as debt service due is in practice simply postponed. Many debtors are beyond the threshold where they can sustain the payments on their external debt in the long run. Debt relief will enhance the ability of these countries to restore income growth and normalize external payments relationships. However, if this is to be achieved, a rapid recovery of export growth will also be needed.

1. Sources of debt relief

Suggestions for debt relief may be considered under three headings: bilateral, multilateral, and commercial. With regard to nonconcessional bilateral debt, the cash flow requirements of the debtors can be reduced significantly through refinancing on concessional terms. A reduction of interest paid will have a large effect on the present value of the debt service payments, and would have a particularly strong impact on poorer debtors with little borrowing from commercial creditors. A lengthening of maturities would have a positive effect on cash flow, to the extent that it postpones payments of principal, but there is no effect on the net present value of the obligations unless there is a reduction of interest rates.

There is less immediate benefit to be gained from an improvement in the terms of concessional bilateral debt, since the debt service requirements on a given volume of such debt is, by definition, already low. However, in the case of the very poorest debtors, this may still account for a large share of the debt service requirements. It has been suggested (in U.N. (1988), for example) that concessional bilateral debt be considered for cancellation, since such an action would benefit the poorest debtors most, and the cost to creditors in terms of present value of debt service receipts lost would not be large. In fact, several creditors (including Canada, Germany, the U.K., France, and some Nordic countries) have written off at least part of their concessional development loans.

Suggestions for multilateral official debt relief emphasize the supply of new, concessional financing to distressed debtors, since multilateral creditors do not wish to risk their status as preferred creditors by allowing the rescheduling of outstanding debt. Special facilities have been established or expanded both at the Fund and at the World Bank for concessional financing for poor debtors. In the case of borrowers with serious payments problems and a large share of multilateral debt, a proposal that may be considered is the provision of

concessional multilateral loans for debt management purposes, which would significantly ease the cash requirements for this category of debtors.

A large number of schemes concerning commercial debt relief have been proposed, mostly in the context of Latin American debt (see, for example, Feldstein, et al. (1987), and Fischer (1987)). These schemes differ fundamentally from plans for official debt, in that they need to consider that the relationships between banks and debtors are based on commercial considerations. What role creditor country governments should have in such schemes has been debated but the issue remains unresolved. Proposals have tended to emphasize market-based approaches such as the introduction of new debt instruments and various types of debt conversions, and there have also been suggestions for a new international institution for debt relief, as well as for mechanisms to effect debt reduction. One specific suggestion by the African Development Bank for relief of African commercial debt can be mentioned: the creation of seniority in international commercial lending accomplished by securitization of exports. The availability of senior debt would potentially provide an incentive to banks to renew lending activities in Africa.

However, it should be noted that since claims on African debtors are relatively small on the books of the commercial banks, the African debtors' bargaining power is more limited than in the Latin American case. Furthermore, since official claims amount to three quarters of African debt, any major change in the treatment of this debt will be dependent more on official initiatives than on commercial bank creditors. There are two sides to this situation. On the one hand, commercial lenders may be tempted to withdraw quietly, hoping that the official lenders will fill the gap. On the other hand, as the relative position of official creditors, compared with the commercial creditors, is much stronger in Africa (except in the Nigerian case) than in Latin America, the impact of any official initiatives will have a large impact on the payments ability of the debtors to all creditors, and this may give official creditors influence to persuade the banks to share the burden of debt relief measures.

2. Issues regarding official debt relief

There has been much discussion in the literature concerning the circumstances under which it is in the joint interest of both debtors and commercial bank creditors to write down existing debt or to provide new lending. The analyses assume rational behavior on the part of both parties, with creditors maximizing profits and debtors maximizing welfare (see for instance Hellwig (1977), Krugman (1987), Bulow and Rogoff (1988a) and (1988b)). This section will examine various issues regarding possible alleviation of official debt.

The goals of official debt alleviation may be considered to be: to normalize payments relationships between debtor and creditor countries,

provide an incentive for appropriate adjustment policies, and provide a flow of resources to the debtor countries to support sustainable growth and employment.

However, the possibility of rescheduling debts at the Paris Club introduces an element of moral hazard in the credit relationship between debtors and creditors. If a country successfully adjusts, the resources provided through future reschedulings fall, which functions as a marginal tax on reforms. The creditors attempt to prevent this by requiring a rescheduling debtor to adhere to an adjustment program, but if the debtor has a high preference for current consumption, there may be an incentive to relax the adjustment effort once the debt relief has been obtained. One way to avoid this would be to grant equal amounts of debt relief to all debtors, in effect abandoning the case-by-case approach to rescheduling; however, the costs would be prohibitive. The moral hazard problem would also need to be considered if debt cancellations are implemented within the framework of the Paris Club.

A related issue concerns the risk that debtors would return to an unsustainable policy path once a significant share of their obligations have been forgiven, and again undertake excessive borrowing in the hope of repeated future forgiveness. This risk may be smaller than it appears. First, debtors may have learned from experience that excessive borrowing complicates economic management and produces no long-term real benefit, and they may be wary of incurring such borrowing in future. Second, creditors can prevent the re-emergence of debt problems by refusing to provide excessive financing.

A further issue relates to creditor coordination. If an individual creditor cancels its claims on a distressed debtor, other creditors are able to increase collection of receipts. In the extreme case, debt relief results not in an increased resource transfer to the debtor, but in a transfer from one creditor to another. It is likely that banks and other private creditors have been able to collect more debt service than they would have in the absence of Paris Club reschedulings. Similarly, Eastern European lenders generally do not take part in rescheduling agreements. For debt relief to result in increased resource transfers to debtors, it is therefore important to ensure equitable burden sharing by all creditors.

Even with adequate burden sharing, there may still be a risk that the alleviation of official debt can lead to a reduction in the resource flow. For example, a creditor country may choose to cancel claims on a debtor by purchasing debt from the domestic export credit agency, using money that would otherwise have been allocated for development aid. In theory, this has no net effect on resource flows, since an outflow and an inflow cancel each other out. In practice, there is an effect if the debtor's actual payments to the export credit agency would have been smaller than the now-cancelled development aid. In this case, the net effect of the debt write-down is to reduce transfers by the difference between the reduction of aid and the intended debt payments. In

addition, the debtor loses the benefit of the technical assistance component that is included in most official aid.

Another issue concerns legislation and accounting practices of creditor countries which may make debt reduction difficult. For example, cancelling a large volume of nonconcessional official debt may threaten the solvency of the domestic export credit agency, according to accounting rules. Similarly, forgiveness of concessional debt may require a budget appropriation equal to outstanding principal, although this may be much larger than the present value of the likely actual receipts of debt service. This issue would have to be addressed through a re-examination of accounting rules and the relevant legislative provisions in each creditor country.

3. A simulation of payments ability

In this subsection, the effect on the debt burden of debt relief over a five-year period is simulated, using different assumptions on export growth (Table 10). The simulation is based on balance of payments developments for an entity very much like sub-Saharan Africa. The current account of this entity is the sum of exports and official transfers less the sum of imports and interest payments. Current account deficits are financed through external borrowing, and current account surpluses are used to reduce the outstanding stock of debt. The change in debt stock is equal to the current account deficit (increased stock) or surplus (reduced stock). This means that outstanding debt is always rolled over, and that principal is only repaid when the debtor runs a current account surplus.

The assumptions of the simulation are as follows. In year zero, exports and imports of goods and nonfactor services are \$35 billion and \$40 billion, respectively. Official transfers are \$5 billion. Outstanding debt is \$119 billion, which gives a debt ratio of 340 percent.^{1/} Average interest on outstanding debt is 6 percent, as is the interest on new loans. These assumptions roughly correspond to the figures for sub-Saharan Africa at the end of 1987.

In sections A through D of Table 10, different assumptions are made concerning the growth rate of exports for years one through five: the annual growth rates are 0 percent, 3 percent, 7 percent, and 11 percent in the four scenarios. Official transfers are assumed to grow by 5 percent annually in all scenarios, while interest is paid on the debt stock at the end of the preceding year. This determines three of the four

^{1/} Since the principal is continuously rolled over, the size of the debt service ratio does not have any significance in this simulation. Instead, an indicator of the burden of debt service payments is the ratio of interest payments to exports. With \$119 billion in outstanding debt, 6 percent interest, and \$35 billion exports, the interest ratio is 20.4 percent.

Table 10. Projections of Debt Burden: Five-Year Projections of External Variables Under Different Assumptions of Export Growth, Debt Relief, and the Debt Ratio ^{1/}

(In billions of U.S. dollars)

Debt forgiveness US\$ billion per year	Debt Ratio in Year Five				Debt forgiveness US\$ billion per year	Debt Ratio in Year Five			
	100 Percent	180 Percent	260 Percent	340 Percent		100 Percent	180 Percent	260 Percent	340 Percent
Section A	(Export growth: 0 percent per year)				Section C	Export growth: 7 percent per year			
0	Exports ^{2/}	175.0	175.0	175.0	0	Exports	215.4	215.4	215.4
	Imports ^{2/}	-92.2	-116.8	-141.7		Imports	-143.4	-178.5	-213.9
	Interest payments ^{2/}	-26.5	-29.8	-33.0		Interest payments	-29.7	-33.8	-37.7
	Current account ^{2/}	84.0	56.0	28.0		Current account	69.9	30.6	-8.6
	Debt service ratio ^{3/}	35.0	63.0	91.0		Debt service ratio	49.1	88.4	127.6
	Interest/ratio ^{3/}	9.4	13.2	16.9		Interest/ratio	8.7	12.3	15.8
2	Exports	175.0	175.0	175.0	2	Exports	215.4	215.4	215.4
	Imports	-102.2	-126.8	-151.7		Imports	-153.4	-188.5	-223.9
	Interest payments	-26.5	-29.8	-33.0		Interest payments	-29.7	-33.8	-37.7
	Current account	74.0	46.0	18.0		Current account	59.9	20.6	-18.6
	Debt service ratio	35.0	63.0	91.0		Debt service ratio	49.1	88.4	127.6
	Interest/ratio	9.4	13.2	16.9		Interest/ratio	8.7	12.3	15.8
5	Exports	175.0	175.0	175.0		Exports	215.4	215.4	215.4
	Imports	-117.2	-141.8	-166.7		Imports	-168.4	-203.5	-238.9
	Interest payments	-26.5	-29.8	-33.0		Interest payments	-29.7	-33.8	-37.7
	Current account	59.0	31.0	3.0		Current account	44.9	5.6	-33.6
	Debt service ratio	35.0	63.0	91.0		Debt service ratio	49.1	88.4	127.6
	Interest/ratio	9.4	13.2	16.9		Interest/ratio	8.7	12.3	15.8
10	Exports	175.0	175.0	175.0	10	Exports	215.4	215.4	215.4
	Imports	-142.2	-166.8	-191.7		Imports	-193.4	-228.5	-263.9
	Interest payments	-26.5	-29.8	-33.0		Interest payments	-29.7	-33.8	-37.7
	Current account	34.0	6.0	-22.0		Current account	19.9	-19.4	-58.6
	Debt service ratio	35.0	63.0	91.0		Debt service ratio	49.1	88.4	127.6
	Interest/ratio	9.4	13.2	16.9		Interest/ratio	8.7	12.3	15.8
Section B	(Export Growth: 3 percent per year)				Section D	Export growth: 11 percent per year			
0	Exports	191.4	191.4	191.4	0	Exports	242.0	242.0	242.0
	Imports	-112.8	-141.6	-170.6		Imports	-177.9	-220.4	-263.2
	Interest payments	-27.8	-31.5	-34.9		Interest payments	-31.7	-36.3	-40.7
	Current account	78.4	46.0	13.5		Current account	60.0	12.8	-34.3
	Debt service ratio	40.6	73.0	105.5		Debt service ratio	59.0	106.2	153.3
	Interest/ratio	9.1	12.8	16.4		Interest/ratio	8.4	11.9	15.2
2	Exports	191.4	191.4	191.4	2	Exports	242.0	242.0	242.0
	Imports	-122.8	-151.6	-180.6		Imports	-187.9	-230.4	-273.2
	Interest payments	-27.8	-31.5	-34.9		Interest payments	-31.7	-36.3	-40.7
	Current account	68.4	36.0	3.5		Current account	50.0	2.8	-44.3
	Debt service ratio	40.6	73.0	105.5		Debt service ratio	59.0	106.2	153.3
	Interest/ratio	9.1	12.8	16.4		Interest/ratio	8.4	11.9	15.2
5	Exports	191.4	191.4	191.4	5	Exports	242.0	242.0	242.0
	Imports	-137.8	-166.6	-195.6		Imports	-202.9	-245.4	-288.2
	Interest payments	-27.8	-31.5	-34.9		Interest payments	-31.7	-36.3	-40.7
	Current account	53.4	21.0	-11.5		Current account	35.0	-12.2	-59.3
	Debt service ratio	40.6	73.0	105.5		Debt service ratio	59.0	106.2	153.3
	Interest/ratio	9.1	12.8	16.4		Interest/ratio	8.4	11.9	15.2
10	Exports	191.4	191.4	191.4	10	Exports	242.0	242.0	242.0
	Imports	-162.8	-191.6	-220.6		Imports	-227.9	-270.4	-313.2
	Interest payments	-27.8	-31.5	-34.9		Interest payments	-31.7	-36.3	-40.7
	Current account	28.4	-4.0	-36.5		Current account	10.0	-37.2	-84.3
	Debt service ratio	40.6	73.0	105.5		Debt service ratio	59.0	106.2	153.3
	Interest/ratio	9.1	12.8	16.4		Interest/ratio	8.4	11.9	15.2

^{1/} The baseline assumptions in year zero are: exports, \$35 billion; imports, \$40 billion; official transfers, \$5 billion; and outstanding debt, \$119 billion. This gives an initial debt ratio of 340 percent. Interest on outstanding debt and on new borrowing is 6 percent.

^{2/} Exports, imports, interest payments, and current account are stated on a cumulative basis for all scenarios.

^{3/} Debt service ratio and interest ratio are percentages of exports in year five for all scenarios.

components of the current account. The fourth, imports, is given residually in the following fashion. Each scenario assumes a certain debt ratio at the end of year 5: 100 percent, 180 percent, 260 percent, or 340 percent. Since the rate of export growth is known by assumption, the value of exports at the end of the period is predetermined, and thus, by inference from the debt ratio, the stock of debt is also given. This in turn, makes it possible to calculate the cumulative current account position, which is allocated over the five-year period. With the current account deficit (or surplus) known in each year, as well as three of the four components of the current account, imports can be calculated.

For example, assuming 3 percent export growth, exports in year five are \$40.6 billion. If the debt ratio is to be 180 percent by that year, outstanding debt needs to be reduced from \$119 billion to \$73 billion. Thus, the cumulative current account surplus is \$46 billion. Allocated over five years, and given the development of the other current account items, this means that cumulative imports are \$141.5 billion (Table 10, Section B). This corresponds to a reduction of import expenditures of almost 30 percent, a development that is unlikely to be realized in practice.

Note that the simulation is based on an extremely simplified notion of adjustment: imports simply fall or expand so that the target current account for each year is reached. Nevertheless, it is possible to make some useful observations based on this approach. Different rates of export growth allow sharply differing import volumes, given some target debt ratio.

For the debt ratio to be unchanged at 340 percent in year 5, zero export growth requires that the cumulative current account be in balance, and that cumulative imports are \$116.9 billion (Table 10, Section A); 3 percent export growth allows a current account deficit of \$19.0 billion and imports of \$200.1 billion (Table 10, Section B); 7 percent export growth permits a current account deficit of \$47.9 billion and imports of \$249.8 billion (Table 10, Section C); and 11 percent export growth allows a current account deficit of \$81.5 billion and cumulative imports of \$306.6 billion (Table 10, Section D). In all these cases, the debt ratio remains at 340 percent.

At the other extreme, if the debt ratio is to be reduced to 100 percent in five years with zero export growth, a cumulative current account surplus of \$84.0 billion is required, which leaves imports at \$92.2 billion (Table 10, Section A); whereas an increase in export growth to 11 percent lowers the current account surplus requirement to \$60.0 billion and allows imports of \$177.9 billion (Table 10, Section D).

The results of these simulations emphasize a perhaps obvious fact. As long as exports grow, debt can grow without an increase in the debt ratio. Equivalently, the current account can remain in deficit as

long as exports keep growing, with the size of the sustainable deficit a positive function of the export growth rate: the the faster exports grow, the larger is the permanent current account deficit consistent with an unchanged debt ratio. Similarly, if the debt ratio is to be reduced, a more rapid growth in exports allows smaller current account surpluses for an equivalent reduction of the debt burden. The implied growth in imports is therefore increased by the larger sustainable current account deficit arising from the faster export growth, as well as by the additional imports which would be consistent with a balanced current account.

A number of scenarios assuming various levels of debt relief are also included in Table 10, where debt relief consists of the gradual cancellation of principal. The four versions of debt relief of \$0 billion, \$2 billion, \$5 billion, and \$10 billion annually imply a total write-down during five years of \$0 billion, \$10 billion, \$25 billion, and \$50 billion, respectively. However, the effect on cash flow is much less, since each \$1 cancelled implies \$0.06 less in annual debt service payments, as interest paid is 6 percent. But since obligations are cancelled, this reduction is permanent.

This scheme for debt relief is unlike those that in practice are being considered, in that it only provides cancellation of principal, and does not address the issue of interest payments on outstanding debt. This mechanism is preferred here since it makes it possible to retain the original interpretation of the debt ratio. Conversely, if interest on outstanding debt were reduced, a given debt ratio would imply a lower debt burden. However, there is no conceptual difference between the two types of relief, since it would be possible to choose some concessional refinancing of nonconcessional debt that would have the same effects on the cash flow as in this model. Finally, the reason for the gradual cancellation of principal is to allow a slower impact on the payments position of the creditors than if all the debt stock was cancelled at once.

The effect of debt relief is to allow increases in the current account deficits (or reductions in the current account surpluses) equal to the total amounts forgiven. For example, in order to reduce the debt ratio from 340 percent to 180 percent when annual export growth is 7 percent, the required cumulative current account surplus when there is no debt relief would be \$30.6 billion, allowing \$178.5 billion of imports. With an annual cancellation of claims of \$5 billion, however, the required current account surplus falls to \$5.6 billion, and imports rise to \$203.5 billion (Table 10, Section C).

It should be noted that export growth is important in enabling an improvement of the debt situation. For example, with 7 percent export growth and no debt forgiveness, the debt ratio is reduced to 180 percent with a cumulative current account surplus of \$30.6 billion and imports of \$178.5 billion (Table 10, Section C). If export growth is only 3 percent, annual debt cancellation of \$5 billion is required to give an

almost identical result: a current account surplus of \$21.0 billion, imports of \$166.6 billion, and a fifth-year debt ratio of 180 percent (Table 10, Section B).

Are any of these scenarios feasible? The answer depends on how much import compression is compatible with a given export growth rate target and also on what debt ratio is feasible. The domestic economy is not described in the model, so the simulations do not specify the relationship between export growth and import requirements. For the sake of comparison, it can be noted that during the five-year period 1983-87, the cumulative value of imports and exports of goods and nonfactor services for sub-Saharan Africa were \$201 billion and \$179 billion, respectively. Even with much improved foreign exchange management, as well as improved terms of trade, it would be hard to trust the feasibility of scenarios that require drastic import reduction while exports grow rapidly. Therefore, an ad hoc assumption is made that for a scenario to be acceptable, the cumulative value of imports should be at least as high as the value of exports. Even this would require significant import compression, compared with 1983-87 levels.

Regarding the feasible debt ratio, it was concluded in the section on debt burden that, with the current terms on outstanding debt, a debt ratio of more than 180 percent tends to be unsustainable for debtors in sub-Saharan Africa. Therefore, as a working hypothesis, only scenarios that leave the debtor with a debt ratio no higher than 180 percent are assumed to be sustainable in the longer run.

These two requirements imply that only four scenarios are feasible. If the debt relief is \$10 billion per year, export growth rates of 3 percent, 7 percent, or 11 percent make it possible to achieve a debt ratio of 180 percent by year five. If debt relief is \$5 billion per year, annual export growth of 11 percent is required.

How does this compare with current debt relief proposals? In U.N. (1988) it is calculated that an increase in flows to sub-Saharan Africa of \$5 billion a year will be required over the next five years to enable rehabilitation of the economies, with new commitments from the World Bank, the IMF, and the African Development Bank providing up to \$3 billion a year, potential concessional rescheduling of some bilateral debt and cancellation of some debt providing another \$1 billion, leaving additional requirements of official flows of \$1 billion. (For comparison, the Toronto proposal is expected to provide \$0.5 billion annually, not necessarily all of it to Africa.)

The simulation exercise suggests that relief of at least the same magnitude as the U.N. proposal is required. Translated into interest due, cancellation of \$5 billion would imply a permanent reduction in annual interest payments of \$300 million; cancellation of \$10 billion would reduce interest payments by double that amount. However, it is assumed that an additional permanent reduction of interest payments of the same size is provided in each year after the first year until year

five, when a total amount of \$25 billion has been cancelled. This amount originally caused annual interest payment requirements of \$1.5 billion (or, in the case of \$10 billion annual cancellations, interest payments of \$3 billion). Thus, if relief is to be provided in the amounts indicated through this simulation, the resources made available through the Toronto proposal will need to be supplemented substantially.

In summary, this simulation exercise implies that the payments situation of the debtors will not be normalized unless debt relief is forthcoming in excess of what is now under discussion; also, any attempt to improve the debtors' ability to improve economic performance will require a rapid recovery of exports in order to succeed.

VI. Concluding Remarks

The debt burden of the countries of sub-Saharan Africa has reached a very high level, and many of the countries find it difficult to reform their economies and to normalize external payments. An examination of the growth of the debt burden of different categories of African debtors indicates that their position took a turn for the worse around 1981, and has continued to deteriorate since. With the kind of economy and composition of borrowing that is typical of most African countries, debt service in excess of 30 percent of export earnings (corresponding to debt ratios of about 180 percent) is rarely fully paid. In the best case, debt service is partly paid and partly postponed through reschedulings; in more difficult cases, the debtors unilaterally delay or even suspend payments. This is sustainable only in the event that the debtor is undergoing a transformation that will raise its payments ability in the future. The experience of the African debtors during this decade belie the assumption that this is happening.

Some African countries are making successful attempts to implement adjustment programs, resulting in improved macroeconomic performance. However, unless the reforms have an extremely large effect on export earnings, not even these countries can be expected to be able to fully service their debts in the foreseeable future.

There is thus a strong argument for effective debt relief, which would make possible a return to normalized relations between debtors and creditors, and would provide an increased flow of resources to the debtors in support of efforts to achieve positive income growth. A combination of debt relief and efforts to promote exports from the African debtors would have a strong impact on the restoration of the viability of the debtors' economies.

The Measurement of Debt Burden

1. Solvency and liquidity

A country (or a firm) that is able to generate a present value of earnings equal to outstanding external debt is by definition solvent. It is liquid if it is able to meet its external payments obligations on the agreed time schedule. Temporary liquidity problems may well appear in spite of a fundamentally solvent position. New credits can resolve a short-term crisis, and it is in both the debtor's and the creditor's interest to ensure that bridging takes place. But short-term payments problems may also be an indication of structural problems, which if unchecked may lead to insolvency, in which case new credits are helpful only if they facilitate economic restructuring. Actual insolvency sooner or later may require action to implement a fundamental restructuring of the debt.

The analogy between the firm and the sovereign borrower is more valid for liquidity questions than for solvency. In the case of a liquidity problem, both face a similar set of possible actions: reducing expenditures, finding new sources of finance, and suspending or cancelling payments. But a nation has neither the same rights nor the same obligations as a firm if insolvent. Whereas an insolvent firm can terminate economic activity, sell its assets, and divide the proceeds among the creditors, a nation cannot. Neither does a nation have the option to file for bankruptcy, achieve a court-enforced settlement of debt obligations under par, and resume operations, with new managers and new access to the credit market. In addition, in the absence of enforceable international law or other effective sanctions, creditors are unable to force an unwilling debtor country to fulfill its obligations. Hence for nations, a solvency crisis, and sometimes a liquidity crisis, becomes a bargaining situation where the outcome is a result of the relative strengths of the bargaining positions of the creditors and the debtors.

In fact, the differences between sovereigns and firms have led to disagreement about the relevance of the solvency concept as applied to nations. Cooper and Sachs (1984), for example, use the net present value definition of insolvency, and maintain that a country is solvent as long as any one of the following three conditions is fulfilled: external debt service increases less slowly than the real rate of interest; external debt grows less rapidly than productive wealth; or discounted consumption spending is no higher than productive wealth minus current stock of debt (where productive wealth is defined as discounted value of output net of investment).

However, Eaton et al. (1986) suggest that whereas solvency is a concept referring to the ability to pay, the correct approach to a sovereign debtor's position should emphasize its willingness to pay. Since international commitments are nonenforceable, all debt service

payments are in effect a result of a negotiating process between debtors and creditors, where the size of the debt service payments depend on the bargaining strength of the two parties. Bulow and Rogoff (1988a) also take this approach, and argue that the creditor subjects the debtor to a credit ceiling to ensure that the scheduled debt service payments are low enough to make the costs to the debtor of default larger than the benefits. Implicit or explicit bargaining over debt service payments takes place if the outstanding debt for some reason increases beyond the credit ceiling. The negotiation results in a partial, negotiated reduction of debt service obligations rather than full default. Thus, a debtor is never insolvent; whenever the debt burden becomes sufficiently large, the parties enter a grey zone of constant debt renegotiation, where actual debt payments are always smaller than what was originally contracted.

The willingness-to-pay approach has some appeal, but there is still a strong reason to consider the debt problem as a matter of payments ability. The ability (or the willingness) of the debtor to fulfill its obligations falls as the external position deteriorates, and eventually, the payments position may become so problematic that a temporary or permanent payments suspension becomes the debtor's most attractive course of action, by choice or by necessity. Thus, both the "willingness" and the "ability" are functions of the same variables, as both depend on the debtor's capacity to fulfill its obligations. Therefore, the concept of sovereign insolvency is used in this paper, if a little more loosely than in Cooper and Sachs (1984), and a debtor is regarded as insolvent if it has accumulated a stock of debt which it is not able to service.

2. Measures of debt burden

Liquidity difficulties exist if a country finds itself unable to locate a regular source of credit for current trade transactions and is forced to resort to exceptional financing, such as the depletion of foreign exchange reserves, the accumulation of arrears, or the rescheduling of debt. An insolvent debtor is not necessarily one which defaults on its external payments once and for all, but can also be a debtor whose liquidity problems are so frequent and sizable as to be permanent features, making it unlikely that the debtor will achieve external balance.

Ideally, a measure of solvency would relate discounted future payments to discounted income while a measure of liquidity would relate current payments requirements to current payments ability. But these ideal measures are not readily available. Mayer (1985) surveys commercial banks' approaches to the assessment of the creditworthiness of sovereign borrowers and finds that a common practice consists of the assessment of a large number of macroeconomic and political variables, often in a rather arbitrary fashion. However, it is for practical purposes possible to reduce the number of indicators of solvency and liquidity. Two easily calculated measures are the debt ratio (the ratio

of outstanding debt to exports of goods and nonfactor services) and the debt service ratio (the ratio of interest plus amortizations to exports of goods and nonfactor services).

The present value of future obligations is in principle equal to outstanding debt (or less, in the case of concessional debt). Unfortunately, uncertainty about the future makes it difficult to calculate a net present value of future income in order to arrive at an estimate of productive wealth out of which the debt is to be serviced. A proxy for future income is therefore required. Output in the near future is constrained by the current level of production, and in addition, output more than one or two decades into the future has only a small effect on discounted income (as long as real interest is not less than 2 percent or 3 percent). Consequently, current income (GDP) may be considered as a reasonable proxy for discounted future income, although GDP is a flow measure and discounted future income is a stock.

However, there are drawbacks in using this measure. GDP forecasts are typically subject to wide margins of error. Since the exchange rates of many African countries are misaligned, and since in addition exchange rates have fluctuated strongly in recent years, both levels of and variations in GDP may reflect nominal valuation effects of exchange rates rather than levels of and movements in real income. More importantly, since debts have to be serviced with foreign currency, the value of exports gives a more accurate impression of income as it relates to debt servicing ability. If the production of nontradables increases but not that of tradables, there is a rise in GDP but not necessarily in the ability to service debts. Furthermore, there is in Africa a low degree of substitutability of exported commodities for domestic consumption goods. Therefore, it is preferable to use exports in the denominator rather than GDP. However, since exports may exhibit short-term swings in value swamping the effects of any real shift in the long-term ability to service debts, debt ratios with export as denominator should preferably be based on developments over several years.

The measure of liquidity is more straightforward than that of solvency. Again, the value of current exports is the appropriate measure of income, since current foreign transactions are financed with export earnings and external borrowing. A temporary increase in exports leads to an easing of the payments situation. Conversely, an increase in obligations with unchanged exports tightens liquidity. Therefore, the ratio of interest and amortizations to exports of goods and non-factor services (the debt service ratio) is used in this paper as an indicator of the liquidity situation. As in the case with the solvency measure, the trend is more informative than individual observations.

A Note on the Data

As always when working with macro-level data on developing countries, great care must be taken when drawing any conclusions from the numbers, as there are many sources of errors. An effort has been made in this paper to emphasize trends rather than individual observations. In addition, there has been only limited use in the discussion of some particularly uncertain statistics, such as observations on arrears, on reserve use, and on short-term debt. It should also be noted that pre-1980 data are less reliable than later estimates.

Tables 2, 6, 7, and 8 are mainly based on an aggregation of country-level data that were gathered for the preparation of the April 1988 World Economic Outlook. Except for corrections of the estimates of the impact of rescheduling, this aggregation has been carried out without adjusting for missing or incorrect data. This may bias the estimates. When numbers are presented in the WEO, various methods for gap-filling and data correction are used to create better estimates of the aggregates; however, the cruder aggregation of this paper tends to give results that differ from the results reported in the WEO by no more than 1-4 percent.

For Table 7, calculations based on the World Debt Tables have been compared with those based on the WEO, and since they produce similar results in spite of different methods of collecting and adjusting the raw data, the general trends shown in the table seem reliable.

References

- Buiter, Willem H., and T.N. Srinivasan, "Rewarding the Profligate and Punishing the Prudent and Poor," World Development, Vol. 15 (1987), pp. 411-417.
- Bulow, Jeremy and Kenneth Rogoff (1988a), "A Constant Recontracting Model of Sovereign Debt," Journal of Political Economy (1988).
- _____, Sovereign Debt Restructurings: Panacea or Pangloss? (1988b), NBER Working Paper No. 2637 (1988).
- Collins, Susan M., and Won Am Park, "External Debt and Macroeconomic Performance in Korea," in Jeffrey Sachs (ed.) Developing Country Debt, NBER Conference Report (Washington, 1987).
- Cooper, Richard, and Jeffrey Sachs, Borrowing Abroad: The Debtor's Perspective, NBER Working paper No. 1427 (1984).
- Dillon K. Burke, and Gumersindo Oliveros, "Recent Experience with Multilateral Official Debt Rescheduling," World Economic and Financial Surveys (Washington: International Monetary Fund, February 1987).
- Eaton, Jonathan, et al., "The Pure Theory of Country Risk," European Economic Review, Vol. 30 (1986), pp. 481-513.
- Feldstein, Martin, et al., Restoring Growth in the Debt-Laden Third World (Trilateral Commission, 1987).
- Fischer, Stanley, Resolving the International Debt Crisis, NBER Working Paper No. 2373 (1987).
- Hellwin, Martin, "A Model of Borrowing and Lending with Bankruptcy," Econometrica, Vol. 45 (1977), pp. 1879-1906.
- International Monetary Fund, IMF Survey, Supplement on Sub-Saharan African Debt (1988).
- _____, International Financial Statistics, various issues.
- Krugman, Paul, Market-Based Debt Reduction Schemes, mimeo (1987).
- Krumm, Kathie L., The External Debt of Sub-Saharan Africa, The World Bank Staff Working Papers No. 741 (1985).
- Lancaster, Carol, and John Williamson (eds.) African Debt and Finance, Institute for International Economics (Washington, 1987).
- Mayer, Emilio, International Lending: Country Risk Analysis (Reston Publishing, Reston, VA, 1985).

Svedberg, Peter, The Export Performance of Sub-Saharan Africa 1970-1985, Seminar paper No. 409 (Institute for International Economic Studies: Stockholm, 1988).

United Nations, Financing Africa's Recovery (New York: New York, 1988).

World Bank, Financing Adjustment with Growth in Sub-Saharan Africa 1986-1990 (Washington: World Bank, 1985).

_____, (1988a), World Development Report (Oxford University Press, New York, 1988a).

_____, (1988b), World Debt Tables (in addition, June Supplement) (Washington: World Bank, 1988).

_____, Social Indicators of Development (Washington: World Bank, 1987).

Young, Crawford, "Africa's Colonial Legacy," in Robert J. Berg and Jennifer S. Whittaker (eds.), Strategies for African Development (University of California Press, Berkeley, CA, 1986).

