Debt Capacity and Developing Country Borrowing: A Survey of the Literature

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The rapid rise in the external debt obligations of the developing countries during the 1970s has given rise to concern about the dangers that this situation may pose for those countries and also for the fabric of the international financial system. Questions arise as to whether the developing countries have been borrowing too much and whether creditors have overextended themselves. While such questions have a long history, in recent years there has been a noticeable increase in the literature on the subject. The objective of this paper is to survey the literature insofar as it relates to this issue of debt capacity. It is not intended that the survey will be exhaustive. Rather, it will attempt to outline some of the principal strands in the literature by discussing many of the relevant contributions.

The first task, therefore, is to identify what we mean by the term "debt capacity." Following Salop and Spitäler (1980), one can identify two approaches to the question. One might approach the question by asking how much a country should borrow, that is, what is its optimal level of debt? The second approach focuses on the sustainability of debt policies. This is a less precise notion. In principle, all that is required is that the consumption plans of the country do not violate its intertemporal budget constraint.1

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1Thus, a country's plans are sustainable if the present value of its consumption plans is less than or equal to the present value of incomes generated.
One might also add the requirement that servicing the debt not result in consumption below the subsistence level. The optimizing approach is more in keeping with the economist's approach to problems of choice, and it has been a major focus of the theoretical literature. In practice, however, principles of optimality are difficult to apply, and the focus of the applied literature is more in the spirit of the sustainability criterion.

Section I begins with the traditional approach to this question, which poses it in the framework of the growth-cum-debt literature. The emphasis has been, principally, on the use of external finance for investment purposes. Some contributions take a non-optimizing approach and try to cast light on the sustainability of debt policies by inspection of the economy's projected path. Others, using optimizing approaches, not surprisingly, identify the optimal debt level as that at which the marginal costs and benefits of using external finance are equalized.

However, possible uses of external finance go beyond this investment role. External finance can be used to shelter consumption from fluctuations in income, whether they are due to internal or external factors. Use of external finance can also reduce costs of adjusting to permanent downward shifts in the economy's income stream. Furthermore, various features of international financial markets must be taken into account. Chief among these is the existence of sovereign risk and its effect on the behavior of lenders and borrowers. It is only in recent years that the theoretical literature has begun to pay significant attention to sovereign risk and to the consumption-smoothing roles of external finance.

The wide range of these considerations tends to rule out any easily applied analytically derived formula for judging the sustainability of any particular debt situation. There would also be significant difficulties in applying such a formula. As a result, considerable effort has been channeled into trying to empirically identify circumstances under which countries experience debt-servicing difficulties, using as explanatory variables a group of external debt ratios and other economic indicators. Section II surveys these indicator approaches to analyzing debt capacity.

The literature surveyed in Sections I and II focuses on debt capacity from the borrower's perspective and is based primarily on borrower characteristics. Section III turns to the literature on the supply of external finance to developing countries. This is relevant for the topic at hand for two reasons. First, for a debt situation to be sustainable, both the borrowing country and lenders must view
it as such. And, indeed, borrowers may be able to affect the terms of external finance by taking into account how their behavior affects the behavior of lenders. Thus, an understanding of lenders' behavior and of the institutional framework of international finance can be important in determining a country's debt capacity. Second, and distinct from an individual country's debt capacity, there is the concern that the international financial system may have overextended itself in its lending to developing countries.

Section IV contains some concluding observations and a summary of the major findings of the survey.

I. Growth-Cum-Debt Models

Traditionally, analysis of the economic problems of developing countries has focused on a lack of capital, both physical and human. Rapid progress in solving these problems is seen to be impeded by a number of bottlenecks—domestic savings, foreign exchange, and human skills. In this framework, external finance can help to relax two of these, and the growth literature, which is discussed in this section, has tended to put particular emphasis on the savings bottleneck. Thus, external finance is seen as a source of increased resources for investment.

The first attempts to put this investment role of external finance in a growth framework used the Harrod-Domar model. The direct focus of this literature has been on describing how debt situations evolve over time, and not on making judgments as to how much a country should borrow. However, the literature is relevant, since analysis of the evolution of debt is used to cast light on the sustainability of different debt situations.

The fundamentals of these models are well known. Output is produced according to a fixed-coefficients technology. A target growth rate, in conjunction with the fixed capital/output ratio, determines the required investment ratio. There is a fixed marginal propensity to save out of output. Foreign borrowing is needed (and assumed to be forthcoming) to fill the gap between the required level of investment and the level of domestic savings, and also to service outstanding debt. Using this framework, it is

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2The first two of these can be considered distinct only if there are difficulties in transforming domestic output into foreign exchange earnings.

3In the usual formulation, the target growth rates and the savings rates are expressed in terms of gross domestic product (GDP). Comments on the nature of this specification are presented in the next few paragraphs in the text.
possible to analytically derive the time path of debt and other relevant indicators. Models such as these have been widely used to cast light on debt-servicing capacity (e.g., Avramovic (1964), King (1968), Solomon (1977), and Nowzad (1981)). Some parameterizations of these models result in countries going through various stages from the position of young debtors to finally becoming mature creditors. However, attention has focused on cases where this transition does not take place and where debt continues to grow indefinitely. In some circumstances, the debt situation becomes explosive: Solomon shows that the debt/output ratio will reach a finite limit only if the target rate of growth is greater than the real interest rate. Clearly, if there is no limit to the debt/output ratio, the country’s debt policies are not sustainable. However, as Solomon points out, even if the debt/output ratio has a finite limit, the policies may not be sustainable. For example, interest payments on debt could exhaust output, in which case income would be zero.

The results provided by these models are of limited applicability in view of the rigidity of their basic assumptions. In addition, their insights into the sustainability of debt policies have nothing to say about the efficiency of investment. For example, if the target rate of growth is less than the real interest rate, then the debt situation is not sustainable, independent of the marginal product of investment. The source of this conflict lies with the specification of consumption behavior in these models. Consumption (saving) behavior is specified as a function of output, not of income. Thus, income accruing to foreigners is treated, in effect, as if it were consumable. The higher the propensity to consume and the lower the ratio of domestic income to output, the more likely that problems will arise.

If, on the other hand, consumption is specified as a function of income rather than of output, the nature of the results is quite different. This can be seen by referring to a model used for a different purpose by Feder (1980). He uses an income specification for consumption and expresses the target in terms of gross national product (GNP) rather than of output. If this model is analyzed in a fashion parallel to that of Solomon, it can be shown that, provided that the marginal product of capital exceeds the

\[ \text{In these models, the marginal product of capital is constant and equal to the inverse of the capital/output ratio.} \]

\[ \text{However, one's intuition might lead one to believe that policies are sustainable if the output/capital ratio is greater than the rate of interest.} \]
marginal cost of borrowing, problems of debt sustainability do not arise. If the investment ratio required by the target growth rate is less than the marginal savings rate, debt will eventually begin to decline and the country will become a creditor. If this condition is not satisfied, the debt/income ratio will reach a finite limit.\textsuperscript{6}

That these two specifications can lead to quite different results was first pointed out by King (1968). However, it does not seem to have received widespread attention among users of these models. On theoretical grounds, the income specification of consumption behavior seems more appropriate than the output specification. In the next group of models to be discussed, however, it is shown how some institutional characteristics of the economy can lead to consumption plans that are excessive, relative to income.

The Harrod-Domar models reviewed earlier in this section condense the dynamics of debt to some basic elements and give clear insights into the mechanics of the process being examined. They do, however, suffer a number of limitations for analyzing debt capacity. In this respect, one can point to their lack of attention to theoretical underpinnings, their extreme rigidity (e.g., the constant marginal propensity to save and the constant capital/output ratio), and their general lack of institutional content. The discussion now turns to models that, to varying extents, attack these limitations.

In a sequence of papers, Kharas (1981 a; 1981 b; 1981 c) maintains the Harrod-Domar production framework but focuses on a situation in which foreign borrowing is carried out by the government to assist in financing domestic expenditure plans. The government's taxing powers are, however, constrained by institutional and technical factors. All benefits of investment projects accrue to the private sector, since it is assumed that any government investment is infrastructural in nature. For a debt situation to be sustainable, it is necessary that the tax base expand quickly enough to allow the government to service the debt. The expansion of the tax base is determined by private savings investment behavior.\textsuperscript{7} Thus, low private savings behavior can be a source of debt problems in situations in which governments face such fiscal constraints. Furthermore, such debt problems can arise even if all

\textsuperscript{6}Here the discussion concerns limits in the debt/income ratio, not the debt/output ratio.

\textsuperscript{7}The rate of increase of gross capital inflows is predetermined, as is the government's propensity to invest.
the net inflow of external finance is used for investment and the marginal product of the capital stock is greater than the real interest rate.

A number of other contributions to the literature have models that follow a similar theme, although in the context of a more flexible neoclassical production structure. In Katz (1982 a) it can be seen again how fiscal constraints and "low" savings behavior can be a source of debt problems and how they can exacerbate the impact of external shocks, such as deteriorations in the terms of finance. Takagi (1981), without disaggregating the government and private sectors, specifies consumption as a function of total available resources (i.e., income plus capital inflow). This specification was suggested to him by empirical evidence (discussed later) that indicates that the domestic savings rate is affected by the size of capital inflows. It is easily seen that, with a low savings rate (out of total resources), consumption can exceed income, therefore giving rise to the possibility of debt problems independent of the efficiency of investment.

The models reviewed in the last two paragraphs highlight some possible sources of debt problems. It is interesting to compare these with the origins of debt problems in the simpler Harrod-Domar models. In the earlier models, total consumption behavior was determined by output, giving rise to the possibility of consumption being consistently greater than income. In the later models, the problem is similar but more specific, stemming from government expenditure being excessive relative to its revenue. It is evident that debt problems frequently have their source in overambitious government expenditure plans. However, these models are based on some rather rigid behavioral and institutional assumptions. It is important, therefore, to be careful in interpreting the models. Specifically, policymakers have more influence on fiscal parameters than these models would allow, and in general it is the policymakers—not the exogenously imposed institutional constraints—that must bear responsibility for debt problems.

At this point, it can be noted that not all attempts at modeling debt processes concentrate directly on debt capacity issues. There are a number of nonoptimizing neoclassical growth models in

8 It is not explained why, in the model specification, gross—rather than net—capital inflow is used.

9 This is not explicit in Takagi (1981). One interpretation of his specification, however, is that government has a propensity to consume out of net capital inflows.
which the emphasis is primarily on analyzing debt dynamics in conditions that do not give rise to explosive debt situations. Katz (1982 b) constructs a one-sector model with a second imported (capital) good and examines how the economy, and in particular debt, responds to changes in the terms of trade. Fischer and Frenkel (1972; 1974 a; 1974 b) analyze the dynamics of debt in two-sector nonoptimizing models. A major focus of interest here is to see how the path of the economy relates to parameter values and initial conditions, and, in particular, what circumstances will generate scenarios that are consistent with stage theories of the balance of payments. It is interesting to note that, provided that one makes the usual factor-intensity assumptions required for the stability of two-sector models (i.e., the sector producing capital goods is more labor intensive than that producing consumption goods), explosive debt situations do not arise: consumption is a function of income; there are no institutional rigidities, such as restrictions on government’s ability to tax; and there is no credit rationing in the international financial markets.

Up to now, growth models have been discussed within non-optimizing frameworks. These have pointed to sources of sustainability problems but are not designed to tackle the issue of how much a country should borrow. Attention now turns to papers in which the emphasis is on deriving optimality criteria in the context of intertemporal optimizing models.

Bardhan (1967) and Hamada (1969) are typical examples of such models. An intertemporal utility function is maximized in the framework of a one-sector neoclassical growth model. The optimal path for the economy is derived for a specified supply function of external finance. In the steady state, as along the optimal path, the marginal cost of foreign borrowing will be equated to the marginal product of capital. This condition, given the supply function of external finance, fixes the optimal quantity of debt at each point in time. A further implication for debt management policy coming from these models is that, if the supply of external finance is not infinitely interest elastic, there is a case for a tax on foreign borrowing, since atomistic borrowers will not take into account the fact that their decision to borrow will have an effect on the costs of all other borrowers by pushing the country further up the supply schedule.10

10 Presumably, if borrowing is to a large extent centralized with the government, this externality will be internalized in the government’s strategy.
Numerous variations on these models exist in the literature. Hanson (1974), Feder and Regev (1975), and Feder and Just (1979) look at how borrower strategy affects borrowing costs through "creditworthiness" effects.\(^\text{11}\) Kharas (1981 c) derives optimality criteria in a model that features the constraints on government behavior outlined in a discussion of his work earlier in this paper. Here, not surprisingly, the marginal return to investment is set above the marginal cost of borrowing because of the constraints that government faces in raising revenue.

There is, however, a literature that challenges the conventional views on the benefits of external finance and suggests that external finance has costs other than those usually considered. The source of these costs is seen to lie in a reduction in the domestic savings ratio associated with the use of external finance, a relationship observed in a number of empirical studies. Since savings are seen as a major ingredient in the growth process, this finding has been viewed with some concern. In many cases, however, it is not clear that the direction of influence underlying the estimated correlations has been identified.\(^\text{12}\) Thus, for example, in a cross-sectional sample, capital inflows may be negatively correlated with domestic savings because low savers have greater need for external finance, or are more likely to receive concessional external finance. The empirical work is not dealt with here. Rather, attention focuses on the issue on a conceptual level.

Stimulated by the observation of this negative relationship between domestic savings and external finance, a recent debate in the literature (Grinols and Bhagwati (1976; 1979), Wasow (1979)) focuses on the question of whether use of external finance engenders long-term dependence on foreign savings, by analyzing Harrod-Domar models under a variety of scenarios. Wasow sees more cause for concern in the results of the analysis than do Grinols and Bhagwati. Leaving aside questions relating to the merit of emphasizing the long-term results coming from a rigid

\(^{11}\)"Creditworthiness effect" means that the cost of external finance may well be affected by the policies and internal structure of the economies concerned. Hanson (1974) emphasizes debt-equity type considerations (i.e., the ratio of debt to the capital stock). Feder and Just (1979) examine a model in which reserve-accumulation behavior affects creditworthiness. Feder and Regev (1975) develop a model in which there are two types of external finance (direct foreign investment and loans) whose supply is related to debt-equity and exposure considerations.

\(^{12}\)Bhagwati (1978, pp. 168–69) gives a list of the various empirical efforts to link savings and external finance.
Harrod-Domar framework, it might also be asked why dependence, as defined by the authors, should be a cause for concern. Certainly, the progression from young borrower to mature creditor is a scenario that has long had appeal. But, it does not necessarily come out of any optimizing framework. Indeed, it is clearly impossible for all countries to be net creditors.\textsuperscript{13} Furthermore, the harm done by dependence has not been clearly spelled out. One possibility is that the availability of external finance allows the government to relax its domestic tax efforts (Kharas (1981 c), p. 10). To the extent that harm is done through avenues such as this, the problem is not inherently a result of the use of external finance.

This concern over the empirical relationship between domestic savings and external finance should also be viewed in the context of the role that external finance is seen to play. In particular, the emphasis on growth driven by investment leads to a neglect of the role of external finance in achieving a more efficient intertemporal allocation of consumption. Indeed, consideration of the requirements of intertemporal efficiency helps us to understand the negative relationship between savings and inflows of external finance. Consider, for example, an increase in inflows of foreign aid. If all the increased aid is invested, it gives rise to higher potential consumption in the future, but current consumption would remain unchanged. It would seem appropriate that some of this enhanced future consumption should be brought forward in time, thereby reducing current domestic saving. Rational response to real economic shocks may also give rise to a negative relationship between savings and foreign capital inflow. To illustrate this point, consider an economy that is subject to variability of export revenues. If the economy cannot engage in external financial transactions, the burden of export shortfalls is borne by current absorption. If, however, the economy can engage in external financial transactions, such transactions could be used to transfer consumption from years in which export performance is above trend to years when it is below trend. McCabe and Sibley (1976) model, in an intertemporal optimizing framework, an economy subject to such export revenue variability and show how such a model gives a negative relationship between domestic sav-

\textsuperscript{13}Indeed, as Sachs (1982, p. 209) points out, consistency with intertemporal budget constraints implies that the present value of debt goes to zero as time approaches infinity.
ings and external finance. When there is a shortfall in export revenue, savings decline and foreign borrowing increases and, conversely, when export revenues rise above trend.

The discussion in the previous paragraph suggests that the traditional growth-cum-debt literature suffers from a number of limitations that stem from the narrowness of its perspective. Thus, while these models provide some insight into the investment motives for using external finance, they tend to exclude a wide range of relevant factors. Earlier, alternative uses of external finance were mentioned briefly, and this is a subject to which the discussion returns in the succeeding paragraphs. In addition, the treatment of the supply side of the international financial markets has been quite limited.

A rationale behind the noninvestment uses of external finance is the smoothing of the consumption path over time. Such a function is already implicitly included, to some extent, in the optimizing neoclassical growth models discussed earlier. However, most of these models have nothing to say about the appropriate response to real shocks, be they permanent or temporary, current or expected in the future. More recently, there has been increased interest in intertemporal optimizing models that focus on this consumption-smoothing role. Apart from McCabe and Sibley (1976), papers by Dornbusch (1981), Martin and Selowsky (1981), Sachs (1981), and Obstfeld (1981 a; 1981 b; 1982) can be mentioned in this respect. In a one-good economy, the condition for the optimal allocation of consumption is that the ratio of marginal utility of current consumption to the discounted marginal utility of future consumption be equal to the rate at which current consumption can be transformed into future consumption. This rate of transformation is usually given by one plus the world interest rate. In a model that includes both traded and nontraded goods, the future path of the exchange rate (the relative price of traded and nontraded goods) will also influence the intertemporal consumption decision. (See Dornbusch (1981); Martin and Selowsky (1981).) Dornbusch (1981, pp. 7–9) explains this exchange rate effect by pointing out that the expectation of exchange rate changes makes the real interest rate facing domestic consumers

14 Since these models optimize intertemporal utility functions, present consumption plans will be adjusted in line with the enhanced future consumption stream stemming from the externally financed investment.

15 These models that focus on the consumption-smoothing role, in general, assume perfect capital mobility. Obstfeld (1982) is an exception.
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diverge from the world real interest rate, thereby changing the rate at which current consumption can be transformed into future consumption. Thus, a shock, which disturbs the relationship between current and future (expected) marginal utilities or the rate at which current consumption can be transformed into future consumption, will, in general, give rise to some additional intertemporal transfer of consumption. The treatment of export revenue uncertainty by McCabe and Sibley (1976) has already been mentioned. Dornbusch (1981) considers the effects of an expected future increase in income and a temporary change in the current world rate of interest. Obstfeld looks at the effects of domestic macroeconomic policies (1981 a), exchange rate policy (1981 b), and terms of trade shocks (1982).

A topical issue in light of the recent history of the world economy is to what extent it is appropriate to postpone adjustment in response to permanent adverse shocks by resorting to foreign borrowing. In a perfectly flexible economy, it would be appropriate to adjust immediately (Sachs (1981), pp. 218–23). However, given real world rigidities, adjustment costs tend, to some extent, to be inversely correlated with the length of the period over which adjustment is carried out. The availability of external finance makes it possible to lengthen the adjustment period and thereby to reduce the costs of adjustment. Of course, it must be recognized that the external finance itself has costs and that eventually complete adjustment to the new situation will have to be achieved. Martin and Selowsky (1981) model an economy that is subject to an increase in the price of an imported intermediate good (oil) and incorporate time-varying adjustment costs by making the elasticity of substitution in production smaller in the short run than it is in the long run. Thus, the adverse effects on income and exchange rate depreciation are greater in the short run than they are in the longer run, thereby providing a reason for borrowing as a way “of both transferring income to the period when it is relatively lower and increasing the supply of foreign exchange when it is more scarce” (Martin and Selowsky (1981, p. 10)). Martin and Selowsky supplement their theoretical analysis by carrying out a wide range of numerical simulations.

Thus, once the role of external finance is expanded outside the investment role, the analysis becomes quite complex. While the

16 In a fixed exchange rate regime, the exchange rate effect can be thought of in terms of the shadow price of foreign exchange.
additional considerations can be dealt with at a theoretical level, it is clearly very difficult, at a practical level, to judge the optimality of borrowing policies. It would involve detailed knowledge of both the parameters of the intertemporal utility function and the production technology of the economy, and information as to whether shocks are permanent or temporary and, if temporary, how long they will last. Indeed, the picture is even more complex in that the models that have been discussed present simplistic representations of the supply side of the international financial markets. Thus, it is not sufficient that the borrower views the policies as sustainable. As in any financial market situation, be it domestic or international, the lender must also view the policies to be sustainable. Indeed, in the international context, there is the additional complication of the existence of sovereign risk, that is, the possibility that the borrower will repudiate debts while maintaining control of the associated assets. It is only recently that this feature of the international financial markets has been given significant attention. Sachs and Cohen (1982) give a detailed treatment of the impact of sovereign risk on the behavior of borrowers and lenders.

Given all these considerations, there are, obviously, great difficulties in applying the theoretical principles, as discussed in this section, to practical judgments of debt capacity. As a result, there has been considerable interest in studies that try to identify those circumstances under which countries have experienced debtservicing difficulties. It is this literature that is discussed next.

II. Indicator Approaches to Debt Capacity

In looking at the debt capacity issue from the empirical side, it would seem that the most appropriate approach would be to base such studies on the theoretical considerations discussed in Section I. However, in much of the empirical literature to be discussed, there has been little attempt to provide rigorous theoretical underpinnings. Rather, the links are more directly with traditional perceptions of the obstacles to development.

There is a strong tradition that considers that, in addition to shortages of capital, foreign exchange shortages can seriously inhibit development programs. And, indeed, there is an influential school of thought that considers this problem a long-term structural problem. However, there now seems to be a considerable
body of evidence indicating that, insofar as this may be a long-
term problem, it is generally due to inappropriate domestic
pricing and demand management policies. Few would deny, how-
ever, that in the short term, significant balance of payments gaps
can arise. Hence, by analogy to debt problems of firms, a dis-
tinction can be made between liquidity and solvency aspects of
debt capacity.\(^\text{17}\)

In this context, attention is focused on the external per-
formance of the economy in relation to the debt service claims on
it. Of particular concern is the possibility that fluctuations in debt
service claims (e.g., because of bunching) or in the trade balance
may give rise to debt service difficulties. However, at this point it
might be asked why, if an economy is subjected to a liquidity
squeeze, external finance is not forthcoming to enable it to get
over temporary difficulties. One answer would be that when
short-run factors have been responsible for debt-servicing diffi-
culties, they have often been brought on by poor economic man-
agement and may, therefore, not be perceived as purely tempo-
rary phenomena.\(^\text{18}\) Alternatively, there may be rationing of
finance and a country may have reached its credit limit.\(^\text{19}\)

Even in the medium term and long term, it is frequently sug-
gested that the relationship between debt developments and ex-
port performance should be closely monitored. The debt service
ratio has long been a focus of attention in this respect. Similarly,
Dhonte (1979, Ch. 6) considers exports to be an appropriate base
with which debt developments should be compared. He defines a
country’s borrowing capacity as the ratio of borrowing to exports
that is consistent with some long-term limit on the debt service
ratio. In a similar vein, he stresses that growth of debt should be
kept in line with growth of exports. There does not seem, how-
ever, to be any a priori reason, as will be pointed out soon, why

\(^\text{17}\) See, for example, Aliber (1980). Liquidity problems arise when available
cash (foreign exchange where a country is concerned) is not sufficient to meet
current obligations. Insolvency arises when assets are less than liabilities. (This
amounts to violation of the intertemporal budget constraint for a country.) This
analogy between domestic and international lending should not be drawn too
strongly, however, since problems of moral hazard are typically more prominent
in international lending. See Sachs and Cohen (1982, pp. 22–24) for a compara-
tive discussion of such problems in domestic and international lending.

\(^\text{18}\) Indeed, the liquidity squeeze may be a symptom of more fundamental diffi-
culties perceived by creditors who, as a result of these perceptions, cut off flows
of finance.

\(^\text{19}\) The issue of the existence of rationing is discussed in Section III.
one should focus on the debt service ratio or, indeed, any other ratio involving debt. These ratios have no necessary relationship to the sustainability considerations outlined in Section I. However, if there are constraints on borrowing in the international financial markets, then liquidity management becomes a much more important concern. Thus, Loser (1977) focuses on the implications of any such current account limitations for internal economic policy. Apart from these considerations, export growth may be serving as a proxy for the quality of domestic economic management insofar as successful development programs are accompanied by rapidly growing export sectors. Leimone (1979) points out that those countries that have been most involved in commercially supplied external finance have had above average GDP and export growth rates. Having briefly outlined some background to indicator approaches to debt capacity, the discussion continues by considering the various contributions in this area.

The roots of this approach to evaluating debt-servicing capacity are frequently traced back to Avramovic and others (1964). While the central focus of that volume was perhaps the study of the long-term evolution of debt, great emphasis was also placed on short-run factors. Here, three categories of variables were pinpointed as being important for assessing a country's short-term debt-servicing capacity: fluctuating variables (exports, capital flows, imports induced by internal shocks), offsetting variables (reserves, compensatory finance, compressible imports), and rigid variables (interest payments, amortization payments, and essential imports). Attention has tended to focus on three of these variables—amortization, interest, and exports—in the form of the debt service ratio. The rationale for using this indicator is fairly self-evident. It can be seen as a measure of the burden of a country's debt position and also of its vulnerability to external shocks. Its weaknesses, however, are well known. Apart from measurement difficulties (it frequently includes only service payments on public or publicly guaranteed debt of more than one year's maturity), it ignores other elements in the overall balance of payments and the terms under which countries can refinance maturing debts. It is frequently pointed out that, historically, situations involving debt service ratios that were quite high have been successfully managed and that many countries have been in severe servicing difficulties with low ratios. Furthermore, the debt

20See Avramovic and others (1964, Ch. 3).
service ratio has no direct link with the allocative efficiency of the economy. Nor did the models discussed in Section I point to the debt service ratio as a key variable for analyzing the sustainability of policies. To try to overcome some of these weaknesses, a natural step was to develop some multidimensional evaluation procedures using a number of debt indicators, as well as indicators of general economic performance.21

One of the primary motivations for developing such procedures was the search for objective criteria for rating different countries. A number of banks have developed checklist systems that consist of a list of quantifiable variables on which countries are rated. One such system is described by Thornblade (1978)—a system being used at the time by the First National Bank of Boston. This system contains a large number of relevant indicators with respect to each of which countries are ranked one through \( n \). The rank ordering of country risk is then derived by getting a simple average of the scores on the various indicators. A major flaw in this system is the absence of any weighting scheme, so that all indicators are assumed to be equally important.

A more comprehensive but less objective system as used by the Bank of Montreal is described by Nagy (1978). Here, the risk analysis is basically a two-part exercise. The first part tries to quantify the maximum possible loss in the event of different types of debt-servicing problem in each of the years after the proposed loan is granted. The second step is a detailed analysis of political and economic characteristics involving an evaluation of the likelihood of the different types of debt-servicing problem and the probable time of occurrence. This system is fairly comprehensive in the range of eventualities that it considers, and it can bring directly into consideration factors that are not easily treated in other approaches. But it is also a highly subjective system and, therefore, requires staff with wide experience and scarce skills.

While policy judgments will always be necessary, these should be based, as much as possible, on quantitative analysis. The availability of reliable quantitative techniques will also reduce the burden placed on judgmental skills. Complications arise in that there are no observable quantifiable indicators for debt-servicing capacity or country risk. The solution adopted has been to examine identified cases of debt difficulties, usually those involving

21For a detailed discussion of a wider range of debt indicators, see Nowzad (1981, Appendix).
debt reschedulings. Since the binary nature of the dependent variable (i.e., a country is involved in rescheduling or not) makes conventional regression techniques inappropriate, researchers have had to use other less familiar techniques in their analyses of these cases.

At this stage, before getting into discussion of these studies, it may be useful to touch briefly on some issues of terminology. The term "default" is widely used in the literature. However, as Eaton and Gersovitz (1981 b, p. 2) point out, a loan is not legally in default until the lender declares that the borrower has failed to honor the terms of the loan. Such action has rarely been taken with respect to sovereign loans in the post-World War II period. When countries have fallen into arrears, either the situation was temporary or a rescheduling occurred that resulted in a new timetable for loan payments. These instances of arrears plus reschedulings are frequently referred to in the literature as defaults, although, legally, no default has occurred. It should also be noted that rescheduling of the debt payments does not, of itself, involve any change in the capital value of the stream of debt-servicing payments. The capital value of this stream may remain the same, increase, or decrease, depending on the terms of the rescheduling. Reschedulings, moreover, may occur even though no arrears have arisen.

A decision to fall into arrears and to seek rescheduling is a decision that is presumably taken in light of the costs of alternative actions. It is likely to have adverse effects on lenders' perceptions of creditworthiness, but it enables the country to reduce the need for extreme short-run austerity measures. It should be noted, however, that the occurrence of rescheduling, default, or arrears does not generally imply repudiation of the loan agreement (i.e., an explicit revocation on the part of the debtor of his obligations under the terms of the agreement). In principle, a decision to repudiate can also be subjected to economic calculus. In their theoretical treatments, Eaton and Gersovitz (1980; 1981 a; 1981 b), Sachs and Cohen (1982), and Sachs (1982) focus on the economic costs and benefits of repudiation. In practice, repudiation tends to follow major political disruptions and a decision to withdraw from the international arena.

Thus, there are various types of deviation from loan agreements and one should be careful to distinguish between them, since they clearly have different implications for the parties involved and the financial markets in general. Accordingly, in the discussion of the
empirical literature that follows, reference will be made to instances of “rescheduling” rather than of “default.”

Dhonte (1975) looks at rescheduling experiences in two ways. First, he compares the characteristics of rescheduling countries with those of nonrescheduling countries by looking at individual indicators one at a time. His analysis suggests that rescheduling countries were heavily indebted in relation to exports, had large and rising debt service ratios, had large capital inflows relative to imports, and suffered from bunching of maturities. However, the limitations of analyses that focus on one indicator at a time have already been noted. The second section of his paper goes beyond this one-indicator-at-a-time approach. The analytic technique that he uses is principal components applied to a set of indicators that are frequently used to summarize debt situations. This is a technique used to condense the amount of information contained in a set of variables by constructing a new set of variables that contains, in aggregate, a high percentage of the information in the original set but has smaller dimensionality. Reducing the dimensions of the data set, however, is not very useful unless some meaning can be given to the constructed variables. This has been a specific criticism of Dhonte’s work. On the basis of his analysis, Dhonte suggests two hypotheses. First, the degree of successful involvement in debt must be suitably in keeping with borrowing conditions. Second, the growth of debt should be kept in line with that of exports.

While both Dhonte’s approach to the issue and his analysis are interesting, there are a number of problems in developing this technique further. First, the hypotheses that he suggests are quite vague. For example, What is meant by keeping exports in line with debt? Certainly the analysis does not suggest that the two growth rates should be equal. Similarly, as Dhonte admits, the analysis does not give any indication of how to express quantitatively the hypothesis relating the level of debt to its terms. Furthermore, the method of attaching meaning to the components involves sacrificing a good deal of information in addition to that sacrificed in constructing the components. Thus, in summary, while this technique has provided useful qualitative

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22 For an introduction to this technique, see Johnston (1972, Ch. 11).
23 See Saini and Bates (1978, p. 10). Dhonte attempts to attach a concrete meaning to specific principal components, by correlating the most important principal components with various explanatory variables.
Evidence, it does not really help in the search for a quantitative technique.

To analyze instances of rescheduling, Frank and Cline (1971) use discriminant analysis.24 The assumption underlying discriminant analysis is that in the total population there exist distinct subpopulations, and the objective is to construct from sample information a rule that will enable one to distinguish between these subpopulations. The present case concerns two subpopulations—rescheduling countries and nonrescheduling countries. The rule is chosen so as to minimize the expected costs of misclassification. Frank and Cline start out with eight indicators, but the best performing classification rule includes only two—the debt service ratio and the amortization debt ratio.25 The in-sample record of error is reasonably impressive—zero Type I errors, and 9 per cent Type II errors.26 However, the fact that the rule relies on only financial indicators is not reassuring, particularly since the indicators have very little to say about the real side of the economy or the sustainability of policies. Thus, while in-sample performance might seem quite good, these weaknesses would be of concern in considering out-of-sample applications.

Sargen (1977) also uses discriminant analysis to examine rescheduling. He broadens the scope of the analysis by considering also some indicators of internal short-run macroeconomic management—the rate of inflation and the rate of money creation. This inclusion is certainly relevant to the extent that poor economic management lies behind debt crises. Presumably, temporary financing is more readily available to countries whose liquidity problems are due to external and internal shocks that are not compounded by poor economic management. Thus, casual evidence presented by Sargen indicates that reschedulings are disproportionately concentrated among high-inflation countries. His final discriminant rule includes the inflation rate, the growth rate of money supply, deviations from purchasing power parity,

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24The Frank and Cline article gives some description of the techniques; Johnston (1972) gives an introduction to linear discriminant analysis; and Eisenbeis (1977) points to some of the pitfalls in applying discriminant analysis. All three contain references to the literature on the technique.

25One other variable, the reserves/import ratio, was excluded on the grounds that it is difficult to forecast.

26Type I errors occur when a rescheduling country is classified as a nonrescheduling country. Type II errors occur when a nonrescheduling country is classified as a rescheduling country.
debtservice ratio, and the growth rate of exports. While his Type I and Type II error rates are not as low as those of Frank and Cline, they are not directly comparable, since Sargen covers a longer sample period. It is also worth noting that the in-sample record for the Latin American countries was better than for the rest of the sample. Sargen points out that it is particularly in these countries that rescheduling is associated with inflation and rapid growth of money supply.

Saini and Bates (1978) question the use of debt statistics in empirical rescheduling studies because of their incompleteness, inconsistency across countries, and the fact that they are available only with a considerable time lag. To proxy debt conditions, they use the five-year cumulative current account balance, adjusted for changes in reserves and deflated by exports in the most recent year. The other variables that they use reflect liquidity, GDP, and domestic demand management. They also use a dependent variable adjusted to include six instances of "balance of payments support loans" and to exclude what were identified as "voluntary" reschedulings.  

While the use of discriminant analysis has been a major contribution to the development of the literature in this area, its use is subject to reservations. While discriminant analysis is designed for discrete dependent variable analysis, it assumes the existence of distinct classes of countries with the discriminant rule being used to assign countries to one of the possible classes. However, as Feder and Just (1977 a, p. 26) point out, the use of this methodology implies that a rescheduling country suddenly becomes a "member of another species." In this respect, the weakness of discriminant analysis is the absence of any behavioral underpinning. It seems much more reasonable to see the rescheduling decision as an option that is open to countries and that is taken after consideration of the costs of the alternatives.

The third approach that is used to statistically analyze the decision to seek rescheduling is logit analysis. This is a framework for analyzing choice among discontinuous alternatives, and its output is the relation of selection probabilities to the factors that influence choice. Specifically, it is designed to relate choice probabilities to a model of behavior and to the underlying attributes of

27 By this, they mean reschedulings that were not associated with major foreign exchange difficulties.
the alternatives and the decision maker. Thus, in light of what was said in the preceding paragraph, it seems more appropriate for analyzing debt-servicing problems.

Feder and Just (1977 a), in the first application of this technique to rescheduling, consider the following explanatory variables—the debt service ratio, a reserves/import ratio, per capita GNP, the debt/amortization ratio, ratio of capital inflow to debt service, imports/GNP ratio, the export growth rate, and an export fluctuations index. The final function excluded the export fluctuations index and the imports/GNP ratio. With a cut-off rate of 40 per cent, the in-sample error rates were approximately 5 per cent for Type I errors and 2½ per cent for Type II errors.

Feder, Just, and Ross (1981) continued this work. Their principal adjustment was in the scope and definition of the dependent variables. They augmented the list of renegotiation cases with some instances of "serious arrears" taken from the World Bank files. They also excluded renegotiations that were identified as having occurred "in circumstances of no great economic stringency" and that were primarily a means of giving aid. The list of explanatory variables was also altered. For a cut-off probability of 10 per cent, the error rates for Type I and Type II errors were both 8 per cent.

Others have also used logit analysis in their analysis of rescheduling. Saini and Bates (1978) base their logit analyses on the same variables as their discriminant analysis referred to earlier. Work done at the Export-Import Bank of the United States is described in a paper by Mayo and Barrett (1978). The attempt at innovation was to relate the probabilities of default within the succeeding five years to the explanatory variables.

The various approaches used to analyze reschedulings have

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28For a detailed treatment of the theoretical aspects of logit analysis, see McFadden (1974). Also see Judge and others (1980). McFadden (1976) considers the relative appropriateness of logit analysis and discriminant analysis under differing circumstances.

29By a cut-off rate is meant that probability of rescheduling which is chosen as a critical value and a value above which countries will be taken to be rescheduling candidates. In the literature, the choice of cut-off value is based on analysis of the errors using different values. Presumably, in real world applications, this choice would be made in light of costs of Type I and Type II errors and their likely frequency. Of course, the fact that one rule performed well in sample does not mean it will be the best out of sample.

30Again, the same procedure is used to locate the cut-off value. Note how this value varies considerably from paper to paper.
been outlined. The discussion now turns to a general consideration of this literature. Of the various approaches used, logit analysis seems, in principle, the most suitable. It is designed for situations of choice among alternatives. One of the key elements here is a model of behavior. To fall into arrears and to seek renegotiation is a decision taken as a result of severe debt-servicing difficulties. Presumably, it is taken in the light of the cost of various alternatives. So, what is needed is a framework that reflects these factors. However, as many of the authors admit, the explanatory variables in the preceding discriminant and logit analyses are introduced in a very ad hoc way. Thus, the studies are based on no underlying theory of why a country follows this course of action or not. They basically involve searching for statistical relationships. Furthermore, the range of variables tried and the widely different final specifications arrived at do not add to one’s confidence. There has not been a consideration here of the relevance of the different explanatory variables chosen. However, it is clear that absence of a theoretical structure has led to difficulties in interpreting the role of some variables.\(^{31}\) Even apart from the variables themselves, there are questions relating to whether they should be lagged, the appropriate number of years over which to calculate a growth rate, and, indeed, whether they should be entered in level or growth rate form.\(^{32}\)

The next thing to note about these models is that they are estimated across a diverse group of countries over long periods. The existence of stable parameters in these circumstances is often to be doubted. With the lack of firm theoretical underpinnings, this may become an even more serious problem.\(^{33}\) A large number of factors could give rise to such instability, but there are a few obvious ones. For example, with the advent of the much larger role played by commercial lenders, it is not clear that the debt service ratio has the same implications as before. Such lending is, by nature, of shorter maturity, implying higher debt service payments. It is not clear that in itself this makes countries poorer risks. Before casting judgment on this, one needs to know more

\(^{31}\)See Eaton and Gersovitz (1981 b, pp. 29–30) and Kharas (1981 a, pp. 3–5) for discussion of this point.

\(^{32}\)For example, periods leading up to rescheduling are frequently characterized by rapid growth in some debt-related indicators.

\(^{33}\)There are thus two sources of instability: one because of instability in the basic structural parameters, the second because of instability of the relationship between the proxy variables and the true independent variables.
about refinancing conditions. Similarly, it is not clear that analysis of reschedulings of official debt is appropriate for predicting experience on private bank loans.

It is surprising, given this obvious weakness of these models, that little work has been done on the question of structural stability and out-of-sample performance. Saini and Bates (1978) estimated their logit and discriminant functions up to 1970 and for the period 1971–77. But they present no formal tests of structural stability. It would have been interesting if they had applied their equation that was estimated up to 1970 to the post-1970 experience. Feder, Just, and Ross (1981) do examine the out-of-sample performance of their estimated equations, and they judge this performance to be acceptable.

Apart from stability over time, there is also the question of stability across countries. This is also quite likely to be a problem. Structural models are likely to differ across countries and, again in the present case, the difficulty may be compounded by the use of proxy variables. Feder, Just, and Ross (1981) do introduce dummy variables to test for differences between countries by geographic location (i.e., continent) and find little improvement in the explanatory power of equation. However, there is clearly room for alternative groupings of countries (e.g., by some economic criteria) and for testing stability of other parameters apart from the constant. One probable reason for little work having been done in the past on parameter stability was the relatively small number of instances of rescheduling. With longer periods now available and with a greater number of rescheduling occurrences, it is hoped that more work will be done on this topic.

Other questions relate to the dependent variable. First, the relative frequency of reschedulings is quite low, a factor that is likely to lower the power of the estimation methods used. Second, there is the question of the appropriate definition for the dependent variable. Reschedulings have reflected a diverse set of circumstances. Not all reschedulings have been associated with

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34 Some work on a related topic is worth noting. Kharas (1981b) has examined how structural changes in the domestic economy may be related to debt-servicing performance.

35 For the period 1946–80, Sachs (1982) lists 47 reschedulings involving 16 countries. Furthermore, approximately one third of these occurred in the last five years of the period and would have been outside the period covered in most of the studies of reschedulings.
Debt-servicing difficulties. In other cases, arrears existed for some time before rescheduling occurred, leaving the researcher the difficulty of deciding the timing of the rescheduling variable. Finally, a decision to seek a rescheduling reflects not just the domestic circumstances of the debtor but also his perception of the attitudes of creditors. To date, most reschedulings have centered on official debt, and it has been suggested that creditor attitudes to debtor difficulties sometimes have been influenced by political factors. (See Hardy (1982), pp. 30–32.)

Apart from these issues, one would like to know how reschedulings relate to debt capacity. Aliber (1977) argues that debt capacity is determined by the return on investment and the terms of external finance, and that the need to reschedule debt payments does not necessarily indicate that a country's debt is too large. While his focus on investment productivity as a benchmark for determining debt capacity is overly narrow, the second point has some validity, since it is possible for debt-servicing difficulties to arise because of a confluence of adverse factors outside the control of policymakers. In such circumstances, the occurrence of debt-servicing difficulties does not necessarily indicate that, ex ante, the level of indebtedness was too high. In addition (as already pointed out), debt difficulties involving reschedulings do not amount to a repudiation by the debtor of the obligations involved. Indeed, commercial creditors seem to have suffered little loss in terms of the net present value of the stream of debt-servicing payments. It might be asked, then, why creditors do not just refinance the loans without getting involved in formal rescheduling arrangements. Where official loans are concerned, this may occasionally be related to budgetary procedures. In some creditor countries, such procedures may treat differently the extension of new loans and the spreading out of payments on existing loans. More generally, however, the occurrence of a rescheduling would seem to indicate that lenders do not view the borrowing country's policy orientation to be sustainable, or their uncertainty about the nature of those policies has increased. In particular, the stabilization programs frequently associated with reschedulings can be interpreted as a means of increasing creditor confidence in the good faith and sustainability of debtor policies.

36 See Hardy (1982) for a discussion of rescheduling as a form of development assistance for India.
Sachs (1982, pp. 229-32) points out that the rescheduling procedures adopted in the post-World War II period provide a means by which creditors and debtors can reach a cooperative solution to their differences. In the event of a repudiation, debtors would face retaliation, while creditors would lose owing to a halt in the flow of scheduled debt-servicing payments. A cooperative solution can clearly leave both parties better off than in the event of a repudiation. Sachs and Cohen (1982, pp. 19-21) show how reschedulings can be interpreted in a bargaining context against such a background of a threat of repudiation. In this context, it should be noted that the observation that the present value of scheduled debt-servicing payments does not decline (or, indeed, even increases after renegotiation) does not necessarily imply that banks lose nothing. Risk perceptions may well have increased as a result of the difficulties experienced by the borrower (Aliber (1980), p. 13), and the rescheduling may also impose liquidity costs on the lender.

A number of reasons have been outlined for exercising caution in the use of the results of these empirical studies. Their weaknesses pose major questions about their out-of-sample applicability. It is necessary to be aware of this to avoid injudicious use and, in particular, the danger that predictions become self-fulfilling. This is not to deny the usefulness of these studies and, in particular, their contribution to our understanding of debt issues. It is clear that much in the evaluation procedure must depend on detailed individual country assessment. However, these models may be of use as a supplement to other procedures, particularly if they are improved in light of the weaknesses pointed out earlier.

In this respect, mention can be made of a recent paper (Kharas (1981 a)) that tries to base empirical analysis of renegotiations on a theoretical base. He uses the growth model framework discussed earlier (Kharas (1981 b; 1981 c)) in which one of the central features is the need for the government to be able to raise revenues to service debt. He develops the notion of a critical capital stock that is based on the parameters of the model, outstanding debt, and capital inflows, and the relationship between this critical capital stock and the actual capital stock is an important element of the empirical application. The theoretical model, which was discussed earlier, is limited in its focus and is based on some rigid

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38The critical capital stock is that capital stock necessary to generate the tax base that will provide the government with enough revenues to service the debt.
behavioral constraints on government. The empirical work is also subject to some of the limitations that affect other analyses (e.g., the possibility of structural instability across countries and over time). Nevertheless, it does represent an interesting attempt to cope with the lack of theoretical underpinning to earlier work.

It must also be stressed that, for evaluation purposes, these models should be forward looking. An interesting illustration of such a use is given by Feder (1980). He constructs two economies, one corresponding to a typical high-income developing country and the other to a typical middle-income developing country. He parameterizes a Harrod-Domar model for each of these economies and uses his own estimated rescheduling functions to trace out how rescheduling probability varies over time with the policies pursued. The principal lesson from this exercise is that current programs must be reviewed for consistency with future debt-servicing capacity, so that appropriate policy changes can be made now. It should be emphasized that the attractions of this exercise relate to its focus on typical economies. Because of the limitations of the estimated rescheduling functions and the Harrod-Domar framework, it should not be interpreted too strictly for individual economies.

Finally, it can be noted that banks have shown interest in the use of these econometric rescheduling predictors (for example, the work by Mayo and Barrett (1978)). Indicator-based quantitative techniques are also in use at the Bank of America. (See Heller, 1982.) However, banks are very keen to stress that such techniques form only a part of their procedure for evaluating borrowers. Indeed, if these models are given too much emphasis, there is the grave danger that Type II errors (a country predicted to reschedule in error) will become self-fulfilling as lenders rush to limit their exposure.

III. Supply of External Finance and Debt Capacity

Up to this point, much of the focus has been on borrower characteristics and how they relate to the debt capacity. However,

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39Kharas does introduce a number of country dummy variables, but the coefficients were significant in only two of the nine cases.

40As with all forward-looking forecasting or evaluation tools, their usefulness depends not only on the inherent qualities of the model but also on the accuracy with which the explanatory variables can be predicted.
in making judgments about the sustainability of policies, it is not sufficient that a borrower’s plans are consistent with his inter-temporal budget constraint. Supply conditions in the financial markets must also be considered, and, in particular, lender perceptions of the sustainability of borrower plans. It is important, therefore, to have an understanding of conditions on both sides of the market. The terms on which external finance is supplied are likely to be influenced by borrower behavior, and the debt capacity of a borrower will depend not just on interest costs but also on such factors as refinancing terms and the existence of quantity rationing. Recent work has been emphasizing this need to consider the total market environment in analyzing debt problems. (See, e.g., Eaton and Gersovitz (1980 a; 1981 a; 1981 b), Sachs and Cohen (1982), and Sachs (1982).) This perspective is important also for gaining an understanding of the institutional framework of international finance (e.g., the financial vehicles chosen), and more attention is being given to how these factors bear on the issues under discussion.

An understanding of supplier behavior is also important, given the widespread concern that commercial lenders may be over-extending themselves in their lending to developing countries, and that this may pose danger for the fabric of the international financial system. Thus, it has been claimed that the banks have been careless in the extension of loans to developing countries and that there is the possibility that some event may signal a large-scale withdrawal. This type of scenario is quite similar to the “anatomy of a typical crisis” described by Kindleberger (1978 b, Ch. 2). Thus, typically a “displacement” sets in motion a boom in lending. With ensuing profits and expectations of further profits, the boom feeds on itself. Eventually there comes a time when the market reaches its peak and there follows an “uneasy period of financial distress.” People realize that the market cannot go any higher, and they start withdrawing. Some signal precipitates a crisis, for example, a bank failure. Then a period of “revulsion” sets in. To Kindleberger, at the time of writing, the situation in the international financial markets could be considered one of “distress,” given the amount of uncertainty and the “uneasy contemplation” of the possibility of widespread difficulties in servicing debt. Elsewhere, however (1978 a), he notes that the euphoria typically associated with the boom stage of financial crises has not been evident in the recent lending to developing countries.

In this light, a relevant question to ask is whether banks have
taken enough notice of risks in making their lending decisions. Feder and Just (1977) analyze the relationship between the terms of credit (spread over the London interbank offered rate—LIBOR) and country risk. They model the Eurocurrency market as one of monopolistic competition and develop an interest rate equation that depends on the cost of funds to the bank, the commitment period, the elasticity of demand, the probability of debt-servicing difficulties, and the expected loss rate in the event that such difficulties are experienced. The probability of debt-servicing difficulties is described by an equation similar to those discussed in the previous section of this paper. This is substituted in the interest equation, giving a reduced form for estimation. Using data for debtor government-guaranteed loans in 1973–74, they found that the spread over LIBOR was significantly related to the debt service ratio, an index of export fluctuations, the import/reserves ratio, the import/GNP ratio, per capita GNP, and the projected GDP growth rate. They also found the spread to be positively related to loan duration.

Angeloni and Short (1980) adopt a slightly different modeling approach, assuming perfect competition in financial markets and directly focusing on the expected loss rate rather than separately considering the probability of debt-servicing difficulties and the expected loss in the event of such difficulties. However, the basic estimating equations are quite similar in the two studies, since Angeloni and Short model the expected loss experience as a function of creditworthiness indicators that are typically used for analyzing occurrence of debt-servicing difficulties. Angeloni and Short analyze three different samples, and, in addition to conventional creditworthiness indicators, they also use a ranking of country creditworthiness that was based on a survey of bankers. This latter indicator, not surprisingly, performed quite well. Other indicators were also found to influence the interest spread, but

41 In the empirical application, it is assumed that this expected loss rate is a constant across countries or at least is unrelated to the other explanatory variables.
42 As is shown in Feder and Ross (1982), the a priori sign of this term is ambiguous. A longer maturity increases profits owing to the increased period over which the interest spread is collected, but it decreases them insofar as it increases the probability of debt-servicing difficulties with the loan.
performance varied from sample to sample. It is also suggested that the sizes of the estimated coefficients were small enough to question whether international banks were paying enough attention to country risk.

A number of observations can be made about these studies. Reservations have already been expressed about the approach to predicting debt difficulties that is embodied in these models. But even if these predictions were accurate, they measure the current probability of such difficulties. Since it is the future probability that affects the riskiness of loans, it is this probability that should enter the analysis of credit terms. Thus, these models should use some forward projection of the relevant indicators. Furthermore, it is not the probability of rescheduling that determines interest spreads; it is the expected present value of any ensuing loss, this obviously depending on the time of rescheduling and the terms of renegotiation. This point should be borne in mind when considering the question raised by Angeloni and Short (1980) as to whether “low” coefficient estimates associated with risk indicators suggest that banks are not paying enough attention to risk. Both theoretical models do explicitly treat the consideration of expected loss. However, in the empirical applications, risk is related to country creditworthiness indicators, and it is not clear how these are related, in quantitative terms, to expected loss considerations. Thus, one can concur with Angeloni and Short when they conclude, in response to the question that they raise, that the results pose problems of interpretation.

A second set of issues relates to sample selection. One of the three samples analyzed by Angeloni and Short is composed of both private and publicly guaranteed loans. The behavior of risk spreads may well differ for these two categories. In Feder and Just (1977), only debtor government-guaranteed loans were included. Another point relating to sample construction concerns the currency composition of the loans. Spreads differ across Eurocurrencies depending on the perceived currency risk. This would argue for looking at samples denominated in the same currency.

Again, as with the literature analyzing reschedulings, one can

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44 Angeloni and Short (1980) recognize this limitation but, because of the nature of their data, were unable to allow for this.

45 Given that forward markets exist over only short time horizons, it would not be possible to incorporate currency risk. Feder and Ross (1982) confine their sample to loans denominated in the same currency.
question the assumption of structural stability. Here, since the samples are principally cross-sectional, one is concerned only with the problem of assuming the constancy of parameters across countries. Indeed, one of the difficulties in carrying out stability tests of the rescheduling prediction models—the small number of observations on reschedulings—would not seem to be a major obstacle here. If the assumed model of bank behavior is valid, then one can indirectly test for the stability across countries of the rescheduling prediction models embodied in these interest rate equations. Thus, for instance, one might divide the countries into groups by some criteria and test whether it is valid to restrict coefficients estimated within these groups to be equal across the group. Angeloni and Short (1980) introduce separate dummy variables for developed economies, centrally planned economies, and oil producing economies, and obtain significant coefficient estimates for the first two. This suggests that it might be worthwhile to do some more work on intercountry differences.

Next, it can be noted that these equations focus only on “economic risk.” It would be expected that the risk rating published by the Institutional Investor would incorporate the whole spectrum of factors that influence risk. However, Angeloni and Short report that the equation including this variable accounted for only 75 per cent of the variance of the interest spread. Part of this may be due to the currency-denomination factor. A second reason might be that the rating is not a very good indicator of bankers’ perceptions of risks. Third, it is the expected loss and not the rescheduling probability per se that is important in determining spreads. Finally, varying spreads is not the only way in which banks react to risk. They may also respond by directly limiting exposure, that is, credit rationing. This point should be borne in mind particularly if one is trying to infer from the behavior of interest spreads whether banks are paying sufficient attention to risk. However, there are a number of other reasons why these models do not capture the range of considerations that determine interest spread (Walter (1981), pp. 79–80). First, other elements are involved in a banker/client relationship apart from the loan, and the returns from these other aspects of the relationship should be taken into account. This is a joint test and depends crucially on the assumed model of bank behavior. Furthermore, it is lenders’ perceptions of risk that are involved here. Thus, the rescheduling functions embodied in these interest rate equations are not conceptually the same as the rescheduling functions discussed in Section II, which analyzed actual occurrences of reschedulings.
account in assessing overall bank returns. Second, terms of loans can vary in other ways, apart from interest spreads. Thus, a number of other fees are associated with organizing Eurocurrency loans and these may vary from loan to loan, depending on the wishes of the borrower and lender.\footnote{For example, borrowers may be prepared to pay additional fees in return for lower spreads, since lower spreads may make the borrower appear less risky to outsiders.} Finally, a loan is part of a portfolio, and, to the extent that risks are not perfectly correlated, there is scope for diversification that will be embodied in the price of the loan.

Realizing that rescheduling functions provide an imperfect measure of the probability of debt-servicing difficulties, Feder and Ross (1982) look at Eurocurrency credit terms using the ratings in the *Institutional Investor* as a proxy for rescheduling risks on the basis that this is the best estimate of how bankers perceive these risks. A model of bank supply is based on perfect competition. Feder and Ross (1982) do not directly test any hypothesis relating to the influence of risk perceptions on interest spreads; rather, using the proxy for rescheduling probabilities, the observed interest rates, and other loan terms, they maximize the likelihood function over the unknown parameters of the model—the expected loss in the grace period, the expected loss in the rest of the loan period, and the time horizon of the banks. Their conclusion is that expected loss rates are quite low. This is consistent with observations that financial losses to commercial banks, as a result of reschedulings, have probably been low, since the adjusted terms at the time of rescheduling seem to have compensated for the delay in servicing debt.

The last two studies that are considered in this context focus not on how terms of external finance vary with risk but on the existence of direct rationing to limit exposure in risky countries. The logic of credit rationing in international financial markets is considered in Eaton and Gersovitz (1981 a; 1981 b), Sachs and Cohen (1982), and Sachs (1982). Lenders will not lend beyond that point at which it is in the interests of borrowers to repudiate.\footnote{The benefits of repudiation are positively related to the size of outstanding debt. The costs of repudiation stem from retaliation by creditors and, in particular, exclusion from many international commercial activities, be they trade or financial. These costs are, therefore, less directly related to the size of outstanding debt.} In a world of uncertainty, there will be a repudiation probability distri-
bution with the cumulative probability of repudiation increasing with exposure. There will come a point at which increasing the interest rate will not compensate for the increased probability of repudiation, and further loans will not be extended.

Kapur (1977) discusses the role of credit rationing in the supply of commercial finance to developing countries and estimates a supply function in which the supply of credit is related to a number of country risk indicators. However, as he himself admits, his estimated equation represents a supply function only under the strong assumption that all borrowers are rationed. Eaton and Gersovitz (1980; 1981 a; 1981 b) take an approach that allows for the possibility of rationing but does not assume it. Using disequilibrium econometric methods, they estimated supply and demand schedules for debt and indicated the likelihood that any particular observation corresponded to a situation of rationing. Apart from the usual problems of cross-sectional work (assumed cross-country constancy of parameters), the exclusion of interest rates from the estimating equations requires some comment. On the supply side, this requires that the expected interest rate be constant across countries. Their exclusion on the demand side implies that borrowers have the same expected interest rate as lenders. Despite these limitations, however, the Eaton and Gersovitz approach is interesting, since it explicitly recognizes the interdependence of the supply and demand sides and directly analyzes an issue about which there has been much speculation—that is, the existence of rationing. It is interesting to note that 80 per cent of their sample was found to be supply constrained with a probability of greater than 0.5. It should be pointed out, however, that if this rationing exists it is not due to stickiness in interest rates but, rather, it is similar to the equilibrium credit rationing analyzed by Jaffe and Modigliani (1969) and Stiglitz and Weiss (1981). The reluctance of banks to increase their exposure in return for a higher spread reflects the fact that the gain from such an action is more than offset by the increase in the expected loss.

The studies discussed thus far would seem to indicate that

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49Perfect competition in the intermediation industry is a necessary but not sufficient condition for expected interest rates to be constant; the assumption of risk neutrality is also needed.

50It was noted earlier that one of the difficulties in analyzing debt capacity was the possibility that borrowers’ future plans may not be consistent with lenders’ perceptions of these plans.
lenders do take account of perceived riskiness of borrowers in making their lending decisions. But this does not really tell us whether "sufficient" recognition has been taken of these risks. And while a number of authors have suggested that in the past bank losses in developing countries have been small, other considerations might moderate any suggestions that concerns with respect to the continuity of supply of commercial finance to developing countries may be exaggerated. In the past, official lenders were the major focus of reschedulings. Commercial lenders now have a much larger share of the market, and it has been suggested that, as a result of their weaker bargaining power, losses may be greater in the future.

But, more important, losses that individual banks may suffer are not of great concern. In the long run, banks will make profits provided that they price risk appropriately and will fail if they do not. Of more concern are externalities stemming from bank failure that are not priced appropriately by the banks. Such large-scale bank failure could arise owing to concurrent repudiation by a number of countries. This gives rise to questions about how systematic country risk is. Some analyses of conventional country risk indicators suggest that country risk is, to a large extent, non-systematic and, therefore, that debt difficulties are likely to arise independently. But, even if this is so, it should be kept in mind that bank lending to developing countries is heavily concentrated and that some individual countries account for large shares of outstanding bank claims. (See Bacha and Diaz Alejandro (1982), pp. 17-18.) In addition, large-scale withdrawal of funds by lenders or bank depositors is not inconceivable if perceived uncertainty about the stability of the international financial markets increases. For example, debt difficulties experienced by a major borrower, in addition to the possibility that it might lead to the demise of a number of banks, may precipitate such a withdrawal. Furthermore, even if a significant number of financial institutions do not find themselves threatened, a withdrawal from lending to deficit countries clearly will have costs owing to effects on welfare in these countries; indeed, the surplus countries will suffer through induced effects on the demand for their products. Thus, in recent

51 For a discussion of these issues, see Folkerts-Landau (1982).
53 Sachs (1982, pp. 225-28) points out that reactions of this type may have been important in the early 1930s.
years there has been considerable attention on the part of monetary authorities in the industrialized countries to the regulation of the international operations of banks under their influence.\(^5\)

While this literature on creditor behavior does not give a clear impression of whether or not the international financial system has exceeded its lending capacity, it certainly indicates that there may be scope for developing countries to enhance their borrowing terms and, hence, their debt capacity by recognizing how their own behavior affects their creditworthiness. Such considerations are taken into account, for example, in the models of Hanson (1974), Feder and Regev (1975), Feder (1978), Feder and Just (1979), and Sachs and Cohen (1982).

Up to now, the discussion has been concerned almost completely with the role of the financial markets in channeling savings from surplus savers to those who are short of savings. Another important role of financial markets in the context of the industrial countries is that of assisting risk diversification and the transfer of risk from more risk-averse to less risk-averse agents. The increased attention being given to the supply side of the international financial markets has generated more interest in this aspect of the external financial dealings of developing countries. Lessard (1977) notes that these countries have developed little in the line of mechanisms, such as direct foreign investment, for shifting risks to world markets. He argues that there would appear to be considerable scope for such shifting of risk, given that the economies of many of these countries are heavily based on the production of commodities with quite uncertain returns.\(^5\) Most external finance is in the form of loans that represent the transfer of risk to the world capital market only in the event of repudiation. However, these modes of finance are not meant to be a means of risk transfer. Considerable moral hazards are involved—in many instances it would be very difficult for the creditor to determine if, in fact, the associated investment project had failed. As a result, use of repudiation to transfer risk involves the borrowing country in the considerable costs associated with lender retaliation. Indeed, as indicated earlier, the loss experience of lenders in the

\(^{5}\) For a more detailed discussion of the regulatory environment, see Hardy (1979), Williams (1980), and Walter (1981). Folkerts-Landau (1982) considers the forms that efficient regulation might take.

\(^{5}\) Some numerical examples are given, based on the world copper market.
post-World War II period seems to have been quite limited. While this low loss experience has attractions, Sachs (1982), pp. 200 and 218–19) points out that a repudiation-free world is not necessarily a Pareto improvement over a world with repudiations because of these risk-diversification considerations.

Clearly, financial instruments, such as bonds or bank loans, are not a suitable means of assisting risk transfer because of the problems of moral hazard that are involved. Of course, the classic medium for risk diversification is through foreign equity participation, either direct foreign investment or portfolio investment. Here is is easier to distinguish economic and political risk, and, presumably, some international agreement with associated sanctions could be set up to cope with political risk. However, these political risks concern any attempt by the government to redistribute benefits of the enterprise by changing explicit or implicit terms of the contract among the parties. Clearly, there is a large grey area over which it would be difficult to apply such international agreement without considerable interference in the domestic economic policies of the country. Most countries have also varied in their attitude toward direct foreign investment. In particular, there is the concern that excessive foreign control may lead to an "unfair" distribution of rents.

As an alternative to risk diversification through equity participation, some interest has been shown in the possibility of using commodity bonds. Lessard (1977) contains a detailed consideration of the relative abilities of commodity bonds and direct foreign investment to cope with the concerns of debtors and creditors, and suggests that commodity-linked bonds may indeed be the more satisfactory vehicle in this respect. Lessard (1982) dis-

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56 The pre-World War II experience provides an interesting contrast with more recent experience. Creditor losses were much more in the normal course of events in international financial markets and were compensated for by high (relative to today) risk premiums in the terms of contract. (See Sachs (1982), pp. 219–29.) The difference is explained in terms of the changed institutional structures of the international financial markets. Pre-World War II lending to developing countries was in the form of bonds subscribed to by a large number of atomistic lenders who had little power of retaliation, in contrast to the present involvement of governments, international organizations, and bank syndicates. (See Eaton and Gersovitz (1981 b), Sachs (1982), and Sachs and Cohen (1982) for further discussion of this contrast between bank lending and bonds.)

57 Commodity bonds are bonds whose return is, by contract, related to the fortunes of the particular commodity concerned.

58 While, it is argued, the risks of repudiation (expropriation in the case of direct foreign investment) are similar for commodity bond and direct foreign
cusses criteria for evaluating financial instruments in the context of developing country lending and examines a variety of financial instruments in light of these criteria. Particular emphasis is given to questions of risk allocation.

The present situation of limited international risk diversification would appear to be unsatisfactory. It is hoped that future research will lead to progress in breaking down the barriers to improved international financial linkages. While such developments would be particularly important for developing countries, there is scope for benefit on all sides. In the more narrow context of the subject matter of this survey, in addition to increasing the benefits derived from external finance, those developments would enhance the debt capacity of these countries by reducing the leverage on income streams.  

### IV. Conclusion

The rapid increase in developing country debt has been accompanied by a large expansion in the literature on the subject. As the papers covered in this survey indicate, there has been a considerable amount of worthwhile analysis. Before summarizing the principal findings of the survey, it may be useful to touch briefly on some topics that have not been covered.

The focus of this survey has been on that part of the literature that deals with the problem on a general analytic rather than a descriptive or case-specific level. Thus, there is little reference to the large literature that deals with descriptions of the evolution of international lending and developing country indebtedness over the past 20 years. Similarly, little attention has been paid to the numerous case studies of countries that have found themselves in debt difficulties. There are also contributions to the literature containing descriptions of the institutions of international finance, the mechanics of rescheduling exercises, and proposals for reform in these areas. For examples of studies covering topics such as these, see Wellons (1977), Wionczek (1978), Franko and Seiber.

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59 When debt-servicing obligations are more closely related to the economic fortunes of the borrowing country, there is less likelihood of debt-servicing difficulties.
(1979), Nowzad (1981), Bacha and Diaz Alejandro (1982), and Hardy (1982).

A second set of topics that has not received much attention in this survey relates to issues of debt management as distinct from issues concerning the total level of debt. In this case, the lack of attention reflects the state of the literature on the subject. Such issues are relevant in the context of this survey, since, clearly, how well a country manages its debt will have an impact on the debt that it is able to carry. Indeed, it is clear that, in many countries, poor debt management has exacerbated debt-servicing problems. Attention in this respect has been drawn to rapid buildup of short-term debt, particularly credits with a maturity of less than one year on which little information is readily available.

Insofar as short-term financial management has received attention, the focus has been on the management of the gross reserve position; this has generally been related to trade characteristics, such as the openness of the economy and the variability of exports. Little attention has been given to the relationship between debt and reserve accumulation. As Eaton and Gersovitz (1980) point out, debt and reserves can be either complements or substitutes. On the one hand, debt may be a means of financing the accumulation of reserves. On the other hand, access to external finance and reserve holding may both act as buffers against unforeseen external payments developments. This substitutability of debt and reserves is relevant only to the extent that the country does not face credit rationing on international financial markets. However, for most developing countries, access to international financial markets is not assured, and the holding of reserves needs to be seen in relation to potential external payments needs. In this context, the focus on reserves in relation to trade characteristics seems overly narrow, since payments problems can also arise owing to cutbacks in the availability of short-term credits. To this extent, the relevant focus is a country’s net short-term position rather than its gross reserve position.

Apart from these issues concerning the short-term net position of developing countries, little has been said about maturity management of debt structure. To some extent, this may reflect the lack of scope on the part of developing countries to negotiate maturities on commercial loans, particularly at the long end of the

—Hardy (1982) draws this conclusion from her case studies.
In addition, apart from the traditional adage that long-term needs should be financed long and short-term needs should be financed short, the finance literature has little to say on the issue of maturity (Haley and Schall (1979), pp. 380–81). Finally, in the international financial markets, longer maturities do not protect borrowers from the risk of interest rate increases, since rates on loans in these markets are periodically adjusted in the light of changes in the LIBOR.

The final debt management issue to be touched on here concerns the currency denomination of debt. In recent years there has been considerable interest in applying the principles of optimal portfolio theory to foreign currency holdings of investors (von Furstenberg (1981) and references therein) and the reserve composition of central banks (Ben-Bassat (1980)). In applying these principles to the currency composition of debt, a number of points should be borne in mind. First, what in the past had been a good choice for portfolio composition is not necessarily an appropriate guide to current portfolio decisions. Second, what is relevant is an investor’s net position in differing currencies, not his gross position. Thus, at the short end of the maturity spectrum, one should focus not on the currency composition of either reserves or short-term credits but on their combination. Finally, while the same principles apply at all points on the maturity spectrum, active currency management becomes less easy for longer maturities. It would seem that a prudent course would be to choose the currency composition of liabilities in light of the composition of the foreign currency returns of associated investment projects. Given that many projects will not have direct identifiable foreign exchange returns, a more practical suggestion might be to link the currency composition of debt to the general structure of foreign exchange earnings.

Hardy (1982, p. 20) points out that developing countries, in general, have limited access to long-term financing. Sachs and Cohen (1982) relate this reluctance on the part of commercial lenders to negotiate longer maturities to sovereign risk factors and, in particular, to the inability of long-term creditors to enforce contracts that impose conditions on additional debt floated by the borrower. Such additional debt flotations increase risk from the point of view of the creditor. In domestic financial markets, creditors can attempt to protect themselves through bond covenants that limit future borrowing or through seniority provisions. (See Sachs and Cohen (1982), p. 32.)

See Dooley (1982) for further elaboration of this point. His paper also contains empirical evidence illustrating how failure to focus on the complete balance sheet can give quite inaccurate impressions of a country’s currency management policies.
In conclusion, some of the major points of the survey can be summarized briefly. Section I looked at the issue of debt capacity in the context of growth models. The focus in this literature is on highlighting general principles about debt capacity that can be learned from analysis of these models. The principal focus of these models has, until recently, been on the investment role of external finance. Lately, the literature has been paying significant attention to consumption-smoothing considerations. While it is clear that any easily applied rule for assessing debt capacity has not been forthcoming, consideration of the factors involved indicates that it is unrealistic to hope for such a rule. In part, this is so because the concept of debt capacity is rather difficult to pin down. But a major part of the difficulty lies in the range of motives for recourse to external finance and numerous other institutional and behavioral considerations. In particular, it has been noted that these models have also relied on simplistic representations of the supply side of the international financial markets. However, an understanding of the principles emphasized in the theoretical literature is an important guide to the questions to be asked in making judgments about the sustainability of a country's policies.

Section II covers attempts in the literature to identify empirically those circumstances under which countries have experienced debt-servicing difficulties. Weaknesses of this part of the literature—pointed to in the text—pose considerable doubts about the out-of-sample applicability of results. In addition, there are questions about the meaning of instances of debt difficulties that have been focused upon—that is, reschedulings. In particular, the empirical work does not distinguish between liquidity problems and solvency problems, a distinction that is relevant for relating the occurrence of reschedulings to the question of debt capacity.

The next set of issues discussed in the survey relates to the supply side of the international financial markets. In this part of the literature, the focus has been on factors that influence lending behavior. While these studies do indicate that creditors take account of perceived country risk in making their lending decisions, it is difficult to make any judgment on the issue raised in the opening section as to whether creditors are overextended in their lending to deficit countries. The literature does make a valuable contribution, however, by highlighting how the policies of debtor countries affect the supply of external finance. Thus, countries
can enhance the terms of external finance, and hence their debt capacity, through a better understanding of lender behavior and through adjusting their own actions in light of this knowledge.

Finally, recent literature has been focusing attention on the institutional framework of international finance as it concerns developing countries. In particular, it has been suggested that this framework is inefficient from a world as well as a developing country perspective, on account of poorly developed mechanisms for international diversification and trading of risk. This observation suggests that increased effort should be directed to improving the environment for the development of appropriate financial instruments.

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