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International Debt with Unenforceable Claims

by Jürg Niehans*

What is called the "international debt crisis", like every complex problem, has many aspects. The present paper concentrates on one of them—the unenforceability of foreign claims. Recent developments make the investigation of the implications of unenforceable claims for the international credit market particularly worthwhile. The resulting picture of international loans to developing countries is inevitably incomplete, but it is nevertheless revealing and, in part, novel.

Prevailing views on the international debt crisis are based on the notion that the international loans in question are essentially similar to private domestic loans. In particular, the "conventional wisdom" assumes that debtors can be expected to service their debt to the limit of their ability. From this assumption, the current crisis appears to be a consequence of a diminished ability to pay, partly due to higher interest rates and partly to deteriorating economic conditions. This view raises the hope that a decline in interest rates and a return to prosperity would cause the crisis to fade away.

It is argued in this paper that the conventional wisdom overlooks a fundamental difference between private domestic loans and the international loans in question. Economic thinking about borrowing and lending is commonly based on the paradigm of debt enforceable through the law. In a cash transaction, there is an immediate *quid pro quo*—the con-

tract is self-enforcing. In a credit transaction, the two parts of the exchange are separated in time. As a consequence, there have to be procedures to enforce the fulfillment of the contract. Because ethics are usually not enough, enforcement becomes a problem. Western civilization has solved this problem through an elaborate system of contract and bankruptcy laws. If a debtor defaults on his obligations, he forfeits collateral, that is, his assets can be attached, impounded, or turned over to his creditors by a bankruptcy court. By such means, the debtor is put under strong pressure to live up to his obligations, no matter how onerous, to the limit of his abilities. Without these legal enforcement mechanisms, modern credit systems could not have developed.

The circumstances are very different for international bank loans to developing countries. Most of these loans are made to governments or guaranteed by governments. To the extent they are loans to private firms, exchange control tends to subject them to a calculus similar to that for government loans. There is usually no collateral and, at least in practice, no access to bankruptcy courts. While the seizure or attachment of assets is conceivable, it is rarely

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feasible. This makes such loans legally unenforceable.¹ It is true that concern about "political" repercussions, about "gunboat diplomacy" or about disruption of trade may, to a certain extent, substitute for legal remedies, but they seem relatively weak. World opinion today tends to side with the debtors rather than the creditor banks.²

The analysis in this paper is based on the assumption that such penalties do not exist at all. Its specific contribution is the development of an "unorthodox" model in which concern about the future availability of credit is the *only* deterrent to default. No doubt this radical assumption does not do justice to the complexities of reality because at least some traces of enforceability are often present, and even the principles of ethics may be of some help. There are, indeed, historical cases of governments faithfully repaying their foreign debts over decades. Recent developments strongly suggest, however, that it is worthwhile to investigate the conditions under which the international credit system might still be viable under this radical assumption.

In the last few years, the implications of unenforceability have found growing attention.³ The present paper is written in the belief that these implications are not yet fully understood. Section I outlines the statistical contours of the problem. Section II shows that unen-

forceable claims do not necessarily lead to crisis. Sections III and IV analyze, respectively, the objectives of rational debtors and creditors. Using a specific model of creditor strategy, Section V pays particular attention to the relationship between the rate of interest and the rate of growth. Section VI extends this analysis to the initial "overshooting" of the long-run debt level. The exposition uses verbal, graphical and mathematical arguments. A reader not worried about mathematical precision can obtain the main content of the paper by concentrating on words and graphs.

Throughout the paper, it will be assumed that international lending, while important for the levels of output and consumption at any moment, has only a negligible influence on the rate of economic growth over decades, the latter depending mainly on population, natural resources and technological progress. Although this assumption may not be strictly valid, the inaccuracies involved do not seem large enough to invalidate the conclusions. Uncertainty about future developments, although obviously important in reality, also is disregarded in this paper. The paper thus does not purport to provide a complete theory of lending with unenforceable claims, but concentrates on certain aspects that seem to be important from the point of view of current debt problems.

I. Statistical Contours

As a preface to the theoretical argument, this section presents some statistical contours of the current debt crisis. These contours are intended to show that the interpretation developed in this paper, although based on a somewhat radical assumption, is consistent with important stylized facts. The data are taken from the World Debt Tables (External Debt of Developing Countries), published by the World Bank, 1983-84 and the first supplement. From 1978 to 1982, as Table 1 and Chart 1 show, disbursements of private loans through financial markets to public debtors or debtors with public guarantees were in the range of \$39 to \$48 bil-

lion. Repayments of principal moved roughly between \$14 and \$18 billion. Neither of these flows displayed a pronounced trend. Interest payments, however, increased dramatically year by year from \$6 billion in 1978 to \$24 billion in 1982. As a consequence, net transfers to the governments of developing countries through the international banking market, representing the net cash flow to the debtors, declined from \$19 billion to less than \$2 billion. With little exaggeration, it can be said that net transfers came to a standstill.

This was immediately followed by the outbreak of the international debt crisis. Based on

Chart 1

Developing Countries: Public and Publicly Guaranteed Debt to Private Creditors Through Financial Markets, 1973–1982

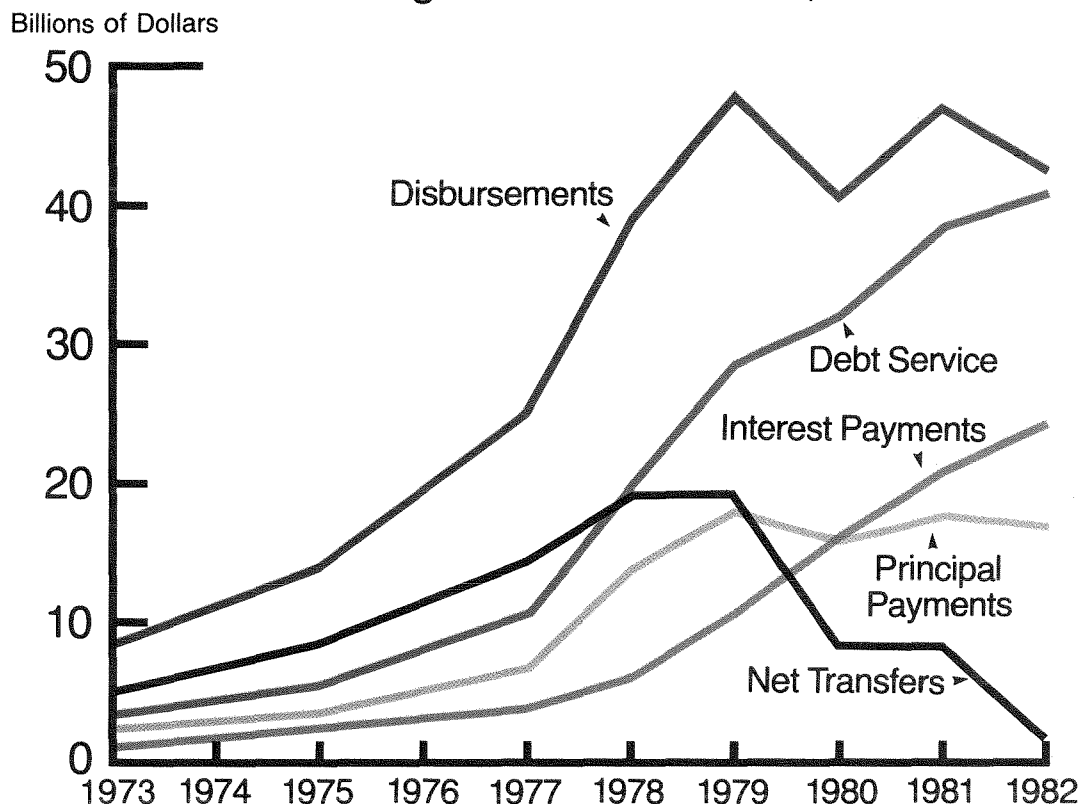


TABLE 1
Developing Countries: Public and Publicly Guaranteed Debt to Private Creditors Through Financial Markets, 1973–1982.
(Billion Dollars)

	1973	1975	1977	1978	1979	1980	1981	1982
Disbursements	8,652.0	14,225.7	25,349.0	39,188.4	47,995.8	40,708.0	47,134.7	42,770.3
Interest Payments	1,064.9	2,651.9	4,136.2	6,287.9	10,703.9	16,317.9	21,021.7	24,149.8
Principal Payments	2,487.6	3,104.4	6,808.6	13,853.7	18,081.2	16,002.6	17,754.0	16,880.3
Total Debt Service	3,552.6	5,756.3	10,944.8	20,141.6	28,785.1	32,820.5	38,775.7	41,030.1
Net Transfers	5,099.5	8,469.4	14,404.2	19,046.7	19,210.7	8,387.4	8,359.0	1,740.2

Source: World Bank, World Debt Tables: External Debt of Developing Countries, 1983–84 and First Supplement, Washington 1984.

the International Monetary Fund's (IMF) chronology of bank-debt restructuring cases (IMF, 1983), there were 3 completed cases in each of 1978 and 1979, 6 cases completed in each of 1980, 1981 and 1982, and 20 cases completed in 1983 by early October with 8 cases still under negotiation.⁴

It is difficult to believe that the association of the virtual vanishing of net transfers and the wave of reschedulings was a mere coincidence. The nature of their causal connection, however, is not obvious. According to one possible hypothesis, borrowers asked for restructuring because rising interest rates, together with deteriorating terms of trade and worldwide recession, had made the burden of their debt unbearably heavy. Evaluated against the statistical contours, this argument is not convincing. It is true that total debt service, consisting of payments on principal and interest, reached a high amount. The relevant burden of international debt, however, is the net transfer obtained by deducting from debt service the disbursements on new loans. Since these disbursements were also very high, there was, until 1982, not a single year with a negative net transfer. Far from carrying an intolerable debt burden, debtors received net benefits throughout, albeit on a rapidly declining scale.

The preceding argument was based on aggregate data for all developing countries. A more detailed picture can be obtained by focusing on Latin America and the Caribbean. Table 2 and the corresponding Chart 2 present net transfers

from 1973 to 1982. It is significant that their amount, after reaching a high point of \$11 billion in 1978, actually turned negative in 1982. It is also important to note that this negative balance was far from alarmingly large. The overall burden of the debt cannot have been very heavy.

The Latin American countries can be divided into those with rescheduling between 1974 and 1982 and those without. The difference is revealing. The 15 rescheduling countries present, although at a somewhat lower level, the same picture as Latin America as a whole. The 10 "good" debtors, however, show roughly stable and positive transfers since 1977; in the last three years, their net transfers actually increased. This observation fits nicely into the aggregate picture.⁵

According to another hypothesis, it is precisely the *prospect* of negative transfers that triggered the debt crisis. This hypothesis is consistent with the effective unenforceability of most of these claims because it is an essential aspect of unenforceable claims that the debtor cannot be forced to accept negative transfers. If, and when, they appear on the horizon, he defaults. The present paper hypothesizes that this hypothesis is largely correct.

It is true that most applications for debt renegotiation are accompanied by arguments intended to show that acute balance-of-payments problems make it impossible for the borrower to pay his debts. Such arguments, however, should not be accepted at face value. Balance-

TABLE 2
Latin America and the Caribbean: Net Transfers from Private Creditors to Public Debtors through Financial Markets, 1973-1982
(Billion Dollars)

	1973	1975	1977	1978	1979	1980	1981	1982
All Countries	2,779.2	4,403.0	8,975.5	11,004.0	9,940.4	1,699.6	3,990.8	-2,317.7
Rescheduling Countries	2,573.0	4,261.9	8,605.6	10,549.1	9,609.1	1,405.7	3,538.1	-2,791.6
Non-Rescheduling Countries	206.2	141.2	369.8	455.1	331.3	294.1	452.9	473.6

Source: World Bank, World Debt Tables: External Debt of Developing Countries, 1983-84 and First Supplement, Washington 1984.

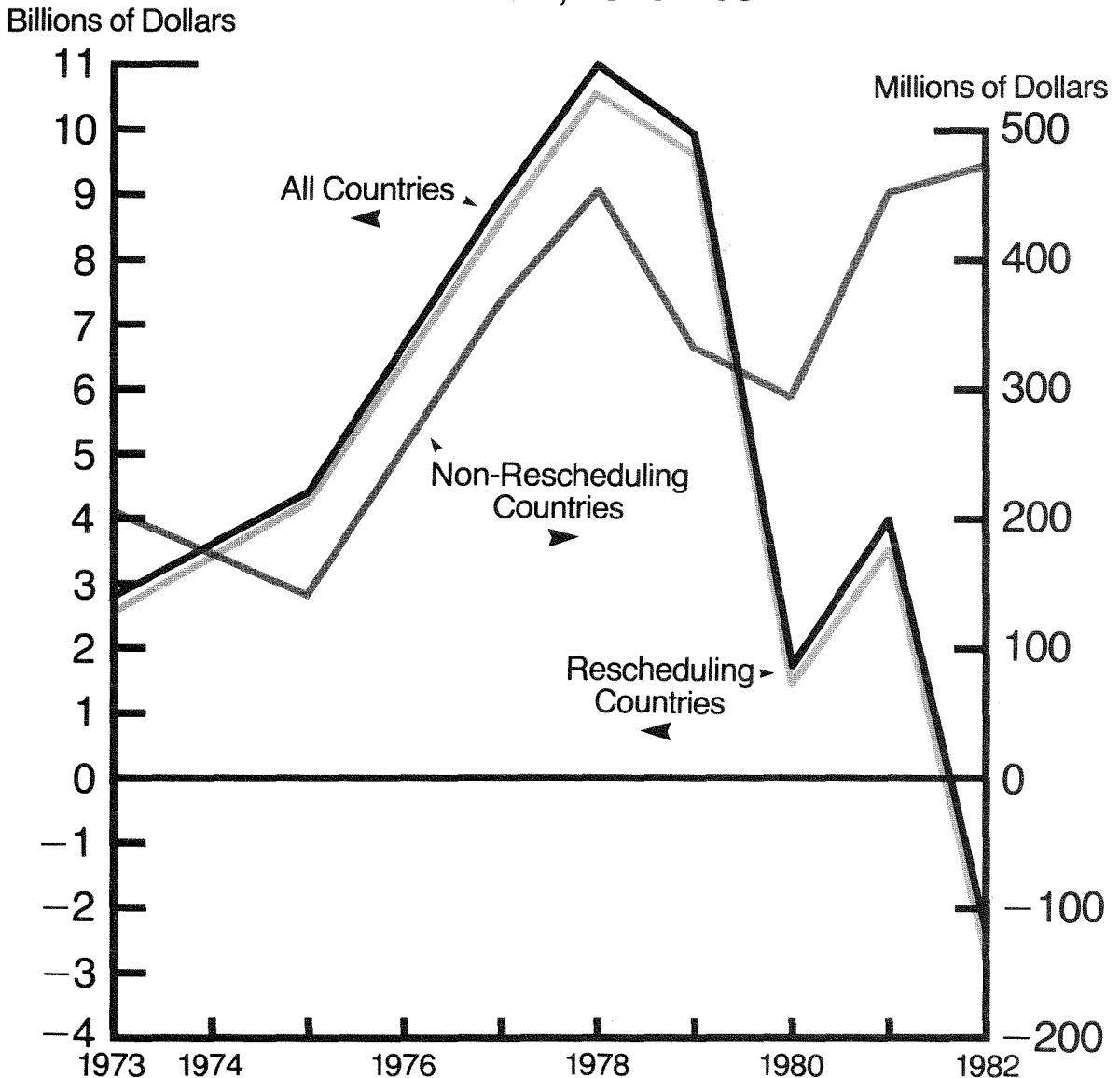
of-payments crises result primarily from a country's own policies. They can be produced at will, virtually overnight, simply by overvaluing the exchange rate.⁶ The fact that IMF lending, despite the collapse of the Bretton Woods system, still is largely conditional on a balance-of-payments crisis creates an incentive for a country to let itself slip into such a crisis

whenever IMF lending is desired.⁷

The rough statistical contours presented in this section, although far from proving anything, suggest that net transfers, defined as the difference between new loans and debt service on old loans, may be of crucial significance for international solvency. The following sections elaborate on the theory behind this idea.

Chart 2

Latin America and the Caribbean:
Net Transfers, 1973–1982



II. Lending Without Budget Constraints

This section considers the long-run feasibility of lending with unenforceable claims. Goods exchanged in the market are, at market prices, of equal value. Their exchange is nevertheless of mutual advantage because the goods, despite their equivalence, have different utility for the buyer and the seller. Similarly, the future payments promised by a borrower, properly discounted, have a present value equal to the amount he borrows; the present value of all his cash flows is zero. This is the intertemporal budget constraint for loans. Despite this constraint, the loan is regarded as advantageous by both parties because a dollar may have different utility depending on the time at which it is available.

An essential implication of an intertemporal budget constraint is that once the loan is disbursed, its present value to the borrower turns negative. For example, once a homeowner has received a mortgage loan, he has to make payments to the bank for years. Economically, therefore, there is a virtually irresistible incentive to default. To counteract this incentive, loan contracts have to be enforced by collateral and bankruptcy courts.

Such a budget constraint, by analogy with individual loans, is often postulated for an economy as a whole (McDonald, 1982; Sachs, 1983; Sachs and Cohen, 1982). As a matter of fact, the unenforceability of loans means that there is no way of imposing this constraint. The paradigm of unenforceable debt thus implies that borrowing is not subject to the familiar intertemporal budget constraint. The constraints that take its place are the main topic of this paper.

In the absence of a budget constraint, a country can forever borrow more each year than what it needs to service its outstanding debt. International lending begins to look like a "Ponzi scheme." Economists, conditioned to the paradigm of enforceable claims, tend to regard such a state of affairs as intrinsically unsustainable. As a matter of fact, it may conceivably be sustained, although only under stringent conditions. Even firms, if they grow

rapidly enough, may end up never repaying their aggregate debt. The same applies to growing economies. While the budget constraint is faithfully observed for every single loan, the present value of aggregate cash flows to the debtor may well be positive and even infinite.

The possibility of such a case over an indefinite period depends largely on the relationship between a country's rate of growth and the rate of interest.⁸ Consider a country in balanced growth at rate g with net foreign debt A . Debt expands at the rate $\alpha = (dA/dt)(1/A)$. There is clearly no reason why α should not be positive in such an economy for an indefinite period. Specifically, in a world economy in balanced growth, there is a continuing capital flow from the creditors to the debtors, growing exponentially at the same rate as debt. Aggregate debt is never repaid.

The net cash flow to the debtor country depends on the difference between new debt and the interest payments on the existing debt. It corresponds to the net transfers of Section I. If there is a world interest rate i , the cash flow is

$$c = \frac{dA}{dt} - iA = (\alpha - i) A. \quad (1)$$

Disregarding other service items, this is equal to the trade deficit. Depending on α and i , c may be positive or negative, which means that debtor countries can have trade deficits or surpluses.

Is it possible for a debt expansion rate different from the interest rate to be maintained forever? The answer depends largely on the relationship between α and g . A rate of debt expansion significantly different from the rate of economic growth would imply that debt either increases beyond any limit relative to national income or else virtually shrinks away. It is unlikely, therefore, to be maintained for very long. Within the framework of balanced growth, one is clearly forced to assume $\alpha = g$. The above question thus pertains in essence to the relationship between the rate of growth and the rate of interest.

In balanced growth with $g = i$, the net cash

flow is zero at all times and so is the trade balance; interest payments are continuously reinvested. With $g < i$, the debtor needs a trade surplus to finance the excess of interest payments over new lending; cash flows are negative and their present value is equal to outstanding debt.⁹ In the case $g > i$, the debtor enjoys a positive cash flow forever, which finances a permanent trade deficit; the present value of cash flows is infinite.

There seems to be no general reason to rule out any of these possibilities. In particular, there is nothing intrinsically unsustainable in a situation in which a growing economy increases

its international indebtedness by more than its interest payments virtually forever, thereby financing a permanent trade deficit.¹⁰ Are the creditors cheated by the debtors in such a case? This analogy to fraudulent bankruptcy would be misplaced. In successive generations, each individual creditor obtains full repayment. It is just that the number of such creditors grows continuously. If the world suddenly came to an end, the last generation of creditors would indeed regret having made those loans, but its regret would be shared by those who hold other assets.

III. The Borrower's Objective

The concept of balanced growth helps to clarify one's thoughts on debt problems. The world, however, is not in balanced growth. This raises the question, under what conditions can a debt crisis generally be avoided, despite the unenforceability of claims. In the present section, this question is considered from the borrower's point of view. The analysis assumes that the rate of interest is given by the market, but that the available amounts of loans may be limited. Although potentially important, risk premia depending on the borrowing strategy of the particular country are disregarded.

If a country with unenforceable debts is able to maintain a positive cash flow at all times, then its aggregate borrowing is not subject to the usual efficiency criteria according to which the marginal return on investment must be no lower than the rate of interest. If loans, in effect, turn into gifts, they cannot be excessive from the borrower's point of view. The overriding objective of borrowing becomes the maximization of the present value of future cash flows.

This objective can be formalized by postulating that the finance minister in the borrowing country at time zero, in choosing the time profile of debt, $A(t)$, seeks to maximize

$$\int_0^{\infty} \left[\frac{dA}{dt} - iA(t) \right] e^{-it} dt. \quad (2)$$

If this expression is infinite for several paths, he presumably will prefer the path that approaches infinity, in some sense, as fast as possible.

In pursuing this objective, the borrower is constrained not by the cost of future debt service but by the willingness of creditors to lend. If the interest rate is assumed to be given by the world market, this constraint expresses itself in a quantitative limitation of the loan supply. The nature of this constraint will be discussed in the following section.

The essential point is that the optimal strategy of the debtor may well entail default.¹¹ More specifically, a "crisis" will occur if, and when, the present value of cash flows becomes negative over future time spans of any length.¹² In more formal terms, default will occur at time T if

$$\int_T^{\theta} \left[\frac{dA}{dt} - iA(t) \right] e^{-i(t-T)} dt < 0 \quad (3)$$

for all θ from T to infinity. The unenforceability of contracts means precisely that the debtor cannot be compelled to accept the prospect of paying out more than he receives for an indefinite future.¹³

The foregoing argument is illustrated in Figure 1. The blue curve describes a path of expected annual cash flows from now into the indefinite future. These cash flows are concep-

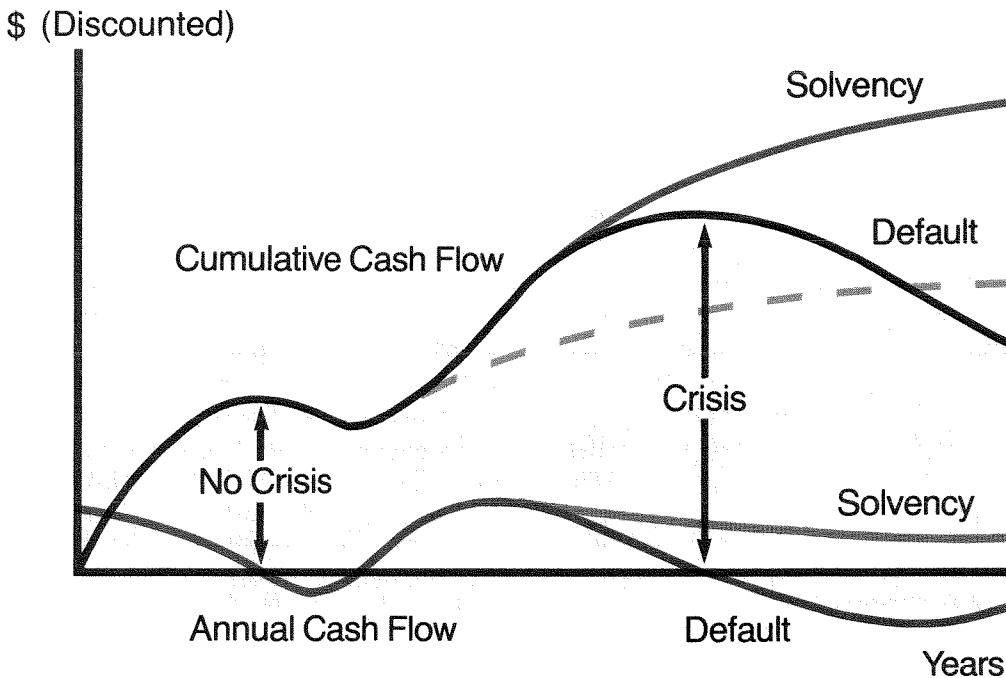
tually similar to the net transfers in Tables 1 and 2 and Charts 1 and 2 except that (1) they relate to future periods and (2) the dollar value for each year is assumed to be discounted back to the present time at the appropriate interest rate. The black curve is derived from the blue curve by cumulating the annual cash flows from time zero to a given future year. It thus represents the present value of all future cash flows over a given future time period. For the moment, one may imagine that the shape of these curves is imposed on the borrower from the outside.

Under what conditions will the debtor, confronted by these curves at time zero, detect a future time T at which default is advantageous? The two cases of solvency and default are illustrated by two variants of each curve. In the solvency case, represented by light lines, the upper curve has no (global) maximum. Whatever the present value of future cash flows up to a given time, there is a later time promising a still higher value. There may indeed be sub-periods of negative cash flows, illustrated on

the left, but these do not trigger default because the debtor expects positive cash flows of even larger size in the future.¹⁴ In the other case, represented by the dark lines, the upper curve has a maximum that is never surpassed. At that point, the rational debtor will default.¹⁵ Any further servicing of debt would reduce his total benefit.

In reality, of course, the shape of these curves is not given to the debtor but depends in part on the debtor's own policies. It is in the debtor's interest to choose those policies that would raise the upper curve as high as possible. In particular, a path with infinite present value is always better than any default path since the latter's present value is finite. This means that the debtor will often do his best to escape default. In contrast a path with solvency is not necessarily better than default because, although it never declines, it may never reach the level of the default path at the crisis point. This possibility is illustrated by the dotted solvency path in relationship to the black default path. It means that there may be no incentive for the debtor to remain solvent.

Figure 1
Net Cash Flows



The shape of the curves also depends on circumstances beyond the debtor's control. Thus, a change in interest rates may produce a downturn where none was anticipated before. Even more importantly, the shape of the cash flow curve is heavily influenced by the policies of the lender. This aspect will be taken up in Section IV.

In general, default will not take the form of an outright repudiation of existing obligations. The rational debtor will, instead, use the threat of repudiation to induce his creditors to negotiate a rescheduling of debt, a lowering of interest rates, and an extension of new loans. The

intended result of such negotiations is a further increase in the cash flow to the borrower, pushing the maximum further up. As Sachs (1982) pointed out, outright repudiation is most likely if the creditors cannot be brought to the bargaining table. This is consistent with the observation that repudiation was frequent when most lending took the form of bonds whose numerous owners could not speak with a common voice. Today, with most lending done through banks, default usually appears in the form of renegotiation (but renegotiation does not necessarily involve default).

IV. Strategic Planning for Creditors

If, with unenforceable contracts, debtors have, loosely speaking, an unlimited demand for loans, what is the appropriate strategy for creditors? To prevent default, creditors have to plan aggregate lending in such a way that the present value of future cash flows to the debtor remains positive forever. This necessary condition for solvency can be formalized as

$$\int_T^{\infty} \left[\frac{dA}{dt} - iA(t) \right] e^{-i(t-T)} dt > 0 \quad (4)$$

for all T . It will be called the solvency constraint.¹⁶ There must never be a moment at which default would pay in this scenario. The larger the present value of the cash flow at any moment, the larger is the safety margin against insolvency.

This constraint imposes no limit on lending at a particular time. Rather, it relates to the shape of the whole lending profile. Specifically, it requires that the cumulative cash flow curve in Figure 1 never pass an all-time maximum. By and large, more rapid debt expansion in the early periods makes default more likely at a later time. The more slowly debt expands in the early stages, the better is the chance of avoiding a crisis. This intuitive argument will be elaborated upon below.¹⁷

The solvency constraint, although necessary, is not sufficient for avoiding a debt crisis. In addition, each creditor must have confidence

that the other creditors will continue to lend on an ever-increasing scale. It is difficult to state precisely what this condition requires. For the present purpose, it is enough to draw attention to two aspects. First, the confidence of creditors will be difficult to maintain unless the path of outstanding debt can be expected to merge into a path of balanced growth. Clearly, an explosive debt profile with a debt ratio rising beyond any limit would not be acceptable, but a debt ratio asymptotically approaching a finite limit may inspire confidence.¹⁸ This idea can be formalized by postulating that the rate of debt expansion eventually should approach the rate of growth.

Besides the expansion rate of debt, the creditors will have to consider the level of debt at a given time. This level determines the size of the net cash flows, positive or negative, relative to the national incomes of debtor and creditor countries along a given growth path. With enforceable debt, the main criterion for judging the optimal level of debt is the condition that the marginal social product of the loan shall be at least as high as the rate of interest. With unenforceable claims, this criterion is clearly not relevant. In fact, with unenforceable claims there are no established criteria for optimal debt levels. The decisive consideration seems to be the share of their portfolios creditors are willing to hold in the form of unenforceable

loans. This will be called the "acceptable" level of debt here. From the point of view of the viability of the credit system, precise determination of the acceptable level is of little importance. The important thing is that it is not subject to marked fluctuations.

A lending strategy along these lines requires coordinated planning.¹⁹ With unenforceable claims, decentralized decision-making is likely to lead to crisis. The reason is that continued debt service on each loan depends crucially on continued net lending by *all* lenders. This creates an externality somewhat analogous to a congestion problem. Even full information of all participants will not, in itself, prevent market failure in such cases. In the absence of concerted action, international lending with unenforceable claims is a game of "devil take the hindmost."

This is probably the basic reason that the familiar country risk indicators performed so poorly in guiding the banks' lending activities.

V. The Growth/Interest Relationship

Considering some particular debt profiles will make the preceding argument more concrete, albeit at the loss of some generality. This section concentrates on the significance of the relationship between interest rates and the rate of economic growth.

To relate the present discussion to that of Section II, it is convenient to begin with an analytically trivial case. Suppose at time $t = 1$, a country with a growth rate g has no foreign debt. With the world interest rate at i , it is now perceived, both at home and abroad, that under the given economic conditions the acceptable level of foreign debt as described in Section IV is $A(1) = A_0 e^g$. It is also perceived that, in the long-run, the rate of debt expansion cannot differ from the rate of the country's growth. There is, therefore, a growth path for acceptable debt:

$$A(t) = A_0 e^{gt}. \quad (5)$$

Suppose at $t = 1$, the country obtains loans in the full amount of $A_0 e^g$, thus "jumping" instantaneously to the growth path. In this case,

Developed by analogy to domestic indicators of creditworthiness, they put the emphasis on the debtor's ability to pay. This is appropriate for enforceable claims because, if a debtor is able to pay, the law can make him willing. With unenforceable claims, however, the ability to pay loses its crucial relevance for solvency because a rational debtor, no matter how able to pay, will not do so unless he can borrow the required funds. The decisive factor, therefore, is the willingness of creditors to lend.²⁰

For the same reason, even drastic improvements in economic conditions, in the debtor's terms of trade, or in his export performance may fail to resolve the debt crisis. If default was in the debtor's interest in adversity, it may still be in his interest in prosperity, no matter how much his ability to pay may have improved. With unenforceable claims, solvency depends on the collective action of the creditors and not on the economic strength of the debtor.

the new net lending each year will be equal to the annual increase in A ,

$$\frac{dA}{dt} = gA_0 e^{gt}, \quad (6)$$

while interest payments on the outstanding debt are

$$iA = iA_0 e^{gt}. \quad (7)$$

The net cash flow, therefore, is

$$c(t) = (g - i)A_0 e^{gt}. \quad (8)$$

If the growth rate exceeds the rate of interest, there is a positive cash flow forever. As long as parameters do not change, there will not be a debt crisis. If the two rates are equal, the situation is just barely viable. With a growth rate lower than the interest rate, the cash flow is forever negative—the borrowing country would immediately default.

Figure 2 depicts this last situation. The two curves represent, respectively, the growth path of new lending and the growth path of interest payments. With $g < i$, the first curve lies below

the second throughout. The shaded area between the curves measures (negative) cash flows.

This case, in all its simplicity, suggests the consequences of an increase in interest rates. Suppose interest rates so far have lain well below growth rates, but that they now rise while growth rates remain constant. Borrowers and lenders would encounter the case in which $i > g$, with the expectation that this will remain so for a long time. With unenforceable debt, the result would be an immediate debt crisis with widespread default. The same result would hold if, at given interest rates, the growth prospects deteriorated.

In reality, the adjustment of debt to a higher acceptable level usually takes time. This idea can be formalized by postulating that debt follows the path given by

$$A(t) = A_0 e^{gt} - \frac{a}{t}, \quad (9)$$

where $a = A_0 e^g$ is set equal to acceptable debt at time $t = 1$, so that $A(1) = 0$. The particular specification of the adjustment term a/t is arbitrary. The important point is that actual debt, beginning at zero, approaches its acceptable level monotonically as shown by the debt curve in Box 1.

New lending is determined by taking the derivative of debt,

$$\frac{dA}{dt} = g A_0 e^{gt} + \frac{a}{t^2}. \quad (10)$$

Initially, at $t = 1$, new lending is far above its growth path, $gA_0 e^{gt}$, but approaches this path in a U-shaped curve without ever crossing it. Interest payments, on the other hand, are

$$iA(t) = iA_0 e^{gt} - i \frac{a}{t}. \quad (11)$$

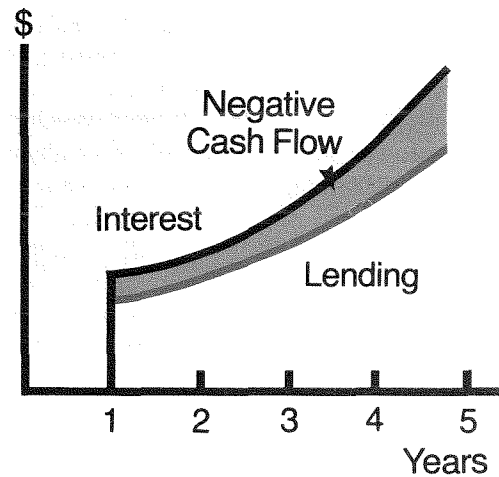
They are initially zero and approach their growth path from below.

The resulting cash flow is the difference between new lending and interest payments,

$$c(t) = (g-i)A_0 e^{gt} + i \frac{a}{t} + \frac{a}{t^2}. \quad (12)$$

The profile of cash flows depends crucially on the relationship between g and i . First con-

Figure 2
Instantaneous
Debt Adjustment



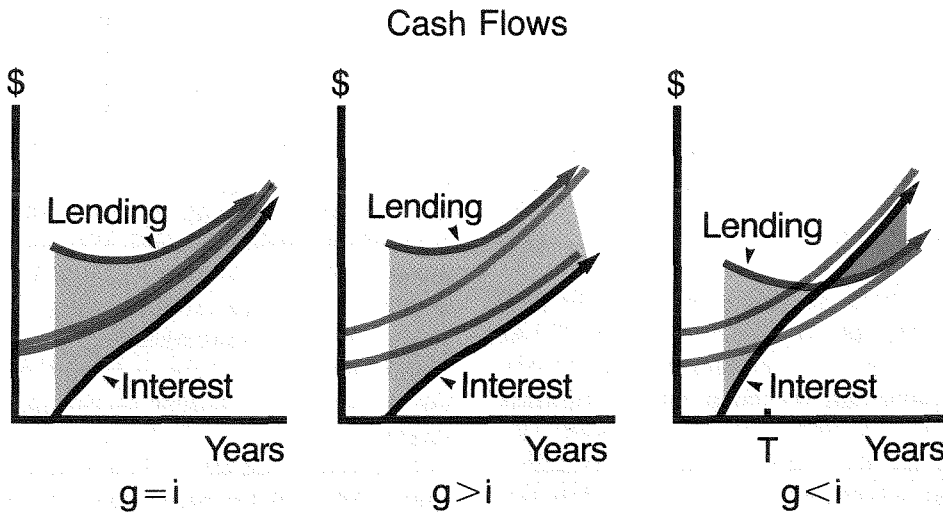
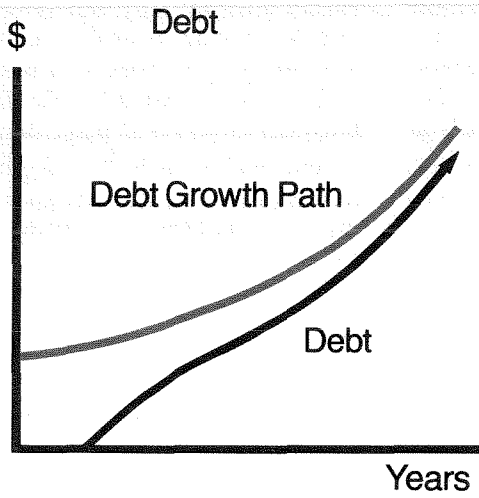
sider the case $g = i$ as illustrated in Box 1. In this case, the growth paths of lending and interest payments coincide. New lending, represented by the blue arrow, approaches this growth path asymptotically from above, whereas interest payments, represented by the black arrow, approach the growth path from below. Cash flows, measured by the vertical distance between the arrows, never become negative although they diminish over time. Their present value, therefore, is positive throughout. The debtor will never find it profitable to default.

This is even more true if $g > i$. In this case, the growth path of lending lies above the growth path of interest payments. As a consequence, the lending curve and the interest curve, after first moving closer together, eventually diverge. Cash flows, after passing a minimum, will increase beyond any finite limit. In this case, even unenforceable claims are quite safe.

In the opposite case, with $g < i$, unenforceable claims are not safe. As shown in Box 1, the growth path of lending now runs below the growth curve of interest payments. New lend-

Box 1

Monotonic Debt Adjustment



- New Lending Growth Path
- Interest Growth Path
- Positive Cash Flows
- Negative Cash Flows

ing, therefore, while initially exceeding interest payments, will sooner or later fall below them. In the initial stages, positive cash flows give debtors a strong motive to service their debt. Eventually, however, the cash flow is bound to become negative forever. With unenforceable claims, therefore, the debtor will find it advantageous to default. This leads to strong advice for the lending banks: do not acquire unenforceable claims unless the borrower's rate of economic growth exceeds the rate of interest. (Clearly, the validity of this conclusion is limited by the assumptions underlying the present analysis.)

What should the creditors' strategy be if

unenforceable claims have already been acquired and the system has reached a point such as T in the diagram for $g < i$? If lenders, under the pressure of increasing default risk, succumb to the temptation to raise interest rates and to curtail lending, they will precipitate the crisis they are trying to protect themselves against. The only way to forestall a crisis seems to be a combination of lowering the interest rate to a level not in excess of long-run growth and continued lending at a level slightly in excess of interest receipts. The cost of such a strategy to the creditors would have to be weighed against the costs of default.

VI. Debt Overshooting

The preceding cases are characterized by a debt path that starts below the acceptable level but approaches that level monotonically from below. Debt is never too high compared to its growth path. In reality, debt may initially expand so rapidly that it overshoots its growth path, and one is inclined to suspect that this is what happened in the late 1970s under the pressure of lenders' competition. It will be shown that this may lead to a debt crisis even though the rate of interest does not exceed the rate of growth.

Suppose creditors permit loans to expand according to

$$A(t) = A_0 e^{gt} + \frac{b-a}{t} - \frac{b}{t^2}, \quad (13)$$

where $b-a > 0$. In this case, the debt profile looks like the debt curve in Box 2. At $t = b/(b-a)$, the curve crosses the debt growth path. It reaches the maximum amount of overshooting at $t = 2b/(b-a)$ and gradually approaches the debt growth path thereafter. There may actually be a phase of absolute decline in debt, but this is not necessary.

To describe the implications of debt overshooting for cash flows, the following discussion is restricted to the case $g = i$. New lending is

$$\frac{dA}{dt} = gA_0 e^{gt} - \frac{b-a}{t^2} + \frac{2b}{t^3}. \quad (14)$$

It can easily be ascertained that new lending is initially, at $t = 1$, above its growth path, which is given by $gA_0 e^{gt}$. At $t = 2b/(b-a)$, the lending curve declines below the growth path, reaching its maximum shortfall compared to the latter at $t = 3b/(b-a)$. Thereafter, it gradually approaches its growth path from below (see Box 2). The important point is that, with overshooting, new lending will eventually run below the growth path.

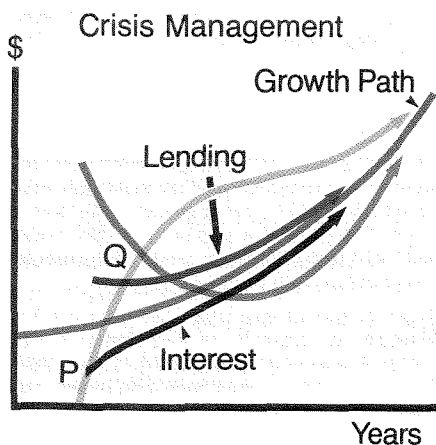
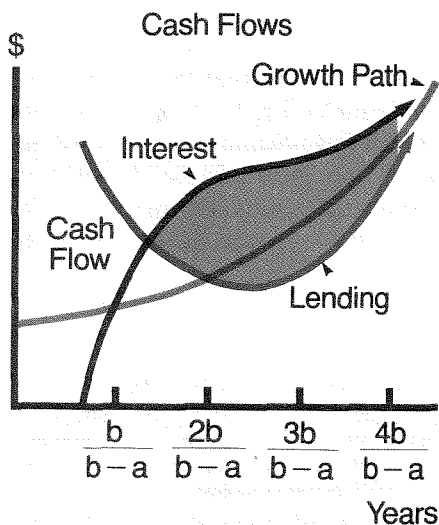
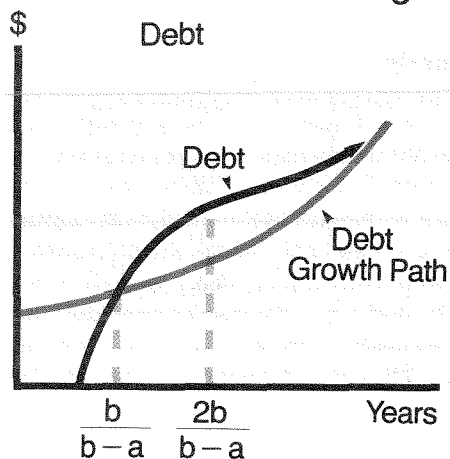
The path of interest payments,

$$iA = gA = gA_0 e^{gt} + g \frac{b-a}{t} - g \frac{b}{t^2}, \quad (15)$$

has the same shape as the debt path with all amounts multiplied by $g = i$. It crosses the debt growth path at $t = b/(b-a)$ and reaches the maximum deviation from the latter at $t = 2b/(b-a)$. With debt overshooting, therefore, the path of interest payments is bound to lie above the growth path of debt except in the early stages.

This means that the cash flow to the debtor, while positive in the early stages, becomes negative and remains negative after the change. With unenforceable claims, overshooting makes a debt crisis inevitable. The stronger the overshooting, as measured by the parameter b , the larger the negative cash flows become and the more acute the debt crisis grows. Extending this reasoning to the case $g > i$ would be

Box 2 Debt Overshooting



straightforward. In that case, a rate of interest safely below the rate of growth, despite overshooting, may avoid a crisis but can lead to one as well. It is evident that with $g < i$, there is no chance of avoiding a crisis.

The policy conclusions suggested by this analysis of debt overshooting, provided the underlying assumptions are regarded as realistic, may be summarized in three rules.

- (1) If, in a country with a growth rate safely above the interest rate, a higher ratio of foreign debt relative to national income is perceived to be acceptable, this ratio should never be permitted to overshoot its acceptable level or a repayment crisis would emerge. Once this rule has been violated, efforts to slow down the excessive debt expansion are likely to precipitate the crisis.
- (2) If debt, even though it is not yet overshooting its acceptable level, is seen to be on an overshooting path (as at P in the crisis management diagram in Box 2), lending should switch to a monotonic (non-overshooting) adjustment path as described in Section V. This would involve an immediate lowering of the rate at which debt is allowed to expand. Gradually, debt would approach its growth path from below. The same is true for interest payments. New lending, in contrast, would be instantaneously reduced, but its future decline also would be reduced and possibly even eliminated. In any case, new lending would remain continuously above its growth path. As a consequence, positive cash flows, and thus solvency, could be maintained. This is illustrated in Box 2, where the light curves represent the original paths whereas the dark curves describe the revised paths.
- (3) Once the crisis has been reached (as at Q in Box 2), a feasible emergency strategy may consist of a combination of a lowering of interest rates to a level clearly below the rate of growth and continuous relending of interest payments. If competently executed over many years, such a strategy, while achieving no overnight mir-

acles, could gradually lead debt back to a sustainable path. Such a strategy may actually be emerging from current interna-

tional negotiations, although perhaps without clear insight into its underlying principles.

VII. Concluding Remarks

Practical men of affairs, bankers, financial writers and policymakers, can often be heard to say, at least in less guarded moments, that, "of course," a large part of the bank loans to governments of developing countries will never, in the aggregate, be repaid. This paper tries to develop the implications of this notion for the viability of the international credit system.

To focus attention on the essential aspects of the problem, the analysis in this article was based on the assumption that concern about the future availability of credit is the *only* deterrent to default. Any other penalties, both legal and extra-legal, were disregarded, as was the ethical maxim that contracts shall be honored. In reality, such penalties may exist and even ethics may have some force. To the extent that they do, the basic assumption of this paper may be one-sided and the conclusions derived from it invalid.

Despite this limitation, the paradigm of unenforceable claims seems to shed light on important aspects of the recent "debt crisis". Over the last decade, banks have acquired vast claims on foreign governments, claims whose enforceability is weak and in many cases virtually nonexistent. In doing so, the banks probably did not fully understand the implications of unenforceability. They also did not recognize the significance of the relationship between a country's economic growth and interest rates. In addition, the apparent profitability of the loans during the early stages seems to have induced the banks to "overshoot" the sustainable debt level. It is hard to believe that the last was not an important contributing factor to the recent debt crisis. From this point of view, the analysis of international debt under the radical assumption of unenforceable claims may perhaps make some contribution toward the prevention of future debt crises.

FOOTNOTES

1. The basic ideas of this paper are summarized in Niehans (1984).

2. Despite the most severe pressures, including partial occupation, vanquished Germany after WWI could not be compelled, on balance, to bear the burden of reparations. Quite to the contrary, by defaulting on her foreign debt, which amounted to roughly twice the cumulative reparation payments, she extracted a vast transfer of resources in her favor (Schmidt, 1934, p. 82 f.).

3. Among the most illuminating contributions are Aliber (1980); Eaton and Gersovitz (1981 a,b); Sachs and Cohen (1982); Sachs (1983); Cline (1983); and Swoboda (1984). Important suggestions can be found in Wallich (1982).

4. Germany in the 1920s presented strikingly similar contours. Before 1929, new foreign lending, with the exception of 1926, far exceeded interest payments and reparations. In 1929, the net transfer became negative, followed by default in the Summer of 1931 (Schmidt, 1934, p. 111).

5. It should be noted, however, that Mexico and Uruguay differ from the group of rescheduling countries in that they enjoyed substantial positive transfers in recent years. Through rescheduling, these countries seem to have increased the net benefits from foreign lending long before these benefits were near the vanishing point.

6. This point is rightly stressed by Aliber (1980).

7. The moral hazard inherent in IMF lending policies is analyzed in Vaubel (1983). Tying the schedule of debt service payments to exports, as is sometimes proposed, would create still another moral hazard.

8. Inflation is not considered in this paper: Nominal rates are thus equal to real rates throughout.

9. If debt in period t is $e^{gt}A_0$, the corresponding cash flow, discounted to the initial period, is $(g - i) e^{(g - i)t}A_0$. The present value of cash flows, therefore, is

$$\int_0^{\infty} (g - i) e^{(g - i)t} A_0 dt = - A_0.$$

10. It may be noted in this context that for a debtor country in balanced growth, the "Golden Rule" for maximum consumption per capita requires a rate of growth in excess of the rate of interest. The reverse is true for a creditor country. (For the world as a whole, unequal growth rates would, of course, be inconsistent with balanced growth.)

11. The optimality of default also has been discussed in the finance literature (for example, in Van Horne, 1976), but there, with enforceable claims, optimality is seen from the point of view of the creditor, while here, with unenforceable claims, it relates to the debtor.

12. Essentially the same criterion for default is used by Eaton and Gersovitz (1981 b, pp. 11–12).

13. Sachs and Cohen (1982) postulate a default penalty in the amount of a certain percentage of gross national product. It is the essence of unenforceability, however, that there are no effective penalties of this sort.

14. This was pointed out by Eaton and Gersovitz (1981 b).

15. Eaton and Gersovitz (1981 a,b) argue that the benefits from future borrowing are higher, and the likelihood of default therefore smaller, the more future income is expected to fluctuate. Their benefit/cost calculus thus relates to the traditional borrowing criteria. From the point of view of the present analysis, these criteria are immaterial. Once the cash flow is reversed, no amount of net benefits in the sense of Eaton and Gersovitz would dissuade a country from defaulting on its unenforceable debts.

16. Solvency, in the present context, is meant in the sense of maintaining debt service. In the sense of positive net worth, the concept has no relevance for unenforceable government debt.

17. Eaton and Gersovitz (1981 b, p. 13) argue that unenforceable loans would be rationed to a sub-optimal level. From the point of view of the present analysis, there is no general reason for this to be the case. Even inefficiently high lending might satisfy the solvency constraint.

18. There is evidently an analogy between this problem and that of "bubbles" in financial markets.

19. This point is forcefully made in De Grauwe and Fratianni (1984).

20. Strictly speaking, with fiat money and floating exchange rates a country is always able to pay its debts because (1) it can print its own money and (2) this money can be exchanged for foreign currency at some exchange rate, although perhaps at very onerous terms (similarly, Sachs and Cohen, 1982, p. 22). A historical example is provided by German reparation payments in 1921, promptly followed by suspension (Bresciani-Turroni, p. 93 f.; Graham, 1930, p. 30 f.; Stolper, et al, 1967, ch. IV).

REFERENCES

- Aliber, Robert Z. "A Conceptual Approach to the Analysis of External Debt of the Developing Countries." World Bank Staff Working Paper, No. 421 (October, 1980).
- Bresciani-Turroni, Costantino. **The Economics of Inflation**. Translated by M.E. Sayers, London: Allen and Unwin, 1937.
- Cline, William R. "International Debt and the Stability of the World Economy." Policy Analyses in International Economics, No. 4. Institute for International Economics. Washington, D.C. (September, 1983).
- De Grauwe, Paul, and Fratianni, Michele. "The Political Economy of International Lending." International Economics Research Papers, No. 42. Catholic University of Louvain, 1984.
- Eaton, Jonathan, and Gersovitz, Mark. "Debt with Potential Repudiation: Theoretical and Empirical Analysis." Review of Economic Studies, Vol. 48 (2). 1981 a.
- . "Poor-Country Borrowing in Private Financial Markets and the Repudiation Issue," Princeton Studies in International Finance. Vol. 47 (June 1981 b).
- Graham, Frank D. **Exchange, Prices and Production in Hyper-Inflation: Germany 1920–1923**. Princeton: Princeton University Press, 1930.
- International Monetary Fund. **Recent Multilateral Debt Restructurings with Official and Bank Creditors**. Occasional Paper, No. 25 (December, 1983).
- McDonald, Donogh, C. "Debt Capacity and Developing Country Borrowing: A Survey of the Literature." International Monetary Fund Staff Papers. Vol. 29, No. 4 (December, 1982).
- Niehans, Jürg. "Strategic Planning with Unenforceable Claims." International Conference on Strategic Planning in International Banking. Rome, May, 1984.
- Sachs, Jeffrey, and Cohen, Daniel. "LDC Borrowing with Default Risk." Working Paper. No. 925. National Bureau of Economic Research, 1982.
- Sachs, Jeffrey. "LDC Debt in the 1980's: Risk and Reforms." In **Crisis in the Economic and Financial Structure**. Edited by Paul Wachtel. Lexington, Massachusetts: Lexington Books, 1982.
- . "Theoretical Issues in International Borrowing." Working Paper No. 1189, National Bureau of Economic Research, 1983.
- Schmidt, Carl T. **German Business Cycles 1924–1933**. New York, National Business of Economic Research, 1934.
- Stolper, Gustav.; Häuser, Karl.; and Borchardt, Knut. **The German Economy 1870 to the Present**. Translated by Toni Stolper. New York: Harcourt, Brace, 1967, Chapt. IV.
- Swoboda, Alexander K. "Debt and the Efficiency and Stability of the International Financial System." Unpublished, 1984.
- Van Horne, James C. "Optimal Initiation of Bankruptcy Proceedings by Debt Holders," Journal of Finance. Vol. 31, No. 3, 1976.
- Vaubel, Roland. "The Moral Hazard of IMF Funding," The World Economy. (September, 1983).
- Wallich, Henry C. "A U.S. Regulator's View of the Debt Rescheduling Problem." **World of Banking**. May/June 1982.
- World Bank, **World Debt Tables—External Debt of Developing Countries, 1983–84, and First Supplement**. Washington, D.C. 1984.