PRINCETON STUDIES IN INTERNATIONAL FINANCE No. 47, June 1981

# Poor-Country Borrowing in Private Financial Markets and the Repudiation Issue

Jonathan Eaton and Mark Gersovitz

INTERNATIONAL FINANCE SECTION DEPARTMENT OF ECONOMICS PRINCETON UNIVERSITY

# PRINCETON STUDIES IN INTERNATIONAL FINANCE

This is the forty-seventh number in the series PRINCETON STUDIES IN INTER-NATIONAL FINANCE, published from time to time by the International Finance Section of the Department of Economics at Princeton University.

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> PETER B. KENEN, Director International Finance Section

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# CONTENTS

1	INTRODUCTION	1
	Focus of the Study Experience in the Markets	1 3
2	PRIVATE LENDING WITH POTENTIAL DEFAULT: AN ANALYTIC FRAMEWORK	8
	The Demand for Credit The Supply of Credit	8 10
	Estimating the Demand for and Supply of LDC Debt LDC Borrowing and Reserve Holding Bank Loans vs. Bond Issues	16 22 24
3	GUIDELINES FOR RISK ANALYSIS	27
4	PUBLIC POLICY BY LENDER COUNTRIES	32
	Retaliation Insurance The Interaction of Private and Public Lending	32 34 35
5	CONCLUSIONS	37
	REFERENCES	38

# LIST OF TABLES

1.	Total Long-Term Debt to Private Creditors, 96 Countries, 1972-78	А
2.	Total Disbursed and Undisbursed Debt to Private Creditors, 1978	5
3.	Defaults on the American Portion of Latin-American Dollar Loans, Dec. 31, 1935	6
4.	Parameter Estimates of Public Indebtedness of 45 LDCs to Private Creditors, 1970 and 1974	18
5.	Countries in the Sample and the Probability That the Supply-Constrained $(\overline{D})$ Regime Obtained, 1970 and 1974	21
6.	Parameter Estimates of Reserve Demand by 45 LDCs, 1970 and 1974	24
7.	Logit Parameters for Probability of Rescheduling	30

# 1 INTRODUCTION

## Focus of the Study

Large differences between rich and poor countries in the relative abundance of capital imply large differences between them in the rate of return on capital. Such differences should provide a strong incentive for private agents in the more developed countries to make financial and physical investments in the developing countries that would tend to align quantities of capital relative to other factors and the rates of return.

Despite the theoretical basis for this view, striking differences remain in the availability of capital in different parts of the world. We believe that a major reason for this continued disparity is the fear on the part of lenders that the governments of developing countries will repudiate debt and expropriate physical assets. These threats to foreign investment are a fundamental characteristic of the interdependence between rich and poor countries.

Much concern about the extent of these impediments to resource flows has been expressed in recent discussions of the "recycling" of petrodollars.1 Large increases in oil prices in 1973 and again in 1979 affected adversely the current-account deficits of the less developed countries (LDCs)-directly, by increasing their oil-import bills, and indirectly, by inducing recessions in industrial countries and a slackened demand for LDC exports. Deposits by OPEC members with major commercial banks increased dramatically at a time when the demand for credit in industrial countries was weak. Although commercial-bank lending to poor countries had begun to expand in the late 1960s and continued to grow throughout the 1970s, the two OPEC price hikes generated considerable discussion about the "capacity" of the private banking system to channel OPEC surpluses to finance LDC deficits. Many commentators and policy makers have expressed concern that commercial banks have "overextended" themselves in their lending to developing countries, which may be unable or unwilling to fulfill the terms of the loan agreements (see e.g. Rowan, 1976, and Wallich, 1978).

We would like to thank Carlos Díaz-Alejandro for his comments on the manuscript.

<sup>&</sup>lt;sup>1</sup> Among the recent literature on this topic are the following volumes: Abbott (1979), Angelini *et al.* (1979), Aronson (1977), Donaldson (1979), Franko and Seiber, eds. (1979), Friedman (1977), Goodman, ed. (1978), and Wionczek, ed. (1978 and 1979). Two earlier volumes also deserve mention: Avramovic (1958) and Avramovic and Gulhati (1960).

The voluntary element in nonrepayment is hard to define. Unless debtservice obligations exceed the maximum foreign-exchange revenue the debtor could realize through all conceivable means, nonrepayment constitutes a decision to use resources for domestic purposes rather than repayment. Even in the unlikely event that the world market value of all national resources does not meet obligations, the decision was voluntarily made earlier to borrow an amount that perhaps could not be repaid.

There are various terms to denote deviations from the loan agreement. In our discussion, a *repudiation* of a loan is the explicit refusal by the *borrower* to pay interest and/or principal as originally agreed. A loan is in *default*, however, when a *creditor* declares that the borrower has failed to comply with some stipulation of the loan agreement. Unlike a repudiation, a default may be temporary, both lenders and borrower expecting a return to behavior consistent with the loan agreement. Even though a loan is not legally in default until a creditor has declared it so, we follow common usage in referring to a borrower as "defaulting" on a loan when it fails to honor the agreement. Finally, a *rescheduling* is an explicit agreement between lenders and borrower to modify the schedule for payment of interest or principal.

In Chapter 2, we explain how the possibility of debt repudiation affects the functioning of international financial markets and the development prospects of LDCs.<sup>2</sup> We conclude that even if repudiation rarely or never occurs, the threat of repudiation may still severely limit capital mobility. To explain the operation of private lending to poor countries, it is necessary to examine factors affecting both the demand for credit by poor countries and the supply of loans by commercial lenders. The supply of funds to poor countries depends implicitly on the sanctions that lenders are able to impose in the event of default and the extent to which a borrower would be punished by such sanctions. The maximum amount that private lenders are willing to lend to one country depends on the ability of lenders to deter default and thus on the effectiveness of sanctions. This credit ceiling constitutes a formal definition of the "capacity" of the international capital markets to finance the current-account deficit of a particular country, a notion that arises frequently in discussions of the recycling of OPEC surpluses but has not been given precise meaning. This possibility of credit rationing has implications for the relationship between the borrowing behavior and the reserve-holding behavior of LDC governments.

Our theoretical framework identifies the country characteristics that determine the size of the credit ceiling. The econometric implementation

<sup>&</sup>lt;sup>2</sup> Much of the framework elaborated in Chapter 2 was originally presented in two earlier papers (Eaton and Gersovitz, 1980 and 1981).

of this theory classifies countries according to whether or not they are credit-constrained and provides a test of the predictions of the theory. A feature of our econometric analysis is its ability to make quantitative estimates of financing capacities.

The supply of funds to developing countries depends in part on the cohesion with which private lenders deal with sovereign governments and on the availability of information to market participants. Consideration must therefore be given to the relationship among international organizations (the International Monetary Fund, the World Bank, and the Bank for International Settlements), the monetary and commercial authorities of lender countries, and the private international capital markets. The international organizations play an important role by providing information to market participants and by influencing the behavior of both lenders and borrowers in order to minimize the possibilities of repudiation and default. The first function is especially important in international capital markets. Because these markets are likely to be characterized by credit rationing, interest rates do not fully reflect all the information important to lenders. In particular, an individual lender will need to know the total debt of the potential borrower, regardless of the interest rate offered on a loan. Otherwise, the lender cannot ascertain the strength of the borrower's incentive to violate loan commitments.

In Chapter 3, we examine guidelines for risk analysis by lenders. The financial press frequently refers to the assessment of country (or crossborder) risk and conducts debates over appropriate rules of thumb to assure prudent investment (Sofia, 1979). Using our own theoretical framework and the historical record, we assess the attempts of researchers to develop statistical models to predict defaults on the basis of past experience.

Chapter 4 covers government policy in the rich countries toward risky foreign lending by their citizens. The United States, for instance, has developed legislation providing for automatic retaliation triggered by default or expropriation and various schemes for the insurance of foreign investment by its citizens.

#### Experience in the Markets

Comprehensive information is not publicly available on the categories of debt owed by individual developing countries in each year during the recent past. Instead, there are several sources of information, each possessing strengths and weaknesses (BIS, 1979).

In its annual publication World Debt Tables, the World Bank provides data on the long-term public external debt of most developing countries. This is the debt that is owed to nonresidents, is repayable in foreign currency, goods, or services, and has an original or extended maturity of over one year. It is an obligation of either a public debtor (national government, political subdivision, or agency) or a private debtor but with repayment guaranteed by a public debtor. The debt<sup>e</sup> is classified by the type of creditor holding it, and several types of official and private creditors are identified. All information is disaggregated into disbursed and undisbursed. Although this reporting system provides no information on short-term debt and little information on private debt not publicly guaranteed, it does provide the most complete information available for the entire 1970s decade.

Using the data provided by the World Bank system, the magnitude of total long-term LDC debt to international financial markets is calculated in Table 1 in both nominal and real terms. (The definition of real debt using the U.S. GNP deflator is most relevant as an index of the real resources potentially at risk of repudiation. It is less relevant as a measure of the debt burden viewed from an LDC perspective.) Not only is the debt large, but it has been growing rapidly. It is clear that recent rates of growth cannot be maintained indefinitely and are probably unsustainable over any very long period.

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Year	Nominal Debt	Growth Rate	Real Debt <sup>a</sup>	Growth Rate
1972	\$ 32.3	······	\$ 32.3	
1973	42.7	32.0%	40.4	24.9%
1974	57.8	- 35.4	49.8	23.5
1975	73.4	27.0	57.7	15.8
1976	97.1	32.3	72.5	25.7
1977	126.1	29.9	89.3	23.1
1978	161.4	28.0	106.1	18.9

TOTAL LONG-TERM DEBT TO PRIVATE CREDITORS, 96 COUNTRIES, 1972-78 (dollar figures in billions of U.S. dollars)

<sup>a</sup> Calculated by using U.S. implicit GNP deflator (1970 = 100). Includes undisbursed debt.

SOURCES: World Bank, World Debt Tables, Washington, 1979, p. 46; U.S. Dept. of Commerce, Statistical Yearbook of the United States, Washington, 1978, and Survey of Current Business, Washington, 1979.

The growth of debt would not be surprising or worrisome if it were primarily due to an increase in the number of participants in the market. In that case, growth would be mostly at the extensive margin. The distribution of debt among poor countries would become increasingly uniform, because countries with low levels of debt at the beginning of the period would have the fastest-growing debts. Furthermore, as more and more countries caught up to the higher debt levels of the earlier borrowers, growth in total debt would automatically taper off. But this has not been the pattern. The borrowers of importance in the early 1970s continue to be the most important borrowers, and the distribution of debt has not become more uniform. In fact, it has become slightly less uniform according to Gini coefficients comparing distributions of debt to distributions of GNP. The coefficient of 0.448 in 1976 rose to 0.494 in 1978.<sup>3</sup> LDC borrowing is actually the story of a few middle-income developing countries.

Table 2 records the distribution of debt across countries in 1978. While many developing countries are sizable borrowers, the concentration of debt is pronounced. Two countries (Brazil and Mexico) have together

## TABLE 2

TOTAL DISBURSED AND UNDISBURSED DEBT TO PRIVATE CREDITORS, 1978 (in millions of U.S. dollars)

Africa South of Sahara		East Asia d	and Pacific
Cameroon	\$ 688.4	Indonesia	\$ 5,844.0
Gabon	957.8	S. Korea	9,935.4
Ivory Coast	3,011.3	Malaysia	2,224.9
Nigeria	1,817.1	Philippines	3,233.3
Sudan	1,095.5	Singapore	809.6
Zaire	1,755.7	Taiwan	2,327.4
Zambia	706.8	Thailand	858.4
Other	3,033.8	Other	262.9
	\$13,066.4		\$25,495.9
Latin America	and Caribbean	North Africa ar	nd Middle East
Argentina	\$ 5,528.5	Algeria	\$15,693.3
Bolivia	963.1	Egypt	1,764.2
Brazil	22,003.3	Iran	8,764.1
Chile	3,444.1	Iraq	584.3
Colombia	1,006.6	Morocco	3,354.7
Costa Rica	638.9	Tunisia	1,071.3
Ecuador	1,365.2	Other	1,062.1
Mexico	21,675.9		\$32,294.0
Panama	1,604.4		. ,
Peru	3,859.8	South	Asia
Uruguay	731.8	Aggregate	\$1,285.5
Venezuela	6,800.3	00 0	
Other	2,260.9	Total	\$144,024.3
	\$71,882.5		

SOURCE: World Bank, World Debt Tables, Washington, 1979, pp. 46-47.

<sup>3</sup> The 89 countries covered by the coefficents were the ones for which the World Bank's World Debt Tables (1979, pp. 46-47) and World Bank Atlas (1975 and 1979) provided data on long-term debt to private creditors (including undisbursed) and total GNP in U.S. dollars for both 1972 and 1978. Countries were ordered by the ratio of debt to GNP to form the Lorenz curve, and the percentage of the 89 countries' total debt accounted for by any subgroup of countries was plotted against the corresponding percentage of the 89 countries' total GNP.

borrowed slightly in excess of a quarter of the total. Five other countries (Algeria, Indonesia, Iran, South Korea, and Venezuela) account for another third of the total.

Past experience with international lending, especially to nonindustrial countries, indicates that widespread default by sovereign governments is not at all an impossibility.<sup>4</sup> Prior to 1929, Madden and Nadler (1929) could argue that most defaults were caused by wars, revolutions, and other political upheavals; severe economic depressions caused by such factors as crop failures or shortfalls in mineral production rarely led to default. This view, however, was clearly disproved by the events of the Great Depression, when most governments of poor countries defaulted on their international debts. Table 3 gives the default status of the American-held portions of Latin-American dollar loans as of 1935. Actually, there was some resumption in payments on these loans, so that the amounts reported in Table 3 do not represent outright repudiations.<sup>5</sup>

#### TABLE 3

Defaults	ON THE AMERICAN PORTION OF LATIN-AMERICAN
	Dollar Loans, Dec. 31, 1935
	(dollar figures in millions of U.S. dollars)

Country	Amount Outstanding Dec. 31, 1935	In Default as to Interest	Percentage in Default
Argentina	\$ 334	\$ 79	24%
Brazil	310	289	93
Chile	236	236	100
Colombia	144	144	100
Cuba	115	72	63
Mexico	139	139	100
Peru	74	74	100
All other	171	140	82
Total	\$1,523	\$1,173	77

SOURCE: Lewis (1938, p. 414).

Between the 1930s and the 1970s there was not much borrowing by LDC governments from private lenders. Lending to these governments was by developed-country governments and multilateral agencies. Some

<sup>5</sup> The history of these loans is documented in the various bulletins of the Institute of International Finance of New York University.

<sup>&</sup>lt;sup>4</sup> Important sources on the last great episode of lending to poor countries (in the 1920s and 1930s) are the annual reports of the Council of the Corporation of Foreign Bondholders in London, the annual reports of the Foreign Bondholders Protective Council in New York, the occasional bulletins of New York University's Institute of International Finance, Lewis (1938 and 1948), Madden and Nadler (1929), Madden *et al.* (1937), Mintz (1951), Patterson (1928), and Winkler (1933).

borrowers have defaulted on portions of their debts to these official lenders, and the subsequent debt rescheduling and renegotiations are documented by Bittermann (1973). The only recent defaults on private loans involved Zaire, which was settled fairly easily (Greayer and Moore, 1976); North Korea, which, unresolved to the satisfaction of lenders, has resulted in that country's inability to borrow; and Iran, which is unresolved at this time. Against this background, we turn in the next chapter to factors deterring defaults and to ways in which these disincentives can break down.

# 2 PRIVATE LENDING WITH POTENTIAL DEFAULT: AN ANALYTIC FRAMEWORK

## The Demand for Credit

We begin by analyzing the determinants of a country's demand for credit. In the next section we examine the supply of credit, focusing in particular on the sanctions that lenders might impose on defaulters and the implications for the organization of the market.

On the assumption of eventual repayment, a number of motives for borrowing can be ascribed to individuals and to countries. One purpose of borrowing is to divorce the level of consumption from the level of income at any moment, holding the level of savings constant. Countries will be most motivated to borrow when current income is low relative to expected future income. Thus a country anticipating a high rate of growth in income over a long period in the future is not likely to want to wait to increase its consumption. Instead of letting consumption grow at the same high rate as income, this type of country would rather consume relatively more in the present and less in the future by borrowing now and repaying later. Even a country without good long-term growth prospects is likely to use borrowing to smooth consumption if its income is highly variable. In this case, the country will want to borrow in periods when income is below average and to repay in periods when income is above average. In all these situations, borrowing is motivated by the strong human desire to isolate the level of consumption from intertemporal differences in the level of income. (Of course, the total discounted value of income must still constrain the total discounted value of consumption.) This reason for borrowing can be called the consumption motive.

In describing the consumption motive, we ignored the way in which income is generated. If income is produced by using the services of physical capital, then differences between the marginal product of the domestic endowment of capital and the rate of interest in world markets provides a second incentive for borrowing. In these circumstances, increasing the capital stock through borrowing will increase income above the interest charges incurred on the debt. The increased income could be consumed or saved, depending on the considerations mentioned above in connection with the consumption motive. Those countries with the lowest initial endowment of capital will be the largest debtors. This reason for being in debt can be termed the *production or investment motive*.

Sudden changes in the level of absorption (consumption plus invest-

ment) can be very costly, and the ability to slow down the adjustment of this variable will make it much less painful. For instance, the large and unexpected increase in oil prices sharply lowered the incomes of many LDC oil importers. A rapid cutback in investment might have led to the abandonment of many almost completed projects. Borrowing eased considerably the transition to a lower level of investment. We term this reason the *adjustment motive*.

Debt can also provide a means of undertaking transactions. Traditionally, in both the domestic and international economies, the media of exchange have been assets of transactors, usually either commodities like gold or liabilities of governments or banks (and, in the case of Special Drawing Rights, of the International Monetary Fund). As the use of credit cards in the domestic economy has shown, however, transactions can be performed efficiently by using media of exchange that are individual liabilities. Thus individuals might want to borrow to economize on transactions costs (e.g. use a credit card) even if they had no desire to increase current consumption at the expense of future consumption. In the international economy, suppliers' credits are a medium of exchange of this type. This reason for borrowing can be called the *transactions motive*.

Finally, countries are often large debtors and hold large reserves at the same time. Saxe (1978, p. 34) and others argue that much of the borrowing in 1976 and 1977 was for the purpose of accumulating reserves. If a country borrows to finance its reserve holding, its gross foreign indebtedness can rise without the development of a current-account deficit. Several reasons for such borrowing can be adduced.

International borrowing often requires large costs to obtain information and negotiate contracts. These costs may not vary markedly in absolute terms with the size of the loan. Thus a country that expects a cyclical pattern of income but wishes a smooth path of consumption or that wants to ease the adjustment of absorption to a permanently lower level of income may borrow a large amount and hold the funds in reserves. The reserves can then be drawn down slowly. In this way, the high costs of frequent borrowing are avoided.

Developing countries may fear that conditions for borrowing in the future will be less advantageous than at present. In this case, too, it is prudent to borrow now and hold reserves. It should be noted that current practice for many loans, especially syndicated Eurocredits, is to specify interest payments as a markup over the short-term London interbank rate (LIBOR). With this type of floating-rate loan, early borrowing cannot protect against future rises in the base rate. It can, however, protect against the possibility of future increases in the markup or decreases in the availability of credit if the country is potentially creditconstrained. Reasons for credit ceilings in international lending are discussed next.

## The Supply of Credit

A central issue in identifying the determinants of the supply of credit to developing countries is an understanding of the borrower's incentives to repay. There is an important distinction between the bankruptcy of an individual economic agent in a national economy and default by a government. In the case of an individual agent, bankruptcy usually reflects negative net worth. Bankruptcy laws define an institutional framework establishing this condition, and creditors are compensated to the extent that assets allow. Domestic bankruptcy laws prevent an agent from shedding liabilities while maintaining full control of assets. The situation is quite different in international lending, where creditors do not enjoy institutional protection to the same degree, if at all, and debtors may therefore be able to repudiate their obligations without losing control of their assets.

In this section, we consider how various sanctions can deter defaults and enable lenders to extend credit to developing countries, and how a breakdown of these sanctions can result in default. After a brief review of the limited legal and political mechanisms for obtaining repayment, we focus on the costs to a borrower of being excluded from future borrowing. Characteristics of the borrower indicating the potential harmfulness of an embargo must be considered by lenders. Thus these characteristics affect the supply of credit as well as the demand.

Legal recourse against a defaulting government is extremely limited. The creditor can contemplate a suit in the courts of the borrowing country, but these courts may not entertain such a suit. Even if the suit is successful, collection still poses a formidable problem.

It is also very difficult to obtain redress in the courts of the lender's country. They will often decide not to hear this type of case, choosing to uphold the doctrine of sovereign immunity. Their position may be based on the notion of the mutual equality and independence of states, or they may feel that this type of case undermines relations between states.<sup>1</sup> Even in the case of a favorable judgment, it is difficult to solve the collection problem, since there must be sufficient assets at hand to seize. Experience with Iran during the last quarter of 1979 indicates, however, that banks may successfully impound balances held abroad by

<sup>1</sup> Many of the legal issues are discussed by Lillich (1965, esp. Chap. 1) and by Delupis (1973).

a sovereign debtor to be offset against debts owed to the banks (Field and Adam, 1980).

A much more extreme course for lenders attempting to obtain repayment is to seek political or military intervention on their behalf by their own government. Aside from the fact that it may not be within the power of the lenders' government to secure repayment by these means, prospects for mobilizing the government on the creditors' behalf may be slim. The basic difficulty is that the costs of undertaking this type of action are borne by the country at large, and the government may be deterred by the consequent domestic opposition to intervention. In their review of the pre-1929 experience, Madden and Nadler (1929, p. 333) concluded that, even in this earlier period, military intervention by creditor countries to secure repayment was rare. The threat of intervention, however, could be sufficient to establish foreign control over the finances of a debtor state.

Whatever the other circumstances under which intervention might be considered, by the 1930s the United States had rejected the use of force to support American creditors and had little inclination to use other forms of coercion (Madden *et al.*, 1937, Chap. 13). At present, the use of force to reverse defaults would seem highly unlikely, but other forms of governmental retaliation are more institutionalized than at the time of the Great Depression defaults. In Chapter 4, we discuss specific forms of retaliation by creditors' governments and their role in deterring defaults.

Even without legal or coercive methods of enforcing repayment, private creditors can take a number of retaliatory actions to penalize defaulting debtors. Among the most important of these penalties is exclusion from future borrowing.<sup>2</sup> Of course, the threat of future exclusion will not deter a country from defaulting if it plans to borrow on an uninterrupted basis for a period of time with no intention of borrowing thereafter. Such a government will be eager to borrow so long as net flows are positive, but if net repayments are ever required, it will repudi-

<sup>2</sup> The extent to which lenders formally enforce a credit embargo against a defaulter may vary. Strange (1979, p. 13) reports that the creditors involved in "neardefaults" by Brazil and Argentina in the early 1950s organized themselves into creditor clubs (the Hague Club of 1955 and the Paris Club of 1956) "in which, having sustained very heavy losses, they put strict limits on the defaulters' future access to trade credit." Odell (1979) documents the difficulty the United States had in enforcing a credit embargo against Chile in the period 1970-72 after Chile announced a unilateral debt rescheduling. However, as the Chilean economic situation deteriorated, its government was reportedly unable to get financial help even from the Soviet Union until its credit from the World Bank had been reopened (Odell, 1979, p. 269). ate its debts. Rational lenders, anticipating this behavior, will never lend to this type of country.

It is unrealistic, however, to assume that the typical country will be a one-time borrower. Countries generally experience periods of high and low income relative to trend, and this fact plays a crucial role in determining the amount a country can safely be lent. If it has not defaulted, a country can borrow in bad periods with the obligation to repay in good periods. To consider an extreme example for expository purposes, a country may borrow from international markets during a crop failure and repay in periods of ample production. The government chooses to repay because it knows that it may face another famine at some time in the future during which it will again desire to borrow. Should the country refuse to repay, private lenders may embargo future loans to the debtor. At this point in the discussion, we assume that this embargo lasts forever, although some consideration is given in the subsequent analysis to the determinants of the period of exclusion. A country refusing to repay is therefore unable to smooth its absorption across periods of varying income by international borrowing.

A country has other means, however, of smoothing the variability of its income. To the extent that these options are available, it can carry a lower level of debt and not repudiate. Among the possible alternatives are holding international reserves or investing in foreign financial assets. But a government in default will probably find that these financial means of smoothing consumption are severely circumscribed, since assets held abroad may be subject to confiscation. The government may therefore be restricted to non-interest-bearing reserves such as gold. Another alternative would be physical investments that help to smooth income. For instance, a country exposed to crop failure, as in the earlier example, might build irrigation dams. Despite these alternatives, it is still probably true that smoothing through international borrowing has benefits and that exclusion from this option represents a penalty.

An important determinant of the cost of exclusion is the variability of a country's income stream. Assume that a country has an income that alternates between a low and a high value indefinitely. The country borrows in a period of low income with an obligation to repay in the next period of high income. If repayment does not occur, no further borrowing is possible. The motive for borrowing is the net gain in utility obtained by consuming more evenly than the income stream allows; a smooth consumption path is more desirable than a variable one if the marginal utility of consumption is falling.

In the period of high income, when repayment is due, the country can consume more if it defaults. This benefit of default increases with the size of the loan that must be repaid. The cost of default is the inability to smooth future consumption. The present value of access to credit markets therefore rises with the variability of income. As a consequence, lenders can assign to the country a maximum safe level of debt such that the total benefits of default (which increase with debt) just equal the total costs of default. The credit ceiling determined in this way rises with the variability of income.<sup>3</sup> Thus the theory of a market where repayment is ensured by the penalty of future exclusion suggests a situation of potential credit rationing. This approach provides a rationale for the use of credit ceilings by bankers and suggests one possible determinant of these limits—the variability of income. There is considerable direct evidence (Angelini *et al.*, 1979) that banks explicitly set credit ceilings (often called "country limits"). Breckenridge (1978, p. 61) reports that Morgan Guaranty established such limits in the late 1960s.

So far, we have assumed that the borrower's income varies in a regular and perfectly predictable way. In this case, rational and fully informed lenders will always set the credit ceiling so that it is never to a debtor's advantage to default. Although defaults will never be observed under these assumed circumstances, the *threat* of default will limit the amount that any country can be lent. If the amount a country wishes to borrow, even if it has to repay, exceeds this ceiling, the country will be creditconstrained. In this case, its inability to guarantee repayment actually reduces its welfare. If more is lent than the credit ceiling, it will always be in the country's interest to refuse repayment. Only if lenders misperceive a borrower's characteristics, for instance the amount it has borrowed from other sources or its marginal utility of consumption, will default occur.

In actuality, however, a country's income varies in an uncertain fashion, and the possibility of default must be considered. Under conditions of uncertainty, a country may experience sequences of poor income performance. Debt contracted at the beginning of the sequence may then come due while low incomes persist. Other things equal, a country will be most tempted to default when income is low and the marginal utility of income is high. We have argued that countries anticipating high income variability are unlikely to default, so as to maintain access to credit markets. If it can occur at all, however, default is most likely in periods when income is low relative to trend and hence the marginal utility of income is high. Thus, in a situation where default is possible, an increase in variability has an ambiguous effect on the credit ceiling, raising it by increasing the penalty of exclusion but lowering it by increasing the probability of low incomes (see Eaton and Gersovitz, 1981).

<sup>3</sup> This model is developed in detail in Eaton and Gersovitz (1981).

If a country experiences a series of low incomes, lenders can adopt one of several responses. They can set the credit ceiling so low that the country will always choose to repay regardless of its income performance in the years when net repayment is due. In this case, it is possible that very little can be lent.

Alternatively, creditors can demand repayment after a certain number of periods, regardless of income performance and with the knowledge that a default will occur if income happens to be low on the due date. In this case, a risk premium will be charged so that the lender is indifferent between a loan to a country that may refuse repayment and a safe domestic loan. This type of arrangement characterizes the contract embodied in a publicly issued bond, where no provision is made for postponing the service of the debt if the debtor experiences a low income.

A third option for lenders is to refinance the debt if the country experiences low income, without future exclusion from borrowing. Rescheduling postpones repayment to periods when income has returned to normal levels. This policy requires that lenders have enough information to distinguish between the occurrence of low and high incomes and between exogenous shortfalls in income and chronic economic mismanagement or other factors within the country's control that impair longrun performance. In the latter case, lenders will want to threaten an end to refinancing (roll-over) of the debt and permanent exclusion from credit markets in order to force the government to repay its debt. If lenders are unable to threaten any sanctions, the situation effectively becomes one where the country refuses to pay but is not penalized. In this case, lending becomes impossible. Thus there is a cost to making loans in these markets associated with monitoring economic conditions in borrowing countries and the economic performance of their governments.

Once the possibility of default is recognized, it is of interest to ask if there are conditions under which many countries are likely to default at the same time. Simultaneous defaults would pose the severest hardships for lenders and raise the specter of financial panics and collapses in their countries. If LDC incomes are highly correlated, simultaneous defaults are likely, because many countries would experience low incomes at the same time. Furthermore, the common interests of the developing countries caused by their similar economic circumstances might help to give them a political cohesion that could make default less costly to them. On the other hand, if their economic performances are mutually independent, defaults or problem cases would occur at different times, so that they would be more easily absorbed by the international financial system. If the conditions precipitating default are independent from debtor to debtor, there is potential for diversification among borrowers.<sup>4</sup>

The fact that lenders can reduce default risk by spreading their loan portfolio across countries suggests that lenders will hold a diversified portfolio of loans.<sup>5</sup> Yet banks in a particular country seem to specialize by area in their lending. In particular, U.S. banks tend to lend in Latin America, while European banks concentrate on African and Eastern European countries. D'Arista (1979, p. 65) reports that in 1977 U.S. lending banks had more than 10 per cent of their combined capital committed to Brazil and Mexico.

One reason for this lack of diversification may be that loans to only a few countries even in the same geographic zone are adequate to lower risk substantially. For instance, Brazil and Mexico have had very different export experiences (Eaton and Gersovitz, 1980). A second reason may be the information requirements discussed above. Economies of scale in monitoring economic conditions and government performance may lead to a concentration of bank lending to countries where the fixed costs of monitoring have already been incurred. If more of the monitoring responsibility were placed in the public domain, it would be easier for individual banks to diversify their loan portfolios, thereby facilitating the flow of resources to the developing countries. For this reason, the IMF should increase its surveillance of economic performance and make this information as available as possible. A third reason may be in the varying degrees of influence a lending bank's government has in different regions. The U.S. government may be able to impose more credible and harmful sanctions on a defaulter in Latin America, for instance, than on one in southern Asia.

We argued in our discussion of the demand for loans that countries with either a highly variable income or one that was expected to grow over time would have a greater than average demand for credit. We have argued above that income variability may contribute to an increase in the

<sup>4</sup> In Eaton and Gersovitz (1980), we present evidence from different LDCs on the pairwise correlation of exports, an important component of income performance. There does not seem to be a high intercorrelation among LDC exports. Furthermore, the exports of the large borrowers of Table 1 are not relatively more correlated than those of the typical LDC.

<sup>5</sup> In the United States, a certain amount of diversification is enforced by law. National banks may not lend more than 10 per cent of capital to any single borrower. This provision is enforced by the Comptroller of the Currency. The limit for non-national banks in New York is 25 per cent. D'Arista (1979, p. 65) reports that Morgan Guaranty, not a national bank, may have generated a great deal of concern in the office of the U.S. Comptroller of the Currency with a loan to Italy that far exceeded the 10 per cent limit and was close to the 25 per cent limit. supply of credit as well. Long-term income growth, on the other hand, may not: rapidly growing countries may have less incentive to repay loans, since they do not expect to enter the market again after the period in which a net repayment of loans is necessary.

Further penalties are associated with disruption in the trade of a defaulting country. Thus countries that are excluded from international financial markets not only have problems smoothing their income streams but also have difficulty effecting international transactions. Creditors may be able to interfere directly with a borrower's trade by harassing importers or exporters in the creditors' country through the court system (Delupis, 1973), but this is probably not a generally effective strategy. Creditor-country governments may retaliate through trade embargoes.

When we discussed the demand for loans, we pointed out that borrowing may serve an important role in reducing the transactions costs of international trade. If banks and other creditors refuse to process transfers of funds or extend credit for the imports or exports of a defaulter, the debtor may be reduced to cumbersome transaction methods and, in the extreme, to the inefficiencies of international barter. Iran in the autumn of 1979 was reported to be having this type of difficulty after banks declared its revolutionary government in default. Other factors the same, therefore, a borrower that benefits greatly from trade and would suffer a corresponding loss from trade disruption will be allowed a high credit ceiling. This type of country is likely to have a high ratio of imports to income.

Finally, we emphasize that allowing a country to borrow at a higher interest rate after defaulting cannot be an adequate deterrent to default but merely invites the country to obtain additional principal on which to default. The higher interest, not being paid, is irrelevant. A higher interest rate can nevertheless play a role when penalties ensure that repayment will occur in at least some situations. In this case, risk-neutral lenders will set the interest rate so that the probability of repayment times the amount to be repaid just equals the gross return that can be made on a safe loan. If lenders are risk-averse, of course, the interest rate will be set at a higher rate.

#### Estimating the Demand for and Supply of LDC Debt

An LDC may or may not want to borrow up to its credit ceiling. Returning to the example of the last section, consider a country that suffers shortfalls in income so severe as to imply mass starvation. It might safely be lent almost any amount, since exclusion from the credit markets in future periods of low income would be infinitely painful. Given a high enough interest rate, however, this country might wish to borrow only the minimum amount necessary to avoid starvation, preferring to sustain considerable residual income variability rather than pay high interest charges. By contrast, other countries might have to be constrained in the amount they can borrow if repayment is to be ensured.

The amount that any country actually borrows is therefore either the amount it wishes to borrow or the amount it can borrow, whichever is smaller. This conclusion implies that any econometric technique used to study the determinants of LDC debt must be capable of distinguishing between countries in these two situations, since it is unlikely that the researcher can confidently sort countries on *a priori* criteria. It would be incorrect to estimate a single equation explaining LDC debt using observations on some countries that are at their credit limit and others that are below theirs. Such a procedure would confuse the determinants of the ceiling, or supply, of credit with the determinants of the demand.

In Eaton and Gersovitz (1980), we present empirical evidence on the determinants of the amount a country wishes to borrow and of the credit ceiling lenders are willing to extend. The estimated relations are based on an econometric technique incorporating the assumption that the observed debt is the smaller of the credit ceiling and the desired debt. Consequently, the basic implications of the preceding theoretical discussion are respected.<sup>6</sup> This econometric method provides estimates of the probability that any particular debtor has a level of debt (D) that is either demand-determined  $(D^{\bullet})$  or supply-constrained  $(\overline{D})$ , i.e. allowed to the country by lenders as a function of its characteristics.

Table 4 reproduces these parameter estimates based on a cross-section of 45 LDC borrowers in two years, 1970 and 1974. Table 5 provides a list of these countries, the years for which each could be included, and the corresponding probability of being in the  $\overline{D}$  regime. The dependent variable (D) is the real public and publicly guaranteed long-term debt of developing countries to private creditors expressed in 1970 U.S. dollars on a per capita basis and transformed to a natural logarithm. Our theory suggests that debt demand  $(D^{\bullet})$  and the credit ceiling  $(\overline{D})$  depend on a common set of country characteristics, but as we explain in the next section, different specifications of the reserve-holding equation are appropriate to each regime. Since debt and reserves were estimated jointly, the reserve equations allow us to identify each regime: the  $D^{\bullet}$  equation corresponds to the reserve equation appropriate to the unconstrained borrowers, while the  $\overline{D}$  equation corresponds to the reserve

<sup>&</sup>lt;sup>6</sup> Kapur (1977) examines the determinants of observed debt in a framework rather different from ours. Although he recognizes that debt can be determined by either LDC demands or lenders' constraints on credit, for estimation purposes he assumes that all observed debt is determined by the credit ceiling.

equation of the constrained borrowers. The data on D were obtained from the World Bank's World Debt Tables. The credit ceiling and demand for debt are specified as functions of the percentage variability of exports  $(\sigma_x)$ ; the share of imports in GNP (M/Y); the average growth rate of per capita income  $(g_y)$ ; the natural logarithms of total real GNP per capita (Y/N), total population (N), and the real level of public debt to official lenders expressed in per capita terms (P), as reported in the World Debt Tables; and a dummy variable (T) equal to 0 in 1970 and 1 in 1974.<sup>7</sup>

#### TABLE 4

	D* (Deman	d) Equation	$\overline{D}$ (Supply) Equation		
Variable	Coefficient	MLE/SE	Coefficient	MLE/SE	
Constant	-6.81		0.34		
$\sigma_x$	1.73	(0.74)	7.05	(3.35)	
M/Y	3.84	(2.32)	1.16	(0.93)	
g,,	0.028	(0.55)	-0.046	(0.96)	
$\tilde{Y}/N$	0.29	(1.07)	1.42	(6.10)	
N	0.71	(3.61)	-0.32	(2.25)	
Р	1.23	(4.08)	0.169	(0.64)	
Т	-0.17	(0.47)	-0.56	(1.96)	

PARAMETER ESTIMATES OF PUBLIC INDEBTEDNESS OF 45 LDCs to Private Creditors, 1970 and 1974

Notes:

Value of the logarithm of the likelihood = -146.

Number of observations = 81.

MLE/SE: Maximum likelihood estimate divided by standard error is asymptotically t.

Source: Eaton and Gersovitz (1980).

We have argued that the costs of default to defaulters arise from retaliation by the international community, that this retaliation may take the form of an embargo on future lending, and that it is likely to be more of a deterrent the higher is  $\sigma_x$ . The average amount of indebtedness a country wishes to incur is also likely to increase with variability. The estimated coefficients imply that both  $D^*$  and  $\overline{D}$  rise with increases in  $\sigma_x$ , although the coefficient in the demand equation is not significant. This result supports the basic theoretical framework we have been developing. Frank and Cline (1971) and Feder and Just (1977a), studying defaults on debt owed to governments and international bodies by poor countries, have reported that the probability of default is lower when export revenues are more variable. These researchers regard this result

<sup>7</sup> Precise definitions of these variables and descriptions of the data used to construct them are contained in Eaton and Gersovitz (1980, Appendix A). as anomalous and reject it on *a priori* grounds that are not clearly developed. In contrast, we view their results as corroborating both our theoretical framework, with its emphasis on the role a higher  $\sigma_x$  plays in increasing the penalty of exclusion and the deterrent to default, and our empirical results on the effect of  $\sigma_x$  on the credit ceiling.

As mentioned earlier, creditors and their governments may also interfere with foreign trade, especially through the disruption of arrangements for financing trade. The more important are imports (M/Y), the more harmful is trade-related retaliation and the higher the sustainable debt. Consistent with this view, the effect of the variable is positive (but not significant) in the  $\overline{D}$  regime. The variable M/Y is also included in the  $D^{\circ}$  equation to reflect transactions effects, since some debt to private lenders is comprised of suppliers' credits and other borrowing used to finance trade. This variable has the expected positive sign.

A higher growth rate of income raises desired debt, for the usual Fisherian reasons—some of the future higher income is desired now. Our framework includes this trend motive for borrowing. A higher growth rate may or may not raise the credit ceiling. On the one hand, a borrower expecting higher future income may have less to fear from the future effects of a credit embargo, thus lowering  $\overline{D}$ . On the other hand, the demand for debt to finance transactions may increase with income, so that a credit embargo will be more harmful in the future to a rapidly growing country. The sign of the effect of  $g_y$  is what we expect in the  $D^*$  regime, but in neither regime is its effect significantly different from zero.

Total population (N) is entered to capture scale effects in the debt functions. Size may affect the credit ceiling positively. Economies of scale in monitoring creditworthiness may make large borrowers more attractive. Fixed costs in negotiating loans would have the same effect. Further, large borrowers are frequently more politically important, and lenders may feel that developed countries' governments will take a more active role in forestalling default by large borrowers. This type of consideration may apply to Turkey, for example, whose economic collapse would be disadvantageous to NATO. On the other hand, a large borrower may feel that its size and political importance will enable it to fend off retaliation more easily. This latter consideration is one possible interpretation of the negative coefficient on N in the  $\overline{D}$  regime.

We view the debt of developing countries to official lenders as predetermined by a number of political and economic factors influencing the decision of international lending organizations and the governments of rich countries. LDCs would almost always desire increases in the quantity of these concessional loans, and these countries are therefore supply-constrained with respect to P. An increase in P should lower the demand for debt  $(D^*)$ , because public debt is a potential substitute for private debt. The reverse of this result obtains in Table 4, however, a finding that seems anomalous. One possible explanation is that official lenders provide only partial financing for investments, so that LDCs receiving these funds want to borrow the additional funds on private markets. Without official loans, these investments might not be feasible at all. In this case, private and official debt would be complements rather than substitutes.

P could have an effect on the supply equation for at least two reasons. First, an increase in P might lower  $\overline{D}$  by increasing the likelihood that a country will find its total debt burden (P + D) insupportable and choose to default. On the other hand, private lenders might view a higher P as a sign that public lenders find the LDC a good risk or that public lenders may act as a lender of last resort if the LDC should encounter economic problems. The statistically nonsignificant coefficient of P in the  $\overline{D}$  equation suggests that this variable has little empirical effect.

With competitive loan markets, if lenders are risk-neutral or if default risk is diversifiable, then the *expected* interest rate r is equal for all borrowers in each year. For this reason r is not an explanatory variable. The expected interest rate should be distinguished from the rate actually charged, which exceeds the safe market interest rate by an amount determined by the lenders' expectations of default.<sup>8</sup> The dummy variable Tcaptures differences in credit-market conditions between 1970 and 1974, along with any possible shifts in the demand for debt and the credit ceiling. Thus the dummy variable does not have a very precise theoretical interpretation, although it is potentially important as an econometric device for handling the possibility of certain types of omitted variables.

The estimates of the probabilities that countries were constrained at different times appear in Table 5.° Of 81 observations, 56 are classified as constrained with probability greater than 0.5. This result reinforces the correspondence made between the two sets of estimated parameters and the two theoretical regimes  $(D^{\bullet} \text{ and } \overline{D})$ . Most observers believe that country limits have been an important aspect of these markets. It is interesting to note that, on average, the probability that a country was credit-constrained tended to rise between 1970 and 1974, which is consistent with the expectation of a greater demand for debt following the oil price increase. Two exceptions to this rule, Ecuador and Iran, were less likely to be supply-constrained in 1974 than in 1970, in accord with the fact that they benefited from the oil price increases. The small number

<sup>&</sup>lt;sup>8</sup> The determinants of this rate have been examined by Feder and Just (1977b), although their specification, similar to that in Feder and Just (1977a), concentrates on country characteristics that proxy for a debt problem rather than predict it. This issue is discussed further in Chapter 3.

<sup>&</sup>lt;sup>9</sup> Details of the statistical formulae used to calculate these probabilities are available in Eaton and Gersovitz (1980).

# TABLE 5

Year	Proba- bility	Country	Year	Proba- bility
1970 1974	0.40 0.49	Malawi	1970 1974	0.81 0.96
$1970 \\ 1974$	0.62 0.65	Malaysia	$1970 \\ 1974$	0.91 0.90
$1970 \\ 1974$	0.89 0.88	Mexico	$1970 \\ 1974$	$\begin{array}{c} 0.69 \\ 0.72 \end{array}$
1974	0.75	Morocco	$1970 \\ 1974$	0.90 0.94
1970 1974	0.72	Nicaragua	1970	0.25
$\begin{array}{c} 1970 \\ 1974 \end{array}$	0.64 0.58	Nigeria	1974 1974	1.00
1970 1974	0.92 0.93	Panama	1970 1974	0.28 0.48
1970 1974	0.31 0.64	Paraguay	1970 1974	0.20 0.38
1974	0.71	Peru	$1970 \\ 1974$	$\begin{array}{c} 0.52 \\ 0.62 \end{array}$
$1970 \\ 1974$	0.38 0.27	Philippines	1970 1974	$0.71 \\ 0.95$
$1970 \\ 1974$	0.16 0.60	Portugal	1970 1974	0.40
$1970 \\ 1974$	0.73 0.96	Sierra Leone	1974	0.49
1974	0.12	Spain	$\begin{array}{c} 1970\\ 1974 \end{array}$	$\begin{array}{c} 0.51 \\ 0.54 \end{array}$
$\begin{array}{c} 1970 \\ 1974 \end{array}$	0.33 0.35	Taiwan	1970 1974	0.88 0.97
$\begin{array}{c} 1970 \\ 1974 \end{array}$	0.23 0.28	Thailand	1970 1974	$0.95 \\ 1.00$
1974	0.93	Togo	1970	0.22
1970 1974	1.00 1.00	Trinidad-Tobago	1970 1974	0.06 0.00
1974	1.00	Tunisia	1970	0.76
$1970 \\ 1974$	0.81 0.62	Turkey	1974 1970	0.90
$1970 \\ 1974$	0.57 0.70	Turkey	1974	1.00
1970	0.19	Yugoslavia	$1970 \\ 1974$	0.80 0.97
1974 1970	0.29	Zaire	$1970 \\ 1974$	0.59 0.77
1974 1970	1.00 0.83	Zambia	1974	0.49
	Year 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974 1970 1974	Proba- bility1970 $0.40$ 1974 $0.49$ 1970 $0.62$ 1974 $0.65$ 1970 $0.89$ 1974 $0.75$ 1970 $0.72$ 1974 $0.75$ 1970 $0.72$ 1974 $0.70$ 1970 $0.64$ 1974 $0.70$ 1970 $0.64$ 1974 $0.70$ 1970 $0.64$ 1974 $0.71$ 1970 $0.31$ 1974 $0.64$ 1974 $0.71$ 1970 $0.38$ 1974 $0.27$ 1970 $0.16$ 1974 $0.60$ 1970 $0.73$ 1974 $0.96$ 1974 $0.12$ 1970 $0.33$ 1974 $0.23$ 1974 $0.23$ 1974 $0.28$ 1974 $0.93$ 1974 $0.00$ 1974 $1.00$ 1974 $0.00$ 1974 $0.00$ 1974 $0.29$ 1970 $0.19$ 1974 $0.29$ 1970 $0.91$ 1974 $0.00$ 1975 $0.91$ 1970 $0.91$ 1970 $0.83$ 1974 $0.98$	Proba- bility     Country       1970     0.40     Malawi       1974     0.49     Malaysia       1970     0.62     Malaysia       1974     0.65     Malaysia       1974     0.65     Morocco       1974     0.75     Morocco       1974     0.75     Morocco       1974     0.70     Nicaragua       1970     0.64     Malaysia       1974     0.70     Nicaragua       1970     0.64     Malaysia       1974     0.70     Nicaragua       1970     0.64     Malaysia       1974     0.70     Nicaragua       1974     0.58     Nigeria       1970     0.31     Paraguay       1974     0.64     Peru       1974     0.27     Philippines       1974     0.28     Sierra Leone       1974     0.96     Sierra Leone       1974     0.28     Thailand       1974     0.28     Thailand <t< td=""><td>YearProbabilityCountryYear19700.40Malawi197019740.49197419700.62Malaysia197019740.65197419700.89Mexico197419740.75Morocco197419740.75Morocco197019740.75Morocco197019700.72197419740.75Morocco197419700.64197419700.64197419700.92Panama197019740.93197419700.31Paraguay197419740.71Peru197419700.38Philippines197419700.16Portugal197419700.33Sierra Leone197419700.33Taiwan197019740.93197419700.33Taiwan197019740.93Togo197419700.23Thailand197019740.93Togo197419700.571974197419740.00Tunisia197419740.92Zaire197419740.992aire197019700.571974197419700.57197419740.007unisia197419740.992aire1970</td></t<>	YearProbabilityCountryYear19700.40Malawi197019740.49197419700.62Malaysia197019740.65197419700.89Mexico197419740.75Morocco197419740.75Morocco197019740.75Morocco197019700.72197419740.75Morocco197419700.64197419700.64197419700.92Panama197019740.93197419700.31Paraguay197419740.71Peru197419700.38Philippines197419700.16Portugal197419700.33Sierra Leone197419700.33Taiwan197019740.93197419700.33Taiwan197019740.93Togo197419700.23Thailand197019740.93Togo197419700.571974197419740.00Tunisia197419740.92Zaire197419740.992aire197019700.571974197419700.57197419740.007unisia197419740.992aire1970

Countries in the Sample and the Probability That the Supply-Constrained  $(\overline{D})$  Regime Obtained, 1970 and 1974

SOURCE: Eaton and Gersovitz (1980).

of countries assigned to membership in the  $D^*$  regime probably contributes to the low statistical significance of the coefficients of this regime.

We end this section by suggesting two refinements to our work on the empirical determinants of the  $D^{\circ}$  and  $\overline{D}$  relations. First, it would be useful to distinguish short-run factors affecting  $D^{\circ}$  and  $\overline{D}$  from permanent characteristics of the developing countries. For instance, M/Y might be replaced by the trend value of M divided by the trend value of Y for a better indicator of long-run openness of the economy. Similarly, trend income might be used in forming Y/N. The deviations of actual exports and imports from trend might be included separately as short-run factors in the demand for debt. This type of change in specification would allow for an explicit distinction between temporary changes in D and permanent differences in D as reflected, for instance, in the fact that different countries have different  $\sigma_x$ 's and  $g_y$ 's. The specification of Table 4 implicitly subsumes these short-run factors in the error term.

A second refinement in the empirical work would be to use the BIS (1979) data in order to include short-term debt, which is not reported in the World Bank's *World Debt Tables*. These data have been available only since the end of 1977, limiting the period that can be studied. Yet the concept of a credit ceiling applies to total private debt and not just to some part of that debt, so that the BIS data are a superior source for analysis.

#### LDC Borrowing and Reserve Holding

The accompanying figure, charting total LDC indebtedness to private lenders and total LDC reserve holding for the period 1973 to 1978, shows that both reserves and debt rose continuously during this period. Thus Saxe's (1978) contention that some countries used borrowing to finance reserve holding during the late 1970s is partially plausible, particularly up to the beginning of 1975, when the two magnitudes were increasing by roughly similar amounts. From 1975 on, however, debt surged past reserves. In any case, a complete analysis of this issue requires careful attention to the determinants of the demand and supply of debt and reserves.

Both debt and the holding of international reserves represent part of a country's overall portfolio-allocation problem. As we saw earlier, in the section on "The Demand for Credit," some of the motives for incurring debt and for holding reserves are closely related. International transactions can be facilitated by using reserves or debt, especially in the form of suppliers' credits. Absorption can be maintained at a stable level in the face of income variability by varying debt or reserves. And it may be that an increase in debt is initially reflected in an increase in reserves,



## TOTAL LDC INDEBTNESS TO PRIVATE LENDERS AND TOTAL LDC RESERVE HOLDING, 1973-78

SOURCE: Data on the 92 countries that appear in both World Bank, World Debt Tables, Washington, 1979, pp. 46-47, and IMF, International Financial Statistics, Washington, 1979, Supplement, pp. 45-47.

which are drawn down later. Not surprisingly, therefore, reserve and debt decisions are related to the same group of country characteristics. For instance, theories of reserve-holding behavior (Williamson, 1973) emphasize a positive relation between desired reserves and both  $\sigma_x$  and M/Y. Desired debt should not, however, be explained by the actual holding of reserves any more than a consumer's purchase of one good should be related to purchases of a second good rather than to prices and income. Both financial decisions should be viewed as outcomes dependent on relevant country characteristics, some of them common to both decisions.

The fact that a country's credit is constrained has implications for its holding of international reserves. A low credit ceiling may make it too costly for the country to hold large reserves, since it cannot borrow to finance them. On the other hand, the inability to borrow very much in times of crisis may make it hold more reserves. Since the credit ceiling is imposed on the country, it is appropriate to include the level of debt in the country's reserve demand if the country is credit-constrained. In Table 6, therefore, we estimated the debt equations of Table 4 together with a pair of reserve-demand equations, one for each debt regime. In the reserve equation associated with the supply-constrained  $(\overline{D})$  regime, denoted by  $\overline{R}^{\bullet}$ , we included  $\overline{D}$  as an explanatory variable.

The results of Tables 4 and 6 support the hypothesis that debt was a

#### TABLE 6

	R* (Unconstru	ined Regime)	$\overline{R}^*$ (Constrained Regime)		
Variable	Coefficient	MLE/SE	Coefficient	MLE/SE	
Constant	10.34		4.45		
$\sigma_x$	3.84	(4.04)	3.45	(3.85)	
M/Y	-0.29	(0.38)	1.13	(2.02)	
g <sub>v</sub>	0.0011	(0.05)	0.11	(5.29)	
$\bar{Y}/N$	1.44	(11.67)	1.21	(10.53)	
Ν	-0.51	(5.54)	-0.31	(4.69)	
Р	-1.2	(8.96)	-0.43	(3.05)	
Т	0.35	(2.02)	-0.08	(0.65)	
$\overline{D}$			-0.10	(1.58)	

#### PARAMETER ESTIMATES OF RESERVE DEMAND BY 45 LDCs, 1970 and 1974

Notes: See Table 4.

SOURCE: Eaton and Gersovitz (1980).

substitute for reserves during the years in the sample. The coefficients of debt to official lenders (P) in both reserve-demand equations and the coefficient of  $\overline{D}$  in the  $\overline{R}^*$  equation are all negative. If a country is creditconstrained, its reserve demand falls when its access to credit rises. Another result pointing to the conclusion of substitution between debt and reserves is the positive effect of  $\sigma_x$  on  $\overline{D}$  and  $D^*$ , suggesting that debt does indeed serve a precautionary role along with reserves.

## Bank Loans vs. Bond Issues

So far we have assumed that each lender has full information about loans already made by all other lenders and about borrowers' characteristics, and that lenders can exclude defaulting governments indefinitely. In reality, these assumptions are unlikely to be completely fulfilled. But to the extent that lenders have some information about debtors and some assurance that defaulters will be excluded from future borrowing, the markets will function as we have set forth. With less information or with a weakened exclusion penalty, credit ceilings will be lower and fewer resources will be transferred to the developing countries.

Different institutional arrangements for lending impose different monitoring requirements and imply different penalties for default. Over time, the kind of lending has varied. Before 1930, lending was largely in the form of public bond issues sold relatively widely, with an active resale market. At present, lending is primarily by private placement among the largest international banks, which are organized in syndicates.<sup>10</sup> This

 $^{10}\,\mathrm{A}$  detailed discussion of the mechanics of this lending is given by Wellons (1977).

fundamental difference in organization has affected the availability of information and the cohesion of lenders in dealing with borrowers. Each of these forms of lender organization has advantages relative to the other in allowing the largest transfer of funds with the least risk of default.

It is important that lenders know the aggregate amount that has been lent to a particular country and the terms of earlier loans. This problem does not arise when publicly listed bonds are sold by prospectus, because data about all past loans are easily available from past offerings (Nevin, 1961). With syndicated loans, however, the full extent of debt may not be known (although the practice of publishing tombstones in the financial press mitigates this situation to some extent). Indeed, one of the complications, if not causes, of the Zaire default of 1976 was the confusion in the Zaire government itself about how much money was owed to whom (Beim, 1977). Recent efforts to improve aggregate data, especially through creditor reporting systems, comprise an important step toward alleviating the information problem (BIS, 1979).

A second important difference between bank and bond debt involves the actual declaration of default. While the clauses governing the occurrence of default are similar (Madden and Nadler, 1929, pp. 265-267, and Wellons, 1977, pp. 95-96), considerable discretion rests with the banks in formally invoking the clauses establishing a default. For instance, in the Iranian crisis of autumn 1979, several American syndicates were quick to declare the revolutionary government in default on their loan agreements. Other non-American syndicates chose to forebear, despite cross-default clauses making their loans due if any other Iranian government debts were in default (Field and Adam, 1980). In general, when banks are the lenders it may be difficult for their governments and other interested parties to ascertain whether or not loan agreements are being observed. In the case of bond debt, however, individual, atomistic creditors have little motive to disguise noncompliance by a debtor and, for that matter, little ability to do so. In the event of noncompliance, moreover, organizing bondholders to negotiate a rescheduling would be a cumbersome task. Bondholders thus have little recourse other than to take their case to court, thereby placing the loan in default.

Another difference between the two types of lending arises in respect of the ability of the lender to refuse a normalization of a borrower's credit position if the borrower does not offer a satisfactory settlement after a default. A syndicate of banks has the cohesion to confront the borrower in negotiations. Bondholders are not so easily organized. For instance, in the case of publicly listed bonds, the debtor may repurchase its own defaulted bonds at depressed prices in the open market, thereby canceling the default. This practice was fairly widespread in the 1930s. Thirteen countries with debts in excess of \$1.8 billion were estimated to have repatriated 25 per cent of this sum by repurchase (Foreign Bondholders Protective Council, Annual Report, 1935, p. 8). These actions indicate that the defaulting governments were able to undertake at least partial debt service, suggesting that default was a chosen strategy rather than an uncontrollable event.

Attempts were made in the 1930s to overcome the problem inherent in organizing many individual bondholders to negotiate with defaulting governments. Bondholder committees were formed, but the founding of rival groups caused difficulties (Madden *et al.*, 1937, pp. 290-293). By contrast, in recent years banks have provided direct management assistance to borrowing countries' development efforts, thereby improving the prospects for repayment. This experience represents a degree of organization probably beyond any large group of bondholders.<sup>11</sup>

Thus a decrease in the number of lenders can promote lender cohesion, deterring defaults and increasing the flow of capital to developing countries. But this same cohesion may allow lenders to act as monopolists, thereby raising rates and impeding rather than facilitating capital movements. Other things equal, therefore, it is better if default is deterred by governmental and para-governmental actions, as described in Chapter 4, rather than by the cartelization of lenders.

In summary, bank lending has the advantage of providing a smaller, more cohesive group of lenders, while public bond issues allow for more information on the debt owed by a borrowing country, the terms of the contract, and whether the agreement is being observed.

 $^{11}$  For example, Lim and Clarke (1978) report that investment banks have provided considerable development advice to Gabon.

# **3** GUIDELINES FOR RISK ANALYSIS

From at least as far back as the 1920s, writers on default risk have examined indebtedness against the background of statistical information on LDC economies. Patterson (1928) and various authors of the Institute of International Finance *Bulletin* at New York University provided information on debt burden relative to a government's finances and its export performance. These bulletins also discussed at considerable length political and administrative conditions and economic events affecting the safety of loans to Latin-American and other countries.

Current practice for assessing country risk has three components. The first is an examination of many qualitative political and administrative details that affect the riskiness of foreign lending. Political considerations include the ideological orientation of a regime, its popularity and stability, the programs of potential successors, and the importance of the country and its regime to world power blocs. Administrative factors include the availability of trained manpower, the ability of the administrative system to execute decisions and complete projects, and the prevalence of corruption. These and many related factors are important: their roles in the recent financial crises in Zaire and Iran are apparent. Lending institutions quite rightly give them considerable attention by assigning country analysts to this type of study (Angelini *et al.*, 1979, Chap. 4). Nevertheless, as this study deals with economic factors, political and administrative aspects will not be considered.

The second component in risk assessment, ratio analysis, has many variants (Sofia, 1979). This approach relates the likelihood of default to the ratio of one measure of indebtedness to another economic variable. One serious weakness of the model implicit in ratio analysis is that it allows for only one determinant of default. An indicator frequently used by financial analysts is the debt-service ratio—interest plus principal repayment due in a given year divided by exports. Other things equal, one might conclude that a higher debt-service ratio means greater benefits to the debtor from a default. Yet countries with the highest debt-service ratios may instead be the best risks. A high ratio may merely reflect other factors perceived by lenders as lowering risk and justifying high debt service. Another problem is that the debt-service ratio concentrates only on the costs of debt in one year, neglecting the total obligations of the country.

Dhonte (1975) attempts to overcome the deficiencies of ratio analysis by combining several indicators of indebtedness, using principal-components analysis, to explain reschedulings. He stresses two dimensions of borrowing, debt outstanding and the terms of the loan, making a convincing statistical case that the debt-service ratio alone is not a complete indicator of debt difficulties. The basic shortcoming of Dhonte's study is that the technique of principal components does not allow the explicit specification of a structural model of an economic process, so that his results are very difficult to interpret.

From the viewpoint of private lenders, a further problem with Dhonte's work and other studies of the probability of default discussed below is the use of debt renegotiations between an LDC and its official creditors as the event studied. It is not at all clear that this type of debt problem (discussed by Bittermann, 1973) is an appropriate precedent for gauging the probability of default on private bank loans that are not insured by lender-country governments. First, none of these episodes has culminated in outright repudiation, the event really feared by lenders. Further, it may be that a few official creditors are far more able than private lenders to act together to threaten sanctions, so that an analysis using official renegotiations may understate the prospects for defaults on private loans. It is almost impossible, however, to substitute a more appropriate type of debt crisis to study the probability of default on private loans, because too few defaults of this type have occurred since the 1930s to form a basis for econometric analysis.

The third component in risk assessment is a model explicitly formulated to determine the probability of default. In line with the framework of Chapter 2, the probability of default is related to the net benefit of default. If all components of the net benefit could be calculated precisely, the probability then would be 1 if the net benefit was positive and 0 otherwise. As one cannot hope to measure the net benefit perfectly, there is merely a positive relationship between the probability of default and the net benefit of default as actually measured.

The net benefit default is the difference between the gross benefit of default and the costs of default, each of which has an immediate and a long-run component. The immediate costs or benefits reflect short-run factors only partially foreseeable at the time the loan is made. For instance, export performance unexpectedly below trend in a particular year may be viewed as an immediate cause of default. Similarly, if interest payments are tied to the Eurodollar interbank rate (LIBOR) and this rate changes unexpectedly, debt service may be higher than anticipated. Thus, one index of the short-run benefit of default is the debt-service ratio, defined as the ratio of actual debt payments due in the year of default divided by actual exports in that year.

On the other hand, the long-run benefits of default may be measured by the expected *present value* of total debt payments already contracted divided by the expected *present value* of total exports over the relevant horizon. One statistical approximation to this measure would be to include two variables, debt outstanding divided by the trend value of exports in the period and the growth rate of exports. As suggested in Chapter 2, two measures of the long-run costs of default would be the variance of exports and the ratio of imports to GNP, reflecting precautionary and transactions costs of a credit embargo respectively. Another factor in the decision to default might be the ratio of reserves to imports at the beginning of the period. It is not clear, however, whether large reserves would lower the probability of default by making it easier to meet payments or raise the probability of default by making it easier to survive an embargo after default.

Several researchers have used econometric methods to try to explain the probability of default on official loans. Feder and Just (1977b) improve on the specification in an earlier study by Frank and Cline (1971) by using the more appropriate logit model instead of discriminant analysis (Press and Wilson, 1978). Unfortunately, neither study provides a rigorous theoretical discussion of the default decision. As a consequence, both reject on *a priori* grounds their statistical finding that the variability of exports lowers the probability of default, apparently confusing high variability of exports with a low value of exports.

These studies also inadequately distinguish *exogenous* country characteristics likely to *lead to* default from *endogenous* variables *simultaneous with* default. Including variables of the second type as explanatory variables is likely to provide an apparently good fit without yielding an equation with useful predictive power. One variable of this type that both studies use is the ratio of capital inflow to debt service. It is true that if, for some exogenous reason, capital inflow falls, a borrower has a greater incentive to default. Another possibility, however, is that lenders have information that a default is likely and reduce their lending as a result. In this case, the reduction of capital inflow does not contain independent information about the likelihood of a default. To alleviate this problem would require estimating a reduced-form equation or implementing simultaneous-equation techniques of estimation.

The main results of a third study, by Mayo and Barrett (1978), are reproduced in Table 7. This study avoids the use of variables simultaneous with default, but its inclusion of some other variables is not easily justified on theoretical grounds. For instance, the inflation rate, while possibly a general indicator of economic difficulty, does not seem directly relevant to the default decision. The authors are more ambitious than others, attempting to predict the default probability for up to five years. As a consequence, they choose to neglect all short-run factors contributing to default. It would seem preferable to include short-run variables such as temporary deviations from trend exports and to make long-range forecasts of the probability of default by estimating the distribution of possible values of the short-run variables.

#### TABLE 7

Logit	PARAMETERS	FOR	Probability	OF	Rescheduling

	Coefficient	t-Statistic
Ratio of disbursed debt outstanding to exports	0.876	5.015
Ratio of international reserves to imports	-3.520	-4.047
Ratio of imports to GDP	-9.215	-3.737
Ratio of reserve position in IMF to imports	-6.340	-3.158
Ratio of gross fixed capital formation to GDP		-2.510
Percentage change in consumer price index	1.500	2.090
Constant	0.090	0.133

Notes:

Log-likelihood ratio = 147.172.

Log-likelihood ratio index = 0.63.

Probability of rescheduling = exp (0.090 + Z)/[1 + exp (0.090 + Z)], where exp denotes exponential and Z is the sum of the product of the coefficients and parameter values ( $Z = sum b_i X_i$ ), where the  $b_i$ 's are the above coefficients and the  $X_i$ 's are the values for the six variables differing by country and year.

SOURCE: Mayo and Barrett (1978, p. 86).

These studies have made an important contribution, although they are somewhat *ad hoc* in omitting some variables that seem theoretically important and including others without obvious theoretical justification. The results indicate a number of statistically significant<sup>1</sup> and economically important determinants of the probability of rescheduling official debt. The design of a theoretically better-justified specification should provide a convincing empirical explanation of this type of default decision.

In conclusion, we wish to emphasize that correct estimation of default probabilities requires a model not only of borrower behavior, incorporating characteristics of the borrower that enhance the probability of default given a particular debt structure, but also a model of lender

<sup>1</sup> These authors show some confusion when they use the percentage of sample observations classified correctly as an indicator of the success of their models. Default is a relatively rare event in these samples, occurring in only about 10 per cent of the observations used by Feder and Just, for instance. Therefore, even the naive rule of classifying all observations as being in the more numerous no-default group would do quite well. The correct assessment of the usefulness of these models should be based on a conventional F-test that all slope coefficients are significantly different from 0. On this criterion these models do well. It would also be useful to examine the performance of these models using a criterion function based on the losses incurred by lenders as a result of misclassification.

behavior. Chapter 2 suggested that the amounts lenders are willing to lend to individual countries depend on the characteristics of those countries. In these statistical models, a country may appear to be a very good credit risk precisely because of certain characteristics that in the past made it appear to be a *bad* credit risk: since potential lenders never made loans to the country, it never had occasion to reschedule.

# **4** PUBLIC POLICY BY LENDER COUNTRIES

Appropriate policies by the governments of creditors and by international organizations can improve the welfare of citizens in both lender and borrower countries. Policies can be classified under three broad headings: lender-country retaliation against defaulters (effected on either an individual or a collective basis), insurance of lenders against default, and disclosure of information on lending (already discussed).

#### Retaliation

Legislation in the United States imposes penalties on any country that

(A) has nationalized or expropriated or seized ownership or control of property owned by any United States citizen or by any corporation, partnership, or association not less than 50 per centum beneficially owned by United States citizens, or

(B) has taken steps to repudiate or nullify existing contracts or agreements with any United States citizen or any corporation, partnership, or association not less than 50 per centum beneficially owned by United States citizens, or

(C) has imposed or enforced discriminatory taxes or other exactions, or restricted maintenance or operational conditions, or has taken other actions, which have the effect of nationalizing, expropriating, or otherwise seizing ownership or control of property so owned,

and such country . . . fails within reasonable time . . . to take appropriate steps, which may include arbitration, to discharge its obligations under international law . . . including speedy compensation for such property in convertible foreign exchange, equivalent to the full value thereof, as required by international law, or fails to take steps designed to provide relief from such taxes, exactions or conditions . . . and the provisions of this subsection shall not be waived . . . unless the President determines and certifies that such a waiver is important to the national interests of the United States. (USCA, 22§2370, 1979, pp. 503-504.)

These or similar conditions appear in several legislative acts. Countries in violation of these provisions are prohibited from receiving foreign aid from the United States (USCA, 22§2370, 1979). The Trade Act of 1974 (USCA, 19§2462, 1980) applies these conditions to the exclusion of a country from the generalized system of trade preferences. American representatives are required to vote against loans or other uses of funds of the World Bank (USCA, 22§284j, 1979), the Inter-American Bank (USCA,  $22\S283r$ , 1979), and the Asian Development Bank (USCA,  $22\S-2830$ , 1979) for the benefit of any country in this situation. Note that this formulation leaves to presidential discretion the waiver of penalties.

Legislation passed in 1934 (USCA, 18§951, 1976) made it a criminal offense for private American citizens to lend to a country in default on loans to the American government. The force of this legislation has been destroyed by an amendment exempting any country with a membership in the IMF and the IBRD. Nonetheless, this legislation provides an example of regulations that can be used to penalize defaulters.

In some cases, penalties may be invoked through the court system, independently of actions taken by the federal executive or legislative branches. The Hickenlooper Amendment to the Foreign Assistance Act (USCA,  $22\S2370$  (e)(2), 1979) specifies that any claim presented in a U.S. court for property confiscated abroad be considered on "the principles of international law" regardless of "state doctrine" (see pp. 10-11 above). (The President may, however, file a suggestion that an exception is in the "foreign policy interests of the United States.")

The existence of penalties activated automatically by default can play a valuable role in stabilizing international lending. If borrowers know that retaliation will occur and if the penalties are sufficiently severe, defaults can be deterred. In this situation, lenders may be better off, since they have an opportunity to lend not otherwise available. Borrowers may also be better off, since they can borrow funds that lenders would not otherwise be willing to lend. In effect, the potential penalty serves as a form of collateral for an LDC that it cannot otherwise give. It may well be that the larger the penalty, the better off is the borrower.

On the other hand, there may be situations in which the borrower's expected welfare at the time of the loan deteriorates with higher penalties. For instance, the country may be required to repay regardless of future economic conditions, which it can neither control nor foresee. In such a case, the option of default will have an insurance aspect, providing as it does an opportunity to lessen obligations under very bad circumstances. An increase in the penalty, therefore, may lower the country's welfare even though its credit ceiling is raised, because the probability of a large penalty curtails this insurance aspect of lending.

For example, during the 1930s default provided one way for borrowers to lessen the impact of the collapse of world trade. It could be argued that these troubles were brought on the less developed countries by decisions in the developed countries and that the less developed countries had a right to this safety valve. Nonetheless, it is still true that if developing countries take advantage of this option, less private capital will be invested there. Penalties in this system are only as important as the resolve of the governments of rich countries to invoke them. If the welfare of both lenders and borrowers actually can be improved by the existence of penalties, it is crucial that both groups perceive lender-country governments as committed to retaliation. Decision makers must realize that the failure to impose penalties may jeopardize the development prospects of poorer countries by discouraging private investment.<sup>1</sup> One possibility is to let individual LDCs agree in advance to the imposition of penalties in the event of default. In this way, they can legitimize such a mechanism and at the same time reveal the penalty level they think best for their own welfare. The Overseas Private Investment Corporation, which is discussed below, embodies the spirit of this suggestion by requiring that host governments agree to conditions for resolving disputes if they wish to be eligible for insured investments.

#### Insurance

Insurance is the second major device used by the United States to protect against the negative effects of possible default on capital transfers to LDCs. The Overseas Private Investment Corporation (OPIC) provides insurance to eligible private investors against

- (A) inability to convert into United States dollars other currencies, or credits in such currencies, received as earnings or profits from the approved project, as repayment or return of the investment therein, in whole or in part, or as compensation for the sale or disposition of all or any part thereof;
- (B) loss of investment, in whole or in part, in the approved project due to expropriations or confiscation by action of a foreign government; and
- (C) loss due to war, revolution, or insurrection (USCA, 22§2194, 1979).

The insurance is limited to a maximum of 75 per cent of the investment. The Export-Import Bank provides similar coverage to American exporters of tangible goods. This insurance extends to cover financial obligations for which exports constitute security (USCA, 12§635, 1957).

One difficulty with insurance schemes of this type is that the borrower has discretion over the default decision. This problem of moral hazard undermines the usefulness of these institutions, encouraging default

<sup>&</sup>lt;sup>1</sup> Strange (1979) discusses the nineteenth-century experience of lending and default. Defaults in that period were fairly common and met with varied responses from creditor-country governments, ranging from no action at all to military intervention that frequently involved the seizure of customhouses in the defaulting countries to collect tariff revenues. She concludes (p. 16) that "one may search nine-teenth-century history in vain for any consistent policy or any coherent and agreed doctrine regarding the rights and duties of international creditors and lenders."

without discouraging private investment. Private investors may be less determined to embargo loans to defaulting governments. These problems are not as important if the insurance is confined to unexpected and uncontrollable events such as war, revolution, or insurrection, and—more difficult to classify—natural or international events leading to poor economic performance.

The fact that OPIC offers protection only up to 75 per cent of an investment provides some brake on any tendency of private investors to neglect the possibility of default. And there are administrative and transactions costs involved in obtaining compensation. Finally, and most important, OPIC can restrict insurance only to countries that are unlikely to default and can forbid future insured investments in any country precipitating claims, a potential penalty. For an investment in a country to be eligible for OPIC coverage, that country's government must formally agree to a number of conditions, including the recognition of OPIC as a successive claimant. Thus OPIC provides an example of a mechanism whereby LDC governments can voluntarily increase the likelihood of a confrontation with the United States in the event that they interfere with private investments. It should be noted that OPIC is not at present an important insurer of the financial investments with which we are concerned. It is discussed here only to suggest how this type of arrangement can work.

Insurance schemes may not be a substitute for penalties, but they can complement retaliatory provisions by functioning as tripwires. For instance, by transferring the burden of default from private investors to their governments, these arrangements can strengthen the resolve of these governments to impose sanctions.

## The Interaction of Private and Public Lending

The growth of total lending to LDCs through the private international capital markets has far outstripped that by rich-country governments and such public organizations as the IMF and IBRD. Some countries have, of course, been exceptions to this rule. One explanation for the relative expansion in private lending is that the funds available to private lenders have grown much more rapidly with the increase in deposits at private banks by OPEC countries. A second explanation is that private lenders seem able to mobilize large loans more quickly. A third explanation, related to the second, is that borrowers perceive loans from the private sector to have fewer restrictions on how they are used. Finally, developed countries, especially the United States, have become disenchanted with aid programs.

Despite the relative decline in the quantitative importance of public

lending, public bodies, especially the IMF, continue to play a central role in LDC borrowing. First of all, as we have seen, these institutions gather and disseminate information on economic conditions and government policy in borrowing countries, thus providing a public good to lenders.

Second, they provide a means of penalizing defaulters by organizing an embargo and enforcing cohesion among private lenders. One way this goal is achieved is through cross-default clauses that appear in many IMF and private loans (see Lipson, 1979, p. 328). Another way is through their greater political influence in lender countries compared with private lenders. There is direct evidence that public lenders are conscious of the implications of their actions for the private market. Lipson (1979, p. 325) quotes former Under Secretary of State Richard N. Cooper as saying: "On occasion, rescheduling of official debt is made contingent on debtor arrangement to seek to renegotiate debt owed to private creditors." The IMF has enforced austerity measures in a number of countries with debt problems (notably Zaire), thereby protecting private loans to these countries. Private lenders have been known to make compliance with conditions imposed by the IMF and IBRD a requirement for access to credit (Lipson, 1979, p. 329, and Odell, 1979, p. 269). Former Under Secretary of the Treasury Anthony Solomon characterizes this role of the IMF as the provider of "a good housekeeping seal" (quoted by D'Arista, 1979, p. 64).

Finally, the IMF, as well as the IBRD and lender-country governments, functions as what Kindleberger (1978) terms an international lender of last resort. Private lenders, observing that a public lender has made a large commitment to a potential borrower, may expect the public lender to finance the repayment of private debt if a crisis should emerge. In view of the large overseas commitments of major banks in lender countries, a series of defaults abroad could create domestic financial crises in lender countries. Governments would have an interest in preventing such a situation and might do so by making loans available to borrowers through the international organizations. While the first two functions of public lenders act to stabilize the market, the third function is potentially destabilizing, reducing the incentive of private lenders to exercise caution in lending.

# 5 CONCLUSIONS

For nearly a decade, analysts and policy makers have been concerned with the international financial system's ability to recycle petrodollars. We believe that this ability depends on whether developing countries are able to borrow as much as they want or are frustrated by credit ceilings. We have examined the notion of credit limits and their determinants. To the extent that various sanctions deterring default are enhanced or undermined under alternative institutional arrangements for lending, these limits will rise or fall.

Thus if OPEC countries wish to channel funds to LDC borrowers through the OECD, it is probably because these ultimate lenders do not feel able to lend very much safely in comparison with the OECD. This opinion seems well founded if one considers the relative ability of OPEC and the OECD to impose sanctions.

Can lending be left to private banks? We would answer affirmatively only to the extent that private banks, reinforced by present government institutions, can credibly impose sanctions in the event of default. Present proposals to involve the IMF more directly in the lending process can be seen as an attempt to ensure greater coordination among lenders and a more assured set of sanctions, so that country limits can be raised. This outcome could be very beneficial to developing countries, while resistance to the organization of sanctions against defaulting countries could hurt them all by lowering their access to credit. This conclusion applies to all lending to developing countries for whatever reason.

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