RISK MANAGEMENT OF U.S. BANKS IN LESS DEVELOPED COUNTRIES: A COUNTRY-RISK ANALYSIS

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SUMMARY

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by

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The object of this research is to determine whether U.S. commercial banks could have predicted in advance the debt crises of the developing countries, i.e., whether a particular LDC would reschedule or default on its loans. A secondary purpose was to determine whether the debt crisis was the fault of the banks or the developing countries who reneged on their loan contracts. What do the banks have to do to prevent this from happening? What do they have to do to manage country risk effectively?

The study begins with a historical account of the United States banking system to the period of debt rescheduling by the LDCs. It continues by describing the different types of risks in international banking. Next it discusses the theoretical issues of LDC debt, including sustainability of debt policy, optimal level of country borrowing, optimal bank foreign lending, and credit rationing by the banks. This is followed by a description of the regulatory aspects of country risk management.

The important issue of country risk management by U.S. banks is next, including a discussion of the various

assessment methods used and a review of the major empirical studies that used econometric methods for predicting the incidence of external debt defaults.

The empirical research investigates debt rescheduling by less developed countries. Linear discriminant function and logistic discrimination approaches were used to determine the predictive ability of any particular subset of economic variables. The sample comprises data on 37 countries over a period of 10 years, 1974-1983. This period was chosen because it was a time of important economic transition.

The results of the discriminant and logistic analyses show modest discriminatory power for predicting the rescheduling of debt of a country with the set of economic predictors used.

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CHAPTER I

INTRODUCTION

The United States banking system has experienced a tremendous increase in its international activities during the past several decades, producing a dramatic change in the nature of the system itself. The claims of U.S. banks against foreigners have increased more swiftly than claims against U.S. entities. Foreign offshoots of U.S. chartered banks have grown more rapidly than their predecessors. Bank assets and liabilities specified in currencies other than the dollar now have a growth rate which is greater than their dollar assets and liabilities. These changes are not unique to the United States banking system; they reflect similar changes in the fabric of foreign banking systems. The interdependency in the capital markets of the various national economies is now very great.

In 1965, the United States international banking representation consisted of thirteen large banks operating 211 overseas branches with assets of $9.1 billion. By 1971, 91 United States banks operated 583 foreign branches with assets of approximately $67.1 billion. When 1979 came around, the number of banks involved in international op-

Table 1.1: FOREIGN BRANCHES OF U.S. BANKS

Year	U.S. Banks with Overseas Branches	Number of Overseas Branches	Total Assets Overseas Branches ($ Billions)	Total Assets of All U.S. Commercial Banks ($ Billions)
1960	8	131	3.5	255.7
1964	11	181	6.9	343.9
1965	13	211	9.1	374.1
1966	13	244	12.4	401.4
1967	15	295	15.7	448.9
1968	26	375	23.0	498.1
1969	53	459	41.1	527.6
1970	79	536	52.6	576.2
1971	91	583	67.1	640.3
1972	108	627	77.4	732.5
1973	122	699	118.0	827.1
1974	125	734	151.9	919.5
1975	126	762	176.5	964.9
1976	127	731	219.4	1,030.7
1977	124	730	258.9	1,166.0
1978	137	761	306.8	1,303.9
1979	139	789	364.2	1,351.0
1980	143	787	401.1	1,537.0
1981	151	841	462.6	1,653.7
1982	162	900	469.2	1,820.0

erations had increased to 139 with 789 overseas branches and assets of $364 billion. Table 1.1 shows development patterns in the foreign expansion of U.S. banks.

Many reasons can be cited for this extraordinary increase. The boom in the establishment of foreign branches and subsidiaries was concurrent with the rapid expansion of U.S. multinational corporations around the world. With the global expansion of their clients, domestic banks attempted to meet their clients' new needs and began to set up branches and subsidiaries in the major and emerging financial center of the world.

Another reason was the massive growth of foreign trade and foreign direct investment. Moreover, this period also marked the arrival of a new financial institution, the

Euromarket, which enabled foreign branches of commercial banks to raise needed funds outside the United States without being subject to domestic reserve requirements and interest rate ceilings. Meanwhile, U.S. balance-of-payments deficits resulted in restrictive regulations on capital outflow. Between 1965 and 1974, U.S. banks were affected by the Voluntary Credit Restraint Program, which restricted the making of foreign loans directly from their domestic offices. Heavy domestic loan demand and the tight credit policies of the U.S. during 1966 and 1969-70 gave additional impetus to U.S. banks to look overseas. To keep capital at home, banks were encouraged to fund their overseas lending from external sources. Obviously, banks without foreign branches were at a great disadvantage when it came to competing for international business.

In the course of the last several years, lending to the less-developed countries (LDCs) has become one of the most serious issues facing the international capital markets because of a rapid increase in the volume of international capital flow to LDCs and a change in the transfer mechanism from official sources to private commercial banks. Until about 1970, LDCs with limited development capital or balance-of-payments deficits had to rely largely on foreign grants, IMF stand-by credit, suppliers' credits, and development loans from official lending agencies of foreign governments (see Table 1.2). Supplier and trade

Table 1.2: TOTAL FLOW OF FUNDS (DISBURSEMENTS) TO LDCS (U.S. $ Millions)[a]

	1969	1970	1971	1972	1973	1974	1975
Total official	4838	5503	6040	6714	8845	10303	14611
Government	3711	4185	4421	4816	6333	6983	10199
International organizations	1127	1318	1619	1898	2512	3320	4412
Total private	4062	4733	5168	7409	10510	13357	17894
Suppliers	2083	2297	1919	2384	2415	3097	3670
Financial markets[b]	1955	2135	3243	5018	8091	10259	14197
Other private[c]	24	301	6	6	4	1	27
Total	8900	10236	11208	14123	19355	23660	32505

(a) Computations based on the public and publicly guaranteed external debt disbursement of 84 LDCs.

(b) Loans from private banks and other private financial institutions plus publicly issued and privately placed bonds.

(c) Debts resulting from nationalized properties and unclassified debts.

SOURCE: World Bank, World Debt Tables, EC-167/477.

credits for financing exports from industrial countries was the LDCs' major source of private loans until 1970, but much of that money was provided under the umbrella of foreign nations' official credit or insurance agencies.[1]

Supplier and trade credits were supplemented by direct bond placements in foreign capital markets, which increased from $612 million for the decade 1956-65 to $380 million in 1970 alone. This funding was quite limited, however, both compared to supplier credits of $2.297 billion and relative to the need for $11.1 billion indicated by current-account deficits in the same year.

The LDCs' access to commercial banks as well as international bond markets increased steadily during the 1970s, as shown in Table 1.3. The worldwide recession and quadrupled oil prices of 1973-74 pushed the LDCs' foreign

Table 1.3: DEBT OUTSTANDING (DISBURSED) FROM PRIVATE SOURCES (U.S. $ Billions)[a]

Year	Suppliers	Financial Markets[b]	Other	Total
1969	6.7	5.8	0.7	13.3
1970	7.6	7.2 (28%)	1.1	15.9
1971	8.4	9.3 (29%)	1.1	18.9
1972	9.2	12.6 (35%)	1.0	22.9
1973	10.0	18.3 (45%)	0.8	29.2
1974	11.4	25.6 (39%)	1.2	38.2
1975	12.1	36.5 (42%)	1.1	49.7

(a) Computations based on the public and publicly guaranteed external debt outstanding of 84 LDCs.

(b) Annual growth rate is shown in parentheses.

SOURCE: World Bank, World Debt Tables, EC-167/77.

exchange requirements (deficits on current-account balance of payments) far in excess of what they were likely to obtain from traditional foreign official sources, despite the creation of a significant new official source of financing in the form of the IMF oil facility in 1974-75. Thus, while funds from foreign official sources to LDCs increased consistently in absolute terms, they subsequently decreased as a proportion of the total foreign exchange needs of LDCs. This meant that LDCs had to rely increasingly on commercial banks to meet their remaining financial needs.

Origins of the Debt Problem

Over the past two centuries, periods of rapid expansion of external capital flows and development loans have been followed by interruptions in debt service, partial or total debt repudiation, and a series of bank failures. Sudden brief bursts of lending after 1800 were typically

ignited by exogenous shocks that created new opportunities for profits. Immediately following an exogenous shock came characteristically high spirits with investors attempting to position themselves strategically. Bank expansion and "bond mania" during the 1870s provided funds to Russia, Spain, Turkey, Egypt, and several Latin American countries, as well as to the United States for railroad and canal construction.

Throughout the time that the feeling of high spirits about the economic situation of the 1920s prevailed, floating one loan frequently came to be regarded as adequate justification for further issues to the same borrower or the same country, regardless of the escalating load of indebtedness. Extensive defaults by Latin American and East European nations followed the build-up of foreign lending in the 1920s. By 1932, there were already defaults totaling about $2.6 billion. The sudden breakdown of world trade, swiftly declining prices for developing countries' exports, accelerating debt service ratios, and a resulting unavailability of foreign currency to meet external debt payments were the major reasons for the defaults of the 1930s.

During the period between World War II and 1973, external capital flows financed post-war construction in Europe and Japan, as well as development in Asia, Africa, and Latin America. Developing countries' external debts

rose only slightly during the reconstruction period, but began to expand in the early 1950s with the massive growth in world trade and income, as well as the emergence of most of the developing world as nations. External debt increased faster than export earnings but did not produce default or affect debt servicing.

The international lending that is widely discussed today is simply a result of the growth of the Euromarket--a phenomenon of the 1960s. In a Euromarket transaction, the borrower takes a loan in a financial center in a currency other than the one used for domestic transactions in that financial center. The first such transactions were made by East European countries with London banks in order to avoid placing their foreign currency reserves--at that time, mainly U.S. dollars--in the United States.

The Euromarket differs from traditional domestic and international capital markets in its regulation (or lack thereof), institutional structure, method of interest rate determination, and in the way funds are channeled from lenders to borrowers. The key distinguishing factor is that the Euromarket is unregulated, because its transactions are made outside the country whose currency is involved. U.S. dollar-denominated deposits, loans, and bonds in Europe, for example, are not subject to U.S. banking or security regulations. Hence the Euromarket can be defined as a market for lending in currencies other than

that of the country of domicile.[2] The size of the Euro-credit market, netting out all purely interbank loans, grew from $57 billion in 1970 to about $945 billion at year-end 1981.[3] This is equivalent to an average compounded growth rate of 29 percent, which by far outstripped the growth rate of commercial bank domestic banking activities.

The global debt problem of developing countries originated in particular from the first massive increase in oil prices in 1973-74. This price hike, or "shock" as it was popularly called, was to have profound social, political, and economic consequences. Several reasons can be cited for the aggravation of the problem; a major one was the effects of global recession from 1980 to 1982. Generally, it can be said that the global debt problem, which reached its height in 1982, was severely exacerbated by lower inflation and higher interest rates in the world economy. As did many individuals and institutions, nations suddenly found themselves paying debts with less-inflated, more-expensive funds rather than with highly inflated, "cheap" money. When the funds were borrowed, inflation was high and real interest rates were low or negative, but the funds became expensive within a low inflation, high real interest rate environment.

The pattern of the tremendous growth of international debt in the 1970s and early 1980s can be seen in Table 1.4.

Table 1.4: EXTERNAL DEBT OF NON-OIL DEVELOPING COUNTRIES (1973-84) AND OF EASTERN EUROPE AND USSR (1970-83) ($ Billions)[a]

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984[b]	Average Rate of Change (%)
Non-Oil Developing Countries													
Nominal debt	130.1	160.8	190.8	228.0	280.3	334.3	395.3	475.2	559.6	633.3	668.6	710.9	15.4
Long-term	111.8	138.1	163.5	194.9	237.2	282.7	336.2	290.8	455.8	508.2	566.4	622.8	15.6
Short-term	18.4	22.7	27.3	33.2	43.2	51.6	59.1	84.5	103.8	125.1	102.2	88.2	14.2
Real debt, deflated by:													
Export unit values (1973=100)	130.1	116.4	140.9	157.7	169.1	192.2	191.5	198.8	239.7	289.4	312.7	323.1	8.3
Import unit values (1973=100)	130.1	109.5	119.3	131.9	151.0	164.0	164.6	163.6	187.0	218.0	238.0	249.4	5.9
Nominal debt by analytical group													
Net oil exporters	20.4	26.0	34.1	42.4	59.7	68.4	79.3	95.4	125.4	147.7	154.9	164.1	19.0
Net oil importers	91.4	112.1	129.4	152.5	220.7	265.9	315.9	379.8	434.2	485.7	573.7	546.9	16.3
Major exporters of manufactures	40.8	51.7	60.9	73.1	105.3	128.4	154.0	188.1	220.2	249.2	261.3	274.8	17.3
Low-income countries[c]	25.4	29.7	33.2	38.3	48.6	54.8	62.7	71.4	75.2	81.8	87.8	94.8	12.0
Other net oil importers	25.2	30.6	35.3	41.1	66.8	82.8	99.2	120.3	138.8	154.0	164.6	177.2	17.7
Nominal debt by region													
Africa[d]	14.2	17.7	21.9	26.9	30.8	36.9	45.3	50.9	55.5	62.5	66.3	70.7	14.6
Asia	30.0	34.6	39.8	46.4	68.7	78.7	92.8	114.6	131.2	152.6	165.0	179.3	16.3
Europe	14.5	17.2	20.0	23.4	37.6	47.0	55.0	67.2	71.1	72.3	74.8	76.6	15.1
Middle East	8.7	10.3	13.3	16.1	21.9	26.7	32.0	36.3	40.6	45.6	50.7	56.2	17.0
Western Hemisphere	44.4	58.2	68.6	82.0	109.1	132.4	157.8	192.6	246.0	283.1	294.4	310.5	17.7
Eastern Europe and USSR													
Nominal debt[e]							76.5	82.0	86.5	82.5	79.5		

(a) Does not include debt owed to IMF.
(b) Figures for 1984 are IMF estimates.
(c) Excludes China prior to 1977. Low-income countries are those with per capita GDP less than $350 in 1984.
(d) Excluding South Africa.
(e) Gross debt in convertible currencies. Figure for 1983 is IMF estimate.

SOURCES: IMF World Economic Outlook 1983, 1984; and IMF International Financial Statistics, various issues.

When analyzed nominally, the unpaid debt of 142 non-oil developing countries more than quintupled, from $130 billion in 1973 to an estimated $711 billion in 1984.[4] When the debt owed by the five OPEC countries that are not in a capital surplus situation (Algeria, Ecuador, Indonesia, Nigeria, and Venezuela) is added, the total unpaid debt of developing countries stood at approximately $812 billion in 1984. A large proportion of the developing countries' total debt is owed by a relatively small number of countries. The twenty-five "major borrowers" accounted for 79 percent of the external debt of all developing countries in 1983.[5] The ten largest borrowers accounted for more than 50 percent, and the five largest (Brazil, Mexico, Argentina, Korea, and Indonesia) accounted for more than 33 percent.[6]

The greatest share of this external debt is sovereign debt: the sum of money owed overseas by national governments, by their decentralized agencies, or by private firms with public guarantees. Nevertheless, a significant part of the debt is owed by the private sector without public guarantees. In 1981, for example, the World Bank estimated that 80 percent of developing-country long-term debt was public or publicly guaranteed, and 20 percent was private.[7] In some countries, such as Chile, private debt is a much larger percentage of the total, producing special problems in cases of debt rescheduling.

During the 1973-84 period, non-oil developing countries saw the nominal value of their debt rise at an annual rate of approximately 15.4 percent. Although in real terms (deflating by an index based on export prices) the increase was a modest 8.3 percent per year, the growth rate of real debt exceeded both the growth rate of real gross domestic product of these countries (4.4 percent) and the expansion of export volume (7.1 percent). This means that while high inflation rates during the 1970s eased the load of unpaid debts, the increase in real debt during 1973-84 nevertheless surpassed the growth of real resources.

The increase in the burden of servicing the unpaid debt rose more rapidly than the increase in the level of the unpaid debt itself, especially after the late 1970s. Interest and amortization payments by non-oil developing countries on medium- and long-term debt grew from $18 billion in 1973 to $61 billion in 1979 and to $108 billion in 1982 (Table 1.5). The rapid increases in debt service obligations during 1979-82 resulted not only from high debt levels and nominal interest rates, but also from the expiration of grace periods for loans contracted in the mid-1970s.[8] A general calculation of real debt service payments may be done by deflating interest amortization payments by either export or import unit values. Both approaches are shown in Table 1.5.

Table 1.5: NON-OIL DEVELOPING COUNTRIES: DEBT SERVICE AND DEBT RATIOS, 1973-84[a]

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984[b]
Debt service ($ Billions)	17.9	22.1	25.1	27.8	32.8	47.5	61.0	73.4	97.2	107.7	96.6	103.4
Interest	6.9	9.3	10.5	10.9	12.7	18.1	25.9	39.0	54.7	63.0	59.2	63.7
Amortization[c]	11.9	12.8	14.6	16.8	20.2	29.4	35.1	34.3	42.5	44.6	37.4	39.7
Deflated by:												
Export unit values, 1973=100	17.9	16.0	18.5	19.2	19.8	27.3	29.6	30.7	41.6	49.2	45.2	47.0
Import unit values, 1973=100	17.9	15.1	15.7	16.1	17.7	23.3	25.4	25.3	32.5	37.1	34.4	36.3
Debt service/exports (%)	15.9	14.4	16.1	15.3	14.8	18.1	18.1	17.2	21.3	24.5	21.6	21.1
Interest/exports	6.1	6.1	6.7	6.0	5.7	6.9	7.7	9.1	12.0	14.3	13.2	13.0
Amortization/exports	9.8	8.3	9.4	9.3	9.1	11.2	10.4	8.0	9.3	10.2	8.4	8.1
By analytical group												
Net oil exporters												
Debt service/exports (%)	29.0	21.1	24.2	24.4	26.4	30.5	31.4	22.6	28.3	31.1	31.0	30.6
Interest/exports	8.8	7.8	9.3	9.2	8.7	9.8	9.9	11.3	15.8	19.9	20.7	20.0
Amortization/exports	20.1	13.3	14.9	15.3	17.7	20.7	21.4	11.3	12.5	11.1	10.4	10.6
Major exporters of manufactures												
Debt service/exports (%)	14.5	14.7	16.4	14.2	12.2	15.6	15.2	16.2	20.8	25.0	19.4	19.1
Interest/exports	5.6	6.1	6.9	5.5	5.1	6.2	7.3	9.0	11.8	14.5	12.5	12.0
Amortization/exports	8.9	8.5	9.5	8.7	7.1	9.3	7.9	7.2	9.0	10.4	6.9	7.1
Low-income countries												
Debt service/exports (%)	14.6	13.7	14.5	12.8	12.1	12.1	10.5	10.3	12.6	14.6	13.3	12.8
Interest/exports	6.1	5.4	5.4	4.9	4.7	5.1	4.5	4.4	5.1	5.4	5.4	6.0
Amortization/exports	8.5	8.3	9.2	7.8	7.4	7.0	6.0	6.0	7.5	9.2	8.0	6.8
Other net oil importers												
Debt service/exports (%)	12.7	10.6	11.8	12.9	13.9	18.7	18.7	18.6	21.6	23.8	24.0	22.6
Interest/exports	5.4	5.2	5.3	5.4	5.6	7.3	8.7	10.3	13.2	14.5	13.8	13.5
Amortization/exports	7.2	5.5	6.5	7.4	8.3	11.4	10.0	8.3	8.4	9.3	10.2	9.1
Debt/GDP (%)	22.4	21.8	23.8	25.7	23.7	24.1	23.3	23.9	27.1	32.5	36.7	37.5
Debt/exports (%)	115.4	104.6	122.4	125.5	126.1	127.7	117.2	111.2	122.5	144.1	149.5	144.7
Reserves/imports (%)	31.4	21.6	19.1	23.6	25.7	26.4	22.6	17.8	16.4	16.9	18.9	20.0

(a) Excludes data for the People's Republic of China prior to 1977.
(b) Figures for 1984 are IMF estimates.
(c) Payments of principal on long-term debt only. Estimates for the period up to 1984 reflect actual amortization payments. Estimates for 1982 and 1983 reflect scheduled payments, but are modified to take account of the rescheduling agreements of 1982 and early 1983.

SOURCE: IMF World Economic Outlook, 1983, 1984.

A very disturbing signal was the manner in which short-term debt (original maturity of less than one year) rose in the overall picture. Short-term debt rose from 8.7 percent of the total in 1973 to 14.6 percent in 1974-79 and to 18.1 percent in 1980-82 (Table 1.6). Since short-term debt is easily affected by abrupt interruptions in normal renewal once creditor confidence erodes, its rising share indicates a source of instability. Short-term borrowing is also not a reliable form of financing long-term development; in theory, loan maturities should be equivalent to the maturities of investment projects.

The debt service ratio, when calculated as interest and amortization payments on medium- and long-term debt divided by exports of goods and services, remained fairly stable at about 15 percent for non-oil developing countries through 1977, then rose from 19 percent in 1978 to approximately 24 percent in 1982. Increases in the debt service ratio were greatest for the group of countries which were termed "major exporters" (mostly middle-income countries that mainly export primary commodities). The debt service ratio of low-income countries, with greater reliance on fixed-interest loans on concessionary terms, was lower in 1984 than it was in 1973. What this signifies is that the burden of external debt increased conspicuously in real terms by this process also. On the other hand, it has to be pointed out that the debt burdens of individual

Table 1.6: NON-OIL DEVELOPING COUNTRIES: INDICATORS OF EXTERNAL DEBT, 1973-82

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
External debt ($ Billions)										
Total	130.1	160.8	190.8	228.0	278.5	336.3	396.9	474.0	550.0	612.4
Long-term	118.8	138.1	163.5	194.9	235.9	286.6	338.1	388.5	452.8	499.6
Short-term	11.3	22.7	27.3	33.1	42.6	49.7	58.8	85.5	97.2	112.8
Total, 1975 prices[a]	169.0	175.7	190.8	218.0	250.9	261.0	294.7	308.6	331.3	357.8
Exports of goods & services	112.7	153.7	155.9	181.7	220.3	258.3	333.0	419.8	444.4	427.4
Debt/exports (%)	115.4	104.6	122.4	125.5	126.4	130.2	119.2	121.9	124.9	143.3
Debt service[b]/exports (%)										
Reported	15.9	14.4	16.1	15.3	15.4	19.0	19.0	17.6	20.4	23.9
Adjusted[c]	n.a.	-1.6	6.5	10.5	9.4	11.0	6.9	4.9	11.7	22.3
Debt/GDP (%)	22.4	21.8	23.8	25.7	27.5	28.5	27.5	27.6	31.0	34.7
Oil imports/total imports[d] (%)	5.9	12.6	13.3	15.6	15.1	13.9	16.2	20.4	21.0	19.9

n.a. Not available.
(a) Deflating by U.S. wholesale prices
(b) Includes interest (but not amortization) on short-term debt.
(c) Deducting inflationary erosion of debt.
(d) Net oil importers only.

SOURCE: IMF, World Economic Outlook, 1982 and 1983.

countries did not follow a consistent pattern. This can be readily illustrated: in 1982, the interest/export ratio was about 6 percent for Nigeria (an increase over the 1979 figure of 1 percent), 39 percent for Brazil (25 percent in 1979), more than 20 percent for Peru (12 percent in 1979), and rounding out the data, approximately 13 percent for Colombia and the Philippines (7 percent in 1979).[9]

The sharp increase in the price of oil in 1973-74 and again in 1979-80 has to be regarded as a major cause of the debt problem of non-oil developing countries. In 1973, the "industrial countries" had a combined current-account (total trade in goods and services) surplus of $20.3 billion, but a year later this had changed dramatically to a deficit of $10.8 billion. Meanwhile, the total deficit of non-oil developing countries increased from $11.3 billion to $37.0 billion from 1973 to 1974 and to $46.3 billion in 1975 (Table 1.7).

In order to finance a current-account deficit, a developing country could elect to (a) deplete its international reserves; (b) reduce economic growth and restrict non-oil imports; or (c) borrow from external sources. From the trend of events, it is not difficult to see that the last option was the most attractive and the least painful. At that time, bankers had become more aware of the lending opportunities in developing countries. International commercial banks acted as intermediaries and recycled the

Table 1.7: CURRENT-ACCOUNT BALANCES ON GOODS, SERVICES, PRIVATE TRANSFERS, 1973-84 ($ Billions)

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984[a]
Industrial Countries	20.3	-10.8	19.8	0.5	-2.2	32.4	-5.4	-40.4	1.9	-1.4	-1.2	-22.5
Seven largest[b]	14.8	-2.7	24.9	10.1	10.0	35.9	6.9	-14.0	16.8	13.1	2.3	-23.0
Other	5.5	-8.1	-5.1	-9.6	-12.2	-3.5	-12.3	-26.4	-14.9	-14.5	-3.5	0.5
Developing Countries	-4.6	31.3	-10.9	7.7	-1.0	-36.6	0.5	23.3	-55.7	-94.2	-72.6	-58.0
Oil-exporting countries[c]	6.7	68.3	35.4	40.3	29.4	5.7	62.5	110.0	53.4	-12.0	-16.2	-8.0
Non-oil developing countries[d]	-11.3	-37.0	-46.3	-32.6	-30.4	-42.3	-62.0	-87.7	-109.1	-82.2	-56.4	-50.0
By analytical group												
Net oil exporters[c]	-2.6	-5.1	-9.9	-7.7	-6.3	-7.4	-7.3	-10.2	-24.3	-14.4	-6.9	-9.5
Net oil importers[d]	-8.8	-31.9	-36.4	-24.9	-25.0	-34.2	-52.5	-74.2	-86.1	-73.5	-54.5	-43.5
Major exporters of manufactures[e]	-3.6	-18.8	-19.1	-12.2	-8.9	-10.8	-22.9	-32.5	-37.4	-34.6	-17.1	-12.0
Low-income countries	-4.1	-7.5	-7.6	-4.3	-3.7	-8.2	-10.5	-14.1	-15.7	-15.1	-13.1	-12.5
Other net importers[f]	-1.1	-5.6	-9.7	-8.3	-12.5	-15.2	-19.1	-27.6	-33.0	-23.8	-24.3	19.0
By area												
Africa[g]	-1.9	-3.2	-6.6	-6.1	-6.6	-9.4	-9.9	-12.9	-14.0	-12.5	-10.8	-9.5
Asia[d]	-2.6	-9.9	-8.9	-2.7	-1.5	-8.3	-16.9	-25.4	-23.2	-14.6	-10.7	-8.0
Europe	0.6	-4.4	-4.9	-4.7	-9.1	-7.2	-10.1	-12.7	-10.4	-6.9	-5.5	-2.5
Middle East	-2.6	-4.5	-6.9	-5.4	-5.1	-5.7	-7.2	-7.1	-11.5	-9.3	-12.0	-12.0
Western Hemisphere	-4.7	-13.5	-16.3	-11.8	-8.5	-13.2	-21.4	-33.1	-45.5	-35.8	-18.5	-18.5
Total[h]	15.7	20.5	8.9	8.2	-3.2	-4.2	-4.9	-17.1	-53.8	-95.6	-73.8	-80.5

(a) Figures for 1984 are IMF estimates.
(b) Canada, United States, Japan, France, West Germany, Italy, United Kingdom.
(c) Algeria, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Oman, Qatar, Saudi Arabia, United Arab Emirates, Venezuela.
(d) The People's Republic of China, which is classified as a low-income country but is also a net exporter, is included in the total (from 1977 onward) but not in the subgroups.
(e) Argentina, Brazil, Greece, Hong Kong, Israel, Korea, Portugal, Singapore, Yugoslavia.
(f) Middle-income countries that, in general, export primary commodities.
(g) Excluding South Africa.
(h) Reflects errors, omissions, and asymmetries in reported balance of payments statistics on current account, plus balance of listed groups with other countries (mainly the USSR and other non-IMF-member countries of Eastern Europe).

SOURCE: IMF, World Economic Outlook, 1983, 1984.

OPEC current-account surpluses. These countries were growing about twice as fast as the industrial countries and demanded additional credit to keep growing. By increasing their level of indebtedness, the developing countries were able to delay the economic adjustment to higher oil prices and to maintain their high levels of government spending and investment. Moreover, the industrial countries implemented expansionary monetary policies leading to greater inflation, which also made the impact of higher oil prices less severe.

By 1978, the OPEC current-account surpluses had almost disappeared. The import capacity of the OPEC countries had increased while inflation had eroded some of the real gains from the price increase. The industrial countries accumulated current-account surpluses in 1978 of $32.4 billion, which provided sufficient funds for new credits to the non-oil developing countries.

The current-account positions of the oil-importing countries had just begun to improve over the tremendously negative situation of 1974 and 1975 when the OPEC oil price shock in 1979-80 caused a relapse. This greatly upset financial flow. The oil-exporting countries' current-account surpluses rose from $6 billion in 1978 to $63 billion in 1979 and $110 billion in 1980. Correspondingly, the current-account deficits of the non-oil developing countries went from $42 billion to $88 billion, and the

industrial countries again moved from surplus to deficit (Table 1.7). But this time, reactions of lender nations created different circumstances for developing countries. The industrial countries implemented tight monetary policies which restricted economic growth and led to higher interest rates. Funds were available to lend to the developing countries, but at average interest rates exceeding 15 percent. Consequently, the developing countries turned to short-term debt, substantially shifting the composition of their total debt. Long-term debt grew only 13.4 percent per year between 1980 and 1982, compared to 20 percent per year in the late seventies.

Even though most international lending experts (especially William Cline)[10] have referred to the sharp increases in oil prices of 1973-74 and 1979-80 as the single most important external cause of the debt problems of non-oil developing countries, a few experts disagree. They contend that a major part of the expansion of bank lending to developing countries was not coincident with these two periods of increased financial needs. They also argue that bank lending to developing countries had already risen in the late 1960s and early 1970s before the first oil shock. They further contend that official development assistance and official nonconcessional flows did not increase very much in real terms between 1970 and 1973, but

that real private bank lending grew 144 percent during those years.

William Cline estimated that the oil price increases added $260 billion to the debt of the non-oil developing countries from 1973 to 1982. He attributed 54 percent of the increase in the debt of the non-oil developing countries during that ten-year period to the oil price shock. Cline derived his estimate by creating a hypothetical "no oil shock" figure for comparison. To arrive at this figure, he assumed that oil prices rose at the same rate as the U.S. wholesale price index since 1973. He also assumed that the non-oil developing countries imported the same amount of oil relative to total imports as in 1973. Overall, the percentage of oil imports to total imports rose from 6 percent in 1973 to 20 percent in 1982. Thus, changes in the price of oil imposed an additional debt burden on the non-oil developing countries, which he estimated to be $260 billion over the ten-year period.

Debt Structure Changes, Interest Rates, and Recession

There have been several structural changes in debt associated with the increase in commercial bank lending. By year-end 1972, the developing countries' external debt was equally divided between official and private creditors. After the first oil shock, developing countries favored private creditors to finance their current-account

deficits. Because of this move, the proportion of long-term debt owed by non-oil developing countries to private creditors (mostly banks) increased from 45 percent in 1973 to an estimated 78 percent in 1984 (Table 1.8). The strongest growth was in funds from the syndicated loan market, as the loans from commercial banks went beyond the more traditional private debt sources, e.g., bonds and supplier's credits (Table 1.9). This trend continued. By 1984, the commercial banks' share of the total guaranteed medium- and long-term debt of non-oil developing countries to private creditors jumped to about 86 percent.[11]

As was discussed earlier, the maturity structure of debt also became shorter. The average maturity for a new loan in 1972 was 18 years, according to the World Bank (1983). By 1981, the average maturity had fallen to 14 years. Between 1979 and 1981, short-term debt of the non-oil developing countries increased from $58.8 billion to $97.2 billion. During the periods of high interest rates in the early eighties, long-term debt was either difficult to obtain or expensive. As a result, many of the larger developing countries contracted large amounts of short-term debt.

Short-term debt can take many forms including lines of credit, letters of credit, and import financing. Short-term debt must be rolled over or renewed periodically at the discretion of creditors. When credit conditions tight-

Table 1.8: CURRENT-ACCOUNT FINANCING BY NON-OIL DEVELOPING COUNTRIES, 1973-84.[a]

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984[b]
Current-Account Deficit[c]	11.3	37.0	46.3	32.6	30.4	42.3	62.0	87.7	109.1	82.2	56.4	50.0
($ Billions)												
Use of reserves[d]	-10.4	-2.7	1.6	-13.0	-11.5	-16.3	-11.8	-6.8	-5.4	3.8	-6.1	-13.3
Non-debt-creating flows[e]	10.3	14.6	11.8	12.6	14.1	17.0	23.7	24.1	27.2	23.9	21.3	23.0
Errors and omissions[f]	-3.8	-2.9	-5.6	-5.9	-6.5	-6.9	-3.0	-15.4	-15.5	-18.8	-10.0	-5.0
Net External Borrowing	15.2	28.0	38.5	38.9	34.4	48.6	53.0	85.9	102.9*	73.2	51.2	45.3
($ Billions)												
From private sources	10.1	19.6	24.4	23.7	18.4	32.8	36.5	60.6	70.5	36.2	20.2	21.2
Long-term capital	6.8	11.3	15.4	17.5	10.9	22.8	31.5	38.4	50.9	22.3	43.1	35.2
From banks[g]	6.5	10.3	14.2	15.3	6.8	22.0	23.3	27.8	28.8	15.7	40.2	35.6
Other	0.3	1.0	1.3	2.2	4.1	0.8	8.1	10.7	22.1	6.6	2.9	-0.3
Short-term capital	3.3	8.3	9.0	6.2	7.5	10.0	5.0	22.2	19.6	14.0	-22.9	-14.0
From official sources	5.1	8.4	14.1	15.1	16.0	15.8	16.5	25.3	32.4	37.0	31.0	24.1
Long-term capital	4.9	6.8	11.7	10.5	13.1	13.8	17.0	20.0	22.6	21.6	22.6	23.1
Use of IMF credit & other reserve related credits[h]	0.2	1.6	2.4	4.6	1.3	1.5	-0.9	3.9	7.2	8.3	10.2	5.0
Accumulation of arrears	--	--	--	--	1.6	0.5	-0.4	1.4	2.62	7.1	-1.8	-4.0
Net External Borrowing												
(percentage share)												
From private sources	66	70	63	61	53	67	69	71	69	49	39	47
Long-term capital	45	40	40	45	32	47	59	45	49	30	84	78
From banks[g]	43	37	37	39	20	45	44	32	28	21	79	79
Other	2	3	3	6	12	2	15	12	21	9	6	-1
Short-term capital	22	30	23	16	22	21	9	26	19	19	-48	-31
From official sources	34	30	37	39	47	33	31	29	31	51	61	53
Long-term capital	32	24	30	27	38	28	32	23	22	30	44	51
Use of IMF credit & other reserve related credits[h]	2	6	7	12	4	3	-2	5	7	11	20	11
Accumulation of arrears	--	--	--	--	5	1	1	2	3	10	-4	-9

(a) Excludes data for the People's Republic of China prior to 1977.
(b) Figures for 1984 are IMF estimates.
(c) Balance on goods, services, and private transfers (with sign reversed).
(d) Negative sign indicates accumulation of reserves.
(e) Chiefly foreign direct investment, aid grants, and SDR allocations.
(f) Presumed to reflect primarily unrecorded capital outflows.
(g) Refers only to long-term lending by banks guaranteed by government of debtor country. Bank lending also accounts for large fractions of unguaranteed long-term flows (included in other long-term flows) and short-term flows.
(h) Includes use of IMF credit and short-term borrowing by monetary authorities from other monetary authorities.

SOURCE: IMF, World Economic Outlook, 1983, 1984.

Table 1.9: LENDING BY PRIVATE CREDITORS TO 102 DEVELOPING COUNTRIES, 1970-82 ($ Billions)[a]

	1970	1973	1976	1978	1979	1980	1981	1982
Debt outstanding to foreign private creditors (year-end)	15.8	32.0	71.1	125.4	154.5	177.7	201.9	229.0
Financial institutions	5.0	16.4	48.5	89.6	118.2	140.0	164.4	190.3
At variable interest rates	0.5	9.3	33.7	64.3	89.2	107.4	131.9	152.8
At fixed interest rates	4.5	7.1	14.8	25.3	29.0	32.6	32.5	37.5
Bonds	3.1	4.5	6.3	13.5	14.1	15.5	16.6	17.1
Suppliers' credits	6.6	9.9	14.3	21.0	21.0	21.5	20.4	21.0
Other[b]	1.1	1.2	2.0	1.3	1.1	0.7	0.6	0.5
Disbursements by foreign private creditors	4.1	11.6	23.9	45.6	52.9	45.8	51.9	48.0
Financial institutions	1.8	7.7	17.7	35.3	45.9	38.6	44.8	39.2
At variable interest rates	0.4	5.7	11.6	27.7	38.1	30.7	37.3	32.0
At fixed interest rates	1.4	2.0	6.1	7.6	7.8	7.9	7.5	7.2
Bonds	0.1	1.0	1.5	3.9	1.9	2.2	2.3	3.0
Suppliers' credits	1.8	3.0	4.7	6.4	5.1	5.1	4.8	6.2
Other[b]	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0

(a) Data covers 102 countries reporting under the Debtor Reporting System.
(b) Principally debt that stems from nationalization or compensation for expropriated foreign assets; this category also includes debt not otherwise allocated.

SOURCE: World Bank, World Debt Tables, 1983-84.

ened during 1982 and 1983, many banks attempted to reduce their short-term lines of credit, only to find that the countries were dependent on the lines. A good example is Mexico, which increased short-term debt from $8 billion in 1977 to $32 billion in mid-1982, equivalent to an increase in the proportion of short-term debt from 41 percent to 50 percent over the period.

Another important change was an increase in the use of variable (or floating) interest rates between 1972 and 1981. In 1972, only 6.5 percent of disbursed debt had a variable interest rate feature. By 1981, the share of debt with variable interest rates was 37.4 percent. The use of variable interest rate loans made lending more attractive for commercial banks because it eliminated the risk associated with fixed rate loans. With variable rate loans, the principal payments are accelerated as the inflation rate increases. This protects the lender from capital losses resulting from higher inflation but is an added burden on the borrower. For borrowers, the use of variable interest rate loans tied the country closer to world financial markets and made the country more vulnerable to sudden changes in interest rates.

The next structural change was increased involvement of a number of U.S. regional and smaller European banks in international lending between 1972 and 1981. Before 1973, lending by private creditors was mainly in the form of

trade credits and was done only by large international banks. Smaller European and U.S. regional banks were not involved in international lending. There were few large syndicated loans to developing countries. In contrast, during the late seventies, smaller European and U.S. regional banks became involved in lending to developing countries and financing international trade. Such banks entered international lending because economic growth in the industrial world was much slower than in the developing world and there were fewer loan opportunities. International loan losses at the time were extremely unusual and mainly related to private sector companies. Hence, these new participants in international lending felt comfortable in lending to a foreign public corporation whose debts were guaranteed by the domestic government. The new banks entering the international lending market increased the supply of funds available for international lending.

In order to discuss the final structural change, the following points have to be recognized. Assuming that the massive increase in oil prices set the stage for the tremendous increase in external debt over the last decade, then the global recession and skyrocketing interest rates of 1982 contributed extensively to the problem. The developing countries became accustomed to low real interest rates in the 1970s. Real interest rates can be defined as nominal interest rates (in this case the prime rate) minus

the expected inflation rate.[12] William Cline, in his general calculation, stated that, between 1961 and 1970, London Inter-Bank offer rate (LIBOR) on U.S. dollar deposits minus the U.S. wholesale price increase produced an average real interest rate of 4.2 percent on non-oil LDCs' external debt. This rate dropped to an incredible -0.8 percent in the period 1971-80. Even though nominal interest rates were high in 1979 and 1980 (LIBOR averaged 13.2 percent), so too was the U.S. inflation rate. But when inflation began declining in 1981-82, it was not accompanied by a corresponding decline in nominal interest rates. This resulted in high real interest rates (7.46 percent in 1981 and 10.95 percent in 1982). In fact, William Cline has also calculated that this surge in interest rates, caused by expansionary fiscal and tight monetary policies in the U.S., accounted for approximately $41 billion in total excess interest payments in the period 1981-82 beyond what would have been anticipated on the basis of real interest rates over the previous two decades.[13]

Although there is considerable coincidence between skyrocketing real interest rates and the world-wide recession of 1980-82, it is safe to say that the high real interest rate had a strong effect. Between 1973 and 1979, real growth in industrial countries averaged 3.2 percent annually. It then fell to 1.2 percent in 1980-81 and to

-0.3 percent in 1982.[14] Commodity export prices for developing countries also fell victim to the recession, and by 1981-82, they had deteriorated drastically. If 1980 is assumed to equal 100, export unit values fell to an index of 94 in 1981 and to 90 in 1982 for developing countries. Import unit values rose to 103 in 1981 and returned to 100 by 1982.[15] Cline estimated that a total loss of $79 billion was suffered by non-oil developing countries as a result of the worsening situation of trade bases (goods and services).[16] Adding to the problem was the fact that real export volume was also a victim of the 1980-82 world recession. Real export growth, which recorded an average of 8.1 percent in 1971-80 for non-oil developing countries, was measured at 9.9 percent for 1981 and then drastically declined to 1.8 percent in 1982.

The preceding events were a factor in Cline's decision to establish that the ex ante impact of all of these exogenous shocks was to increase the debt of non-oil developing countries by $401 billion. These figures are summarized in Table 1.10, which also shows that the total increase in external debt of these countries since 1973 amounted to $482 billion. Although these figures are not strictly comparable to actual debt increases after the fact, because countries did pursue adjustment measures to reduce external deficits (and debt), nonetheless, they strongly suggest that a very large part of the increase in

Table 1.10: IMPACT OF EXOGENOUS SHOCKS ON EXTERNAL DEBT OF NON-OIL DEVELOPING COUNTRIES

Effect	Amount ($ Billions)
Oil price increase in excess of U.S. inflation, 1974-82 cumulative	260
Real interest rate in excess of 1961-1980 average: 1981 and 1982	41
Terms-of-trade loss, 1981-82	79
Export volume loss caused by world recession, 1981-82	21
Total	401
Memorandum Items	
Total debt: 1973	130
1982	612
Increase: 1973-82	482

SOURCE: William R. Cline, International Debt and the Stability of the World Economy, Institute for International Economics (September, 1983).

developing-country debt in the last decade may be attributed to the impact of global causes that were exogenous to the developing countries themselves.

Domestic Policies

In addition to these exogenous shocks, the developing countries' domestic policies can be blamed for the deterioration of their debt situation. In Mexico, government action was responsible for the peso becoming seriously overvalued, and thus for deficits surging to 16.5 percent of GNP in 1982. The government also strictly followed a strategy of high growth that probably exceeded capacity growth and failed to take into account the substantial weakening of the oil market in 1981.

In the case of Brazil, a high-risk strategy of pursuing high growth that depended on rapid accumulation of external debt proved to be an oppressive burden when the

international economy weakened and exports declined instead of continuing their earlier rapid growth. These policies contributed greatly to the severe recession that started in 1981 and lasted until 1983. In addition, overvaluation of the cruziero followed a failed attempt to bring down domestic inflation by placing a 40 percent ceiling on devaluation in 1980.

In the case of Argentina, pre-announcement of a government plan to reduce inflation through devaluing the exchange rate by less than the domestic inflation rate resulted in a tremendously overvalued peso, high imports, poor export performance, and a massive increase in the level of debt in 1981. Chile had seen strict monetary and fiscal policies reduce inflation in the 1970s. However, it followed Argentina's example in trying to reduce inflation by pre-announcing an exchange rate devaluation by less than the rate of domestic inflation. As a result, Chile too faced an acute overvaluation of the peso, which, coupled with the decline in the price of copper, increased the level of debt.

Slackness in management of state agencies in Venezuela contributed to the build-up of short-term debt after 1976, despite the presence of surpluses in the petroleum agency. In Venezuela and Mexico, attempts to maintain an overvalued currency in a fully convertible basis, along with domestic interest rate policies, led to capital flight. In Argen-

tina and Venezuela, outflow of capital is estimated to have accounted for roughly one-third of total debt, and in Mexico, approximately one-fifth.

In addition to short-term policy errors, long-term development strategies have been disastrous. Excessive protection in programs of industrialization based on import substitution, inadequate pricing of capital, over-pricing of labor, overly ambitious and inefficient government enterprise activities, and other distortions have been a significant hindrance to growth in many developing countries.[17]

Debt Rescheduling of the LDCs

Debt reschedulings were relatively uncommon from about 1948 until 1979. The first major debt rescheduling to occur during this time was in 1954, when Argentina rescheduled $500 million of loans. At that time, the Paris Club, an unofficial organization of government lenders, was formed to facilitate the debt restructuring.

Between 1956 and 1979, there were 41 cases of debt reschedulings. The majority of these reschedulings involved government lenders only and were handled by the Paris Club. Debt to international organizations and commercial banks generally was not included in the rescheduling process. Several of the debt reschedulings were actually aid consortia (loans raised among a group of

international banks formed by groupings of existing banks usually drawn from different countries) and not true debt reschedulings. For example, the reschedulings of India's debt between 1974 and 1976 and of Pakistan's debt in 1974 were considered aid consortia. The maturity of their debts was extended to more than twenty years, and the interest rates were substantially reduced.

Table 1.11 lists the countries that rescheduled their debts between 1956 and 1979 and the amounts involved. Only fifteen countries were involved in debt reschedulings during the entire period. With this relatively small number of countries, the international financial markets, IMF, and the commercial banks could easily monitor the situation and increase credit exposure if required. All but four of these countries rescheduled their debt several times. India rescheduled seven times during this period, while Chile, Ghana, Indonesia, and Turkey each rescheduled four times, and Argentina, Peru, Pakistan, and Zaire on three occasions each. Apparently, once a country rescheduled its debt, it was likely to do so again.

Although most of the debt reschedulings involved mainly government creditors, commercial bank debt rescheduling started to occur frequently in the late seventies. Bank reschedulings are more difficult because of the large number of parties involved. The rescheduling of a loan syndication requires the approval of all of the lenders.

Table 1.11: DEBT RESCHEDULING, 1956-79

Year	Country	Amount ($ Millions)	Year	Country	Amount ($ Millions)
1956	Argentina	500	1972	Cambodia	2
1959	Turkey	440	1973	India	340
1961	Brazil	300		Pakistan	107
1962	Argentina	270	1974	Pakistan	650
1964	Brazil	270		Chile	450
1965	Argentina	274		India	194
	Turkey	220		Ghana	190
	Chile	90	1975	India	248
1966	Indonesia	310		Chile	230
	Ghana	170	1976	Zaire	280
1967	Indonesia	110	1977	Zaire	210
1968	Indonesia	180		India	200
	Peru	120		India	120
	Ghana	100		Sierra Leone	52
	India	100	1978	Peru	1,212
1969	Peru	100		Turkey	1,100
1970	Indonesia	2,090	1979	Turkey	3,200
	Ghana	18		Zaire	1,000
1971	India	100		Sudan	500
1972	Chile	258		Togo	200
	Pakistan	236			

SOURCE: Euromoney, August, 1982.

Moreover, bankers do not always have the influence on government policy that government lenders may have. As a result, bankers try to get the IMF or governments involved in the debt rescheduling process.

The shock of the increasing and, through 1983, accelerating rate of debt rescheduling has dramatically changed international banking. Rescheduling negotiations occur either through mutual agreement between a debtor country and its creditors or because a country has either defaulted or is likely to default in the near future. By definition, any failure to service a loan agreement on schedule, regardless of the reason, is a default. However, a distinction is usually drawn in the literature between a narrower definition of default, the inability to service

debt, and a repudiation, which refers to the unwillingness to service a debt on schedule. Examples of repudiation can be found in the cases of Cuba, North Korea, and the People's Republic of China in the 1950s and possibly Iran in the 1980s.

Whether a country will be able to service its foreign debt on schedule is dependent upon the willingness of the government to favor foreign debt service over economic and political goals. When the perceived burden of the current pattern of debt service exceeds the perceived benefits, then a country will seek to reschedule. Thus a re-scheduling may be requested by one country while a similar country with a more onerous foreign debt continues to make payments according to the original agreement. In other words, whether a rescheduling occurs may depend on perceptions, political will, or negotiating ability as well as on the actual economic conditions of the country.

In order to prevent the debtor from favoring one creditor over another, both government (official) and bank creditors favor multilateral rescheduling negotiations over bilateral ones. Government creditors tend to use the Paris Club, a facility provided informally by the French Government. Of the forty-three official multilateral debt negotiations that occurred between 1975 and 1983, thirty-four occurred under the auspices of the Paris Club. Other government rescheduling negotiations were organized by

various aid consortia, which conducted five negotiations and OECD, which held three. Private banks lack the formal rescheduling mechanism of the Paris Club, but their negotiations tend to coalesce around several standing "rules." The banks with the largest exposure in the country will generally handle most of the direct negotiations. No bank can receive more favorable terms than another bank in the agreement, and a rescheduling agreement is usually accompanied by an agreement with the IMF. From 1978 through 1983, 83 percent of the multilateral bank rescheduling agreements were made conditional upon the country agreeing to follow economic policies recommended by the IMF.

This dependence on the IMF reflects the inability of banks to monitor the economic policy and institutions of a debtor country. Assuming that a country's debt crisis was begun or exacerbated by the government policies of the debtor nation, the private creditors will seek assurances that the government will change these policies. It is difficult for a consortium of banks to obtain these assurances. While the banks involved in a rescheduling may stick together until the agreement is reached, their common interests are much more limited after the new debt service schedule has begun. An LDC government can play one group of international banks against another with the threat that if any group insists too adamantly on the country's com-

pliance with the policy understandings of the rescheduling agreement, then that group will be excluded from future lending opportunities involving that country.

In a recent attempt to circumvent this problem, many of the international banks have sponsored a joint information clearing house and analysis center. While an organization might reduce the endemic shortage of accurate information concerning LDC economies, it seems unlikely that a private authority will be able to monitor agreements as effectively as the IMF, which wields a powerful financial club. The IMF can provide financing from its own sources or withhold such financing if its conditions are not met. It is extremely unlikely that private banks will extend authority to some outside organization to commit the banks to make or refuse loans. The banks and the LDC are always free to enter private negotiations.

Although every bank rescheduling agreement is different, some generalizations are possible. The terms of the reschedulings in the period 1978-1983 tended to be rigorous with respect to interest and liberal with respect to principal. Interest arrears were rarely rescheduled. Of the fifty-one bank rescheduling agreements for thirty countries during the period 1978-1983, only eight of the agreements for four countries allowed interest in arrears to be rescheduled. However, in fifteen agreements for eleven countries, the banks agreed to make new loans as

part of the rescheduling agreement, resulting in partial or full capitalization of interest.

This insistence on the part of the banks that interest payments must be made on schedule regardless of whether or not the principal is rescheduled is primarily a result of how banks calculate their earnings. In the U.S., it has long been the practice that a loan must be declared non-performing if interest payments are overdue a significant period of time. The International Lending Supervision Act of 1983 gave this practice the force of law by requiring that any loan be declared non-accrual if interest payments are more than ninety days in arrears. A non-performing/non-accrual loan must be reported to shareholders in a public corporation, and the bank's auditors usually require that the loan be reduced in value to reflect an estimate of its actual worth. Thus non-receipt of interest not only directly reduces the bank's earnings but also, if the book value of the loans is lowered, reduces the bank's net worth or capital. (Since assets equal liabilities plus net worth, by definition, a reduction in the valuation of a bank's assets leads to an equivalent reduction in the bank's net worth).

It is for this reason that banks are willing to allow interest payments to be rescheduled only when the amounts are small. The foreign bank debt of the four countries that rescheduled interest arrears, Bolivia in 1983, Nica-

ragua in 1980-83, Senegal in 1982, and Sudan in 1981 and 1983, amounts to a relatively small proportion of foreign bank debt. In contrast, countries that received funds to capitalize interest included the LDCs with the largest proportion of foreign debt: Argentina, Brazil, and Mexico.

Beginning in 1980, debt reschedulings started to take on a more ominous nature. The doubling of oil prices, high interest rates, and the world-wide recession provided a very tough economic setting. In 1980, eight countries, led by Turkey and Zaire, rescheduled debts valued at $5.1 billion (see Table 1.12). The trend continued in 1981 when twelve countries rescheduled their debts. However, most of the countries involved were small African or Latin American countries, and the debt problem was not considered too serious at the time. Since relatively few problems had occurred during the first petrodollar recycling, the second recycling in 1980 was not feared.

However, there were three major differences between the two OPEC current-account recyclings. First, the industrial economies restricted their monetary policies from 1980 to 1982 to avoid the inflationary impact of the increase in oil prices. After the initial spurt caused by energy prices, inflation slowed dramatically in the industrial countries. Second, the world entered a protracted recession lasting three or more years. The slowdown in the world economy, a decline in world trade, and a slump in

Table 1.12: DEBT RESCHEDULING, 1980-83

Year		Amount ($ Millions)	Year		Amount ($ Millions)
1980	Turkey	3,000	1983*	Mexico	24,550
	Zaire	1.008		Brazil	13,600
	Nicaragua	437		Argentina	6,000
	Yugoslavia	420		Chile	4,100
	Togo	68		Yugoslavia	3,800
	Sierra Leone	40		Peru	2,820
	Liberia	30		Poland	2,600
	Bolivia	29		Ecuador	2,350
				Nigeria	1,830
1981	Turkey	3,100		Zaire	1,600
	Sudan	638		Costa Rica	1,366
	Zaire	574		Morocco	1,200
	Bolivia	444		Romania	767
	Pakistan	263		Dominican Republic	660
	Nicaragua	190		Cuba	583
	Jamaica	103		Sudan	550
	Togo	93		Bolivia	536
	Senegal	77		Togo	384
	Central African Republic	55		Zambia	320
	Uganda	27		Madagascar	195
	Liberia	25		Senegal	173
				Uruguay	170
1982	Poland	4,600		Jamaica	166
	Romania	1,778		Honduras	122
	Sudan	174		Malawi	87
	Madagascar	103		Niger	29
	Senegal	84		Liberia	25
	Nicaragua	55		Guyana	24
	Malawi	24		Central African Republic	13
	Liberia	27			
	Guyana	14			
	Uganda	10			

* Covers arrangements signed or agreed in principle.

SOURCES: World Debt Tables, 1983-84 Edition, and Euromoney, August 1982.

commodity prices made it extremely difficult for the LDCs to earn enough foreign exchange to service their debts. Finally, the U.S. dollar gained strength from 1981 to 1983. Since most debt was contracted in dollars, the relative cost of servicing the debt appreciated with the dollar's strength.

With the world-wide recession continuing in 1982, the debt problem became more pronounced. In 1982, ten countries had to reschedule their debts. When Mexico, which

owed about $85 billion, announced in August 1982 that it was close to default and had to reschedule its debt, the problem finally got the attention that it deserved. Then in December 1982, Brazil, the most indebted developing country, with a debt of $86 billion, announced that it would also reschedule its debts. During 1983, twenty-nine countries, including Mexico and Brazil, negotiated debt reschedulings of $68.8 billion. Fourteen of the twenty-nine countries had already rescheduled their debts at least once between 1980 and 1982. Of the total debt rescheduled in 1983, debt to commercial banks represented 84 percent or $57.9 billion, according to the IMF Survey (1984). The remaining $10.9 billion was government-to-government debt which was rescheduled by the Paris Club.

One general explanation of the record number of debt reschedulings is that it was the result of a unique combination of adverse economic shocks which occurred from 1980 to 1983. The 1980 to 1983 world recession was one of the longest and deepest on record. The recession was accompanied by high real interest rates, higher oil prices, an oil supply crisis, a decline in commodity prices, an increase in the value of the dollar, and a decline in world trade. As an example, the prime rate in the United States had not averaged more that 11.0 percent for longer than a year since World War II. The prime rate was 15.27 percent in 1980, 18.87 in 1981, and 14.86 in 1982. The largest

cumulative decline in commodity prices since the depression occurred from 1981 to 1982. In 1981, the commodity price index of the IMF fell 14.7 percent and then fell another 12.2 percent in 1982. Thus, the severity and the length of the recession mark the 1980 to 1983 period as the worst in post-war economic history.

Another explanation for the record number of debt reschedulings is related to the supply of credit. It is logical that if commercial banks suddenly stopped lending to the developing countries, there would be massive reschedulings, and in fact, commercial bank lending to the non-oil developing countries did slow dramatically in 1982 and 1983. From 1979 to 1981, net new bank lending to the non-oil developing countries expanded at annual rates exceeding 22 percent. In 1982, bank lending increased only 8.8 percent, as shown in Table 1.13. In monetary terms, new bank lending was $49 billion in 1980 and $51 billion in 1981, which covered about half of the current-account deficits of the non-oil developing countries. New bank lending in 1982 fell to $25 billion, enough to cover 29 percent of the current-account deficits. Seven billion dollars of reserves, as well as other sources of financing, had to be used to cover the current-account deficits.

In 1983, new lending by commercial banks declined to an estimated $15 billion, one-third the level in 1981. New lending would probably have been even less if not for the

Table 1.13: BANK LENDING TO NON-OIL DEVELOPING COUNTRIES, 1977-82 ($ Billions)

	1977	1978	1979	1980	1981	1982
Net bank lending	15	25	40	49	51	25
Growth in bank lending (%)	14.9	19.3	26.6	26.2	22.2	8.8
Current-account positions	-29	-41	-61	-89	-108	-87
Bank lending as a percent of current account (%)	52	61	66	55	46	29
Change in reserves	13	17	13	5	2	-7

SOURCE: IMF, International Capital Markets, Developments and Prospects, 1983, Occasional Paper #23.

"involuntary" lending required by IMF stabilization programs; in 1983, 90 percent of the bank lending to Latin America was required by rescheduling programs.

The change in OPEC current-account balances was one of the causes of the decline in new bank lending. When the OPEC current-account surplus evaporated in 1982, one of the major sources of new funds for the banking system was lost. In 1982, the OPEC current account recorded a deficit of $2 billion after a surplus of $65 billion in 1981. In 1983, the OPEC current-account deficit expanded to $27 billion, which tightened international credit conditions even more.

To conclude, the huge debt reschedulings of the early eighties have to go down as one of the phenomenal events in modern international economic history. The factors most directly and immediately responsible for bringing the external financial positions of many developing countries under such severe strain in 1982 were higher oil prices in 1973-74 and 1979-80, unprecedented high interest rates in

1980-82, declining export prices and volumes connected with global recession in 1981-82, and inappropriate domestic economic and financial policies.

Debt-Relief Proposals

When the critical nature of the debt problems became universally evident by early 1983, a variety of debt-relief proposals were suggested. Programs advocated for attaining debt relief were divided between those favoring solutions through an increase in debt and those favoring solutions that would reduce it.

Programs of the former type viewed debt problems as mostly problems of liquidity, capable of being eased and eventually resolved by an increase in lending. A very good example of this was the proposal introduced in 1983 by Lord Lever, the former British Minister, advocating a substantial increase in official loan guarantees through export credit agencies.

On the other hand, debt-reducing programs focused on debtor solvency. Their proponents argued that without an easing of the debt service burden, many countries would be unable to recover financial strength. Their assertion was that both the countries and their creditors would be better served by agreeing to an early financial reconstruction, and they pointed to similarities in some respects to Chapter 11 arrangements under U.S. bankruptcy laws. It was

their contention that if the negotiations were held under appropriate international supervision, the agreements would restore growth to the debtor countries, improve the global economy, and present banks the opportunity of eventually recovering a higher proportion of their loans than if they continued to seek repayment in full.

In 1983, Peter Kenen, a professor at Princeton University, and Felix Ruhatyn, former chairman of New York's Municipal Assistance Corporation, proposed the creation of a new international agency to take over claims owed to commercial banks and assume responsibility for adjusting terms with the debtors. The initial cost would be borne by banks, which would sell their loans to the agency at a discount. However, the residual credit risk would then pass to the agency and its official shareholders.

These proposals required official support and financial commitment at a level that was not politically feasible. The global recovery of mid-1983 made the fate of the proposals questionable. The slowdown of the world economy after 1984 along with the failure of debtor countries to resume adequate growth became signals for action to be taken in new directions.

The U.S. Secretary of the Treasury, James A. Baker III, set forth a basic international strategy for dealing with the debt problem. This strategy has subsequently guided official policy. The Baker plan was presented at

the meetings of the World Bank and International Monetary Fund in September 1985 in Seoul, Korea. That plan sought to reinforce the tripartite strategy that had developed after 1982: adjustment by debtor countries, additional bank lending, and financial support from international agencies and industrial country governments. The Baker plan's guidelines were that banks should expand their exposure by approximately 2.5 percent per year, amounting to $7 billion annually for fifteen major debtor countries. The plan also expected the international agencies to orient their programs more fully toward growth and less toward contractionary adjustments and required multilateral development banks in particular to increase their net disbursements by approximately $3 billion annually. Moreover, it expected debtor countries to adopt structural reforms oriented toward improved longer term growth, especially trade liberalization, encouragement of foreign investment, and reduction of the role of the state in their economies.

Not surprisingly, the Baker plan has been criticized as insufficient. Bela Balassa, Bueno, Kuczynski, and Simonsen all indicated that to ensure adequate growth, the Baker plan's capital-flow targets should be increased from $10 billion to $20 billion per year. They also felt that the bulk of the additional funds should come from the official sector, in view of the already extended position

of the banks and the difficulty of mobilizing cohesive bank participation in raising even the original fund Baker proposed.[18]

As interest in debt-relief programs was fading, oil prices suddenly collapsed in 1986 and Mexico experienced extreme external-sector difficulties through mid-1986. The suspension of interest payments in February 1987 rekindled interest in debt-relief programs. During the first quarter of 1987, some of the debt-relief proposals suddenly became topics of important discussions in the U.S. Congress.

Senator Bill Bradley's plan was the most widely publicized debt-relief proposal to originate with a U.S. legislator. Senator Bradley disagreed with the Baker plan, saying that it would prolong the debt problem by piling more debt on top of existing debt. He contended that the past strategy for dealing with the problem had benefited banks at the expense of the U.S. agricultural and manufacturing firms and workers, who had lost out when exports dropped as Latin American debtor countries were forced to cut back their imports.

Senator Bradley proposed that for a period of three years, the banks forgive 3 percentage points of interest and 3 percent of principal annually. At the end of the period, full servicing of interest and of the remaining principal would resume. For their part, the debtor countries would adopt economic reforms of their own choosing, a

plan Senator Bradley considered to be more sustainable than reforms imposed from outside by the Baker plan.

A plan by Jeffrey D. Sachs of Harvard University is more concentrated than that of Senator Bradley in terms of narrower country coverage as well as more extensive relief.[19] One of the major differences is that, while the Bradley plan would be available for the full range of debtor countries, Sachs' proposal would require that outright debt relief be limited to those countries that have experienced declines of 15 percent or more in per capita GNP since 1980. At the same time, his proposal would forgive all interest payments over a period of five years, and countries that had experienced declines in per capita income of more than 25 percent would be forgiven interest over 10 years. The extent of forgiveness in this proposal is far greater than in the Bradley plan. But since the Sachs plan forgives only interest, it accomplishes a greater cash-flow relief per unit of bank loss than the Bradley plan, which, by also forgiving some principal, inflicts a loss that has no counterpart in current cash-flow reduction.

The Bradley and Sachs plans differ in degree, but the Kenen, Sarbanes, LaFalce, and Weinart plans differ in kind from both of these. This alternative family of plans stems from an idea first proposed by Peter B. Kenen of Princeton University, that some international entity could buy up

debt from the banks at a discount and pass along the benefit of the discount to the debtor country.[20]

Sometime in late 1986, Senator Paul S. Sarbanes suggested that a new entity purchase the debt held by banks at a discount, and pass on the discount to debtor countries in the form of lower interest rates. Senator Sarbanes proposed that the capital base necessary for such an entity come from Japan's large external surplus.

Richard Weinert proposed that the existing secondary market in developing-country debt could provide the valuation basis for the purchase of debt from the banks, and that the existing discount would then be passed on to the debtor country. Congressman John J. LaFalce proposed legislation in March 1987 that followed this approach. The LaFalce plan would use approximately $4 billion of the IMF's holdings of gold (about 10 percent) for the creation of an international debt adjustment facility to purchase a country's loans at a discount in the secondary market and to restructure them to pass on the benefit of the discount to the debtor. The purchase program would be initiated by a request from the country, but be implemented only after agreement on a detailed plan of future economic management. The facility would also seek to use debt-equity swaps and commodity linked bonds to expand the degree of restructuring.

Alfred Herrhausen of Deutsche Bank proposed the creation of an Interest Compensation Fund (ICF) to stabilize and limit the interest payments of eligible developing countries (eligibility would be determined by need and the debtor's commitment to an approved adjustment program). The ICF would be financed jointly by governments, international financial institutions, and banks on the basis of their respective exposure to the debtor, and would be managed by the IMF. It would limit interest rates to a pre-agreed level, but allow for a recovery of earlier unpaid interest if rates subsequently fell below this level.

Finally, the obvious lack of enthusiasm on the part of the international banks to the Baker plan of 1985 has at long last led to consideration by the U.S. administration of different proposals. On March 9, 1989, Nicholas Brady, U.S. Treasury Secretary, in a speech to the Brookings Institution and the Bretton Woods Committee Conference on Third World Debt specified that the United States government will look favorably on guarantees to encourage commercial bank creditors to pass the discounts on their third-world debts on to the debtors as a form of debt relief. This is contingent on the bankers undertaking renewed lending to third-world debtor countries. The speech also indicated that the U.S. has explicitly ended opposition to the idea of guarantees as a means of inducing

commercial banks to forgive some developing countries' debt.

The following are key points in Treasury Secretary Brady's suggestions. The debtor nations must concentrate particular attention on the adoption of policies which can better encourage new investment flows, strengthen domestic savings, and promote the return of flight capital. This requires sound growth policies which creates confidence in both domestic and foreign investors. He specified that the IMF and the World Bank should emphasize the reduction of future stock of debt and sustaining strong growth. He also brought up the point that total capital flight for most major debtors was roughly comparable to their total debt.

Brady went on to urge the creditor community--the commercial banks, international financial institutions, and creditor governments--to provide more effective and timely financial support. Commercial banks need to work with debtor nations to provide a broader range of alternatives for financial support, including greater efforts to achieve both debt and debt-service reduction and to provide new lending. He further stressed the negotiation of a general waiver of the sharing and negative pledge clauses for each performing debtor, to permit an orderly process for banks to negotiate debt or debt-service-reduction transactions.

Another point stressed by Brady was more timely and flexible financial support. There is a need to make the

way "financial gaps" are estimated and filled less rigid and less cumbersome. He also indicated that while it is accepted that the IMF should continue to estimate debtor financing needs, there is still a question of whether the international financial institutions should delay their initial disbursements until firm, detailed commitments have been provided by all other creditors to fill the financing "gap." To conclude, Brady emphasized that sound policies and open, growing markets within the industrial nations will continue to be an essential foundation for efforts to make progress on the debt problem.

In the next chapter a distinction will be made between domestic and international lending. The subject of country risk will be thoroughly discussed, with a focus on economic risk, political risk, sovereign risk, and transfer risk.

Endnotes to Chapter I

1. For a detailed study of the development of supplier credits, see IMF, "The Use of Commercial Credits by Developing Countries for Financing Imports of Capital Goods," 1968.

2. For an extensive description of the Euromarket, see Dufey, Gunter, and Giddy, The International Money Market (New Jersey: Prentice-Hall, Inc., 1978).

3. Bank for International Settlement (BIS), 1982.

4. The IMF defines oil-exporting countries as those developing countries whose oil exports equal at least 100 million barrels per year. All other developing countries are called non-oil developing countries.

5. "Major borrowers" is a term used by the International Monetary Fund to refer to the twenty-five developing countries with the largest total external debt at the end of 1982. The list of major borrowers includes four major oil-exporting countries.

6. IMF, 1984 C:60.

7. World Bank, World Debt Tables, 1982-83 ed., p. viii.

8. IMF, 1981:13.

9. OECD, 1984:37.

10. William R. Cline, International Debt and the Stability of the World Economy (pp. 20-22, 1983), Institute for International Economics, Washington, D.C.

    William R. Cline, International Debt: Systematic Risk and Policy Response (1984), Institute for International Economics, Washington, D.C.

    Mario Enrique Simonsen, "The Financial Crisis in Latin America," Rio de Janeiro, Getulio Vargas Foundation, 1983 (processed).

11. Michael P. Claudon, World Debt Crisis: International Lending on Trial (Cambridge, Mass: B. Allinger Books, 1986).

12. Real interest rates can be defined in several different ways. In this definition, it is assumed that the most recent inflation rate is a good predictor of future inflation rates. There are other definitions which use forecasted inflation rates.

13. See reference 10(a).

14. IMF, World Economic Outlook, 1983.

15. IMF, International Financial Statistics, May 1982, pp. 56-57.

16. See reference 10(a).

17. World Bank, World Development Report 1983, Part II.

18. William R. Cline, "Mobilizing Bank Lending to Debtor Countries," Institute for International Economics, June 1987.

19. Jeffrey D. Sachs, "Managing the LDC Debt Crises," Brookings Papers on Economic Activity, No. 2. 1986, pp. 397-431.

20. New York Times, March 6, 1983.

CHAPTER II

TYPES OF RISKS IN INTERNATIONAL BANKING

In every lending, credit risk is the likelihood that a borrower will not be able to repay the principal or pay the interest when it becomes due. One of the major responsibilities of the lending institutions is to minimize that risk. The bank as a typical lending institution is, therefore, very interested in the economic status of the borrower and analyzes that status very carefully. Past performance and forecasts of future development are reviewed. The bank is interested in knowing the purpose of the loan, and from which cash flow the interest and principal would be paid. In many instances, the bank will ask for collateral to further reduce credit risk because of the difficulty in evaluating the customer's future economic performance.

What differentiates international lending from domestic lending is the general notion of country risk and the presence of sovereign risk. When repayment difficulties exist in sovereign lending, the lender's ability to recover the borrower's current assets is very limited, and recovery becomes almost impossible when the debtor is a

government or one of its agencies. Recovery of assets is very difficult because of the lack of a legal enforcement system common to both lender and borrower.

Several experts, most notably Kharas,[1] have emphasized that borrowing by a government implies that debt-servicing capacity will depend not only on the country's growth prospects but also on the government's ability and willingness to tax and to generate a fiscal surplus. It should be pointed out that willingness alone is, of course, not enough to guarantee ability.

Sovereign risk, which was noted earlier as a key factor in the differentiation of international lending from domestic lending, can be divided into two categories: political stability and willingness to pay. The degree of political stability is an important element of creditworthiness because political instability might bring about economic or social discontinuities that would be detrimental to the borrower's economy, which would, in turn, reduce the capacity to service debts. Furthermore, political instability might develop into situations which would be detrimental to the interest of foreign lenders, such as repudiation of debt or prevention of foreign currency transfer. Finally, the international lenders might not be totally familiar with the political and economic systems of the borrowing country and this unfamiliarity would increase the discount factor of risk.

In international lending, commercial bankers emphasize the importance of a country's willingness to repay. Even when individual projects are economically feasible and permit borrowers to repay their loans, the government of the country could prevent the borrower from complying with its obligations. Unlike the case with domestic credit, foreign lenders have no resort when a country is not willing to pay its obligations. In fact, the immediate cause for a number of defaults in Eastern Europe during the 1930s was the inability to transfer funds rather than the borrowers' inability to repay their obligations. Many defaults in Latin American obligations in the 1930s were governmental defaults which were due to a decrease in government revenues.

Alexander K. Swoboda[2] developed three aspects of sovereign borrowing that are relevant to the stability and efficiency of international lending. First, he stressed that ownership of assets ultimately financed by government borrowing may not be vested in the government's hands, exacerbating the recoverability problem not only for foreign lenders but also for the borrowing government. Secondly, private borrowing by developing nations is often at a disadvantage relative to government or government-guaranteed borrowing. A very good example of this is that often a prejudice develops against private borrowing because of servicing problems; thus it carries a higher

transfer risk than government borrowing. This discrimination against private borrowing may contribute to the prominence of syndicated lending to governments over the issue of private debt in different forms (such as bond finance). Since it is unlikely that government investment decisions and project selection will obey as strict a profitability criterion as will those of private investment, the riskiness of sovereign lending may increase with the proportion of borrowing that is done by governments and their agencies or borrowing that bears government guarantees.

Swoboda's third point is that sovereign borrowing by governments makes it all but impossible to tie loans to specific projects. He believes that this has two major undesirable consequences. The first is that debt-servicing difficulties tend to affect all loans to a country simultaneously. Failure of one project can lead to debt-servicing problems in all other projects since there is no way of making an individual loan bear the risk of an individual project. A second and related consequence is that it becomes very difficult to recognize actual losses on past loans and simultaneously engage in new lending.

In other words, new loans have to bear the burden of capital losses on past projects financed by old loans. When a firm experiences difficulties in domestic lending, the firm can obtain new loans at reasonable terms after a

restructuring has shared past losses between the creditors and the debtor. Moreover, loans that are not extended to the firm in difficulty can be transferred to firms that have more worthwhile projects. In international sovereign lending, once a country's debt-servicing problems lead to a write-down of its liabilities in the books of lending banks, new loans are unlikely to be forthcoming to any entity or project except at significantly harder terms. The new projects, which may offer a perfectly acceptable risk-return tradeoff at normal interest rates, may well not be worthwhile at these harder terms.

Country Risk

Country risk is the additional risk, beyond the usual commercial risk in domestic lending, that exists when lending to a foreign country or to a borrower residing in a foreign country.[3] Some banks use a broader definition which includes local currency as well. Country risk is thus defined as the probability that a significant proportion of all outstanding foreign loans for a particular country will not be serviced according to the terms laid down in the original loan agreement. Country risk is due to economic, social, and political conditions within a country that may affect a borrower's ability or willingness to repay principal and interest on schedule. Hence, country risk should be considered in addition to

credit risk because country-specific factors influence all economic activities of a country, be they national or private units.

Risk in commercial lending is essentially the likelihood of default, repudiation, or rescheduling. A loan is in default when the creditor declares that the borrower has failed to comply with some aspect of the loan agreement. A repudiation of a loan is the explicit refusal of the borrower to pay the principal or interest as originally agreed. Rescheduling is an agreement between both parties to alter the schedule of payments. Default and repudiation usually incur loss for the lending bank; rescheduling need not result in direct loss for the bank.

Default and repudiation are usually initiated by an inability to pay or, simply, bankruptcy. However, there is a fundamental difference between ordinary bankruptcy of an individual unit within a national economy and that of an entire government. Ordinary bankruptcy usually indicates negative net worth. Most countries have bankruptcy laws that protect creditors and prevent private units from divesting themselves of liabilities while maintaining control of assets; that is, creditors are compensated for their losses to the extent allowed by the debtors' assets.

A lender extending credit to a government entity, however, enjoys no such legal protection. A government may repudiate all or part of its debt without losing control of

its assets and without being legally bound to compensate the lender in any way. The most powerful default or repudiation deterrent is the ability to declare a repudiating government ineligible for future loans. Such a declaration is not limited to the institution in question; because of the nature of banking, ineligibility most likely will extend across the financial market. Not all loans within a country involve the same level of country risk. Local currency loans extended by a bank's foreign branch to local residents typically involve only the normal credit risk, as such lending is generally funded locally. This suggests that a distinction must be made between local currency lending and cross-border foreign-exchange lending. However, this research is concerned only with cross-border foreign-exchange lending.

A good way to explain country risk is to imagine a bank lending money to a foreign corporation doing business in another foreign country. The foreign corporation will very likely do most of its business in local currency. It will also have to comply with the laws and regulations that are in effect in the country where it is doing business.

Imagine a scenario in which a foreign corporation is in possession of the local currency needed to pay all of its obligations but is unable to obtain the foreign exchange needed to pay foreign creditors, or where it has the needed foreign exchange but is prevented from trans-

ferring it abroad by local laws or regulations. It is very clear that what is happening here is not the inability of the foreign corporation to pay its obligations, but rather its inability to convert domestic currency into foreign exchange and to transfer it abroad. This situation could also occur if the loan is made to, or guaranteed by, a government. Even though a government could tax its residents or print money to pay its domestic obligations, it cannot tax the residents of foreign countries or print foreign money to pay external debts. Again the non-payment is due to its inability to convert domestic currency into foreign exchange. Of course, a government's refusal to pay its obligations is also a possibility.

Because international lending always involves a foreign currency, there can be a foreign-currency risk for the borrower only, for the lender only, or for both. A French bank verifying a letter of credit of a Nigerian bank in Canadian dollars involves a foreign-currency risk for both parties. An Italian consortium bank lending yens to a Japanese company means a foreign-currency risk for the lender only. A West German bank lending Deutsche marks to a British company is a typical foreign-currency risk for the borrower. When foreign-currency risk is mentioned as part of the country risk, what is meant is the foreign-currency risk that the lender runs. There are two parts to this risk. The first part originates from equivalence

adjustments, binding the borrower to pay an amount which may be considerably different in local currency from what was due when the obligation was contracted. Examples of this are recent lendings to the private sector in Mexico, which show that solvency can be seriously impaired. The second part deals with the borrower's inability to remit foreign currency at the time of payment because the authorities of his country have introduced foreign currency remittance regulations which relate to the borrower's liability in foreign currencies. Both of these cases show the lender facing a country-risk problem which emanates from the economic policies of that country.

Sovereign Risk

Sovereign risk arises when, because of the legal status of the borrower, the lender is not protected if he experiences difficulty in recovering his loan. Sovereign risk is most often spoken of synonymously with country risk, since it is generally true that governments are able to generate the money necessary to service their debts in their domestic currency. Sovereign risk involves only the risk that the government cannot raise the foreign exchange to service its debts.

In international lending, the lender and the borrower are residents of two different independent countries with different sets of laws and regulations that affect both

lender and borrower. It is the risk of future unfavorable action by a borrower's government that is most disturbing, e.g., new, more binding limitations or orders forbidding the transfer of funds abroad, moratoria, increased taxes, or other governing directives that adversely affect external creditors. The difficulty here is that the creditor may also be unfavorably affected by laws initiated in his own country because of, for example, the freezing of funds or export bans.

Transfer Risk

Transfer risk arises from balance-of-payment difficulties; it dominates most discussions on country-risk evaluation. Transfer risk is incurred when a borrower who has domestic currency to repay his debt is prevented from paying by the host government policies which make foreign exchange unavailable. Transfer restrictions implemented in countries that are members of the International Monetary Fund are published in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions.

Transfer risk involves only the risk that a private sector company with the ability and willingness to pay will not be able to obtain the necessary foreign currency to service its debts. However, most countries' banking systems allow the government first claim on the country's

foreign exchange, making transfer risk to some extent generally greater than sovereign risk.

There is no transfer risk if a bank has a branch with local deposits in a country; the loan would be part of local lending operations, and it would be a domestic loan in the host country. However, if foreign currency was converted by the lender for the purpose of creating the local currency to be lent, then the lender would run not only the risk that the funds may not be transferable when the loans become due, but also the risk that the local currency may have been devalued while the loan was outstanding. The causes of transfer problems could be economic conditions, political actions of a government, or both.

In 1983, the Federal Reserve, Comptroller of the Currency, and the Federal Deposit Insurance Corporation clearly recognized transfer risk in sovereign lending caused by the possible inability of a country to raise enough foreign exchange to service debt.[4] This recognition is significant because not very long ago, some prominent bankers declared that sovereign lending had no risk whatsoever because countries do not disappear. The three agencies proposed a five-point program of regulation:

(a) stricter examination of country exposure, which included expectation of higher capital-to-loan ratios for banks with greater concentration of country exposure;

(b) greater public disclosure of the country exposure of banks;

(c) the definition of new loan classifications: loss, reservable, and debt-service impaired, with requirements for write-off or provisioning into reserves in the first two cases, respectively;

(d) stretchout of reported income from loan fees; and

(e) increased cooperation with bank regulators abroad and, possibly, greater sharing of IMF information.

Economic Risk

Economic risk is the result of innate or exogenous economic developments which inimically affect the balance of payments of a country, such as economic policies that result in high domestic demand or in a decline in demand and prices of a country's exports. Defaults induced by revolutionary changes have not been common occurrences during the last few decades; outright refusals to pay external debts happened only in Cuba, Ghana, and Southeast Asia when new regimes took over. However, payment difficulties due to economic causes have occurred with disturbing frequency.

Political Risk

Political risk arises when non-economic factors affect the availability of foreign exchange either to the government or to its residents, or the willingness of the government to act quickly on its external obligations. It is usually associated with political turmoil and revolution.

When a new government takes over power in a country, the incoming government may not recognize previous external obligations or may enact laws that thwart the borrower from meeting his external obligations, such as expropriation laws or confiscatory taxation. However, experience of the last several years shows that even when drastic changes in government take place, new governments, in most instances, recognize old external obligations. The new government realizes that not paying existing debt has only short-term benefit and opts for the long-term benefit of being able to borrow internationally by maintaining a good payment record.

The theoretical issues of country risk will be discussed in the next chapter.

Endnotes to Chapter II

1. Homi Kharas, "The Analysis of Long-Run Creditworthiness: Theory and Practice," World Bank Domestic Finance Study No. 73 (July 1981).

   Homi Kharas, "On Structural Change and Debt Service Capacity," World Bank Domestic Finance Study No. 74 (August 1981).

   Homi Kharas, "Constrained Optimal Foreign Borrowing by Less Developed Countries," World Bank Domestic Finance Study No. 75 (August 1981).

2. Alexander K. Swoboda, "Debt and the Efficiency and Stability of the International Financial System," in International Debt and the Developing Countries, edited by Gordon W. Smith and John T. Cuddington, A World Bank Symposium, 1985.

3. Irving S. Friedman, The World Debt Dilemma: Managing Country Risk, Robert Morris Associates, 1983, p. 307, defines country risk as "a spectrum of risks arising from the economic, social, and political environments of a given foreign country."

4. Joint Memorandum: "Federal Reserve, FDIC, and Comptroller of the Currency: Program for Improved Supervision and Regulation of International Lending" (Washington, April 7, 1983; processed).

CHAPTER III

THEORETICAL ISSUES

There have been few theoretical models created to determine the risk levels of international lending, despite its importance and its protracted history. Before the late 1970s, the topic did not even attract much academic attention. This omission is probably due to the complexity of the international debt issue and the many disciplines involved, e.g., economics, political science, sociology.

Despite the complexities of analytic structure, there have been some contributions to the underlying theory of international lending. For instance, in 1972, Donough C. McDonald[1] delved into the subject of developing-country borrowings and endeavored to come up with the meaning of the term "debt capacity." He proposed two approaches: (1) the optimal level of debt and (2) the sustainability of debt policies. The optimal level of debt is how much a country should borrow; the sustainability of debt is the continued ability of a country to make debt-service payments. The optimizing approach has been more developed theoretically, yet in practice, has been more difficult to

apply. Most of the applied literature has concentrated on the sustainability of debt policies.

The issues of sustainability of debt policies, optimal amount of borrowing by countries, optimal bank foreign lending, and credit rationing are further discussed here.

Sustainability of Debt Policy

Traditional analyses of developing countries' economic problems have concentrated on lack of both physical and human capital, in the form of domestic savings, foreign exchange, and human skills. Any progress toward solving their problems was impeded by a scarcity of domestic savings and foreign exchange to finance internal investment--the so-called "two-gap" model. External financing can be a solution to most of these problems by providing an additional resource for investment. Foreign borrowing thus bridges the "gap" between domestic savings and the required level of investment.

Harrod (1939) and Domar (1946) provided the basis for early attempts to put this investment function--external financing--into a growth framework. Their model defines the rate of growth as the product of the savings rate and the capital output ratio. Under the assumptions that there is no substitutability between capital and labor and that labor is in surplus supply, capital becomes the overriding constraint on LDC economic development.

The Harrod-Domar model is well known. Output is produced according to fixed-coefficients technology. The required investment ratio is determined by a target growth rate, in conjunction with fixed capital/output ratio. The rate of saving is a linear function of the output. The residual between the required level of investment plus service payments on the outstanding external debt and the level of domestic saving thus forms the level of foreign borrowing.

The debt-servicing capacity of the borrower is analyzed on the basis of this framework. However, as several authors have pointed out, problems can arise in the various stages a country goes through from young debtor to mature creditor--for example, when the transition to creditor does not occur, and the country's external debt continues to grow.

Solomon[2] pointed out that the debt situation becomes unsustainable if the real interest rate on the debt is higher than the real growth rate, and that even if the debt/output ratio has a finite limit, the debt burden may not be sustainable. Such is the case if interest payments exhaust output, thereby creating zero income to domestic residents.

Though the foundation of the Harrod-Domar model is well known, its usefulness is limited because of the rigidity of the basic assumptions. For example, it does

not consider investment efficiency. However, if the target rate of growth is less than the real interest rate, then the debt is not sustainable, regardless of the marginal product of investment, because of the specification of consumption behavior inherent in the model.

Consumption (saving) behavior is specified as a function of output, not of income. Thus, income accruing to foreigners is treated, in effect, as if it were consumable. The higher the propensity to consume and the lower the ratio of domestic income to output, the more likely it is that problems will arise. Specifying consumption as a function of income rather than output, however, generates a substantially different result.

The Harrod-Domar approach was later modified by R. Solow (1956) and J. Meade (1963), who provided for substitution among factors rather than the fixed proportions assigned by the original models, and by N. Kaldor (1957), who explained it using a technical-progress function related to investment. King[3] and Feder[4] adjusted the models using new assumptions and showed that debt-sustainability difficulties do not arise if the marginal product of capital exceeds the marginal cost of borrowing.

Feder also sought to improve on the earlier studies connecting the growth and debt model literatures with a more realistic, empirically based concept of debt-servicing capacity. The economies of two broad groups of LDC's were

simulated in order to show the relation between debt-servicing capacity and growth and to create situations in which debt-service problems could be identified. His method used income specification for consumption and a target in terms of gross national product (GNP) rather than output.

The Feder study suggested the exercise of caution with regard to the applicability of accepted beliefs and the rules of thumb related to external debt management. The study also has some advice for economic planners: that while fairly detailed development plans are designed for the medium term (mostly five-year plans), the period of indebtedness and the build-up of debt-service problems are of a longer time span, which is not covered by the detailed programs. It then went on to stress the need for more quantitative work to improve on existing knowledge of the relation between debt-servicing capacity and economic variables, and thus to enable better planning. Development planning which specifically concerns itself with maintenance of a reasonable debt-servicing capacity is to the benefit of borrowers and lenders alike.

Avramovic[5] developed widely used models to clarify debt-servicing capacity. His method divided the ability to meet debt-service payments into two parts or potential problems: long-term growth and balance of payments. A shortage of foreign exchange initiated the external debt

problem. Avramovic's conclusion was, then, that debt-servicing problems could be prevented if the marginal saving from the additional income generated was larger than the interest on the debt. His analysis brought two essential factors to light in evaluating the long-run outlook for a debtor country: (1) the efficiency of investment, and (2) the adequacy of domestic marginal saving.

Poor export performance in the short run, however, could initiate a critical balance-of-payment problem. Avramovic's resultant theory was that the debt-service payments of a country versus its export value of goods and services was a good indicator of potential short-term difficulties. As a result, the debt service ratio has become one of the most frequently used indicators of country risk, and a high debt service ratio may indicate potential vulnerability to adverse short-term fluctuations in export performance. In an overall, long-run view, however, the debt service ratio alone may not be so reliable an indicator of debt capacity as one would hope because a high ratio may indicate countries that have invested heavily but wisely, as well as those with an extremely poor long-term outlook.

Another investment theorist who presented similar models was Homi Kharas.[6] He also based his work on the Harrod-Domar model but focused on foreign borrowing situations as planned and carried out by a government to

assist in financing domestic expenditure. He argued that the government's taxing powers are constrained by institutional and technical factors, and because it is assumed that all government investment is infrastructural in nature, all benefits of investment projects accrue to the private sector. For a debt to be sustainable, the tax base must expand quickly, allowing the government to service the debt. However, inasmuch as the expansion of the tax base is determined by private savings/ investment behavior, low private savings/investment behavior could produce debt problems as a result of a fiscal constraint.

Other models, though in the context of a more flexible neoclassical production structure, follow a similar theme. Takagi,[7] without disaggregating the government and private sectors, deems consumption a function of income plus capital inflow. In this model, the savings rate is low and consumption may exceed income, creating debt problems independent of the efficiency of the country's investments. Yet, an unsustainable debt level may be the result of extensive external borrowing to finance private consumption. The result is much the same if a government's expenditure is excessive relative to the revenue it generates through borrowing abroad (Katz[8]).

In the earlier models, total consumption behavior was determined by output, creating the possibility that consumption could consistently be greater than income. In the

similar later models by Kharas, Takagi, and Katz, the problem is more specific and stems from excessive government expenditure over and above revenue. Debt problems, then, frequently arise as a result of over-ambitious government expenditure plans.

It should be noted, however, that these models are based on behavioral and institutional assumptions that can be construed as quite rigid. Therefore, interpretation must be carefully considered--specifically, policymakers have more influence on fiscal parameters than allowed in these models. Also, in general, it is policymakers--not the exogenously imposed institutional constraints--that must bear responsibility for debt problems.

The growth models that have been discussed have been within non-optimizing frameworks. They have pointed to possible sustainability problems, but they are not designed to confront issues of how much a country should borrow. The next section will deal with optimal amount of borrowing by countries.

Optimal Level of Country Borrowing

The external debt level of a country and its optimal debt level have been studied by many economists, because the economic growth of developing countries is considered heavily dependent on the inflow of foreign funds. Most of these studies focus on a country's relative affluence, as

well as different capital return rates across countries. It was theorized that these differences would give strong incentives for capital movement from country to country, e.g., from developed countries (with an abundance of capital) to developing countries (those with capital scarcity), and that this would equalize the rates of return across countries (MacDougall).[9]

Early optimal level studies assumed that a developing country might be able to borrow indefinitely with a rate of interest exogenously determined.[10] In these studies, bond export was treated just like any other good exported from a small country. Theoretically, however, the risk in lending to a foreign country was not the absolute size of the debt, but rather the ratio of foreign debt to such variables as the country's goods and services exports, its GNP, or its foreign exchange stocks. The expected result then was that there would eventually be a limit to foreign demand for their bonds.

The studies of Bardhan[11] and Hamada[12] emphasize deriving optimizing criteria in the context of intertemporal optimizing models. Both maximize an intertemporal utility function using a one-sector growth model framework. In this type of model, the optimal economic path is derived for a specified external finance supply function, and the marginal cost of foreign borrowing will be equal to the marginal product of capital if the path is

optimal and steady. This fixes the optimal quantity of debt at each point in time. Further, if the supply of external finance is not infinitely interest-elastic for debt management, a tax on foreign borrowing may be required. Atomistic borrowers do not consider that their borrowing invariably has an effect on the costs of all other borrowers, because it changes their position upward on the supply schedule. The presumption here is that if borrowing is to a large extent centralized with the government, this externality will be internalized in the government's strategy.

There are many variations of these models. The Hanson variation[13] emphasizes the ratio of debt to capital stock, i.e., debt-equity considerations. The Feder and Regev[14] model developed a relationship between the supply of external finance forms: direct foreign investment and loans to debt-equity and exposure considerations. The Feder and Just[15] model studies borrower strategy as it affects the "creditworthiness" of borrowing costs. "Creditworthiness effect" means that the cost of external finance may well be affected by the policies and internal structure of the economies concerned.

Other studies focused on a negative relationship between domestic saving and external finance (Grinols and Bhagwati,[16] Wasow[17]). In these studies, it was determined that external finance might make a country dependent on

foreign savings. Kharas[18] argues that relaxed domestic taxation would be the result of the availability of external finance. However, for both negative effects on savings and for domestic taxation, the problem is not inherently a result of the use of external finance.

The Eaton and Gersovitz study[19] considered LDC borrowing and international reserves being held to be a partial problem in general portfolio equilibrium. In this study, the determinants of a country's demand for credit were analyzed in terms of five motives for borrowing. The first motive is based on pronounced consumption needs that arise when a country's current income is low relative to its anticipated future income, creating desire to separate consumption from income. This is the basis of what their model calls consumption smoothing--if a country is experiencing a low level of income versus expected future income, it may borrow to maintain the current level of consumption. Hence, the more variable a country's income, the more its government is likely to borrow.

The production and investment motive is based on the premise that foreign borrowing is advantageous when the difference between a country's marginal productivity (domestic capital) and the rate of interest in world markets is positive. The third motive--the adjustment motive--arises from consumption plus investment and the need to avoid sudden changes in the level of absorption. The

higher oil prices of the 1970s undoubtedly forced many LDC oil importers to borrow simply to ease them through the adjustment. The transaction motive is the fourth motive; it evidences a country's desire to perform international transactions and perhaps use a supplier's credit (debt can be used as a means for undertaking transactions) to economize on transaction costs. The reserve motive--the fifth--is where a country may decide it is desirable to incur large debt and hold large international reserves if there is a fear that the future market will be less positive than the present one, i.e., that the cost of external financing will increase. In this case, foreign borrowing becomes a substitute for international reserves.

Sachs' model[20] illustrated the effects of international lending with possible debt repudiation, limitations on government taxing authority, and syndicated lending on optimal level foreign debt. Debt repudiation could cause the setting of credit ceilings for borrowing countries in order to keep the benefits from repudiation below the costs. This is the international equivalent of credit rationing within domestic capital markets. Sachs suggested that borrowing countries would need to institute stricter penalties for debt repudiation (such as a formal agreement). This would prevent access to any official or private foreign finance by the repudiating country for a specific amount of time and so reduce creditor concern,

thereby leading to increased finance availability and easier credit terms.

The Sachs' model suggested that there is a political or economic ceiling to tax collection, though previous studies implicitly assumed that government could service foreign debt by claiming any necessary proportion of national income. Such a constraint would make it necessary for the country not to equate marginal product of capital with the world market cost of capital but rather should be kept higher, to reflect a lower shadow value of second-period output.

Sachs' model also assumes syndicated lending by creditors and emphasizes the free rider problem and the possibility of panics. Sachs emphasized that on a typical loan the creditor side tends to be composed of a large number of financial intermediaries who join together as a syndicate on an ad hoc basis. While the syndicate process helps to diversify risk, it leads to several other significant problems. However, substantial public benefits result from many activities of this syndicate process. As an example, an efficient loan package may require banks to monitor a country's economic performance after a loan is made, but the banks may have no way to share the cost of monitoring. Even if the need for monitoring is clear, each bank may try to be a free rider on the monitoring

expenditures of other banks, leading to insufficient supervision.

Also, Sachs stated that the most dramatic breakdown of loan supply occurs in a panic, where a fundamentally sound economy is forced into default by a shortage of credit. This type of market can result from the rational behavior of a large number of small lenders. Each bank rationally bases its loan-supply decision on the actions of other banks. In a panic, all banks stop lending because the others have stopped lending, and even though a country is financially sound, it can find itself forced to default.

Clearly, the international banks who join together as a syndicate need to be well organized; also, cooperation and mutual trust are essential. If they are able to act in unison in crucial situations, the efficiency of the international loan markets will definitely be enhanced. Of course, if banks are able to respond appropriately, a financial panic can be minimized if not avoided. Another important benefit of efficient organization and cooperation in a syndicate is that creditors reach agreement on rescheduling the debts of the borrower at below market rates, thereby avoiding a very painful default. Another important advantage in a syndicate is the sharing of the experience of personnel as well as relevant and important information about particular countries, thereby pooling the individual

strengths of the monitoring and assessing capability of each bank.

When these syndicate strengths are implemented properly, the country risk in international lending will be seriously reduced and lending will again become beneficial to both the creditors and the borrowing countries.

A central planner motivated to maximize national welfare is central to the Cooper and Sachs[21] study. Choosing appropriate levels of consumption and investment in each period, thereby creating the optimal amount of external borrowing determined residually (capital inflow added to domestic saving), makes an optimal level of investment possible. The model, however, ignores monetary or macroeconomic considerations and concludes that marginal return on investment should exceed the marginal cost of funds in world capital markets before capital investment should be undertaken. Cooper and Sachs assumed, perhaps ideally, that optimum levels of saving, investment, and external borrowing were possible in a free-market system if interest rates adjust to world-wide demand and supply for loanable funds. Their study stressed that a laissez-faire attitude toward capital inflows and outflows creates difficulties in achieving the optimal amount of borrowing.

Cooper and Sachs also analyzed repudiation, showing that adding foreign exchange risk (called liquidity risk in the Cooper-Sachs paper), capital risk (referred to as

solvency risk), and repudiation risk to a model of optimal foreign borrowing would complicate management of the economy of borrowing countries. Such decentralized or laisse- faire foreign borrowing would lead to optimal results under restrictive conditions. First, the probability of a foreign exchange crisis cannot be construed as a function of the level of debt--an unlikely assumption, inasmuch as large foreign debt (relative to national income or capital) would bring with it large debt-service payments and greater rescheduling or repudiation concerns.

The second assumed condition for a decentralized system to be optimal requires that the private sector have rational expectations regarding a foreign exchange crisis. This is not always possible because households or firms may incorrectly project future current exchange rates and interest rates. Government may reinforce this problem if they promise no exchange-rate changes.

The third requirement is that the government credibly commit itself to refuse to bail out private entities, thus cutting them off from external funds. When crisis occurs, invariably governments are asked to assist those firms that are having foreign debt-servicing problems. A question of moral hazard exists if private firms are allowed to believe that the government might provide such assistance, a belief often implicit in government guarantees to government-owned

or regulated businesses. Finally, the social costs resulting from private bankruptcies in foreign-exchange crises would not make decentralized or laissez-faire borrowing optimal. Such costs, not considered by private borrowers, might also produce over-borrowing.

Optimal Bank Foreign Lending

Risk and Diversification Studies

Most risk and diversification studies use Knight (1921), Tobin (1958), and Markowitz (1959) as a basis. The fundamental concept of their approach assumes that the probability of deviation from an expected return rate can create a basis for an optimal risk/return portfolio when definite outcomes are not known. The definitional basis for the distinction between risk and uncertainty was clarified substantially in F. H. Knight's pioneering work, Risk, Uncertainty and Profit.

This portfolio theory was the basis for early studies of optimal level of bank lending to foreign countries. To maximize the corporate utility function, banks estimated the return and the risk of total possible assets and used this information to purchase a portfolio of those assets. A seller would not want to offer a riskless asset with a high return, and the bank would not want to purchase a risky asset with a low return; thus, the average asset's interest rate would be a part of its risk.

Branson (1970) found the interest rate variables to be insignificant in one of the first studies using a mean-variance portfolio approach to analyze U.S. bank foreign lending. This finding and later omissions of interest rates as a key explanatory variable of bank foreign lending were caused by the failure to include the supply of assets by foreign countries. By this time, however, the attention of economists in this area shifted to the question of quantity rationing instead of price rationing in the supply of bank credit.

Theory of Credit Rationing

Donald R. Hodgman,[22] Marshall Freimer and Myron J. Gordon,[23] and Dwight M. Jaffee and Franco Modigliani[24] developed theoretical frameworks for credit rationing. Their studies show that rationing is consistent with profit maximization if there is rational economic behavior despite uncertainty. Dwight M. Jaffee and Franco Modigliani devised a theoretical model considering three elements: the demand for loans, the supply of loans, and the determinants of the commercial loan rate, and showed that equilibrium rationing--credit rationing which occurs when the loan rate is set at the long-run equilibrium level--is rational economic behavior for commercial banks. Previous studies had concentrated on the determinants of the quantity supplied by lenders while neglecting the other two

elements, the demand for loans and the determinants of the commercial loan rate.

Hodgman asserted that within a risk-return context that does not rely on oligopolistic market structure or legal maxima to the interest rate and a given risk ratio (expected value of loan payments relative to expected value of probable losses including interest payment), banks will set a limit for extending credit regardless of the interest rate. There is a positive relationship, other things equal, between the size of a loan and its risk, the probability of the borrower's inability to repay the loan. He showed that as the loan's amount increases by increasing the interest rate, the risk ratio can be kept above a predetermined figure. At some point, however, raising the interest rate will not prevent a fall in the risk ratio. Hodgman was concerned with "weak credit rationing"--the amount a banker will lend a borrower varies with the interest rate only up to a limit. Beyond this point, credit will be refused regardless of the interest rate.

Freimer and Gordon extended Hodgman's position, saying that the amount a profit-maximizing banker will lend to a borrower is highly interest-elastic. They showed, based on the supplier's loan offer curve, that the optimal amount of a high-risk loan rises in a limited increasing amount with interest rate. The optimal loan, however, is virtually independent of the interest rate on low-risk loans.

Corry F. Azzi and James C. Cox[25] questioned using rejected offers to pay market rates of interest as an indicator of credit rationing. They noted that borrower equity (collateral) created incentive for lenders to ration credit through non-price means. In propositions which they developed, Azzi and Cox show that a larger loan was possible where there was greater borrower-provided collateral. Therefore, the borrower's wants and demands for credit depend not only on the rate of interest offered but also on collateral and borrower's equity. Credit rationing and nonsupplied effective demands for loans versus unsatisfied wants will not solely involve lender response to offers of interest rate but must include collateral and equity.

Azzi and Cox asserted that optimal credit rationing is possible only if there are effective institutional constraints on the collateral and equity terms of loan contracts as well as on interest rates. They concluded that the belief that credit rationing is rational for a monopolistic lender, assuming a single interest rate constraint (Jaffee and Modigliani), is false. Note that the primary concern of the Jaffee and Modigliani study was "equilibrium credit rationing" assuming that a lender can act as a discriminating monopolist. Jaffee and Modigliani also assumed that the lender would ration some borrowers if lending was subject to an institutional constraint

requiring the same interest rate charge for borrowers with different credit demand curves.

Jaffee and Modigliani[26] responded to the Azzi and Cox criticism by arguing that the definition of credit rationing was based on a misunderstanding of the role of collateral in the Freimer-Gordon and Jaffee-Modigliani models. The Azzi and Cox propositions relating collateral to loan supply were correct, though more intuitive than factual. Jaffee and Modgigliani said the first two propositions were the stronger but had limited application because the assumptions were highly restrictive. It was agreed that providing sufficient borrower collateral meant less risky investment for the lender, and within the limit, could eliminate the default risk entirely; then no rationing would occur. On the other hand, they said, less collateral meant a residual risk of default and thus credit rationing was a possibility. However, even if lenders cannot freely credit-ration between borrowers based on their collateral provisions and even if the borrower provides the optimal amount of collateral, credit rationing can still occur.

In economics, a free market equilibrium requires supply to equal demand. If demand should exceed supply, prices will rise. Resultant decreased demand and/or increased supply will exist until demand and supply are again equal at a new price. With such an equilibrium, credit

rationing does not occur. However, there is apparently a need for credit rationing and it seems to indicate a great demand for loanable funds.

Consider what might happen with this equilibrium theory if the amount of available international funds were decreased and the amount available was assigned in portions to borrowers. In equilibrium, as the supply of funds declined, the interest rate would rise, clearing the market. This is not the case in the commercial lending market, where interest rates rise but not indefinitely and credit is rationed. Given what should happen in equilibrium, this would imply that the market is unable to clear.

The objective of the Joseph E. Stiglitz and Andrew Weiss study[27] was to show that credit rationing is a characterization of a loan market equilibrium. Banks are concerned about the interest rate they will receive on the loan and the riskiness of the loan. They noted, however, that the interest rate itself could affect the riskiness of a pool of loans by (1) the adverse selection effect in sorting potential borrowers or (2) the incentive effect, influencing the actions of borrowers.

Their model used an interest rate that acts as a screening device among borrowers. With rising capital costs (interest rates), the return rate on investment projects would decline. Higher interest rates, then, dis-

courage certain borrowers. Other borrowers might be willing to attempt projects with potentially lower success as long as they had a higher return. Overall, then, higher interest rate paying borrowers are also higher risk borrowers for the lender. As the interest rate increases, the average risk for the lender's portfolio also increases. Note that in the Stiglitz and Weiss model, information is asymmetric--lenders are not allowed to distinguish between types of borrowers. Hence, imperfect methods of selection and information gathering lead to credit rationing by lenders.

The Stiglitz and Weiss model uses r^* as the interest rate maximizing the bank's expected return. As the interest rate approaches r^*, the amount of return to the bank's portfolio increases. However, it increases at a decreasing rate because the possibility of borrower default increases with higher interest rates. At rates above the optimal r^* rate, borrower default becomes more likely, and the bank's expected return decreases. Lowering the interest rate to r^* will create an increase in the bank's expected return and lower the probability of default.

Stiglitz and Weiss use a four quadrant diagram to illustrate the credit rationing process (Figure 3.1). The lower right-hand quadrant illustrates the relationship between the bank's expected rate of return on loans and the interest rate. The concave function reaches a maximum at

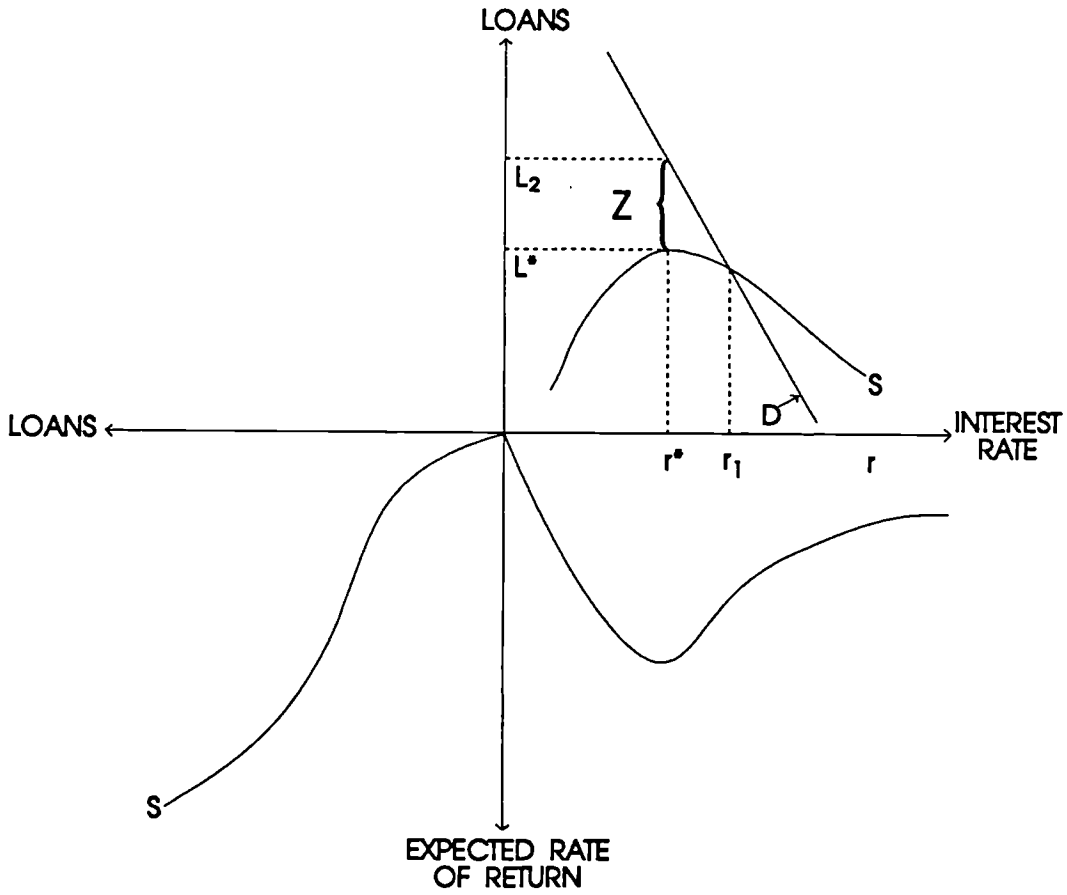

FIGURE 3.1 CREDIT RATIONING

r^*. The supply of loans resulting from the expected rate of return on loans is presented in the lower left quadrant, and the supply and demand curves are in the upper right quadrant. The supply curve reaches a maximum at r^*. The demand curve is exogenous and decreasing. In this diagram, the demand curve intersects the supply curve at r_1. The gap Z shows a greater demand for loans than there is a supply of loans. Market clearance would actually occur at interest rate r_1, but the expected rate of return would be less for the bank. A profit increase would occur with credit rationing equilibrium by charging r^* and lending L^*. If the intersection of the demand and supply curves is below r^* (loan supply increase or demand shift) there is no credit rationing. Equilibrium is the lending market behavior.

Under conditions where there is no credit rationing, a borrower is able to obtain funds at a competitive interest rate. Figure 3.2 shows the intersection of the demand and supply curve at interest rate r_1. The supply curve continues to rise after r_1, but declines after r^*, as shown in Figure 3.1. Since the intersection is below r^*, there is no credit rationing.

However, interest rate screening and adverse selection do not appear to be the prime reason for credit rationing in international lending. Unlike the case with a private borrower within a country, lenders cannot assume assets in

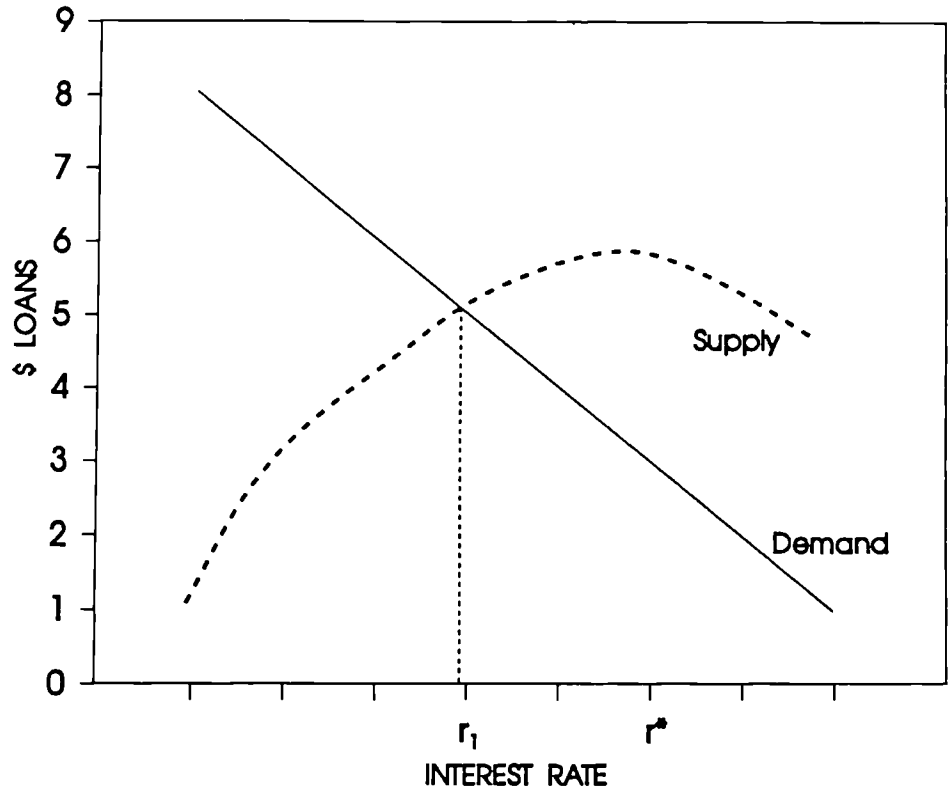

FIGURE 3.2 WITHOUT CREDIT RATIONING

a foreign country and liquidate them to offset losses if the borrowing country repudiates its loan. Hence it is important to determine beforehand the probability of a country defaulting on its debts by assessing that government's creditworthiness and by limiting the supply of loans accordingly. Though Stiglitz and Weiss do not deal with this problem, creditworthiness, asymmetrical information, and credit rationing are a part of the Eaton and Gersovitz model.

In the Eaton and Gersovitz model, a country borrows in order to smooth the path of domestic consumption. Countries are not one-time borrowers; they borrow from the international market during bad times and repay during good times. Private lenders will place an embargo on future lending to that country if the country defaults on its loans. Creditors may also cut off aid to the country. Hence, a country that defaults cannot borrow to smooth its absorption over time. Their model does not contain the option of rescheduling. Unlike the Stiglitz and Weiss model, it assumes that lenders know the characteristics of borrowers and under what conditions default may occur. It also assumes that as the size of the outstanding debt increases, the benefits of default for the borrower increase. To counter this, lenders should impose a credit ceiling or a maximum safe level of borrowing, such that the costs of default just exceed the benefits of default.

Given the need to limit the amount of country debt to avoid giving debtor countries an incentive to gain from default, Eaton and Gersovitz's analysis implies that an international equivalent of the credit rationing discussed by Stiglitz and Weiss should take place. The common link between the two forms of credit rationing is that the cost of funds will not adjust to achieve an unconstrained credit market equilibrium. The determination of the optimum amount of country debt thus involves more factors than those considered in simple models of the operation of credit markets.

Over time, many models have been developed to consider the issue of debt capacity. The focus of this chapter has been to present the principles of debt capacity learned from analyzing these models, including theoretical relationships between a country's debt capacity, debt sustainability policies, optimal level of debt, and other related economic variables such as consumption, saving, investment, inflation, taxes, and the country's balance of payments.

However, the development of a more comprehensive theoretical framework for determining country risk entails not only economic conditions, but also political and sociological dimensions that do not lend themselves easily to quantitative analysis. As a result, most researchers have attempted only to empirically identify characteristics of debtor countries. The major point of the theory of credit

rationing remains--lenders must optimize return (subject to a risk constraint) or optimize a joint function of return and risk.

To conclude this chapter without discussing the extent to which countries are credit rationed would not be appropriate. Eaton and Gersovitz[28] point out that most developing countries were credit rationed in the early seventies. However, if the developing countries were credit constrained in the late seventies and early eighties, how did the banks extend to them the huge amount of loans? Of course, the large accumulation of debt was the major cause of the massive debt reschedulings of the early eighties. The explanations for the cause of the debt reschedulings of the eighties would be much easier to understand if the countries had not been credit constrained in the seventies.

The studies also showed that the reluctance of banks to increase their exposure in return for a higher spread reflects the fact that the gain from such an action is more than offset by the increase in the expected loss. The studies also seem to indicate that lenders do take into account the perceived riskiness of borrowers in making their lending decisions. But this does not really tell us whether enough weight has been given to these risks. What is very important to remember is that banks will make

profits provided that they do a thorough job to recognize these risks and will fail to make profits if they do not.

But the key issue here is the externality problem which arises when individual lenders fail to take into account the possibility that their individual loan decisions might place a country in the position where it can benefit by defaulting on all its debt. Such large-scale bank failure could arise when there is concurrent repudiation by a number of countries. This gives rise to questions about how systematic country risk is. Eaton and Gersovitz[29] and Goodman[30], in analyses of conventional country risk indicators, suggest that country risk is, to a large extent, non-systematic and, therefore, that debt difficulties are likely to arise independently.

Bacha and Diaz-Alejandro[31] countered that bank lending to developing countries is heavily concentrated; some individual countries account for large shares of outstanding bank claims. Moreover, massive withdrawal of funds by bank lenders or bank depositors is quite possible if doubt about the stability of the international financial markets escalates. Even if a large number of financial institutions do not find themselves in a dangerous position, a withdrawal from lending to countries whose liabilities far outweigh their assets definitely will have costs owing to effects on welfare in these countries;

again, the countries in surplus will be hurt as a result of the induced effects on the demand for their products.

Clearly, it is important for individual lenders to pool information about the extent of their loans and loan applications from foreign countries to ensure that the whole amount of such lending does not exceed the optimum level. A loan package that appears safe from a bank's point of view may not appear so safe when combined with the rest of external debt owed by a country.

The next chapter will deal with the regulatory issues of risk management.

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CHAPTER IV

REGULATORY ASPECTS OF COUNTRY-RISK MANAGEMENT

Events That Caused the Debt Crisis

The wave of external debt problems in 1982-83 raised some new doubts about the adequacy of the international banking system. Many members of the United States Congress objected to approving increased IMF quotas because raising them was seen as a bailout for banks that had been excessive and irresponsible in lending abroad.[1] Such strong criticism moved Congress to press for tighter bank regulation and encouraged regulatory authorities to propose stronger limits on external lending. At the same time, many academic critics questioned whether the structure of central bank responsibility around the "lender-of-last-resort" mechanism was adequate for international lending.

Widespread criticism charged that in the 1970s bank lending to developing countries was excessive, departing from past standards of prudence.[2] In his 1984 study, Sebastian Edwards said:

> The recent foreign debt crisis faced by some less developed countries (LDCs)(Mexico, Brazil, Argentina, among others) has generated concern among economists, bankers, and politicians. In

> particular, the ability of the international banks to distinguish between "good" and "bad" risks has been questioned. It has even been suggested that the inability to restrict credit to countries with low "creditworthiness" has resulted in the overextension of some major banks and that, as a consequence, this has increased the probability of a global international financial collapse.[3]

The role of market forces in the massive rise in international bank lending cannot be ignored. International agencies were very cognizant of the fact that both the huge increase of deposits from oil exporter surpluses and the depressive effects of the international recession on competing demands for loans in industrial countries brought about an expansion in bank lending to developing countries.[4] Henry C. Wallich of the Federal Reserve Board of Governors also criticized the growth of such lending as too swift to be maintained (an average pace of 25% from 1975 to 1980).[5]

As noted in Chapter I of this study, change in the world economic environment, unforeseen by banks or involved countries, played a major role in this problem. The impact of such economic forces, not the irresponsibility of the banks or the countries, was the primary cause of current debt problems.

Nevertheless, in the late 1970s, regional U.S. banks, as well as Japanese and European banks, began to penetrate into the international lending market more vigorously than

ever, helping to bring about an increased lending supply at low spreads above LIBOR just as new and traditional lenders competed for shares of the market.[6] These supply factors, plus the large funds made accessible from OPEC deposits, led in some important cases to continued lending to countries that should have borrowed less and adopted adjustment measures under IMF patronage. Instead, these countries took advantage of the financing offered by the banks. This situation occurred, for example, in Peru in 1976 and in Mexico and Argentina from 1981 to early 1982. Thus between December 1981 and June 1982, with Mexico in the final stages of budgetary excess only two months before its financial crisis, U.S. exposure to Mexico increased at an annual rate of 34%. Moreover, between December 1979 and December 1980, when Argentina pursued a policy of extreme overvaluation, U.S. exposure increased there at an annual rate of 42%.[7]

Rudiger Dornbusch stresses that overvalued exchange rates and large budget deficits in developing countries are important causes of excessive external lending.[8] Dornbusch uses a simple accounting framework and attributes gross increases in a country's external debt to (a) current-account deficits (i.e., net merchandise imports and interest payments on existing foreign debt) minus any long-term, non-debt-creating capital inflows, including direct foreign investment; (b) gross private capital outflows; or

(c) net accumulation of official foreign exchange reserves. He then analyzes three countries (Argentina, Brazil, and Chile) from 1978-82 to determine which factors contributed most significantly to the growth of their external debts.

Dornbusch posits that a massive deterioration in its current account was a major source of increase in Brazil's external debt. This deterioration, in turn, was a consequence of a loose fiscal policy and large increases in interest payments to foreigners. In Dornbusch's words, "The deterioration of Brazilian external indebtedness is largely attributable to a failure to adjust the [government's] budget to the combined external shocks of higher world interest rates and increased real oil prices."

Dornbusch thinks that, in contrast to Brazil, Argentina's external debt was in part a product of private capital flight, facilitated by the absence of capital account restrictions. The openness of the Argentinean capital market allowed massive private outflows as the real exchange rate grew increasingly overvalued. Misalignment of the exchange rate affects not only capital flows but also various components of domestic expenditure, including private consumption and investment and the government budget. Dornbusch also stresses the likely negative effects of large fiscal deficits on private saving and investment, and as a result, on the current account.

To protect against the potential loan losses created by the growth of U.S. bank lending overseas, government regulatory agencies required diversified exposure between countries and between government agencies within a country through supervisory measures which would affect all banking institutions. The U.S. Interagency Country Exposure Review Committee (ICERC) which is composed of the three Federal bank regulatory authorities--the Federal Reserve, the Comptroller of the Currency, and the Federal Deposit Insurance Corporation--established these guidelines in a statement made in 1983.[9]

In 1978, the three agencies adopted a uniform examination procedure for evaluating and commenting on country-risk factors in international lending by United States banks. Under this system, examiners for the three agencies separate the evaluation of country-risk factors from that of other lending risks. This information then becomes a separate part of their examination reports. Beyond that, banks' international portfolios continue to be assessed for commercial credit risks on a loan-by-loan basis. These assessments are based on traditional credit analysis standards, thereby diversifying exposure to individual countries and moderating country risk in international portfolios.

The premise behind this diversification of loan portfolios is that it provides the best protection for U.S.

banks during a period of economic or political change in a country or group of countries. The adequacy of this diversification within a bank's portfolio is itself based on comparing the bank's individual country-risk exposures to its capital funds. Where numerous components of a similar kind are found, examiners analyze a bank's loans in a particular country by the type of credit, borrower, and loan maturities. Risk involvement is assessed based on these concentrations and on the effect of internal and external factors in the debt-service volumes (public and private) within the country.

A designated section of the examination report deals with country exposure and consists of the following four parts:

1. Large country exposures are shown as a list (relative to capital or other lenders). This makes it easier for management to review them for their significance to the overall picture.

2. Specific comments about large exposures to individual countries (divided into three wide-range groups based on cross-classification of country-risk factors and the degree of exposure by the bank).

3. Classification of exposure when necessary.

4. Presentation of the bank's management procedures and controls for country risk.

The main objectives of the country exposure examination are to encourage effective diversification in the U.S. international lending portfolios and to make an attempt to identify risk situations and, as necessary, make correction possible. To do this, examiners classify a bank's aggregate credits to a country in categories: "substandard," "value impaired," or "loss," when this has been interpreted either to exist or to be imminent in debt servicing (see Appendix A).

The examiners also assess the bank management's ability in (and methods for) analyzing and monitoring country risk in its international lending. This includes a report of a bank's procedures for monitoring and controlling exposure to country risk, that is, the bank's system of limiting lending in a country. The control, assessing, and examination system for major components of country risk is handled by the Interagency Country Exposure Review Committee, consisting of nine bank examiners--three from each of the three U.S. bank supervisory agencies. This committee reviews the information on a specific country; its creditworthiness is then determined. Week-long meetings are held three times a year for this purpose.

Each meeting consists of discussions about a routine list of countries, or specific countries, as is appropriate. All discussions, statistics, and decisions made by the committee are confidential. Economists from the

Federal Reserve system attend these meetings as ex-officio members and present their evidence and recommendations based on their own periodic country screening procedures on specific countries. It is also at this time that the committee asks for additional information and testimony from others.

Interagency Examination of International Loans

The three government regulatory agencies enacted the International Lending Supervision Act of 1983 (ILSA) in November 1983 to establish procedures that regulators and banks must use in international lending practices. It also described changes in the examination categories which identified adversely affected "transfer" risks (i.e., problems created by borrowers that might not be able to maintain debt servicing in the denominated currency because foreign exchange is not available).

In April of 1983, the agencies announced plans for uniform examination categories, with certain refinements, to establish methods for identifying credits that have been adversely affected by transfer risk problems. These plans included new definitions for transfer risk classifications (see Appendix A). In addition, a new category was created called "Other Transfer Risk Problems." This was used to identify and categorize credits which do not warrant classification. It includes all or part of credits to a

country that is unable to comply with its external debt-service obligations but is taking positive steps to restore debt service using economic adjustment measures, generally as part of an International Monetary Fund (IMF) program. This new category was also used to acknowledge situations that have improved in recent debt-service performance, such as when the country credits no longer warrant transfer risk classification but still require special attention by bank management.

As in the past, "other transfer risk" classified credits are combined with commercial loan classifications to evaluate a bank's assets and financial soundness. These credits, however, are not regarded as classified assets. They are considered to be a judgmental factor in the general assessment of a bank's asset quality and its reserves and capital adequacy.

The International Lending Supervision Act was implemented in 1983 in recognition of the need for stability in the international banking system and in the world economy. Its essential importance was in creating methods to better provide continued international bank credit flows, particularly in countries utilizing IMF-approved economic adjustment programs to correct economic difficulties. The purpose of such new flows (under appropriate circumstances) was to strengthen the adjustment

process and help to improve the quality of outstanding credit.

This is the latest international banking legislation. It developed gradually from a need to expand U.S. funding for the International Monetary Fund to help with the growing financial problems of many developing countries, especially those in Latin America, where U.S. banks were heavily exposed. The law strengthened and clarified the role of the Federal banking agencies in supervising the foreign lending of U.S. banks. It required additional reporting and disclosures of U.S. bank lending to foreign countries and directed the Federal banking agencies to ensure that U.S. banks maintain adequate reserves against country risks. It also strengthened the authority of these agencies to establish and enforce formal standards of capital adequacy for all U.S. banking.

Reserving Requirements

The banking agencies have established a responsibility to assure that a bank's management and auditors are following reasonable and prudent policies for recognizing and accounting for deterioration in the value of a bank's assets, including a deterioration due to transfer risk problems. Management and auditors are also responsible for seeing that any necessary adjustments are made in a reliable fashion.

To assure that this is done (pursuant to the International Lending Supervision Act), U.S. banks are required to establish "Allocated Transfer Risk Reserves" (ATRR) to be held against certain assets whose value has been significantly impaired by transfer risk problems. The ATRR (after regular joint reviews of country credits by the agencies) would then be applied to those international assets that had been classified for transfer risk reasons as "value impaired." The minimum ATRR amounts are to be determined jointly and regularly by the agencies.

The reserving provisions, the agencies emphasized, in no way lessened the responsibility of bank managements and their auditors to recognize and provide adequately for any significant deterioration in the value of their assets, including international loans. The aim, then, is to encourage banks to continue to strengthen their general reserve and capital positions against the risks involved in international lending.

Loans rated as "value impaired" demonstrate significant transfer risk and should not be carried at their original book values. For developing countries categorized as "value impaired," the U.S. banking agencies established the percentage of outstanding loans that must be either written off or for which an ATRR must be established. An ATRR is not part of general reserve and is not counted as bank capital. ATRR increases resulted in reductions in

exposure during 1989 for the nine money center U.S. banks and for twelve other large banks.

Risk-Based Capital Adequacy Proposal

Capital adequacy is a critical part of any analysis by the Board of Governors of the Federal Reserve system in order to take action on applications for mergers and acquisitions by bank holding companies. It is also an important factor in the implementation of the Board's various supervisory activities related to the safety and soundness of individual banks, bank holding companies, and the banking system.

In order to do this more effectively, the Board announced revised guidelines in April 1985 for minimum and appropriate levels of capital for bank holding companies and state chartered banks that are members of the Federal Reserve system. These guidelines (based on ratios of primary and total capital versus total assets) were established in conjunction with other Federal bank regulatory agencies. They set uniform capital standards for all Federally regulated agencies and banking organizations, regardless of size.

The Proposed Supplemental Adjusted Capital Measure

The Federal Reserve Board first issued its supplemental adjusted capital measure proposal in January 1986. The Board asserted that adoption of this measure (based on an assessment of distinct but necessarily broad risk categories) would provide a valuable additional means of assessing the financial strength and stability of individual organizations as well as the banking system as a whole. Even a limited risk-adjusted measure of capital adequacy would provide assessment of whether or not an individual bank's or bank holding company's capital level was sufficient to serve the key functions of capital: to provide a buffer against losses, to promote the safety of depositors' funds, to maintain the public's confidence in banking organizations, and to encourage the reasonable growth of such organizations. Realistically, then, it is essential that an organization's capital base bear a reasonable relationship to the risk profile of that organization in order to achieve these purposes.

Not only another tool for assessing capital adequacy, the proposed supplemental adjusted capital measure furthered certain policy objectives and (by including assessment of off-balance-sheet risk as part of the supplemental adjusted capital ratio) permitted the board to

address off-balance-sheet exposures, a factor that has expanded greatly in the last several years. The proposed measure would also control to some degree the inherent negatives in the existing guidelines (holding low-risk, relatively liquid assets). It would also put capital adequacy policies in the United States more closely in line with those of other major industrial countries.

This measure was used as a formulation process. It was a working mechanism that ultimately became the international convergence of capital measures and capital standards.

The supplemental adjusted capital measure proposal involved a supplemental risk-sensitive capital measure to the Board's existing capital guidelines. The measure is based on the ratio between primary capital and total assets adjusted for risk. These factors are considered in tandem with, rather than in place of, the minimum primary and total capital ratios as defined in the Board's guidelines.

However, while the proposal's aim is to better bring to view an organization's capital needs versus its overall risk profile, it does not claim to be able to account for the many different kinds of risks to which banking organizations can be exposed.

For example, the proposal does not take explicit account of the risks associated with significant asset concentrations, nor with exposure to interest rate changes.

The measure, therefore, is not a substitute for examiner judgment in the assessment of an organization's capital adequacy.

The Supplemental Adjusted Capital Ratio

Risk considerations play an essential part in the relationship between the proposed supplemental adjusted capital measure and primary capital. The asset portion of the supplemental adjusted capital ratio is determined by assets and certain off-balance-sheet items from four broad risk categories which are weighted according to the level of risk assigned to each category. Credit risk considerations are the main determinants of asset groupings and the assignment of weights, though some attention is given to liquidity concerns. The components of each risk category, the weight assigned to that category, the types of assets and off-balance-sheet items in each category, and the rationale for assigning assets to a certain category are as follows.

Category I: Cash and Equivalents

This category includes what are often referred to as riskless assets, such as vault cash, balances due from Federal Reserve Banks, balances due from foreign central banks in immediately available funds. It also includes "near cash" assets, such as cash items in the process of

collection and transaction accounts due from U.S. depository institutions.[10] United States Treasury securities held in the investment account with original or remaining maturities of one year or less are also included in this category. These items are assigned a zero weight.

Category II: Money Market Risk

The high-liquidity assets in this category generally have little or no risk of default: all holdings of long-term (remaining maturity of over one year) United States Treasury securities, all United States government agency securities, those portions of loans that are fully guaranteed by the United States government, as well as short-term (90 days or less) claims on U.S. depository institutions. Other types of money market instruments make up the larger portion of the rest of this category, including acceptances of other U.S. banks, all federal funds sold, loans to brokers/dealers secured by United States Treasury or agency securities, and securities purchased under agreements to resell. All trading account assets, which are typically marked to market on a regular basis are included, along with all legally binding loan commitments, including note issuance facilities.[11] These items are assigned a 30 percent risk weight.

Category III: Moderate Risk

This category contains assets with more credit and liquidity risk than those in Category II, but significantly less risk than those of the standard commercial bank loan portfolio. Included are: all state, county, and municipal securities (not including industrial development bonds); longer-term claims (over 90 days) on U.S. depository institutions; all claims on governments and banks in industrial countries; holdings of acceptances of banks in industrial countries; and local currency claims on governments and banks of non-industrial countries to the extent funded by local currency liabilities.[12] Also included are loans to brokers/dealers collateralized by other marketable securities, commercial letters of credit, and standby letters of credit which are performance-related, issued on a secured basis to support brokers/dealers, or issued in support of SCM securities (excluding those supporting industrial development bonds). This risk category is assigned a 60 percent weight.

Category IV: Standard Risk

This category generally comprises those assets found in a typical bank loan portfolio and not included in the foregoing categories, including commercial and industrial loans and leases, loans to individuals, loans secured by real estate, farm-related loans, and all other claims on

foreign borrowers. Loans to nondepository financial institutions--insurance companies, mortgage companies, finance companies, and bank holding companies--are also included. So are all corporate securities and commercial paper, industrial development bonds, and all other standby letters of credit (including those backing industrial development bonds) that are not included in previous categories. Loans sold with recourse, including those that, in the case of bank holding companies, may not, under generally accepted accounting principles, be retained as assets on the balance sheet, are a part of this category as well. (Under bank call report instructions, loans sold with recourse are not removed from the balance sheet.) The major content of this risk group is banking assets, including those with strongly dissimilar risk characteristics. This category is assigned a 100 percent risk weight.

To obtain the weighted risk asset and off-balance-sheet total against which actual primary capital would be compared, the collective dollar value of the assets listed in each category would be multiplied by the weight assigned to that category. The ratio derived by dividing primary capital by the sum of these weighted values would equal the supplemental adjusted capital ratio. Table 4.1 provides an example of how this supplemental adjusted capital ratio would be calculated.

Table 4.1: ILLUSTRATION OF CALCULATION OF SUPPLEMENTAL ADJUSTED CAPITAL MEASURE

Risk Category	Dollar Amount of Items in Category		Risk Weight	Weighted Risk Assets and Off-Balance Sheet Items
Cash and equivalents	5,000	x	0	0
Money market risk	35,000	x	.30	10,500
Moderate risk	30,000	x	.60	18,000
Standard risk	80,000	x	1.00	80,000
TOTAL (including $100,000 in aggregate assets and $50,000 in off-balance-sheet items)	150,000			108,500
Aggregate primary capital	7,000			
Primary capital to total assets ratio (as defined under existing guidelines)	7,000/100,000 = 7.0%			
Supplemental adjusted capital ratio (as proposed)	7,000/108,500 = 6.5%			

NOTE: This example assumes a bank with total assets (before deducting the loan loss reserve) of $100,000, off-balance-sheet items of $50,000, and primary capital of $7,000.

SOURCE: U.S. Federal Reserve Board, 1986.

The Federal Reserve Board's choice to avoid unneccessary complexity in the grouping of assets and off-balance-sheet items reflects an effort to reasonably delineate risk categories. Risk asset systems abroad were closely studied by the Board, in particular for their methods of treatment of affected assets and off-balance-sheet items. Decisions were made about where certain items should be categorized and where to set risk weights, relative to a desire to avoid artificial pricing distortions which might lead to awkward or undesirable changes in credit flows or financing practices. Decisions were also made to temper the gradation of implied capital costs among items in the various risk categories.

The decisions were difficult and involved the treatment of country risk and off-balance-sheet items. This required the distinction between claims on governments and banks in industrial countries versus claims on governments and banks in all other countries, a view that the Board felt represents the most acceptable alternative among a variety of possible groupings. Groupings were, then, intended to distinguish, in general, among differences in transfer risk, i.e., the possibility that an asset cannot be serviced in the currency of payment because of lack of foreign exchange needed for payment in the country of the obligor. This is a more workable view than an approach requiring a country-by-country evaluation of transfer risk that would require frequent updating and revision.

Claims on banks and governments in industrial countries would be included in the Moderate Risk category because this would tend to minimize possible distortions in international interbank money market credit flows (resulting from different capital requirements for claims on domestic and foreign banks which compete alongside one another in the market). Just about all countries with significant international banks are on the list of industrial countries, excluding countries viewed as having an accountable degree of transfer risk.

Bank and government claims involving transfer risk in non-industrial countries, and all claims on private nonbank

borrowers in foreign countries, are included in the Standard Risk category. Industrial countries for risk asset purposes comprise those nations designated by the IMF and World Bank,[13] but developments and modifications of this designation for risk asset purposes may not coincide with the IMF and World Bank lists.

This treatment of claims on foreign banks differed from the typical approach in risk-based capital measures used in other industrial countries. Generally speaking, those measures assigned a very low (often zero) risk weight to claims on their own government. They assigned claims on all other governments to the equivalent of a standard risk category. In terms of interbank claims, however, the typical approach was to combine claims on all foreign and domestic banks and place both of these types of assets in the same relatively low risk category. This approach was developed prior to the realization of strong concern over country or transfer risk, and does not recognize the way claims on banks in different countries are affected by transfer risk, including those claims on banks in the less developed countries which are involved in extensive debt restructurings. Ironically, this placed claims on foreign banks in a lower risk category than claims on the governments that generally acted as the safety net for these banks. Also, assigning a lower risk treatment to claims on foreign banks than to those on their own governments might

create unintended incentives to substitute claims on banks for claims on other parties that may be involved in debt restructurings. Hence, the Board decided to depart from the more or less typical approach to the treatment of interbank claims.

Critical decisions involving the treatment of various types of off-balance-sheet items were made by the Board. For instance, standby letters of credit were divided into two broad components. The first, included in the Moderate Risk category, consisted of performance bonds, secured letters of credit supporting brokers/dealers, and standbys supporting state and local government securities (excluding those supporting industrial development bonds). The second component, assigned to the Standard Risk category, consisted of all other standbys, including those backing commercial paper, industrial development bonds, and other financial instruments and loans included in the Standard Risk category. This division, though broad, is generally consistent with the way in which comparable off-balance-sheet items are treated in risk asset frameworks abroad and is based on the nature of the underlying credit risk--how that risk would be treated if it were on the balance sheet.

Two other off-balance-sheet items, legally binding commitments and note issuance facilities, were placed in the Money Market Risk category rather than in a higher risk category. This placement was influenced by the fact that

these commitments often retain a conditional as well as contingent character because of "adverse material change" clauses and other covenants which may help banks avoid losses by avoiding or curtailing drawdowns; and because, unlike standby letters of credit, when drawings on commitments do occur there is a greater possibility that the resulting assets will be higher quality; and because supervisors should be evaluating the volume of these commitments in terms of the overall funding capacity of a bank, not just its capital adequacy; and, perhaps most importantly, because the Board felt that a relatively low capital charge was more appropriate in order to give banks time to adjust their commitment policies to any amendment to the guidelines that includes off-balance-sheet risk.

Securities, foreign exchange trading activities, and managing interest rate risk, including interest rate swaps, make up another area that is affected by off-balance-sheet risk. Therefore, the Board felt that any supplemental capital measure would have to take into account these types of risks and would need a more involved supervisory technique to measure such risks at those banking organizations which are heavily involved in such activities. It was also important to effectively supervise interest rate exposure that resulted from the rate sensitivity of assets, liabilities, and off-balance-sheet activities.

International Convergence of Capital Measurement and Capital Standards

The financial concerns and crises of the mid-1970s brought about an awareness of the need for cooperation between the banking supervisories of many nations. The resulting expansion of international lending by private banks was considered to be innovative, but it created a supervisory vacuum within and between various national authorities.

To counteract these rising difficulties, major industrialized nations joined forces to discuss cooperative initiatives and to exchange information. A forum of governors from the world's largest banks (a group of ten of the most advanced industrial countries) was convened in 1974. This new standing committee, called the Committee on Banking Regulations and Supervisory Practices, has met regularly at the headquarters of the Bank for International Settlements (BIS) in Basel, Switzerland, since its inception, and has been chaired mainly by Peter Cooke of the Bank of England.

The first objective of the committee, based on the continuing growth of banking internationalization, was to determine an appropriate division of responsibility between national authorities for the supervision of a bank's

foreign establishments, in order to ensure that no foreign banking establishment was omitted from supervision. The committee's views on jurisdiction were issued and endorsed by the BIS governors in a December 1975 general statement called the Concordat. This statement defined guidelines that determine which authorities were to be responsible for ongoing supervision of banks operating in more than one national jurisdiction. It did not provide for agreement about the responsibilities of lender-of-last-resort facilities in the international banking system.

A recent paper prepared by the Basel committee on banking regulations[14] and one on supervisory practices prepared by the Cooke committee[15] established the framework to be used for international convergence of bank capital adequacy standards. This framework is to be implemented by the banking supervisory authorities in the Group of Ten countries (Belgium, Canada, France, Germany, Italy, Japan, Netherlands, Sweden, Switzerland, the United Kingdom, and the United States). The framework establishes minimum levels of capital for international banks, still allowing for supervisory authorities in any individual country to establish higher standards.

This report presented the outcome of the committee's work over several years to bring about international convergence of supervisory regulations governing the capital adequacy of international banks. The committee's proposals

were circulated to supervisory authorities worldwide in December 1987, and a consultative process was created in the Group of Ten (G-10) countries. Some changes were made to the original proposals after those consultations. The present paper is now a statement agreed upon by all the committee's members. It details the agreed-upon framework for measuring capital adequacy and the minimum standard to be achieved by each committee member's respective country. The framework and standard were endorsed by the G-10 central-bank governors.

There are three fundamental objectives to the committee's regulatory convergence work: that the new framework should serve to strengthen the soundness and stability of the international banking system, and that it should be fair, and that it should have a high degree of consistency in its application to banks in different countries (to diminish existing sources of competitive inequality among international banks). The response received by the committee on its original proposals indicated from the outset that the proposed framework was welcomed in its general shape and rationale. Many respondees supported the view that it should be applied as uniformly as possible at the national level.

In development of the framework, the committee sought to create sound principles that would respect individual features in a country's existing supervisory and accounting

systems. It believes that this objective has been achieved and made sure that the framework provided for a transitional period that allowed time for flexibility and adjustment so that the existing circumstances in different countries were reflected.

The framework allows (in a very limited way) for the country to use a certain degree of discretion in the way in which the framework is applied. (The impact of such discrepancies on the overall ratios is likely to be negligible and it was not considered that they would compromise the basic objectives.) The committee intent was to later monitor and review the application of the framework to analyze and perhaps improve its consistency.

It should be noted that the capital adequacy that is measured by the framework, though important, is only one of a number of factors taken into account when assessing the strength of banks. The framework particularly assesses capital in relation to credit risk, but other risks, notably interest rate risk and the investment risk on securities, must be taken into account by supervisors in assessing overall capital adequacy. The committee considered various approaches in relation to these risks. It also took into consideration that capital ratios judged alone could be misleading guides to relative strength because so much also depends on the quality of a bank's

assets and the value of provisions a bank may be holding outside its capital against assets of doubtful value.

This close relationship between capital and provisions, among other things, created the need for the committee to establish monitoring of provision policies made by banks in member countries and to work to establish convergence policies in this field as in other related fields. The committee would continue to assess progress by banks in member countries toward meeting the agreed capital standards and to scrutinize carefully differences in existing policies and procedures for setting the level of provisions among countries' banks, and in the form such provisions would take.

The committee was aware that differences between countries in the fiscal treatment and accounting presentation (for tax purposes) of certain classes of provisions (for losses and capital reserves derived from retained earnings) may tend to distort the comparability of the real or apparent capital positions of international banks. However, convergence in tax regimes, though desirable, were not considered. Tax and accounting matters were kept under review to the extent that they could affect the comparability of the capital adequacy of different countries' banking systems.

The measurement and standards agreement was intended to be applied to banks on a consolidated basis. This also

includes subsidiaries undertaking banking and financial business. The committee recognized that ownership structures and the position of banks within financial conglomerate groups were changing and was concerned that ownership structures should not weaken the capital position of the bank or expose it to risks from other parts of the group. Developments were reviewed, based on the regulations of the member country, in order to ensure maintenance of the integrity of the capital banks.

There are four sections to the document: the constituents of capital, the risk weights, a target standard ratio, and transitional implementing arrangements.

The Constituents of Capital

Core Capital (Basic Equity)

Core capital elements (tier 1) of an institution's qualifying capital must represent at least 50 percent of qualifying total capital and may consist of the following items that are defined as core capital elements: common stockholders equity, qualifying cumulative and non-cumulative perpetual preferred stock, and minority interest in equity accounts of consolidated subsidiaries.

The committee considered that the main emphasis should be placed on equity capital and disclosed reserves because it is the only element common to all countries' banking systems. It is wholly visible in the published accounts

and is the basis on which most market judgments of capital adequacy are made. It also has a crucial bearing on profit margins and a bank's ability to compete. This emphasis on equity capital and disclosed reserves reflects the importance the committee places on progressive enhancement in the quality, as well as the level, of the total capital resources maintained by major banks.

Supplementary Capital

Supplementary capital elements (tier 2) of an institution's qualifying total capital may consist of the following items that are defined as supplementary capital elements: allowance for loan and lease losses; perpetual preferred stock and related surplus; hybrid capital instruments, perpetual debt, and mandatory convertible securities; subordinated debt and intermediate-term preferred stock (original weighted average maturity of 5 years or more); and revaluation reserves (equity and building).

Undisclosed reserves. Many countries do not recognize undisclosed reserves as an accepted accounting concept or as a legitimate element of capital. They argue for excluding them from the core equity capital element because though they may have the same intrinsic quality as published retained earnings, their lack of transparency is difficult to fit within the context of an internationally agreed minimum standard. Yet, unpublished reserves exist in different ways, depending on differing legal and ac-

counting regimes in member countries. Under this heading are included only reserves which, though unpublished, have been passed through the profit and loss account and which are accepted by the bank's supervisory authorities.

Revaluation reserves. Some national regulatory or accounting systems allow certain assets to be revalued to reflect (or be close to) their current value, rather than their historic cost. The resultant revaluation reserves are then included in the capital base. Such revaluations can be made in two basic ways: (a) from a formal revaluation, carried through to the balance sheets of a bank's own premises; or (b) from a notational addition to capital of hidden values which arise from the practice of holding securities in the balance sheet valued at historic cost. Such reserves are included within supplementary capital, provided that the assets are considered by the supervisory authority to be realistically and wisely valued, and that they reflect the possibility of price fluctuations and forced sale.

General provisions/general loan loss reserves. General provisions or general loan loss reserves are created to protect against future losses. If they are not ascribed to particular assets and do not reflect a reduction in the valuation of particular assets, they can be included in capital. Where, however, provisions have been created against identified losses or in respect to a

specific deterioration in the value of particular assets, they may not be able to meet unspecified losses which subsequently arise elsewhere in the portfolio. These, therefore, do not possess an essential characteristic of capital. Such specific or earmarked provisions should therefore not be included in the capital base.

Hybrid debt capital instruments. Capital instruments in this category reflect characteristics of equity and debt which affect their quality as capital. If these instruments (close to equity) are able to support losses on an on-going basis without triggering liquidation, they are included in supplementary capital. These instruments include: perpetual preference shares carrying a cumulative fixed charge, long-term preferred shares in Canada, titres participatifs and titres subordonnes a duree indeterminee in France, Genusscheine in Germany, perpetual debt instruments in the United Kingdom, and mandatory convertible debt instruments in the United States.

Subordinated term debt. Subordinated term debt instruments have significant deficiencies as constituents of capital despite their fixed maturity. They also have an inability to absorb losses except in a liquidation. Thus additional restriction was placed on the amount of such debt capital which is eligible for inclusion within the capital base. Subordinated term debt instruments with a minimum original term to maturity of over five years,

however, may be included within the supplementary elements of capital, but only to a maximum of 50 percent of the core capital element, and subject to adequate amortization arrangements.

Deductions from Capital

The deductions from the capital base for the purpose of calculating the risk-weighted capital ratio consist of:

1. Goodwill, as a deduction from tier 1 capital elements.

2. Investments in subsidiaries engaged in banking and financial activities which are not consolidated in national systems. (The normal practice was to consolidate subsidiaries for the purpose of assessing the capital adequacy of banking groups. If this is not done, deduction is essential to prevent the multiple use of the same capital resources in different parts of the group.) The deduction for such investments is made against the total capital base. The deducted assets would not be included in total assets used to compute the ratio.

The Risk Weights

A weighted risk ratio in which capital is related to different categories of asset or off-balance-sheet exposure was the preferred method for assessing a bank's capital adequacy. Other capital measurements were also useful, but they were considered by the committee to be supplementary

to the risk weight approach because the risk ratio has advantages over the simpler method. These advantages include:

1. The risk ratio provides a fairer basis for making international comparisons between banking systems whose structures may differ.

2. It allows off-balance-sheet exposures to be incorporated more easily into the measure.

3. It does not deter banks from holding liquid or other assets which carry low risk.

The framework of weights was kept as simple as possible. Only five weights are to be used--0, 10, 20, 50, and 100 percent--despite the inevitable grey-area judgments necessary in deciding which weight should apply to different types of asset. Weightings are noted not to be substitutes for commercial judgment for purposes of market pricing of the different instruments.

Categories of Risk Captured in the Framework

A bank's management needs to guard against different kinds of risks, especially credit risk, i.e., the risk of counterparty failure. Other kinds of risk to watch for are: investment risk, interest rate risk, exchange rate risk, concentration risk. However, the central focus is credit risk and a further aspect of it--country transfer risk. Some countries, however, would prefer to retain a weighting for open foreign exchange positions or for some

aspects of investment risk. No standardization was added in the framework for these other kinds of risks. Therefore, the framework allows individual supervisory authorities to have discretion to build in certain other types of risk.

The committee considered the desirability of incorporating additional weightings to reflect the investment risk in holdings of fixed rate domestic government securities (an indication of interest rate risk present in the complete range of a bank's activities, on or off the balance sheet). Individual supervisory authorities were allowed to apply either a zero or a low weight to claims on the domestic government (e.g., 10 percent for all securities, or 10 percent for those maturing in under one year and 20 percent for one year and over). It was agreed, however, that interest rate risk needed further study and that it might be possible to develop a satisfactory method of measurement for this aspect of risk.

Country transfer risk. The difficulty of devising a satisfactory method for incorporating country transfer risk into the framework of measurement resulted in the consideration of two alternative approaches. The first was a simple differentiation between claims on domestic institutions (central government, official sector, and banks) and claims on all foreign countries. The second was to

establish comparisons on the basis of a defined grouping of countries considered to be of high credit standing.

The second alternative was overwhelmingly favored, based on four specific arguments. First, a simple domestic/foreign split ignored the fact that transfer risk varies greatly between different countries. It also ignored the necessity of ensuring that broad distinctions in the credit standing of industrialized and non-industrialized countries would have to be made and captured in the system of measurement, particularly one designed for international banks. It also does not reflect the global integration of financial markets or the absence of some further refinement that would discourage international banks from holding securities issued by central governments of major foreign countries as liquid cover against their Euro-currency liabilities. Such an approach would run counter to encouraging prudent liquidity management, an important objective of the risk weighting framework. Finally, and most importantly, the member states of the European community felt that whatever approach was used, it should cause all claims on banks, central governments and the official sector within European community countries to be treated in the same way, preventing an undesirable asymmetrical treatment of members of the community (the seven European G-10 countries) as compared with the treatment of non-community countries.

It was concluded that a defined group of countries should be adopted as the basis for applying differential weighting coefficients, and that the countries in this group should be full members of the OECD or countries which have concluded special lending arrangements with the IMF associated with the fund's General Arrangements to Borrow. This group of countries is referred to as the OECD.

This decision caused consequences for the weighting structure. Claims on central OECD governments would receive a zero weight (or a low weight if the national supervisory authority elected to incorporate interest rate risk), and claims on OECD non-central-government public-sector entities would receive a low weight (see next section). Claims on central governments and central banks outside the OECD would receive a zero weight (or a low weight if the national supervisory authority elected to incorporate investment risk), provided such claims were denominated in the national currency and funded by liabilities in the same currency. This reflected the absence of risks relating to the availability and transfer of foreign exchange on such claims.

To preserve the efficiency and liquidity of the international interbank market concerning interbank claims, there was no differentiation made between short-term claims on banks incorporated within or outside the OECD. There was however a distinction drawn between short-term place-

ments with other banks (an accepted method of managing liquidity in the interbank market which is seen as low risk) and longer-term cross-border loans to banks (often associated with particular transactions and which carry greater transfer and/or credit risks). A 20 percent weight would be applied to claims on all banks, wherever incorporated, that had residual maturity of up to and including one year; longer-term claims on OECD incorporated banks were weighted at 20 percent; and longer-term claims on banks incorporated outside the OECD, at 100 percent.

Claims on Non-Central-Government, Public-Sector Entities

A single common weight that could be applied to all claims on domestic public-sector entities (PSEs) below the level of central government (e.g., states, local authorities, etc.) was considered not possible because of the special character and varying creditworthiness of these entities in different member countries. As a result, each national supervisory authority was allowed to determine the appropriate weighting factors for the PSEs within that country. In order to preserve a degree of convergence in the application of such discretion, the weights would be 0, 10, 20, or 50 percent for domestic PSEs, but foreign PSEs within the OECD would attract a standard 20 percent weight. These weightings were subject to review by the committee in pursuit of further convergence towards common weights and consistent definitions in member countries. Decisions

within the European community on the specification of a common solvency ratio for credit institutions also had an effect. Commercial companies (owned by the public sector) would obtain a uniform weight or 100 percent inter alia in order to avoid unequal competition with similar private-sector commercial enterprises.

Collateral and Guarantees

To a limited extent, the framework recognized the importance of collateral in reducing credit risk. The varying collateral practices in banks in different countries and the different physical and financial collateral value/actions made it impossible to develop a basis for recognizing collateral within the weighting system. This applied only to loans secured against cost or against securities issued by OECD central governments and/or specified multilateral development banks. Such loans would receive the weight given to the collateral (i.e., a zero or a low weight). Loans partially collateralized by these assets would also attract the equivalent low weights on that part of the loan which is fully collateralized.

OECD central-government-guaranteed loans, OECD public-sector entities, or OECD incorporated banks would receive weights allocated to a direct claim on the guarantor (e.g., 20 percent in the case of banks). Loans guaranteed by non-OECD incorporated banks would receive a

20 percent weight but only if the underlying transaction had a residual maturity of less than one year. Monitoring this latter arrangement was done to ensure that it does not give rise to inappropriate weighting of commercial loans. In loans covered by partial guarantees, only that part of the loan which is covered by the guarantee would receive reduced weight. A credit conversion factor of 100 percent would be given to the contingent liability assumed by banks.

Loans Secured on Residential Property

Residential property loans (secured by mortgage, and borrower occupied and/or rented) are assigned a 50 percent weight because they are known to have a very low record of loss in most countries. This concessionary weight is applied restrictively for residential purposes and in accordance with strict prudential criteria. For example, the 50 percent weight in some countries would only apply to first mortgages, creating a first charge on the property. In other member countries, it would be applied only where strict, legally based, valuation rules ensure a substantial margin of additional security over the amount of the loan. The 50 percent weight was specifically not applied to loans to companies engaged in speculative residential building or property development. Other collaterals would not be used to justify reduction of the weightings.[14]

A Target Standard Ratio

In the light of consultations and preliminary testing, a minimum standard was set which international banks were generally expected to achieve by the end of the transitional period. This standard was set at a level consistent with the objective of securing (over time) soundly based and consistent capital ratios for all international banks. The target standard ratio of capital to weighted risk assets would be set at 8 percent (of which the core capital element would be at least 4 percent). This is expressed as a common minimum standard which international banks in member countries would be expected to observe by the end of 1992, thus allowing a transitional period of some four-and-a-half years for any necessary adjustment by banks who need time to build up to those levels. The transition from existing, sometimes long-established, definitions of capital and methods of measurement toward a new internationally agreed-upon standard was acknowledged as not easily or quickly achievable. The period to 1992 ensured progressive steps towards adjustment and did not require banks whose ratios are presently below the 8 percent standard to take immediate action.

Transitional and Implementing Arrangements

Certain transitional arrangements were agreed upon to ensure that there would be sustained effort during the

transitional period to build the individual banks' ratios up to the highest target standard, and to create smooth adjustments and phasing in of the new arrangements within a wide variety of existing supervisory systems.

The transitional period would be from July 1988 to the end of 1992, by which latter date all banks undertaking significant cross-border business would be expected to meet the standard in full.

Initially no formal standard or minimum level would be set. However, those banks whose capital levels were at the low end of the range would be encouraged to build up their capital as quickly as possible. No erosion of existing capital standards in individual member countries' banks was expected. Thus, during the transitional period, all banks needing to improve capital levels up to the interim and final standards would not diminish (even temporarily) their current capital levels (subject to the fluctuations which can occur around the time new capital is raised). A reasonable yardstick for the lower capitalized banks to seek to achieve in the short term by application of the framework and transitional arrangements would be 5 percent. Individual member countries would be free to set, and announce, at the outset of the transitional period, the level they would expect all their banks to move toward and their final target standard.

Assessment and comparison of progress takes into account existing supervisory systems, and the new arrangements would initially apply the basis of measurement as follows. The capital position of banks would be measured at the start of the transitional period, when supplementary elements may constitute up to a maximum of 25 percent of core capital elements, reducing to 10 percent by end-1990. At that point, there would be an interim minimum standard of 7.25 percent, of which at least half should be core capital. Between end-1990 and end-1992, up to 10 percent of the required core elements may be made up of supplementary elements. This means, in round figures, that a minimum core capital element of 3.6 percent, of which tier 1 elements should total at least 3.25 percent, must be achieved by the end of 1990. In addition, from end-1990, general loan loss reserves or general provisions which include amounts reflecting lower valuations of assets or latent but unidentified losses present in the balance sheet would be limited to 1.5 percentage points, or as an exception, up to 2.0 percentage points of risk assets within supplementary elements. These limits would apply only in the event that no agreement is reached on a consistent basis for including unencumbered provisions or reserves in capital.

Throughout the transitional period up to end-1992 (subject to restrictive policies individual authorities may

wish to apply), term subordinated debt may be included without limit as a supplementary constituent. Also, the deduction from tier 1 capital elements with respect to goodwill may be waived.

At the end of the transitional period, the minimum standard would be 8 percent, of which core capital (tier 1 equity and reserves) would be at least 4 percent, with supplementary elements to be no more than core capital, and term subordinated debt within supplementary elements no more than 50 percent of tier 1. In addition, general loan loss reserves or general provisions would be limited at end-1992 to 1.25 percentage points, or as an exception and temporarily, up to 2.0 percentage points, within supplementary elements.

The arrangements described in this section were implemented at a national level at the earliest possible opportunity. Each country decided the way in which the supervisory authorities introduced and applied these recommendations, based on their different legal structures and existing supervisory arrangements. Changes in the capital regime were introduced in some countries, after consultation, without the need for legislation. Other countries employed more lengthy procedures, which in some cases required legislation. In due course, the member states of the European community also needed to ensure that their own domestic regulations were compatible with the

community's legislative proposals, none of which affected the timing of implementation among member countries. Hence, some countries applied the framework, formally or informally, in parallel with their existing system, certainly during the initial period of transition. In this way, banks were assisted in starting the necessary process of adjustment in good time before substantive changes in national systems were formally introduced.

Summary

The effective management of risk by U.S. banks in developing countries is an important priority of the U.S. bank regulatory agencies. The amount of loans granted to countries with debt-servicing problems by the U.S. banks has declined. However, the exposure levels of some of the largest U.S. banks are still very high in terms of absolute exposure and exposure relative to capital. Lately, the regulatory agencies have embarked on a number of procedures to strengthen the supervisory framework that applies to the international lending operations of U.S. banks. These procedures, along with amendments to regulatory policies that strengthen examination procedures, have resulted in decreased exposure to countries with debt-servicing problems and increased capital in the U.S. banking system.

There are two major reasons why the U.S. banking system is now better able to deal with the effects of the

debt-servicing problems of developing countries. First, international bank lending has been strengthened through bank policies and procedures on lending that make sure that risk in the loan portfolio is properly appraised and reserves against future loan losses are well established. Throughout 1989, the 21 largest internationally active U.S. banks increased their loan loss provisions for developing country debt by $9.3 billion. The average reserve levels involved with exposure to medium- and long-term debt of developing countries is 49 percent for the nine money center banks and 60 percent for the twelve other large banks. These reserves brought about a more flexible environment for international loan portfolio management by these banks.

The other reason is that bank capital has been strengthened relative to overall bank lending activity as banking supervisors and bank personnel have stressed the need to maintain sufficient capital to withstand potential loss. From December 1982 to December 1989, primary capital for the 21 largest internationally active U.S. banks increased from $40 billion to $76 billion. As a percentage of total banking assets, capital levels have increased from 4.7 percent to 8.2 percent during this period. Throughout 1989, primary capital levels increased by $2 billion for these banks.

It is estimated that U.S. banks own about 30 percent of developing country debt. This means that non-U.S. creditor banks hold most commercial bank claims on developing countries. Japan and the European countries have banking systems which are highly concentrated within a few large banks. This could subject these banking systems to greater vulnerability to debts of developing countries than the U.S. banking system. However, the major non-U.S. banks are not subjected to the stringent disclosure requirements that apply to U.S. banks, and thus data for individual banks on the exposure to developing countries are more restricted. Exposure data for the main Canadian and British banks have been fairly well publicized, but the developing-country portfolios of German, French, and Japanese banks are still unpublished.

The tax authorities in many countries efficiently reduced the cost of loan loss provisioning by allowing banks to deduct increases in provisions from taxable income. These provisions are largely tax deductible in most of the industrial countries, with the exception of Japan and the U.S. In Japan, loan loss reserves are tax deductible up to 1 percent of the banks' exposure to developing countries. In the U.S., only specific reserves mandated by the federal regulatory agencies and actual charge-offs are tax deductible. In the United Kingdom, tax deductibility is permitted on a case-by-case basis, using

provisioning levels mandated by regulatory authorities through a matrix system of country classification. To make up for the cost of loan loss provisions through tax deductions would encourage enough earnings to make use of the tax deduction.

It is evident that banking regulation has helped the present debt crises. Effective enactment of responsible regulation by U.S. banks will improve the current debt situation and make the present and future loans of U.S. banks to developing countries more manageable. Of course, if the present regulatory guidelines had been in place about ten years ago, the current debt crises would not have reached this proportion. It is also important for the international regulatory agencies to establish guidelines, procedures, and capital ratios for all major international banks that are comparable and thus less likely to give the banks in one country a competitive edge.

The next chapter will discuss the management of country risk and address previous work on empirical investigation of factors leading to the need for rescheduling debt of less-developed countries, applying logit and discriminant models.

Endnotes to Chapter IV

1. The Wall Street Journal, editorial, March 9, 1983.

2. David Lomax, "Sovereign Risk Analysis Now," The Banker (January 1983), pp. 33-39.

3. Sebastian Edwards, "LDC Foreign Borrowing and Default Risk: An Empirical Investigation, 1976-80," American Economic Review, Vol. 74 (September 1984), p. 726.

4. IMF Annual Report (Washington, 1976), p. 21.

5. Henry C. Wallich, "Banks, LDC's Share Concern for Viable System," Journal of Commerce, July 30, 1981.

   BIS Annual Report (Basel, 1978), p. 92.

   Bis Annual Report (Basel, 1981), p. 105.

6. The average spread above LIBOR for Eurocurrency loans to developing countries was about one percentage point in 1973-74, 1.5% in 1975-77, down to 1.2% again by 1978, and only 0.9% in 1979-81. IMF, "International Capital Markets: Recent Developments and Short-Term Prospects," September 1980, p. 26 and July 1982.

7. Federal Financial Institutions Examination Council, Country Exposure Lending Survey, various issues.

8. Rudiger Dornbusch, "External Debt, Budget Deficits, and Disequilibrium Exchange Rates," International Debt and the Developing Countries, edited by Gordon W. Smith and John T. Cuddington, Washington, D.C.: A World Bank Symposium, 1985.

9. Joint Memorandum, "Federal Reserve, FDIC, and Comptroller of the Currency Program for Improved Supervision and Regulation of International Lending" (Washington, April 7, 1983: processed).

10. For purposes of this proposal, the terms 'U.S. banks' and 'U.S. depository institutions' refer to depository institutions chartered under the laws of the United States and include the foreign branches of these institutions. While banks chartered in the U.S. that are subsidiaries of foreign banking organizations are also included in the definition, U.S. branches and

agencies of foreign banks are not considered to be U.S. banks or depository institutions for purposes of the supplemental adjusted capital measure.

11. According to the Federal Reserve, a note issuance facility is a medium-term (5 to 7 years) commitment to help a borrower obtain short-term financing. Participating banks commit to provide funds under a revolving credit or standby arrangement if the client fails to sell notes within a range of predetermined contractual rates.

12. "Banks" are defined to include their foreign branches and are categorized by the country under whose laws they are chartered.

13. Industrial countries designated by the IMF and World Bank include Australia, Austria, Belgium, Canada, Denmark, Finland, France, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Spain, Sweden, Switzerland, United Kingdom, West Germany.

14. Committee on Banking Regulations and Supervisory Practices, "International Convergence of Capital Measurement and Capital Standards," Bank for International Settlements, Basel, July 1988.

15. W. P. Cooke, "A Supervisory Perspective of Risks in Banking," The World of Banking, November-December 1986.

CHAPTER V

MANAGING COUNTRY RISK

Fundamental to managing country risk is the notion that the additional risk associated with international lending, whether by private banks or by any private investor, cannot be eliminated. Banking, whether domestic or international, is a risk-taking business; nevertheless, risk can be managed so as to make private banks that do undertake such actions less vulunerable. Most importantly, banks must anticipate change in order to function proactively, not reactively. They must work quickly, thereby avoiding excessive losses which could have been anticipated.

The importance of management of international risks is the direct result of increased international banking/investment activity over the past two decades. During that time, international transactions expanded more than domestic transactions in almost every country. Growth and profit opportunities became dependent on effective management. Ironically, however, even as international risk management has become more important, the ability of banks to anticipate risks has not improved.

To better understand the nature of the risk, and, therefore, what it is that will be managed, it is necessary to clarify the measuring, controlling, and reporting of such exposure, because accurate and current information is essential for effective management.

Managing country risk requires two separate undertakings: first, assessing the degree of risk incurred by increasing involvement with a particular country; and second, transforming those assessments into a set of constraints on a bank's asset portfolio.

Techniques for Assessing Country Risk

The shift in the movement of international capital flow from official sources to commercial banks, in conjunction with increased borrowings of the LDCs, brought about the need for country-risk assessment. Commercial banks, as profit-maximizing entities, are more concerned with the risks of lending than are foreign official sources, which provide "soft loans." Commercial banks lend on commercial terms, the hardest available, and the people and countries that borrow from such sources do not expect concessions such as lower interest rates or longer grace periods and maturities than those in private markets. As a result, countries that borrow commercially accumulate larger external debt and debt-servicing obligations than they would in borrowing from concessional sources.

Before recent efforts by United States bank regulatory authorities to monitor overseas lending activities more closely, the larger U.S. commercial banks used their own criteria for assessing the risk and debt-repayment capability of developing countries. Even the smaller banks, which previously had relied on the decisions of larger banks when participating in loan syndication, began to develop their own evaluation systems.

However, rarely did any two banks involved in international lending act in the same way; rather, they behaved according to their own needs and capabilities. Some decided to participate in loan syndications, which limited their international exposure and enabled them to rely on the knowledge of other syndicate participants. Others decided to act on their own. Each responded differently because of varying portfolio sizes, earnings, and geographic location. Too often, though, satisfied with prevailing views, banks neglected to build their own capabilities. As a result, evaluating country credit risk became more and more important.

The procedures that banks followed, however, were not generally known, prompting Eximbank[1] to conduct a survey of 37 U.S. commercial banks. It began the survey without any strong preconceived notions of these procedures. Four of the 37 banks that participated in the survey (11%) indicated that they had no systematic procedure for assessing

creditworthiness; they simply reviewed the political and economic conditions of a particular country in connection with the processing of an individual loan request. These four banks had comparatively small international loan portfolios and were relatively new to overseas lending, but they seem representative of a large number of other U.S. commercial banks. The remaining 33 banks used procedures that ranged from strictly qualitative to quite quantitative. Overall, four types of country evaluation could be distinguished: fully qualitative, structured qualitative, checklist, and quantitative econometrics. Some banks used more than one system.

The fully qualitative system is structured around a report which details a country's economic, political, and social conditions and prospects; the report's format, detail, and extent vary from country to country. Five of the 37 banks surveyed follow this approach in evaluating a country's creditworthiness. There were indications that these banks have only recently implemented these procedures, though three were experienced foreign lenders. The qualitative system has both advantages and disadvantages; it is able to adapt easily to the unique strengths and problems of the country undergoing evaluation, but such reports tend to be retrospective, severely limiting their utility.

In comparison, the structured qualitative system uses a standard format across countries and is augmented by economic statistics which can vary across countries and over time. The inclusion of the economic data serves as a foundation for deriving a concise set of statistics, which in turn facilitates the prediction of future trends and thus lessens, to some extent, retrospective prejudice. Nearly 75% of the banks surveyed used this system.

The checklist system compresses a country's overall performance into some type of rating. The rating is either quantitative (in which the scoring requires no personal judgment or first-hand knowledge of the country) or qualitative (in which the scoring is determined subjectively). The influence of each component variable in the final score can be adjusted by assigning a weight to each indicator, in a method known as the weighted checklist approach. In the unweighted checklist approach, component variables are weighted equally. Fourteen percent (five of 37) of the banks surveyed used a weighted checklist, but only to supplement another evaluation system. In four of the banks, the checklist is used with the structured qualitative system; in the fifth, with more advanced experimental qualitative techniques.

Because the checklist produces a concise evaluation, it can be correlated statistically with the actual repayment experience that the bank has had with the country.

Such comparisons can shed valuable light on the checklist's accuracy in evaluating country risk. Only one bank, however, used such testing--the only one out of 37 to validate the results of its country evaluation system against its repayment experiences.

The quantitative econometric approach requires evaluation techniques that are statistically more sophisticated than the others. These techniques include discriminant, logit, and probit analyses, principal components, and linear probability models. The quantitative approach attempts to overcome the shortcomings of the checklist system, which necessarily involves subjectivity in selecting the most significant variables. Here, standard statistical tests of predictive ability are used to select the most relevant explanatory variables and to predict potential debt-servicing difficulties.

Significantly, 26 of the 37 surveyed banks used their country evaluation results in setting overall country exposure limits, as well as other important factors, such as marketing strategy. Several of these banks also used their results to set limits for specific loan maturities and categories. Nine of the 37 banks used their results to help analyze portfolio quality; and six of these nine banks decided country limits on the basis of their evaluations. The eight other banks in the survey either did not have any systematic approach to evaluating countries, or used the

system's results very generally. Finally, the survey indicated that banks did not use the results from their country evaluations to determine interest rates or fees.

The fact that private banks use various methods to assess country risk is not surprising, considering that each bank's involvement in providing loans differs according to changes in the world economy and the accompanying variability in demand for international banking services. Some banks have very limited international activities; others are somewhat more involved; and the rest devote a great deal of time to building a portfolio of high-quality international loans.

Differences also exist among operating and lending policies. Some banks offer credits with time constraints to overseas entities only when such exposure is completely guaranteed by the central bank in the debtor's country. Others offer only short-term, trade-related credits, while still others allow meaningful exposure which specifies the time allowed for discharge.

The current state of country assessment has been described concisely by Ingo Walter:

> The conflicting demands of country assessment--ranging from high levels of usability, auditability and comparability and the need to capture exceedingly complex and country-specific qualitative judgments over extended periods of time, to the need to avoid abuse of the results in decision-making--probably means that there is no such thing as the "ideal" system. "Appropriate" systems will certainly differ for

different banks. The key may reside as much on the "human resources" side as on the "technology" side.[2]

Traditional Approaches to Assessing Country Risk

The traditional approach to assessing country risk has involved the selection of both risk indicators (with either an implicit or explicit weighting scheme) and a formula to rank potential country exposure. This section will address the quantitative and qualitative components generally thought necessary in making comparisons among countries.

Any assessment of country risk must concentrate on the economic, commercial, political, and social conditions of a particular nation. Information on economic conditions alone is not sufficient to determine a country's ability to service its external debt.

A carefully formed structure for risk approval can provide a time series of evaluations from which one can make a thoughtful appraisal of a country's strengths and weaknesses. By highlighting the improvement, deterioration, or turning point in a country's status, this process can shed some light on emerging economic, social, and political developments which may mandate early corrective measures to reduce exposure risks.

Economic Indicators

Economic indicators normally measure the ability of a country to pay its debts. There are many, some more meaningful than others. For example, important data and ratios may be scored so as to measure the relative stability and growth of an economy. The economic indicators to be discussed below are connected to a country's balance of payments, its debt structure, and its international liquidity.

The outlook of a country's balance of payments is crucial because key components of it control the future ability of the country to pay its external debt on time. Most significant are the trends, both historical and projected, in exports, imports, the trade deficit, and the current-account deficit. Until a few years ago, many developing countries had borrowed to finance balance-of-payments deficits which were clearly larger (in relation to the GNP and exports) than could be sustained. The critical question thus was whether or not these countries were making the necessary adjustments to reduce their trade deficits, and as a result their current-account balance-of-payments deficits, to levels which could be sustained over the long run. The existence of a deficit is not the indication of a problem; a continued capital flow (which is what the deficit indicates) benefits both the lender and the borrower when the resources are well used and the returns on investments comparatively high.

When evaluating country risk and monitoring a country's economic development, it is crucial to have information on the current-account balance of payments, along with some indication of its causes and likely development (such as the government's budget deficit, domestic savings and investment, and the economy's supply potential). When a country undergoes continuous balance-of-payments deficits and an unfavorable drift in, for example, its trade account, there exists the possibility of a basic disequilibrium, overvalued currency, and capital flight caused by speculation that the currency will weaken. Serious deficits can lead to either a shortfall in available foreign exchange or difficulty in converting local currency into hard currency.

A current account consists of imports and exports of goods and services, and transfer payments. A surplus is a positive indicator because a stagnant economy or poor country management will not attract foreign capital, whereas a sound, growing economy is more likely to receive private capital from direct foreign investment and lending, and from official capital inflows as a result of active development efforts.

External financial instability is often a result of internal financial instability which "spills over" into the balance of payments via lagging exports and a rapid growth in demand for imports. Consequently, one can often anti-

cipate external financial problems by examining the financial management of the public sector. The World Bank most often uses as an indicator the public-sector deficit as a percentage of the gross domestic product (GDP). Related significant indicators are public-sector savings in relation to the GDP and to investment expenditures.

One of the most fundamental yet elusive issues in country-risk analysis is whether or not a level of debt is sustainable. A large number of indicators have been suggested for analyzing debt levels, but until recently, obtaining data on foreign debt and debt structure (which have been historically either partially or wholly unavailable) has been difficult. Governments have published statistics covering only the medium-term, public-sector debt which, in excluding short-term and private-sector debt, has forced analysts to turn to a shortened version of the debt service ratio to assess country risk.

In analyzing liquidity problems, the most popular indicator is the total of reserves. In general, reserves act as cushions for cyclical variations in a country's external revenues and for emergencies. They do not represent money set aside to pay external debts; rather, they are used to pay all external expenditures. The size of the reserves indicates the extent of a country's international cash flow and, indirectly, the extent of the international credit that the country can carry. For example, all else

being equal, the repayment potential of a country with reserves in the $7 to $9 billion range should be higher than that of a country whose reserves are at the $700 to $900 million level.

Reserves are used only after compensating all foreign exchange transactions through normal international clearing arrangements and after using the regular credit facilities. Thus increases or decreases of the reserves represent net imbalances of all payments affecting a country's international liquidity. Variations will indicate disequilibrium between foreign exchange inflow and outflow. In the IMF Balance of Payments Manual under "Reserves--Explanation of Concept," reserves is defined as follows:

> "Reserves" is singled out as a category because the kind of capital that it is designed to comprise can perform a distinctive and important function in the context of an economy's international transactions. The category may be described as the monetary gold, special drawing rights (SDRs) in the Fund, reserve positions in the Fund, use of Fund credit, and existing claims on nonresidents that are available to the central authorities either to finance payments imbalances directly or to manage the size of such imbalances by intervening to influence the exchange rate for the national currency.[3]

International reserves consists of monetary authorities' reserve positions in the fund, holdings of special drawing rights (SDRs), foreign exchange, and gold. The sum of the first three items, "total reserves minus gold" or "non-gold reserves," is normally used as a measure of

international reserves in the International Financial Statistics (IFS).

There is some opposition to the use of reserves as a performance indicator in assessing country risk. For instance, it is possible for a country accumulating extensive foreign debt to show very acceptable reserve trends. Mexico is the best example. It had run deficits in its current account for 20 consecutive years before the 1976 devaluation, yet its reserves were remarkably stable, increasing gradually from $400 to $500 million in the mid-1950s to $1.5 billion by 1975. Furthermore, in the second half of the 1970s, developing countries that did not export oil began to accumulate reserves while their current accounts showed a deficit.

Commercial Indicators

Commercial indicators are best derived from first-hand experience and in-depth knowledge of a country. They are also divisible into four types, all of which are necessarily somewhat subjective and dynamic: business confidence and activity, financing purpose, climatic conditions, and access to energy resources. In some countries, both private and overall commercial activity can be adversely affected by varying but pervasive government intervention into basic and other industries, burdensome and changing regulations and taxes, and official discrimination. On the

other hand, in centrally planned economies (where private investment, foreign or domestic, may or may not be sanctioned), this factor, at least in its narrowest sense, cannot be included as heavily negative in risk assessments. There, official judgments can affect attitudes toward foreign business, the negotiating and operating climate, and the stability of economic, commercial, and political policies. Business confidence can also be assessed by examining the stability of the indigenous labor supply, the tax structure, the cost of capital, government incentives to promote commerce and industry, and government organizations and agencies established to assist foreign business and finance.

Loan purpose is the most important of these indicators, not only from the microeconomic viewpoint of judicious lending practices, but as an explicit element in both the future economic growth of the country and (especially in the U.S.) the regulatory procedures covering bank lending to governments and government-owned entities. Credit risk is minimized if the loan involves an efficient export-oriented industry (a foreign exchange earner) or, secondarily, an import-substitution industry (a foreign exchange saver). These industries may have the tacit or formal support of the government and, more fundamentally, tend to have a direct impact on the country's capacity to service its foreign debt.

Many less developed countries suffer from periodic geophysical catastrophes: tornados, earthquakes, floods, drought, and so on. Such natural calamities particularly affect agricultural export, either generally, with specific crops, or with products from specific geographical areas. Because of this potential, a country's ability to meet debt obligations may be erratic. Such considerations are subsumed by the rubric "commercial" rather than "economic" because they are judged only by the likelihood of their occurrence. When such potential dangers become real and course through a culture, they are reclassified as "economic."

Less developed countries also lack the domestic energy resources to sustain growing industrial and agricultural production. Again, this fact is not explicitly obvious in national income data but can reflect indigenous attempts to overcome such deficiencies. The first OPEC price hike in 1974 made the importance of energy resources abundantly clear. Oil is a prime, non-indigenous source of energy in many LDCs, and price fluctuations have taken their toll on a number of these countries. Whatever the form, energy resources--their adequacy, conservation, development, and financing--have assumed increasing importance in recent years, both within a country's domestic economy and in its balance of payments.

Political and Social Indicators

While economic indicators are used primarily to determine a country's ability to service its external debt, political and social indicators are used to determine a country's willingness to service it. Since the political elements of country risk are less quantifiable than the economic elements, there is more disagreement about how to assess it. Political risk factors can be either inherent in, evolving out of, or wholly discrete from a particular country.

When evaluating political risk factors inherent in a country's legal framework, one must focus on that country's constitutional environment, watching closely the attitudes toward foreign investment and international transfer payments. If the attitude is vague, it will lead to insecurity about, and indicate a decline in, cross-border transactions.

It is also important to identify and forecast key developments in domestic and external politics. Internally, one must examine the structure of the government and its main political institutions and their evolution for indications of power struggles and salient issues for the various political players. One must also assess the groups that could conceivably replace the existing authorities during the forecast period and take seriously their

policies and doctrines, as well as those of outlawed groups.

Another major factor in assessing political risk is the quality of the government--whether it can act independently or is impeded by the influence of pressure groups. The quality of a country's administration is crucial because it is often more important than the government itself, especially in day-to-day affairs. In general, the bulk of the government does not change; only the top echelon, the politically appointed, come and go. Four-year election cycles in many countries prevent drastic alterations in an administration. Nevertheless, a change in the government always has some influence on political risk assessment.

A country's adherence to a major block, or to a group of neutral or non-aligned countries, is another important factor in evaluating the political risk of its foreign policy. Any change usually results from a change in the government and can therefore be anticipated if one knows the positions of the other major political parties. For example, the Communist takeover of Czechoslovakia in 1948, Egypt's turn to the West under President Sadat, and France's departure from NATO all altered the nature of the political risk associated with those countries.

Apart from identified political groups, legal or otherwise, many other groups with potential or realized

power are important factors (e.g., distinct religious and ethnic-tribal groups, students, etc.). Such groups are sources of potential organized unrest and are subject to manipulation either by powerful local political figures or by foreign influences. The more homogeneous a country is, the less important this factor becomes, though such a precept is not universal (for example, Switzerland, which has four languages and cultures and two religious divisions). Thus it is necessary to evaluate ethnic and religious structures to determine whether the differences compound or compensate each other. Such differences can become explosive if one superimposes wealth and population disparities. Both Lebanon and many African countries exemplify the problem of tensions created by ethnic and religious differences.

Social strains and conflicts among economic classes, religions, and ethnic groups can lead to profound political instability if not properly handled. The core of a political analysis is thus the assessment of power shifts among these groups, either peacefully or violently. Often, history can indicate the type of likely transition. It must be noted, though, that political stability is neither a sufficient nor, indeed, a necessary condition for a low degree of country risk. Italy, for example, is noted for its political instability, but Italy is far less risky than it appears at first glance. Although cabinets in Rome have

changed constantly, and new governments have formed almost annually for the past 40 years, their strong central bank, with a governor not subject to direct political control, eliminates country risk. Paradoxically, this underlying stability has counteracted constant changes in government--the factor of most concern to banks.

Social factors such as the homogeneity of the population, religious beliefs, wealth and income distribution, unemployment, degree of urbanization, educational opportunities, and the literacy rate can also significantly affect the political stability of the country, because major discontent in any of these areas can lead to disruption, both political and economic. Cultural polarization is the basis of conflict. Countries with a high literacy rate have populations with access to a wide spectrum of information, which in general leads to more stability because political leaders find it more difficult to influence such a population.

External factors are as important as domestic factors to a country's political and economic stability. Obviously, a country threatened by foreign invasion is likely to concentrate its resources on military defense and leave little for economic development (e.g., Thailand, on the border of Viet Nam, in the late 1970s). In examining this factor, one should consider whether, during the period of review, the country is likely to be involved in some kind

of external conflict which might entail outright armed warfare or simply trade embargoes and hostile restrictions. For example, the real possibility of armed conflict between Chile and Argentina in the Beagle Channel dispute loomed large in late 1978, with both sides in a state of readiness and Buenos Aires in nightly blackout.

Occasionally, unpopular governments may initiate military ventures against traditional external enemies in order to detract from internal problems; and sometimes such actions can bring down the government. An example of this was the Greek junta in 1974. The South Atlantic dispute mentioned above between Chile and Argentina and Buenos Aires' dispute with England over the Malvinas (Falklands) both have long histories. While few analysts were shocked by a short Chile-Argentina war, most were taken by surprise when Argentina occupied the Malvinas and England responded with a sizable portion of the Royal Navy. Too little attention had been paid to Argentina's global relationships, too much to its local dispute with Chile. Not only were the political and economic costs of the South Atlantic disputes hard to bear, the inherent economic instability of the military government (that should have been noticed earlier) was revealed as well, and the effect on Argentina's risk rating was profound.

The primary question of probable political stability and continuity in country-risk assessment is important to

external debt management because it provides insight into a country's willingness to meet its foreign obligations--the key element in understanding default. In time of crisis, when local administrators are confronted with the dilemma of either domestic belt-tightening in order to continue servicing its external debt or defaulting in order to avoid instituting politically unpopular corrective measures, questions of political stability and governmental tendencies become crucial.

Statistical Approaches to Assessing Country Risk

Increased interest in country-risk analysis, coupled with the apparent weaknesses in the assessment approaches used by commercial banks, generated efforts to develop more objective methods of assessing a country's debt servicing capacity with the aid of statistical methods. These methods generally involve the specification of a statistical model which expresses a country's degree of risk (the dependent variable) as a function of several economic factors (independent variables) which might be used to predict this risk. The model is developed using a sample of countries, some of which have known debt-servicing difficulties and others which do not, for which information on the set of economic variables of interest is available. A discussion of the variables generally used is presented below.

Dependent Variable

Several forms of dependent variable have been used. The most common is a binary variable which categorizes countries into need to reschedule vs. no need to reschedule. Some variants of this categorization include: (a) involuntary reschedulings vs. voluntary reschedulings or no need to reschedule and (b) involuntary reschedulings or balance-of-payment support loans vs. no need to reschedule, with voluntary reschedulings eliminated.

A second type of dependent variable is the probability (or odds) of rescheduling, contingent upon the country's status with respect to a combination of economic variables.

Independent Variables

The explanatory variables that have generally been used in the development of the statistical models varied from one study to another. The following are those most commonly used.

1. The Debt Service Ratio

This indicator, the most widely used, is defined as the ratio of annual interest and principal (amortization) payments on external debt to the annual earnings from exports of goods and services. It indicates the size of foreign exchange earnings absorbed by the country's external debt-servicing payments. This ratio usually covers a one-year period, which is then compared with two years of development, and is used to forecast future periods. While

the necessary payments of external debt are easily compiled, the income side of the ratio involves making many assumptions and is thus difficult to project. Lower ratios are better: a ratio of 10% or lower is very good, while a 25% or higher ratio creates a greater danger of country risk.

This ratio's development depends on each of the two sides of the equation. The development of principal and foreign exchange income is quite volatile, while interest payments are more stable.

As a performance indicator, the ratio has a fundamental weakness, pointed out by Avramovic:[4] "The debt-service ratio is a cash flow concept rather than a profitability or productivity concept." Another weakness exhibited by this ratio is that the components of the numerator are not in unison. Debt interest is an expenditure, a net drain on resources, whereas amortization is a financial transaction--payment reduces both the external assets and the external liabilities of the country.

The ratio's major weakness, however, is that it assumes that the country in question can repay its debt from its own resources. Such repayment is normally not possible, since a continuous import of capital goods is necessary to maintain a current export performance. Thus a 10% debt service ratio is good because it leaves ample room for the required expenditure on imports. One should not

assume that country risk is minimal simply because of a 10% ratio, though, as this ratio provides no indication that a country may be running a positive current account; thus it measures solvency more than liquidity. No critical number exists to tell an analyst the initial point at which a country could run into trouble. For example, during the 1930s, Canada and Australia had DSRs of 30% and 40%, respectively, while Latin American nations (Brazil, Peru, Columbia, Uruguay, etc.) had DSRs considerably lower; yet the latter defaulted on their bond payments, while the former did not.

The debt service ratio also neglects the extent to which imports have been or can be compressed to compensate for foreign exchange shortage. While obviously true, it is difficult to assess the possibility of such a development. Furthermore, the traditional debt service ratio omits the income from currency reserves and foreign investments, though this income is of minor importance for many LDCs.

The debt service ratio is widely held to be an indicator of a country's short-term liquidity; but its two- or three-year time lag in making information available is too long to make it a useful warning signal. By the time it becomes available, it is largely redundant.

Exports of goods and services (the denominator in the ratio) are the main source of foreign exchange, and it is crucial to determine the pattern, stability, and growth of

a country's exports. One should collect figures for perhaps a five-year period, distinguishing real growth from possibly transitory price effects. A country must have a good track record on export growth to reduce its country risk, and the percentage of manufactured goods to total exports is a solid indicator of a country's level of development and its diversity in export earnings. A high share of manufactured goods tends to assure greater stability and a sustained growth in export revenues, unless international economic conditions become unfavorable.

2. Total External Debt/Exports of Goods and Services

The denominator of this indicator is the same as that in the debt service ratio, but the numerator is total external debt. The main difference between this and the DSR is that this ratio is of a longer-term nature. Unlike the DSR, an indicator of immediate problems, this ratio signals a country's long-term external commitments, measuring its total external debt in a given year (as opposed to what must be serviced in the next year). The crisis of 1982-83 revealed the problems of countries with a ratio of over 200%: when the market grew cautious during this period, the countries ran into some problems. Significantly, if a large proportion of debts (the numerator) is from the government on concessional terms (as is usually the case with poorer LDCs), then the real burden (measured

by interest payments to exports of goods and services) is obviously smaller.

The main problem with this ratio, from an economic point of view, is that it relates a stock concept (debt) to a flow concept (exports). Countries are in much better shape if the ratio is low.

3. The Ratio of Total External Debt to GNP

This ratio measures total external debt outstanding at the end of a year to the total output of an economy during the same year. Gross national product (GNP) is the total output of goods and services of a given country.

The higher this ratio is, the more risk involved; below 15% is acceptable, while above 30% is troublesome. Again, this generalization must be qualified. A highly export-oriented country has a different potential for incurring external debts from that of a country that internally creates its GNP, because the export-oriented economy earns relatively more foreign exchange to service its level of debt. A substantial public sector certainly offers better control over the inflow and outflow of foreign exchange but hinders the flexibility of the economy. The size of the GNP, however, can also be important because the larger it is, the more lenders it will attract. This ratio is not very suitable as a tool to detect liquidity problems; it is more useful in assessing a country's overall risk in international financial markets.

4. The Growth Rate of Exports

This indicator's name makes its meaning self-evident. Since country risk bears a direct relationship to the availability of foreign exchange, one must consider the growth rate of exports, normally the most important factor in such availability. A country whose exports of goods and services are rapidly growing is more likely to earn the revenues required to service its debt. Its economy will be competitive if it is able to generate continuous growth in its export volume. This ratio should be averaged by including growth rates over several years.

Countries whose ratio is over 5% perform well in international markets. However, a country's export performance must always be qualified by its export structure; diversified structures that grow are better than those relying on a few commodities.

5. The Ratio of International Reserves to Imports

This ratio is sometimes referred to as the "liquidity ratio," relating a country's currency reserves to its imports. It also indicates short-term liquidity problems, and as such, measures the country's ability to pay for its imports with current liquid assets. Normally, this figure is expressed as one month's coverage, though some researchers express it as the number of months for which reserves are available, given the value of a country's import bill. Generally, the availability of less than

three months reserves is risky, but reserves sufficient to cover three months of imports is satisfactory. A country's total international reserves includes its gold holdings, special drawing rights, reserve position in the IMF, and foreign exchange holdings. Imports must be estimated with an average of at least the past six months, unless the country shows extreme seasonal volatility.

This ratio clearly focuses on the short end of a country's external liabilities. On the other hand, it omits the interest and principal payments needed to service its external debt. The ratio is not very effective for smaller countries because they do not have typical export/import foundations.

6. The Ratio of Imports to GNP

Imports are the principal cause of foreign exchange expenditure. Thus it is essential to determine their volume, their trends, and their constitution. The use of this ratio reflects an attempt to indicate the degree to which national income growth will be affected should a country have to reduce its import bill in response to debt-servicing difficulties. The higher this ratio is, the greater the likelihood of rescheduling because the country is more likely to be dependent on imports to sustain production and thus economic growth.

Since in many LDCs, capital and intermediate goods comprise a large proportion of imports, this ratio tends to

reflect a degree of rigidity because import reductions imply lower real growth and high unemployment.

7. Per Capita GNP

Per capita GNP is an indicator of a country's living standards. The higher it is, the greater the consumption of non-essential items, which allows greater flexibility in adjusting consumption patterns to any debt-servicing difficulties. Countries with low per capita incomes do not have such flexibility and are thus more likely to reschedule their debts.

One important shortcoming with this measure is that it gives no indication of a country's distribution of income. Often, countries with high per capita income may have a narrow distribution of wealth and are more subject to class tensions and potential conflict, while those with lower but more evenly distributed incomes possess a more stable social environment.

8. The Ratio of Debt Amortization to External Debt

This indicator was first introduced by Frank and Cline,[5] who argued that the inverse of this ratio represented the average maturity of a country's external debt. A low value of this ratio suggests a predominance of long-term liabilities, which may indicate that there is little short-run flexibility in reducing debt commitments by reducing temporarily any overseas borrowing. The ratio is helpful in identifying potential difficulties associated

with the bunching of maturities. Such a phenomenon may not cause debt-servicing problems if the country is able to earn relatively substantial amounts of foreign exchange from the import of goods and services, attract large amounts of capital through direct investment or new loans, or rely on its large foreign exchange reserves. Moreover, the absence of short-term liabilities may suggest that a country does not have access to short-term capital markets, and is not deemed "creditworthy."

Finally, this ratio and the debt service ratio are not independent of each other because amortization enters the numerators of both. Cline[6] argued that the ratio represents the rate of amortization and is inversely related to the probability of rescheduling, because for any given debt service ratio, a high rate of amortization will reduce the probability of rescheduling.

9. Compressibility of Imports Ratio

This ratio assumes that imports can always be compressed to a certain extent in order to save foreign exchange. One can thus analyze and divide the import side into basic needs such as energy, raw materials, investment goods, and luxury goods. Luxury goods can be easily eliminated when a country has financial problems, but basic needs cannot. Someone not from a particular country will have difficulty measuring the compressibility ratio; but one can generally assume that a country experiencing some

difficulties can usually compress its imports by about 25% without serious trouble. Such compression cannot be of long duration because of counterproductive shortages in some sectors.

Review of Some Empirical Studies

Frank & Cline

The first major study of a quantitative approach to country-risk assessment was that of Frank and Cline.[7] Frank and Cline used discriminant analysis to explore the ability of eight economic indicators to identify potential debt-servicing difficulties. Discriminant analysis is a statistical method of developing a linear combination of explanatory variables which optimally discriminates between two (or more) groups. Based on a country's discriminant score (its value for this optimal linear combination of explanatory variables), the country may be assigned to one of the groups--in this case, either to the debt-servicing-difficulties group or to the no-difficulties group.

Using the earlier work of Avramovic,[8] Frank and Cline selected the following variables: (1) debt service ratio, (2) index of export fluctuations, (3) non-compressible imports/total imports, (4) imports/GNP, (5) imports/reserves, (6) amortization/debt, (7) per capita income, and (8) growth rate of exports.

These indicators were tested on a binary-valued dependent variable defined as rescheduling vs. non-rescheduling cases. The sample contained 145 observations, including 13 rescheduling cases and 132 non-rescheduling cases, covering the period 1960-1968.

Frank and Cline's first step consisted of a discriminant analysis using all eight indicators to attempt to select those which were most significantly related to debt-servicing difficulties. Though they realized that the standard linear regression test of the coefficients was not strictly appropriate because of distributional problems, they used it as a gross measure "to obtain some notion of the relative importance of the variables." Applying this test to each of the eight coefficients, they found that three (debt service ratio, imports/reserves, and amortization/debt) were significant at the .05 level.

Frank and Cline then used iterated linear discriminant functions to test whether these three variables were capable of predicting debt rescheduling. In the first step of their analysis, they assumed a linear discriminant function with equal covariance matrices. They discovered that through the first iteration, the model committed a Type I error (when a rescheduling country is predicted to be non-rescheduling) in 23% of the cases, and a Type II error (when a non-rescheduling country is predicted to be rescheduling) in 11% of the cases, for a total error rate

Table 5.1: FRANK AND CLINE: PREDICTION ERRORS BASED ON DISCRIMINANT ANALYSIS

	Type I Errors		Type II Errors		Total Errors	
	N/13	%	N/132	%	N/145	%
3-Variable Case-Linear[a]						
Iteration 1	3	23.1	14	10.6	17	11.7
Iteration 10	1	7.7	25	19.9	26	17.9
2-Variable Case-Linear[b]						
Iteration 1	1	7.7	17	12.8	18	12.4
Iteration 10	0	0.0	26	19.7	26	17.9
3-Variable Case-Quadratic[a]	1	7.7	21	15.8	22	15.2
2-Variable Case-Quadratic[b]	0	0.0	12	9.0	12	8.3

Note. Iteration 1 assumes equal covariances for the two groups; Iteration 10 allows for unequal covariance structure.

(a) Significant variables ($p < .05$; 2-tailed t-test):
debt service ratio
imports/reserves
amortization/debt

(b) Significant variables ($p < .05$; 2-tailed t-test):
debt service ratio,
amortization/debt

of 12%. By the tenth iteration, where the assumption of unequal covariance structure is incorporated in the linear function, these error rates became 8%, 20%, and 18%, respectively (see Table 5.1).

They then re-estimated the linear discriminant function excluding the imports/reserves ratio. For this 2-variable case at the first iteration, the Type I error rate was 8%, the Type II error rate, 13%, and the total error rate, 12%. By the tenth iteration these rates had changed to 0%, 20%, and 18%, respectively.

Frank and Cline then repeated the entire process using quadratic functions, which for the 3-variable case, produced 8% Type I errors, 16% Type II errors, and a total

error rate of 15%. The 2-variable case was better, producing no Type I errors and 9% Type II errors, for a total error rate of 8%. This case had the lowest error rate of all those tested.

Although Frank and Cline had some success with their discriminant model, they did no out-of-sample test of its predictive power.

Feder & Just

In 1977, Gerson Feder and Richard E. Just[9] attempted to improve upon the methods used by previous studies in analyzing debt-servicing difficulties. Instead of discriminant analysis, they chose another technique developed for dealing with the binary-valued dependent variable case, called logit analysis.[10] According to Feder and Just, discriminant analysis assumes two completely different populations and thus implies that a country suddenly becomes a member of the other group when it reschedules. They argue, however, that rescheduling takes place after the combined effect of certain economic variables reaches some critical threshold level. Based on this argument, Feder and Just believe that discriminant analysis lacks behavioral support and logit analysis is more appropriate for determining when a country will reach this threshold. The logit approach is especially suitable when several observations (for both default and non-default years) for a given country are included.

Logit analysis assumes that the probability that a country will reschedule its external debt is related logistically to a set of economic variables. This logistic model is converted to a linear regression model by a log transformation. Thus, the new linearized model can determine which of the economic variables and their interactions are significantly related to the dependent variable, degree of debt-servicing difficulty. In fact, logit analysis may be considered an analog of the analysis of variance for a qualitative dependent variable.

Logit analysis provides both an indication of which variables contribute significantly to the explanation of the dependent variable and a means of generating an implicit probability of rescheduling. However, in order to predict future performance, it is necessary to decide upon a cutoff probability point. If a country's probability of rescheduling is above the cutoff, rescheduling is predicted; if below, then nonrescheduling is predicted. How one determines this cutoff is based on the relative cost of each of the two kinds of error. Clearly, if the cutoff is set too low, there will be a relatively large number of Type II errors; if it is set too high, there will be a relatively large number of Type I errors.

Donogh C. McDonald[11] stated that "By a cut-off rate is meant that probability of rescheduling which is chosen as a critical value above which countries will be taken to

be rescheduling candidates. In the literature, the choice of cut-off values is based on analysis of the errors using different values. Presumably, in real world applications, this choice would be made in light of costs of type I and type II errors and their likely frequency. Of course, the fact that one rule performed well in sample does not mean it will be the best out of sample."

Feder and Just analyzed 21 cases of debt rescheduling in 11 countries and 217 non-rescheduling cases for a total of 238 observations from 41 countries, from 1965 to 1972. They examined nine economic indicators of debt servicing capacity. Seven were the same as those used by Frank and Cline: debt service ratio, export fluctuations index, imports/GNP, imports/reserves, amortization/debt, per capita income, growth rate of exports. The measure of non-compressible imports was not used. The two additional indicators were capital inflows/debt-service payments and growth of per capita domestic product.

Of the nine economic indicators tested, six were significantly ($p < .05$; 1-sided t-test) related to debt servicing capacity: imports/reserves, amortization/debt, debt service ratio (also found significant by Frank and Cline), as well as export growth rate, per capita income, and capital inflows/debt service. The authors argued that, because these variables include indicators of short- as well as long-term capacity, "the probability of default

thus appears to depend not only on the circumstances prevailing immediately before the year on which a forecast is being made, but also on trends based on a relatively long period of time preceding the forecast."[12]

Feder and Just used the regression coefficients generated by the model to calculate the implied probabilities of default and adopted a rule of thumb for extending credit which uses a critical probability value, P^*. Thus, all countries with probability greater than P^* are denied credit because they are expected to default, while those with probability less that P^* are granted loans because they are not expected to default.

For any critical probability P^*, there are two possible types of error: a Type I error occurs when a country's predicted probability of default is lower than P^*, (default is not predicted), but it does default; a Type II error occurs when a country's predicted probability of default is greater than P^* (default is predicted), but it does not default.

For the nine values of P^* tested, there were never more than 11 predictive errors (4.6%) made out of a total of 238 observations. In addition, when $P^* = .4$, only six errors (2.5%) were produced in the five-predictors case and nine errors (3.8%), in the six-predictors case (see Table 5.2).

Table 5.2: FEDER & JUST: PREDICTION ERRORS BASED ON LOGIT ANALYSIS

	Five Variable Case[a]						Six Variable Case[b]					
P*	Type I Errors		Type II Errors		Total Errors		Type I Errors		Type II Errors		Total Errors	
	N/21	%	N/217	%	N/238	%	N/21	%	N/217	%	N/238	%
.1	0	0.0	10	4.6	10	4.2	0	0.0	11	5.1	11	4.6
.2	0	0.0	6	2.8	6	2.5	1	4.8	8	3.7	9	3.8
.3	1	4.8	6	2.8	7	2.9	2	9.5	7	3.2	9	3.8
.4	1	4.8	5	2.3	6	2.5	3	14.3	6	2.8	9	3.8
.5	2	9.5	4	1.8	6	2.5	4	19.0	6	2.8	10	4.2
.6	3	14.3	4	1.8	7	2.9	4	19.0	2	.9	6	2.5
.7	5	23.8	1	.5	6	2.5	5	23.8	1	.5	6	2.5
.8	5	23.8	1	.5	6	2.5	6	28.6	1	.5	7	2.9
.9	7	33.3	1	.5	8	3.4	8	38.1	1	.5	9	3.8

(a) Significant variables ($p < .075$; 1-tailed t-test):
debt service ratio
imports/reserves
per capita income
capital inflow/debt service
export growth rate

(b) Significant variables ($p < .05$; 1-tailed t-test):
debt service ratio
imports/reserves
per capita income
capital inflows/debt service
export growth rate
amortization/debt

Feder, Just, & Ross

In 1981, Feder, Just, and Ross[13] extended their previous logit analysis study. They expanded the database to cover the years 1965 to 1976 and to include 56 countries. Of their 580 total observations, rescheduling occurred in 40. Countries that "voluntarily" rescheduled were not included in the sample. Six variables (debt service ratio, GNP/US GNP, reserves/imports, exports/GNP, commercial foreign exchange inflows/debt service, non-commercial foreign exchange inflows/debt service) were used in the study. All were found to be significant. Feder, Just, and Ross also tried a quadratic version of their

model. In this version, three of the squared variables (debt service ratio, reserves/imports, commercial inflows/debt service) were also found to be significant.

The error rates for this study are presented in Table 5.3. With a cut-off probability of .1, the rate for both Type I and Type II errors for the linear model was about 8%. With $P^* = .2$, the error rates were 20% and 6%, respectively. The performance of the quadratic model was somewhat better, with Type I and Type II error rates of about 8% for $P^* = .1$, and 15% and 5%, respectively, for $P^* = .2$.

It would appear that the discriminatory performance of the Feder and Just logit approach is quite good; the highest total error rate for the original study was 4.6% and for the later study, 8.8%. In the later study, where an out-of-sample validation test was used, the predictive power of the model was also demonstrated to be quite high. *Table 5.3 also* presents the error rates for the out-of-sample predictions.

Mayo & Barrett

Mayo and Barrett[14] did an extensive study for Eximbank, designing an early warning system built on the earlier work of both Frank and Cline and Feder and Just. Their model extended the application of logit analysis by enlarging the sample to include more countries and a longer time period. The database included 50 basic variables for

Table 5.3: FEDER, JUST, & ROSS: PREDICTION ERRORS BASED ON LOGIT ANALYSIS

Development Sample (1965-76)												
	Model 1 (Linear)[a]						Model 2 (Quadratic)[b]					
P*	Type I Errors		Type II Errors		Total Errors		Type I Errors		Type II Errors		Total Errors	
	N/40	%	N/540	%	N/580	%	N/40	%	N/540	%	N/580	%
.1	3	7.5	48	8.9	51	8.8	3	7.5	43	7.9	46	7.9
.2	8	20.0	32	5.9	40	6.9	6	15.0	27	5.0	33	5.7
.3	12	30.0	16	3.0	28	4.8	10	25.0	16	3.0	26	4.5
.4	15	37.5	11	2.0	26	4.5	13	32.5	11	2.0	24	4.1
.5	18	45.0	6	1.1	24	4.1	13	32.5	6	1.1	18	3.1
.6	21	52.5	6	1.1	27	4.7	13	32.5	6	1.1	18	3.1
Validation Sample (1977-79)												
	Model 1 (Linear)[a]						Model 2 (Quadratic)[b]					
P*	Type I Errors		Type II Errors		Total Errors		Type I Errors		Type II Errors		Total Errors	
	N/10	%	N/125	%	N/135	%	N/10	%	N/125	%	N/135	%
.1	0	0.0	18	14.4	18	13.3	1	10.0	14	11.2	15	11.1
.2	1	10.0	15	12.0	16	11.9	1	10.0	11	8.8	12	8.9
.3	1	10.0	13	10.4	14	10.4	2	20.0	10	8.0	12	8.9
.4	2	20.0	11	8.8	13	9.6	3	30.0	6	4.8	9	6.7
.5	2	20.0	10	8.0	12	8.9	3	30.0	6	4.8	9	6.7
.6	5	50.0	10	8.0	15	11.1	4	40.0	5	4.0	9	6.7

(a) Significant Variables ($p < .10$; 1-tailed t-test)
- Debt service ratio
- GNP/US GNP
- Reserves/imports
- Exports/GNP
- Commercial foreign exchange inflows/debt service
- Non-commercial foreign exchange inflows/debt service

(b) Additional Significant Variables ($p < .10$; 1-tailed t-test)
- $(\text{Debt service ratio})^2$
- $(\text{Reserves/imports})^2$
- $(\text{Commercial inflows/debt service})^2$

48 countries and covered the years from 1960-1975. Twenty-eight reschedulings were included among the total 571 cases. The number of variables is substantially higher than that for the other two studies. Mayo and Barrett examined alternative measures of debt-servicing difficulty, in addition to formal multilateral reschedulings (such as Eximbank reschedulings and claims), and made the model

prospective. Thus the model was intended to predict different types of debt-servicing difficulty five years into the future, making unnecessary the need to project or lag the explanatory variables (as was the case in the previous two studies).

Mayo and Barrett used six variables in the final re-estimated logit model: disbursed debt outstanding/exports, international reserves/imports, gross fixed capital formation/GDP, imports/GDP, reserve position in the IMF/imports, and rate of increase in consumer prices. This model produced a 25% Type I error rate and a 13% Type II error rate.

Cline

William Cline,[15] in a study which utilized the idea of a disequilibrium in the market for international credit, explained external debt rescheduling with a theory of credit rationing. Cline says:

> It is useful to interpret debt rescheduling . . . as the consequence of a disequilibrium that occurs in the international credit market when the amount the country seeks to borrow . . . exceeds the amount that foreign banks are prepared to supply at the upper ceiling interest rate. The international credit market thus fails to clear. A non-market solution must be established, and is arrived at in a bargaining process: debt rescheduling.

He continues:

> . . . in the bargaining context of rescheduling, the borrowers will reach an agreement . . . if the borrower's leverage is high the full

> amount . . . will tend to be covered by the extension of new, involuntary lending and postponement of maturities otherwise due. If the lender's leverage is stronger, a smaller portion . . . will be covered and the country will be forced to take additional painful measures.

Cline notes the importance of whether rescheduling will be demanded, supplied, or both. Any force that shifts the demand-for-capital curve outward to the right will tend to increase the probability that rescheduling will be required. On the other hand, factors tending to shift the supply curve of international credit to the left raise the probability that disequilibrium will occur between the amount of international capital demanded and supplied, leading to a rescheduling (see the diagram in Figure 3.1).

To summarize, Cline's study divided rescheduling indicators into either demand- or supply-related, although some were considered both. His logit model used data from 58 countries for the period between 1967-82. During that time there were 22 cases of debt rescheduling. Of the variables tested, the debt service ratio, reserves to imports, and LDC borrowings to imports were the most significant. Errors ranged from 9% to 13% (see Table 5.4).

Sargen

Nicholas Sargen[16] made use of two conceptual approaches to analyze past debt reschedulings in his discriminant analysis study. The first is the debt service

Table 5.4: CLINE: PREDICTION ERRORS BASED ON LOGIT ANALYSIS

	Model A	Model B	Model C	Model D	Model E
Number of Observations	640	640	670	670	574
Number of Reschedulings	22	22	22	22	20
Errors					
Type I	2 9.1%	4 18.2%	2 9.1%	3 13.6%	2 10.0%
Type II	84 13.6%	90 14.6%	84 13.0%	104 16.1%	69 12.5%
Total	86 13.4%	94 14.7%	86 12.8%	107 16.0%	71 12.4%
Demand Side Variables					
Reserves/imports	*	*	*	*	*
Growth rate (income)	*	*	*	*	*
Squared CAX	*	ns	*	ns	*
Debt service ratio	*	-	*	-	*
GDP	ns	ns	-	-	-
Supply Side Variables					
Amortization/debt	*	ns	*	ns	*
LDC borrowing/imports	*	*	*	*	*
Net debt/exports	-	*	-	*	-
Inflation index	*	*	-	-	-
Savings/GNP	*	ns	-	-	-
Export growth rate	-	-	-	-	ns

* = Significant at $p < .05$ using a 2-tailed t-test; ns = not significant; - = not used.

approach, similar to that of other studies, which assumes that reschedulings arise from fluctuations in export earnings that lead to a rapid accumulation of external debt. For this approach, Sargen used variables identified in previous empirical studies: debt service ratio, export growth rate (in U.S. dollars), and the growth rate of real GNP.

Sargen's second approach treated rescheduling as a monetary phenomenon; it assumed that inflation and an over-valued exchange rate increase the demand for imports and cause export stagnation, which in turn leads to a rapid build-up of external debt. Here he used the above three variables, as well as the (consumer price) inflation rate,

the growth rate of the M1 money supply, and a measure of relative purchasing-power parity (the difference between the domestic and U.S. inflation rates on a wholesale price basis, less the rate of domestic currency depreciation vis-a-vis the U.S. dollar). All these explanatory variables were expressed as three-year annual averages, using data from 1960-1975 for 44 countries, totaling 466 observations. Twenty-four debt rescheduling cases and 442 non-rescheduling cases were included. Depending on the cut-off value selected for the discriminant function, the percentage of cases incorrectly classified ranged from 3% to 11%. The Type I error rate varied from 15% to 54%, and the Type II error rate ranged from 1% to 11%. At a cut-off of 0, Sargen found a 33% Type I error rate, an 8% Type II error rate, and a 9% total error rate.

Saini and Bates

Krishan Saini and Philip Bates,[17] in their study of the statistical techniques used to determine debt servicing capacity, attempted to test the validity of some of the previous test results. Their work differed from that of the others in four major respects. First, they tested a modified dependent variable, in addition to the traditional binary-valued dependent variable of rescheduling and non-rescheduling cases. Second, they also tested several non-debt variables which serve as proxies for the debt-related indicators prevalent in earlier studies. Third, results

from discriminant and logit analysis were compared with theirs, to examine their relative merits as explanations of past balance-of-payments difficulties. Fourth, their sample period was divided into two intervals in order to test for structural shifts in the parameters of the functions evaluated.

Saini and Bates conducted tests on two types of binary-valued dependent variables which can be used to represent a country's difficulties in servicing its external debt. The first variation examined official debt rescheduling vs. non-rescheduling cases. This dependent variable has been used in all the major statistical studies of country-risk evaluation and contains 22 rescheduling observations for 12 countries over the 1960-1977 period. The second variation consists of 23 cases of involuntary debt reschedulings or balance-of-payment support loans (without which rescheduling would have been necessary) vs. voluntary reschedulings and countries without apparent balance-of-payment problems.

Saini and Bates used 11 explanatory variables:

1) Imports/reserves
2) Per capita GDP
3) Consumer Price Index
4) Imports/GDP
5) Money supply growth rate
6) Export growth rate, averaged over three years

7) Debt service ratio

8) Current-account balance minus (plus) increase (decrease) in reserves/exports

9) 5-year cumulative current-account balance minus (plus) increase (decrease) in reserves/exports-in-the-latest-year

10) Net foreign assets of banking system/money supply

11) Growth rate of international reserves

The first seven variables were also significant in earlier studies. The last four variables were included because they provide information on external debt.

The authors conducted both discriminant and logit analyses for three time intervals (1960-77, 1960-70, 1971-77) and came to several conclusions. (a) No significant differences were observed in the error rates and coefficient values generated by the discriminant and logit functions. (b) The modified dependent variable appears to be more useful in identiyfing countries with debt-servicing problems than the traditional dependent variable. (c) The consumer price index, money supply growth, cumulative current-account balance to exports ratio, and international reserve growth consistently exhibited the greatest explanatory ability. (d) The debt service ratio, without adjustment, is virtually useless in isolating debt-servicing problems. (e) The explanatory variables seem to be more effective in isolating debt-

servicing problems during the 1971-77 sub-period than during the 1960-70 sub-period. The 1971-77 sub-period included most of the modifications in the dependent variable. (f) Although error rates obtained in this study were higher than those of other studies, this difference was attributable to methodological differences in the selection of data entries.

Table 5.5 presents a summary of the Saini and Bates results. The total error rates for the modified dependent variable for the period 1960-77 were 15.4% for the discriminant model and 19.1% for the logit model, compared with 18.5% and 19.2%, respectively, for the traditional dependent variable. For the period 1971-77, the error rates for the modified dependent variable were 9.7% for both the discriminant and logit models, while those for the traditional dependent variable were 5.8% for the discriminant model and 7.5% for the logit model.

Saini and Bates believe that logit analysis is generally superior to discriminant analysis for investigating binary-valued dependent variable cases.

Morgan

In 1985, John B. Morgan[18] conducted both logit and discriminant analyses of debt rescheduling. Nine economic indicators were used in the models. New short-term debt data were included to give a better indication of the indebtedness of the developing countries, and variables

Table 5.5: SAINI & BATES: PREDICTION ERRORS BASED ON DISCRIMINANT AND LOGIT ANALYSES

	Discriminant Analysis			Logit Analysis		
	Type I Errors	Type II Errors	Total Errors	Type I Errors	Type II Errors	Total Errors
Time Period 1960-1977						
Dependent Variable 1						
Number of Errors	4/22	50/270	54/292	7/22	49/270	56/292
Error Rate	18.1%	18.5%	18.5%	31.8%	18.1%	19.2%
Dependent Variable 2						
Number of Errors	4/23	42/275	46/298	4/23	53/275	57/298
Error Rate	17.4%	15.3%	15.4%	17.4%	19.3%	19.1%
Modified Procedure						
Number of Errors	3/23	10/136	13/159	2/23	14/136	16/159
Error Rate	13.0%	7.4%	8.2%	8.7%	10.3%	10.1%
Time Period 1971-1977						
Dependent Variable 1						
Number of Errors	5/11	5/162	10/173	5/11	8/162	13/173
Error Rate	45.5%	3.1%	5.8%	45.5%	4.9%	7.5%
Dependent Variable 2						
Number of Errors	2/12	10/112	12/124	1/12	11/112	12/124
Error Rate	16.7%	8.9%	9.7%	8.3%	9.8%	9.7%

Dependent Variable 1: rescheduling vs. non-rescheduling
Dependent Variable 2: balance-of-payments support loans and involuntary reschedulings vs. voluntary rescheduling and nonrescheduling cases.

The modified procedure replicates the procedure used by Feder and Just.

representing economic shocks were used to capture changes in the world economy since the first oil price change in 1974. All indicators were lagged one year.

The 30-country database, accounting for 88% of the debt of the developing countries, covered the period from 1975-1982. The total sample contained 240 observations, 40 of which were debt rescheduling cases. Thus, this study had a larger number of debt rescheduling cases than any previous study.

Two logit models were developed to estimate the probability of a country's rescheduling. Model A included two

of the shock variables (real GDP growth and bank lending), the exports to imports ratio, and two debt measures (current debt service ratio and amortization rate). Model B contained three of the shock variables (real GDP growth, bank lending, and interest rate sensitivity indicator), the reserves to imports ratio, and two debt indicators (total debt to exports ratio and short-term debt to imports ratio).

All variables in Model A were significant at the .05 level, except for the exports to imports ratio, which was significant at the .20 level. The current debt service ratio was the most significant variable in this model. Amortization rate was negatively related to debt rescheduling, as was the case in the Feder and Just study.

Four of the indicators in Model B (reserves to imports ratio, total debt to exports ratio, bank lending, and real GDP growth) were significant at the .05 level. The interest rate sensitivity indicator was significant at the .10 level, and the short-term debt to imports ratio was insignificant. Total debt to exports ratio was the most significant variable in Model B.

A discriminant analysis was carried out for the variables in Model B. Total debt to exports ratio and real GDP growth rate were the most significant variables in the discriminant model, followed by bank lending and reserves

Table 5.6: MORGAN: COMPARISON OF DISCRIMINANT AND LOGIT MODELS

	Model A		Model B			
	Logit		Logit		Discriminant	
Type I Errors	6/40	15.0%	6/40	15.0%	6/40	15.0%
Type II Errors	30/200	15.0%	26/200	13.0%	27/200	13.5%
Total Errors	36/240	15.0%	32/240	13.3%	33/240	13.8%
Cutoff Point	.16		.16		--	

NOTE: Cutoff point chosen to equalize Type I and Type II error rates

Variables Used

Model A: current debt service ratio
amortization rate
real GDP growth rate
bank lending
exports/imports

Model B: total debt/exports
real GDP growth rate
bank lending
reserves/imports
interest rate sensitivity indicator
short-term debt/imports

to imports ratio. Thus, the results of the discriminant analysis confirmed those of the logit analysis for Model B.

The predictive performance of the two functions for the Model B variables was also very similar. Both the logit and discriminant functions committed six Type I errors, and the same six rescheduling countries were erroneously predicted to be non-rescheduling by both models. The discriminant model produced 27 Type II errors, while the logit model produced 26, and 22 of the countries for which these errors were made overlapped for the two models. The predictive performance of the Model A logit function and both Model B functions is shown in Table 5.6.

In general, the differences between the discriminant and logit models were slight. They identified the same important variables and had essentially the same discriminatory power.

Dhonte

Pierre Dhonte[19] used yet another approach, the principal components technique, to analyze the ability of countries to service their external debt. This technique condenses the information contained in a large set of variables by constructing a new set of variables that contains, in the aggregate, all of the information in the original set. The reason for so doing is that the new variables (components), each of which is a linear combination of the original variables, can be ordered in terms of the amount of information they contain. Thus, the first few components will contain most of the information in the larger original set of variables. The remaining components can be ignored because they add little to the information captured by the first few components.[20]

Dhonte analyzed 12 cases of debt rescheduling between 1959 and 1971, comparing them with a sample of 69 non-rescheduling countries. The indicators for the rescheduling countries were lagged one year; those for the non-rescheduling countries were taken as of 1969. On examining ten indicators which, with one exception, contain debt information, Dhonte found that four (net trans-

fers/imports, debt disbursement/imports, external debt/exports, and external debt/GNP) were the most significant for the first principal component, explaining approximately 35% of the variation in the sample data. In the second principal component, explaining another 18% of the variation, he found that two other indicators (debt-service payments/debt disbursement and debt-service payments/external debt ratios) were the most significant. Overall, he succeeded in summarizing 77% of the variation in the sample data with only 4 principal components.

Dhonte has proposed the existence of two equilibrium conditions. The first is a trade-off between a country's "involvement" in external debt and the terms of the debt itself. In other words, a country with a very high external debt suddenly faced with a rapid increase in interest rates or a sudden decline in export earnings is likely to experience a debt management crisis. The second is that increases in external debt should be kept in line with the growth of exports. The first equilibrium condition was given some support by the results of his study. The second equilibrium condition could not be tested.

Most of the criticism of Dhonte's study has revolved around reducing the dimensionality of the data set because such a reduction is not very useful unless some meaning can be given to the constructed variables. Dhonte attempted to assign meaning to the first two principal components by

using them as coordinates to plot his sample rescheduling observations. According to the first equilibrium condition, the first quadrant of this graph represents the critical region in which heavy external debt is made worse with unfavorable borrowing terms (i.e., the double condition in which debt rescheduling is expected to occur). Eight of the 12 renegotiating countries fell in this critical quadrant, with an additional one on the border, for a 25% Type I error rate. Moreover, only 9 of the 69 non-renegotiating countries fell in this quadrant (13% Type II error rate), whereas about twice that many would be expected by chance. This represents modest support for Dhonte's first equilibrium hypothesis. Nonetheless, Dhonte's results are less convincing than those of either the discriminant or the logit approaches.

Dhonte points out that his analysis does not provide any indication of how to express quantitatively a hypothesis relating a level of debt to its terms. Moreover, the method of attaching meaning to the components sacrifices a good deal of information, in addition to that lost by constructing the components. Thus, while this technique provides useful qualitative evidence, it does not provide a quantitative means of assessing risk.

Taffler and Abassi

Taffler and Abassi[21] used a combination of principal components and discriminant analyses to develop a model to

predict whether or not a country will have serious problems in repaying external debts to international banks and financial agencies. The focus of the study was three-fold: first, to develop an operational discriminant model of country risk; next, to assess the performance of the model when applied outside the time frame in which it was developed; and finally, to compare the predictions of the model with those of banker judgment, a commonly used criterion for evaluating country loan applications.

A total of 715 observations for 72 developing countries over the period from 1967 to 1977 were used to fit the model. They included 55 debt-rescheduling cases from 14 countries. The model was then tested by using later data for these same countries to predict rescheduling in 1979 through 1983.

A set of 42 variables, selected either because they were used in earlier studies or for theoretical reasons, provided the starting point for the study. These variables were transformed to approximate normality and subjected to a principal components analysis. The first ten principal components from this analysis accounted for 84 percent of the total variation of the initial set of 42 variables. A set of eight relatively uncorrelated variables was then selected, representing seven of the first ten principal components.

Table 5.7: TAFFLER AND ABASSI: PREDICTIVE PERFORMANCE OF DISCRIMINANT MODEL

	Total Sample	Number of Rescheduling Cases	Errors					
			Type I		Type II		Total	
Development Sample								
1967-1977	681	50	5	10.0%	56	8.9%	61	9.0%
Validation Sample								
1979	78	7	3	42.9%	16	22.5%	19	24.4%
1980	78	7	2	28.6%	17	23.9%	19	24.4%
1981	78	12	5	41.7%	15	22.7%	20	25.6%
1982	78	24	7	29.2%	15	27.8%	22	28.2%
1983	78	23	6	26.1%	20	36.4%	26	33.3%
Total	390	73	23	31.5%	83	26.2%	106	27.2%

These eight variables were used to develop a discriminant model of debt rescheduling. Four of the eight were very highly significant (commitments per capita, debt/exports, average rate of inflation, domestic credit/gross domestic product). The principal components represented by these four variables were wealth, external indebtedness, external trade, and monetary policy, respectively. The error rates from this four-variable model were under 10% (see Table 5.7), indicating performance on the development sample about as good as that for prior studies.

The real test of the model, however, is its ability to predict ex ante. For this test, the model was used to predict the rescheduling status of a set of 78 LDCs over a period of five years from 1979 through 1983. The total number of observations was 390, of which 73 were re-

scheduling cases during this period. The results of this test are presented in Table 5.7. For all five years combined, the Type I error rate was 31.5%, ranging from a low of 26.1% to a high of 42.9%. The overall Type II error rate was 26.2%, ranging from 22.5% to 36.4%. The overall total error rate was 27.2%, ranging from 24.4% to 33.3%. These results, of course, are not so good as those for the development sample, but they are significantly better than chance. Thus, the model does hold some promise as a means of forecasting debt-service difficulties.

Finally, the model was tested vs. the judgment of bankers, as represented by the Institutional Investor (II) country credit index. Over the four years tested, 1980-1983, the discriminant model showed a correct classification rate of 71 percent, compared with 64 percent for the II credit index. Thus, the discriminant model slightly outperforms the II index overall and for Type I errors (29% for the model vs. 36% for the II index). The two approaches are about the same for Type II errors (56% for the model vs. 54% for the II index).

Taffler and Abassi believe that their model showed true ex ante predictive ability and was quite robust to major structural changes in the economic environment. Nonetheless, they caution against the use of the model as a substitute for the skills and experience of the bank loan officer, and feel that the real benefits of such an eval-

uative tool come as additional input to the complex judgmental task of loan approval.

Summary

Tables 5.8 and 5.9 present summaries of the discriminant and logit analyses discussed here. The results of these studies all indicate some improvement in predictability of debt-servicing difficulties using a statistical model. There is, however, no conclusive evidence that any one model is better than another, or that any particular statistical approach to the problem leads to a better model. The performance of both the discriminant- and logit-based models was very similar. In the cases where they were both used for the same population, especially in Morgan's study, they generally selected the same economic predictors and made virtually the same predictions.

Because of the generally low predictive power of these models, it would appear that the basic problem is in identifying economic indicators more significantly related to debt-servicing difficulties. This problem is compounded by the fact that the impact of these variables on whether or not a country defaults may change with time and with shifts in the general economic climate.

Table 5.10 presents a comparison of the performance of discriminant and logit models in both the development and the validation samples. In both cases, the development

Table 5.8: SUMMARY OF DISCRIMINANT ANALYSIS STUDIES

	Frank & Cline[a]	Sargen[b]	Saini & Bates[c]	Morgan[d]	Taffler & Abassi[e]
Period Tested	1960-68	1960-75	1960-77	1975-82	1967-77
Number of Observations	145	466	159	240	681
Number of Reschedulings	13	24	22	40	50
Error Rates					
Type I	23.1%	33.3%	13.6%	15.0%	10.0%
Type II	10.6%	7.9%	7.3%	13.5%	8.9%
Total	11.7%	9.2%	8.2%	13.8%	9.0%

(a) 3-variable case, linear, iteration 1 (equal covariance structure).
(b) Cut-off value of discriminant function = 0.
(c) Replicates procedure used by Feder and Just, with modified dependent variable.
(d) Model B.
(e) Development sample.

Significant Variables

Frank & Cline:
- Debt service ratio
- Amortization/debt
- Imports/reserves

Morgan:
- Total debt/exports
- Real GDP growth rate
- Bank lending
- Reserves/imports

Sargen:
- Debt service ratio
- Inflation rate
- Growth rate of exports
- Real GNP growth rate
- Purchasing-power parity
- M1 growth rate

Taffler & Abassi:
- Commitments per capita
- Debt/exports
- Average inflation rate
- Domestic credit/GDP

Saini & Bates:
- Consumer price index
- Money supply growth rate
- Growth rate of international reserves
- 5-yr CA - increase in reserves/exports-in-latest-year

sample error rate is lower than that for the validation sample, as expected, although for the logit model, the difference is not very great. Because the discriminant and logit models used different predictor variables (no variables were common to the two models), their performance cannot be directly compared.

Table 5.9: SUMMARY OF LOGIT ANALYSIS STUDIES

	Feder & Just[a]	Feder, Just & Ross[b]	Mayo & Barrett	Cline[c]	Saini & Bates[d]	Morgan[e]
Period Tested	1965-72	1965-76	1960-75	1967-82	1960-77	1975-82
Number of Observations	238	580	571	670	159	240
Number of Reschedulings	21	40	28	22	22	40
Errors Rates						
Type I	4.8%	20.0%	25.0%	9.1%	31.8%	15.0%
Type II	2.3%	5.9%	13.1%	12.9%	18.1%	13.0%
Total	2.5%	6.9%	13.7%	2.8%	19.2%	13.3%
P* Cutoff	.40	.20	---	.041	---	.16

(a) 5-variable case.
(b) Model 1 (linear)
(c) Model C.
(d) Dependent Variable 1 (rescheduling vs. non-rescheduling).
(e) Model B.

Significant Variables

Feder & Just:
- Debt service ratio
- Imports/reserves
- Export growth rate
- Per capita income
- Capital inflows/debt service

Feder, Just, & Ross:
- Debt service ratio
- Reserves/imports
- Exports/GNP
- GNP/US GNP
- Commercial inflows/debt service
- Non-comercial inflows/debt service

Mayo & Barrett:
- Rate of consumer price increase
- International reserves/imports
- Imports/GDP
- IMF reserves/imports
- Disbursed debt outstanding/exports
- Gross fixed capital formation/GDP

Cline:
- Debt service ratio
- Reserves/imports
- Amortization/debt
- LDC borrowings/imports
- Per capita income growth rate
- Squared (CA/exports)

Saini & Bates:
- Money supply growth rate
- 5-yr CA - reserves increase/ exports-in-latest-year
- Growth rate of international reserves

Morgan:
- Total debt/exports
- Real GDP growth rate
- Bank lending
- Reserves/imports
- Interest rate sensitivity

Perhaps the most insightful critique of statistical models of sovereign risk analysis is that of Shelagh A. Heffernan.[22] Heffernan raises several points, the first of which relates to the use of rescheduling as a proxy for default on external debt by a sovereign borrower.

Table 5.10: PERFORMANCE OF DEVELOPMENT AND VALIDATION SAMPLES

Analytic Method	Taffler & Abassi		Feder, Just, & Ross[a]	
	Discriminant		Logit	
	Development	Validation	Development	Validation
Period Tested	1967-77	1979-83	1965-76	1977-79
Number of Observations	681	390	580	135
Number of Reschedulings	50	73	40	10
Error Rates				
Type I	10.0%	31.5%	20.0%	10.0%
Type II	8.9%	26.2%	5.9%	12.0%
Total	9.0%	27.2%	6.9%	11.9%

(a) Model 1 (linear); P* = .2.

Heffernan disagrees with the implicit assumption that rescheduling is bad for the lender. His preliminary research in 1985 convinced him that many of the reschedulings that took place in the 1980s may have benefited both lender and borrower.

Second, Heffernan disagrees with the implied direction of causality in the models, which runs from the explanatory variables to the probability of rescheduling. He believes that causality is highly likely to run in both directions.

Third, Heffernan suspects that the models suffer from serious problems of multicollinearity. He questions whether many of the explanatory variables found to be statistically significant in a given study are in fact independent of each other. Lack of independence means that it is not possible to identify the relative importance of the different explanatory variables.

More seriously, the variables seem to be highly sensitive to particular sets of sample data, which may explain the wide variety of variables that have been found to be significant over past studies.

The fundamental problem of all of these models is that they provide no underlying supply-and-demand framework for sovereign loans. Heffernan believes that estimating the probability of default or rescheduling based on a number of economic variables is putting the cart before the horse. Without the underlying framework, there is no fundamental understanding of why there is international sovereign borrowing and lending, and consequently of why rescheduling or outright repudiation occurs. Once the key determinants of supply and demand for sovereign loans are identified, it will be possible to pinpoint the factors contributing to their riskiness.

Management of Country Exposure

One of the principal reasons that international banks should analyze country risk is to establish exposure limits for individual countries. For such an analysis to be useful, its scope and content must be framed with an eye on the specific (actual or contemplated) foreign assets (or liabilities) at risk and the bank's other business activities. The volume and maturity of such assets must be measured often and reported efficiently, so that the

officers responsible for the portfolio can respond to new information.

Nevertheless, the total volume of assets must be diligently monitored and aggregated. This total provides the single most important piece of information on the risk a bank is taking with a given country. The bank's total exposure level is needed to evaluate the significance of trends and anticipated difficulties; its figures must be accurate and available virtually instantaneously. Furthermore, highly efficient exposure measurement and reporting schemes and interbank communication are necessary to this larger aggregate picture in order to make it operationally useful. Using such country exposure limits, the bank can apply its results to advance specific business goals.

Country exposure applies to the risks associated with the geographical location of a bank's business activities. Depending on the scope and magnitude of its overseas portfolio, the bank's balance sheet and the portfolio's quality can be vulnerable to losses caused by adverse political or economic events. This exposure is often of a cross-border (or foreign currency) nature, which can increase difficulties in loan repayment.

The bank's size and the extent to which it is involved in international activities have a considerable impact on the number and types of factors which create country exposure. Generally, the larger the bank and the greater

the scope of its international operations, the more likely it is to have a wide variety of balance-sheet and off-balance-sheet components. Conversely, the smaller the bank and the narrower the scope of its international activities, the more likely it is to limit its exposure to traditional balance-sheet items.

In 1977, the Association of Reserve City Bankers (ARCB) conducted a study involving two questionnaires.[23] The first inquired about the size and scope of each bank's international operations and their general reporting procedures, the second sought to define, for exposure measurement purposes, treatment of the various types of asset-acquisition and off-balance-sheet transactions.

According to the ARCB survey, the determination of what is included as country exposure and how this exposure is disaggregated are a function of two principal factors: (1) the materiality in volume terms of particular types of assets and off-balance-sheet transactions to a given bank's operation, and (2) the information requests from regulatory authorities, boards of directors, internal auditors, etc.

One of the study's findings was that if a bank had larger total assets, comparatively speaking, it would have a larger percentage of assets in international activities. This finding is particularly significant because most of the money center banks were not large, particularly when compared with the truly large banks. While only 9% of the

banks had total assets in excess of $10 billion in 1975, 66% of the respondents had assets of less than $2.5 billion. Moreover, only 15% of the 119 responding banks had more than 25% of their total assets in foreign operations, and only 3% had more than 45% tied up internationally. On the other hand, 38% of the responding banks had tied less than 5% of their assets to international activities, while 37% had between 5% and 15% of their assets involved in such operations. A substantial majority of the responding banks used formal country exposure reporting procedures. Only 12 banks with foreign exposure did not prepare reports on a regular basis. These banks had international assets which were less than 5% of their total.

The use of adequate precautions in managing international lending exposure is ultimately the responsibility of bank officials. Their effectiveness and commitment make up the most important element of any country-risk management process. To assist them in effectively maintaining the systems, the bank should create ceilings and subceilings for each country's foreign currency exposure. The following guidelines for making decisions on exposure ceilings are provided by Irving S. Friedman:[24]

1. What are the potential in-country business opportunities?

2. What are the risk variables inherent in the patterns of exposure in the country?

3. What are the possible effects of anticipated national and international events, including governmental policies, changes, and measures which could affect exposure?

4. What quantitative and qualitative techniques can be applied to information potentially available to banks?

The concept of country sublimits derives from the principle that country risk is not homogeneous within any economy. Different borrowers are affected in different ways by both the domestic and international events included in the definition of country risk. A bank can better recognize these factors by the use of subceilings for different maturities and types of transactions. Borrowers can then be managed individually, according to anticipated or actual changes in country conditions.

Irving S. Friedman's step-by-step proposal for managing such exposure is generally designed for a private bank with branch networks or other business presence in foreign countries. He suggested:

1. Establishment of cross-border ceilings and subceilings at the beginning of the year for each country in which the bank books business. Where appropriate, procedures may include (a) recommendation by the senior officer in the field or at the head office responsible for

preparing the country business budget; (b) review of proposed ceilings by senior management at the head office; (c) approval by executive authority within the bank ultimately responsible for establishing ceilings or subceilings.

2. The establishment of procedures for allocating and re-allocating exposure ceilings and subceilings among different lending units within the bank at home and abroad.

3. Creation of procedures to ensure that total outstandings of the bank worldwide do not surpass established ceilings.

4. The development of a reporting system of actual worldwide exposure on a periodic basis.

5. Allowance for procedures to deal with changes in ceilings and subceilings during the course of the year as the country's conditions and outlook warrant.

6. Ongoing assessment and monitoring of country conditions and outlook from the viewpoint of bank activities in the country.

7. Identification of potential country risks--a by-product of ongoing assessment and monitoring of country conditions and outlook. Where appropriate, this is a combined activity of the field and the head office.

The country officer in the field, the bank marketing officer, or the bank's executive officers in charge of country risk must make change proposals in country judg-

ments whenever the country's circumstances change enough to warrant adjustments of country limits or sublimits. These written proposals for recommended action regarding the setting or changing of exposure ceilings and subceilings include an analysis of economic, financial, social, and political conditions; judgments on country outlook; and recommendations on exposure.

The above proposed steps by Friedman are essential to the success of country-risk management systems. Effective guidelines have to be established to give the process the opportunity to succeed. Friedman's proposals should be seriously considered, even though they are somewhat general. If the above proposals are implemented, the flow of international lending will be much improved and the bank's concern over repayment failures will be substantially diminished.

One of the major problems faced by banks in assessing country risk is deciding where the exposure lies. A. Bruce Brackenridge,[25] in his brief outline of the procedures used by Morgan Guaranty to establish country exposure limits, gives the following example:

> If our Paris office grants a line of credit to the French subsidiary of a U.S. company under the guarantee of the parent, most people would agree that it is U.S. exposure. But what if there is only a keepwell letter? If our Brussels office places a redeposit with the Milan office of Citibank, do we place the exposure in Italy or the United States?

> The shipping industry is particularly difficult. We have a client who is the sole owner of a Liberian company which has one asset--a Very Large Cargo Carrier (VLCC) carrying oil between Iran and Japan. How are the locally funded assets of a foreign branch to be treated? What about forward and spot foreign exchange? Or Federal Fund lines to the U.S. branch of a British bank? The questions are endless.

He specifies that banks have answered the above questions differently, as was confirmed by the ARCB study.

According to Brackenridge, maximum country exposure limits were first established at Morgan Guaranty in the late 1960s. They calculated their exposure on what they called the "credit-risk basis." In this scheme, each credit facility and risk asset is placed in the country which best reflects the location of the entity that has the ultimate legal responsibility for repayment. Specifically, this means that the loan from their Paris office to the French subsidiary of a U.S. company under the parent's guarantee is U.S. exposure; but if the French subsidiary receives a keepwell letter that is not legally binding, the exposure is French.

Morgan reviewed every credit facility throughout the bank, including overseas branches and consolidated affiliates, and each credit facility was assigned to a specific country. In addition, they were able to calculate total exposure maturing beyond one year in each country. They established limits by country for "maximum country

exposure" and "exposure over one year." According to Brackenridge, the second category is more difficult; he wanted Morgan to concentrate on those figures. Recent events prove that banks can reduce their short-term exposure when a country becomes troubled.

These limits are reviewed at least annually, and more frequently for those countries experiencing rapid political or economic change. Thus, countries such as Brazil and Mexico are under continual review. Requests for increases or decreases in limits normally originate with the lending officers of the International Banking Division, and requests for countries with significant exposure are accompanied by the latest country evaluation report prepared by Morgan's international economists.

The Robert Morris Associates (RMA) Survey of the Management of International Loan Portfolio Diversification, completed in June 1980, covered 70 banks.[26] This survey differed in several ways from the ARCB survey because it included fewer banks with assets of less than $1 billion. Consequently, more banks had 15-25% of total assets from international operations and fewer (3% versus 24% for ARCB) had no foreign branches. Even with these differences, the RMA survey showed little change in the definition of exposure from that of the ARCB.

Most surveyed banks included foreign currency loans (for example, U.S. dollar), money market transactions, and

local currency transactions (for example, non-U.S. dollar) as part of their exposure. A smaller segment of banks included money market (except placements) and local currency transactions. Items most often excluded were foreign exchange transactions, capital at risk, and federal funds transactions.

Relating exposure to international risk, the RMA survey found that two-thirds of banks that responded placed no set limit (maximum percentage) on international assets versus total assets. Most banks that did set limits were smaller in size, with total assets of less than $7.5 billion. About 30% of both large and small banks that set maximum limit levels relied on international credit market conditions as the determining factor. One-fifth (mostly smaller banks) used a specific percentage of total assets as the criterion for maximum international exposure; approximately 15% of the group used a percent of capital. Just about one-third of the large banks also used a percent of capital to determine their limit on international assets. Some surveyed banks indicated that they used several additional factors in their decision-making process.

Approximately 30% of the survey respondees said that they did not set limits on most transactions included in their definition of exposure. Banks with less than $7.5 billion in assets were less likely to set limits in their

elements of exposure than were the larger banks (probably a direct result of the bank's volume of such items in their operations).

Limits were set by 70% of all the banks surveyed, particularly on foreign currency transactions. A smaller percentage set limits on short-term transactions. Limits were most often not set for foreign exchange or federal funds transactions. More of the larger banks did not impose limits on local currency transactions, while more of the smaller banks did not include capital at risk. Most assigned guaranteed loans to the country of the guarantor; although, at some smaller banks, they were assigned to the borrower.

The RMA survey also showed that 80% of participating banks were diversifying their portfolios, in order to distribute risk. Over 90% had set maximum levels of country exposure for most individual countries (there was usually more than one committee, department, and/or officer that set and was responsible for individual country exposure limits). Less than one-fifth (primarily in large banks) had a country exposure committee that had this function. In 10%, chief executive officers were involved in the process.

A combination of internal and external factors affecting the country were the most important criteria used by banks to manage risk diversification. Large banks focused

on an analysis of country risk, economic conditions, and political stability, while smaller banks were more interested in political risk. All banks placed importance on business opportunities and profitability.

The RMA survey also found that multiple criteria were used to guide portfolio diversification among countries which were considered to be of equal creditworthiness or risk. Business opportunities were most often cited as important (40% of all the banks surveyed), followed by loan profitability (30%). Special relationships of bank officers and special lending skills were important to 25% of the group (both small and large banks).

The RMA survey revealed an increasing concern, versus that shown in earlier studies, with diversification of risk among countries. Formal country risk evaluation systems were being more commonly used than were fixed ratios in making decisions. Business opportunities and loan profitability became important criteria in guiding the portfolio only after the basic country risk or creditworthiness of the borrower had been established.

The responsibility for the management of international exposure included recommendations from the international banking department and from the bank's chief executive officers. The international department was most often the holder of primary responsibility for international exposure--particularly in the smaller banks. Next came the

responsibilities of chief executive officers, and then the credit policy committee (chosen frequently in smaller banks). Only 10% of respondees used an asset and liability committee.

Translation of Country Risk Assessments into a Country Risk Management System

The procedures that banks use to manage country risk are less varied than are the techniques used in assessing that risk. Banks generally manage risk by setting individual country limits, the highest acceptable levels of claims against entities whose debt-service capabilities are tied to a given country. The limits are set by a Country Risk Committee, which usually consists of individuals interested in growth and others interested in maintaining quality. Economists and political analysts responsible for individual country risk assessments generally serve as the committee's secretariat.

Three important elements form the country limit system. First, the distribution of the bank's portfolio by country is determined directly by administrative decision, rather than through a centrally determined set of risk adjustments or discounts to the nominal return on loans to different countries (price guidelines). In other words, no explicit attempt is made to ensure that risk-adjusted rates of return are equated at the margin for all countries.

While many banks use country pricing guidelines (certainly influenced by risk assessments), the fact that country-risk control procedures focus on maximum exposure limits rather than minimum returns over the cost of funds implies that these pricing guidelines are also heavily influenced by other factors, such as the degree of competitive pressure from other lenders.

Second, banks focus on individual country limits rather than the overall structure of the loan portfolio. Despite the fact that this focus is changing, current portfolios reflect lending decisions made essentially on a country-by-country basis. Attention has thus been focused on assets at risk in only one country, rather than in two countries or the entire portfolio. There has been relatively little systematic analysis of how much a given asset contributes to the riskiness of the overall portfolio.

Third, risk management systems take on many of the characteristics of adversary proceedings, an inevitable result of the judgmental nature of country risk assessments. Because of its limited information base, such an adversarial system cannot be accepted as a meaningful, permanent element in a bank's decision-making process unless each of the bank's major interest groups--in particular, the loan producers and credit analysts--is directly involved. These parties may not have the same amount of power, however; and while many banks have striven to

balance power among the groups, in some cases the design of the country limit decision process favors the parties interested in growth, rather than those interested in portfolio composition.

The next chapter will focus on the methods and procedures used by eight U.S. banks in managing country risk.

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CHAPTER VI

COUNTRY-RISK MANAGEMENT BY EIGHT U.S. BANKS

The assessment of country risk by U.S. commercial banks has little meaning unless it is integrated into a bank's business operation. Whatever the methods used, country-risk assessments are a necessary part of business decision making. This chapter examines how commercial banks use these fundamentals and other factors to manage their international loan portfolios. The examples will draw on the experiences of actual institutions, specifically, Citibank, Bank of America, Chase Manhattan Bank, Chemical Bank, Continental Illinois Corporation, First National Bank of Chicago, American Security Bank, and Morgan Guaranty.

Citibank

Citicorp is a multifaceted financial services organization whose principal subsidiary is Citibank, N.A. Its services include general banking, asset-based financing, merchant banking, consumer businesses, investment management, and trust services. It has more than 2,000 offices, including its subsidiaries and affiliates, in 103

countries around the world.[1] The organization's 1975 international earnings were about 70% of total earnings.

Country-exposure management, i.e., country-risk evaluation, is an integral part of the decision-making process at Citicorp and has essentially a control function. Decisions on cross-border exposure are made in a separate and independent fashion from marketing decisions because the profit motive conflicts with country-risk considerations. The inevitable tensions between risk taking and profit making are resolved by providing the best possible information base and by utilizing the best management judgment available.

The key instrument for managing a bank's exposure in a particular country is to place ceilings on the amount of country exposure that is acceptable. Ceilings require the abiity to measure and report exposure, as well as the opportunity to be reviewed and changed when conditions warrant. Citicorp is one of a few U.S banks that are large enough and have sufficient international interests to warrant the elaborate system required to do that. Citicorp is represented by approximately 75 large banks situated around the world.

These large banks account for an estimated 90% of all international bank business and thus represent the dominant mode of international banking practice. They are large-scale, internationally oriented companies with substantial

overseas business, either through overseas branches with local currency deposit business, overseas offices established for other business reasons, or overseas affiliates or subsidiaries that represent the more important prototypes for international lending. Through these prototype systems, several guiding principles have been identified that facilitate usage of the country-risk function as it was designed, that is, as an early-warning system.

One of the guiding principles was that an adequate network of intrabank communication must be established to monitor and report country exposures on a continual and consistent basis. It was also necessary to set up guidelines to guarantee the use of country-risk judgments in setting ceilings (and subceilings) that determine the total amount of exposure that the bank was willing to undertake in a particular foreign country. In this way, setting specific ceilings for various countries not only serves as a management mechanism for achieving greater variance in the bank's loan portfolio, but, equally important, gives comparison data for acting on information about changing country-risk developments that might require altering particular country ceilings during the course of the business period for which the ceiling is set, which at Citicorp is one year.

Another guiding principle was never to permit a country ceiling to be raised without careful deliberation. A system that too easily raises a country ceiling can also bring about a temptation to lower the bank's credit standards and the quality of its loan portfolio. How fast a country ceiling should be increased is often related to the overall growth of the bank's total assets. Therefore, flexibility had to be built into the Citicorp management system because to be effective, it had to be a responsive behavioral system, rather than a preconceived mechanistic system.

At Citibank, country-risk decisions were made at its world headquarters, where frequent exchanges of ideas and information with the field offices were seen as important and were encouraged. As time went on and experience was gained, this process became more and more field driven and resistance to the burden of country assessment and reporting declined as the system enabled the field to expand business and earnings profitably, and with minimal risk.

Citicorp acts as both a national and international intermediary. It makes loans in national currencies financed by deposits or money market sources in the same currency. It also makes loans in foreign currency. Local currency lending, however, is not seen as involving exposure across country borders and, therefore, is not con-

sidered to involve country risk; lending in currency foreign to the borrower was typically seen as involving country risk. Over fifty percent of Citicorp's foreign loans involve lending to a borrower in local currency.

In 1975, Citicorp put its country-risk management system in place. Management of country and cross-border risk was made an important function for two key groups:

1. Field officers of Citicorp (managing the business in their respective countries) would have to provide information about their areas' local conditions by being actively involved there professionally and socially. They would then be better able to anticipate and respond to changes in local conditions.

2. Top and senior management were then to add both perspective and experience to the judgment and recommendations made by the field.

Citicorp's systematic process established limits on country exposure and monitored outstandings under its limits. Its reporting system aimed to give information to management quickly and accurately about outstanding cross-border exposure by a country. The objective was to be able to anticipate national and international developments within or outside the control of the country's government that could adversely or favorably affect each country in which Citicorp did business.

The management process also provided for ceilings to be established for cross-border exposure (subject to country risk in any given country) and for subceilings (of different maturities) because overall exposure needed to be broken down to cover varying trends, indebtedness, and other factors. Quarterly reports were required for cross-border exposure; however, additional statistical and qualitative information was required monthly for countries experiencing rapidly changing conditions. To ensure that the system achieved its purposes, a checks-and-balance system was set up that required Citicorp outside the country of the prospective borrower to get credit approval from a senior officer in the field who was responsible for the borrowing country.

According to Irving S. Friedman,[2] four principal factors form the basis for the critical judgments needed to establish cross-border ceilings:

1. Evaluation of the needs and capabilities of Citicorp's client base in each country;

2. Analysis of business characteristics, such as classes of business, investments, guarantees, transactions, and accompanying tenor, in any one country;

3. Anticipation or analysis of national and international events which might affect Citicorp in any one country;

4. Application of quantitative and qualitative techniques to the information available to Citicorp world wide.

According to Friedman, Citicorp monitored country conditions and other elements needed for country assessments and judgments and then compiled a variety of statistical indicators of that nation's creditworthiness. To do this, it analyzed the country's economic conditions, its political-economic outlook and policies, balance of payments and the country's management thereof, other international economic and financial aspects, the country's principal trends and prospects, flow of funds, and financial intermediation--actual and potential. Other factors included social conditions and international positions and relations and how world events--economic, political and military--affect them. All these factors became a single, comprehensive risk assessment for that country.

It was felt at Citicorp that sole reliance on debt-service ratios was inadequate and could be misleading in country-risk analysis. Therefore, while debt service ratios, such as changes in debt service to changes in gross national product were examined, other statistical relationships needed to be examined, such as compressibility of imports, consumption and investment goods, variability in export earnings, and foreign investment in relationship to total investment. Citicorp created its own databank, specifically on developing countries, and constantly added

and examined new statistical or functional information which might give better insight into a country's conditions and policies.

Citicorp's System of Measuring Exposure

The Citicorp system began with its own definitions of exposure since no legal definitions existed, but as regulatory authorities have gained experience, uniform procedures have been encouraged for reporting to these authorities. Internal procedures within banks tend to conform to these general banking procedures, with attention to detailed country exposure reports, and instructions for preparing such reports are now required by U.S. banking regulations.

A few years ago, country exposure was defined as including both foreign currency and local currency exposure to residents of each foreign country. This currency exposure was defined as all cross-border direct and indirect claims on residents, including Citicorp-related residents of a foreign country, irrespective of currency. This definition also included all intracountry foreign currency direct and indirect claims on residents, minus all Citicorp offshore to Citicorp resident intercorporate flows in foreign currency, backing up the intracountry foreign currency exposure.

In Citicorp's original system, foreign currency exposure to residents of each foreign country was broken down, identified, and reported separately as cross-border or intracountry foreign currency exposure. In the later system, foreign currency exposure was consolidated. Citibank requires this information from the field in their reports of country exposure.

The reporting system requires the breakdown into four categories of maturity, as required by the regulatory authorities. All continue to be controlled by cross-border exposure ceilings (one global, and for most countries, two maturity subceilings) which govern the total permissible exposure at any given time in a country. International financial centers and offshore banking units must make special reports which are used to govern the maximum permissible level of exposure flowing into the country in support of the offshore bank. This country exposure reporting distinguishes between maturities and types of entities, and also between differing categories of borrower (monetary authorities, bank, nonbank, and multilateral organizations) and ownership (private sector, public sector, and Citicorp-owned).

Assets and contingent liabilities are included in cross-border exposure subject to country risk. They are tallied and reported by the branch in the country of the borrowing entity. For assets, most equity investments,

loans, discounts, leases, and placements are included, but excluded are transactions involving U.S. borrowers, shipping transactions, local currency assets, or externally guaranteed assets. For contingent liabilities, formal, unused loan commitments as well as opened, confirmed commercial credits are included as cross-border exposure.

It is important to note that cross-border country exposure ceilings are typically much greater than the sum of those items which actually appear on the balance sheet. For instance, two items, intrabank cross-border and contingent liabilities, are also included as country exposure, although these do not appear on the balance sheet. Though not shown, these off-balance-sheet items could well be as important as the balance-sheet items themselves.[3]

Functions of Field and Head Office in Exposure Management

Field offices assist greatly in determining country risk and ceilings because they have better access to on-the-spot and often enlightening information. It is the role of the senior country officer in each country to maintain a timely and critically expert opinion on that country and its outlook from the viewpoint of Citicorp's country risk.

In addition, a staff was developed at the head office capable of following, reviewing, and independently judging country situations. These were experienced Citicorp

people, and they were instructed to acquire knowledge which was not readily accessible to the field. In this way, the opinions from field staff could be checked against other expert judgments based on other sources of knowledge. Differences would then point clearly to the need for further thought, while the independently achieved agreement of the two would establish mutual reinforcement and reassurance.

The purpose of such activity, however, was not to substitute or second guess the field but rather to augment it with independent information, and in the process, to link the thinking in the field with the general experience, policies, and objectives of Citicorp. In this way, the inevitable risks involved in a large-scale operation in over 100 countries could, it was believed, be reduced to acceptable levels.

The methods of management and capability were created in a number of mutually reinforcing ways:

1. Use of memoranda to give recommendations and suggested changes in guidelines;

2. Close work between individual country desk officers and top headquarters staff;

3. Development of relationships with country experts in Washington, D.C., particularly in the IMF and World Bank;

4. Frequent meetings of the senior country risk officer with country desk officers, along with the par-

ticipation of other special Citibank groups to discuss country-risk developments (minutes of such meetings were kept and disseminated to the field);

5. Encouragement of all groups within the head office to look to the country desk officers as sources of information and judgments;

6. Encouragement of all groups within the head office to include desk officers in policy discussions and decision making on their countries.

Bank of America

Bank of America Corporation provides diverse financial services to its customers throughout the world. As of December 31, 1987, Bank America had assets of $93 billion, deposits of $76 billion, and primary capital of $8 billion.[4] Its California Banking Group and Seattle-First National Bank operate 1,040 domestic branches in California and Washington. Its World Banking Group and Seattle-First National Bank have 66 foreign branches and representative offices in 51 nations.

It is easy to see why Bank of America is a tremendously important international lender with a very large international loan portfolio. With foreign branch and subsidiary business on a global scale, it has long been involved in most facets of international lending. How to cope with country risk problems, then, has been a major

concern of the bank's management, as indicated by the elaborate approach developed for country-risk and portfolio management.

Though the country evaluation system developed by Bank of America has been broadly characterized as a numerical rating system that blends qualitative and quantitative data sources, the bank's management style encourages substantial delegation of authority and decentralized decision making. Its country-risk assessment techniques combine quantitative indicators with a judgmental component determined by a consensus-building process of rating the creditworthiness of many countries.

The requirements of Bank of America's country evaluation system were shaped by the great diversity of its financial business abroad and its highly decentralized organizational structure, as well as by the bank's belief that its purposes were best served by calculation of country ratings and an approach that is not static. Even this has reportedly evolved with the changing international environment and the company's new staff capabilities.

Bank of America's Risk Management System

The Bank of America's system aims to effectively manage a wide variety of risks inherent to global banking: asset quality, liquidity, interest rates, foreign exchange,

and country risk. (Country risk also plays an indirect role in what happens in these other risk categories.)

However, despite Bank of America's safeguards for asset quality and credit risk by detailed credit analysis, proper documentation, timely re-evaluation of outstanding credits, and prompt follow-up of identified problems, some uncertainty of loan repayment always remains. The bank is protected against this potential problem both by including risk premiums on interest rate charges to different major loan categories and by adding sufficient loan loss provisions to reserves to cover expected future losses for each major loan category, as well as maintaining additional reserves against less predictable losses. Net loan losses from nonperforming loans are charged off or deducted from loan loss provisions.

Bank of America manages its international liquidity to meet the multicurrency needs of borrowers by trying to secure deposits in the Eurocurrency market or elsewhere, by maintaining additional sources of liquidity in the form of marketable securities, and by setting shorter limits on the funding of each currency.

Overseas interest rate risk is generally considered less difficult to manage than its domestic counterpart because international loans are typically priced at pre-arranged spreads that remain constant regardless of subsequent interest rate movements. Maturity mismatching,

a major type of interest rate risk, is handled by eliminating the potential for mismatching permitted for each currency.

Foreign exchange risk arises from unexpected changes in rates of exchange between currencies. Bank of America's more than 30 worldwide currency trading units manage foreign exchange risks by limiting the size of acceptable trading positions, by decentralization of trading activities, and by the many currencies involved. Even though these categories are all influenced by country risk issues, the Bank of America country evaluation system is quite distinct from these risks.

Bank of America's Methods of Country Assessment

The Bank of America's method[5] of country assessment began as a judgment-based transfer-risk rating system in the 1960s and has become a computer-assisted system. It combines an analytical formula with judgmental factors to arrive at a comprehensive country-risk rating. This country evaluation system consists of three major elements:

1. A country assessment method which culminates in numerical ratings (country ratings are used mainly as one of several determinants for adopting an overall country lending limit);

2. A method for setting overall country lending limits and sublimits;

3. Frequent monitoring of actual country loan exposure levels.

The bank's model recognizes the importance of assimilating subjective information in addition to quantitative analysis when assessing a country's relative creditworthiness. The bank's approach, therefore, begins with quantitative and statistical information, but is refined by the inclusion of two distinct judgmental letter ratings: an economic indicator and a political indicator. These are arrived at by having the appropriate staff, line officers, and economists fill out questionnaires to determine a consensus on various country ratings. The two judgmental ratings then serve as the distillation of the results of the overall country assessment. The search for a reliable set of statistical lead indicators of debt-service difficulties has been made numerous times, but finding a precise enough definition for the dependent variable (debt-service difficulty) has been the main obstacle.

Country risk assessment factors are grouped under four broad headings: external liquidity, economic policy, economic structure, and sociopolitical factors. The quantitative point of departure is development of an analytical data matrix, which Bank of America constructed in the mid-1970s as sets of equations (agreed upon by a number of senior line officers and economists) made to approximate a set of subjective country ratings.

Even though external liquidity factors were at first separate from those of economic policy and economic structure in order to calculate two composite indices (the debt-service rating and the so-called adaptability index), it was soon found preferable to combine these into what then became the debt-service capacity index. This included the four weighted components of that original debt-service index: debt-service capacity, import coverage, debt burden, and compressibility. The eight weighted subindices of the original adaptability index include gross domestic product, inflation, exports, product concentration, and savings patterns. An informal method was then used to gather less readily quantifiable economic and sociopolitical information, in part by tapping Bank of America's global network of economists.

Influential factors not adequately covered in the debt-service index were the focus of a questionnaire filled out by the bank's country and regional managers. Flexible enough to encompass possibly unique environmental factors, the consistency of the questionnaire's format allows comparison between countries. Questionnaire responses are then sent to divisional headquarters, at which point preliminary ratings are assigned to each of the countries. These are then sent to Bank of America's world headquarters in San Francisco, where they are consolidated and checked

for global consistency. The worldwide ratings are then reviewed by senior management.

Changes made a few years ago in the Bank of America's country evaluation system suggest that more emphasis has begun to be placed on incorporating judgmental factors in country-risk assessment. Any disagreements over proper ratings are resolved, and other ratings are reviewed, by the bank's world banking division executive council. The country rating process then can be described as moving up the organizational hierarchy and is based on consensus-building along the way.

The three most important uses of country ratings are to set country lending limits, to define overseas investment of bank capital in advance of opening a new foreign branch, and to set loan loss reserves. This is considered to be the key to managing country portfolios, when coupled with an elaborate computerized monitoring system to provide current information on actual cross-border exposure levels for the bank. Actual risk exposure levels, however, must be in compliance with the bank's lending limits. Country ratings serve as one of a number of inputs which are used when decisions are to be made on country lending limits. Other criteria are the profitability of country markets, the size of the country, its external debt position, whether the bank has undue concentration of business in that country, and the long run

goals and other business relationships. Another major use of country rating is in the authorization of overseas investment of bank capital.

Most countries stipulate in law or regulation the amount of capital required to establish a branch or subsidiary in that country. Bank of America continuously monitors actual loan exposure in many countries and tabulates fairly detailed information. This information consists of the agreed-upon country lending limits, commitments made by all bank units, and the actual exposure level.

Chase Manhattan

The Chase Manhattan Corporation is the holding company of the Chase Manhattan Bank, N.A., and numerous other subsidiaries. It has assets in the area of $100 billion and employs more than 42,000 people in 60 countries.[6] Chase provides a comprehensive range of financial services to individuals, corporations, and other financial institutions and governments through its three major business components:

1. Global Banking, which serves corporate, institutional and sovereign clients around the world through a network of banking and trading locations,

2. Individual Banking, which serves consumers in the U.S. and selected overseas markets with loan and deposit

products, discount brokerage, trust and investment services,

3. Institutional Banking, which offers corporations, financial institutions, and middle-market companies such specialized services as real estate and commodity finance, leasing, service products, and correspondent banking.

Chase Manhattan operates from the point of view that international lending requires not only the normal credit risk analysis associated with extending financing to a particular customer, but also an assessment of country risk which may result from government decisions or unforeseen events and which may interrupt normal business activities in the country, thus affecting a borrower's ability to repay its loans. Attention is, therefore, focused on the availability of foreign exchange to permit timely repayment of cross-border loans by borrowers in that country.

Chase monitors and analyzes the economic, social, and political environments in all the countries in which it does business or in which its borrowers reside. These in-depth assessments, performed by a team of economists and political analysts in conjunction with local Chase management, are utilized by Chase within its planning cycle as well as in its system of managing total country exposures. However, Chase does not use any statistical or quantitative techniques in its risk management system. Nor does it have

a detailed credit analysis system like that of Citibank or Bank of America.

Chemical Bank

Chemical New York Corporation[7] is the fourth-largest bank holding company in the United States. It has assets of more than $78 billion and is an international financial services organization. Its principal subsidiaries are Chemical Bank and Texas Commerce Bancshares, Inc. Chemical, one of the nation's oldest banks, was originally chartered in 1824 as a subsidiary of chemical manufacturing and is today a top global financial services institution.

On May 1, 1987, Chemical and Texas Commerce were officially merged. This action created an institution with powerful capabilities in the consumer, middle market, and corporate and institutional markets. This combined entity is stronger than were the separate banks in providing advisory and financing services to very diverse industries. With Texas Commercial Bank, Chemical also enhances its position in processing important categories of debt instruments, such as commercial paper, medium-term notes, and collateralized mortgage obligations.

Chemical Bank, like other banks, controls the various degrees of country risk through continuing evaluation of economic and political trends, and through a system of predetermined exposure and maturity limits for each

country. For some countries, sublimits are also established with varying maturity limits by sectors (government, banking, and private).

Te refine its methods of dealing with political risk, Chemical Bank has made use of an analytic technique called a political spread sheet. This technique is used to determine probable political disposition of various "actors" in a particular country with respect to a specific country's lending strategy. Weighing and categorizing this information aims to give a useful measure for the likelihood of potentially adverse political events.

The other elements of Chemical Bank's country exposure system are the country rating categories and the country review format. The former stresses grouping countries according to their similarities; the latter focuses on the uniqueness of each country. Financial, economic, and political parameters are then combined to arrive at a particular country's rating with specific maximum capital ratios (indicative rather than binding) assigned to various country risk categories for the setting of country limits. Chemical Bank's approach to credit analysis is not so detailed as that of Citibank or Bank of America, and no statistical techniques are used to assess a country's relative creditworthiness.

Continental Illinois Corporation

Continental Illinois Bank Corporation is a market-driven bank holding company that serves corporations, institutional investors, and individuals with complex financial requirements. Through a 24-hour market-making and distribution network centered in Tokyo, London, and Chicago, Continental meets the investment, financing, risk-management, and foreign-exchange requirements of corporations, institutions, and governments throughout the world. In 1989, Continental's corporate finance transactions grew in number by 14 percent, representing $24 billion in total bank financing and $28 million in fee income.[8]

In 1987, unusual provisions for possible losses on loans to 17 less-developed countries (LDCs) were made in the amount of $500 million (second quarter) and $200 million (fourth quarter).[9] This reserve for LDC exposure amounted to 50 percent of medium-term loans, long-term loans, and commitments to those countries, after considerations for previous charge-offs. In 1989, medium- and long-term loans to LDCs were cut by $900 million through charge-offs, sales, and swaps.[10]

Continental Illinois has integrated the use of exposure limits into its planning process and its asset and

liability management. In the planning process, corporate direction is projected by determining an expected international loan portfolio growth that would be consistent with prudent risk levels and with long-term profit growth. This plan is then used to focus geographic division goals. Attention is also focused on the cost of funding international loans, as well as on the interest rate spreads and fees accompanying the making of loans.

Continental Illinois has created a committee of senior officers from its international and multinational banking departments and from its economic research division to examine country exposure. This committee meets every two weeks with the list of countries to be reviewed determined by country risk rating. Committee members receive and make their decisions based on three inputs: first, an economic risk evaluation and forecast; second, a political risk evaluation and outlook; and third, the recommendation from the geographic lending division. Their decisions to increase, reduce, or hold constant the exposure limit for a country are then reviewed by top management.

Exposure limits cover all extensions of credit by the bank and its branches, as well as by all its majority-owned subsidiaries. Several sublimits are established within these overall limits. The most important of these include sublimits on term credits (by amount and years of maturity

for each country) as well as limits on extensions of credit of less than one year.

In defining exposure, location of the borrower is also an important determinant because branches of a borrower are considered to be the responsibility of the borrower's head office. Credit exposure to the branch of a borrower (in a country other than that of the head office) is counted as exposure in the country of the head office. Subsidiary (located in a country other than that of the parent company) borrowings are considered to be exposure in the country in which the subsidiary is located. Credits that are supported by guarantees are considered exposure in the country of the issuer of the guarantee.

The impact of potential loan loss in capital funds is regarded to be of paramount importance in determining maximum exposure. The impact of such a possible write-off varies from country to country depending on the tax structure of that particular country.

An economic risk rating for all countries is provided by the economic research division, which is separate from the international and multinational banking departments. Their economic analysis is used to determine a country's foreign borrowing requirements, their achievability, how sustainable its growth targets are, and how stable its economy is in its ability to generate hard currency earnings to meet its obligations. Consideration is also

given to how efficiently and effectively a country's natural, human, and capital resources are, or might be, employed. Government management of the economy is also appraised.

Much consideration is given to the country's current status in its balance-of-payments as well as to its future prospects. Important early-warning indicators have been developed to pinpoint possible problems in countries' international financial conditions. A number of factors correlate closely with potential debt-servicing difficulties, including debt service ratios, maturity profiles, international reserve adequacy, selected macroeconomic variables, and government policy indicators.

In their political risk-rating system, country analysis is obtained from loan officers responsible for each country and includes information from Continental Illinois officers overseas. Reports are submitted regularly which provide estimates of the willingness and political ability of the country's government to continue to honor its foreign obligations. Attention is given to the risk of expropriation or nationalization without adequate compensation. The objective is to identify potential difficulties in the centers of power inside the country as well as those possible with other nations. However, Continental Illinois makes no use of quantitative or statistical techniques in its risk-evaluation procedure.

First National Bank of Chicago

First Chicago Corporation is a bank holding company which started the 1980's with only one major subsidiary, First National Bank of Chicago. By 1989, First Chicago had two major lines of business: the Superregional Bank, which handles bankcard and local banking, and the Global Corporate Bank (GCB). The GCB, with 22 banking locations across the globe, delivers financial products and services to large businesses, worldwide corporations, governments, and other institutions. With average assets of $33.5 billion in 1989, GCB represented 69 percent of First Chicago's total asset base.[11]

Since 1987, First Chicago has made an aggressive effort to reduce troubled-country debt exposure. In 1989, exposure was reduced by $800 million to a year-end total of $1.3 billion, down from $3.1 billion at year-end 1987.

There is a strong resemblance between the way First Chicago operates its country risk system and the way it assesses the credit of an individual company. Countries are specifically classified (in definition and use, just as individual problematic credit are) according to each one's short- and long-term creditworthiness, which is determined by First Chicago's country risk management committee. This committee makes most of the decisions relating to country

risk. Its chairman is also chairman of the credit policy committee. Its membership is comprised of most of the bank's senior management.

Risk ratings, exposure limits, and country marketing strategies are all decided by this committee. However, the chairman must ratify any proposals for large exposure in high-risk countries. The two major inputs to the deliberations of the country-risk management committee are country-risk reports done by analysts in First Chicago's country risk division and by its country marketing strategy.

The country-risk classifications used by First Chicago are similar (both procedurally and functionally) to credit classifications applied to individual credits. The bank uses a 1-4 classification scale and assigns countries both a short-term and a long-term rating.

First of Chicago management has stated that this explicit classification is the main reason its international loan portfolio includes fewer countries classified in high-risk categories than the average international exposure distribution of other large U.S. banks. Country limits have been set for over 100 countries, in terms of both the size and the composition of competing product areas of lending activities in that particular country.

Country analysis forms an important basis for setting country limits. It focuses on seven factors:

1. The external balance sheet of the country,
2. Foreign exchange earnings capacity and financing needs,
3. Access to capital markets,
4. The quality of economic and political management,
5. Analysis of major political actors and institutions,
6. Resources available to government and other power centers,
7. International context.

American Security Bank

American Security Bank is located in the nation's capital. It is smaller in size than the very large banks but has been heavily involved in international lending because of its location--Washington, D.C., the center of official world finance, headquarters of the IMF, the World Bank, and the Inter-American Development Bank.

American Security specifically defines country risk as being based on the elements in the economic and political environments of a given country. That is, despite the financial condition of the borrower, events that take place within a country can adversely affect the collectibility of debt investments.

In its corporate manual,[12] the bank notes the following factors as possible adverse influences on debt collectibility:

1. Economic: special taxes that are imposed on the lender or borrower, interest rate management, government imposed delays on liquidation of external obligations, devaluation of foreign exchange controls, and domestic policies--often imposed in a sudden unpredictable manner, which would affect the borrower's ability to generate the necessary cash flow to repay the debt.

2. Political: nationalization, confiscation, wars, embargoes, revolutions, etc.

American Security's management system measures total country risk in all countries separately for maturities of under one year and over one year. Exposure is divided into direct exposure--loans (including overdrafts and acceptances), placements, investments, guarantees and standby credits, legal commitments to lend, and letters of credit--and indirect exposure--unused portions of lines of credit, including placements and foreign exchange lines. Country risk is further defined in relation to the legal and ultimate credit-responsible entity. Unsecured facilities (those which do not have binding, third-party legal support) are considered exposure in the country in which the borrower is domiciled. Those which have legally binding support from third parties (principally, guarantees

and insurance) are considered as risk in the country in which the third parties are domiciled. If secured by cash, marketable securities, or real estate, the facility risk is placed in the country where the security is physically located. Bank branches are considered as exposure to the head office of that bank regardless of where that branch is located.

Any American Security division recommending or originating a country-risk transaction must obtain the agreement of its international division. The head of the international division, a senior vice president, is directly responsible for monitoring country risk and recommending changes in country limits. These recommendations are then reviewed by the bank's consulting economist, the chairman of credit policy, the president, or the chairman of the bank. Even though the countries are not selected for new business solicitations, the policy is to monitor and evaluate risk in countries where the bank has exposure.

The two basic inputs into establishing country limits are country-risk assessment and marketing strategy. Other factors considered in establishing maximum lending limits are credit risk, profitability and other benefits, capital, tenor, and their impact on rating agencies.

Morgan Guaranty

J. P. Morgan & Co., Incorporated, provides financial services to institutional and individual clients worldwide. Through its subsidiaries, it conducts international commercial and private banking business, provides financial advisory services, underwrites and trades securities in international capital markets and (to the extent permitted) in domestic capital markets, and manages some $65 billion in pension and other investment funds.[13]

J. P. Morgan is a holding company incorporated in Delaware, U.S.A. It maintains the strongest capital position among major money-center bank holding companies in the United States. Its principal subsidiary, Morgan Guaranty Trust Company of New York, accounts for 85% of the total assets of the holding company. As of December 31, 1987, their ratio of common stockholder's equity to assets was 6.35%; that of common stockholder's equity to average assets was 5.96%. Country exposure is measured according to Morgan Guaranty's concept of credit risk.

Risk is assigned to the location reflecting the entity having ultimate legal responsibility for repayment of the obligation. There are two limits: maximum country exposure and exposure over one year. International banking division loan officers are allowed to request changes in country

limits on an ad hoc basis and must submit country evaluation reports with all such requests for countries in which the bank already has appreciable exposure. Country limits are reviewed frequently for countries undergoing major changes, and even countries regarded as safe are reviewed on an annual basis.

Morgan Guaranty's standard country evaluation procedure is activated in meetings called by the senior credit officer of the international banking division. The area manager, the loan officers, and the international economist who has written the most recent report about the country to be discussed also attend. Following the economist's presentation on the future of the country, and based on country evaluation reports which examine policy factors, basic economic factors, external finance, and political factors, the area manager then outlines the bank's current and contemplated position in that country. Statistical and quantitative techniques play no role in this decision process.

Conclusion

This chapter has shown the various views, preferences, and practices in country-risk assessment by eight high-ranking banks. Though they differ in format of country assessments, professional background of analysts, sources of information, and frequency and detail of analysis, it is

important to note that they have shown the value and need for country-risk assessments and country-risk management systems. Each has its own ultimate responsibility, origins of accountability for fixing and changing country limits, use of sublimits, and ways of linking to business decisions. The economic and financial complexity make it easy to see why more and more bankers believe that a practical, efficient country risk system is essential. For an example of the specific systems used by Manufacturers Hanover Bank to manage country-risk assessment, see Appendix B.

Only Citibank and Bank of America have consistently used formal quantitative techniques in their country-risk assessments. Although the other six banks have made some improvements over the years, they still do not use quantitative techniques to any great extent. None of thes six banks has a country-risk assessment system in place that is as sophisticated and efficient as that of Citibank or Bank of America.

Quantitative techniques should be incorporated into banks' assessment procedures because they do provide some important information. However, as discussed in Chapter V and reinforced in Chapter VII in this study, they should be used only in an ancillary capacity, not as the sole means of risk management.

The next chapter will focus on country-risk assessment for developing countries by both discriminant and logistic analyses.

Endnotes to Chapter VI

1. Citicorp Annual Report, 1987.

2. Irving S. Friedman, The World Debt Dilemma: Managing Country Risk, Robert Morris Associates, 1983.

3. Irving S. Friedman, ibid.

4. Bank America Corporation, 1987 Annual Report.

5. Irving S. Friedman, ibid.

6. Chase Manhattan Corporation, 1987 Annual Report, Part One.

7. Chemical New York Corporation, The Year in Review: Annual Report 1987.

8. Continental Illinois Corporation, 1989 Annual Report.

9. Continental Illinois Corporation, 1987 Annual Report.

10. See reference 8.

11. First Chicago Corporation, 1989 Annual Report.

12. American Security Bank, Corporate Manual.

13. J. P. Morgan & Co., Incorporated, 1987 Annual Report.

CHAPTER VII

STATISTICAL ANALYSIS OF COUNTRY-RISK ASSESSMENT FOR LESS DEVELOPED COUNTRIES

This chapter presents linear discriminant function and logistic regression models using economic indicators for predicting debt reschedulings in developing countries. These models were developed for the purpose of identifying in advance those countries that will be unable to meet their commitments on external debt.

Previous studies of debt rescheduling followed relatively similar approaches. Those studies employed statistical techniques, specifically discriminant, logistic, and principal components analysis, that apply continuous independent variables to explain a dichotomous dependent variable--typically debt rescheduling vs. no rescheduling.

Gordon W. Smith[1] showed in his 1979 study that the statistical models developed in the early 1970's tended to over-predict the occurrence of debt-rescheduling problems in the late 1970's. Using the 1971 Frank-Cline and 1977 Feder-Just models, he discovered that when applied to data in the mid-1970's to 1977, both models predicted several rescheduling situations that did not happen.

The models used here combine recently developed short-term debt data and variables representing economic shocks as predictors. These new indicators, along with the use of recent data, enable the models to reflect the changes that have taken place since the oil price shocks and the period of swift debt accrual by developing countries. In addition, some of the economic indicators that were significant in previous research models are used in this study, although it is recognized that they may not be reliable predictors of debt reschedulings in the 1980s or beyond. One of the purposes of this study is to see whether statistical models using the newly developed indicators will show improved performance over the older models.

A Discriminant Analysis Approach to Predicting Debt Rescheduling

R. A. Fisher[2] introduced the concept of a linear discriminant function (LDF) for discriminating between two groups or populations. He derived the LDF for p multinormal variables $\underline{X}$ with a common covariance matrix for the two groups by linearly combining the variables $X_1,\ldots,X_p$ in $\underline{X}$ in an optimal way. The LDF is optimal in the sense that it maximizes the "distance" between the two groups, subject to a fixed scale (or variance).

Fisher's LDF is estimated by:

$$\underline{a}'\underline{X} = [S^{-1}\underline{d}]'\underline{X} = \underline{d}'S^{-1}\underline{X}$$

where S = pooled sample covariance matrix

d = difference between sample mean vectors for two groups

$= \bar{\underline{X}}_1 - \bar{\underline{X}}_2$

Later it was shown by Welch[3] that the LDF is optimal in the sense that it minimizes the probability of misclassification. The actual classification rule for a new observation $\underline{X}_0$ is to assign it to group 1 if $W \geq 0$ and to group 2 otherwise, where W is the classification statistic of Anderson[4] defined as

$$W = \underline{a}'\underline{X}_0 - (1/2)\ \underline{a}'(\bar{\underline{X}}_1 + \bar{\underline{X}}_2)$$

The efficiency of this LDF depends on the Mahalanobis distance D between the mean vectors of the two multinormal populations defined by

$$D^2 = \underline{d}'\underline{S}^{-1}\underline{d}$$

The probability of misclassification[5] is estimated by

$$\Phi(-D/2)$$

where Φ is the cumulative distribution function of a standard normal distribution.

Fisher later showed that an alternative computational procedure for discriminant analysis is to "formally" carry out a multiple regression analysis on a dummy variable Y defined as

$$Y = \begin{cases} 1, \text{ if an observation comes from group 1} \\ 0, \text{ otherwise} \end{cases}$$

of the variables $X_1,\ldots,X_p$ for the combined set of $N=n_1+n_2$ observations in the two samples. If the estimated regression is

$$Y = b_0 + b_1X_1 + b_2X_2 + \ldots + b_pX_p = \underline{b}'\underline{X}$$

Kshirsagar[6] shows that the regression coefficients b_i and the discriminant function coefficients a_i are related by

$$\underline{b} = \frac{(n_1n_2) \;/\; (n_1 + n_2)}{f + \dfrac{n_1n_2}{n_1 + n_2} D^2} \cdot \underline{a}$$

where $f=n_1+n_2-2$, and further, that the relation between the multiple correlation coefficient R^2 between Y and the variables $\underline{X}$, and the Mahalanobis distance D is

$$R^2 = \frac{(n_1n_2) \;/\; (n_1 + n_2)}{f + \dfrac{n_1n_2}{n_1 + n_2} D^2} \cdot D^2$$

Also worth noting is the alternative expression

$$\underline{b} = \frac{(n_1 n_2)}{(n_1 + n_2) f} (1 - R^2) \underline{a}$$

connecting LDF with the regression vector $\underline{b}$.

Because of this regression analogy, we can test the significance of the regression/discriminant function coefficients by the t-test and decide which variables contribute significantly to the LDF and which variables can be omitted.

The validity of these t-tests might be challenged because the usual assumptions of multiple regression that Y is normal and $\underline{X}$ is fixed are not satisfied. On the contrary, Y is fixed here and $\underline{X}$ is assumed normal. However, Fisher used an ingenious geometrical argument to establish a "duality" relation between two vectors and showed that the distributional theory of the correlation coefficient r or the multiple correlation coefficient R remains the same, whether the dependent vector is fixed and the independent vector is normal or the other way around. Kshirsagar provides a mathematical derivation of this result.

Assuming that the a priori probabilities of membership in group 1 and group 2 are equal, the classification procedure is now simple. Predict Y by Y_0 for the new observation $\underline{X}_0$ using the regression equation. Find $\bar{Y}_1$ and $\bar{Y}_2$ for the sample means $\bar{\underline{X}}_1$ and $\bar{\underline{X}}_2$ and assign the

new observation according to:

$$Y_o - 1/2\ (\bar{Y}_1 + \bar{Y}_2) \geq 0 \quad \Longrightarrow \text{Group 1}$$

$$Y_o - 1/2\ (\bar{Y}_1 + \bar{Y}_2) < 0 \quad \Longrightarrow \text{Group 2}$$

There are several procedures for estimating the probability of misclassification using the LDF. These procedures may be divided into two classes: empirical methods, which require no distributional assumptions, and normality based methods, which use the properties of the normal distribution. Lachenbruch and Mickey[7] studied seven techniques, some from each class.

They concluded that the methods based on normality are consistently superior to the empirical methods when normality can be assumed, but are poor otherwise. Further study showed that without normality, only the apparent error rate method and the various sample partition methods are useful. For moderately large samples, the apparent error rate may be used, but for small samples, one of the partition methods is preferable.

The apparent error rate is estimated by the resubstitution method, in which the original observations on which the LDF was developed are used to evaluate its performance. This technique requires no distributional assumptions, but is biased in the direction of underestimating the error rate which will be found in future samples. Although this

method is biased, Lachenbruch and Mickey found it to be adequate for moderately large samples when normality is violated.

One technique not studied by Lachenbruch and Mickey was the holdout method, which uses part of the sample to derive the LDF and the balance of the sample to estimate the success rate. This method requires no distributional assumptions, but does require initial samples large enough to provide adequate sample size for estimating both the LDF and the error rate.

Because the economic indicators used for the restricted population in this study cannot be assumed to be normally distributed, both the resubstitution and the holdout approaches were used to estimate the probability of misclassification.

A Logistic Analysis Approach to Predicting Debt Rescheduling

Afifi and Clark[8] remarked that "multiple logistic regression equations are often used to estimate the probability of a certain event occurring to a given individual. Examples of such events are failure to repay a loan, the occurrence of a heart attack, or death from lung cancer." One way of obtaining estimates of such a model is to select two random samples, one for which the event did not occur. This is called a case-controlled sample and the

data are obtained in retrospective fashion, from past records. The logistic model is

$$p = \frac{1}{1 + e^{-(b_o + b_1X_1 + \ldots + b_pX_p)}}$$

or equivalently,

$$\log \{p/(1 - p)\} = \underline{b}'\underline{X}$$

a multiple logistic function. Logistic models have also been found useful in discriminating, especially when dealing with some categorical variables.[9]

Press and Wilson[10] have given a good account of when to choose the logistic regression and when to choose the LDF. They described discriminant analysis as the classification of an observation into one of several populations, and logistic regression as the relation of qualitative variables to other variables through a logistic cdf functional form. They prefer discriminant analysis over logistic regression estimators for the discriminant analysis problem if the populations are normal with identical covariance matrices. However, under non-normality, they prefer the logistic regression model with maximum likelihood estimators.

Press and Wilson compared the performance of the two methods (logistic regression with maximum likelihood estimation and linear discriminant analysis) in both the

classification problem and the problem of relating qualitative to non-normal explanatory variables. They concluded that logistic regression with MLE slightly outperformed the classical linear discriminant analysis in both cases.

Harrell and Lee[11] offer a good account of the comparative merits of both procedures. Harrell and Lee stated that "When sampling from two multivariate normal populations having equal covariance matrices, both the Fisher linear discriminant function (LDF) and logistic regression model (LRM) can be used to derive valid estimates of the probability that a new observation comes from one of the two populations. In this setting, the LDF has been shown to yield asymptotically smaller relative classification error rates. When assumptions for the LDF are violated, LRM has been shown to be superior. In many situations, one is interested in using more information from a probability model than what is needed to devise a binary classification rule."

Description of the Data on 40 Countries from 1974 to 1983

This period was chosen because it was a time of important economic transition. The model also included developing countries that are viewed as very important in international lending. Normally, commercial banks consider loan requests only from the large, well known developing countries. Since banks have to watch the economic and

political situations in countries whose loans are in arrears, there is some economy of scale in focusing their lending to the larger developing countries.

Twelve economic indicators were considered for building discriminant and logistic models for predicting whether a particular country will need to reschedule its debts or not. Data based on a record of ten years for 37 countries were used for this purpose. The following is a description of the economic indicators (explanatory variables) used in this study.

(1) DSR (Debt Service Ratio): The ratio of total interest payments on all debt plus amortization on long-term debt, divided by exports of goods and services. Long-term amortization payments were obtained from the Balance of Payments Yearbook (BOPY);[12] total interest payments were calculated from the World Debt Tables (WDT);[13] and exports of goods and services were obtained from International Financial Statistics (IFS).[14]

(2) RSM (International Reserves to Imports Ratio): The ratio of international reserves (excluding gold holdings) to imports of goods and services. Gold holdings were excluded from international reserves because of the instability of gold values on the world market and because national

habits vary on gold valuation. The values of international reserves minus gold were found in the IFS, while those of imports of goods and services were found in the WDT.

(3) AMZ (Amortization Ratio): The ratio of amortization of long-term debt to total outstanding long-term debt at the end of the previous year. The WDT was the source of the total long-term debt.

(4) SQCA (Squared Ratio of Current Account to Exports): The squared ratio of current account surplus or deficit to exports of goods and services, multiplied by a constant to retain the status of the current account.

William Cline[15] pointed out that the relationship between current account and exports may be nonlinear. Accordingly, using a quadratic specification to capture the nonlinearity and a constant to distinguish the direction of the current account:

$$SQCA = h\left[\frac{\text{Current Account}}{\text{Export of Goods and Services}}\right]^2 = hCAX^2$$

If the current account shows a deficit, h=-1; if the current account shows a surplus, h=+1. The use of the constant h is necessary because squaring the ratio makes all signs positive,

preventing the distinction between deficit and surplus.

The values for the current account balance and exports of goods and services were found in the WDT.

(5) GRO (Growth Rate of per capita GDP): The growth rate of per capita income is obtained using international financial statistics data on real GDP and population.

(6) GDP (Per Capita Income): Level of real total income divided by the corresponding population count, i.e. level of real income per capita.

(7) X/M (Ratio of Exports to Imports): Exports of goods and services divided by imports of goods and services.

(8) XGR (Real Growth Rate in Exports): The export growth variable is calculated as the ratio of average real exports in years t and t-1 to that average for years t-2 and t-3. A four year growth period is sufficiently long to avoid extremes of annual fluctuation and sufficiently short to be considered relevant by creditors for evaluation of recent performance. The IFS was the source of estimation of the values of the real exports.

(9) NDX (Ratio of Debt to Exports): The ratio of net debt (gross debt minus international reserves) to exports of goods and services. The values of gross debt were found in the WDT.

(10) M/GDP (Ratio of Imports to GDP): Imports of goods and services relative to nominal GDP.

(11) DSR1 (Debt Service Ratio): The ratio of total interest payments on all debt and amortization on long-term and short-term debt, divided by exports of goods and services.

(12) AMZ1 (Amortization Ratio): The ratio of amortization of long-term and short-term debt to total outstanding debt at the end of the previous year.

Two types of DSR and AMZ were considered because of the difference involving amortization. Both of course have amortization in their ratios. Long-term amortization is actual amortization. Short-term amortization is net change in loans, i.e., drawings minus amortization. Drawings are withdrawal of the loans or use of the loans. If drawings are larger than amortization, the net change will appear as a positive entry (net drawing). If amortization is larger, the net change will appear as a negative entry (net amortization).

Although 40 countries were targeted for this study, because of missing records, only 37 could actually be used.

Table 7.1: LESS DEVELOPED COUNTRIES' DEBT RESCHEDULINGS, 1974-83

Country	Year(s)
Argentina	1976,1982,1983
Bolivia	1981-83
Brazil	1982,1983
Chile	1975,1982,1983
Costa Rica	1982,1983
Ecuador	1982,1983
Gabon	1978
Ivory Coast	1983
Jamaica	1978,1981,1983
Mexico	1982,1983
Morocco	1983
Nigeria	1983
Peru	1976,1978,1979,1982,1983
Philippines	1983
*Sierra Leone	1977,1980,1982
*Sudan	1979-83
Turkey	1978-80, 1982
Uruguay	1982,1983
Venezuela	1983
Yugoslavia	1980,1982,1983
Zaire	1976,1977,1979-83
Zambia	1982,1983

*Dropped because of unavailability of data

Total Rescheduling Years = 57 Years

A few missing observations were replaced by interpolation between neighboring values to avoid complications, but when a country lacked data for a number of variables in any year, the whole case was dropped to avoid introduction of bias. Table 7.1 lists the 22 rescheduling countries included in the study, along with the years they rescheduled their debts during the period of this model (1974-1983). The rescheduling date begins when the country proclaims its intent to reschedule and ends after an agreement has been signed. Table 7.2 shows a list of all 40 countries targeted for this study.

Table 7.2: COUNTRIES TARGETED FOR THIS STUDY

1.	Algeria	21.	Jamaica
2.	Argentina	22.	Malaysia
3.	Bolivia	23.	Mexico
4.	Brazil	24.	Morocco
5.	Burma	25.	Nigeria
6.	Cameroon	26.	Pakistan
7.	Chile	27.	Peru
8.	Colombia	28.	Philippines
9.	Costa Rica	*29.	Portugal
10.	Dominican Republic	*30.	Sierra Leone
11.	Ecuador	31.	South Korea
12.	Egypt	*32.	Sudan
13.	El Salvador	33.	Thailand
14.	Gabon	34.	Tunisia
15.	Ghana	35.	Turkey
16.	Greece	36.	Uruguay
17.	India	37.	Venezuela
18.	Indonesia	38.	Yugoslavia
19.	Israel	39.	Zaire
20.	Ivory Coast	40.	Zambia

* Dropped because of unavailability of data

Statistical Analyses

All statistical analyses were carried out using the SAS[16] (Statistical Analysis System) software package. After examination of the preliminary analyses of the data, it was noted that the correlation between DSR and DSR1 (-.958) and between AMZ and AMZ1 (.880) were too high to include both variables in each pair in the analytical models. DSR1 and AMZ1 were chosen for use in the models because they use total debt (both long- and short-term debt) in their ratios, whereas DSR and AMZ use only long-term debt. DSR and AMZ were not examined further.

A complete listing of the data, along with the means, standard deviations, and correlation matrices are contained in Appendix C.

Growth Curve Analysis

Since economic variables fluctuate over time and economic variables for the same country over different years are related, a preliminary time trend analysis for the indicators was undertaken.

This analysis is an attempt to find out whether there is a growth curve type relationship for the 12 indicators, that is, whether any of these indicators has a pattern of relationship to time--such as increasing or decreasing over the years. If such a time trend exists, it would be necessary to take this trend into consideration in building the LDF.

A polynomial regression of the type

$$x_t = \alpha + \beta_1 t + \beta_2 t^2 + \beta_3 t^3 + \ldots$$

where t = year - 1973 (i.e., t = 1,2,...,10), and x_t represents the value of the variable in the year represented by t, was fitted to each variable, averaging over all the countries and sequentially for powers of t. R'^2, the multiple correlation of each x_t with powers of t fitted so far, was examined and when R'^2 did not show an increase of a significant amount, the procedure was terminated. The appropriate degree of the polynomial and the value of R'^2 for some key variables are shown in Tables 7.3 and 7.4.

Table 7.3: TIME TREND ANALYSIS FOR SIGNIFICANT VARIABLES IN LINEAR DISCRIMINANT ANALYSIS

Variables	Degree of Polynomial in t	Value of R^2
DSR1	2	.1894
GRO	3	.1108
GDP	--	.0018
X/M	1	.0431
NDX	3	.1981
M/GDP	--	.0088

Table 7.4: TIME TREND ANALYSIS FOR SIGNIFICANT VARIABLES IN LOGISTIC ANALYSIS

Variables	Degree of Polynomial in t	Value of R^2
DSR1	2	.1894
RSM	1	.0468
X/M	1	.0431
XGR	--	.0072
NDX	3	.1981

However, the value of R^2 was so low in all cases that it was concluded that time does not appear to be a significant cause of variation in the variables. Perhaps a different econometric model is necessary to account for the variation. In the absence of any such time trend, the 10 different values for each of the 12 predictor variables for each country were treated as 10 independent observations. This is not entirely satisfactory bacause the 10 values of any variable in the same country are related. But any attempt to take cognizance of these relationships in building the LDF will introduce so many parameters that effectively the degrees of freedom left for LDF will be too few. Therefore, 370 observations (37 countries x 10 years) were used to build the LDF, ignoring dependence over the

years. Nicholas Sargen[17] has also observed this problem. A plot of the mean of each variable against time (years) is shown in Appendix D.

Discriminant Analysis

The fundamental purpose of discriminant analysis is to assign an observation, $\underline{X}$, of unknown source to one of two (or more) different groups, based on the value of the observation. Some problems provide fairly thorough information about the distribution of $\underline{X}$ in the two groups. When this happens, the information may be used and the problem treated as if the distributions are known. But, in the greatest number of instances, the information about the distribution of $\underline{X}$ originates from a relatively small sample from each of the groups, and slightly dissimilar methods are used.

To assess the ability of discriminant functions to predict countries likely to reschedule, a sequential step-by-step building up of Fischer's LDF was undertaken. The procedure consisted of constructing an LDF for all the countries, for all the years up to a time, using it to predict the outcome for the next year, and then repeating the procedure by including the next year in the construction of LDF and so on. This procedure permits assessment of the predictive ability of the LDF, as well as of the

stability of variables entering the LDF and their contribution to its significance.

The results are summarized below for each set of years except 1974, where no defaults occurred and thus no LDF could be constructed. The symbol 'Res' is used for Reschedule and 'N-R' for Non-Reschedule.

1974-1975: Combine 1974 and 1975 to estimate 1974-75 and predict 1976.

Model:			
	Intercept	-0.10	
	RSM	0.00	
	SQCA	0.15	
	GRO	0.21	
	GDP	0.00	
	X/M	0.07	
	XGR	0.02	
	NDX	0.02	
	M/GDP	0.07	
	DSR1	0.37	($p < 0.1117$)
	AMZ1	0.25	

R^2: .1385

Classification for 1974-75

		Res	N-R
Actual	Res	0	1
	N-R	0	73

Misclassification Rate: 1/74 = 1.4%

Type I Error Rate: 100.0%

Type II Error Rate: 0.0%

Prediction for 1976

		Res	N-R
Actual	Res	0	3
	N-R	0	34

Misclassification Rate: 3/37 = 8.1%

Type I Error Rate: 100.0%

Type II Error Rate: 0.0%

1974-1976: Combine 1974 through 1976 to estimate 1974-76 and predict 1977.

Model:			
	Intercept	-0.34	
	RSM	-0.04	
	SQCA	-0.12	
	GRO	0.31	
	GDP	0.00	
	X/M	0.25	($p < 0.0638$)
	XGR	-0.03	
	NDX	0.05	
	M/GDP	0.07	
	DSR1	0.47	($p < 0.0948$)
	AMZ1	0.04	

R^2: .1808

Classification for 1974-76

		Res	N-R
Actual	Res	0	4
	N-R	0	107

Misclassification Rate: 4/111 = 3.6%

Type I Error Rate: 100.0%

Type II Error Rate: 0.0%

Prediction for 1977

		Res	N-R
Actual	Res	0	1
	N-R	0	36

Misclassification Rate: 1/37 = 2.7%

Type I Error Rate: 100.0%

Type II Error Rate: 0.0%

1974-1977: Combine 1974 through 1977 to estimate 1974-77 and predict 1978.

Model:			
	Intercept	-0.33	
	RSM	-0.03	
	SQCA	-0.35	(p < 0.0014)
	GRO	0.06	
	GDP	0.00	
	X/M	0.27	(p < 0.0122)
	XGR	-0.04	
	NDX	-0.01	
	M/GDP	0.12	
	DSR1	0.62	(p < 0.0027)
	AMZ1	0.20	

R^2: .2243

Classification for 1974-77

		Res	N-R
Actual	Res	1	4
	N-R	0	143

Misclassification Rate: 4/148 = 2.7%

Type I Error Rate: 80.0%

Type II Error Rate: 0.0%

Prediction for 1978

		Res	N-R
Actual	Res	0	4
	N-R	0	33

Misclassification Rate: 4/37 = 10.8%

Type I Error Rate: 100.0%

Type II Error Rate: 0.0%

1974-1978: Combine 1974 through 1978 to estimate 1974-78 and predict 1979.

Model:			
	Intercept	-0.47	
	RSM	-0.08	
	SQCA	-0.26	(p < 0.0275)
	GRO	-0.01	
	GDP	0.00	
	X/M	0.37	(p < 0.0019)
	XGR	-0.06	
	NDX	0.05	
	M/GDP	0.20	(p < 0.0561)
	DSR1	0.41	(p < 0.0384)
	AMZ1	-0.12	

R^2: .1981

Classification for 1974-78

		Res	N-R
Actual	Res	0	9
	N-R	0	176

Misclassification Rate: 9/185 = 4.9%

Type I Error Rate: 100.0%

Type II Error Rate: 0.0%

Prediction for 1979

		Res	N-R
Actual	Res	0	3
	N-R	0	34

Misclassification Rate: 3/37 = 8.1%

Type I Error Rate: 100.0%

Type II Error Rate: 0.0%

1974-1979: Combine 1974 through 1979 to estimate 1974-79 and predict 1980.

Model:			
	Intercept	-0.50	
	RSM	-0.07	
	SQCA	-0.19	(p < 0.0890)
	GRO	-0.17	
	GDP	0.00	
	X/M	0.41	(p < 0.0004)
	XGR	-0.07	(p < 0.1031)
	NDX	0.07	(p < 0.0150)
	M/GDP	0.16	(p < 0.1023)
	DSR1	0.35	(p < 0.0569)
	AMZ1	-0.14	

R^2: .2010

Classification for 1974-79

		Res	N-R
Actual	Res	0	12
	N-R	0	210

Misclassification Rate: 12/222 = 5.4%

Type I Error Rate: 100.0%

Type II Error Rate: 0.0%

Prediction for 1980

		Res	N-R
Actual	Res	0	3
	N-R	0	34

Misclassification Rate: 3/37 = 8.1%

Type I Error Rate: 100.0%

Type II Error Rate: 0.0%

1974-1980: Combine 1974 through 1980 to estimate 1974-80 and predict 1981.

Model:			
	Intercept	-0.45	
	RSM	-0.05	
	SQCA	-0.18	(p < 0.0967)
	GRO	-0.02	
	GDP	0.00	
	X/M	0.36	(p < 0.0009)
	XGR	-0.08	(p < 0.0470)
	NDX	0.07	(p < 0.0084)
	M/GDP	0.14	
	DSR1	0.34	(p < 0.0495)
	AMZ1	-0.10	

R^2: .1925

Classification for 1974-80

		Res	N-R
Actual	Res	1	14
	N-R	0	244

Misclassification Rate: 14/259 = 5.4%

Type I Error Rate: 93.3%

Type II Error Rate: 0.0%

Prediction for 1981

		Res	N-R
Actual	Res	0	3
	N-R	0	34

Misclassification Rate: 3/37 = 8.1%

Type I Error Rate: 100.0%

Type II Error Rate: 0.0%

1974-1981: Combine 1974 through 1981 to estimate 1974-81 and predict 1982.

Model:			
	Intercept	-0.42	
	RSM	-0.05	
	SQCA	-0.10	
	GRO	-0.14	
	GDP	0.00	
	X/M	0.32	($p < 0.0015$)
	XGR	-0.07	($p < 0.0713$)
	NDX	0.07	($p < 0.0061$)
	M/GDP	0.18	($p < 0.0462$)
	DSR1	0.34	($p < 0.0335$)
	AMZ1	-0.14	

R^2: .1825

Classification for 1974-81

		Res	N-R
Actual	Res	0	18
	N-R	0	278

Misclassification Rate: 18/296 = 6.1%

Type I Error Rate: 100.0%

Type II Error Rate: 0.0%

Prediction for 1982

		Res	N-R
Actual	Res	0	13
	N-R	0	24

Misclassification Rate: 13/37 = 35.1%

Type I Error Rate: 100.0%

Type II Error Rate: 0.0%

1974-1982: Combine 1974 through 1982 to estimate 1974-82 and predict 1983.

Model:			
	Intercept	-0.39	
	RSM	-0.06	
	SQCA	0.00	
	GRO	-0.54	($p < 0.0933$)
	*GDP	0.00	($p < 0.0953$)
	X/M	0.32	($p < 0.0039$)
	XGR	-0.05	
	NDX	0.04	
	M/GDP	0.17	($p < 0.0803$)
	DSR1	0.79	($p < 0.0001$)
	AMZ1	0.27	

R^2: .2906

* GDP = -0.000019503

Classification for 1974-82

		Res	N-R
Actual	Res	8	23
	N-R	0	302

Misclassification Rate: 23/333 = 6.9%

Type I Error Rate: 74.2%

Type II Error Rate: 0.0%

Prediction for 1983

		Res	N-R
Actual	Res	6	12
	N-R	0	19

Misclassification Rate: 12/37 = 32.4%

Type I Error Rate: 66.7%

Type II Error Rate: 0.0%

1974-1983: Combine 1974 through 1983 to estimate 1974-83.

Model:			
	Intercept	-0.50	
	RSM	-0.05	
	SQCA	0.10	
	GRO	-0.86	($p < 0.0069$)
	*GDP	0.00	($p < 0.0328$)
	X/M	0.40	($p < 0.0003$)
	XGR	-0.08	($p < 0.0948$)
	NDX	0.07	($p < 0.0113$)
	M/GDP	0.26	($p < 0.0081$)
	DSR1	0.86	($p < 0.0001$)
	AMZ1	0.31	

R^2: .4016

* GDP = -0.000025391

Classification for 1974-83

		Res	N-R
Actual	Res	23	26
	N-R	2	319

Misclassification Rate: 28/370 = 7.6%

Type I Error Rate: 53.1%

Type II Error Rate: 0.6%

Stepwise: Combine 1974 through 1983 to estimate 1974-83; non-significant variables deleted.

Model:		
	Intercept	-0.48
	SQCA	0.10
	GRO	-0.85
	X/M	0.37
	XGR	-0.08
	NDX	0.06
	M/GDP	0.29
	DSR1	0.91
	AMZ	0.49

R^2: .4048

Misclassification Rate: 29/370 = 7.84%

Table 7.5: SUMMARY OF DISCRIMINANT MODEL PERFORMANCE

Model Years	Actual Number of Res	Classification[a]				Prediction[b]			
		N Res	Type I Error %	Type II Error %	Total Error %	N Res	Type I Error %	Type II Error %	Total Error %
1974-75	1/ 74	0	100.0	0.0	1.4	0	100.0	0.0	8.1
1974-76	4/111	0	100.0	0.0	3.6	0	100.0	0.0	2.7
1974-77	5/148	1	80.0	0.0	2.7	0	100.0	0.0	10.8
1974-78	9/185	0	100.0	0.0	4.9	0	100.0	0.0	8.1
1974-79	12/222	0	100.0	0.0	5.4	0	100.0	0.0	8.1
1974-80	15/259	1	93.3	0.0	5.4	0	100.0	0.0	8.1
1974-81	18/296	0	100.0	0.0	6.1	0	100.0	0.0	35.1
1974-82	31/333	8	74.2	0.0	6.9	6	66.7	0.0	32.4
1974-83	49/370	25	53.1	0.6	7.6	-	-	-	-

(a) Classification for years on which model was based.
(b) Prediction for year (N = 37) following years on which model was based.

Table 7.5 presents the error rates for both the classification in the development sample and the prediction in the year following those on which the model was based, along with a comparison of the actual, classified, and predicted number of reschedulings. From 1975 through 1981, when the rescheduling rate was very low, virtually all of the reschedulings are missed by the model, and thus Type I error rates are very high. For the periods 1974-82 and 1974-83, when the rescheduling rate increased considerably, some of the reschedulings are predicted--25% for 1974-82 and over 50% for 1974-83--and the Type I error rate decreases.

Because there were so few rescheduling cases (49/370) during this time, the model generally indicated non-rescheduling status in virtually all cases, leading to Type II error rates of 0 except for the 1974-83 classification, where two non-rescheduling cases were classified as rescheduled.

Table 7.6: SIGNIFICANT COEFFICIENTS FOR SUCCESSIVE DISCRIMINANT MODELS

	Years on Which Model Was Based								
Variable	1974-75	1974-76	1974-77	1974-78	1974-79	1974-80	1974-81	1974-82	1974-83
RSM									
SQCA			-.347	-.260	-.192*	-.175*			
GRO								-.535*	-.865
GDP								.000*	.000
X/M		.249*	.272	.370	.406	.356	.324	.318	.398
XGR					-.067*	-.080	-.072*		-.075*
NDX					.071	.075	.075		.071
M/GDP				.197*	.159*		.178	.168*	.262
DSR1		.468*	.624	.409	.346*	.337	.335	.791	.861
AMZ1									
R^2	.1385	.1808	.2243	.1981	.2010	.1925	.1825	.2906	.4016

NOTE: GDP = -0.00002 for 1974-82 and GDP = -0.00003 for 1974-83.

NOTE: Coefficients are significant at $p < .05$, except for those indicated by *, where $.05 \leq p \leq .11$.

Table 7.6 presents the significant coefficients from the successive discriminant models. Only DSR1 and X/M were consistently significant. M/GDP was significant in five of the nine models, but with very low coefficients. NDX, XGR, and SQCA were significant in four models, while GDP and GRO showed up only when 1982 and 1983 were included in the regression base. These were the two years of those studied where a large number of reschedulings took place. These two years also showed a substantial increase in R^2.

Note that the R^2 value shows a general tendency to increase as more years are included in the regression base, but even with all ten years, it is still quite low, indicating only modest discriminating power for these economic indicators.

To see the change in the LDF over the years, a stepwise LDF was calculated for each year separately. The

Table 7.7: SIGNIFICANT STEPWISE LDF MODEL COEFFICIENTS FOR EACH SUCCESSIVE YEAR

	1975	1976	1977	1978	1979	1980	1981	1982	1983
Intercept	-0.62	-0.11	-0.02	-0.11	-1.13	-0.10	-0.10	-0.80	-1.34
DSR	-1.86					-0.70		-1.95	
RSM									
AMZ		5.97		2.89				2.80	
SQCA	0.33	-1.12	-0.52	0.58			0.97		
GRO							-2.32		-4.02
GDP									
X/M	0.58				0.97			1.00	0.94
XGR									
NDX			-0.09	0.13	0.26				0.20
M/GDP	0.32						0.51		1.01
DSR1			0.55				0.73		0.63
AMZ1	0.79	-6.35		-4.03					
R^2	0.48	0.45	0.68	0.33	0.45	0.15	0.42	0.58	0.70

results are given in Table 7.7. Only the final models are given--that is, after removing insignificant variables and reconstructing the LDF's.

Logistic Analysis

The logistic analysis procedure used in this study is contained in the SAS SUGI Supplemental Library User's Guide. SUGI contains a procedure called LOGIST, which provides maximum likelihood estimates of logistic regression parameters. The predictive ability of the logistic model is provided by a likelihood ratio goodness-of-fit statistic, akin to the R^2 provided by regression models.

Stepwise selection can be misleading. Variables may turn out to be significant even when no real associations with the dependent variable exists. When the absolute value of a parameter being tested becomes very large, the

standard error estimate becomes too large and the Wald statistic becomes too small. LOGIST indicates this condition by declaring an estimate to be "infinite" and suppressing the calculation of the standard error and the Wald statistic. An alternative is to use a likelihood ratio test by running the procedure with and without a variable and testing the difference in the likelihood ratio chi-square.

The successive *model*-building approach used for the LDF was also used here for the logistic model. That is, the model was first constructed for 1974-75; one additional year was then added at each step, providing a total of nine models.

The logistic coefficients and associated test statistics and the classification table for the successive models are shown below. In these tables, 'Res' means Reschedule and 'N-R' means Non-Reschedule. Rescheduling is predicted if the estimated probability of rescheduling is greater than a given number. Otherwise, non-rescheduling is predicted. Sensitivity is the proportion of true positives (rescheduling countries) that were predicted to be positive (rescheduling), the complement of the Type I error rate. Specificity is the proportion of true negatives (non-rescheduling countries) that were predicted to be negative (non-rescheduling), the complement of the Type II error rate. False positive rate is the proportion

of predicted positives that were actually negative. False negative rate is the proportion of predicted negatives that were actually positive.

1974-1975: Combine 1974 and 1975 to estimate 1974-75 and predict 1976.

Model:	Intercept	-73.36
	RSM	-60.22
	SQCA	17.55
	GRO	53.14
	GDP	0.00
	X/M	53.39
	XGR	6.73
	NDX	8.48
	M/GDP	19.40
	DSR1	49.33
	AMZ1	94.62

No variables were significant at the 10% level.

Classification for 1974-75

		Res	N-R
Actual	Res	1	0
	N-R	0	73

Misclassification Rate: 0/74 = 0.0%

Type I Error Rate: 0.0%

Type II Error Rate: 0.0%

Sensitivity: 100% False Negative Rate: 0.0%

Specificity: 100% False Positive Rate: 0.0%

Prediction for 1976

		Res	N-R
Actual	Res	0	3
	N-R	2	32

Misclassification Rate: 5/37 = 14.0%

Type I Error Rate: 100.0%

Type II Error Rate: 5.9%

1974-1976: Combine 1974 through 1976 to estimate 1974-76 and predict 1977.

Model:		
	Intercept	-33.11
	RSM	-11.01
	SQCA	-9.23
	GRO	9.08
	GDP	0.00
	X/M	18.51
	XGR	0.92
	NDX	4.23
	M/GDP	8.06
	DSR1	2.12
	AMZ1	-22.73

No variables were significant at the 10% level.

Classification for 1974-76

		Res	N-R
Actual	Res	2	2
	N-R	1	106

Misclassification Rate: 3/111 = 2.7%

Type I Error Rate: 50.0%

Type II Error Rate: 0.9%

Sensitivity: 50.0% False Negative Rate: 1.9%

Specificity: 99.1% False Positive Rate: 33.3%

Prediction for 1977

		Res	N-R
Actual	Res	1	0
	N-R	4	32

Misclassification Rate: 4/37 = 10.8%

Type I Error Rate: 0.0%

Type II Error Rate: 11.1%

1974-1977: Combine 1974 through 1977 to estimate 1974-77 and predict 1978.

Model:	Intercept	-17.55
	RSM	-8.72
	SQCA	-6.29
	GRO	4.19
	GDP	0.00
	X/M	11.28
	XGR	-1.46
	NDX	0.46
	M/GDP	3.08
	DSR1	15.86
	AMZ1	13.17

No variables were significant at the 10% level.

Classification for 1974-77

		Res	N-R
Actual	Res	1	4
	N-R	1	142

Misclassification Rate: 5/148 = 3.4%

Type I Error Rate: 80.0%

Type II Error Rate: 0.7%

Sensitivity: 20.0% False Negative Rate: 2.7%

Specificity: 99.3% False Positive Rate: 50.0%

Prediction for 1978

		Res	N-R
Actual	Res	1	3
	N-R	1	32

Misclassification Rate: 4/37 = 10.8%

Type I Error Rate: 75.0%

Type II Error Rate: 3.0%

1974-1978: Combine 1974 through 1978 to estimate 1974-78 and predict 1979.

Model:			
	Intercept	-17.06	
	RSM	-8.64	
	SQCA	-4.44	(p < 0.0845)
	GRO	7.66	
	GDP	0.00	
	X/M	9.51	(p < 0.0207)
	XGR	-1.44	
	NDX	1.81	(p < 0.0446)
	M/GDP	3.65	
	DSR1	4.84	
	AMZ1	-2.55	

Classification for 1974-78

		Res	N-R
Actual	Res	3	6
	N-R	2	174

Misclassification Rate: 8/185 = 4.3%

Type I Error Rate: 66.7%

Type II Error Rate: 1.1%

Sensitivity: 33.3% False Negative Rate: 3.3%

Specificity: 98.9% False Positive Rate: 40.0%

Prediction for 1979

		Res	N-R
Actual	Res	0	3
	N-R	1	33

Misclassification Rate: 4/37 = 10.8%

Type I Error Rate: 100.0%

Type II Error Rate: 2.9%

1974-1979: Combine 1974 through 1979 to estimate 1974-79 and predict 1980.

Model:			
	Intercept	-17.65	
	RSM	-4.36	
	SQCA	-3.38	
	GRO	1.51	
	GDP	0.00	
	X/M	9.72	(p < 0.0030)
	XGR	-1.63	
	NDX	2.02	(p < 0.0141)
	M/GDP	3.46	
	DSR1	5.79	
	AMZ1	-1.74	

Classification for 1974-79

		Res	N-R
Actual	Res	2	10
	N-R	3	207

Misclassification Rate: 13/222 = 5.9%

Type I Error Rate: 83.3%

Type II Error Rate: 1.4%

Sensitivity: 16.7% False Negative Rate: 4.6%

Specificity: 98.6% False Positive Rate: 60.0%

Prediction for 1980

		Res	N-R
Actual	Res	1	2
	N-R	0	34

Misclassification Rate: 2/37 = 5.4%

Type I Error Rate: 66.7%

Type II Error Rate: 0.0%

1974-1980: Combine 1974 through 1980 to estimate 1974-80 and predict 1981.

Model:			
	Intercept	-14.55	
	RSM	-4.67	
	SQCA	-2.40	
	GRO	3.81	
	GDP	0.00	
	X/M	7.63	($p < 0.0059$)
	XGR	-1.68	
	NDX	1.72	($p < 0.0113$)
	M/GDP	3.03	
	DSR1	5.18	
	AMZ1	-1.06	

Classification for 1974-80

		Res	N-R
Actual	Res	3	12
	N-R	2	242

Misclassification Rate: 14/259 = 5.4%

Type I Error Rate: 80.0%

Type II Error Rate: 0.8%

Sensitivity: 20.0% False Negative Rate: 4.7%

Specificity: 99.2% False Positive Rate: 40.0%

Prediction for 1981

		Res	N-R
Actual	Res	0	3
	N-R	0	34

Misclassification Rate: 3/37 = 8.1%

Type I Error Rate: 100.0%

Type II Error Rate: 0.0%

1974-1981: Combine 1974 through 1981 to estimate 1974-81 and predict 1982.

Model:			
	Intercept	-14.22	
	RSM	-4.62	
	SQCA	-1.41	
	GRO	2.00	
	GDP	0.00	
	X/M	7.14	(p < 0.0051)
	XGR	-1.52	
	NDX	1.69	(p < 0.0081)
	M/GDP	3.79	
	DSR1	5.24	(p < 0.0934)
	AMZ1	-3.80	

Classification for 1974-81

		Res	N-R
Actual	Res	3	15
	N-R	3	275

Misclassification Rate: 18/296 = 6.1%

Type I Error Rate: 83.3%

Type II Error Rate: 1.1%

Sensitivity: 16.7% False Negative Rate: 5.2%

Specificity: 98.9% False Positive Rate: 50.0%

Prediction for 1982

		Res	N-R
Actual	Res	6	7
	N-R	0	24

Misclassification Rate: 7/37 = 18.9%

Type I Error Rate: 53.9%

Type II Error Rate: 0.0%

1974-1982: Combine 1974 through 1982 to estimate 1974-82 and predict 1983.

Model:			
	Intercept	-10.77	
	RSM	-6.73	(p < 0.0373)
	SQCA	-0.65	
	GRO	-2.51	
	GDP	0.00	
	X/M	6.20	(p < 0.0056)
	XGR	-0.94	
	NDX	0.96	(p < 0.0690)
	M/GDP	1.72	
	DSR1	7.64	(p < 0.0028)
	AMZ1	4.18	

Classification for 1974-82

		Res	N-R
Actual	Res	13	18
	N-R	5	297

Misclassification Rate: 23/333 = 6.9%

Type I Error Rate: 58.1%

Type II Error Rate: 1.7%

Sensitivity: 41.9% False Negative Rate: 5.7%

Specificity: 98.3% False Positive Rate: 27.8%

Prediction for 1983

		Res	N-R
Actual	Res	9	9
	N-R	0	19

Misclassification Rate: 9/37 = 24.3%

Type I Error Rate: 50.0%

Type II Error Rate: 0.0%

1974-1983: Combine 1974 through 1983 to estimate 1974-83.

Model:			
	Intercept	-11.69	
	RSM	-5.75	(p < 0.0307)
	SQCA	0.31	
	GRO	-6.08	
	GDP	0.00	
	X/M	6.82	(p < 0.0006)
	XGR	-1.29	
	NDX	1.10	(p < 0.0133)
	M/GDP	2.53	
	DSR1	8.19	(p < 0.0005)
	AMZ1	5.76	

Classification for 1974-83

		Res	N-R
Actual	Res	29	20
	N-R	5	316

Misclassification Rate: 25/370 = 6.8%

Type I Error Rate: 40.8%

Type II Error Rate: 1.6%

Sensitivity: 59.2% False Negative Rate: 6.0%

Specificity: 98.4% False Positive Rate: 14.7%

Stepwise: Combine 1974 through 1983 to estimate 1974-83; all non-significant variables deleted.

Model:		
	Intercept	-11.07
	RSM	-7.28
	X/M	6.76
	XGR	-1.70
	NDX	1.27
	DSR1	6.74

Classification for 1974-83

		Res	N-R
Actual	Res	28	21
	N-R	8	313

Misclassification Rate: 29/370 = 7.8%

Type I Error Rate: 42.9%

Type II Error Rate: 2.5%

Sensitivity: 57.1% False Negative Rate: 6.3%

Specificity: 97.5% False Positive Rate: 22.2%

Table 7.8: SUMMARY OF LOGISTIC MODEL PERFORMANCE

Model Years	Actual Number of Res	Classification[a]				Prediction[b]			
		N Res	Type I Error %	Type II Error %	Total Error %	N Res	Type I Error %	Type II Error %	Total Error %
1974-75	1/ 74	1	0.0	0.0	0.0	2	100.0	5.9	14.0
1974-76	4/111	3	50.0	0.9	2.7	5	0.0	11.1	10.8
1974-77	5/148	2	80.0	0.7	3.4	2	75.0	3.0	10.8
1974-78	9/185	5	66.7	1.1	4.3	1	100.0	2.9	10.8
1974-79	12/222	5	83.3	1.4	5.9	1	66.7	0.0	5.4
1974-80	15/259	5	80.0	0.8	5.4	0	100.0	0.0	8.1
1974-81	18/296	6	83.3	1.1	6.1	6	53.9	0.0	18.9
1974-82	31/333	18	58.1	1.7	6.9	9	50.0	0.0	24.3
1974-83	49/370	34	40.8	1.6	6.8	-	-	-	-

(a) Classification for years on which model was based.
(b) Prediction for year (N = 37) following years on which model was based.

Table 7.8 presents the error rates for both the classification in the total development sample and the prediction in the year following those on which the model was based, along with a comparison of the actual, classified, and predicted number of reschedulings. Type I error rates are high because most of the reschedulings are missed by the model, especially when the actual rescheduling rate was very low. Type II error rates are consistently very low because the model generally indicates non-rescheduling status for most of the cases.

Table 7.9 presents the significant coefficients from the successive logistic models. There were no significant coefficients prior to the 1974-78 analysis. After 1977, X/M and NDX were consistently significant, with DSR1 showing up as significant beginning in 1974-81. RSM was significant in two of the time periods, while SQCA was significant in only one time period. It is worth noting that RSM showed up only when 1982 and 1983 were included in

Table 7.9: SIGNIFICANT COEFFICIENTS FOR SUCCESSIVE LOGISTIC MODELS

	Years on Which Model Was Based								
Variable	1974-75	1974-76	1974-77	1974-78	1974-79	1974-80	1974-81	1974-82	1974-83
RSM								-6.73	-5.75
SQCA				-4.44*					
GRO									
GDP									
X/M				9.51	9.72	7.63	7.14	6.20	6.82
XGR									
NDX				1.81	2.02	1.72	1.69	0.96*	1.10
M/GDP									
DSR1							5.24*	7.64	8.19
AMZ1									

NOTE: Coefficients are significant at $p < .05$, except for those indicated by *, where $.05 \leq p \leq .10$.

the model base. These were the two years of those studied where a large number of reschedulings took place.

Comparison of Model Performance with Chance

The performance of the discriminant and logistic models was tested by comparing the probabilities of correctly classifying the rescheduling and non-rescheduling countries with each of these models to the a priori (chance) probabilities of rescheduling and non-rescheduling, respectively. This approach is described by Taffler and Abassi.[18]

The a priori (chance) probabilities of rescheduling and non-rescheduling are shown in Table 7.10 for each set of model years in this study. For the total period, the a priori probability of rescheduling is .132, and the a priori probability of not rescheduling is .868.

Table 7.10: PERCENT OF CORRECT CLASSIFICATIONS BY MODELS VS. CHANCE

Year	Actual Res Cases	Chance		LDF Model		Logistic Model	
		Res	N-Res	Res	N-Res	Res	N-Res
1974-75	1/ 74	1.4	98.6	--	98.6	100.0	100.0
1974-76	4/111	3.6	96.4	--	96.4	66.7	98.1
1974-77	5/148	3.4	96.6	100.0	97.3	50.0	97.3
1974-78	9/185	4.9	95.1	--	95.1	60.0	96.7
1974-79	12/222	5.4	94.6	--	94.6	40.0	95.4
1974-80	15/259	5.8	94.2	100.0	94.6	60.0	95.3
1974-81	18/296	6.1	93.9	--	93.9	50.0	94.8
1974-82	31/333	9.3	90.7	100.0	92.9	72.2	94.3
1974-83	49/370	13.2	86.8	92.0	92.5	85.3	94.0

(a) '--' indicates that no rescheduling classifications were made by the model for that period; thus no percentage can be computed.

Table 7.10 also shows the probability of correct rescheduling and non-rescheduling classifications for the discriminant and logistic models. Overall, the probability of a correct rescheduling classification using the discriminant model was .92, significantly greater than the a priori probability of .132. The probability of a correct non-rescheduling classification with this model was .925, significantly greater than the a priori probability of .868, although this difference is primarily due to the improved performance when 1982 and 1983 are included in the model base. Prior to those years, the model did not show better than chance performance for the non-rescheduling countries. Thus, the discriminant model performs significantly better than chance.

For the logistic model, the overall probability of a correct rescheduling classification was .853, significantly greater than the a priori probability of .132. The probability of a correct non-rescheduling classification with

this model was .94, significantly greater than the a priori probability of .868, although again this difference is due primarily to the improved performance of the model for 1982 and 1983. Thus, the logistic model also performs significantly better than chance.

Comparison of Discriminant and Logistic Approaches

The discriminant and logistic approaches produced very similar results. Table 7.11 presents a comparison of the error rates for both models. Generally, the Type I error rates for the logistic models are lower than those for the discriminant models, while the Type II error rates tend to be lower for the discriminant models, though they are still quite low for the logistic models. The high Type I error rates for both models indicate that they are of limited use for identifying rescheduling countries. The reason is not inherently a problem with either statistical approach, but instead a result of having so few rescheduling countries in the sample, especially prior to 1982.

Table 7.12 presents the year/variable combinations where significant coefficients were found for either the logistic or the discriminant analyses or both. There is fairly strong agreement in the results of both statistical models. Except for the years prior to 1978, where the logistic model failed to find any significant variables, the same significant year/variable combinations were found

Table 7.11: ERROR RATES FOR DISCRIMINANT AND LOGISTIC MODELS

Model Years	Actual Res	Discriminant Models			Logistic Models		
		Type I	Type II	Total	Type I	Type II	Total
1974-75	1/ 74	100.0	0.0	1.4	0.0	0.0	0.0
1974-76	4/111	100.0	0.0	3.6	50.0	0.9	2.7
1974-77	5/148	80.0	0.0	2.7	80.0	0.7	3.4
1974-78	9/185	100.0	0.0	4.9	66.7	1.1	4.3
1974-79	12/222	100.0	0.0	5.4	83.3	1.4	5.9
1974-80	15/259	93.3	0.0	5.4	80.0	0.8	5.4
1974-81	18/269	100.0	0.0	6.1	83.3	1.1	6.1
1974-82	31/333	74.2	0.0	6.9	58.1	1.7	6.9
1974-83	49/370	53.1	0.6	7.6	40.8	1.6	6.8

Table 7.12: SIGNIFICANT VARIABLES FOR DISCRIMINANT AND LOGISTIC MODELS

	Years on Which Models Was Based								
Variable	1974-75	1974-76	1974-77	1974-78	1974-79	1974-80	1974-81	1974-82	1974-83
RSM								L	L
SQCA			D	L&D	D	D			
GRO								D	D
GDP									
X/M		D	D	L&D	L&D	L&D	L&D	L&D	L&D
XGR					D	D	D		D
NDX				L	L&D	L&D	L&D	L	L&D
M/GDP				D	D		D	D	D
DSR1		D	D	D	D	D	L&D	L&D	L&D
AMZ1									

NOTE: D = Discriminant Analysis
L = Logistic Analysis

in 14 of 34 cases. The most important variables, X/M, NDX, and DSR1, were consistently found to be significant by both models, although DSR1 failed to achieve significance in the logistic model before 1974-81.

Comparison of Results with Prior Research

Model Performance in Development Sample

The performance of the models developed in the present study is compared with that of prior studies in Table 7.13

Table 7.13: COMPARISON OF LOGISTIC ANALYSIS WITH PRIOR STUDIES

	Present Study[a]	Feder & Just[b]	Feder, Just, & Ross[c]	Mayo & Barrett	Cline[d]	Saini & Bates[e]	Morgan[f]
Period Tested	1974-83	1965-72	1965-76	1960-75	1967-82	1960-77	1975-82
Number of Cases	370	238	580	571	670	159	240
Number of Res Cases	49	21	40	28	22	22	40
Error Rates							
Type I	40.8%	4.8%	20.0%	25.0%	9.1%	31.8%	15.0%
Type II	1.6%	2.3%	5.9%	13.1%	12.9%	18.1%	13.0%
Total	6.8%	2.5%	6.9%	13.7%	12.8%	19.2%	13.3%
P* Cutoff	.50	.40	.20	---	.041	---	.16

(a) Classification of cases on which model was developed.
(b) 5-variable case.
(c) Model 1 (linear).
(d) Model C.
(e) Dependent Variable 1 (rescheduling vs. non-rescheduling).
(f) Model B.

for the logistic model and Table 7.14 for the discriminant model. The Type II and total error rates found here for the logistic model are generally lower than those found in earlier studies, but the Type I error rate is substantially higher than that for the earlier studies. The reason for this is the relatively high cutoff P* used in the present study, which tends to reduce the number of reschedulings predicted and thus results in more actual reschedulings missed by the model.

The same pattern as that for the logistic model occurs again in the comparison of the discriminant model error rates with those of prior studies. The Type II and total error rates found here are consistently lower than those found in prior studies, but the Type I error rate in this

Table 7.14: COMPARISON OF DISCRIMINANT ANALYSIS WITH PRIOR STUDIES

	Present Study[a]	Frank & Cline[b]	Sargen[c]	Saini & Bates[d]	Morgan[e]	Taffler & Abassi[f]
Period Tested	1974-83	1960-68	1960-75	1960-77	1975-82	1967-77
Number of Cases	370	145	466	159	240	681
Number of Res Cases	49	13	24	22	40	50
Error Rates						
Type I	53.1%	23.1%	33.3%	13.6%	15.0%	10.0%
Type II	0.6%	10.6%	7.9%	7.3%	13.5%	8.9%
Total	7.6%	11.7%	9.2%	8.2%	13.8%	9.0%

(a) Classification of cases on which model was developed.
(b) 3-variable case, linear, iteration 1 (equal covariance structure).
(c) Cut-off value of discriminant function = 0.
(d) Replicates procedure used by Feder and Just, with modified dependent variable.
(e) Model B.
(f) Development sample.

study is substantially higher than those for earlier studies.

Comparison of Significant Predictors

Some of the variables found to be significant in the logistic model developed here were also found by earlier studies. The debt-service ratio appeared as a significant predictor in both Feder and Just studies and in the Cline study. The ratio of reserves to imports was found by all prior studies except the Saini and Bates study. The squared current account to exports ratio found by Cline was significant here in the 1974-78 model. The net debt to exports ratio found significant here was not found elsewhere, but total debt to exports was a significant

predictor in both the Morgan and the Mayo and Barrett models.

On the other hand, some variables found by the earlier models were not confirmed here. The growth rate of exports and per capita income variables found by Feder and Just, the amortization ratio found by Cline, the ratio of imports to GDP found by Mayo and Barrett, and the real GDP growth rate found by Morgan were not confirmed as significant predictors of debt payment problems in the logistic model developed here.

The discriminant model in this study generally confirmed the variables found significant in earlier studies. Debt service ratio, found by Frank and Cline and by Sargen, was also found to be significant here. Real GDP growth rate, a significant predictor in Morgan's model, and the growth of rate of exports, significant in the Sargen study, were significant predictors here as well. Net debt/exports, a significant factor in the discriminant model in this study, confirms the debt/exports variables found by Morgan and by Taffler and Abassi.

However, the imports to reserves ratio, found by Frank and Cline and by Morgan, was not found to be significant in this discriminant model. Nor was the amortization ratio, which was found significant by Frank and Cline confirmed here.

Table 7.15: COMPARISON OF VALIDATION RESULTS WITH PRIOR STUDIES

	Discriminant Analysis		Logistic Analysis	
	Present Study	Taffler & Abassi	Present Study	Feder, Just, & Ross[a]
Model Development				
Period Used	1974-82	1967-77	1974-82	1965-76
Number of Cases	333	681	333	580
Number of Res Cases	31	50	31	40
Model Validation				
Period Tested	1983	1979-83	1983	1977-79
Number of Cases	37	390	37	135
Number of Res Cases	18	73	18	10
Error Rates				
Type I	66.7%	31.5%	50.0%	10.0%
Type II	0.0%	26.2%	0.0%	12.0%
Total	32.4%	27.2%	24.3%	11.9%

(a) Model 1 (linear); cut-off P* = .20.

Model Performance in Validation Sample

Table 7.15 compares the out-of-sample validation results for the discriminant and logistic models in the present study with those for the two prior studies that reported such validation.

The discriminant model developed here has a much higher Type I error rate, a much lower Type II error rate, and a somewhat higher total error rate than those found by Taffler and Abassi's discriminant model. Similarly, the logistic model developed here has much higher Type I and total error rates and a much lower Type II error rate than those found in Feder, Just, and Ross's logistic model. The primary reason for this poorer performance by the models developed here is the very limited sample on which they were validated.

The implications of these results for assessing country risk are discussed in the next chapter.

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CHAPTER VIII

CONCLUSIONS

The primary purpose of this research was to determine whether U.S. commercial banks could have predicted in advance the debt crises of the developing countries. A secondary purpose was to determine whether the debt crises were the fault of the banks or the developing countries who reneged on their loan contracts. What the banks have to do to prevent this from happening and what they have to do to manage country risk effectively are also very important concerns of this research.

This study has demonstrated that the contributing elements most directly responsible for the serious problems in the external financial positions of many developing countries in 1982, and possibly beyond, were the higher oil prices in 1973-74 and 1979-80, unprecedented high interest rates in 1980-82, a deterioration in the prices and volumes of exports linked to the global recession in 1981-82, and inappropriate domestic and financial policies of these developing countries.

While theoretical studies are helpful in country-risk analysis, determination of risk should be treated case by

case--there is no general theory. Determining the sustainability of debt policy, optimal level of country borrowing, optimal bank foreign lending, and theory of credit rationing is a difficult task.

In practice, of course, a country's external borrowing may not be the result of optimizing decisions by a central authority. Rather, it may mirror the conduct of a loosely organized group of households, firms, banks, and government agencies. Cooper and Sachs[1] specified an idealized supposition where optimal levels of savings, investment, and external borrowing can be attained in a free-market system where interest rates adjust to equate the worldwide supply of and demand for loanable funds. Cooper and Sachs went further to emphasize the difficulties in achieving the optimal amount of borrowing by adopting a laissez-faire attitude toward capital inflows and outflows.

Analysis of the quantitative and qualitative techniques discussed in this study suggest that banks should concentrate on qualitative techniques. The survey of statistical work shows that it is not a very useful method for predicting. Predicting and managing country risk cannot rely solely on statistical analysis, but should be an ongoing managerial process.

In Chapter VI, an examination of country-risk management by eight U.S. banks was presented. Overall, all eight banks have an effective to somewhat effective country

management system in place. Citibank and Bank of America both have effective systems in place, while the other banks discussed, Chase Bank, Chemical Bank, Continental Illinois Corporation, First National Bank of Chicago, American Security Bank, and Morgan Guaranty, need to improve on their present system to be in line with the suggestions given in this chapter. The procedures of Citibank and Bank of America are by no means perfect. They too can use some improvements by strictly following the suggestions given in this chapter. A revision of these banks' systems will go a long way toward curtailing country risk.

The country-risk rating system for Manufacturers Hanover Trust (Appendix B) proposes an effective and detailed approach to evaluating the economic, financial, political, and social aspects of a country. However, it cannot compensate for the lack of strong macroeconomic policies in the developing countries or for the absence of greater international cooperation among major economies.

Summary of Present Study

Both the discriminant and logistic analyses show modest discriminatory power for predicting the rescheduling of debt of a country with the set of economic predictors used in this study. The moderate value of R^2, which corresponds to a moderate value of Mahalanobis' D^2 (distance), indicates that the differences between the

"bad" and "good" countries are not fully explained by these economic predictors as a whole. Nonetheless, both models perform better than chance, and the sequential analyses do show a consistent pattern whereby some indicators generally discriminate and others do not. Moreover, this general consistency is found for both logistic and LDF models.

The sequential building up of LDF's and logistic functions produces three indicators that appear to be consistently better than the others--DSR1, X/M, and NDX. RSM shows up in the logistic model as the number of reschedulings increases.

The consistency of the variables in both models, along with the fact that the misclassification rates are about the same in both models, leads to the conclusion that both models produce very similar results. This confirms the findings of J. Morgan[2] and Krishan Saini and Philip Bates,[3] who observed that both forms of analysis produce comparable results.

The variables appear not to have any significant relation to time, as shown by the plots of the variables over the years, as well as by the insignificant polynomial regressions on time (growth curves). This finding was used to justify combining all countries over all years as if the observations were independent over time.

Limitations of the Analyses

One reason why the models demonstrated only modest efficiency is that the economies of the various countries are so vastly heterogeneous that combining the data for such a non-homogeneous set is likely to create a non-sensitive model. Also, John Morgan[4] rightly points out that the values of many economic predictors tend to change over the years, and the pooling of data over time, especially when there are structural economic changes (oil price shocks, warfare, coups, etc.), is undesirable.

Pooling has some technical implications as well. A country may be in group 1 at one time and in group 2 at another time, so the observations in the two samples are not strictly independent. However, without pooling, the data are too scanty to produce a very useful model.

Moreover, there are both analytical relations (Dhonte[5]) and stochastic relations (Domar[6]) in the economic system, which neither the logistic nor the LDF model is capable of taking into consideration. Frequently, debt-rescheduling is a political decision, which exacerbates the problems of building up a valid model. Furthermore, the role of domestic price levels, exchange rates, and interest rates that influence foreign borrowings is unknown.

Another factor that upsets the performance of the models in the earlier years is that fewer countries rescheduled in the years before 1980 than after. The increase after 1980 produces "better" samples later in time. Prior to 1980, the models have almost no ability to discriminate between the rescheduling and non-rescheduling countries.

Yet another factor is the limitation on the quality of the data available. The data that pertain to the whole country are frequently of poor quality. No wonder then that the results are only modest.

Comments About the Statistical Approaches

It is the contention of many authors that Fisher's LDF is appropriate only if the variables are normally distributed; otherwise, the logistic discriminant function should be used. Normality of variables is an assumption of the LDF approach; that is, the vector of independent variables needs to be multi-normal for exact tests of significance. However, when the number of observations is large (greater than 1000), Bartlett[7] has shown that the tests, if properly formulated, will be asymptotically correct and therefore still useful. Also, E. J. Williams[8] has made some comforting comments on the robustness of statistical tests in canonical analysis, which is a generalization of discriminant analysis.

The only difference between the two methods is whether to start with a linear combination first or to linearize the likelihood later. Operationally, therefore, both methods suffer from some minor drawbacks and ultimately produce comparable results, as is shown by their similar misclassification rates. Also, the analogy between regression and discriminant analysis pointed out earlier indicates that the least squares estimates of parameters are obtainable in both methods. By transforming P to log(P/1-P), the logistic model is linearized, and then a least squares approach is used. Thus, there is great similarity between both methods and no distinctive differences upon which to base a choice between them.

Many analysts (for example, see Dhonte, cited earlier) use principal components analysis on economic variables to construct indicators and then use these indicators to build an LDF. In this connection, a cautionary note is needed. Principal components analysis picks out the linear combinations in decreasing order of their contribution to the total variation. Thus, the first few components (those most likely selected for use in the LDF) are those with the maximum variation. These are not necessarily the same as good discriminators. Kshirsagar, S. Kocherlakota and K. Kocherlakota[9] have shown that a considerable loss of efficiency--even up to 100%--can arise if the direction of the first principal component is orthogonal to that of the

LDF. Because of the necessity of reducing a large number of variables to a manageable size, people do use principal components, but a judicious screening of economic variables may yield better results.

Proposals for Effective Risk Management

The successful management of an international portfolio is by necessity complex. Banks operating on a global scale must make many decisions regarding individual assets and liabilities. Most are made by a somewhat large number of individual officers and committees with delegation of authority as an accepted management principle, because no one officer or single committee would be able to cope with the volume of decisions that are necessary.

First, an international bank needs to be aware of its exposure to country risk around the world. To do this, it must develop an information system that holds information on all cross-border loans, investments, and other forms of exposure. The system must classify these by type, maturity, borrower, and other characteristics. This will keep the bank constantly informed of its exposure in each country where it does business. And, no matter in what country a loan originates, the information must be promptly and accurately placed in the bank's central tracking system, usually at the head office or at a specific facility. This information must be made immediately avail-

able so that bank officers can effectively develop business and make decisions on the bank's activities in that country.

The country-risk system is an essential part of a bank's business decisions, and country-risk management is a direct function of the bank's management skills. There is clear accountability for judgments on countries and the resulting business recommendations that are made. That is also why clear responsibility for leadership within the bank for analyzing countries and for management of the system must be established. This development of analytical approaches for evaluating country risk and for controlling international exposure make possible a better evaluation of resulting financial gains or losses. This improved evaluation, in turn, strengthens the bank's ability to plan future strategy and to establish documented information and methods to enhance the knowledge of future managers.

International banks exposed to country risk would be well advised to develop improved country information systems. A country's economic performance and debt position should be readily available. There should be increased direct knowledge of countries and experience in evaluating countries. Banks should make every effort to rely on their own organization in judging the policies of the countries involved.

There should be improved interaction and communication among all the participants of international lending. Banks should come to the realization that country-risk evaluation and management are a part of banking and not a distinct function of the bank. Specifically, what is being said here is that the problem should be viewed as one of bank management, not principally as one of analysis. The results of this study have shown that statistical/ quantitative methods are not the solution to the problem of country risk; the solution has to be management control and judgment.

The most effective system of country risk management is one based on substantial past experience in lending in a country and on timely analysis of the country's political, social, and economic conditions, and of its cyclical foreign exchange revenues relative to its foreign exchange needs. The presence of personnel with a long history in international lending, past data on resources and loans, and information on conditions and changes in the environment are essential to the formulation of management approaches to country-risk problems.

It should be clear that the ultimate objective of any proposal for dealing with the debt problem of developing countries should be to permit these countries to become creditworthy in as little time as possible. The proposal should be realistic and economically sound, while

minimizing costs to all involved. The important information for banks includes the short-term position of the countries' banking institutions, on both the liability and the asset side. This information consists of short-term accounts, trade credits and documents, deposit accounts, foreign and domestic currency reserves (both public and private), and foreign investments--direct, portfolio, and others.

Any successful country-risk management plan by the banks must be compatible with sustained economic growth in the debtor countries. This means that the debtor countries must be able to finance the imports needed for growth as well as the interest on their accumulated debts.

Why should international banks be so concerned about the economic situations and policies of the developing countries? The answer is simple: both sides would benefit. The banks would profit from the loans they make without the difficulties involved in rescheduling and possible repudiation, and the developing countries would enjoy all the benefits of the loans--sustained growth without being engulfed in uncontrolled debt. The following information supports this point. From 1973-1982, the seven largest U.S. banks found that the amount earned from foreign operations increased from 22 percent to 60 percent of total profits. Furthermore, the five largest U.S. banks all enjoyed record profits from 1982 to 1986 (fully one quarter

of Citicorp's 1985 profits came from payments on its Latin American loans).

Debt equity swap is sometimes used as a means of debt reduction, and, consequently, risk management. Debt equity swap presents a useful way to reduce the external debt of developing countries through a process of converting the creditors' claims for repayment to claims on assets in the debtor country. Banks normally sell their discounted, developing-country loans to multinational corporations who then resell them to the original debtor nation, payable in local currency that is used by the multinational corporation for investment in that country.

Debt equity swaps have been used successfully in Chile, where the profit derived from the purchase of the debt at a discount is properly shared between the central bank and the investor, who is committed not to repatriate earnings or sell the equity for a specified period of time. The main reason why debt equity swap can contribute to effective management of risk by banks in developing countries is that it helps the banks to reduce their outstanding debt on their books. At the same time, the developing country's economy is able to move toward greater dependence on a market-oriented system. Any situation that benefits both sides is a more lasting solution to the debt problem. Banks will not enjoy successful risk management of their loans to the developing countries if they enact a

policy that benefits them but might disrupt the economy of the developing countries.

It is obvious that the international debt policy pursued during the last six years has been faulty. Debts of major debtor countries have been increasing, despite all the adjustment efforts. The World Bank's World Development Report in 1988 stated:[10]

> Since 1980, matters have turned from bad to worse: economic growth rates have slowed, real wages have dropped, and growth in employment has faltered in most developing countries. . . . In some the prolonged economic slump is already more severe than it was during the great depression in the industrial countries. The tide of poverty and misery in those countries is rising, not receding. . . . Without significant changes in policies, the present economic uncertainty may soon be followed by a world-wide recession. . . . This is a fragile situation--one that could rapidly deteriorate.

Also the 1988-1989 edition of World Debt Tables (a World Bank publication) stated "an end to the debt crises remains elusive."

When the debt problem occurred in 1982, new bank lending to developing countries with severe debt-servicing difficulties was suspended. But through 1985, the foreign debt of these countries continued to increase in both money and real terms. These increases were the result of new lending to countries that were regarded as creditworthy countries by the capital market. These countries in turn borrowed heavily to supplement their domestic resources.

The countries include India, Indonesia, Malaysia, Thailand, Egypt, Algeria, and Greece. Indonesia and Greece experienced balance-of-payments problems, and Egypt found itself in a serious financial problem.

There was also the case of the countries that were already in serious financial problems by 1982. Their debts continued to grow, even though they were making heavy debt-service payments from 1982-1985, because their export prices were falling during that period. Consequently, their debts rose faster in real terms than in money terms.

The country case-by-case approach which earlier had great promise has not worked as anticipated. Despite the fact that it enables developing countries to concentrate on domestic efforts to improve the balance of payments and raise savings, and also allows solutions specific to individual countries, this approach has been eclipsed by more important matters. Issues like interest rates, commodity prices, and trade restrictions are so essential in solving this debt problem that only an across-the-board approach can put them in focus. However, a country case-by-case approach which can recognize the importance of these issues for each debtor country will serve a very useful purpose.

It is important to have representatives of the banks and the developing countries develop a policy that is agreeable to both sides. It sometimes appears that the

creditors are forming policies without trying to understand the individual countries. Also, the countries relate to the international banks as adversaries. A dialogue between the representatives of the banks and the developing countries will go a long way toward producing a debt policy that can be sustained.

Even though some international policies to resolve debt problems have been pursued over the last few years, many serious proposals have not been considered. It is not enough to have conferences and make important policy statements; a way must be found to analyze these policies. There should be an end to situations where academics and international bankers make proposals which are hailed, but never evaluated. One possibility would be to form an international policy group which is acceptable to the international banks and the debtor nations. This group would function differently from the Institute of International Finance, Inc. The major objective of this new group would be to find a solution to the crisis of international debt of developing countries. As long as both sides agree on the composition of this body, there would be no mistrust by either side, and mutual cooperation should prevail.

There should also be further work done to improve the techniques and methods for forecasting debt rescheduling problems since early warning of such problems will not only

benefit banks but enable the international community to provide assistance to countries in trouble. The updating and improvement of techniques and methods are essential to the demands of the ever-changing world of international lending. Again, suggestions outlined in this chapter should be extremely helpful here.

Summary

The results of the statistical studies indicate that statistical or econometrical methods in country-risk management should be only one of the segments of an inclusive evaluation system. They should not be used as the only instrument for an evaluation. The need for debt rescheduling is not a process; it is virtually a unique event. This might tend to discourage the idea of creating a generally applicable early-warning system for detecting the probabilities of debt-servicing problems. In spite of this, statistical or econometric methods may be useful to identify the kinds of financial interruptions that are likely to result in a fully developed debt crisis and help to understand the reason for debt-servicing problems that have occurred. By doing this, a repeat of previous mistakes may be avoided.

The need for country-risk analysis and management systems must be emphasized in international banking. The lending banks need to be well informed about the countries

and then transform this information into effective decisions to improve their country-risk assessments. The banks need to strengthen their high-level professional country-risk management systems. Ideally, a relationship of mutual trust would exist between the banks and the borrowing countries; an adversarial relationship benefits no one. As a matter of fact, it is detrimental to a smooth running international banking system.

The banks should be aware of how the developing countries manage their domestic economy and their balance of payments, including external debt management, when determining the country's creditworthiness. The international banks need to realize that reasonable exchange and domestic interest rates are crucial to prevent capital flight in developing countries. Also, the banks should make these countries realize that internal savings is essential to their financial development. These measures will encourage foreign direct investment, stimulate growth, and diminish reliance on foreign borrowings.

Industrial countries must effectively implement regulatory laws. Interest rates need to be reduced. Economic growth in the industrialized countries is extremely important for continued progress in the debt situation because the developing countries' exports are dependent on this growth. Of course, the developing countries' governments must demonstrate genuine interest in

establishing procedures essential to the restructuring of their economies.

In order to reduce the vulnerability of the U.S. banking system to developing countries' debt-servicing problems, the United States banking system must improve its present state of affairs through increasing capital, diversification of income, and reserves for international debt. The risks caused by the developing countries' debt crises, which are presently faced by the largest U.S. banks, will need enduring and cautious management by the banks and will require the development of suitable regulatory policies to accommodate new ideas for managing country risk.

Finally, to answer the question of who is at fault for the debt crisis: Was it the banks who lent too much money and charged a very high interest premium, or was it the LDCs who did not always use the money for the development of their economy and reneged on their contractual obligations? Despite all the literature, there has been no conclusive evidence on who is to blame for the debt crises. There has, however, been much circumstantial evidence.

This research has chosen not to lay blame on either side because of that lack of clear-cut evidence. What is suggested is that the international banks follow a well-defined policy and show genuine commitment to resolution and management of the crises. The developing countries

must demonstrate more responsibility and follow sound economic policy. Not until these actions are taken will there be a lasting solution to the debt problem of developing countries. For international banks to be profitable, they need to lend money. This lending process can be successful only when developing countries have a sound economic foundation in place.

Endnotes to Chapter VIII

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APPENDICES

APPENDIX A

CLASSIFICATION CATEGORIES

I. Substandard: This category applies when:

1. A country is not complying with its external service obligations, as evidenced by arrearages, forced restructuring, or rollovers; and

2. The country is not in the process of adopting an IMF or other suitable economic adjustment programs, or is not adequately adhering to such a program; or

3. The country and its bank creditors have not negotiated a viable rescheduling and are unlikely to do so in the near future.

II. Value Impaired: This category applies when:

1. A country has protracted arrearages, as indicated by more than one of the following:

   a. the country has not fully paid its interest for six months;

   b. the country has not complied with IMF programs (and there is no immediate prospect for compliance);

   c. the country has not met rescheduling terms for over one year;

   d. the country shows no definite prospects for an orderly restoration of debt service in the near future.

III. Loss

This category applies when the loan is considered uncollectable and of such little value that its continuance as a bankable asset is not warranted.

An example would be an outright statement by a country which repudiates obligations to banks, the IMF, or other lenders.

APPENDIX B

COUNTRY RISK RATING SYSTEM FOR MANUFACTURERS HANOVER TRUST

1 Definition of Country Risk

For purposes of this system, country risk is defined as the sum of economic, financial, political and social factors which influence the ability and willingness of borrowers within a country to meet their external obligations to creditors in a timely fashion. The intent here is to evaluate the probability of a payments interruption.

2 Objectives of the Country Risk Rating System

The primary objective is to provide information (prepared in a consistent way and that is comparable across countries) to enable management to evaluate the effect of country risk on the bank's international portfolio. The system should also provide sufficient lead time to function as an effective tool for portfolio analysis, by: (1) acting as an early warning system for countries with potential payments problems; (2) identifying possible courses of action to protect MHT exposure where such exposure cannot be reduced, such as, where an actual payments interruption has occurred; and (3) identifying areas of potential profitability.

3 Structure of the System

In designing the system over the last few years, three basic premises were kept in mind:

(a) The system had to be clean and simple, organizing and assessing as much measurable or substantive qualitative information as possible and then reducing it to a form which is usable as a tool for evaluating country risk in the Sector's business activities. This was achieved through a process of completing standard worksheets, determining relative weightings of various factors and arriving at a letter rating.

(b) The system had to be flexible and non-mechanistic, allowing for differences in the quantity and quality of information available for individual countries and differences in the relative importance of components in the rating system for each country. This was achieved by building into the process a "productive tension" by sharing responsibility for analysis between staff and line professionals. Economics staff is charged with preparing the economic/financial component of the overall assessment while line account officers are responsible for the political/social element.

(c) Further, the system had to provide crosscountry comparability, a uniform framework against which all countries are evaluated. In order to reduce possible subjective bias, the economic/financial assessments of individual analysts must be defended before other staff economists and are subject to review by the head of the International Economics Group and to comment by regional credit officers, sectoral management, and Sovereign Risk, in certain cases. A further crosscheck is provided by using the summary statistics table which provides a

snapshot of a country's economic performance as compared to the performance of other debtor countries.

The structure of the system is based on one used by the U.S. bank regulatory authorities--the Office of Comptroller of the Currency, the Federal Reserve and the FDIC--as part of the broader bank examinations process. However, it has been modified and we believe improved by taking account of the strengths and weakness pointed out by the GAO (General Accounting Office) in its assessment of the ICERC's (Interagency Country Exposure Review Committee) system as well as incorporating many of the recommendations the GAO and other agencies made to improve its effectiveness. Not that the system used by U.S. examiners was so flawed, in fact, the ICERC system correctly identified with at least one year's lead time all but one country that experienced actual or imminent payments arrearages between 1977 and 1982, with one exception, Nicaragua. In addition, many other existing systems were examined and evaluated.

The modifications to the ICERC system centered upon giving greater emphasis to political and social factors, and to market sentiment; and making the system more "forward-looking."

4 Components of the System

A. The Screening Process. The screening process is used both to determine the frequency and depth of country assessments and as a cross-check to the subjective analysis. It identifies those countries with both high MHT exposure and a high debt burden, the latter consisting simply of ratio analysis of a number of indicators which have been shown to be highly correlated to debt servicing

problems. The indicators which go into this screen and the most recent results are included in Exhibit I.

B. Economic/Financial Component. Exhibit II is an Economic/Financial Analysis Worksheet. It is completed by the International Economics Group. Exhibit III provides a more detailed explanation of each of the components of the Economic/Financial Analysis Worksheet. Under each component is a description of the quantitative and qualitative factors that contribute to the overall assessment of economic/financial risk.

C. Economic/Financial Summary Statistics. Statistics which highlight key indicators (including those on the screen) for Sections I through IV of the Economic/Financial Analysis Worksheet for all countries where MHT outstandings are in excess of 2 percent of bank capital are tabulated on a summary table as shown in Exhibit IV. Each ratio is ranked across all countries and the resulting ranking is divided in quintiles, with the first quintile being the "best," and the fifth being the "worst." On the summary table, the value for each ratio is given along with the respective quintile ranking. These rankings are not intended to lock the economist into a particular rating for the section; rather, they provide a perspective on one aspect of a country's performance relative to all other countries in the portfolio.

D. Political/Social Component. Exhibit V is a Political/Social Analysis Worksheet. It is completed by the Region. Exhibit VI provides a more detailed background on the components of the Political/Social Analysis Worksheet.

E. Summary Worksheet. A Summary Worksheet for Country Risk Rating is shown in Exhibit VII. The matrix provides an orderly and concise method of scrutinizing a

country vis-a-vis others. The purpose of rating a country is to categorize it in accordance with its broad similarities to other countries. The country rating methodology has been developed with an understanding that the relative weight of each aspect varies from country to country. The International Economics Group and the Senior Loan Officer for each country jointly decide the relative weighting of the factors prior to each occasion that a country is rated.

F. Requirements and Sources of External Financing. Additionally, for those countries with MHT outstandings in excess of 2 percent of bank capital, and with a high debt burden, the International Economics Groups will continue to provide a Requirements and Sources of Financing (cash flow) Table to augment the assessment of the country's ability and willingness to service external debt by identifying its payments obligations over the coming period compared to its access to financing. This table will typically include projections for the principal macroeconomic variables, mentioned before.

Exhibit I. Country Risk Screen Ratios

The purpose of the screen is to separate countries into high and low debt burden categories. Debt burden is assessed by the following seven ratios:

1. Net external debt/GDP
2. Debt service payments/Total exports
3. Interest payments on external debt/Total exports
4. Net external debt/Total exports
5. International reserves minus gold/Total imports
6. Short-term external debt/Total imports
7. Short-term external debt/Int'l reserves minus gold

Based on these ratios, the countries are divided into high and low debt burden categories as follows:

1. The ratios are computed for all countries included in the screen.
2. The ratio values are ranked from best to worst.
3. Any country which has more than three ratios below the median value in the rankings, of which at least three are in the bottom quartile of the ranking, is categorized a high debt burden country.

Exhibit II. Economic/Financial Analysis Worksheet

Country_____ Year _____

Assign a rating (at 0.5 intervals), between 0 and 5, to each of the five factors. Sum the ratings and divide by 5 (this implicitly gives equal weight to each of the 5 factors). The overall rating for this section, which will be between 0 and 5, should then be transferred to the economic/financial portion of the summary worksheet.

	Favorable			Unfavorable	
	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
I. THE DOMESTIC ECONOMY Performance --- Policy					
II. THE EXTERNAL ECONOMY Performance --- Adjustment Capabilities					
III. EXTERNAL DEBT Level --- Composition					
IV. DEBT SERVICING CAPABILITY					
V. MARKET SENTIMENT					

Sum of scores / 5 = Raw Score

☐ / 5 = ☐

Adjusted Overall Economic/Financial Rating =

(Raw Score x 0.8) + 1 = ☐

Worksheet completed by: _____

Date: _____

Exhibit III: Economic/Financial Analysis

Domestic Economic Performance and Policy

Quantitative Components	Qualitative Components
A. GDP Data *--Real and nominal growth rates --Sectoral analysis B. National Accounts Data --In real terms, and as % of GDP C. Other Data --Real wages and incomes --Income distribution --Real GDP/capita --Unemployment/ underemployment	The analysis will focus on the question of how and to what degree the performance and structure of the domestic economy will affect markets, profitability and the ability to service external debt. The sectoral composition and growth of GDP gives an indication of the nature and development of the country's natural resource base. Is growth broadbased or concentrated in certain sectors? What is the outlook for growth in each sector? This sectoral examination permits assessment of the vulnerability of overall growth to both internal and external shocks as well as assessment of the impact of economic policy on particular areas of the economy. In addition, current prospective performance of individual sectors is a useful input in assessing the credit risk of a borrower operating in that sector.

Exhibit III: Economic/Financial Analysis (Cont.)

Domestic Economic Performance and Policy (Cont.)

Quantitative Components	Qualitative Components
D. Fiscal Policy 1. Government budget components (in local currency and as % of GDP) *2. Size of budget surplus or deficit and method of financing	An evaluation of fiscal policy and its effectiveness is important to determine the nature and extent of the government's influence on the economy. What government policies influence domestic savings and investment? What kinds of incentives and disincentives are built into the nation's fiscal and regulatory system? Is the current revenue base sufficient to support current and planned expenditures? If not, what changes in tax policy or other revenue (e.g. reduction or subsidies) are necessary to maintain fiscal discipline?
E. Monetary Policy (in local currency and % change) *1. Money and quasi-money 2. Domestic credit 3. Net foreign assets 4. Interest rates *5. Prices *6. Exchange rate	An important component of the economic analysis is the monetary sector. Monetary disturbances may originate domestically or from the foreign sector. In addition to their inflationary and exchange rate effects, these disturbances may also impact on the real sector in consumption, savings, capital formation and the like.

Exhibit III: Economic/Financial Analysis (Cont.)

External Economic Performance and Adjustment Capabilities

Quantitative Components	Qualitative Components
A. Balance of payments 1. Merchandise trade 2. Current account 3. Capital account *4. Current account balance/GDP	The diversity of the export sector is an important indication of the volatility of export earnings. How diversified is the export base and as such how vulnerable are overall export earnings on import payments to price movements in one or a few internationally traded products? On the import side, how compressible are merchandise imports? On both the import and export side, what is the government's policy context in terms of incentives and the structure of effective tariff and nontariff protection and its impact on domestic resource allocation and production efficiency? Finally, how diversified are the country's trading partners? Because multinational companies and private domestic companies are often sensitive to changes in national policy environments and because they can often portend shifts in a country's creditworthiness, shifts in foreign direct investment patterns and patterns of non-government long-term capital flows deserve close attention. Similarly, short-term capital outflows on the part of domestic residents, which are often sensitive to the domestic outlook, may also be important indicators of changes in a country's creditworthiness.

Exhibit III: Economic/Financial Analysis (Cont.)

External Economic Performance and Adjustment Capabilities (Cont.)

Quantitative Components	Qualitative Components
B. Liquid Assets 1. International reserves, less gold 2. Gold reserves 3. Commercial bank external assets **4. Int'l reserves/ imports of goods & services	It is important to look at more than just the overall level of international reserves for a country. The composition of reserves and in particular the level of "free reserves" provides a better indication of a country's liquidity since the latter does not include reserves that are committed or collateralized. In addition, a country's gold stock may add significantly to liquidity. Finally, an evaluation of market sentiment and its potential impact on liquidity is an important component of this section.
C. Regulatory Framework *1. Exchange rate arrangement *2. Specific exchange restrictions	In general, those countries with a greater amount of restrictions on foreign exchange and trade systems are those which perceive an increased need to control foreign exchange resources. Is this control an attempt to implement certain policy measures (e.g. import-substitution, export promotion), or does it reflect a need for foreign exchange earnings for external debt repayment? How do the restrictions affect the climate for outside participation in the economy? How effective are they in terms of accomplishing short- and long-term policy goals?

Exhibit III: Economic/Financial Analysis (Cont.)

External Debt Level and Composition

Quantitative Components	Qualitative Components
A. Total Debt 1. Long-term 2. Short-term B. External Assets C. Net Debt D. Ratios **1. Net external debt/GDP **2. Net external debt/exports *3. Short-term debt/imports *4. Short-term debt/reserves	Analysis of the composition of external debt by maturity structure and type of lender is important in determining a country's ability to repay and/or borrow additional sums abroad, or to refinance existing debt, as well as the sensitivity to interest rate changes and to changes in the availability of credit extended by types of lenders. Ratios such as net external debt to exports or to gross domestic product are used in virtually all country analyses, as are ratios which compare short-term debt to imports and reserves, since high levels of short-term debt can signal increasing vulnerability.

Debt Service

Quantitative Components	Qualitative Components
A. Total Debt Service 1. Public long-term 2. Private long-term 3. Short-term interest B. Ratios **1. Total debt service/exports **2. Interest/exports	The interpretation of the debt service ratio and any other ratios used in this part of the analysis is important since these ratios have different meanings for different countries and for the same country at different times. Changes in the ratios over time, and in the specific context of particular country situations are more indicative of debt servicing ability than the actual levels themselves.

Exhibit III: Economic/Financial Analysis (Cont.)

Market Sentiment

Quantitative Components	Qualitative Components
A. Access to Export Credits B. Access to Commercial Paper Markets in U.S.A. C. Direction of Lending Margins	These indicators attempt to assess a country's ability to access bank and non-bank commercial sources of credit. The direction of lending margins on bank debt is a leading indicator of future access because banks tend to stop lending rather than continue at ever increasing margins.

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*Indicates a ratio is used in the country risk screen.

**Indicates a key ratio for the particular component, meaning it is either particularly illustrative or easy to get data for, or both.

Exhibit IV: Economic/Financial Summary Statistics

1. Domestic Economy Performance Indicators

Country Name	Real GDP Growth	CPI	Average
REGION I			
Algeria			
Bulgaria			
Cameroon			
Czechoslovakia			
Egypt			
German Dem. Rep.			
Hungary			
Jordan			
Kuwait			
Morocco			
Nigeria			
Poland			
Romania			
Saudi Arabia			
South Africa			
U.A.E.			
U.S.S.R.			
Zimbabwe			
REGION II			
Australia			
Indonesia			
Japan			
Malaysia			
New Zealand			
Philippines			
South Korea			
Taiwan			
Thailand			
REGION III			
Columbia			
Dominican Rep.			
Ecuador			
Jamaica			
Mexico			
Panama			
Peru			
Venezuela			
REGION IV			
Argentina			
Brazil			
Chile			
Uruguay			
REGION V			
Denmark			
Finland			
Iceland			
Norway			
Sweden			
REGION VI			
Belgium			
France			
Germany			
Italy			
Netherlands			
Switzerland			
United Kingdom			
REGION VII			
Greece			
Israel			
Portugal			
Spain			
Turkey			
Yugoslavia			

Exhibit IV: Economic/Financial Summary Statistics (Cont.)

2. External Economy Performance Indicators

Country Name	CAB/GDP	CAB/EXP
REGION I		
Algeria		
Bulgaria		
Cameroon		
Czechoslovakia		
Egypt		
German Dem. Rep.		
Hungary		
Jordan		
Kuwait		
Morocco		
Nigeria		
Poland		
Romania		
Saudi Arabia		
South Africa		
U.A.E.		
U.S.S.R.		
Zimbabwe		
REGION II		
Australia		
Indonesia		
Japan		
Malaysia		
New Zealand		
Philippines		
South Korea		
Taiwan		
Thailand		
REGION III		
Columbia		
Dominican Rep.		
Ecuador		
Jamaica		
Mexico		
Panama		
Peru		
Venezuela		
REGION IV		
Argentina		
Brazil		
Chile		
Uruguay		
REGION V		
Denmark		
Finland		
Iceland		
Norway		
Sweden		
REGION VI		
Belgium		
France		
Germany		
Italy		
Netherlands		
Switzerland		
United Kingdom		
REGION VII		
Greece		
Israel		
Portugal		
Spain		
Turkey		
Yugoslavia		

Exhibit IV: Economic/Financial Summary Statistics (Cont.)

3. External Debt Performance Indicators

Country Name	NED/GDP	NED/EXP	TED/EXP	TED/GDP	ST/TED
REGION I					
Algeria					
Bulgaria					
Cameroon					
Czechoslovakia					
Egypt					
German Dem. Rep.					
Hungary					
Jordan					
Kuwait					
Morocco					
Nigeria					
Poland					
Romania					
Saudi Arabia					
South Africa					
U.A.E.					
U.S.S.R.					
Zimbabwe					
REGION II					
Australia					
Indonesia					
Japan					
Malaysia					
New Zealand					
Philippines					
South Korea					
Taiwan					
Thailand					
REGION III					
Columbia					
Dominican Rep.					
Ecuador					
Jamaica					
Mexico					
Panama					
Peru					
Venezuela					
REGION IV					
Argentina					
Brazil					
Chile					
Uruguay					
REGION V					
Denmark					
Finland					
Iceland					
Norway					
Sweden					
REGION VI					
Belgium					
France					
Germany					
Italy					
Netherlands					
Switzerland					
United Kingdom					
REGION VII					
Greece					
Israel					
Portugal					
Spain					
Turkey					
Yugoslavia					

Exhibit IV: Economic/Financial Summary Statistics (Cont.)

4. Debt Service Performance Indicators

Country Name	RES/IMP	DSR	ST/IMP	ST/RES	INT/EXP
REGION I					
Algeria					
Bulgaria					
Cameroon					
Czechoslovakia					
Egypt					
German Dem. Rep.					
Hungary					
Jordan					
Kuwait					
Morocco					
Nigeria					
Poland					
Romania					
Saudi Arabia					
South Africa					
U.A.E.					
U.S.S.R.					
Zimbabwe					
REGION II					
Australia					
Indonesia					
Japan					
Malaysia					
New Zealand					
Philippines					
South Korea					
Taiwan					
Thailand					
REGION III					
Columbia					
Dominican Rep.					
Ecuador					
Jamaica					
Mexico					
Panama					
Peru					
Venezuela					
REGION IV					
Argentina					
Brazil					
Chile					
Uruguay					
REGION V					
Denmark					
Finland					
Iceland					
Norway					
Sweden					
REGION VI					
Belgium					
France					
Germany					
Italy					
Netherlands					
Switzerland					
United Kingdom					
REGION VII					
Greece					
Israel					
Portugal					
Spain					
Turkey					
Yugoslavia					

Exhibit IV: Economic/Financial Summary Statistics (Cont.)

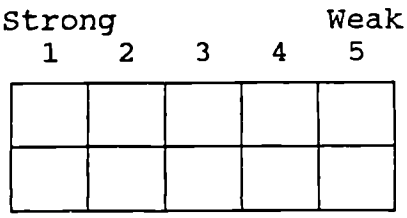
5. Market Sentiment Performance Indicators

Country Name	Survey Average
REGION I	
Algeria	
Bulgaria	
Cameroon	
Czechoslovakia	
Egypt	
German Dem. Rep.	
Hungary	
Jordan	
Kuwait	
Morocco	
Nigeria	
Poland	
Romania	
Saudi Arabia	
South Africa	
U.A.E.	
U.S.S.R.	
Zimbabwe	
REGION II	
Australia	
Indonesia	
Japan	
Malaysia	
New Zealand	
Philippines	
South Korea	
Taiwan	
Thailand	
REGION III	
Columbia	
Dominican Rep.	
Ecuador	
Jamaica	
Mexico	
Panama	
Peru	
Venezuela	
REGION IV	
Argentina	
Brazil	
Chile	
Uruguay	
REGION V	
Denmark	
Finland	
Iceland	
Norway	
Sweden	
REGION VI	
Belgium	
France	
Germany	
Italy	
Netherlands	
Switzerland	
United Kingdom	
REGION VII	
Greece	
Israel	
Portugal	
Spain	
Turkey	
Yugoslavia	

Exhibit V: Political/Social Analysis Worksheet

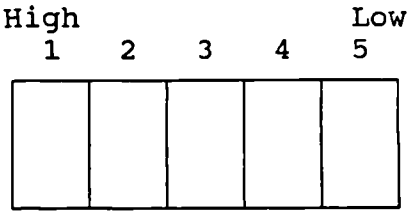
Assign a rating between 1 and 5 to each of the factors. Sum the ratings and divide by the number of factors. You will arrive at an overall rating for this section which will lie between 1 and 5. Transfer this overall rating to the political/social portion of the summary worksheet.

1. Political Management

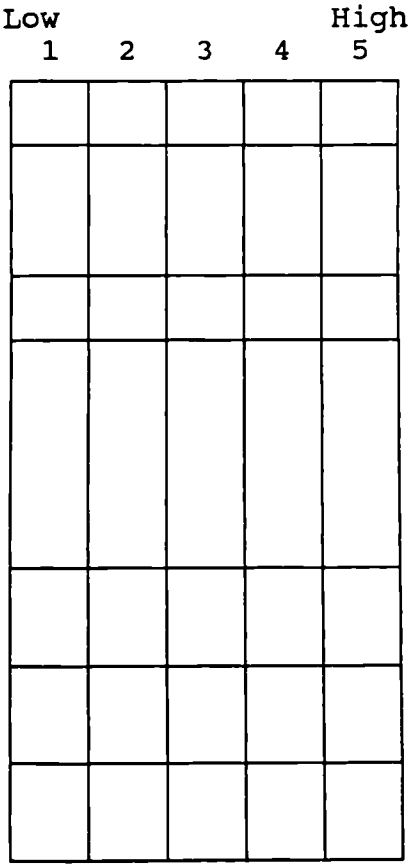


   A. Competence of government officials.
   B. Ability to implement unpopular but necessary policy changes.

2. Political Environment



   A. Political change is likely to be by institutionalized process with reasonable continuity of fundamental policies.



   B. Fractionalization of political power.
   C. Degree to which concessions must be made to appease factions, regions, or special interest groups.
   D. Extent of restrictive measures required to retain power.
   E. Degree of control on channels for voicing dissent. (A system would be rated "5" if there is little or no freedom of the press, freedom to organize parties and unions and freedom to assemble, etc.)
   F. Frequency of demonstrations against government or symbols of government.
   G. Frequency of resort to violent means to exhibit anti-government sentiment.
   H. Level of terrorism and impact of insurgency movements on stability.

Exhibit V: Political/Social Analysis Worksheet (Cont.)

3. External Political Factors

Low 1 2 3 4 5 High

A. Dependence on and/or importance to a major power.
B. Negative influence of regional political forces.
C. Presence of border or territorial dispute.

4. Social Factors

Low 1 2 3 4 5 High

A. Overall level of nationalist sentiment and xenophobia.
B. Likelihood of unrest resulting from unequal social conditions and wealth distribution.
C. Potential for future social and physical resource allocation problems because of population growth.
D. Frequency of societal conflict involving demonstrations, strikes and street violence aimed at non-government institutions or groups.
E. Fractionalization by language, ethnic or religious groups.

5. Other Factors, not included elsewhere (Optional). (The questions below are illustrative only; any three questions the analyst deems important may be used.)

Impact on Debt-Servicing Capability

Positive 1 2 3 4 5 Negative

A. Does this country fall under the "umbrella" of a major political power?
B. Does this country supply strategic materials to a major political power?
C. Does this country have any special currency convertibility arrangements (e.g. CFA zone)?
D. Other _____

Sum of Ratings [ ] ÷ Number of Items Answered [ ] = Overall Political/Social Rating [ ]

Exhibit VI: Political/Social Analysis

Assessing Political Risk

In assessing political/social risk, the analyst is asked to evaluate the probability of a payments interruption or other financial loss associated with adverse political developments (e.g. foreign or civil war, expropriation or nationalization, crippling legal restrictions, freezing of assets, forced divestment, etc.). One problematic area immediately arises, that of separating the inherently interrelated areas of political/social risk and economic/financial risk. Simply put, for purposes of this exercise, the former is associated with the willingness to maintain external payments on a timely basis while the economic/financial area relates to the country's ability to maintain debt servicing. Political factors are generally taken to mean trends and decisions caused by the activity of political actors in the host country. To a broad extent, some of these "political" considerations are incorporated explicitly in the economic/financial analysis, specifically in the assessment of domestic economic policy (monetary and fiscal policy as well as various indicators of labor market activity and social welfare indicators) and external adjustment capabilities (exchange rate and trade policies, foreign investment restriction, international reserve management, etc.). These considerations need not be duplicated in the political/social analysis and assessment.

Components

1. Political Management

Assessment of the competence of government officials involves a determination of whether current government officials, particularly those in the economic, financial, defense, and internal security sectors are competent and effective. Are they able to plan and implement realistic and sustainable policies? Do officials have the ear of political leadership? Are there good lines of communication between technocrats and politicians?

Do officials have a full political mandate to do what is necessary to service external debt? Does the overall leadership have the political strength to implement decisions, particularly if they involve austerity measures, once decisions are made? Is the government firmly entrenched enough (or popular enough) to carry them out?

2. Political Environment

It is necessary to determine the direction, magnitude and timing of political shifts if any. The most important element is to determine the likelihood of change being sudden, violent and by non-constitutional means. We try to determine whether change in leadership will leave fundamental economic policies unchanged, improved or deteriorated, especially insofar as it concerns the will to honor external debt obligations.

Symptoms of political drift will usually be evident by fractionalization of power (fragmented political base, in which elite interests dominate). Political players such as military leaders, regional leaders, religious leaders or labor leaders will use their power to obtain government actions that shift resources to them. Government will give in to unreasonable demands or refuse to comply with reasonable demands, resorting instead to coercive measures to implement policies or curb dissent.

Violent manifestations are the most dramatic stage of a political system about to change. Strikes, terrorism and sabotage disrupt the workings of the domestic economy with serious consequences for the balance of payments and possible impairment of ability to service debt.

3. External Political Factors

It is necessary to assess the strength of any insurgency as well as the ability of a government to control it. Often the existence of support from a hostile neighbor requires an analysis of the neighboring state's motives, strengths, weaknesses and staying power. The existence of a border dispute is significant only if the parties have to divert an unacceptable level of resources, material or human, to maintaining the status quo.

A country's relationship with major powers and the consequences of that relationship are important. Is the relationship a matter of geographic strategic importance? Is it mutually beneficial? Is it based on underlying commercial significance or is it a matter of being a buffer or a useful base for expanding regional influence of the major power.

For non-OECD countries, the highest grade would go to a country that is able to maintain relationships with all major powers based on shared national interests.

4. Social Factors

The existence of conditions such as rapid population growth, sharply unequal distribution of wealth and sharp contrasts in social conditions within a nation can have long-term impact on stability. The more critical element is the direction of trends, recognition of the problems by political leadership and whether appropriate policies are being implemented.

Some societies are more affected by emotions, such as nationalism and xenophia than others. This can have an ultimate impact on willingness, rather than ability, to honor external obligations. Existence of fractionalization, even when not political, can put governments in difficult no-win decision positions that lead to dissatisfaction, unrest and instability.

5. Other Factors, not included elsewhere (Optional)

This section builds in flexibility for the analyst by allowing for the addition of country-specific considerations not included elsewhere in the questionnaire that may impact on a country's ability to repay external obligations. The three questions listed on the worksheet are intended to be examples only; their inclusion or exclusion is left to the discretion of the analyst. At most, this section should contain three separate items.

Exhibit VII: Summary Worksheet for Country Risk Rating

Country _____

Year _____

Country Desk
Economics
Sovereign Risk
Regional Manager
Date

Assign weights to factors A and B in the second-to-last column according to your assessment of the relative importance of each summary factor. Weights must sum to 100. Then multiply the value you have assigned to each factor by its weight, and add the products for items A and B. The total weighted country risk rating will lie somewhere between 100 and 500. This translates to a letter rating as follows:

Numerical Rating		Letter Rating		Narrative Rating
100 - 180	=	A	=	Top Quality
181 - 260	=	B	=	Favorable
261 - 340	=	C	=	Medium
341 - 420	=	D	=	Marginal
421 - 500	=	E	=	Poor

Overall Rating

	Rating	x	Weight	= Product
A. Economic/Financial Value		x		
B. Political/Social Value		x		
		Totals	100	

Weighted Country Rating _____

Letter Rating _____

APPENDIX C

RAW DATA, SUMMARY STATISTICS, AND CORRELATION MATRICES FOR 40 LDCS (1974-83)

1974 Data for 40 Developing Countries: Rescheduling Index (Y) and Economic Indicators

COUNTRY	Y	DSR	RSM	AMZ	SQCA	GRO	GDP	X/M	XGR	NDX	M/GDP	DSR1	AMZ1
Algeria	0	-0.1233	0.2898	-0.16030	0.00100	0.07000	1463.00	1.1212	0.1148	0.3293	0.43250	0.12328	-0.16035
Argentina	0	-0.2169	0.2489	-0.09490	0.00060	-0.04760	5683.32	1.0255	-0.1894	1.1975	0.48790	0.21687	-0.09179
Bolivia	0	-0.1626	0.3717	-0.11010	0.22910	0.03540	885.57	1.2616	-0.3344	0.9562	0.21890	0.18120	-0.12298
Brazil	0	-0.3669	0.3080	-0.15180	-0.65120	0.02870	1755.27	0.5534	0.2980	1.5153	0.23920	0.36687	-0.15178
Burma	0	-0.1554	0.6268	-0.09230	-0.00090	0.01900	139.99	0.8041	-0.4091	0.5923	0.07310	0.15540	-0.07995
Cameroon	0	-0.0702	0.1304	-0.12910	-0.00080	0.02910	652.48	0.9701	0.0719	0.4049	0.29330	0.07024	-0.12906
Chile	0	-0.3807	0.0155	-0.18990	-0.01540	-0.14360	2197.51	0.8845	0.2177	1.9060	0.24040	0.41142	-0.20636
Colombia	0	-0.2383	0.1833	-0.11350	-0.03220	-0.00540	1094.44	0.8350	0.0078	1.0265	0.19010	0.25198	-0.12507
Costa Rica	0	-0.1789	0.0517	-0.16720	-0.24260	0.00010	1908.91	0.6626	0.1084	0.8646	0.48900	0.17889	-0.16721
Dominican Rep	0	-0.1138	0.0862	-0.10420	-0.10000	0.02090	1077.74	0.7537	0.0752	0.6573	0.34490	0.13497	-0.13858
Ecuador	0	-0.0907	0.2401	-0.25450	0.00080	0.02430	1189.27	1.0045	0.4923	0.1143	0.35760	0.09066	-0.25449
Egypt	0	-0.3246	0.0605	-0.27440	-0.01760	0.11810	376.37	0.6067	0.3175	1.1167	0.38900	0.32462	-0.26614
El Salvador	0	-0.1540	0.1156	-0.26800	-0.06670	0.02400	824.68	0.7735	-0.0231	0.5441	0.42530	0.15405	-0.26795
Gabon	0	-0.1101	1.8640	-0.20230	0.04750	0.00632	4131.68	1.2803	0.5344	0.3658	0.50830	0.11013	-0.20241
Ghana	0	-0.0369	0.0759	-0.02090	-0.05300	-0.15160	1717.66	0.7930	0.0450	0.8548	0.23250	0.05343	-0.03828
Greece	0	-0.1464	0.1551	-0.17170	-0.08680	0.05020	3411.56	0.7695	0.4725	0.5619	0.26810	0.14642	-0.17169
India	0	-0.5748	0.1745	-0.21140	-0.03000	0.07470	211.25	0.8167	0.0988	2.3296	0.06860	0.57503	-0.23223
Indonesia	0	-0.0212	0.2155	-0.01610	0.00640	0.02140	357.37	1.0794	0.3274	0.9094	0.26800	0.02116	-0.01606
Israel	0	-0.2388	0.1707	-0.05860	-0.16860	0.00910	5384.62	0.5274	0.1053	1.4259	1.35120	0.23882	-0.05862
Ivory Coast	0	-0.0837	0.0465	-0.12260	-0.00180	0.07540	1123.70	1.0226	0.1788	0.4719	0.46050	0.08366	-0.12264
Jamaica	0	-0.0618	0.1623	-0.01780	-0.00690	-0.01770	1565.85	0.9420	-0.2372	1.1263	0.49390	0.06183	-0.01756
Malaysia	0	-0.0292	0.2956	-0.05210	-0.01320	-0.01320	1386.58	0.9045	0.1466	-0.0904	0.55110	0.02923	-0.05210
Mexico	0	-0.2234	0.1322	-0.06690	-0.20400	0.02040	2199.55	0.6800	2.2158	1.6815	0.10640	0.22341	-0.06694
Morocco	0	-0.0501	0.1749	-0.07670	0.00820	0.01060	795.19	1.1145	0.2675	0.3432	0.29070	0.05505	-0.08846
Nigeria	0	-0.0057	1.1090	-0.03250	0.23750	-0.08780	1189.49	1.9889	0.2807	-0.4307	0.16890	0.00567	-0.03251
Pakistan	0	-0.1660	0.2028	-0.02620	-0.12580	0.00270	251.40	0.7175	0.1532	3.2826	0.23790	0.16595	-0.02528
Peru	0	-0.3061	0.3487	-0.12580	-0.14870	-0.00400	1045.05	0.7086	-0.1793	1.8212	0.23710	0.30609	-0.12513
Philippines	0	-0.1930	0.3637	-0.27500	-0.00350	0.03860	594.77	0.8791	0.0379	0.2852	0.27370	0.19301	-0.26249
Portugal	0	-0.0255	0.2074	-0.07620	-0.02990	-0.08780	2233.05	0.8580	.	0.0102	0.42020	0.02550	-0.07616
Sierra Leone	0	-0.0619	0.2158	-0.03400	-0.12880	0.00310	329.60	0.6719	.	0.8494	0.45270	0.06193	-0.03400
South Korea	0	-0.1041	0.1389	-0.06580	-0.14340	0.05750	1165.30	0.7042	0.9744	0.7585	0.40620	0.10636	-0.06896
Sudan	0	-0.2473	0.1675	-0.18600	-0.36590	.	.	0.6038	-0.4720	1.7203	0.20730	0.24733	-0.18595
Thailand	0	-0.1138	0.5021	-0.26170	-0.00080	0.04350	532.04	0.9063	0.0731	-0.1882	0.26290	0.11383	-0.26168
Tunisia	0	-0.0810	0.3078	-0.08910	0.00120	0.04170	1118.35	1.0254	0.0110	0.3747	0.38330	0.16206	-0.22645
Turkey	0	-0.1078	0.3779	-0.08420	-0.02560	0.05140	1217.75	0.8488	0.0877	0.4903	0.14050	0.10785	-0.08420
Uruguay	0	-0.1275	0.1266	-0.05360	-0.05460	0.03620	2772.83	0.7891	-0.1833	1.2554	0.16840	0.12752	-0.04856
Venezuela	0	-0.0336	1.0040	-0.17810	0.23150	-0.02630	4076.38	1.9912	-0.0706	-0.3550	0.22950	0.03365	-0.17805
Yugoslavia	0	-0.1746	0.1291	-0.22390	-0.01750	0.02550	2189.27	0.8551	0.1643	0.5653	0.34600	0.17491	-0.22310
Zaire	0	-0.1347	0.0622	-0.16770	-0.05640	0.01640	288.29	0.8204	0.0329	0.8029	0.53090	0.13470	-0.16159
Zambia	0	-0.0852	0.1231	-0.03900	0.00010	-0.05370	822.36	1.1070	-0.0010	0.5515	0.45530	0.09023	-0.03575
Average		-0.15301	0.28956	-0.12615	-0.05072	0.008093	1573.32	0.91654	0.15293	0.82496	0.342532	0.157880	-0.131460
Standard Deviation		0.11615	0.34116	0.07889	0.14845	0.054961	1352.06	0.30738	0.43681	0.74044	0.209643	0.116772	0.079637

1975 Data for 40 Developing Countries: Rescheduling Index (Y) and Economic Indicators

COUNTRY	Y	DSR	RSM	AMZ	SQCA	GRO	GDP	X/M	XGR	NDX	M/GDP	DSR1	AMZ1
Algeria	0	-0.1171	0.1636	-0.11790	-0.09930	0.05750	1565.38	0.7644	-0.0667	0.6355	0.48360	0.11707	-0.11795
Argentina	0	-0.3074	0.0590	-0.09720	-0.12870	-0.01620	5502.24	0.7352	-0.3822	1.8361	0.48790	0.42427	-0.15778
Bolivia	0	-0.2176	0.2088	-0.10730	-0.06900	0.03140	916.95	0.7410	-0.2293	1.4495	0.27150	0.23697	-0.11753
Brazil	0	-0.3930	0.2348	-0.10880	-0.49720	0.07070	1805.60	0.5864	0.1447	1.9878	0.16780	0.39305	-0.10877
Burma	0	-0.1640	0.4611	-0.06530	-0.17360	0.03830	142.65	0.6667	-0.2331	1.0167	0.07810	0.18535	-0.06929
Cameroon	0	-0.1265	0.0340	-0.20990	-0.05180	-0.00330	671.49	0.7925	-0.0255	0.5806	0.31320	0.12647	-0.20589
Chile	1	-0.4106	0.0238	-0.11230	-0.07080	0.01830	1881.85	0.7858	0.2677	2.5527	0.32430	0.43089	-0.11572
Colombia	0	-0.2082	0.1979	-0.08850	-0.00610	0.01760	1088.58	0.9158	0.0930	1.0332	0.18320	0.29613	-0.16751
Costa Rica	0	-0.2275	0.0590	-0.20030	-0.13160	0.02890	1909.19	0.7258	0.0135	1.0569	0.42230	0.27095	-0.24218
Dominican Rep	0	-0.1008	0.0991	-0.11520	-0.00490	0.03670	1100.29	0.9255	-0.0393	0.5373	0.31310	0.10079	-0.11308
Ecuador	0	-0.0604	0.1838	-0.09000	-0.03810	0.06060	1218.15	0.8173	-0.1714	0.4046	0.32000	0.06035	-0.08997
Egypt	0	-0.2440	0.0355	-0.18630	-0.23750	0.05410	420.83	0.5401	-0.6333	1.6477	0.40800	0.24404	-0.17937
El Salvador	0	-0.1575	0.1486	-0.21400	-0.02400	0.01190	844.49	0.8333	-0.0340	0.5083	0.40200	0.15960	-0.20454
Gabon	0	-0.1357	2.3600	-0.27320	0.00350	0.02589	4098.63	1.0613	0.6144	0.5019	0.54460	0.15997	-0.33753
Ghana	0	-0.0364	0.1352	-0.01890	0.00040	-0.07640	1457.24	0.9707	-0.2893	0.6687	0.20070	0.11877	-0.12267
Greece	0	-0.1596	0.1829	-0.18090	-0.04040	0.04960	3582.73	0.8278	0.2785	0.6412	0.25140	0.15961	-0.17825
India	0	-0.1212	0.1723	-0.03350	0.00190	-0.00530	227.04	0.9927	0.1285	1.9387	0.07150	0.12162	-0.03195
Indonesia	0	-0.0602	0.0716	-0.04380	-0.02490	0.08600	365.01	0.8609	0.1481	1.3920	0.26780	0.06016	-0.04342
Israel	0	-0.2673	0.1507	-0.05630	-0.22720	-0.00940	5433.53	0.4893	0.0826	1.6214	0.94210	0.28568	-0.06648
Ivory Coast	0	-0.0877	0.0590	-0.09430	-0.06360	0.07540	1123.70	0.8633	0.1313	0.6109	0.44710	0.09892	-0.11519
Jamaica	0	-0.0743	0.0876	-0.01690	-0.05860	-0.07810	1538.12	0.8158	-0.2996	1.2732	0.50090	0.07430	-0.01672
Malaysia	0	-0.0304	0.2999	-0.03870	-0.01280	0.07940	1368.30	0.9046	0.0238	0.0881	0.52040	0.03039	-0.03871
Mexico	0	-0.2923	0.1310	-0.06740	-0.40570	0.01150	2244.47	0.6027	2.0678	2.2350	0.12000	0.29225	-0.06742
Morocco	0	-0.0480	0.1147	-0.05640	-0.04260	0.03910	803.61	0.8336	-0.0806	0.5373	0.34190	0.04803	-0.05637
Nigeria	0	-0.0062	0.6233	-0.02660	0.00000	0.07100	1085.11	1.0187	0.0567	-0.4866	0.25330	0.00615	-0.02665
Pakistan	0	-0.2101	0.1273	-0.03350	-0.51610	0.01380	252.08	0.5571	-0.0422	3.5034	0.25270	0.21006	-0.03149
Peru	0	-0.3886	0.1284	-0.08230	-0.79990	0.00620	1040.87	0.5201	-0.3088	2.6997	0.24090	0.38863	-0.09610
Philippines	0	-0.1758	0.2978	-0.14700	-0.08500	0.04090	617.74	0.7585	-0.0465	0.5486	0.16380	0.17578	-0.13915
Portugal	0	-0.0930	0.0831	-0.23220	-0.03400	0.04210	2036.92	0.8548	.	0.2636	0.32520	0.09295	-0.23220
Sierra Leone	0	-0.0585	0.1246	-0.02320	-0.18290	-0.04290	330.61	0.6667	.	0.8329	0.35840	0.05851	-0.01588
South Korea	0	-0.1253	0.1940	-0.06680	-0.09910	0.10900	1232.28	0.7391	0.4833	0.8361	0.37790	0.12525	-0.06476
Sudan	0	-0.2836	0.0370	-0.10400	-0.69340	.	.	0.5218	-0.5516	2.6198	0.22700	0.28355	-0.10399
Thailand	0	-0.1391	0.4567	-0.22990	-0.04430	0.05950	555.19	0.8082	0.0586	-0.1101	0.25070	0.13909	-0.22990
Tunisia	0	-0.1011	0.2275	-0.09210	-0.01340	0.01050	1165.03	0.8802	-0.0729	0.4416	0.38520	0.10114	-0.09209
Turkey	0	-0.1097	0.1850	-0.07490	-0.24490	0.05510	1280.29	0.6526	-0.1472	0.7931	0.14190	0.12093	-0.08632
Uruguay	0	-0.2405	0.0786	-0.10180	-0.11720	0.03250	2873.18	0.7337	-0.0633	1.3117	0.20730	0.42228	-0.23184
Venezuela	0	-0.0338	1.0850	-0.16080	0.04630	0.05040	3969.22	1.3025	-0.2065	-0.6846	0.28110	0.03376	-0.16077
Yugoslavia	0	-0.1620	0.0942	-0.18760	-0.00650	0.02840	2245.05	0.8994	0.0318	0.6699	0.29690	0.16203	-0.17938
Zaire	0	-0.2262	0.0287	-0.10430	-0.31840	-0.08140	293.02	0.6297	0.0631	1.6708	0.43490	0.38450	-0.22249
Zambia	0	-0.1064	0.0963	-0.02640	-0.67130	0.01040	778.24	0.5970	-0.0471	1.3739	0.59920	0.10642	-0.02389
Average		-0.16269	0.23854	-0.10717	-0.15457	0.025889	1565.77	0.77982	0.01887	1.07598	0.329495	0.182666	-0.122530
Standard Deviation		0.10334	0.39404	0.06799	0.21080	0.043210	1335.94	0.16831	0.41842	0.88166	0.162460	0.121749	0.076300

1976 Data for 40 Developing Countries: Rescheduling Index (Y) and Economic Indicators

COUNTRY	Y	DSR	RSM	AMZ	SQCA	GRO	GDP	X/M	XGR	NDX	M/GDP	DSR1	AMZ1
Algeria	0	-0.1514	0.2585	-0.11620	-0.02200	0.03890	1655.40	0.8746	-0.0098	0.6982	0.41500	0.15138	-0.11626
Argentina	1	-0.2640	0.3561	-0.10950	0.13880	0.04120	5412.89	1.1560	-0.1250	1.4524	0.05070	0.45695	-0.23645
Bolivia	0	-0.2194	0.2137	-0.11330	-0.00720	0.01580	945.77	0.8996	-0.0190	1.4763	0.25070	0.25666	-0.13869
Brazil	0	-0.4553	0.3637	-0.12780	-0.33740	0.03180	1933.23	0.6324	0.1952	1.9980	0.10980	0.45534	-0.12780
Burma	0	-0.2164	0.4079	-0.10380	-0.06600	0.03670	148.11	0.7517	0.2596	1.1964	0.07160	0.24782	-0.10980
Cameroon	0	-0.0769	0.0515	-0.10870	-0.01630	0.02870	669.27	0.8472	-0.1829	0.7589	0.30940	0.07686	-0.10509
Chile	0	-0.4197	0.1742	-0.15620	0.00370	0.07980	1916.28	1.0430	0.1192	1.8325	0.23580	0.47479	-0.17152
Colombia	0	-0.1675	0.4021	-0.07790	0.00320	0.04600	1107.69	1.0562	0.0462	0.6158	0.17850	0.16753	-0.07785
Costa Rica	0	-0.2382	0.1031	-0.18550	-0.08070	0.05750	1964.45	0.7686	-0.0578	1.0515	0.38340	0.23825	-0.17597
Dominican Rep	0	-0.1373	0.1115	-0.13720	-0.01790	0.02050	1140.72	0.8709	-0.0979	0.7135	0.28040	0.13725	-0.13724
Ecuador	0	-0.0866	0.3250	-0.12090	0.00000	0.03530	1291.93	0.9748	-0.1993	0.2742	0.27630	0.08657	-0.12093
Egypt	0	-0.2362	0.0429	-0.14460	-0.02520	0.05360	443.59	0.7409	-0.4699	1.4436	0.32660	0.23623	-0.14199
El Salvador	0	-0.0993	0.2049	-0.13610	0.00070	0.02580	854.56	0.9945	0.2085	0.3273	0.39650	0.09927	-0.12916
Gabon	0	-0.1550	1.5340	-0.19730	0.00150	0.02960	4065.57	1.0454	0.3234	0.7097	0.43180	0.15502	-0.19730
Ghana	0	-0.0546	0.0922	-0.03720	-0.00690	0.01270	1345.95	0.8985	-0.2246	0.7129	0.17530	0.09669	-0.08694
Greece	0	-0.1372	0.1483	-0.12960	-0.03470	0.02330	3760.51	0.8382	0.2287	0.5933	0.26290	0.13814	-0.12322
India	0	-0.1005	0.4346	-0.03410	0.04620	0.06020	225.83	1.1961	0.1852	1.4582	0.07180	0.10114	-0.03234
Indonesia	0	-0.0727	0.1543	-0.05470	-0.01080	0.06430	396.40	0.9047	0.1267	1.2681	0.26020	0.07268	-0.05471
Israel	0	-0.2563	0.1779	-0.06420	-0.02090	0.01190	5382.44	0.5889	0.1667	1.6693	0.74660	0.27110	-0.07118
Ivory Coast	0	-0.0964	0.0384	-0.11250	-0.01550	0.00570	1208.44	1.0045	0.0787	0.5984	0.42660	0.09641	-0.11106
Jamaica	0	-0.1379	0.0259	-0.03680	-0.09370	-0.03770	1417.95	0.7914	0.1191	1.4319	0.42180	0.19376	-0.07076
Malaysia	0	-0.0267	0.4583	-0.02590	0.00980	0.05360	1476.89	1.1182	0.1053	-0.0232	0.46290	0.02674	-0.02585
Mexico	0	-0.4098	0.1103	-0.08110	-0.22420	0.00480	2270.36	0.6688	1.9189	2.6844	0.12120	0.40980	-0.08113
Morocco	0	-0.0712	0.1289	-0.04370	-0.37970	0.03410	835.02	0.6259	-0.2010	0.8981	0.39030	0.07124	-0.04373
Nigeria	0	-0.0045	0.4656	-0.02440	-0.00110	0.03610	1162.14	0.9819	-0.1096	-0.3912	0.25280	0.00925	-0.07014
Pakistan	0	-0.1793	0.1688	-0.03000	-0.21440	0.00850	255.57	0.6478	0.0900	3.3909	0.22500	0.20533	-0.03599
Peru	1	-0.4519	0.0962	-0.08950	-0.46160	0.02900	1047.35	0.5838	0.0145	3.4360	0.23610	0.45190	-0.08948
Philippines	0	-0.1963	0.3354	-0.14620	-0.10560	0.03540	642.99	0.7122	0.1392	0.8475	0.26190	0.19632	-0.13700
Portugal	0	-0.1643	0.0361	-0.30050	-0.13100	0.04890	2122.70	0.7255	.	0.5221	0.31510	0.16429	-0.30049
Sierra Leone	0	-0.1578	0.1235	-0.08890	-0.19390	-0.00170	316.43	0.6569	.	1.2522	0.36820	0.15779	-0.08545
South Korea	0	-0.1023	0.2927	-0.07720	-0.00110	0.09110	1366.62	0.9351	0.5065	0.5335	0.35250	0.10234	-0.07466
Sudan	0	-0.1940	0.0194	-0.07140	-0.29410	.	.	0.6489	0.0516	2.0182	0.22970	0.19403	-0.06351
Thailand	0	-0.1263	0.4377	-0.21740	-0.01460	0.04580	588.21	0.8870	0.2113	-0.0307	0.24820	0.12626	-0.21741
Tunisia	0	-0.1075	0.1929	-0.08580	-0.06050	0.02500	1177.23	0.7806	-0.0437	0.6323	0.42300	0.13895	-0.13097
Turkey	0	-0.2780	0.1740	-0.22280	-0.33170	0.04850	1350.77	0.6192	0.0107	0.9276	0.13860	0.28922	-0.21875
Uruguay	0	-0.2003	0.2244	-0.09120	-0.01110	0.00820	2966.70	0.8967	0.2362	1.0242	0.20690	0.21782	-0.09330
Venezuela	0	-0.0794	0.8214	-0.45260	0.00060	0.03030	4169.21	1.0491	-0.2841	-0.4639	0.31400	0.07939	-0.45260
Yugoslavia	0	-0.1450	0.2226	-0.15620	0.00040	0.06930	2308.72	0.9866	0.0491	0.6354	0.27420	0.14503	-0.15145
Zaire	1	-0.2832	0.0240	-0.08710	-0.48750	-0.02300	269.18	0.5695	0.1773	2.0718	0.58020	0.28320	-0.08295
Zambia	0	-0.1274	0.0816	-0.02480	-0.01240	-0.07220	786.33	0.9877	0.0246	1.2953	0.42740	0.16775	-0.05676
Average		-0.17710	0.25086	-0.11552	-0.08687	0.029572	1599.98	0.84899	0.09389	1.08852	0.297747	0.191162	-0.123700
Standard Deviation		0.10998	0.26638	0.08164	0.14453	0.030476	1340.51	0.17313	0.35676	0.85603	0.139768	0.120026	0.079926

1977 Data for 40 Developing Countries: Rescheduling Index (Y) and Economic Indicators

COUNTRY	Y	DSR	RSM	AMZ	SQCA	GRO	GDP	X/M	XGR	NDX	M/GDP	DSR1	AMZ1
Algeria	0	-0.1804	0.1873	-0.12510	-0.11900	0.10500	1719.78	0.7491	0.0969	1.2823	0.45510	0.18041	-0.12507
Argentina	0	-0.1817	0.5589	-0.09110	0.02790	-0.05210	5636.07	1.1940	0.6259	1.2305	0.10750	0.22947	-0.12427
Bolivia	0	-0.2847	0.2531	-0.11720	-0.16830	0.00640	960.69	0.8405	0.0927	2.1710	0.25580	0.31139	-0.13429
Brazil	0	-0.5072	0.3862	-0.14780	-0.14320	0.02470	1994.74	0.7255	0.1353	2.5318	0.07490	0.51043	-0.14937
Burma	0	-0.1408	0.2641	-0.07220	-0.08700	0.04200	153.54	0.7545	0.5784	2.2509	0.09400	0.18941	-0.10506
Cameroon	0	-0.0998	0.0384	-0.15410	-0.00770	0.03530	688.48	0.8868	-0.0980	1.0364	0.34340	0.10596	-0.15395
Chile	0	-0.4778	0.1305	-0.20050	-0.04420	0.06390	2069.27	0.8020	0.1801	2.0822	0.24450	0.47782	-0.18112
Colombia	0	-0.1416	0.5506	-0.08300	0.01120	0.05510	1158.61	1.1169	-0.2057	0.9328	0.16300	0.15732	-0.10242
Costa Rica	0	-0.2360	0.1573	-0.19630	-0.05440	0.03760	2077.35	0.8002	-0.0978	1.1625	0.39410	0.23605	-0.18747
Dominican Rep	0	-0.2154	0.1491	-0.12360	-0.01470	-0.00620	1164.16	0.8800	0.0149	0.8851	0.26330	0.26762	-0.18819
Ecuador	0	-0.1130	0.3106	-0.11980	-0.04450	0.03530	1337.58	0.8106	-0.0560	1.0768	0.30140	0.15509	-0.19854
Egypt	0	-0.2296	0.0672	-0.13440	-0.04810	0.07270	467.36	0.7633	0.4026	1.7076	0.30580	0.22965	-0.12975
El Salvador	0	-0.1069	0.1861	-0.19580	0.00070	-0.03670	876.62	1.0220	-0.0044	0.4412	0.39590	0.10911	-0.19536
Gabon	0	-0.2857	0.1231	-0.28400	0.00440	0.02240	4032.52	1.1015	-0.0526	0.9866	0.48050	0.28566	-0.33033
Ghana	0	-0.0387	0.1282	-0.01870	-0.00620	0.05050	1363.10	0.8801	-0.1279	0.9082	0.11940	0.06907	-0.05965
Greece	0	-0.1341	0.1534	-0.15240	-0.03540	0.05650	3848.03	0.8389	0.1932	0.8486	0.26120	0.13414	-0.14095
India	0	-0.1099	0.6426	-0.04230	0.04650	0.04540	239.43	1.2027	0.1436	1.1687	0.07370	0.11003	-0.04096
Indonesia	0	-0.0866	0.2282	-0.06920	0.00000	0.05270	421.87	0.9935	0.2452	1.2748	0.24000	0.10173	-0.08226
Israel	0	-0.2396	0.1946	-0.06820	-0.00280	0.01910	5318.56	0.6983	0.2977	1.7865	0.52120	0.24454	-0.06839
Ivory Coast	0	-0.1063	0.0696	-0.14910	-0.00410	0.07490	1215.38	1.0463	0.0718	0.8497	0.42390	0.10635	-0.14592
Jamaica	0	-0.1919	0.0447	-0.06380	-0.00160	-0.00400	1364.44	0.9804	0.1330	1.5565	0.32900	0.26624	-0.11393
Malaysia	0	-0.0378	0.4368	-0.03700	0.00410	0.03930	1555.98	1.0734	0.3101	0.0219	0.48500	0.03782	-0.03696
Mexico	0	-0.5573	0.1612	-0.12500	-0.05070	0.05210	2281.18	0.8026	1.7708	3.5981	0.12490	0.65795	-0.16297
Morocco	0	-0.1146	0.1178	-0.05510	-0.56860	0.00360	863.50	0.5740	0.1754	1.8228	0.38790	0.11456	-0.05144
Nigeria	0	-0.0067	0.3001	-0.06840	-0.00580	-0.11080	1204.15	0.9414	0.0390	-0.0818	0.27960	0.01125	-0.13542
Pakistan	0	-0.2051	0.1459	-0.03270	-0.20100	0.04820	257.73	0.6543	0.1312	3.5179	0.22110	0.20687	-0.03070
Peru	0	-0.4255	0.1142	-0.08460	-0.18490	-0.04260	1016.99	0.6865	-0.1613	4.1186	0.23620	0.42549	-0.08165
Philippines	0	-0.2100	0.2818	-0.14980	-0.02980	0.02970	665.77	0.8308	0.4533	1.5460	0.25190	0.33285	-0.25457
Portugal	0	-0.1532	0.0658	-0.27080	-0.04280	0.02540	2226.40	0.8342	.	0.5738	0.34100	0.15318	-0.24390
Sierra Leone	1	-0.1565	0.1440	-0.08500	-0.09040	-0.01260	315.88	0.7026	.	1.3472	0.43330	0.15650	-0.07049
South Korea	0	-0.0947	0.3242	-0.07020	0.00000	0.08460	1491.15	0.9841	0.6404	0.7697	0.36000	0.09589	-0.06888
Sudan	0	-0.1305	0.0196	-0.04090	-0.10890	.	.	0.7443	0.5925	2.6790	0.17700	0.13053	-0.04086
Thailand	0	-0.1279	0.3412	-0.21000	-0.06850	0.07500	615.13	0.7866	0.4599	0.3664	0.27580	0.12789	-0.20029
Tunisia	0	-0.1104	0.1553	-0.07740	-0.09410	0.04430	1206.67	0.7493	-0.0169	1.1102	0.50490	0.11036	-0.07739
Turkey	0	-0.2394	0.0976	-0.10620	-0.91920	-0.04850	1416.22	0.5008	0.1757	3.2939	0.13680	0.23938	-0.09642
Uruguay	0	-0.1889	0.3239	-0.09950	-0.04150	0.04530	2991.03	0.8249	0.2464	1.1329	0.23350	0.18887	-0.08338
Venezuela	0	-0.0933	0.5588	-0.21650	-0.08430	-0.01350	4295.53	0.7908	-0.1603	0.2733	0.38160	0.09332	-0.21645
Yugoslavia	0	-0.1511	0.1747	-0.15240	-0.01790	0.06150	2468.71	0.8595	0.1049	0.8086	0.29130	0.15114	-0.14396
Zaire	1	-0.4638	0.0478	-0.10600	-1.22130	-0.08250	262.98	0.4691	-0.0381	2.5096	0.60640	0.52890	-0.13106
Zambia	0	-0.2033	0.0598	-0.05150	-0.04960	-0.02540	729.57	0.8783	0.0635	2.3580	0.44100	0.21076	-0.05186
Average		-0.19444	0.21736	-0.11619	-0.11164	0.022400	1640.31	0.84437	0.19356	1.49842	0.300420	0.211275	-0.128400
Standard Deviation		0.12918	0.15839	0.06399	0.24656	0.047098	1363.29	0.16765	0.34744	0.98805	0.134346	0.141045	0.067356

1978 Data for 40 Developing Countries: Rescheduling Index (Y) and Economic Indicators

COUNTRY	Y	DSR	RSM	AMZ	SQCA	GRO	GDP	X/M	XGR	NDX	M/GDP	DSR1	AMZ1
Algeria	0	-0.2446	0.1870	-0.12900	-0.24640	0.05240	1900.29	0.6731	0.1238	1.8830	0.40380	0.24458	-0.10796
Argentina	0	-0.3651	0.8211	-0.25460	0.05610	0.05150	5342.27	1.2956	0.5217	1.0605	0.09300	0.46535	-0.25339
Bolivia	0	-0.6053	0.1594	-0.22600	-0.22110	0.00970	966.88	0.6629	0.0870	2.8218	0.27840	0.66117	-0.21162
Brazil	0	-0.6175	0.5476	-0.15470	-0.23580	0.03820	2043.92	0.6709	0.0079	2.8841	0.11480	0.61754	-0.13233
Burma	0	-0.2093	0.1781	-0.06240	-0.82150	0.02960	159.99	0.4935	0.1145	3.2082	0.11710	0.25714	-0.07457
Cameroon	0	-0.1240	0.0348	-0.14910	-0.01760	0.02980	712.78	0.8770	0.1716	1.0809	0.35060	0.12396	-0.12757
Chile	0	-0.5178	0.2615	-0.22080	-0.13290	0.06400	2201.59	0.7158	0.1243	2.1059	0.27070	0.51780	-0.17469
Colombia	0	-0.1544	0.6045	-0.10460	0.00390	0.03430	1222.42	1.0585	0.0074	0.6604	0.16820	0.15440	-0.06394
Costa Rica	0	-0.3999	0.1380	-0.28900	-0.12540	0.02520	2155.50	0.7295	0.0236	1.4489	0.39880	0.40049	-0.23286
Dominican Rep	0	-0.2600	0.1175	-0.17230	-0.10140	0.01960	1156.92	0.7475	-0.0039	1.2041	0.27690	0.26002	-0.12098
Ecuador	0	-0.2418	0.2561	-0.15590	-0.16360	0.02370	1384.82	0.7000	-0.0858	1.9219	0.32440	0.30523	-0.14614
Egypt	0	-0.2495	0.0663	-0.12820	-0.03180	0.05670	501.34	0.8093	0.3636	1.7775	0.29660	0.24953	-0.12369
El Salvador	0	-0.0936	0.2067	-0.08510	-0.08100	0.02350	844.49	0.7749	-0.2745	0.6387	0.42150	0.09359	-0.05964
Gabon	1	-0.3909	0.1929	-0.34180	0.00250	0.05830	3889.46	1.0849	-0.1053	1.0043	0.57210	0.45470	-0.35467
Ghana	0	-0.0511	0.2515	-0.03840	-0.00210	-0.06820	1431.91	0.9047	-0.2817	1.0118	0.07960	0.05109	-0.02824
Greece	0	-0.1302	0.1664	-0.15360	-0.01940	0.02710	4065.48	0.8743	0.1352	0.7814	0.24810	0.13415	-0.10798
India	0	-0.1011	0.6197	-0.03740	0.00000	-0.06650	250.31	0.9647	-0.0491	1.0053	0.08690	0.10185	-0.03649
Indonesia	0	-0.1016	0.2060	-0.07360	-0.01580	0.03850	444.10	0.8873	0.2544	1.3573	0.24770	0.10161	-0.06499
Israel	0	-0.2439	0.2703	-0.06940	-0.01720	0.01260	5420.05	0.6815	0.2109	1.6883	0.80930	0.25942	-0.06633
Ivory Coast	0	-0.1050	0.1277	-0.07080	-0.07390	0.01950	1296.40	0.8802	-0.0625	1.0875	0.51410	0.10504	-0.05705
Jamaica	1	-0.3275	0.0472	-0.09900	-0.00170	-0.03110	1358.93	0.9599	0.0291	1.1406	0.47120	0.34062	-0.18343
Malaysia	0	-0.0460	0.3939	-0.03960	0.00020	0.04780	1617.08	1.0186	0.2177	0.0135	0.50330	0.04598	-0.03819
Mexico	0	-0.6772	0.1248	-0.20020	-0.07700	0.06150	2399.99	0.7727	1.5107	2.9725	0.14370	0.68607	-0.16516
Morocco	0	-0.1763	0.1450	-0.06040	-0.20900	0.01550	866.59	0.6868	0.3333	1.9351	0.32200	0.17626	-0.05144
Nigeria	0	-0.0061	0.1256	-0.02510	-0.10640	0.00390	1070.68	0.7677	0.0513	0.2778	0.26850	0.00610	-0.00787
Pakistan	0	-0.1561	0.1164	-0.02880	-0.02940	0.00920	270.16	0.8095	0.0841	2.7907	0.21450	0.15608	-0.02611
Peru	1	-0.6250	0.1463	-0.14350	-0.00630	0.01560	973.65	0.9069	0.2643	3.8528	0.25410	0.63849	-0.11047
Philippines	0	-0.2938	0.2788	-0.19830	-0.04670	0.04050	685.54	0.8009	0.3345	1.7879	0.26210	0.29380	-0.12535
Portugal	0	-0.1406	0.1441	-0.14170	-0.00720	0.04100	2282.88	0.9279	.	0.9586	0.33720	0.14057	-0.12778
Sierra Leone	0	-0.1334	0.1015	-0.05240	-0.27910	0.05700	311.89	0.6181	.	1.2887	0.42200	0.13335	-0.03913
South Korea	0	-0.1190	0.2629	-0.10850	-0.00400	0.05730	1617.34	0.9169	0.4655	0.7222	0.37720	0.13657	-0.09302
Sudan	0	-0.1413	0.0200	-0.03970	-0.25870	.	.	0.6521	-0.1292	3.0665	0.18510	0.14702	-0.03423
Thailand	0	-0.1909	0.3183	-0.29460	-0.05080	0.03670	661.28	0.8109	0.3830	0.5892	0.27350	0.19087	-0.17609
Tunisia	0	-0.1321	0.1656	-0.07290	-0.06950	0.06000	1260.15	0.7813	0.0514	0.4341	0.44770	0.14773	-0.07993
Turkey	1	-0.1596	0.1545	-0.04210	-0.11080	0.00510	1347.51	0.7335	0.0424	3.6887	0.09890	0.15964	-0.01814
Uruguay	0	-0.2355	0.3305	-0.14680	-0.01860	0.05800	3126.53	0.8742	-0.1297	0.6939	0.20870	0.26363	-0.13252
Venezuela	0	-0.1434	0.3729	-0.19270	-0.27910	-0.02010	4237.74	0.6708	-0.0694	0.9703	0.41090	0.14342	-0.09522
Yugoslavia	0	-0.1623	0.1823	-0.15100	-0.01250	0.05930	2620.64	0.8784	0.0234	0.8814	0.27070	0.16227	-0.13292
Zaire	0	-0.4638	0.0780	-0.10600	0.02340	-0.02790	241.29	1.1928	-0.2201	2.1244	0.24600	0.32327	-0.08878
Zambia	0	-0.1656	0.0430	-0.03220	-0.09800	-0.06150	711.07	0.8013	-0.0827	2.6837	0.42210	0.19159	-0.03198
Average		-0.24255	0.22412	-0.12730	-0.09714	0.023264	1668.00	0.82668	0.11691	1.58761	0.305300	0.251050	-0.107572
Standard Deviation		0.17213	0.17147	0.08071	0.14915	0.035447	1357.86	0.15899	0.30173	0.97601	0.151146	0.177106	0.072422

1979 Data for 40 Developing Countries: Rescheduling Index (Y) and Economic Indicators

COUNTRY	Y	DSR	RSM	AMZ	SQCA	GRO	GDP	X/M	XGR	NDX	M/GDP	DSR1	AMZ1
Algeria	0	-0.2735	0.2204	-0.12420	-0.02400	0.13690	1999.88	0.8726	0.0837	1.4539	0.36170	0.27348	-0.10820
Argentina	0	-0.1952	0.8952	-0.07500	-0.00270	-0.00890	5617.53	0.9456	-0.0442	1.1660	0.09530	0.19517	-0.05568
Bolivia	0	-0.3496	0.1348	-0.08280	-0.20680	-0.02150	957.48	0.6604	-0.0446	2.7180	0.29270	0.38931	-0.08409
Brazil	0	-0.6691	0.3147	-0.14360	-0.33870	0.02290	2122.00	0.6318	0.1113	2.8580	0.13540	0.66953	-0.12477
Burma	0	-0.1899	0.1995	-0.06250	-0.92740	0.05600	164.72	0.4779	0.0124	2.2129	0.19190	0.18989	-0.05667
Cameroon	0	-0.0813	0.0682	-0.05550	-0.00420	0.02880	734.05	0.9338	0.1884	1.1558	0.34550	0.08132	-0.04768
Chile	0	-0.4524	0.3209	-0.23140	-0.06280	0.06040	2342.44	0.7858	0.0053	1.5640	0.29130	0.45354	-0.18668
Colombia	0	-0.1911	0.8514	-0.14940	0.00790	0.02040	1264.29	1.0884	0.6518	0.4121	0.16160	0.26272	-0.16189
Costa Rica	0	-0.5042	0.0705	-0.30610	-0.25230	-0.02830	2209.88	0.6605	0.1626	1.7924	0.41680	0.50417	-0.24848
Dominican Rep	0	-0.3652	0.1400	-0.28700	-0.06210	0.03330	1179.64	0.7793	-0.0586	1.0282	0.30990	0.36524	-0.22199
Ecuador	0	-0.3799	0.2306	-0.21600	-0.06490	0.01930	1417.59	0.7893	0.0685	1.5378	0.33480	0.37986	-0.15088
Egypt	0	-0.1771	0.0521	-0.09610	-0.05110	0.06100	529.79	0.8027	0.3148	1.5266	0.56380	0.17711	-0.07081
El Salvador	0	-0.0718	0.1029	-0.04720	0.00020	-0.04100	824.68	1.0137	-0.0575	0.5291	0.40260	0.08635	-0.05235
Gabon	0	-0.3039	0.1463	-0.31780	0.01490	-0.01910	4116.39	1.2191	-0.1462	0.8616	0.54980	0.34480	-0.31579
Ghana	0	-0.0716	0.2579	-0.02660	0.01090	-0.03190	1334.24	1.0401	-0.3022	0.8447	0.10940	0.16890	-0.10612
Greece	0	-0.1141	0.1251	-0.14130	-0.04580	-0.00260	4175.74	0.8216	0.1772	0.6769	0.27820	0.12011	-0.10257
India	0	-0.0943	0.5470	-0.04440	0.00090	0.04580	233.66	0.9277	-0.0476	0.7477	0.10280	0.09438	-0.04287
Indonesia	0	-0.0752	0.2784	-0.06680	0.00390	0.07390	461.18	1.0648	0.1140	0.9310	0.28390	0.07852	-0.06302
Israel	0	-0.2311	0.2630	-0.04760	-0.01030	0.00760	5488.13	0.6893	0.0647	1.5823	0.75970	0.23115	-0.03742
Ivory Coast	0	-0.1959	0.0358	-0.12090	-0.17640	0.00840	1271.11	0.8024	-0.0567	1.3933	0.44890	0.19594	-0.09770
Jamaica	0	-0.2359	0.0443	-0.14420	-0.01200	0.06680	1316.71	0.8820	0.0753	1.2939	0.59450	0.23587	-0.11803
Malaysia	0	-0.0373	0.3410	-0.03970	0.00560	0.05490	1694.37	1.0815	0.1598	0.0008	0.54130	0.03734	-0.03965
Mexico	0	-0.6912	0.0956	-0.23790	-0.11640	0.05400	2547.61	0.7379	1.7820	2.5468	0.16120	0.69122	-0.20295
Morocco	0	-0.2261	0.1078	-0.07820	-0.17280	0.01010	880.02	0.7081	-0.0299	2.1785	0.32470	0.22610	-0.06815
Nigeria	0	-0.0313	0.3458	-0.01200	0.00850	-0.00580	1074.88	1.1283	0.0000	0.0380	0.22410	0.03130	-0.00621
Pakistan	0	-0.1592	0.0447	-0.03360	-0.05380	0.06600	272.64	0.7451	0.3293	2.4483	0.26160	0.15924	-0.03069
Peru	1	-0.4483	0.4301	-0.17080	0.03100	0.00210	988.87	1.1717	0.3462	1.8586	0.24940	0.50238	-0.15037
Philippines	0	-0.2489	0.2776	-0.15830	-0.05380	0.02180	713.29	0.7953	0.1098	1.7151	0.27490	0.24888	-0.09268
Portugal	0	-0.1697	0.1185	-0.17850	0.00000	0.05070	2376.52	0.9898	.	0.8934	0.38710	0.16968	-0.12570
Sierra Leone	0	-0.1621	0.1035	-0.07430	-0.54260	0.01200	329.66	0.5388	.	1.3675	0.46310	0.16209	-0.05859
South Korea	0	-0.1208	0.2360	-0.06930	-0.04520	-0.04460	1709.97	0.8097	0.2397	0.8804	0.37400	0.12081	-0.05006
Sudan	1	-0.1397	0.0482	-0.01630	-0.20960	.	.	0.6776	-0.3697	3.8245	0.18260	0.13965	-0.01793
Thailand	0	-0.2051	0.2093	-0.26750	-0.09780	0.04930	685.52	0.7566	0.2033	0.7179	0.32320	0.20508	-0.14669
Tunisia	0	-0.2604	0.1666	-0.07170	-0.00880	0.01530	1335.79	0.9017	0.1714	0.8985	0.48100	0.11674	-0.06403
Turkey	1	-0.3083	0.1063	-0.12550	-0.09190	-0.03090	1354.37	0.7530	0.0152	3.2671	0.08820	0.52162	-0.12650
Uruguay	0	-0.1197	0.2002	-0.04580	-0.08180	0.05270	3307.94	0.7737	-0.3425	0.8013	0.22000	0.11991	-0.03973
Venezuela	0	-0.1470	0.4708	-0.19480	0.00050	-0.05060	4152.69	1.0487	-0.0100	1.0166	0.32130	0.14696	-0.10074
Yugoslavia	0	-0.1590	0.0713	-0.11970	-0.07230	0.01820	2776.04	0.7738	-0.0112	1.0790	0.28680	0.15904	-0.10620
Zaire	1	-0.3607	0.1176	-0.09330	0.00580	-0.00820	234.55	1.0899	-0.1938	2.4075	0.27360	0.11763	-0.08529
Zambia	0	-0.1193	0.0574	-0.03350	0.00060	-0.00120	667.32	1.1019	-0.0559	1.9283	0.41540	0.17421	-0.05308
Average		-0.23341	0.22118	-0.12018	-0.09244	0.019333	1714.44	0.86180	0.09516	1.45386	0.322100	0.238681	-0.100473
Standard Deviation		0.15587	0.19589	0.08359	0.17608	0.039552	1406.31	0.17860	0.34149	0.84851	0.150309	0.163283	0.066079

1980 Data for 40 Developing Countries: Rescheduling Index (Y) and Economic Indicators

COUNTRY	Y	DSR	RSM	AMZ	SQCA	GRO	GD P	X/M	XGR	NDX	M/GDP	DSR1	AMZ1
Algeria	0	-0.2732	0.2593	-0.15210	0.00030	-0.01460	2273.70	0.9964	-0.0485	1.0284	0.34280	0.27320	-0.13576
Argentina	0	-0.3184	0.4198	-0.10200	-0.18170	-0.07830	5567.36	0.6998	-0.1796	1.8382	0.10180	0.31837	-0.06837
Bolivia	0	-0.4302	0.0860	-0.10150	-0.01250	-0.03690	936.94	0.8583	-0.0889	2.4502	0.23500	0.56805	-0.13689
Brazil	0	-0.5951	0.1591	-0.12640	-0.30240	-0.03720	2170.67	0.6424	0.2948	2.7593	0.13770	0.59507	-0.10835
Burma	0	-0.2427	0.2826	-0.05070	-0.49270	0.01960	173.94	0.5363	0.3562	2.4940	0.15760	0.24270	-0.04699
Cameroon	0	-0.1150	0.0740	-0.08880	-0.04390	0.04380	755.17	0.8225	0.2125	1.1068	0.39740	0.11496	-0.07739
Chile	0	-0.4044	0.3736	-0.18670	-0.09860	0.03750	2483.95	0.7507	0.0368	1.4329	0.30320	0.40441	-0.15055
Colombia	0	-0.1489	0.7795	-0.06680	-0.00120	0.00190	1290.03	0.9456	0.4599	0.3591	0.18560	0.14885	-0.04390
Costa Rica	0	-0.3126	0.0767	-0.09980	-0.29660	-0.03120	2147.34	0.6427	0.0138	2.1321	0.39260	0.33143	-0.09127
Dominican Rep	0	-0.3425	0.0930	-0.17330	-0.26020	0.01450	1218.88	0.6049	-0.0700	1.3727	0.32740	0.34248	-0.12563
Ecuador	0	-0.3677	0.2777	-0.17220	-0.04650	0.00960	1445.02	0.8158	0.0140	1.5537	0.31090	0.36767	-0.12847
Egypt	0	-0.2617	0.1073	-0.09030	-0.00450	0.04370	549.88	0.6685	0.4917	2.4939	0.44100	0.26172	-0.08808
El Salvador	0	-0.1039	0.0603	-0.10150	0.00060	-0.09890	790.86	0.9859	0.2757	0.6585	0.36140	0.11361	-0.08364
Gabon	0	-0.2361	0.0558	-0.26580	0.02590	-0.05210	4037.83	1.2637	-0.1261	0.6124	0.44990	0.23890	-0.23058
Ghana	0	-0.0908	0.1428	-0.04560	0.00058	-0.05080	1291.66	0.9602	-0.0387	0.8978	0.06660	0.12657	-0.06978
Greece	0	-0.1330	0.1153	-0.14030	-0.06970	-0.01240	4164.76	0.7169	0.1889	0.9679	0.29080	0.13318	-0.09368
India	0	-0.1038	0.3979	-0.04930	-0.02100	0.03830	244.37	0.7065	0.0188	0.9919	0.10760	0.10385	-0.04721
Indonesia	0	-0.0481	0.2779	-0.05940	0.01660	0.05520	495.24	1.1446	-0.0283	0.6978	0.26770	0.04813	-0.05260
Israel	0	-0.2622	0.2468	-0.05350	-0.00580	0.01640	5529.72	0.7215	0.0787	1.4467	0.63450	0.26220	-0.04230
Ivory Coast	0	-0.2341	0.0041	-0.12940	-0.25180	-0.01530	1281.77	0.7646	0.0556	1.6252	0.45020	0.23408	-0.10599
Jamaica	0	-0.2674	0.0626	-0.18570	-0.01360	0.01100	1228.80	0.8471	0.0072	1.2475	0.62940	0.28241	-0.14846
Malaysia	0	-0.0361	0.2905	-0.03960	-0.00037	0.04330	1787.33	0.9825	0.1341	-0.0352	0.61400	0.03611	-0.03962
Mexico	0	-0.3591	0.0895	-0.10030	-0.10980	0.05130	2685.28	0.7449	1.3585	2.1992	0.17750	0.35907	-0.08115
Morocco	0	-0.3186	0.0687	-0.06650	-0.18820	-0.05010	888.91	0.5632	-0.0613	2.3831	0.32580	0.39697	-0.08899
Nigeria	0	-0.0247	0.4643	-0.09910	0.03380	-0.06130	1068.41	1.2589	0.0537	-0.0485	0.25610	0.02472	-0.06280
Pakistan	0	-0.2286	0.0821	-0.04280	-0.09380	0.04540	290.64	0.4976	0.4441	3.1341	0.28430	0.23746	-0.04155
Peru	0	-0.4760	0.4019	-0.20700	0.00016	0.00430	990.99	0.9849	0.2147	1.6505	0.28730	0.47603	-0.15975
Philippines	0	-0.1866	0.2751	-0.07360	-0.05670	0.00920	728.83	0.7731	0.1877	1.8184	0.29360	0.18738	-0.04073
Portugal	0	-0.1891	0.0728	-0.09620	-0.02420	0.05320	2496.90	0.6273	.	1.2324	0.44240	0.18909	-0.07331
Sierra Leone	1	-0.1146	0.0606	-0.04830	-0.37450	0.04610	333.62	0.5337	.	1.4114	0.45830	0.11461	-0.03735
South Korea	0	-0.1694	0.1031	-0.08230	-0.05550	0.05280	1633.76	0.7964	0.1176	1.0082	0.45540	0.17143	-0.05801
Sudan	1	-0.3336	0.0309	-0.07850	-0.09600	.	.	0.6535	-0.3145	4.4942	0.19360	0.33358	-0.06762
Thailand	0	-0.2378	0.1436	-0.29010	-0.61820	0.04080	719.34	0.7553	0.1550	0.8201	0.32470	0.23775	-0.17711
Tunisia	0	-0.1423	0.1529	-0.07270	-0.01390	0.02770	1356.29	0.7781	0.1196	0.8026	0.44530	0.15377	-0.07807
Turkey	1	-0.7382	0.1164	-0.13680	-0.86210	0.01980	1312.49	0.3969	-0.1119	4.9562	0.16250	0.79965	-0.11463
Uruguay	0	-0.1437	0.1661	-0.05780	-0.19800	0.01200	3482.28	0.6895	-0.1467	0.8005	0.22810	0.14553	-0.05105
Venezuela	0	-0.1532	0.3870	-0.15050	0.04520	-0.03270	3942.71	1.3028	0.0090	1.0339	0.28820	0.17836	-0.09981
Yugoslavia	1	-0.2358	0.0676	-0.10930	-0.02810	0.00550	2826.64	0.6746	0.0857	1.2398	0.32470	0.23582	-0.12444
Zaire	1	-0.3607	0.0809	-0.09330	-0.00477	0.02000	232.63	0.8657	-0.1287	2.0547	0.41130	0.36068	-0.08181
Zambia	0	-0.2593	0.0380	-0.14500	-0.11140	0.06170	666.51	0.7808	-0.0860	1.9685	0.53020	0.25925	-0.09272
Average		-0.24998	0.18610	-0.11077	-0.12038	0.005456	1731.32	0.79387	0.10408	1.57728	0.327360	0.260227	-0.091160
Standard Deviation		0.14733	0.15949	0.05898	0.19088	0.041087	1404.35	0.20697	0.27776	1.03611	0.141885	0.158068	0.043496

1981 Data for 40 Developing Countries: Rescheduling Index (Y) and Economic Indicators

COUNTRY	Y	DSR	RSM	AMZ	SQCA	GRO	GDP	X/M	XGR	NDX	M/GDP	DSR1	AMZ1
Algeria	0	-0.2895	0.2416	-0.16010	0.00003	-0.08230	2240.40	0.9853	-0.1717	0.9237	0.34410	0.28946	-0.14016
Argentina	0	-0.4714	0.1988	-0.10450	-0.15880	-0.06070	5131.67	0.7193	0.0694	2.5761	0.13200	0.65594	-0.14415
Bolivia	1	-0.5587	0.0735	-0.10090	-0.07670	-0.11180	902.41	0.7609	-0.0280	2.9244	0.20430	0.58023	-0.09491
Brazil	0	-0.6515	0.1695	-0.13030	-0.18950	-0.01290	2089.82	0.6930	0.4149	2.7172	0.13680	0.65209	-0.10533
Burma	0	-0.2539	0.2237	-0.06120	-0.25510	0.03240	177.35	0.6074	0.2577	2.3823	0.17380	0.25387	-0.05953
Cameroon	0	-0.1608	0.0321	-0.11300	-0.04650	0.02430	788.28	0.8392	0.1208	1.0993	0.40180	0.16084	-0.10022
Chile	0	-0.6614	0.3074	-0.19300	-0.71080	-0.15580	2577.05	0.5370	0.0419	2.3893	0.32030	0.66139	-0.14814
Colombia	0	-0.2934	0.6713	-0.11870	-0.15290	-0.01070	1292.48	0.7012	0.0000	0.7801	0.19650	0.29337	-0.07871
Costa Rica	0	-0.4430	0.0804	-0.09760	-0.11640	-0.09280	2080.30	0.7338	-0.0678	2.6129	0.62270	0.51855	-0.10814
Dominican Rep	0	-0.3017	0.1061	-0.11810	-0.07090	-0.01160	1236.58	0.7179	-0.1673	1.3557	0.29220	0.31802	-0.09983
Ecuador	0	-0.4566	0.1570	-0.17580	-0.11140	-0.01750	1458.85	0.7451	-0.0769	2.2285	0.28870	0.48942	-0.14417
Egypt	0	-0.3235	0.0634	-0.10810	-0.09470	0.02710	569.96	0.6138	0.4014	2.5674	0.45620	0.31629	-0.07612
El Salvador	0	-0.1653	0.0561	-0.12920	-0.06660	-0.07020	712.68	0.7574	-0.1925	1.0911	0.37030	0.18068	-0.11340
Gabon	0	-0.1699	0.0963	-0.21570	0.02570	-0.00840	3827.64	1.2269	-0.1892	0.3963	0.53450	0.16988	-0.18296
Ghana	0	-0.1423	0.1090	-0.04720	-0.25590	-0.09470	1226.04	0.6228	0.0892	1.5299	0.05435	0.17701	-0.06363
Greece	0	-0.1694	0.0796	-0.11970	-0.06830	-0.00780	4113.22	0.7173	0.0430	1.0561	0.34770	0.16942	-0.08119
India	0	-0.1007	0.2624	-0.04120	-0.04890	-0.02250	253.73	0.6822	0.0255	1.3124	0.10510	0.10072	-0.03848
Indonesia	0	-0.0469	0.1944	-0.05740	-0.00052	0.00010	522.60	0.9665	-0.1535	0.7105	0.30160	0.04688	-0.04982
Israel	0	-0.2791	0.2358	-0.05020	-0.01660	-0.01100	5620.26	0.7022	0.1436	1.6559	0.64740	0.27908	-0.04078
Ivory Coast	0	-0.2926	0.0046	-0.09120	-0.23430	-0.00600	1262.15	0.7577	0.2022	2.2878	0.45160	0.29257	-0.07492
Jamaica	1	-0.3398	0.0434	-0.20320	-0.05040	-0.00390	1242.26	0.7649	0.0381	1.3584	0.66320	0.34706	-0.16500
Malaysia	0	-0.0494	0.2509	-0.05180	-0.03210	0.02950	1864.71	0.8499	0.0051	0.1240	0.65070	0.04940	-0.05180
Mexico	0	-0.4228	0.0911	-0.11080	-0.20880	-0.03090	2822.98	0.6800	1.0829	2.4278	0.18670	0.42279	-0.07944
Morocco	0	-0.4084	0.0382	-0.07920	-0.35570	0.02000	844.38	0.5127	0.0462	3.0730	0.40530	0.40843	-0.06876
Nigeria	0	-0.0506	0.1532	-0.10730	-0.09990	-0.03300	1002.96	0.7746	-0.2300	0.4136	0.33160	0.05061	-0.06443
Pakistan	0	-0.1669	0.1057	-0.02590	-0.06600	0.01200	303.83	0.5212	0.2354	2.7527	0.23840	0.16691	-0.02299
Peru	0	-0.6356	0.1960	-0.23230	-0.16730	-0.01800	995.30	0.6905	-0.0429	2.1492	0.30160	0.63806	-0.17386
Philippines	0	-0.2441	0.1849	-0.08150	-0.05780	0.00530	735.55	0.7675	0.2672	2.1809	0.28910	0.24410	-0.04210
Portugal	0	-0.3134	0.0450	-0.13450	-0.16630	0.03050	2629.80	0.5383	.	1.6628	0.49600	0.31337	-0.09784
Sierra Leone	0	-0.1297	0.0406	-0.03430	-0.39450	0.04090	349.01	0.5265	.	2.1167	0.35270	0.33577	-0.13207
South Korea	0	-0.1866	0.0826	-0.08630	-0.02890	0.03890	1719.96	0.8415	0.2044	1.0009	0.47270	0.18707	-0.05370
Sudan	1	-0.1936	0.0076	-0.02620	-0.25320	.	.	0.5618	-0.4211	4.5147	0.25130	0.19361	-0.02127
Thailand	0	-0.2233	0.1444	-0.13820	-0.08570	0.01950	748.67	0.7314	0.1488	1.0344	0.33290	0.22326	-0.09678
Tunisia	0	-0.1677	0.1298	-0.09500	-0.05720	-0.02060	1393.92	0.7984	-0.0341	0.9737	0.48990	0.16770	-0.08775
Turkey	0	-0.4483	0.0883	-0.08100	-0.10140	0.02400	1338.49	0.5726	0.1512	3.0856	0.18220	0.47402	-0.07410
Uruguay	0	-0.1398	0.1855	-0.03100	-0.06240	-0.10010	3524.18	0.7967	0.6294	0.9448	0.20480	0.14127	-0.02658
Venezuela	0	-0.1867	0.4060	-0.13910	0.02660	-0.02230	3813.95	1.2192	-0.1088	0.9691	0.30270	0.19724	-0.07482
Yugoslavia	0	-0.2494	0.0761	-0.09890	-0.00370	-0.00110	2842.11	0.7512	0.1582	1.2103	0.33210	0.24944	-0.10474
Zaire	1	-0.5027	0.0659	-0.09950	-0.06750	-0.05830	237.29	0.7096	0.1366	2.8500	0.42410	0.50269	-0.08827
Zambia	0	0.2340	0.0303	-0.05280	-0.40100	-0.06050	707.63	0.6253	-0.1081	3.0501	0.46190	0.30226	-0.06134
Average		-0.27641	0.14321	-0.10355	-0.13206	-0.021049	1723.09	0.73302	0.07687	1.81224	0.343796	0.305519	-0.088310
Standard Deviation		0.18464	0.12355	0.05177	0.14291	0.046806	1370.17	0.15877	0.26097	0.95676	0.153544	0.173933	0.041186

1982 Data for 40 Developing Countries: Rescheduling Index (Y) and Economic Indicators

COUNTRY	Y	DSR	RSM	AMZ	SQCA	GRO	GDP	X/M	XGR	NDX	M/GDP	DSR1	AMZ1
Algeria	0	-0.3224	0.1628	-0.23340	-0.00016	-0.04845	2056.10	0.9656	-0.1574	0.9925	0.32740	0.13308	-0.01717
Argentina	1	-0.6448	0.2064	-0.05890	-0.05850	0.01140	4820.00	0.8012	0.1741	4.2290	0.21300	0.98682	-0.13832
Bolivia	1	-0.7459	0.1473	-0.10620	-0.01020	-0.10080	801.52	0.8703	0.0098	3.2705	0.17360	0.79310	-0.10777
Brazil	1	-0.8800	0.0987	-0.12560	-0.48240	-0.05290	2062.93	0.5899	0.2685	3.7088	0.14100	0.89548	-0.10607
Burma	0	-0.2345	0.0964	-0.03480	-0.93080	0.02380	183.10	0.4775	-0.0773	3.7648	0.18010	0.23454	-0.03335
Cameroon	0	-0.1485	0.0287	-0.10660	-0.03470	0.02380	807.43	0.9099	-0.0773	1.2372	0.35400	0.14846	-0.09615
Chile	1	-0.6899	0.2399	-0.09940	-0.19990	-0.02320	2175.58	0.6811	0.0914	3.0141	0.31090	0.70016	-0.07889
Colombia	0	-0.3156	0.4805	-0.07130	-0.37700	-0.00390	1278.60	0.6189	-0.1500	1.2951	0.20620	0.31561	-0.04862
Costa Rica	1	-0.6038	0.1563	-0.10940	-0.05450	-0.02200	1887.20	0.7898	0.0591	2.8339	0.55490	0.64489	-0.10238
Dominican Rep	0	-0.3756	0.0719	-0.10450	-0.14860	0.00100	1222.25	0.6392	-0.0921	2.0654	0.22470	0.43943	-0.10676
Ecuador	1	-0.7295	0.0770	-0.22350	-0.19100	-0.05560	1433.31	0.6923	-0.0092	2.6617	0.28520	0.87861	-0.21749
Egypt	0	-0.3477	0.0604	-0.10250	-0.06570	0.06030	585.42	0.6250	0.1620	2.6886	0.39850	0.34773	-0.07717
El Salvador	0	-0.2440	0.0908	-0.13130	-0.03050	-0.00490	662.66	0.7297	-0.4237	1.4858	0.33330	0.29715	-0.14256
Gabon	0	-0.1714	0.1574	-0.24740	0.01770	0.01020	3795.48	1.1860	-0.2115	0.3152	0.54780	0.17138	-0.21446
Ghana	0	-0.1701	0.1535	-0.04490	-0.02310	0.02940	1109.90	0.7888	-0.0920	1.6782	0.04203	0.21015	-0.05538
Greece	0	-0.2087	0.0755	-0.11780	-0.05730	-0.00230	4081.06	0.6931	-0.1148	1.3112	0.29840	0.21612	-0.08731
India	0	-0.1140	0.2369	-0.04130	-0.03910	0.05560	248.03	0.7011	0.0321	1.6085	0.10450	0.11474	-0.03809
Indonesia	0	-0.0609	0.1176	-0.06100	-0.06270	0.01930	522.63	0.7955	-0.2233	1.0986	0.29650	0.06091	-0.05219
Israel	0	-0.3251	0.2577	-0.04100	-0.04020	-0.00200	5558.32	0.6779	0.0236	1.8537	0.63520	0.32513	-0.03255
Ivory Coast	0	-0.3206	0.0006	-0.08620	-0.12200	-0.17020	1254.53	0.8190	0.2105	2.7344	0.46750	0.32063	-0.06638
Jamaica	0	-0.4050	0.0566	-0.19680	-0.08660	0.00220	1237.45	0.7123	-0.1124	1.8061	0.58690	0.40501	-0.14474
Malaysia	0	-0.0584	0.2109	-0.02500	-0.06340	0.03720	1919.72	0.8003	-0.0148	0.3196	0.66560	0.05840	-0.02407
Mexico	1	-0.7738	0.0245	-0.17200	-0.05030	-0.07620	2735.65	0.8137	0.8987	3.0659	0.20410	0.94197	-0.17664
Morocco	0	-0.4095	0.0374	-0.06960	-0.40550	-0.02760	861.58	0.5055	0.0402	3.6933	0.38940	0.40949	-0.05728
Nigeria	0	-0.0905	0.0817	-0.06450	-0.31440	-0.11490	970.15	0.6544	-0.4583	0.9788	0.26910	0.09054	-0.04077
Pakistan	0	-0.3061	0.1357	-0.05110	-0.06340	0.03670	307.57	0.4462	0.0601	3.2223	0.26210	0.32202	-0.04786
Peru	1	-0.5605	0.2263	-0.17870	-0.14750	-0.14240	977.72	0.7025	-0.0140	2.5977	0.29430	0.61584	-0.15141
Philippines	0	-0.3720	0.0760	-0.09500	-0.15980	-0.01120	731.65	0.6847	0.1367	2.9083	0.29310	0.37197	-0.04749
Portugal	0	-0.3860	0.0379	-0.12090	-0.30330	0.04185	2710.03	0.5002	.	2.1812	0.50490	0.38603	-0.08414
Sierra Leone	1	-0.1299	0.0228	-0.03030	-1.16370	-0.03500	363.29	0.4030	.	3.1649	0.28750	0.14698	-0.02814
South Korea	0	-0.1959	0.0890	-0.08360	-0.00870	0.07780	1786.80	0.8992	0.2789	1.1059	0.43620	0.19590	-0.05234
Sudan	1	-0.2863	0.0161	-0.01550	-0.07010	.	.	0.7191	-0.4113	6.8138	0.19270	0.28635	-0.01224
Thailand	0	-0.2378	0.1450	-0.10840	-0.01300	0.03760	763.29	0.8279	0.2082	1.2139	0.28830	0.23780	-0.07247
Tunisia	0	-0.1926	0.1548	-0.09160	-0.05720	0.03210	1365.18	0.7028	-0.0534	1.2217	0.48400	0.19263	-0.08421
Turkey	1	-0.3993	0.0968	-0.10020	-0.01390	0.01270	1370.59	0.7106	0.7724	2.3851	0.21140	0.39934	-0.08215
Uruguay	1	-0.2602	0.0601	-0.05660	-0.01940	-0.06490	3171.55	0.8730	0.5796	1.3160	0.20850	0.26142	-0.04449
Venezuela	0	-0.3105	0.2773	-0.17100	-0.04450	-0.08200	3728.90	0.8480	-0.1656	1.2547	0.34970	0.35212	-0.10631
Yugoslavia	1	-0.2632	0.0382	-0.08844	-0.00096	-0.02050	2838.87	0.7576	0.0579	1.2542	0.34860	0.26317	-0.09449
Zaire	1	-0.5032	0.0183	-0.08930	-0.07900	-0.01600	223.46	0.7160	0.2557	3.0216	0.39280	0.50324	-0.07671
Zambia	1	-0.2206	0.0351	-0.04350	-0.31910	-0.05260	664.81	0.6536	-0.0318	3.3031	0.28020	0.22058	-0.02764
Average		-0.35036	0.11892	-0.09998	-0.15736	-0.015810	1673.70	0.72456	0.03761	2.26688	0.326103	0.372373	-0.081870
Standard Deviation		0.20886	0.09487	0.05763	0.24190	0.055475	1324.14	0.14801	0.27869	1.25421	0.144000	0.250035	0.050330

1983 Data for 40 Developing Countries: Rescheduling Index (Y) and Economic Indicators

COUNTRY	Y	DSR	RSM	AMZ	SQCA	GRO	GDP	X/M	XGR	NDX	M/GDP	DSR1	AMZ1
Algeria	0	-0.3444	0.1349	-0.23730	-0.00004	-0.04850	2056.10	0.9768	-0.1574	0.9569	0.28770	0.34437	-0.19815
Argentina	1	-1.0118	0.0959	-0.16840	-0.06230	0.01470	4875.00	0.7989	0.0693	4.5930	0.18850	1.13638	-0.13249
Bolivia	1	-0.7341	0.1407	-0.10790	-0.02890	-0.10080	720.71	0.7750	-0.1106	4.1323	0.19620	0.75194	-0.10365
Brazil	1	-0.8220	0.1392	-0.13670	-0.07870	0.02200	1953.73	0.7792	0.0699	3.7410	0.15080	0.93031	-0.13865
Burma	0	-0.4110	0.1030	-0.05980	-0.60330	0.04210	187.45	0.5102	0.1659	5.0330	0.14010	0.41098	-0.05714
Cameroon	0	-0.2231	0.0716	-0.12300	-0.03800	0.02380	826.63	0.9562	-0.2431	1.1853	0.32320	0.22310	-0.10497
Chile	1	-0.7786	0.3412	-0.14100	-0.05410	0.04550	2125.04	0.8047	0.1859	3.3664	0.30200	0.92836	-0.15528
Colombia	0	-0.3926	0.2711	-0.08650	-0.53540	0.01130	1273.65	0.5853	-0.0486	2.3203	0.18100	0.40052	-0.06341
Costa Rica	1	-0.5579	0.2040	-0.10390	-0.05750	0.03650	1845.70	0.7754	0.0455	3.3838	0.49640	0.56877	-0.08845
Dominican Rep	0	-0.3990	0.0909	-0.10480	-0.11370	-0.01930	1223.52	0.6625	0.0234	2.2001	0.21980	0.43825	-0.09994
Ecuador	1	-0.7914	0.2289	-0.26330	-0.00150	0.01130	1353.59	0.9545	0.0648	2.7837	0.22170	1.16921	-0.32115
Egypt	0	-0.3715	0.0679	-0.10860	-0.00320	0.06030	620.75	0.6392	0.1620	2.9080	0.31530	0.37148	-0.08184
El Salvador	0	-0.2868	0.1317	-0.10620	-0.00510	0.00200	659.41	0.7465	-0.1047	1.6731	0.30140	0.44803	-0.21525
Gabon	0	-0.1743	0.0909	-0.29600	0.00110	0.01020	3834.20	1.0785	-0.0500	0.3502	0.59380	0.17430	-0.24443
Ghana	0	-0.4823	0.1999	-0.13530	-0.13290	0.02940	1077.23	0.6595	-0.0936	2.8492	0.02972	0.76483	-0.21432
Greece	0	-0.2329	0.0833	-0.10170	-0.06840	0.02290	4071.68	0.6638	-0.0179	1.7066	0.31220	0.24867	-0.08584
India	0	-0.1381	0.2753	-0.03590	-0.02620	0.01640	261.82	0.6729	0.0388	1.9342	0.09342	0.13806	-0.02995
Indonesia	0	-0.0954	0.1412	-0.05760	-0.10110	0.01930	532.73	0.7570	-0.0549	1.3273	0.32490	0.09538	-0.04717
Israel	0	-0.3078	0.2415	-0.03320	-0.04570	0.00530	5547.44	0.6566	0.1823	1.9862	0.58430	0.31524	-0.03007
Ivory Coast	1	-0.3442	0.0064	-0.06280	-0.13100	-0.17020	1041.07	0.8145	-0.0636	3.0239	0.46890	0.36533	-0.05690
Jamaica	1	-0.5001	0.0353	-0.24320	-0.07100	-0.01690	1240.23	0.7448	-0.2718	2.1698	0.50110	0.55192	-0.20584
Malaysia	0	-0.0674	0.1930	-0.02260	-0.04640	0.04970	1991.16	0.8282	0.1015	0.4513	0.65110	0.06738	-0.02185
Mexico	1	-0.7514	0.1657	-0.19390	0.03460	0.01030	2527.28	1.2126	0.6103	3.1360	0.16540	0.93527	-0.19567
Morocco	1	-0.3729	0.0223	-0.05460	-0.09200	-0.02760	837.80	0.6096	0.0686	3.9003	0.36150	0.37289	-0.04455
Nigeria	1	-0.1650	0.0668	-0.12360	-0.15500	-0.08600	858.64	0.7436	-0.3780	1.6920	0.22910	0.16499	-0.08608
Pakistan	0	-0.2785	0.2765	-0.04390	0.00005	0.01230	318.87	0.4962	0.0479	2.7335	0.25590	0.27851	-0.03802
Peru	1	-0.6663	0.2763	-0.17210	-0.05140	0.02080	838.50	0.7786	0.0299	2.8740	0.30600	0.68675	-0.12692
Philippines	1	-0.3585	0.0658	-0.08060	-0.11440	-0.07410	723.46	0.7161	0.0353	2.8432	0.32810	0.50719	-0.09011
Portugal	0	-0.3312	0.0383	-0.12110	-0.02090	0.04185	2710.03	0.6903	.	2.0363	0.48690	0.33123	-0.08592
Sierra Leone	0	-0.1621	0.0792	-0.03230	-0.01680	-0.03500	350.59	0.6598	.	3.5378	0.17710	0.16208	-0.02515
South Korea	0	-0.1763	0.0720	-0.08960	-0.00278	0.06260	1925.84	0.9335	0.2431	1.1007	0.42440	0.17625	-0.05494
Sudan	1	-0.3532	0.0130	-0.01220	-0.06970	.	.	0.6356	0.5844	8.3021	0.19270	0.35325	-0.00991
Thailand	0	-0.2539	0.1297	-0.10930	-0.11760	0.04220	792.01	0.6765	0.1281	1.4630	0.30830	0.25393	-0.07579
Tunisia	0	-0.2129	0.1547	-0.09410	-0.05080	0.03210	1408.98	0.7055	-0.0606	1.3798	0.45400	0.21287	-0.08567
Turkey	0	-0.4496	0.1108	-0.12780	-0.05710	0.01270	1387.94	0.6833	0.5191	2.4115	0.22860	0.44956	-0.10470
Uruguay	1	-0.4087	0.1340	-0.13600	-0.00160	-0.03050	2965.84	0.9542	0.0343	2.0932	0.28310	0.63255	-0.22262
Venezuela	1	-0.2798	0.6017	-0.08750	0.06520	-0.04050	3423.11	1.3651	-0.1571	1.4195	0.18790	0.43783	-0.13317
Yugoslavia	1	-0.3279	0.0588	-0.07802	0.00043	-0.02050	2780.68	0.7966	-0.0585	1.4615	0.37730	0.33438	-0.13701
Zaire	1	-0.4285	0.0476	-0.08280	-0.03530	-0.00300	219.89	0.7722	0.0144	3.0276	0.46550	0.42853	-0.07136
Zambia	1	-0.2405	0.0435	-0.02770	-0.04390	-0.04540	629.83	0.8679	0.0774	3.3848	0.37510	0.25014	-0.02127
Average		-0.39210	0.14111	-0.11007	-0.07331	-0.001558	1641.49	0.77844	0.04294	2.57181	0.312261	0.445275	-0.107640
Standard Deviation		0.22047	0.11220	0.06621	0.12496	0.047650	1311.59	0.17329	0.20348	1.42737	0.142738	0.278304	0.072151

Statistics for Economic Indicators (1974-83)

VARIABLE	N	MEAN	STD DEV	MINIMUM	MAXIMUM
DSR	400	-0.243	0.175	-1.0118	0.234
RSM	400	0.203	0.227	0.0006	2.360
AMZ	400	-0.114	0.070	-0.4526	-0.012
SQCA	400	-0.108	0.183	-1.2213	0.237
GRO	390	0.010	0.047	-0.1702	0.137
GDP	390	1653.142	1342.371	139.9900	5683.320
X/M	400	0.811	0.196	0.3969	1.991
XGR	380	0.093	0.330	-0.6333	2.216
NDX	400	1.576	1.126	-0.6846	8.302
M/GDP	400	0.321	0.153	0.0297	1.351
DSR1	400	0.262	0.195	0.0057	1.169
AMZ1	400	-0.108	0.068	-0.4526	-0.006

Correlation Matrix for Economic Indicators (1974-83)
(Table Entries: Correlation / Probability(Correlation > 0)

	DSR	RSM	AMZ	SQCA	GRO	GDP	X/M	XGR	NDX	M/GDP	DSR1	AMZ1
DSR	1.00000 0.0000	0.14994 0.0026	0.31573 0.0001	0.20144 0.0001	0.16354 0.0012	-0.12453 0.0139	0.28127 0.0001	-0.17160 0.0008	-0.64500 0.0001	0.15120 0.0024	-0.95786 0.0001	0.26494 0.0001
RSM	0.14994 0.0026	1.00000 0.0000	-0.15171 0.0023	0.21199 0.0001	0.08726 0.0853	0.24200 0.0001	0.45601 0.0001	0.06997 0.1735	-0.33161 0.0001	-0.12804 0.0104	-0.14117 0.0047	-0.18025 0.0003
AMZ	0.31573 0.0001	-0.15171 0.0023	1.00000 0.0000	-0.10273 0.0400	-0.11925 0.0185	-0.22724 0.0001	-0.16527 0.0009	-0.01377 0.7890	0.19762 0.0001	-0.05229 0.2968	-0.28841 0.0001	0.87952 0.0001
SQCA	0.20144 0.0001	0.21199 0.0001	-0.10273 0.0400	1.00000 0.0000	0.10710 0.0345	0.18404 0.0003	0.64745 0.0001	0.01695 0.7418	-0.39112 0.0001	0.06005 0.2308	-0.18873 0.0001	-0.13242 0.0080
GRO	0.16354 0.0012	0.08726 0.0853	-0.11925 0.0185	0.10710 0.0345	1.00000 0.0000	-0.08694 0.0864	-0.01131 0.8238	0.16129 0.0019	-0.20546 0.0001	0.01186 0.8155	-0.18598 0.0002	-0.11540 0.0227
GDP	-0.12453 0.0139	0.24200 0.0001	-0.22724 0.0001	0.18404 0.0003	-0.08694 0.0864	1.00000 0.0000	0.17938 0.0004	0.07567 0.1463	-0.12619 0.0126	0.23272 0.0001	0.14249 0.0048	-0.22556 0.0001
X/M	0.28127 0.0001	0.45601 0.0001	-0.16527 0.0009	0.64745 0.0001	-0.01131 0.8238	0.17938 0.0004	1.00000 0.0000	-0.02954 0.5659	-0.50428 0.0001	-0.03398 0.4980	-0.25577 0.0001	-0.20855 0.0001
XGR	-0.17160 0.0008	0.06997 0.1735	-0.01377 0.7890	0.01695 0.7418	0.16129 0.0019	0.07567 0.1463	-0.02954 0.5659	1.00000 0.0000	0.10568 0.0395	-0.12507 0.0147	0.15302 0.0028	0.00025 0.9962
NDX	-0.64500 0.0001	-0.33161 0.0001	0.19762 0.0001	-0.39112 0.0001	-0.20546 0.0001	-0.12619 0.0126	-0.50428 0.0001	0.10568 0.0395	1.00000 0.0000	-0.22183 0.0001	0.64184 0.0001	0.20661 0.0001
M/GDP	0.15120 0.0024	-0.12804 0.0104	-0.05229 0.2968	0.06005 0.2308	0.01186 0.8155	0.23272 0.0001	-0.03398 0.4980	-0.12507 0.0147	-0.22183 0.0001	1.00000 0.0000	-0.17176 0.0006	-0.00638 0.8988
DSR1	-0.95786 0.0001	-0.14117 0.0047	-0.28841 0.0001	-0.18873 0.0001	-0.18598 0.0002	0.14249 0.0048	-0.25577 0.0001	0.15302 0.0028	0.64184 0.0001	-0.17176 0.0006	1.00000 0.0000	-0.31626 0.0001
AMZ1	0.26494 0.0001	-0.18025 0.0003	0.87952 0.0001	-0.13242 0.0080	-0.11540 0.0227	-0.22556 0.0001	-0.20855 0.0001	0.00025 0.9962	0.20661 0.0001	-0.00638 0.8988	-0.31626 0.0001	1.00000 0.0000

Correlation Matrix for Economic Indicators in 1974
(Table Entries: Correlation / Probability(Correlation > 0)

	DSR	RSM	AMZ	SQCA	GRO	GDP	X/M	XGR	NDX	M/GDP	DSR1	AMZ1
DSR	1.00000	0.21477	0.42640	0.41759	-0.20716	-0.01466	0.44459	-0.01349	-0.67607	0.13167	-0.99257	0.41475
	0.0000	0.1832	0.0061	0.0073	0.2057	0.9294	0.0041	0.9359	0.0001	0.4180	0.0001	0.0078
RSM	0.21477	1.00000	-0.08797	0.36619	-0.09312	0.27393	0.63076	0.00623	-0.36471	-0.07547	-0.22422	-0.07103
	0.1832	0.0000	0.5894	0.0201	0.5729	0.0915	0.0001	0.9704	0.0207	0.6435	0.1642	0.6632
AMZ	0.42640	-0.08797	1.00000	0.02415	-0.37347	0.03856	0.06855	0.04603	0.13125	0.08928	-0.41168	0.95753
	0.0061	0.5894	0.0000	0.8824	0.0192	0.8157	0.6743	0.7838	0.4195	0.5838	0.0083	0.0001
SQCA	0.41759	0.36619	0.02415	1.00000	-0.14100	-0.00992	0.74226	-0.17076	-0.48271	-0.08649	-0.40052	0.00442
	0.0073	0.0201	0.8824	0.0000	0.3919	0.9522	0.0001	0.3054	0.0016	0.5957	0.0104	0.9784
GRO	-0.20716	-0.09312	-0.37347	-0.14100	1.00000	-0.26085	-0.25896	0.12040	0.02533	-0.00330	0.18896	-0.37136
	0.2057	0.5729	0.0192	0.3919	0.0000	0.1087	0.1114	0.4778	0.8784	0.9841	0.2493	0.0199
GDP	-0.01466	0.27393	0.03856	-0.00992	-0.26085	1.00000	0.14304	0.07447	-0.03750	0.45466	0.00567	0.05932
	0.9294	0.0915	0.8157	0.9522	0.1087	0.0000	0.3850	0.6614	0.8207	0.0036	0.9727	0.7198
X/M	0.44459	0.63076	0.06855	0.74226	-0.25896	0.14304	1.00000	-0.09475	-0.54618	-0.17660	-0.43575	0.05238
	0.0041	0.0001	0.6743	0.0001	0.1114	0.3850	0.0000	0.5715	0.0003	0.2757	0.0049	0.7482
XGR	-0.01349	0.00623	0.04603	-0.17076	0.12040	0.07447	-0.09475	1.00000	0.04288	-0.05077	0.00157	0.05867
	0.9359	0.9704	0.7838	0.3054	0.4778	0.6614	0.5715	0.0000	0.7982	0.7621	0.9925	0.7264
NDX	-0.67607	-0.36471	0.13125	-0.48271	0.02533	-0.03750	-0.54618	0.04288	1.00000	-0.08714	0.67099	0.13770
	0.0001	0.0207	0.4195	0.0016	0.8784	0.8207	0.0003	0.7982	0.0000	0.5929	0.0001	0.3968
M/GDP	0.13167	-0.07547	0.08928	-0.08649	-0.00330	0.45466	-0.17660	-0.05077	-0.08714	1.00000	-0.13681	0.09534
	0.4180	0.6435	0.5838	0.5957	0.9841	0.0036	0.2757	0.7621	0.5929	0.0000	0.3999	0.5584
DSR1	-0.99257	-0.22422	-0.41168	-0.40052	0.18896	0.00567	-0.43575	0.00157	0.67099	-0.13681	1.00000	-0.43348
	0.0001	0.1642	0.0083	0.0104	0.2493	0.9727	0.0049	0.9925	0.0001	0.3999	0.0000	0.0052
AMZ1	0.41475	-0.07103	0.95753	0.00442	-0.37136	0.05932	0.05238	0.05867	0.13770	0.09534	-0.43348	1.00000
	0.0078	0.6632	0.0001	0.9784	0.0199	0.7198	0.7482	0.7264	0.3968	0.5584	0.0052	0.0000

Correlation Matrix for Economic Indicators in 1975
(Table Entries: Correlation / Probability(Correlation > 0)

	DSR	RSM	AMZ	SQCA	GRO	GDP	X/M	XGR	NDX	M/GDP	DSR1	AMZ1
DSR	1.00000	0.20043	0.14421	0.56159	0.11484	-0.23801	0.61379	-0.11003	-0.74739	0.05861	-0.93742	0.19990
	0.0000	0.2150	0.3746	0.0002	0.4863	0.1445	0.0001	0.5108	0.0001	0.7194	0.0001	0.2162
RSM	0.20043	1.00000	-0.36128	0.22724	0.14526	0.33247	0.49525	0.19096	-0.35207	0.08966	-0.20023	-0.37101
	0.2150	0.0000	0.0220	0.1585	0.3776	0.0386	0.0012	0.2508	0.0259	0.5822	0.2154	0.0184
AMZ	0.14421	-0.36128	1.00000	-0.24359	-0.20544	-0.23393	-0.19682	-0.02642	0.29863	-0.03811	-0.10548	0.88464
	0.3746	0.0220	0.0000	0.1299	0.2096	0.1518	0.2235	0.8749	0.0612	0.8154	0.5171	0.0001
SQCA	0.56159	0.22724	-0.24359	1.00000	0.14227	0.12636	0.76752	0.02507	-0.69965	0.01841	-0.46023	-0.24364
	0.0002	0.1585	0.1299	0.0000	0.3876	0.4434	0.0001	0.8812	0.0001	0.9102	0.0028	0.1298
GRO	0.11484	0.14526	-0.20544	0.14227	1.00000	-0.04884	0.13462	0.11157	-0.30348	-0.15691	-0.24271	0.00940
	0.4863	0.3776	0.2096	0.3876	0.0000	0.7678	0.4139	0.5109	0.0604	0.3401	0.1366	0.9547
GDP	-0.23801	0.33247	-0.23393	0.12636	-0.04884	1.00000	0.14171	0.14364	-0.05413	0.44047	0.28817	-0.31763
	0.1445	0.0386	0.1518	0.4434	0.7678	0.0000	0.3895	0.3964	0.7435	0.0050	0.0752	0.0488
X/M	0.61379	0.49525	-0.19682	0.76752	0.13462	0.14171	1.00000	0.03487	-0.69366	-0.12524	-0.53839	-0.20369
	0.0001	0.0012	0.2235	0.0001	0.4139	0.3895	0.0000	0.8354	0.0001	0.4413	0.0003	0.2074
XGR	-0.11003	0.19096	-0.02642	0.02507	0.11157	0.14364	0.03487	1.00000	0.06225	-0.09732	0.05964	-0.00615
	0.5108	0.2508	0.8749	0.8812	0.5109	0.3964	0.8354	0.0000	0.7104	0.5611	0.7221	0.9708
NDX	-0.74739	-0.35207	0.29863	-0.69965	-0.30348	-0.05413	-0.69366	0.06225	1.00000	-0.08148	0.68470	0.22968
	0.0001	0.0259	0.0612	0.0001	0.0604	0.7435	0.0001	0.7104	0.0000	0.6172	0.0001	0.1540
M/GDP	0.05861	0.08966	-0.03811	0.01841	-0.15691	0.44047	-0.12524	-0.09732	-0.08148	1.00000	-0.04624	-0.03994
	0.7194	0.5822	0.8154	0.9102	0.3401	0.0050	0.4413	0.5611	0.6172	0.0000	0.7769	0.8067
DSR1	-0.93742	-0.20023	-0.10548	-0.46023	-0.24271	0.28817	-0.53839	0.05964	0.68470	-0.04624	1.00000	-0.31168
	0.0001	0.2154	0.5171	0.0028	0.1366	0.0752	0.0003	0.7221	0.0001	0.7769	0.0000	0.0502
AMZ1	0.19990	-0.37101	0.88464	-0.24364	0.00940	-0.31763	-0.20369	-0.00615	0.22968	-0.03994	-0.31168	1.00000
	0.2162	0.0184	0.0001	0.1298	0.9547	0.0488	0.2074	0.9708	0.1540	0.8067	0.0502	0.0000

Correlation Matrix for Economic Indicators in 1976
(Table Entries: Correlation / Probability(Correlation > 0)

	DSR	RSM	AMZ	SQCA	GRO	GDP	X/M	XGR	NDX	M/GDP	DSR1	AMZ1
DSR	1.00000	0.15575	0.09163	0.49421	0.00237	-0.16509	0.45894	-0.36298	-0.72211	0.23375	-0.96149	0.08350
	0.0000	0.3372	0.5739	0.0012	0.9886	0.3152	0.0029	0.0251	0.0001	0.1466	0.0001	0.6085
RSM	0.15575	1.00000	-0.33956	0.30069	0.21569	0.36876	0.44796	0.03724	-0.34448	-0.04888	-0.15212	-0.35137
	0.3372	0.0000	0.0321	0.0594	0.1873	0.0209	0.0037	0.8244	0.0295	0.7645	0.3487	0.0262
AMZ	0.09163	-0.33956	1.00000	-0.06564	-0.26631	-0.34296	-0.05808	0.14622	0.35741	0.04806	-0.04640	0.95375
	0.5739	0.0321	0.0000	0.6874	0.1013	0.0326	0.7218	0.3810	*0.0236*	*0.7684*	*0.7762*	*0.0001*
SQCA	0.49421	0.30069	-0.06564	1.00000	0.23560	0.28886	0.80895	-0.15425	-0.56269	-0.03989	-0.37046	-0.16853
	0.0012	0.0594	0.6874	0.0000	0.1488	0.0745	0.0001	0.3552	0.0002	0.8069	0.0186	0.2985
GRO	0.00237	0.21569	-0.26631	0.23560	1.00000	0.04483	0.25978	-0.08864	-0.24832	-0.31121	-0.03710	-0.21853
	0.9886	0.1873	0.1013	0.1488	0.0000	0.7864	0.1102	0.6019	0.1274	0.0538	0.8226	0.1814
GDP	-0.16509	0.36876	-0.34296	0.28886	0.04483	1.00000	0.18569	0.09040	-0.10933	0.12982	0.25737	-0.45300
	0.3152	0.0209	0.0326	0.0745	0.7864	0.0000	0.2577	0.5947	0.5076	0.4309	0.1137	0.0038
X/M	0.45894	0.44796	-0.05808	0.80895	0.25978	0.18569	1.00000	-0.14542	-0.53255	-0.17237	-0.34515	-0.15501
	0.0029	0.0037	0.7218	0.0001	0.1102	0.2577	0.0000	0.3837	0.0004	0.2875	0.0292	0.3396
XGR	-0.36298	0.03724	0.14622	-0.15425	-0.08864	0.09040	-0.14542	1.00000	0.31618	-0.13901	0.29774	0.20854
	0.0251	0.8244	0.3810	0.3552	0.6019	0.5947	0.3837	0.0000	0.0531	0.4052	0.0694	0.2089
NDX	-0.72211	-0.34448	0.35741	-0.56269	-0.24832	-0.10933	-0.53255	0.31618	1.00000	-0.15362	0.70777	0.36482
	0.0001	0.0295	0.0236	0.0002	0.1274	0.5076	0.0004	0.0531	0.0000	0.3439	0.0001	0.0206
M/GDP	0.23375	-0.04888	0.04806	-0.03989	-0.31121	0.12982	-0.17237	-0.13901	-0.15362	1.00000	-0.28755	0.11245
	0.1466	0.7645	0.7684	0.8069	0.0538	0.4309	0.2875	0.4052	0.3439	0.0000	0.0720	0.4897
DSR1	-0.96149	-0.15212	-0.04640	-0.37046	-0.03710	0.25737	-0.34515	0.29774	0.70777	-0.28755	1.00000	-0.11575
	0.0001	0.3487	0.7762	0.0186	0.8226	0.1137	0.0292	0.0694	0.0001	0.0720	0.0000	0.4769
AMZ1	0.08350	-0.35137	0.95375	-0.16853	-0.21853	-0.45300	-0.15501	0.20854	0.36482	0.11245	-0.11575	1.00000
	0.6085	0.0262	0.0001	0.2985	0.1814	0.0038	0.3396	0.2089	0.0206	0.4897	0.4769	0.0000

Correlation Matrix for Economic Indicators in 1977
(Table Entries: Correlation / Probability(Correlation > 0)

	DSR	RSM	AMZ	SQCA	GRO	GDP	X/M	XGR	NDX	M/GDP	DSR1	AMZ1
DSR	1.00000	0.21174	0.22881	0.33951	0.10279	-0.09107	0.38303	-0.27906	-0.69512	0.10766	-0.97919	0.20806
	0.0000	0.1896	0.1556	0.0321	0.5335	0.5814	0.0147	0.0898	0.0001	0.5085	0.0001	0.1976
RSM	0.21174	1.00000	0.08714	0.28508	0.03941	0.23994	0.48838	0.03066	-0.35176	-0.34235	-0.19450	0.03361
	0.1896	0.0000	0.5929	0.0746	0.8117	0.1412	0.0014	0.8550	0.0260	0.0306	0.2291	0.8369
AMZ	0.22881	0.08714	1.00000	-0.09451	-0.10774	-0.31099	-0.04279	0.11532	0.27661	-0.19639	-0.18927	0.90194
	0.1556	0.5929	0.0000	0.5618	0.5138	0.0540	0.7932	0.4906	0.0840	0.2245	0.2421	0.0001
SQCA	0.33951	0.28508	-0.09451	1.00000	0.43467	0.22174	0.69121	0.10071	-0.44511	-0.18683	-0.32901	-0.13140
	0.0321	0.0746	0.5618	0.0000	0.0057	0.1749	0.0001	0.5474	0.0040	0.2484	0.0382	0.4190
GRO	0.10279	0.03941	-0.10774	0.43467	1.00000	-0.04499	0.16163	0.21787	-0.14461	-0.09614	-0.12548	0.00990
	0.5335	0.8117	0.5138	0.0057	0.0000	0.7857	0.3256	0.1952	0.3798	0.5604	0.4466	0.9523
GDP	-0.09107	0.23994	-0.31099	0.22174	-0.04499	1.00000	0.18732	0.11375	-0.18293	0.05834	0.06495	-0.26871
	0.5814	0.1412	0.0540	0.1749	0.7857	0.0000	0.2535	0.5026	0.2650	0.7242	0.6945	0.0981
X/M	0.38303	0.48838	-0.04279	0.69121	0.16163	0.18732	1.00000	-0.00468	-0.55490	-0.15519	-0.35054	-0.12712
	0.0147	0.0014	0.7932	0.0001	0.3256	0.2535	0.0000	0.9778	0.0002	0.3390	0.0266	0.4344
XGR	-0.27906	0.03066	0.11532	0.10071	0.21787	0.11375	-0.00468	1.00000	0.29251	-0.31809	0.34748	0.06924
	0.0898	0.8550	0.4906	0.5474	0.1952	0.5026	0.9778	0.0000	0.0747	0.0516	0.0325	0.6796
NDX	-0.69512	-0.35176	0.27661	-0.44511	-0.14461	-0.18293	-0.55490	0.29251	1.00000	-0.29193	0.68271	0.29236
	0.0001	0.0260	0.0840	0.0040	0.3798	0.2650	0.0002	0.0747	0.0000	0.0676	0.0001	0.0671
M/GDP	0.10766	-0.34235	-0.19639	-0.18683	-0.09614	0.05834	-0.15519	*-0.31809*	*-0.29193*	*1.00000*	*-0.14028*	*-0.12241*
	0.5085	0.0306	0.2245	0.2484	0.5604	0.7242	0.3390	0.0516	0.0676	0.0000	0.3879	0.4517
DSR1	-0.97919	-0.19450	-0.18927	-0.32901	-0.12548	0.06495	-0.35054	0.34748	0.68271	-0.14028	1.00000	-0.24201
	0.0001	0.2291	0.2421	0.0382	0.4466	0.6945	0.0266	0.0325	0.0001	0.3879	0.0000	0.1324
AMZ1	0.20806	0.03361	0.90194	-0.13140	0.00990	-0.26871	-0.12712	0.06924	0.29236	-0.12241	-0.24201	1.00000
	0.1976	0.8369	0.0001	0.4190	0.9523	0.0981	0.4344	0.6796	0.0671	0.4517	0.1324	0.0000

Correlation Matrix for Economic Indicators in 1978
(Table Entries: Correlation / Probability(Correlation > 0)

	DSR	RSM	AMZ	SQCA	GRO	GDP	X/M	XGR	NDX	M/GDP	DSR1	AMZ1
DSR	1.00000	-0.04153	0.56340	0.04193	-0.18000	-0.14927	0.00230	-0.36712	-0.55895	0.14462	-0.98226	0.59974
	0.0000	0.7992	0.0002	0.7973	0.2728	0.3644	0.9888	0.0234	0.0002	0.3733	0.0001	0.0001
RSM	-0.04153	1.00000	-0.19478	0.15101	0.04865	0.37558	0.38147	0.05546	-0.26767	-0.29700	0.09776	-0.14352
	0.7992	0.0000	0.2284	0.3523	0.7687	0.0185	0.0152	0.7409	0.0950	0.0627	0.5484	0.3770
AMZ	0.56340	-0.19478	1.00000	-0.11907	-0.40496	-0.42284	-0.16348	-0.24717	0.07573	-0.03990	-0.60098	0.91828
	0.0002	0.2284	0.0000	0.4643	0.0105	0.0073	0.3135	0.1346	0.6423	0.8069	0.0001	0.0001
SQCA	0.04193	0.15101	-0.11907	1.00000	-0.04842	0.20075	0.73384	0.07121	-0.41177	0.13725	-0.07319	-0.13785
	0.7973	0.3523	0.4643	0.0000	0.7698	0.2204	0.0001	0.6710	0.0083	0.3984	0.6535	0.3963
GRO	-0.18000	0.04865	-0.40496	-0.04842	1.00000	0.22228	-0.07262	0.43955	-0.12702	0.11522	0.22099	-0.38177
	0.2728	0.7687	0.0105	0.7698	0.0000	0.1738	0.6604	0.0065	0.4410	0.4849	0.1764	0.0165
GDP	-0.14927	0.37558	-0.42284	0.20075	0.22228	1.00000	0.20023	0.12381	-0.21378	0.27400	0.21564	-0.43748
	0.3644	0.0185	0.0073	0.2204	0.1738	0.0000	0.2216	0.4653	0.1913	0.0914	0.1874	0.0054
X/M	0.00230	0.38147	-0.16348	0.73384	-0.07262	0.20023	1.00000	0.00561	-0.39460	-0.07087	-0.02064	-0.26464
	0.9888	0.0152	0.3135	0.0001	0.6604	0.2216	0.0000	0.9734	0.0117	0.6639	0.8994	0.0989
XGR	-0.36712	0.05546	-0.24717	0.07121	0.43955	0.12381	0.00561	1.00000	0.17119	-0.12018	0.38967	-0.20986
	0.0234	0.7409	0.1346	0.6710	0.0065	0.4653	0.9734	0.0000	0.3041	0.4723	0.0156	0.2060
NDX	-0.55895	-0.26767	0.07573	-0.41177	-0.12702	-0.21378	-0.39460	0.17119	1.00000	-0.32454	0.54558	0.05513
	0.0002	0.0950	0.6423	0.0083	0.4410	0.1913	0.0117	0.3041	0.0000	0.0410	0.0003	0.7355
M/GDP	0.14462	-0.29700	-0.03990	0.13725	0.11522	0.27400	-0.07087	-0.12018	-0.32454	1.00000	-0.13536	-0.11330
	0.3733	0.0627	0.8069	0.3984	0.4849	0.0914	0.6639	0.4723	0.0410	0.0000	0.4050	0.4864
DSR1	-0.98226	0.09776	-0.60098	-0.07319	0.22099	0.21564	-0.02064	0.38967	0.54558	-0.13536	1.00000	-0.65937
	0.0001	0.5484	0.0001	0.6535	0.1764	0.1874	0.8994	0.0156	0.0003	0.4050	0.0000	0.0001
AMZ1	0.59974	-0.14352	0.91828	-0.13785	-0.38177	-0.43748	-0.26464	-0.20986	0.05513	-0.11330	-0.65937	1.00000
	0.0001	0.3770	0.0001	0.3963	0.0165	0.0054	0.0989	0.2060	0.7355	0.4864	0.0001	0.0000

Correlation Matrix for Economic Indicators in 1979
(Table Entries: Correlation / Probability(Correlation > 0)

	DSR	RSM	AMZ	SQCA	GRO	GDP	X/M	XGR	NDX	M/GDP	DSR1	AMZ1
DSR	1.00000	0.06228	0.62315	0.17632	-0.04396	-0.10355	0.29833	-0.44357	-0.52187	0.12845	-0.92645	0.63825
	0.0000	0.7026	0.0001	0.2764	0.7904	0.5305	0.0615	0.0053	0.0006	0.4296	0.0001	0.0001
RSM	0.06228	1.00000	0.02936	0.19774	-0.07429	0.30090	0.34490	0.06454	-0.34052	-0.38354	-0.01852	0.03016
	0.7026	0.0000	0.8573	0.2213	0.6531	0.0627	0.0293	0.7003	0.0315	0.0146	0.9097	0.8534
AMZ	0.62315	0.02936	1.00000	-0.03897	0.00008	-0.22834	0.02622	-0.28879	0.01526	-0.08660	-0.61588	0.92798
	0.0001	0.8573	0.0000	0.8113	0.9996	0.1621	0.8724	0.0787	0.9256	0.5952	0.0001	0.0001
SQCA	0.17632	0.19774	-0.03897	1.00000	-0.08036	0.22878	0.71929	0.02751	-0.38598	0.12581	-0.17278	-0.05873
	0.2764	0.2213	0.8113	0.0000	0.6268	0.1612	0.0001	0.8698	0.0139	0.4392	0.2864	0.7189
GRO	-0.04396	-0.07429	0.00008	-0.08036	1.00000	-0.21107	-0.17400	0.23558	-0.01799	0.06928	-0.01612	0.06118
	0.7904	0.6531	0.9996	0.6268	0.0000	0.1971	0.2894	0.1604	0.9134	0.6752	0.9224	0.7114
GDP	-0.10355	0.30090	-0.22834	0.22878	-0.21107	1.00000	0.05546	-0.02037	-0.16285	0.14004	0.12594	-0.21003
	0.5305	0.0627	0.1621	0.1612	0.1971	0.0000	0.7374	0.9048	0.3219	0.3952	0.4449	0.1994
X/M	0.29833	0.34490	0.02622	0.71929	-0.17400	0.05546	1.00000	-0.06818	-0.50930	0.04044	-0.29517	-0.07963
	0.0615	0.0293	0.8724	0.0001	0.2894	0.7374	0.0000	0.6842	0.0008	0.8043	0.0644	0.6253
XGR	-0.44357	0.06454	-0.28879	0.02751	0.23558	-0.02037	-0.06818	1.00000	0.05247	-0.05397	0.43852	-0.26667
	0.0053	0.7003	0.0787	0.8698	0.1604	0.9048	0.6842	0.0000	0.7544	0.7476	0.0059	0.1056
NDX	-0.52187	-0.34052	0.01526	-0.38598	-0.01799	-0.16285	-0.50930	0.05247	1.00000	-0.25847	0.52694	-0.01459
	0.0006	0.0315	0.9256	0.0139	0.9134	0.3219	0.0008	0.7544	0.0000	0.1073	0.0005	0.9288
M/GDP	0.12845	-0.38354	-0.08660	0.12581	0.06928	0.14004	0.04044	-0.05397	-0.25847	1.00000	-0.20947	-0.03755
	0.4296	0.0146	0.5952	0.4392	0.6752	0.3952	0.8043	0.7476	0.1073	0.0000	0.1945	0.8180
DSR1	-0.92645	-0.01852	-0.61588	-0.17278	-0.01612	0.12594	-0.29517	0.43852	0.52694	-0.20947	1.00000	-0.67333
	0.0001	0.9097	0.0001	0.2864	0.9224	0.4449	0.0644	0.0059	0.0005	0.1945	0.0000	0.0001
AMZ1	0.63825	0.03016	0.92798	-0.05873	0.06118	-0.21003	-0.07963	-0.26667	-0.01459	-0.03755	-0.67333	1.00000
	0.0001	0.8534	0.0001	0.7189	0.7114	0.1994	0.6253	0.1056	0.9288	0.8180	0.0001	0.0000

Correlation Matrix for Economic Indicators in 1980
(Table Entries: Correlation / Probability(Correlation > 0)

	DSR	RSM	AMZ	SQCA	GRO	GDP	X/M	XGR	NDX	M/GDP	DSR1	AMZ1
DSR	1.00000	0.15689	0.36742	0.48902	0.05333	-0.05533	0.42391	0.03002	-0.74046	0.22386	-0.98732	0.45109
	0.0000	0.3336	0.0197	0.0014	0.7471	0.7380	0.0064	0.8580	0.0001	0.1649	0.0001	0.0035
RSM	0.15689	1.00000	0.07772	0.20204	-0.10631	0.12063	0.37142	0.08000	-0.35301	-0.34629	-0.17747	0.20423
	0.3336	0.0000	0.6336	0.2112	0.5195	0.4645	0.0183	0.6330	0.0255	0.0286	0.2733	0.2062
AMZ	0.36742	0.07772	1.00000	0.17497	0.11655	-0.15798	-0.25130	0.13164	0.07457	-0.12608	-0.33022	0.91624
	0.0197	0.6336	0.0000	0.2802	0.4798	0.3368	0.1178	0.4308	0.6474	0.4382	0.0374	0.0001
SQCA	0.48902	0.20204	0.17497	1.00000	-0.11205	0.14704	0.61045	0.03395	-0.50453	0.23394	-0.47799	0.09092
	0.0014	0.2112	0.2802	0.0000	0.4971	0.3717	0.0001	0.8397	0.0009	0.1463	0.0018	0.5769
GRO	0.05333	-0.10631	0.11655	-0.11205	1.00000	-0.31283	-0.33575	0.28348	0.09301	0.30227	-0.10318	0.22137
	0.7471	0.5195	0.4798	0.4971	0.0000	0.0525	0.0367	0.0891	0.5733	0.0614	0.5319	0.1756
GDP	-0.05533	0.12063	-0.15798	0.14704	-0.31283	1.00000	0.13064	-0.11192	-0.15503	0.03558	0.03058	-0.13545
	0.7380	0.4645	0.3368	0.3717	0.0525	0.0000	0.4280	0.5096	0.3460	0.8297	0.8534	0.4110
X/M	0.42391	0.37142	-0.25130	0.61045	-0.33575	0.13064	1.00000	-0.10163	-0.63074	0.10313	-0.40819	-0.23595
	0.0064	0.0183	0.1178	0.0001	0.0367	0.4280	0.0000	0.5437	0.0001	0.5266	0.0089	0.1427
XGR	0.03002	0.08000	0.13164	0.03395	0.28348	-0.11192	-0.10163	1.00000	-0.02097	-0.09381	-0.06428	0.18507
	0.8580	0.6330	0.4308	0.8397	0.0891	0.5096	0.5437	0.0000	0.9006	0.5753	0.7014	0.2660
NDX	-0.74046	-0.35301	0.07457	-0.50453	0.09301	-0.15503	-0.63074	-0.02097	1.00000	-0.28214	0.74483	-0.00296
	0.0001	0.0255	0.6474	0.0009	0.5733	0.3460	0.0001	0.9006	0.0000	0.0778	0.0001	0.9855
M/GDP	0.22386	-0.34629	-0.12608	0.23394	0.30227	0.03558	0.10313	-0.09381	-0.28214	1.00000	-0.23820	-0.10250
	0.1649	0.0286	0.4382	0.1463	0.0614	0.8297	0.5266	0.5753	0.0778	0.0000	0.1388	0.5291
DSR1	-0.98732	-0.17747	-0.33022	-0.47799	-0.10318	0.03058	-0.40819	-0.06428	0.74483	-0.23820	1.00000	-0.44817
	0.0001	0.2733	0.0374	0.0018	0.5319	0.8534	0.0089	0.7014	0.0001	0.1388	0.0000	0.0037
AMZ1	0.45109	0.20423	0.91624	0.09092	0.22137	-0.13545	-0.23595	0.18507	-0.00296	-0.10250	-0.44817	1.00000
	0.0035	0.2062	0.0001	0.5769	0.1756	0.4110	0.1427	0.2660	0.9855	0.5291	0.0037	0.0000

Correlation Matrix for Economic Indicators in 1981
(Table Entries: Correlation / Probability(Correlation > 0)

	DSR	RSM	AMZ	SQCA	GRO	GDP	X/M	XGR	NDX	M/GDP	DSR1	AMZ1
DSR	1.00000	-0.07203	0.50013	0.21473	0.24664	-0.13061	0.22127	-0.22473	-0.41971	0.17010	-0.86604	0.47287
	0.0000	0.6587	0.0010	0.1833	0.1301	0.4281	0.1700	0.1750	0.0070	0.2940	0.0001	0.0021
RSM	-0.07203	1.00000	-0.12305	0.04611	-0.13206	0.19447	0.24891	-0.05357	-0.36215	-0.25823	-0.01780	0.04195
	0.6587	0.0000	0.4494	0.7776	0.4229	0.2355	0.1214	0.7494	0.0217	0.1076	0.9132	0.7972
AMZ	0.50013	-0.12305	1.00000	-0.02915	0.14574	-0.17576	-0.34470	0.16618	0.21628	-0.19531	-0.41681	0.84209
	0.0010	0.4494	0.0000	0.8583	0.3760	0.2845	0.0294	0.3187	0.1801	0.2272	0.0075	0.0001
SQCA	0.21473	0.04611	-0.02915	1.00000	0.28659	0.14837	0.61785	-0.06189	-0.50122	0.17121	-0.43391	0.11260
	0.1833	0.7776	0.8583	0.0000	0.0769	0.3674	0.0001	0.7120	0.0010	0.2908	0.0052	0.4891
GRO	0.24664	-0.13206	0.14574	0.28659	1.00000	-0.20698	-0.04962	0.11905	-0.13255	0.20935	-0.34365	0.18722
	0.1301	0.4229	0.3760	0.0769	0.0000	0.2061	0.7642	0.4828	0.4212	0.2009	0.0322	0.2538
GDP	-0.13061	0.19447	-0.17576	0.14837	-0.20698	1.00000	0.32414	0.11365	-0.20218	0.13754	0.11484	-0.15649
	0.4281	0.2355	0.2845	0.3674	0.2061	0.0000	0.0441	0.5030	0.2171	0.4037	0.4863	0.3414
X/M	0.22127	0.24891	-0.34470	0.61785	-0.04962	0.32414	1.00000	-0.23921	-0.62311	0.21680	-0.33091	-0.21354
	0.1700	0.1214	0.0294	0.0001	0.7642	0.0441	0.0000	0.1481	0.0001	0.1790	0.0370	0.1858
XGR	-0.22473	-0.05357	0.16618	-0.06189	0.11905	0.11365	-0.23921	1.00000	0.11671	-0.21625	0.16207	0.21247
	0.1750	0.7494	0.3187	0.7120	0.4828	0.5030	0.1481	0.0000	0.4853	0.1922	0.3310	0.2003
NDX	-0.41971	-0.36215	0.21628	-0.50122	-0.13255	-0.20218	-0.62311	0.11671	1.00000	-0.23346	0.59226	0.11138
	0.0070	0.0217	0.1801	0.0010	0.4212	0.2171	0.0001	0.4853	0.0000	0.1471	0.0001	0.4938
M/GDP	0.17010	-0.25823	-0.19531	0.17121	0.20935	0.13754	0.21680	-0.21625	-0.23346	1.00000	-0.15331	-0.17975
	0.2940	0.1076	0.2272	0.2908	0.2009	0.4037	0.1790	0.1922	0.1471	0.0000	0.3449	0.2671
DSR1	-0.86604	-0.01780	-0.41681	-0.43391	-0.34365	0.11484	-0.33091	0.16207	0.59226	-0.15331	1.00000	-0.53170
	0.0001	0.9132	0.0075	0.0052	0.0322	0.4863	0.0370	0.3310	0.0001	0.3449	0.0000	0.0004
AMZ1	0.47287	0.04195	0.84209	0.11260	0.18722	-0.15649	-0.21354	0.21247	0.11138	-0.17975	-0.53170	1.00000
	0.0021	0.7972	0.0001	0.4891	0.2538	0.3414	0.1858	0.2003	0.4938	0.2671	0.0004	0.0000

Correlation Matrix for Economic Indicators in 1982
(Table Entries: Correlation / Probability(Correlation > 0)

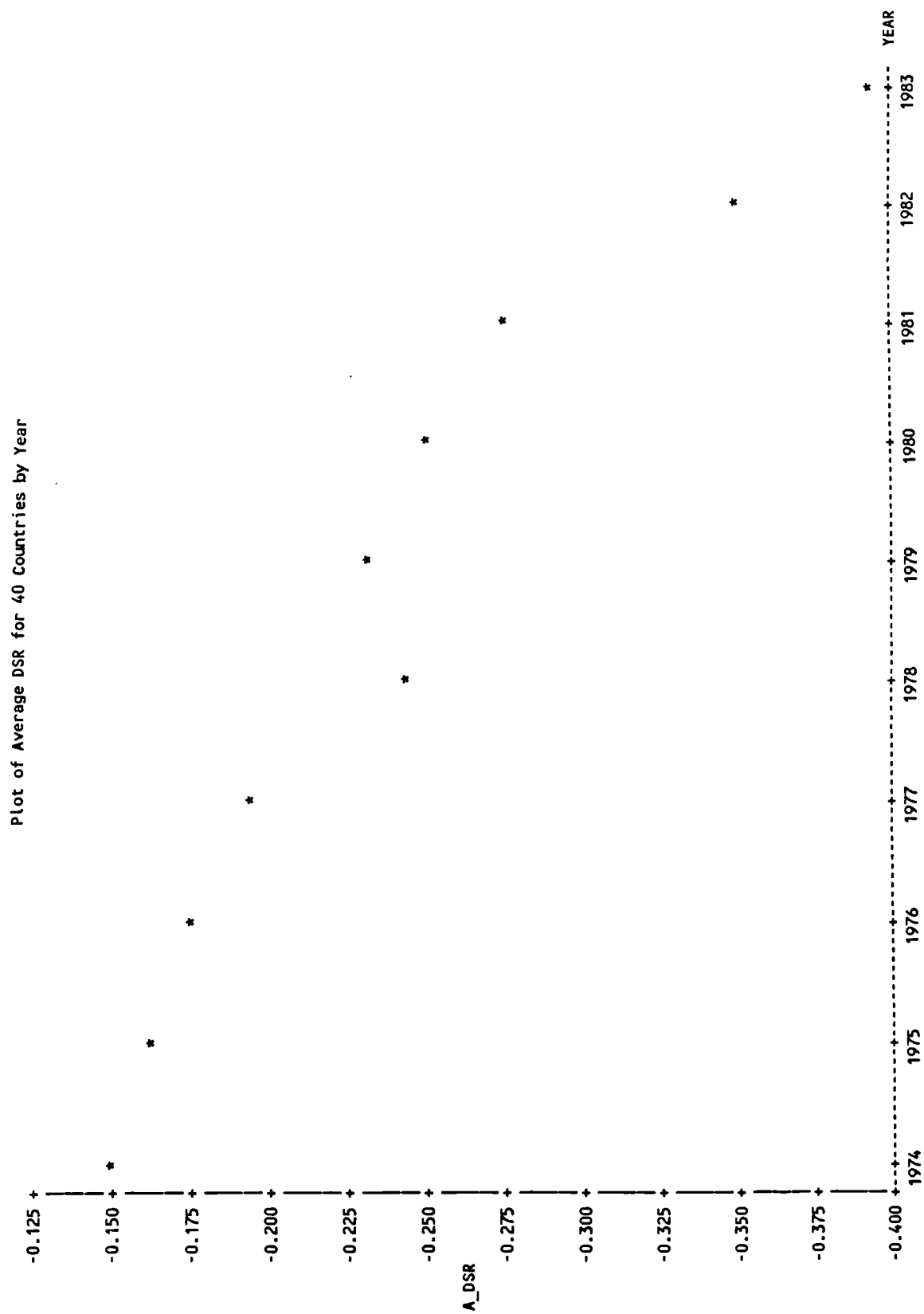
	DSR	RSM	AMZ	SQCA	GRO	GDP	X/M	XGR	NDX	M/GDP	DSR1	AMZ1
DSR	1.00000 0.0000	-0.01594 0.9222	0.37747 0.0163	-0.02577 0.8746	0.37469 0.0188	-0.16495 0.3156	0.06719 0.6804	-0.42537 0.0078	-0.49534 0.0012	0.16760 0.3013	-0.96662 0.0001	0.51306 0.0007
RSM	-0.01594 0.9222	1.00000 0.0000	-0.01124 0.9451	0.11396 0.4838	0.09322 0.5725	0.24556 0.1319	0.10938 0.5017	-0.19581 0.2387	-0.29165 0.0678	-0.02075 0.8989	0.02523 0.8772	0.03892 0.8116
AMZ	0.37747 0.0163	-0.01124 0.9451	1.00000 0.0000	-0.28192 0.0780	0.26153 0.1078	-0.20489 0.2109	-0.45137 0.0035	-0.00931 0.9558	0.28467 0.0750	-0.20289 0.2093	-0.31070 0.0510	0.74329 0.0001
SQCA	-0.02577 0.8746	0.11396 0.4838	-0.28192 0.0780	1.00000 0.0000	0.10173 0.5378	0.29729 0.0661	0.66889 0.0001	0.12424 0.4574	-0.32061 0.0437	0.18404 0.2556	0.03252 0.8421	-0.24938 0.1207
GRO	0.37469 0.0188	0.09322 0.5725	0.26153 0.1078	0.10173 0.5378	1.00000 0.0000	-0.05217 0.7525	-0.08846 0.5923	-0.03075 0.8566	-0.22566 0.1672	0.12440 0.4505	-0.33412 0.0376	0.19080 0.2446
GDP	-0.16495 0.3156	0.24556 0.1319	-0.20489 0.2109	0.29729 0.0661	-0.05217 0.7525	1.00000 0.0000	0.35069 0.0286	0.12849 0.4485	-0.17764 0.2793	0.28924 0.0741	0.21968 0.1790	-0.24921 0.1260
X/M	0.06719 0.6804	0.10938 0.5017	-0.45137 0.0035	0.66889 0.0001	-0.08846 0.5923	0.35069 0.0286	1.00000 0.0000	0.03193 0.8491	-0.43760 0.0047	0.18118 0.2632	-0.06370 0.6962	-0.32983 0.0377
XGR	-0.42537 0.0078	-0.19581 0.2387	-0.00931 0.9558	0.12424 0.4574	-0.03075 0.8566	0.12849 0.4485	0.03193 0.8491	1.00000 0.0000	0.11670 0.4853	-0.12331 0.4608	0.42088 0.0085	-0.11625 0.4870
NDX	-0.49534 0.0012	-0.29165 0.0678	0.28467 0.0750	-0.32061 0.0437	-0.22566 0.1672	-0.17764 0.2793	-0.43760 0.0047	0.11670 0.4853	1.00000 0.0000	-0.34217 0.0307	0.50588 0.0009	0.08281 0.6114
M/GDP	0.16760 0.3013	-0.02075 0.8989	-0.20289 0.2093	0.18404 0.2556	0.12440 0.4505	0.28924 0.0741	0.18118 0.2632	-0.12331 0.4608	-0.34217 0.0307	1.00000 0.0000	-0.20181 0.2117	-0.09538 0.5583
DSR1	-0.96662 0.0001	0.02523 0.8772	-0.31070 0.0510	0.03252 0.8421	-0.33412 0.0376	0.21968 0.1790	-0.06370 0.6962	0.42088 0.0085	0.50588 0.0009	-0.20181 0.2117	1.00000 0.0000	-0.58594 0.0001
AMZ1	0.51306 0.0007	0.03892 0.8116	0.74329 0.0001	-0.24938 0.1207	0.19080 0.2446	-0.24921 0.1260	-0.32983 0.0377	-0.11625 0.4870	0.08281 0.6114	-0.09538 0.5583	-0.58594 0.0001	1.00000 0.0000

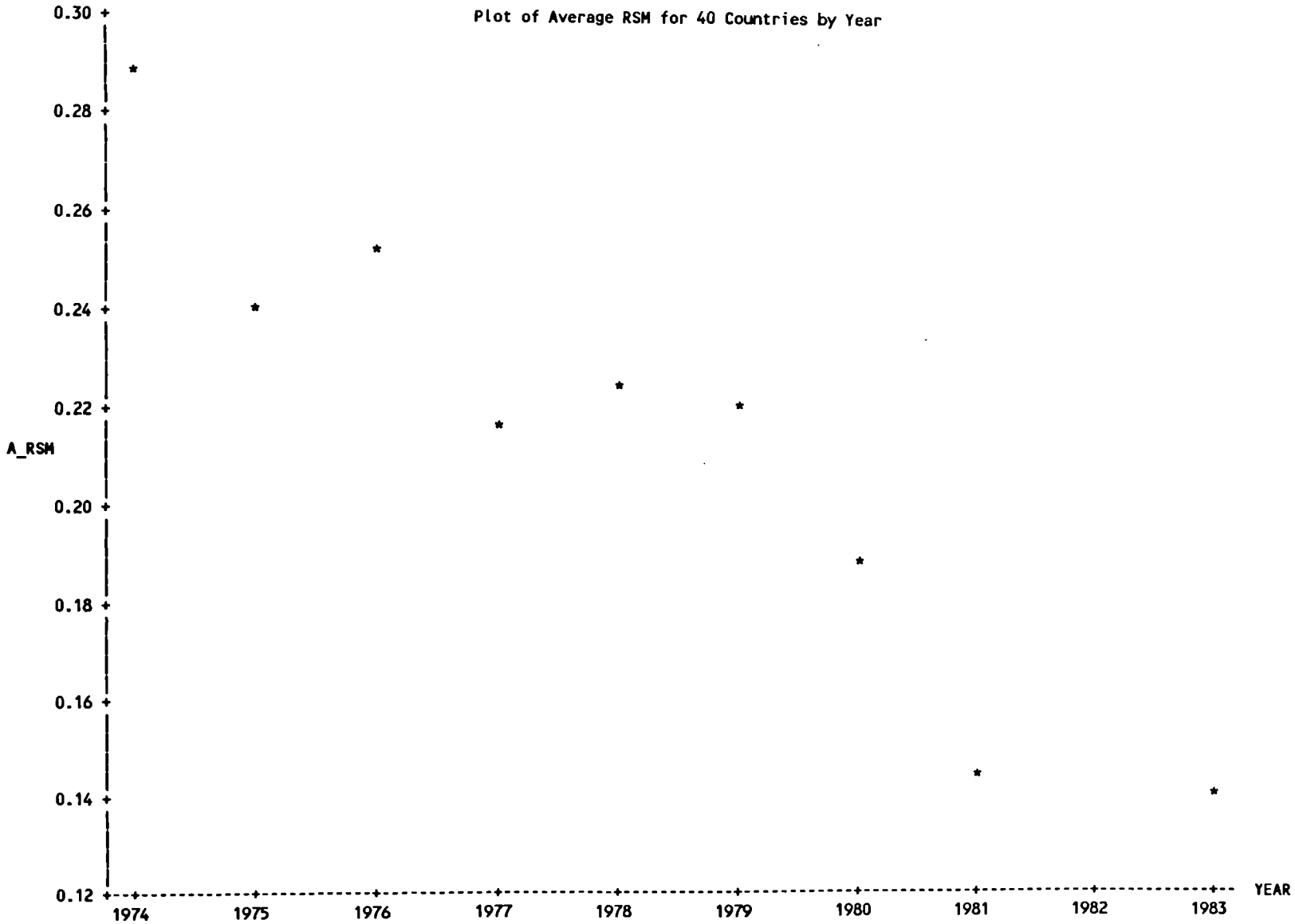
Correlation Matrix for Economic Indicators in 1983
(Table Entries: Correlation / Probability(Correlation > 0)

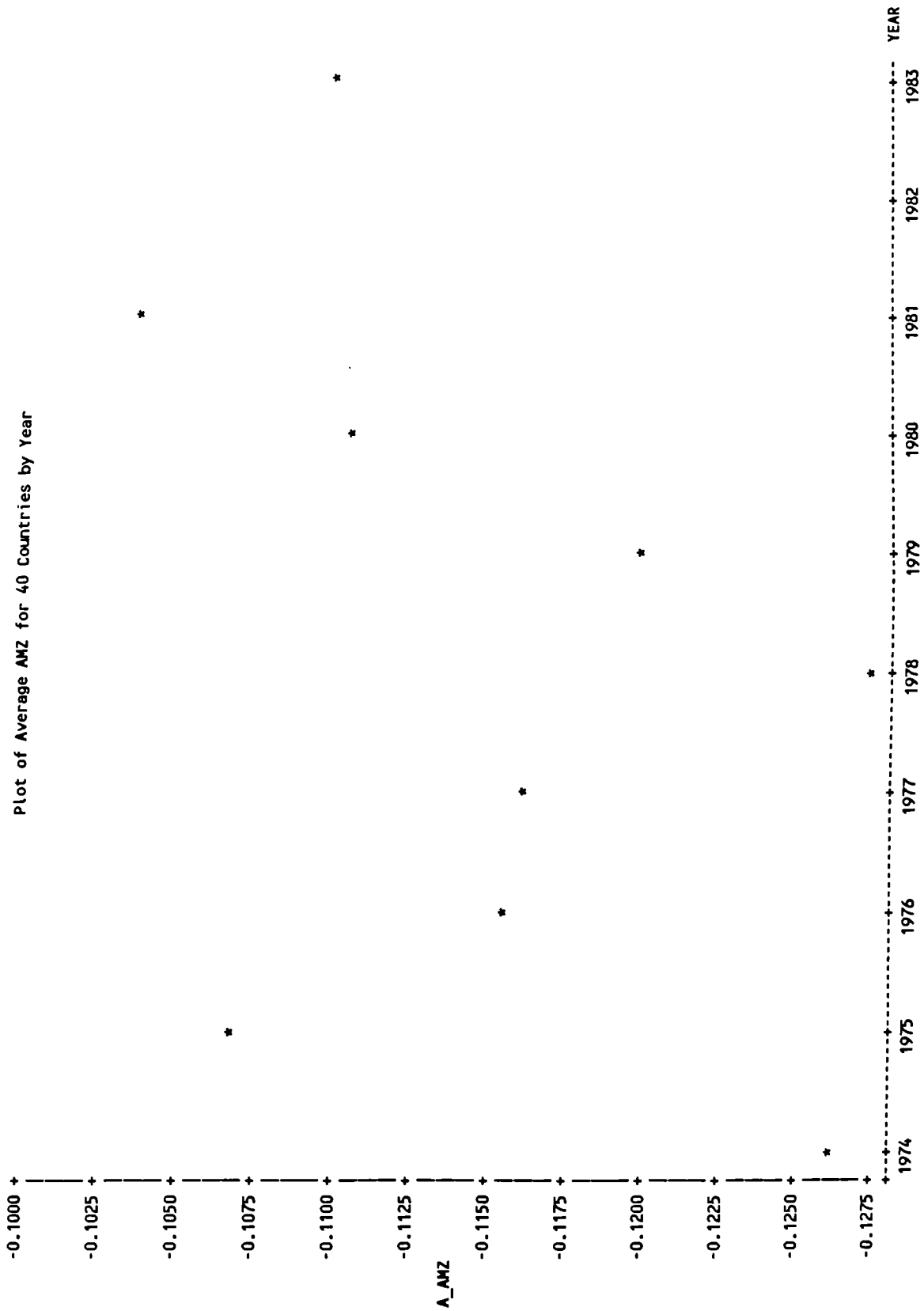
	DSR	RSM	AMZ	SQCA	GRO	GDP	X/M	XGR	NDX	M/GDP	DSR1	AMZ1
DSR	1.00000	-0.12778	0.45454	-0.00158	-0.02541	-0.18739	-0.11175	-0.23163	-0.47991	0.33248	-0.95995	0.45884
	0.0000	0.4320	0.0032	0.9923	0.8780	0.2533	0.4924	0.1617	0.0017	0.0361	0.0001	0.0029
RSM	-0.12778	1.00000	-0.01956	0.07027	0.18761	0.18678	0.33377	-0.05949	-0.19345	-0.23809	0.20750	-0.14936
	0.4320	0.0000	0.9047	0.6666	0.2527	0.2549	0.0353	0.7228	0.2317	0.1390	0.1989	0.3577
AMZ	0.45454	-0.01956	1.00000	-0.19160	-0.06632	-0.25778	-0.45821	0.18294	0.25295	-0.01650	-0.49562	0.86474
	0.0032	0.9047	0.0000	0.2363	0.6883	0.1131	0.0029	0.2716	0.1153	0.9195	0.0011	0.0001
SQCA	-0.00158	0.07027	-0.19160	1.00000	-0.04656	0.25389	0.48686	0.04238	-0.24260	0.24246	0.05488	-0.24286
	0.9923	0.6666	0.2363	0.0000	0.7784	0.1188	0.0014	0.8006	0.1315	0.1317	0.7366	0.1311
GRO	-0.02541	0.18761	-0.06632	-0.04656	1.00000	0.12072	-0.15241	0.39020	-0.13836	0.04627	0.01740	-0.01494
	0.8780	0.2527	0.6883	0.7784	0.0000	0.4641	0.3543	0.0170	0.4009	0.7797	0.9163	0.9281
GDP	-0.18739	0.18678	-0.25778	0.25389	0.12072	1.00000	0.37207	0.13282	-0.20790	0.27926	0.19625	-0.23447
	0.2533	0.2549	0.1131	0.1188	0.4641	0.0000	0.0197	0.4332	0.2041	0.0851	0.2312	0.1508
X/M	-0.11175	0.33377	-0.45821	0.48686	-0.15241	0.37207	1.00000	-0.05332	-0.33091	0.09411	0.20978	-0.49561
	0.4924	0.0353	0.0029	0.0014	0.3543	0.0197	0.0000	0.7505	0.0370	0.5635	0.1939	0.0011
XGR	-0.23163	-0.05949	0.18294	0.04238	0.39020	0.13282	-0.05332	1.00000	0.47975	-0.12241	0.19299	0.19233
	0.1617	0.7228	0.2716	0.8006	0.0170	0.4332	0.7505	0.0000	0.0023	0.4641	0.2457	0.2473
NDX	-0.47991	-0.19345	0.25295	-0.24260	-0.13836	-0.20790	-0.33091	0.47975	1.00000	-0.40929	0.40366	0.22255
	0.0017	0.2317	0.1153	0.1315	0.4009	0.2041	0.0370	0.0023	0.0000	0.0087	0.0098	0.1675
M/GDP	0.33248	-0.23809	-0.01650	0.24246	0.04627	0.27926	0.09411	-0.12241	-0.40929	1.00000	-0.38588	0.12489
	0.0361	0.1390	0.9195	0.1317	0.7797	0.0851	0.5635	0.4641	0.0087	0.0000	0.0139	0.4426
DSR1	-0.95995	0.20750	-0.49562	0.05488	0.01740	0.19625	0.20978	0.19299	0.40366	-0.38588	1.00000	-0.60229
	0.0001	0.1989	0.0011	0.7366	0.9163	0.2312	0.1939	0.2457	0.0098	0.0139	0.0000	0.0001
AMZ1	0.45884	-0.14936	0.86474	-0.24286	-0.01494	-0.23447	-0.49561	0.19233	0.22255	0.12489	-0.60229	1.00000
	0.0029	0.3577	0.0001	0.1311	0.9281	0.1508	0.0011	0.2473	0.1675	0.4426	0.0001	0.0000

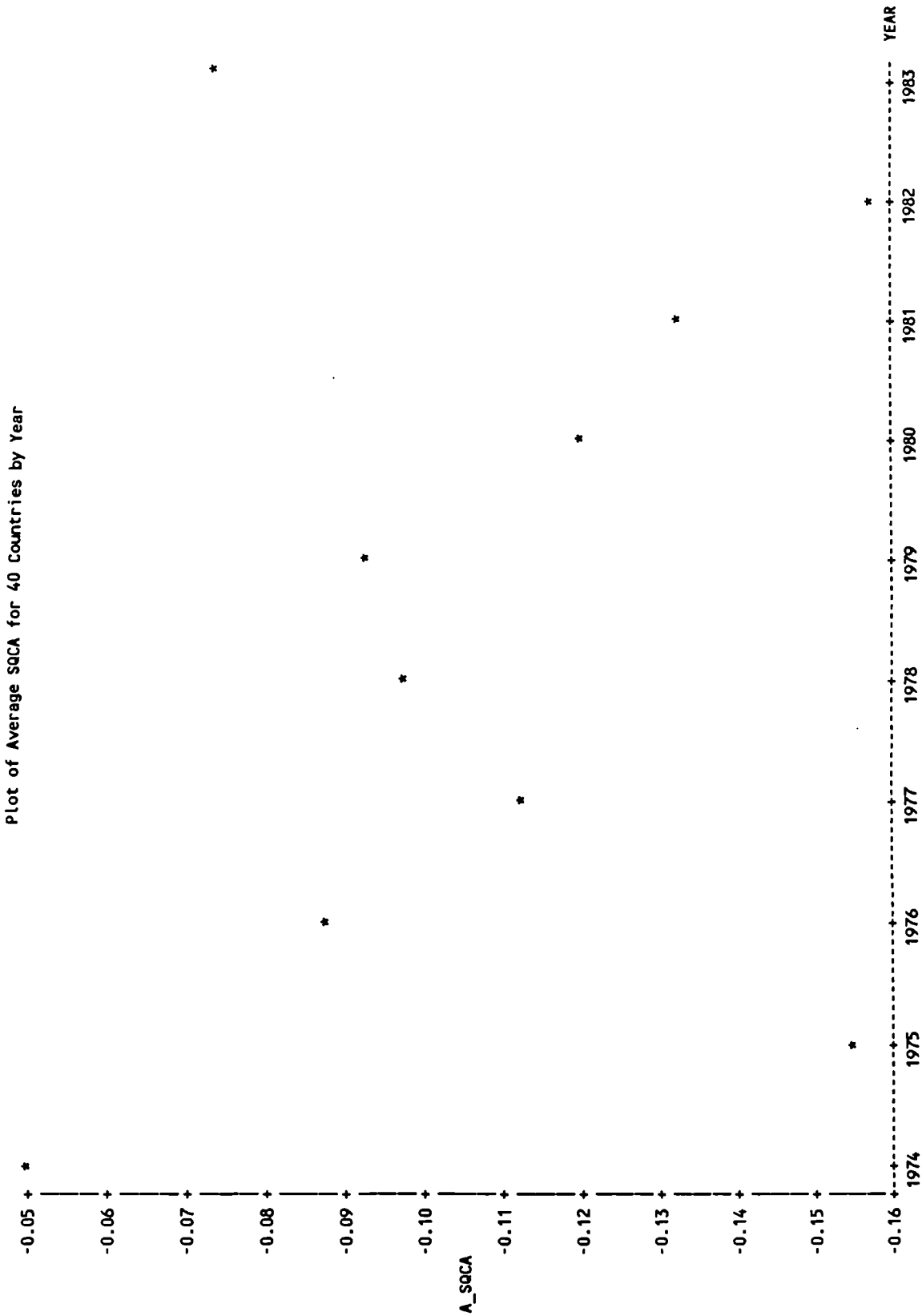
APPENDIX D

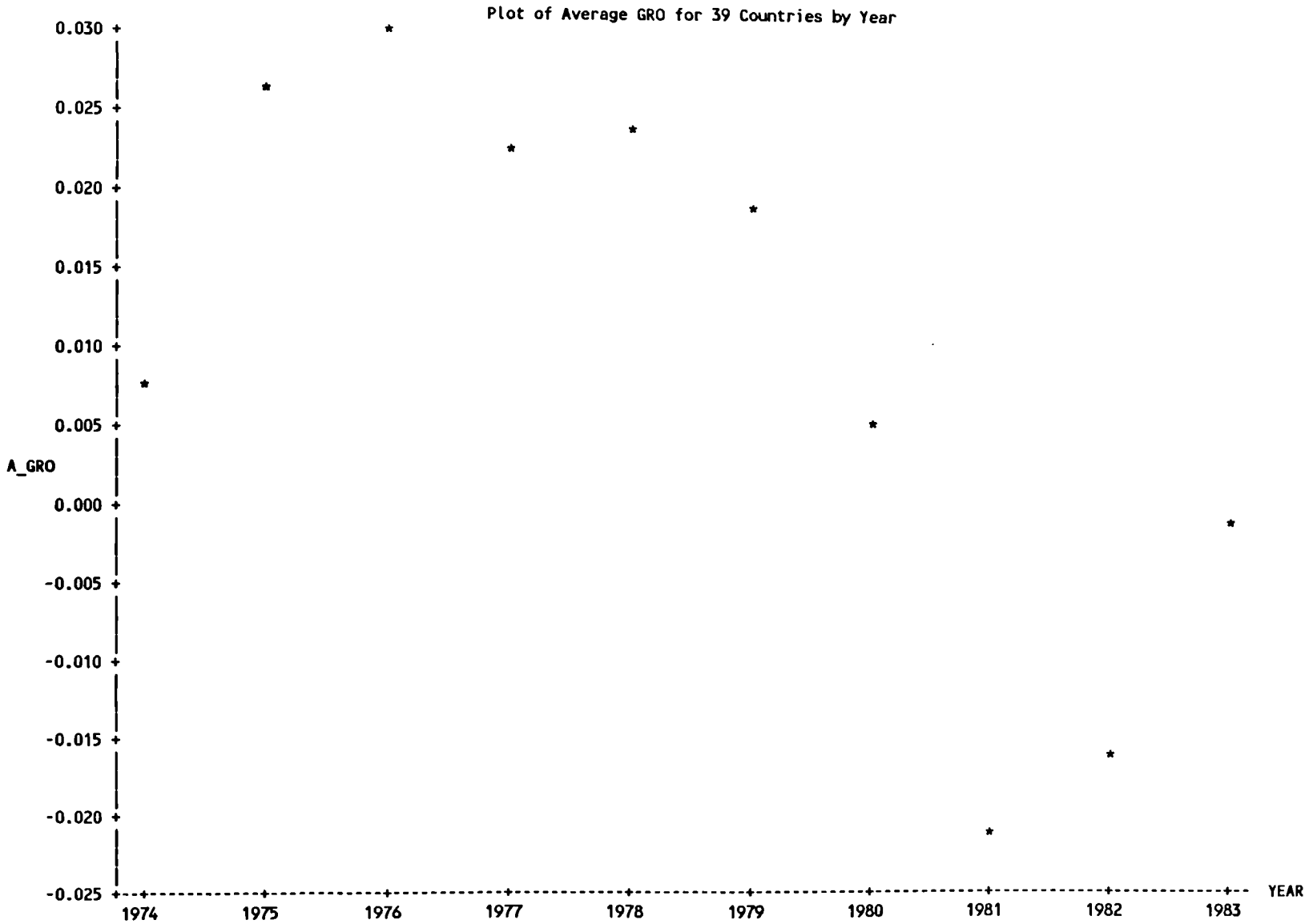
PLOTS OF AVERAGE ECONOMIC INDICATORS OVER TIME

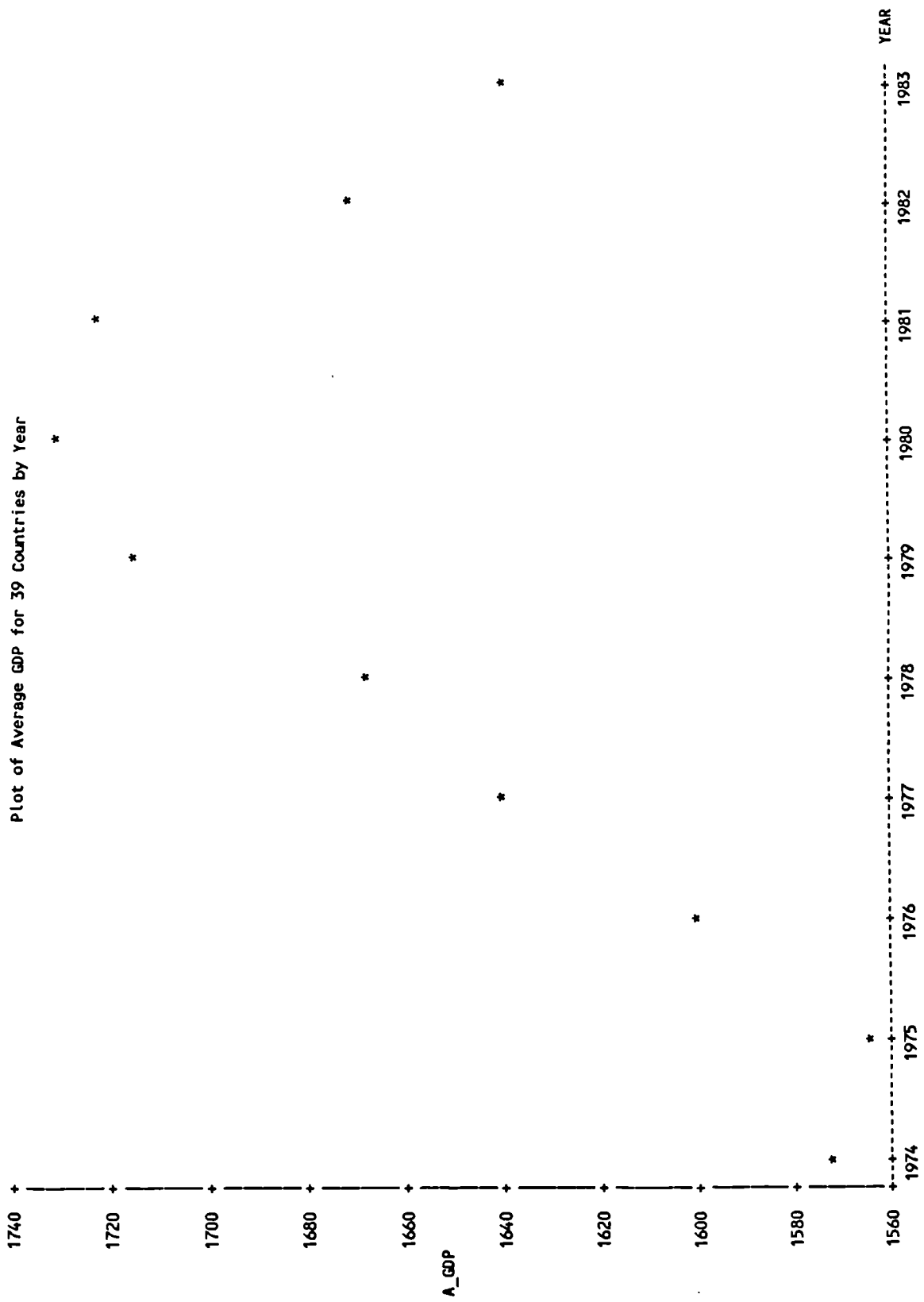

Plot of Average DSR for 40 Countries by Year
A_DSR
-0.125
-0.150
-0.175
-0.200
-0.225
-0.250
-0.275
-0.300
-0.325
-0.350
-0.375
-0.400
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
YEAR

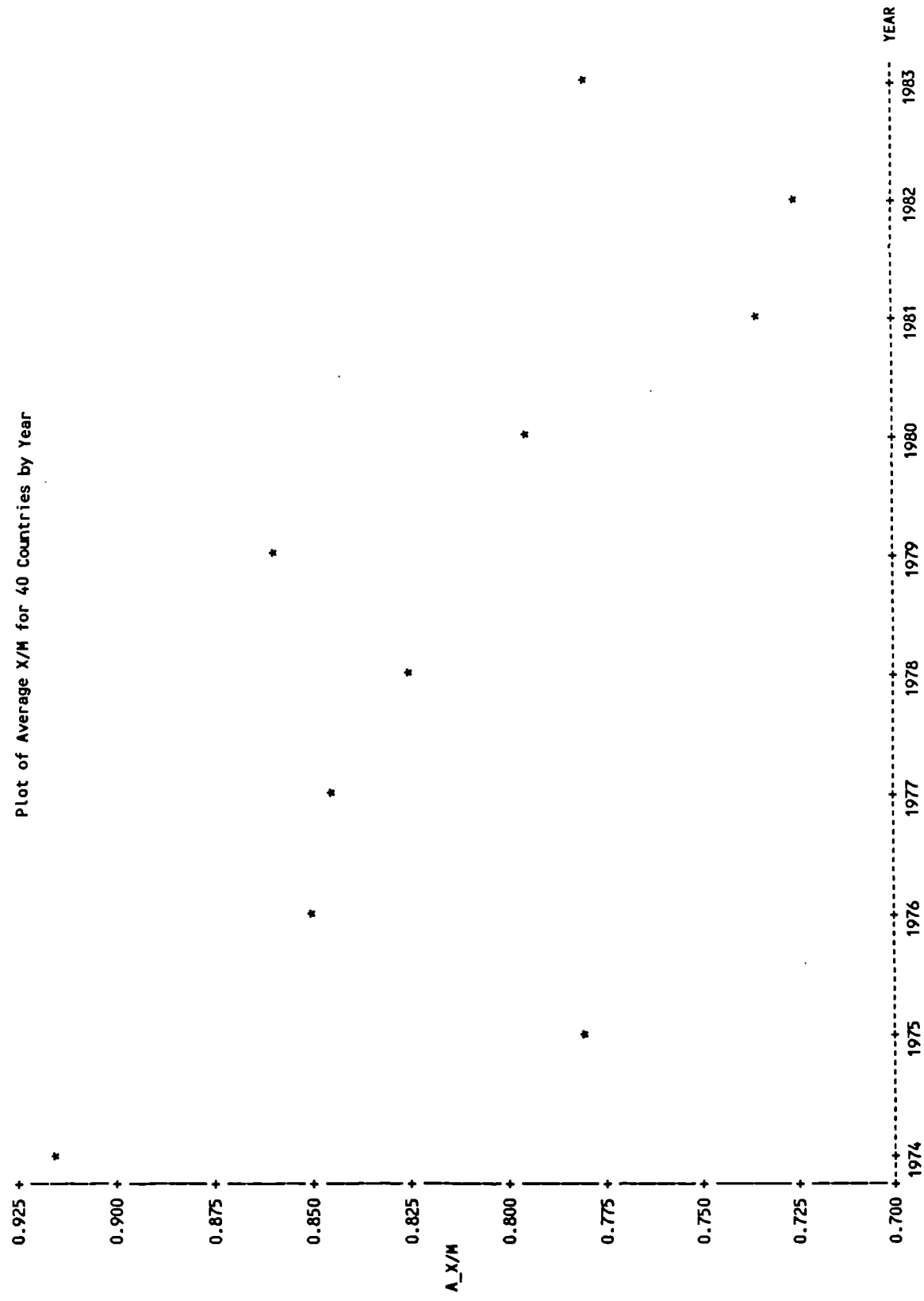

Plot of Average RSM for 40 Countries by Year
A_RSM
0.30
0.28
0.26
0.24
0.22
0.20
0.18
0.16
0.14
0.12
YEAR
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983

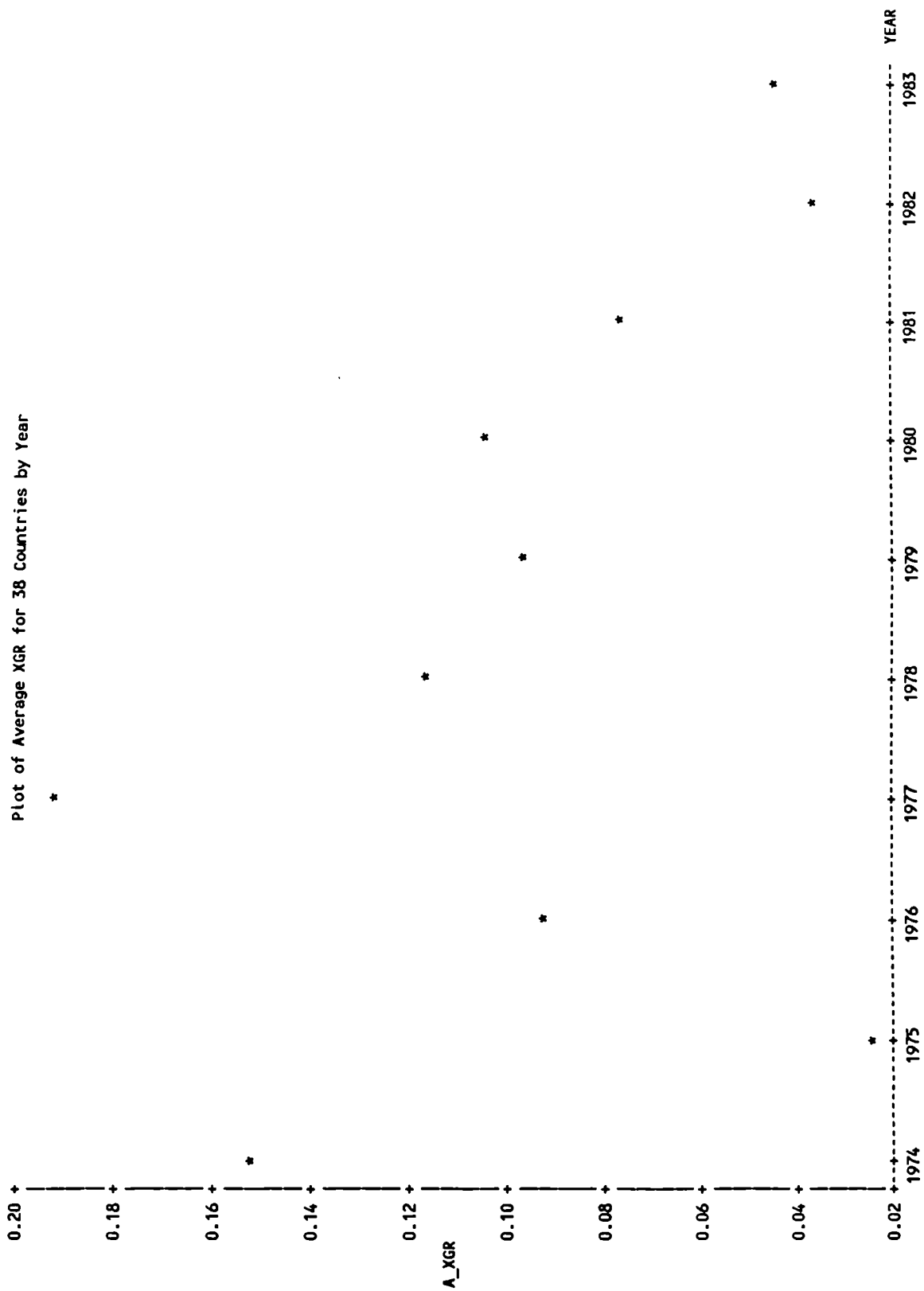

Plot of Average AMZ for 40 Countries by Year
A_AMZ
-0.1000
-0.1025
-0.1050
-0.1075
-0.1100
-0.1125
-0.1150
-0.1175
-0.1200
-0.1225
-0.1250
-0.1275
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
YEAR

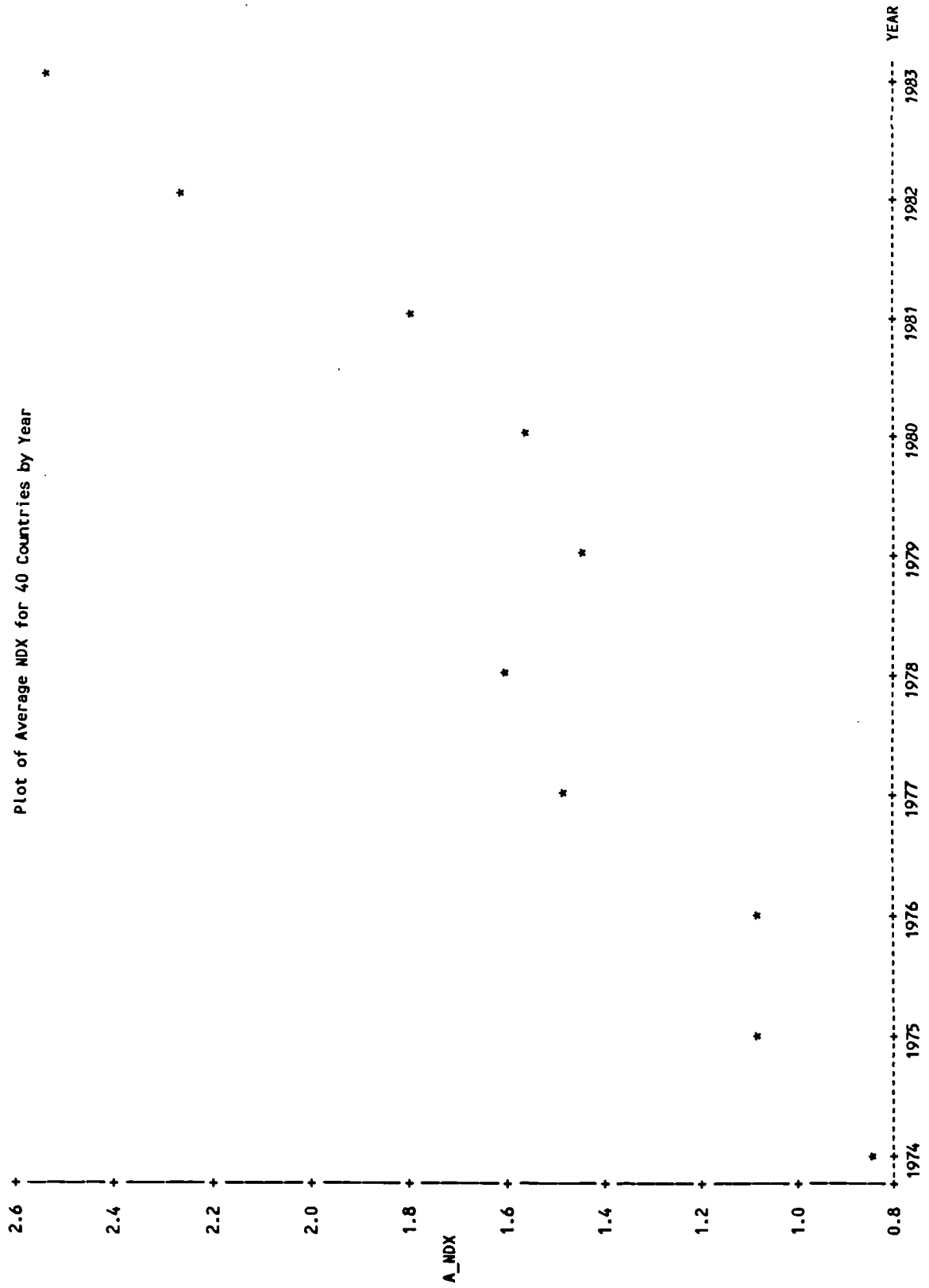

Plot of Average SQCA for 40 Countries by Year
A_SQCA
YEAR
-0.05
-0.06
-0.07
-0.08
-0.09
-0.10
-0.11
-0.12
-0.13
-0.14
-0.15
-0.16
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983

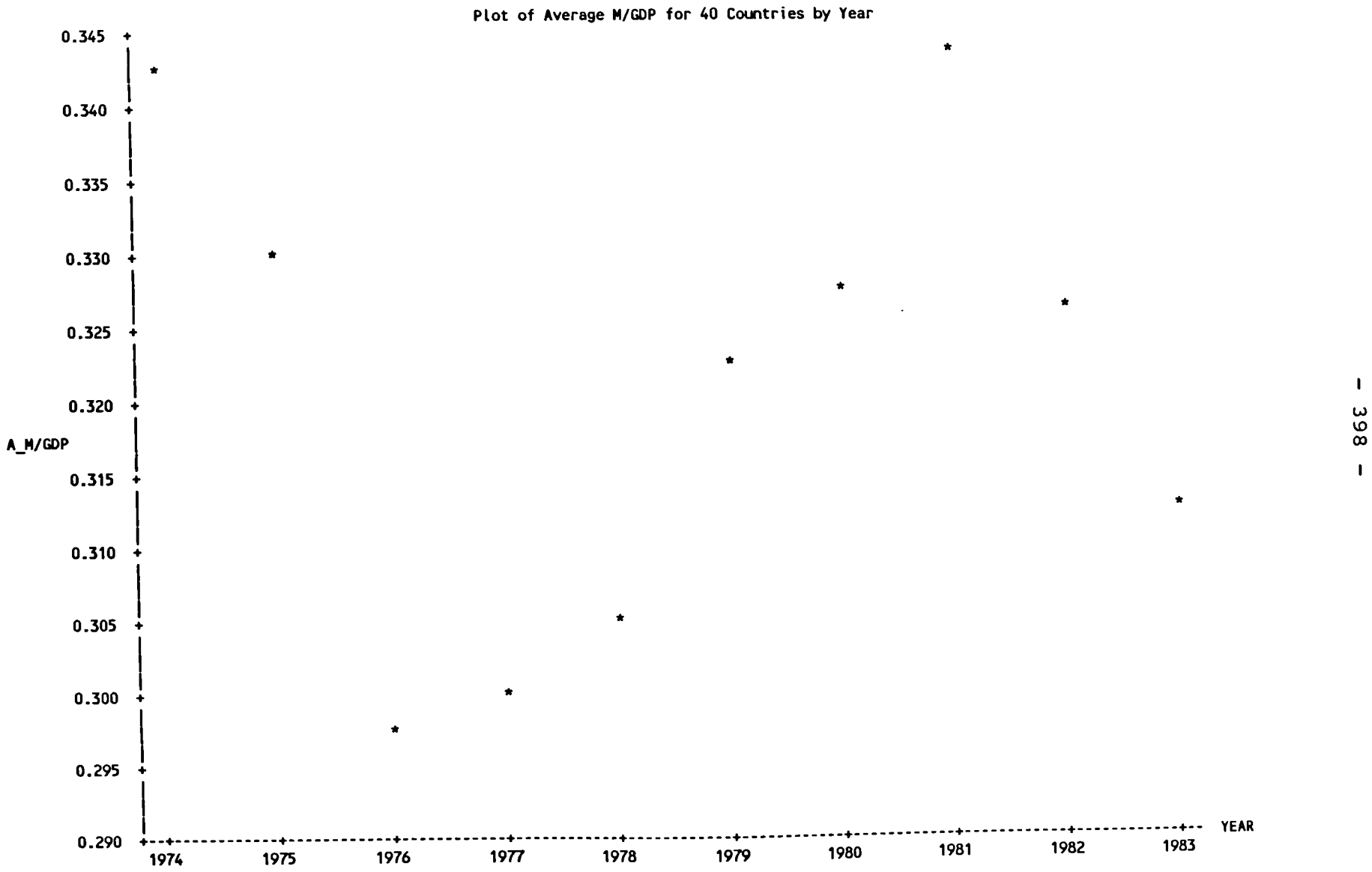

Plot of Average GRO for 39 Countries by Year
A_GRO
0.030
0.025
0.020
0.015
0.010
0.005
0.000
-0.005
-0.010
-0.015
-0.020
-0.025
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
YEAR

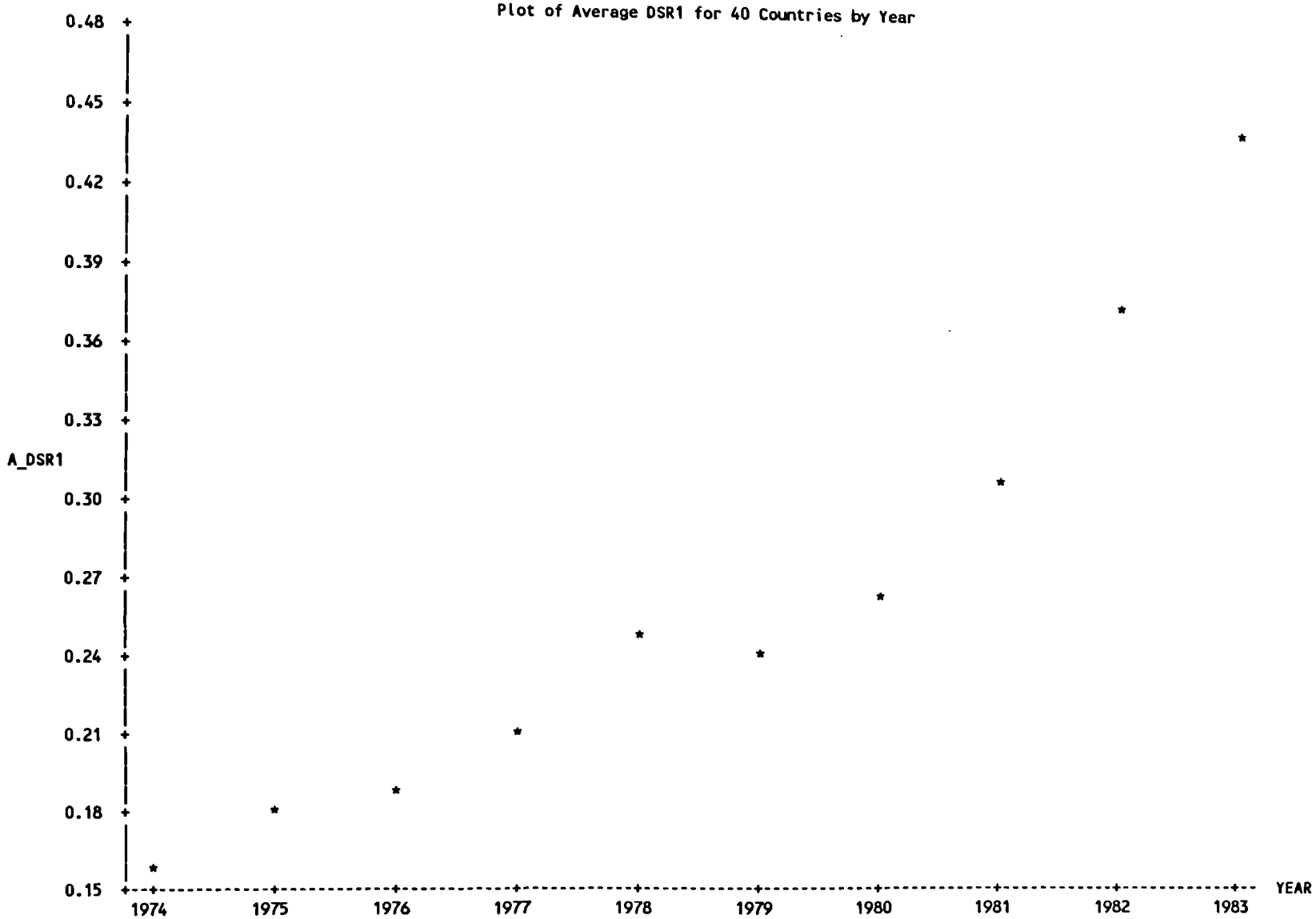

Plot of Average GDP for 39 Countries by Year
A_GDP
1740
1720
1700
1680
1660
1640
1620
1600
1580
1560
YEAR
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983

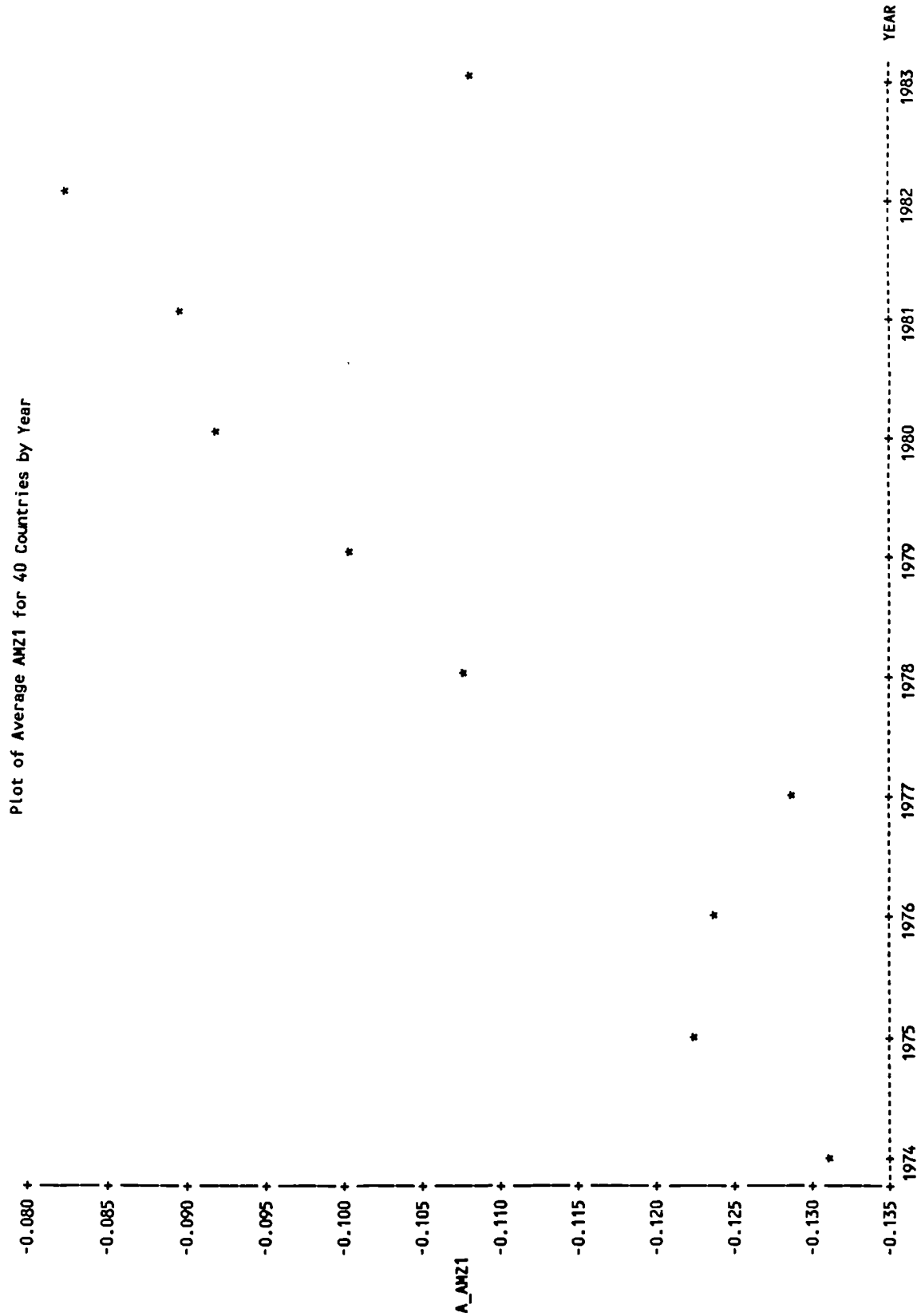

Plot of Average X/M for 40 Countries by Year
A_X/M
0.925
0.900
0.875
0.850
0.825
0.800
0.775
0.750
0.725
0.700
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
YEAR


Plot of Average XGR for 38 Countries by Year
A_XGR
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
YEAR


Plot of Average NDX for 40 Countries by Year
A_NDX
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
YEAR


Plot of Average M/GDP for 40 Countries by Year
A_M/GDP
0.345
0.340
0.335
0.330
0.325
0.320
0.315
0.310
0.305
0.300
0.295
0.290
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
YEAR


Plot of Average DSR1 for 40 Countries by Year
A_DSR1
0.48
0.45
0.42
0.39
0.36
0.33
0.30
0.27
0.24
0.21
0.18
0.15
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
YEAR


Plot of Average AM21 for 40 Countries by Year
A_AM21
-0.080
-0.085
-0.090
-0.095
-0.100
-0.105
-0.110
-0.115
-0.120
-0.125
-0.130
-0.135
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
YEAR

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