JOURNAL OF ECONOMIC DEVELOPMENT
Volume 12, Number 2, December 1987

Determinants of Third World Mineral-Oil Economies External Debt

Robert E. Looney*

Third World mineral economies have experienced considerable problems in recent years in servicing their external debt. The question asked in this paper is whether or not these economies are inherently more prone to defaults and reschedulings than developing countries in general, and if so for what reason.

The main thesis of the paper is that developing countries have not been uniform in their accumulation of debt, and that in fact the mineral-oil economies have borrowed in international markets for reasons quite different from those of other developing countries. Furthermore, they have used their debt in ways distinctively different from non-mineral/oil countries. The analysis undertaken in the study tends to confirm these patterns. It appears that mineral-oil countries have not only higher levels of debt per level of gross domestic product than other developing countries, but have in many ways used this debt more productively. Thus it appears that the relatively large number of defaults experienced by this group of countries appears to be as much the fault of the international financial community as of the countries themselves.

I. Introduction

The increasing indebtedness of the developing countries has attracted much attention in recent years (Nowzad and Williams; Bravand and Williams; Dillon, et al.; and Griffith-Jones and Sunkel). The main focus of that attention has been the rapid in-

* Professor, National Security Affairs, Naval Postgraduate School, Monterey, California.

ined through the development of a basic supply and demand model of international lending. The model developed here is a modified version of the one developed by Heller and Frenkel capable of determining the equilibrium level of debt. This equilibrium debt level is solved for by a reduced form equation. The major supply and demand elements of the model are isolated using ordinary least squares regression estimation on a cross section sample of countries.

It is important to note that the analysis below is concerned with the volume of external indebtedness rather than the price of the debt. Actual decisions of the volume of debt are usually based on an assessment of measurable indices such as country limits, micro economic factors and project profitability. On the other hand, price decisions are considered on the bases of a less quantifiable set of factors. These include: conditions in the international capital markets, prevailing premia, and the economic policies in effect in currency countries. These factors more often than not tend to dominate developments in local and regional financial markets.

III. Patterns of Mineral/Non-Mineral Development

Data for the analysis below were taken largely form the World Bank, with the country sample consisting of 94 developing countries, 23 of which were mineral-oil exporters.[1]

External debt figures are from the World Bank (1984), and are defined as public external debt owed to non-residents and having a maturity over one year and payable in foreign currency.

An examination of the structural and performance differences between mineral and non-mineral developing countries (Table 1) provides a valuable frame of references for the analysis that follows. As might be expected mineral economies have:

1. a much more concentrated export structure;

[1] For the purposes of this study mineral-oil exporters were defined as any developing country were mineral and/or oil exports accounted for over forty percent of their merchandise exports, a figure originally proposed by Nankani. The countries classified as mineral/oil on this basis were: Nigeria, Indonesia, Bolivia, Togo, Tunesia, Morocco, Venezuela, Iran, Mexico, Chile, Angola, Zaire, Jamaica, Trinidad, Zambia, Peru, Papua-New Guinea, Saudi Arabia, Iraq, Kuwait, Syria, The UAE, and Egypt.

Table 1 (continued)

(Means)

Symbol	Variable	Total Sample	Mineral, Oil	Non Mineral	Mineral	Oil	Non-Mineral, Non-oil
	Fiscal-Savings Variables						
AS	Average National Savings, 1970-81	16.9	25.2	12.9	14.3	35.9	13.1
MS	Average Marginal National Savings, 1970-81	12.7	21.3	8.4	10.2	33.3	8.4
RTOPYB	Government Revenues as % GDP, 1982	21.2	26.0	19.1	25.8	26.7	19.2
GETYB	Government Expenditures as % GDP, 1982	26.3	29.9	24.9	32.6	26.6	15.1
GDB	Government Deficit as % GDP, 1982	-4.8	-3.1	-5.5	-7.1	2.0	-5.6
	Composition of GDP						
AB	Share of Agriculture in GDP, 1982	24.4	14.4	22.9	18.1	9.4	29.6
IB	Share of Industry in GDP, 1982	29.9	40.3	24.5	32.4	49.3	24.6
MB	Share of Manufacturing in GDP, 1982	13.9	12.0	14.9	13.3	10.5	14.9
SB	Share of Services in GDP, 1982	45.7	45.3	46.0	49.4	41.3	43.4
	Performance Variables						
GDICB	Growth in GDP, 1970-82	4.3	4.2	4.3	3.3	5.4	4.4
INFB	Inflation, 1970-82	14.5	20.2	13.2	24.0	15.5	17.6
GDIGB	Growth in Investment, 1970-82	6.3	7.4	5.8	3.1	12.9	5.8
GDIB	Share of Investment = GDP, 1982	22.9	24.9	22.0	24.6	27.2	21.7
ICOR	Incremental Capital—Output Ratio	4.0	4.0	3.9	5.1	2.9	3.9
GIRA	Gross International Reserves, 1970	288.1	330.4	270.6	171.3	452.2	275.3
GIRB	Gross International Reserves, 1982	2,389.7	3,835.8	1,776.9	728.2	7,213.8	1,774.6
AGB	Growth in Agriculture, 1970-82	2.5	2.6	2.5	2.1	3.4	2.5

Source: World Bank, 1983 and 1984.

that foreign lenders will be more than ready too grant them *ceteris paribus* relatively large amounts of external credits. Clearly, if the mineral-oil developing countries are experiencing relative difficulty in servicing these debts, it must stem not so much from their possession of minerals and oil *per se,* as from the fact that countries with exportable resources may be inclined to over-borrow and/or waste external resources (Schattner).

IV. Determinants of Total Debt

The model developed below analyzes the basic supply and demand of total public external indebtedness in the third world. As a first step in constructing the model, it is reasonable to assume that a country's economic size will have a direct relationship on its external indebtedness and the capacity to service that debt.

A large country in terms of GDP will have more financial and commercial interactions with the rest of the world economy, and therefore be more likely to accumulate a relatively larger volume of debt. At the same time, the debt servicing capacity of a large country is apt to be greater than that of a smaller nation, and consequently, a larger external debt can be accumulated at relatively lower risk. In general, therefore, the larger the developing economy as measured by GDP, the greater its demand for external indebtedness (Heller and Frenkel).

Second, it is obvious, and almost true by definition, that a country's external debt will be related to its current account balance. Clearly, current account deficits can not exist without external financing. Hence, *ceteris paribus,* a country's indebtedness will be higher as its current account deficits increase.

Third, international reserve holdings are another factor likely to influence the amount of external indebtedness. Here, however, the relationship is likely to be more complex and less straightforward than in the case of economic size and the current account balance. On the one hand, it is apparent that as a country's reserves increase, its ability to service a growing external debt will also increase. In a portfolio model both assets and liabilities will tend to increase simultaneously. On the other hand, *ceteris paribus,* one might expect a richer country to hold more international and have less need to incur external indebtedness. Clearly,

V. Model Specification

The next step in our analysis is to isolate the main supply and demand influences on total mineral/non-mineral country indebtedness through the development of a reduced form equation capable of measuring the influence of all relevant independent variables simultaneously. Following Heller and Frenkel, GDP and the current account deficit are assumed to be the main demand variables, while the international reserve position of the country is the main factor affecting supply.

More precisely:

(a) Total debt (PDB) supply = f_1 (reserves(GIRB))

(b) Total debt (PDB) demand = f_2 (gross domestic product (GDPB), current account balance (CAB), military expenditures (ME), health expenditures (SH), and education expenditures (SE))

(c) Total debt supply = total debt demand
Dividing equations (a) and (b) by the equilibrium level of total debt as specified in (c) we obtain:

(d) x_1 (f_1/Total debt, f_2/Total Debt) = 0
x_2 (Total Debt, GDPB, CAB, ME, SE, SH, GIRB) = 0

The implicit form of the reduced form equation being:

(e) Total debt = f_3 (GDPB, CAB, ME, SE, SH, GIRB).

VI. Results

The results[4] for out total sample of countries (Table 2) indicate that over 67% of the fluctuation in third world debt can be explained by only two variables, gross domestic product (GDPB), and international reserves (GIRB). In terms of individual demand components, increased military expenditures were not associated

[4] The debt variable in the analysis is for the year 1982. This year was selected largely because it is the terminal year of a decade of rapidly increasing borrowing by third world countries. The debt crisis in the summer of 1982 brought on by the *de facto* Mexican default resulted in a marked change in the volume international borrowing thereafter. Since hardly any new debt has been created after, the results obtained below would most likely be similar to those found for the early 1980s. Several other years were also examined — 1979, 1980, and 1981. The results were essentially the same as those presented here for 1982.

with increases in external public debt, but increased educational expenditures were.

Health expenditures, however, had a negative sign, indicating perhaps that health is an area where public cutbacks occur during periods of austerity associated with high over all levels of public external indebtedness. Interestingly enough, third world countries as a whole do not appear to have a direct causal link between balance of payments deficits (CAB) and public external debt.

In addition to the variables specified in the model developed above, several additional independent variables were added to the regression equation — public external indebtedness (PDA) in 1970, and an export concentration index — CIX (World Bank 1983). The export concentration index was used to control for several of the major OPEC countries such as UAE, Saudi Arabia and Libya, all having extremely concentrated export earnings together with little or no external public debt. The results with these variables included indicate that:

1. Public external indebtedness (PDA) in 1970 appears to be a good predictor of external public debt in 1982.
2. Increasing the concentration of exports (CIX) does not, however, affect public external indebtedness in any statistical sense.

The results (Table 3) for the mineral-oil sub-group of countries indicate several interesting patterns:

1. The standardized coefficient for gross domestic product (GDPB) is consistently higher than that obtained for the total sample. Apparently, given a level of GDP, mineral countries are able to obtain a higher volume of external indebtedness than developing countries as a whole.
2. The coefficient for the international reserves term (GIRB) is nearly the same magnitude as that of the total sample.
3. For both mineral exporters and the total sample of countries, international reserves had a positive sign when regressed individually on external public debt. In both cases, if one corrects for the influence of gross domestic product, countries with high reserves tend to receive less external funds. This result supports that theory that a country in a relative comfortable financial position (as evidenced in high reserve holdings) is less likely to incur external indebtedness.
4. Military expenditures (ME) were statistically significant with a

negative sign in all the regressions. On the other hand, health (SH) and educational expenditures (SE) did not prove to be statistically significant.

These results, together with the higher overall savings rates charcterizing mineral economies, (Table 1) tend to refute the notion that mineral exporting countries as a group tend to incur increased external indebtedness to facilitate increased consumption. According to this argument (Schattner), periods of mineral and/or oil price increases are accompanied by an increased government revenues, much of which is used for expanded social programs and or military expenditures (Whynes, chapter 2).

Increased expenditures in these areas during periods of expanding revenues are assumed to create rising expectations, parti cularly among urban groups (Hirschman and Rotschild). During periods of declining government revenues, the authorities often attempt to stave off political and social unrest through maintaining these expenditures by running down reserves and/or stepped up levels of external borrowing (Looney 1987c). Iran in the mid 1970s was a classic example of this phenomena (Looney 1982).

At least in the areas of defense, education, and health, the results presented above tend to contradict this theory. Contrary to ths notion, mineral producers apparently choose instead to reduce military expenditures during periods of austerity as a means of increasing external credit worthiness. The oil countries with a high degree of export concentration do not appear to affect the above conclusion significantly. The sign on the export concentration (CIX) term is not highly significant; nor does the introduction of this variable cause a marked change in the coefficients for gross domestic product (GDPB), reserves (GIRB), or military expenditures (ME).

In the case of the mineral economies public external debt (PDA) in 1970 appears to be a weaker predictor of public external debt in 1982 than the sample as a whole (both in terms of the size of its coefficient and degree of statistical significance). This result may, in part, reflect the reduction in public external debt of several of the major oil exporters during the 1970-1982 period. In sum, the introduction of the level of debt in 1970 in the regression equation does not significantly affect the overall coefficient of determination. Finally, the mineral exporting countries do not ex-

Table 4

DETERMINANTS OF PUBLIC EXTERNAL DEBT (1982): IN NON MINERAL EXPORTING COUNTRIES

(Standardized Estimates)

	Independent Variables								Statistics		
	GDPB	GIRB	ME	CAB	CIX	PDA	SH	SE	r^2	F	DF
External Public Debt =	0.77										
	(8.96)								0.598	80.37	55
		0.33									
		(2.66)							0.114	7.12	56
			0.60								
			(5.47)						0.366	30.10	53
				-0.86							
				(-11.78)					0.743	138.98	49
	0.78	-0.31	0.27								
	(6.55)	(-2.69)	(2.33)						0.663	31.52	51
	-0.21	-0.31	0.55	-0.97							
	(-1.68)	(-4.66)	(7.32)	(-9.81)					0.897	89.71	45
		-0.35	0.46	-0.83	-0.04						
		(-4.77)	(5.97)	(-13.80)	(-0.51)				0.891	78.16	42
		-0.32	0.24	-0.77	-0.08	0.27					
		(-4.87)	(2.68)	(-14.14)	(-1.15)	(3.68)			0.921	84.44	41
		-0.20	0.42	-0.89		0.14	-0.28				
		(-3.78)	(6.44)	(-18.43)		(2.49)	(-4.95)		0.951	148.06	43
		-0.29	0.35	-0.84		0.26		-0.11			
		(-4.84)	(3.72)	(-8.91)		(3.68)		(-0.88)	0.921	88.83	43

Notes: Independent variables, GDPB, 1982 (millions of dollars); GIRB, 1982 (millions of dollars); ME, 1981 (millions of dollars); CAB, 1982, (millions of dollars); PDA, 1982 (millions of dollars); CIX, 1970-1980; SE, 1980 (millions of dollars); SH, 1980 (millions of dollars).
DF = degrees of freedom; F = F statistics; r^2 = correlation coefficient; ( ) = t statistic