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ENDOGENOUS CREDITOR SENIORITY AND EXTERNAL DEBT VALUES

Michael Dooley

Mark R. Stone

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ABSTRACT

A new aggregation scheme used to measure the sources of fiscal financing of indebted countries suggests that there was a fundamental improvement in the seniority of domestic debt at the expense of foreign bank debt during the late 1980s. We argue that this was the revenue maximizing response of governments to internal and external capital flight that drained the domestic financial "tax base" subject to indirect taxation. Empirical analysis indicates that the profile of the sources of fiscal financing influenced external debt values. The econometric analysis also implies that previous studies have neglected an important reason for the decline in loan values from 1985 to 1989: the increase in international interest rates.

Michael Dooley
Department of Economics
University of California, Santa Cruz
Santa Cruz, CA 95064

Mark Stone
International Monetary Fund
700 19th Street N.W
Washington D.C. 20431

I. Introduction

Most analyses of sovereign external debt assume that the capacity to raise foreign exchange revenue is the binding constraint in the repayment decision.[1] Alternatively, since the repayment of foreign debt--most of which is owed by the government--is financed by the transfer of resources from the private to the public sector, several studies have focused on the fiscal constraint.[2] This paper extends the fiscal approach. By viewing changes in payments to different creditor classes as signals of changes in seniority we argue that it is not only the level but the distribution of the primary fiscal balance between domestic and external creditors that determines repayment and debt values.

A new aggregation scheme is used to measure the distribution of government financing between foreign and domestic creditors, and the influence of the level and financing of the primary fiscal surplus on the market value of foreign loans is estimated. According to the empirical results, the profile of the sources of fiscal financing influenced external debt values from 1985 to 1989, suggesting that the decline in prices during this period (Table 1) reflected a fundamental improvement in the seniority of domestic debt at the expense of foreign bank debt. We argue that this change in relative creditor standing was the cost minimizing response of governments to internal and external capital flight that drained the domestic financial "tax base" subject to indirect taxation. A secondary objective of the paper

is to show that previous studies have neglected an important reason for the decline in loan values from 1985 to 1989: the increase in market interest rates.

A Simple Model

Our analysis starts from the conventional assumption that the aggregate market value of claims on a government depends upon the expected present value of payments to all creditors. Because debt payments are financed by the transfer of resources from the private to the public sector, the average value of all classes of debt depends upon the expected present value of the fiscal surplus. But prices and values of classes of credits depend in addition on their expected seniority of payment, and one of the interesting problems associated with sovereign debt is that the contractual structure of credits does not provide a clear basis for seniority. In fact, the debtor government can treat a class of creditors as senior by making payments to that creditor at the expense of other creditors. The government can even borrow from a junior creditor to pay a senior creditor if it has the ability to coerce the junior creditor. This, of course, generates strong incentives for the junior creditor to escape the coercive relationship with the debtor government. Since the debtor government will discriminate among creditors to minimize the present value of the costs of debt service it makes sense to aggregate debt according to broad creditor groups.

In general then, the market values of classes of credits reflect an optimal intertemporal strategy by debtor governments toward different creditors and the endogenous reactions of creditors to the government's choices. While there is an enormous theoretical literature on the enforcement technology available to foreign creditors, scant attention has been paid to the response of domestic creditors or to the relative standing of the two major classes of creditors.

A very simple static framework illustrates the financing problem faced by governments.[3] The government budget constraint is

$$(1) \quad G - \tau Y = D + F$$

where G is fixed government expenditure, τ is the tax rate, Y is income, D is domestic debt and F is foreign debt. For the reasons discussed above we assume that total financing costs (interest and noninterest) of domestic and external financing are increasing and decreasing, respectively, in the proportion of domestic financing

$$(2) \quad C_d(d) \quad C_f(d) \quad d = D/(D + F) \quad C'_d > 0 \quad C'_f < 0$$

Determination of the exact shape of the C_d and C_f functions would be possible only with accurate data concerning the costs, as well as the amounts, of financing. However, we feel confident that the assumed signs of the first derivatives are reasonable. Total financing costs are

$$(3) \quad C(d) = C_d(d) + C_f(d).$$

The government chooses the mix of financing that minimizes total financing costs.

The C_d curve shown in Chart 1 is zero at the origin where the primary balance is financed only by external debt, and increases to its maximum where only residents finance the deficit at d equal to one. An analogous relationship holds for C_f reading leftward from the d equal to one vertical line. Total financing costs are minimized at the trough of the C curve where the marginal cost of an extra unit of each financing source is equal.

Now consider a reduction in Y which, given fixed G, necessitates a higher level of financing. Chart 2 shows two sets of financing cost curves for income levels Y_0 and Y_1 where $Y_0 > Y_1$. The $C_d(d,Y_1)$ and $C_f(d,Y_1)$ curves are above the $C_d(d,Y_0)$ and $C_f(d,Y_0)$ curves because costs increase in the amount of debt. As the curves are drawn the lower level of Y increases the optimal proportion of the fiscal gap financed by residents.

In a dynamic setting, the government attempts to minimize the expected present value of the costs as represented in Chart 2. The interesting difference between the two markets is that access to the international market was lost almost entirely in 1982 for most of these countries. In terms of Chart 2, the $C_f(d)$ shifts to the right immediately because new external debt carries a market clearing interest rate approximated by the risk free rate divided by the market price of existing debt. For the sample of countries considered here this was two to ten times the risk free rate. Because the cost of foreign borrowing had in practical terms become infinite, governments turned to domestic credit. Access to domestic credit markets eroded slowly during the 1980's, not because residents were slow to learn or misinformed, but because their ability to respond was constrained by capital controls and other administrative restrictions. According to measures of capital flight reported below, residents succeeded over time in replacing their government's liabilities with foreign assets as an outlet for their savings. This would result in a gradual upward shift in $c_d(d)$ over time. Our conjecture is that debtor governments had nearly exhausted their domestic market power by 1987 so that the yield on new internal debt approached the yield on existing external debt. The associated rise in debt service costs was very rapid given the very short maturity of most internal debt. The costs of continuing to tap the internal

market inevitably exceeded the costs of improving the primary balance. Moreover, the expected need for access to some credit market to smooth unexpected changes in the primary balance may have favored reestablishing a payments record in the domestic market.

Testable Implications of the Model

The importance of a shifting profile of creditor seniority could be tested by comparing the relative rates of return on domestic versus external debt for the 17 sample countries.[4] Such an analysis is ruled out by the difficulty of gauging the real after-tax returns on domestic assets in the high inflation and high indirect taxation regime of financial repression. Instead, we estimate the influence of the primary fiscal deficit and its allocation between domestic and external creditors on secondary market external loan prices.

Even after the inclusion of indicators of internal financing, country-specific indicators do not explain the fall in loan prices, that is prices early in the sample period are underfitted while 1988 and 1989 prices are overfitted. Several studies have exploited the correlation between the portion of loan prices unexplained by country-specific indicators and measures of creditor behavior--which do not vary over countries and increase over the sample period--to support the view that creditor behavior is an important determinant of loan prices.[5] If this is the case,

that is, if prices in secondary markets reflect the regulatory and reserve positions of banks, then it seems clear that debtor countries could benefit from restructuring agreements that exploit these market imperfections.

We offer an alternative explanation for the inability of country-specific fundamentals to fully explain the fall in loan prices. From 1986 to 1989 the LIBOR annual average rose from 6.86 percent to 9.28 percent, implying that the value of any payment stream would have been decreasing. Moreover, the empirical evidence supports the view that the expected partial payments on floating rate debt are unaffected by changes in market interest rates, so that the market value of both fixed rate and floating rate sovereign debt is affected by changes in the rate at which expected payments are discounted. Including LIBOR in the regression improves the model fit and smooths out the intertemporal pattern of residuals. It follows that verification of hypotheses concerning creditor behavior should be based on indicators that have explanatory power over and above that of market wide interest rates.

II. Measuring Domestic Financial Repression

A debtor government can make net payments to nonresident creditors if it can capture domestic resources through taxation or net borrowing from residents. If taxation is used the resident gets a receipt. If borrowing is used the resident gets some type

of financial government liability. If the government subsequently acts to reduce the value of its liability the borrowing becomes an alternative form of taxation. At the limit a tax receipt is the same as a defaulted government bond. The most obvious form of taxation of this sort is the inflation tax on the government's monetary liabilities. But in many cases this is not the most important form of taxation. Financial repression can be defined as any regulatory mechanism that limits residents' access to investments other than their government's liabilities. In the case of developing countries an important alternative for residents has been foreign currency denominated assets in off-shore markets. For a variety of reasons developing countries have limited resident's access to such markets through legal restrictions. In addition, registered financial intermediation in domestic markets is in many cases a government monopoly. In return for the right to engage in financial intermediation, banks and other financial intermediaries have been forced to hold government liabilities at below market yields.

Because the tax base in this case depends upon a system of legal restrictions it is very difficult to quantify. Moreover, as the government imposes higher tax rates to this base, residents can be expected to intensify efforts to avoid the tax by reducing holdings of money and other government liabilities and by evading taxation by acquiring foreign financial assets and

unregulated domestic assets. The government's response usually involves more controls as well as redesigned government securities. The shifting legal structure and the response of governments makes time series of financial aggregates very difficult to interpret in most cases.

The tax rate relevant for domestic liabilities of the debtor government is also difficult to quantify. Clearly, any government liability that pays a rate of interest not indexed to the rate of inflation (or the exchange rate) is potentially taxable through inflation. Measures of the maximum steady state revenue from inflation are useful but do not capture the essence of the problem for most debtor countries. The government can impose a 100 percent tax on any of its non-indexed liabilities, including wages and pensions, through a sufficiently sudden and unexpected hyperinflation. To the extent that the government controls commercial bank lending decisions and imposes restrictions on deposit yields, one can think of the liabilities of the banking system as being taxed in order to support government expenditures in the form of subsidies to favored borrowers. Finally, government bank reserve requirements are another means of implicit financial taxation.

Although direct measures of government financing from financial repression are not available, CPI inflation can serve as a gauge of the tax rate on money holdings. After the advent of

external debt servicing difficulties in 1982 the inflation tax rose for most of the sample countries. Even after excluding the debtors that experienced hyperinflation--Brazil, Argentina, Peru and Uruguay--the average rate of inflation rose from 25 percent in 1982 to 38 percent in 1987, and 45 percent during the last two years of the sample interval (Chart 3).

By the mid-1980s the low rates of return on controlled domestic assets induced residents of developing countries to incur the costs of transferring capital to offshore financial intermediaries. The methodology of Dooley (1988) provides estimates of the stock of resident capital invested abroad in order to avoid the control of domestic authorities. The doubling of the stock of flight capital for the sample countries over the five years after 1982 (Chart 4) suggests that financial repression intensified as indebted country governments paid a larger share of available resources to foreign creditors. For most countries capital flight increased from the early 1980s to 1987 or 1988, then leveled off through 1989. Mexico experienced a reversal beginning in 1987, suggesting that the process of domestic reintermediation began before the end of the sample interval. These data are utilized in more formal econometric tests below.

III. A Flow Measure of External and Domestic Creditor Seniority

In the middle income debtor countries domestic debt has become the dominant competitor for payment of the external debt. However, it is often difficult to construct data for domestic contractual interest obligations and for new credits, particularly in high inflation countries. Moreover, the distinction between money and alternative highly liquid government obligations is often difficult to maintain in practice. This inability to directly measure taxation of resident creditors limits empirical study of governments' treatment of broad classes of creditors. To overcome this problem we develop a "flow measure" of payments to different classes of creditors. This measure, in combination with observable external debt prices, allows empirical inference concerning the relative standing of domestic and external creditors. We develop an accounting system in which net government payments to domestic asset holders is measured as a residual.

The starting point for the analysis is a measure of the debtor government's primary fiscal surplus. This is defined as the central government's noninterest receipts less its noninterest expenditures. It is therefore the net amount available for distribution to all domestic and foreign creditors.[6] Because we have reasonably reliable data on contractual interest obligations

to nonresidents and for new credits from nonresidents, net payments to these groups can be identified. By subtracting these amounts from the primary fiscal surplus we find the payments net of new borrowing from residents of the debtor country.[7] Thus, we treat net payments to holders of domestic debt, including money, as the residual in the accounting system. For example, if the primary fiscal surplus in a year was less than the net payments to external creditors, residents must have acquired government debt, including money, in order to finance debt-service payments to nonresidents.

The net payment to a creditor in a time period does not, in itself, tell us anything about how different creditors expect to be treated in the future. If we observe, for example, that domestic creditors make new loans to their government that more than cover interest due on existing debt--while nonresidents make no new loans and receive full interest on existing debt-- we cannot conclude that foreign creditors will always receive payments at the expense of residents. To the contrary, if neither creditor can be coerced by the debtor, only the senior creditor will make a new loan if there is any doubt about the government's payments capacity. In this case domestic creditors might grant new loans because they believe they will get first claim on future fiscal surpluses.

Nevertheless it is reasonable to suppose that over time residents would revise their expectations about their status relative to nonresident creditors as governments continued to make large net payments to nonresidents financed by domestic borrowing. Moreover, capital flight, accelerating domestic inflation, and in a few cases outright default on domestic debt suggests that the pattern of payments during the time period studied below reflect coercion of residents rather than expected seniority.

The level and distribution of the primary balance aggregated over seventeen indebted countries (in U.S. dollars) is shown in Chart 5. The decline in the accumulation of net government claims on domestic residents from 1985 to 1987, combined with the sharp fall in the primary surplus, reduced the amount paid to foreigners from $50 billion to $24 billion over the two year period. We interpret these payment streams as signalling a change in relative seniority between domestic and foreign creditors, and note that the decline in payments to foreigners may provide an explanation for the pervasive fall in external debt prices in 1987.

IV. Creditor Seniority as a Fundamental Determinant of Debt Values

The empirical analysis has two objectives. First, estimation of the impact of domestic and external creditor

financing of the fiscal gap on external debt prices, controlling for other key macroeconomic determinants of debt values, serves as a rough and ready test of the importance of creditor seniority. However, even after accounting for the fiscal constraint there are certain regularities in the model residuals, suggesting an additional omitted variable. We offer an alternative explanation to that of other studies that have used creditor behavior to explain loan price movements after controlling for country-specific factors.

Virtually all studies of sovereign creditworthiness in general, and of secondary loan prices in particular, choose from a standard list of debt payment capacity indicators related to the external balance constraint e.g. the debt service to export ratio, the reserve to import ratio, and the debt to GDP ratio.[8] However, Stone (1992) shows that published risk ratings have predictive power over and above that of the standard balance of payment fundamentals, which suggests there are country-specific fundamentals systematically used by loan market participants that have not been captured in empirical studies.

The hypothesis that the expected status of bank loans relative to other credits is an important omitted fundamental is examined in the regression results presented in Table 2. Three of the standard indicators are included in the specification reported in column A. The importance of indirect taxation of

domestic assets is examined in the second specification. Both indicators of financial repression, CPI inflation, and the stock of flight capital appear to have a significant impact on debt prices, even after controlling for external indicators of creditworthiness.

The importance of payments to all creditors is examined in the third model reported in column C. Interestingly, the coefficient for our measure of the total amount paid to government creditors, the primary balance, enters the model with a positive sign, but is not significant at conventional levels. The key regression results are presented in column D: both the level of the primary surplus, and the distribution of funds to creditors--measured here by the amount paid to domestic creditors[9]--have a significant impact on external debt market values. Furthermore, the t-statistics for the inflation and capital flight parameter estimates indicate that market participants jointly consider financial repression in addition to the size and distribution of payments to creditors.

The measure of government financing needs is extended to include central bank losses but not profits, since the latter are given to the central government.[10] The average across the fifty five available observations (all but the African countries) of central bank losses was -3.0 percent of GDP. Column E of Table 2 indicates that the key parameter estimates for the subsample for which central bank losses are available are broadly

similar to those for the full sample. Column F reports the impact of the broader measure of government financing needs on debt prices. The sum of central bank losses and the primary balance does not improve on the explanatory power of the latter, suggesting that either central bank losses are difficult to estimate, or financing of these losses is so uncertain as to obfuscate their impact on debt prices.

The inability of country-specific measures to explain the drop in loan prices has provided scope for empirical verification of an alternative view of debt price determination. Correlation between indicators of creditor behavior and debt prices have been used to support the importance of creditor behavior. Examples of such measures include proxies for loan loss reserves (either a dummy variable for the periods of reserve changes or an aggregate measure of U.S. bank reserves for all countries),[11] as well as the amount of debt concentrated in large banks[12] and bank capitalization.[13] These results call into question the efficacy of using secondary market loan prices in debt restructuring since participants could benefit from agreements that exploit these market imperfections. Except for the dummy variables these measures of creditor behavior increase steadily over time, and do not vary across countries, hence, given the pattern of residuals shown in Table 3, they will have explanatory power. Of course it would be impossible to empirically distinguish the influence of

these indicators of creditor behavior from any other explanatory variable that increased over time and did not vary over countries. We propose an alternative explanation for the tendency of the residuals to move from positive to negative values over the sample period for virtually all sample countries.

In addition to sovereign risk these prices will reflect interest rate risk, and, given the steady increase in the LIBOR from 6.86 percent in 1986 to 9.28 in 1989, the prices of loans across all countries would be expected to fall over the sample period, after controlling for country specific fundamentals. Including LIBOR as reported in column G of Table 2, not only improves the model fit, but, as shown in the bottom panel of Table 3, smooths out the intertemporal pattern of the regression residuals.

Ideally the spread of sovereign security yields over risk-free securities with the same contract terms would be used as the dependent variable. However, uncertainty regarding contractual terms as well as measurement problems rules out using secondary market sovereign-risk yields.[14] Nevertheless, we argue that the impact of creditor behavior on loan prices is best gauged after controlling for interest rate changes, in addition to accounting for external and fiscal constraints.[15]

V. Conclusion

The empirical results reported here are the first to show that, in addition to current account developments, sovereign debt values reflect the level and financing of the fiscal gap. This is further evidence that the debt prices used in restructuring should be perceived as capturing important macroeconomic information. The explanatory power of market interest rates suggests that a reexamination of the emphasis on creditors in empirical analyses of external debt prices may be merited. The empirical results verify the importance of country-specific fundamentals in the determination of sovereign risk.[16]

An enormous theoretical literature has addressed the potential means of contract enforcement available to external creditors.[17] The empirical importance of the shifting sources of creditor financing reported here suggests that domestic creditors should be included as a player in models of government repayment and creditor punishment. Endogenizing creditor seniority could enhance understanding of the consequences of financial repression as well as provide insights into the conditions underlying the resumption of voluntary lending to debtor governments by domestic investors at market rates.[18]

Chart 1

Total Cost Minimizing Shares of Domestic and External Financing

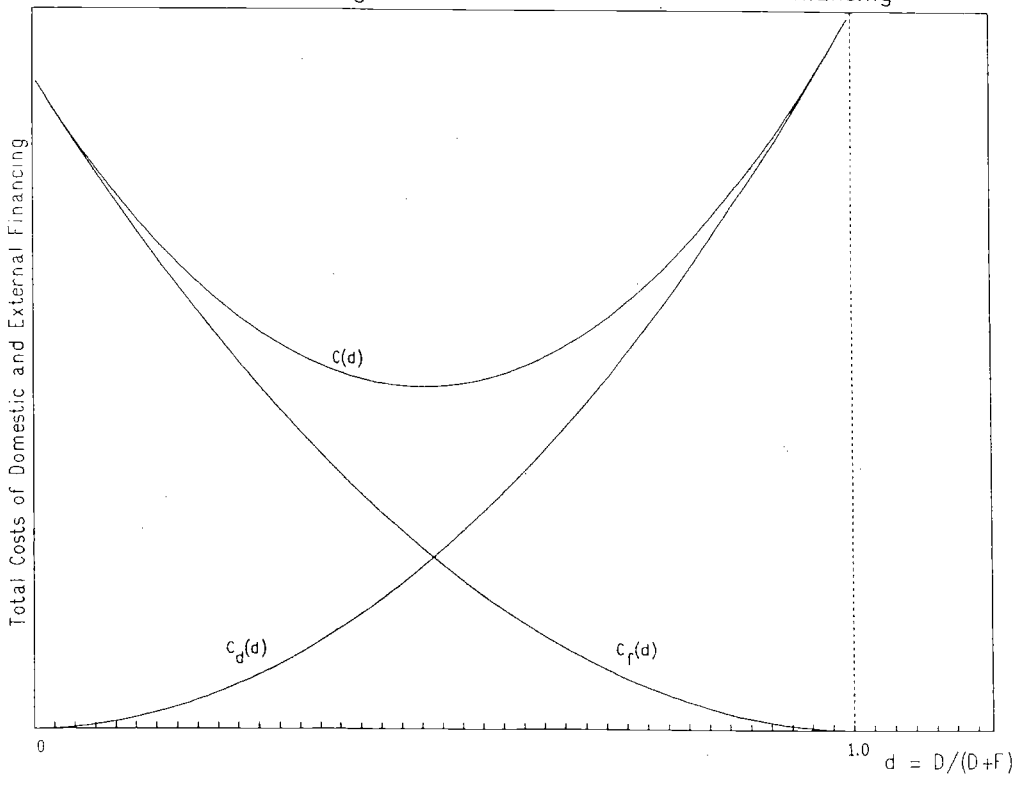


Chart 2

Total Cost Minimizing Financing Under Different Income Levels

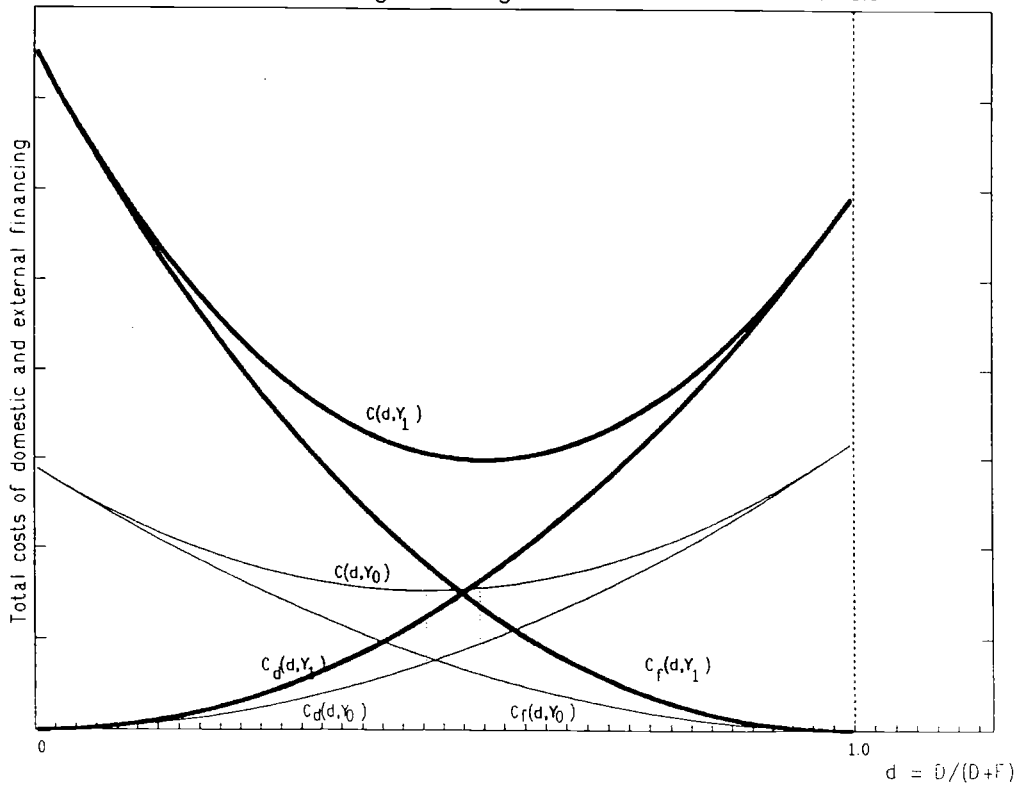
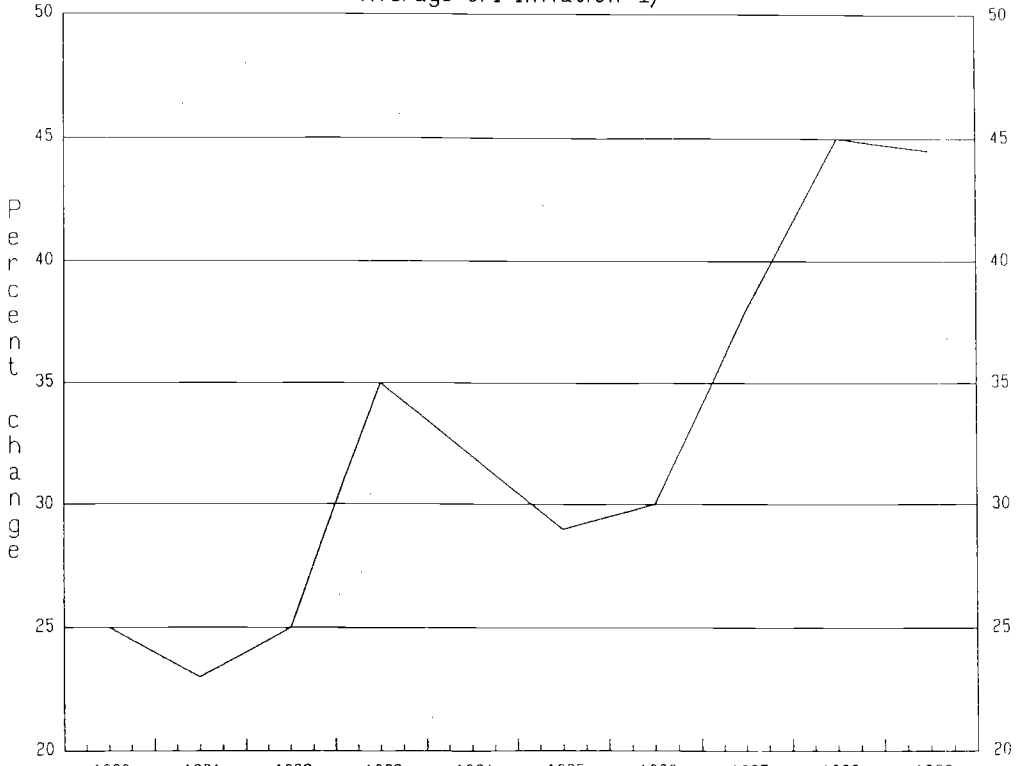


Chart 3

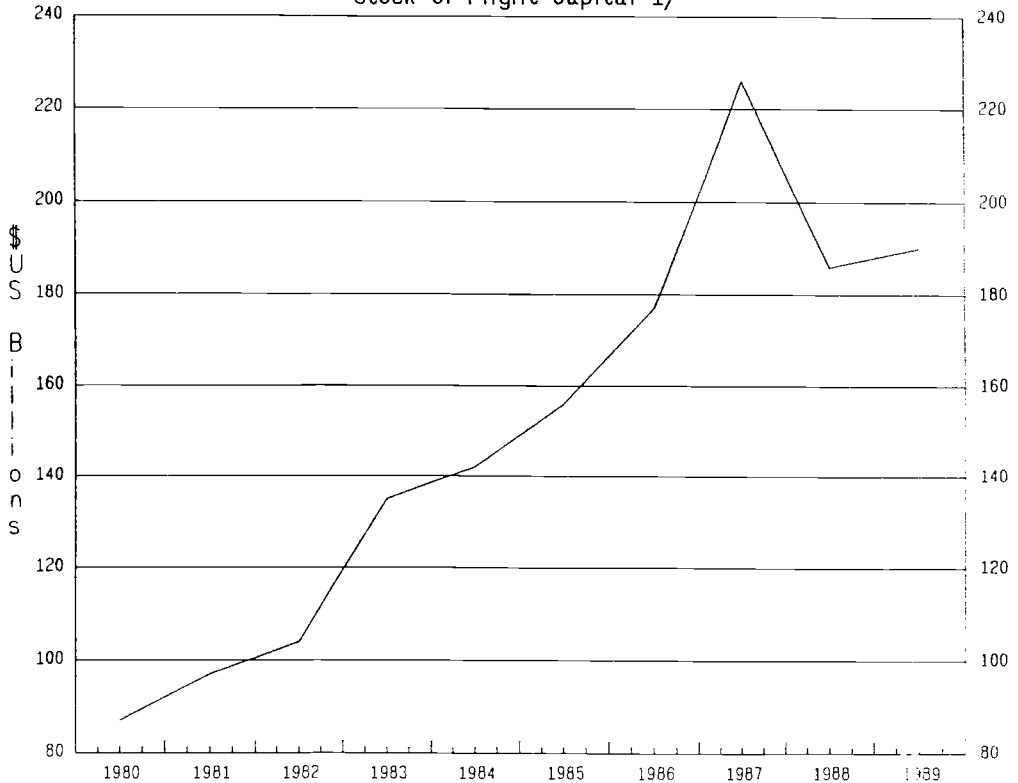
Average CPI Inflation 1/



1/ Seventeen debtor countries except Argentina, Brazil, Peru and Bolivia.

Chart 4

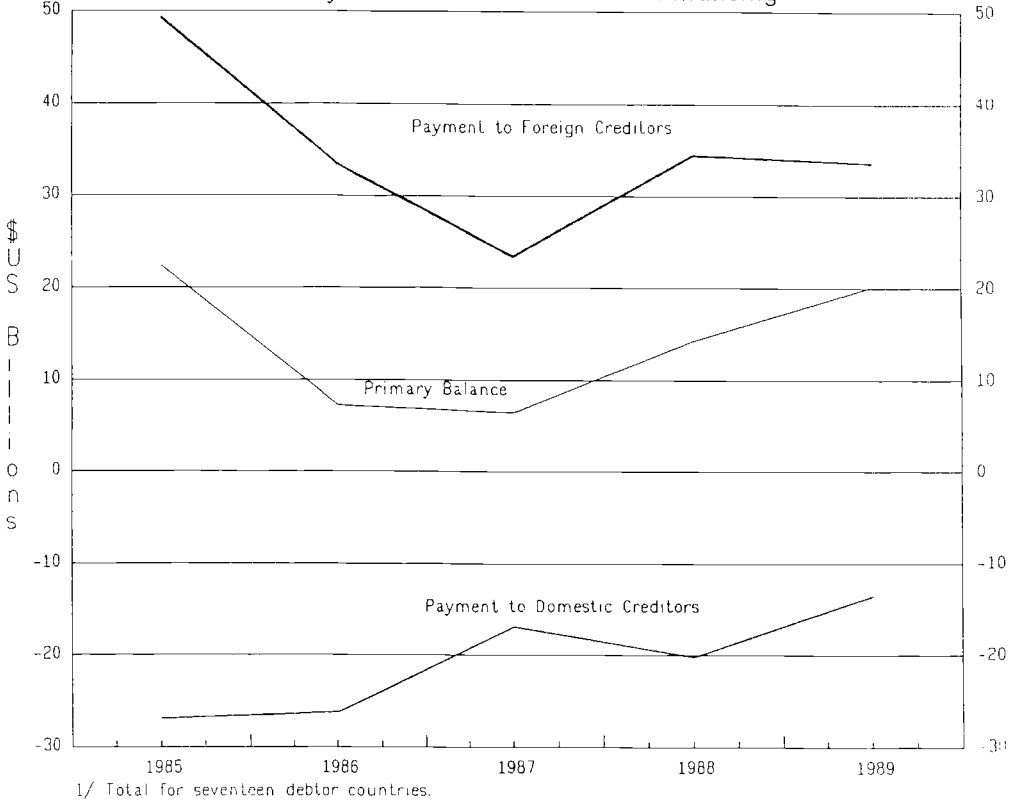
Stock of Flight Capital 1/



1/ Total for seventeen debtor countries.

Chart 5 1/

Primary Balance and Sources of Financing



1/ Total for seventeen debtor countries.

Table 1. Secondary Market External Debt Prices 1/

	1985	1986	1987	1988	1989
Brazil	77.2	75.6	56.6	47.8	30.3
Mexico	72.9	59.1	54.5	48.6	39.8
Argentin	NA	65.7	50.8	25.6	16.2
Venezuela	81.2	76.9	66.3	51.4	37.2
Philippines	NA	64.5	64.8	52.1	47.4
Algeria	NA	95.2	95.2	90.5	76.1
Chile	67.4	67.7	64.6	59.5	60.7
Nigeria	NA	50.5	31.5	27.5	24.7
Peru	36.9	20.5	13.5	6.4	4.8
Colombia	83.0	84.9	81.2	64.7	59.4
Ecuador	68.1	66.2	48.2	25.5	14.0
Uruguay	NA	64.6	69.5	60.3	55.8
Zaire	NA	25.1	25.1	21.4	19.7
Costa Rica	NA	47.1	31.0	13.9	15.1
Sudan	NA	11.6	6.2	5.4	2.3
Zambia	NA	17.3	19.4	19.6	20.5
Bolivia	NA	7.0	10.3	11.3	11.1
Average	69.5	52.9	46.4	37.2	31.5

1/ See Data Appendix for sources.

Table 2: Regression Results 1/

Dependent Variable: Log of Annual Loan Market Price

Seventeen countries from 1985 or 1986 to 1989

	A	B	C	D	E	F	G
Debt/exports	-.00122	-.00092	-.00072	-.00076	-.00109	-.00133	-.00095
	(3.36)	(2.23)	(1.87)	(2.32)	(1.59)	(1.56)	(2.75)
Imports/reserves	-.00013	-.00024	-.00026	-.00013	-.00037	-.00035	-.00002
	(0.85)	(1.56)	(1.48)	(0.96)	(1.83)	(1.68)	(0.14)
Arrears/debt	-.06088	-.04374	-.04485	-.04293	-.05457	-.05447	-.04133
	(4.15)	(2.66)	(3.12)	(3.34)	(5.22)	(4.84)	(2.92)
CPI Inflation		-.00019	-.00018	-.00014	-.00009	-.00007	-.00005
		(1.97)	(2.10)	(1.65)	(1.33)	(0.86)	(0.51)
Capital flight/GDP		-.50112	-.40801	-.57770	-.12970	-.28682	-.56624
		(2.04)	(1.71)	(2.55)	(0.44)	(0.81)	(2.74)
Primary balance/GDP			.02917	.05858	.06802		.06335
			(1.35)	(2.80)	(3.06)		(3.34)
Payment to domestic creditors/GDP				-.03879	-.02654		-.03833
				(4.21)	(1.26)		(4.18)
Primary and central bank balance/GDP						.05398	
						(2.27)	
Payment to domestic creditors/GDP						-.04070	
						(2.27)	
LIBOR							-.02035
							(3.35)
Constant	4.24	4.30	4.20	4.03	4.22	4.30	5.56
	(41.8)	(40.6)	(32.7)	(32.4)	(14.5)	(14.0)	(12.0)
ASIA	.22787	.33267	.36369	.16378			.10437
AFRICA	.06714	.24342	.27000	.41587			.36558
R-Squared	0.61	0.64	0.65	0.69	0.59	0.57	0.73
N	75	75	75	75	55	55	75

1/ T-statistics are reported in parentheses. Standard errors are adjusted for heteroscedasticity.

Table 3. Regression Residuals

	Model D (Without LIBOR)					
	1985	1986	1987	1988	1989	Average
Brazil	0.52	0.66	0.57	0.08	-0.05	0.35
Mexico	0.34	0.31	0.24	-0.13	-0.37	0.08
Argentina	NA	0.58	0.67	-0.09	0.17	0.33
Venezuela	0.14	0.34	0.47	0.20	-0.55	0.12
Philippines	NA	0.13	-0.03	-0.02	-0.08	0.00
Algeria	NA	0.31	0.32	0.40	0.14	0.29
Chile	0.09	0.02	-0.24	-0.23	-0.26	-0.12
Nigeria	NA	-0.05	-0.55	-0.50	-0.84	-0.49
Peru	0.24	0.05	-0.05	-0.22	-0.15	-0.03
Colombia	0.71	0.60	0.52	0.33	0.20	0.47
Ecuador	0.28	0.41	0.38	-0.35	-0.98	-0.05
Uruguay	NA	0.23	0.39	0.16	-0.04	0.19
Zaire	NA	0.03	0.28	0.09	0.19	0.15
Costa Rica	NA	0.02	-0.47	-1.24	-1.17	-0.71
Sudan	NA	0.07	0.11	0.35	-0.28	0.06
Zambia	NA	0.50	-0.34	-0.23	0.00	-0.02
Bolivia	NA	-1.21	-0.46	-0.63	-1.01	-0.83
Average	0.33	0.18	0.11	-0.12	-0.30	

	Model G, (With LIBOR)					
	1985	1986	1987	1988	1989	Average
Brazil	0.63	0.47	0.44	0.04	0.11	0.34
Mexico	0.42	0.12	0.11	-0.18	-0.16	0.06
Argentina	NA	0.42	0.56	-0.06	0.16	0.27
Venezuela	0.23	0.17	0.34	0.24	-0.28	0.14
Philippines	NA	0.00	-0.16	-0.02	0.18	0.00
Algeria	NA	0.14	0.23	0.41	0.35	0.28
Chile	0.24	-0.15	-0.36	-0.22	0.01	-0.10
Nigeria	NA	-0.30	-0.73	-0.55	-0.54	-0.53
Peru	0.35	-0.13	-0.22	-0.30	-0.17	-0.09
Colombia	0.84	0.43	0.40	0.36	0.49	0.50
Ecuador	0.36	0.21	0.25	-0.36	-0.72	-0.05
Uruguay	NA	0.05	0.27	0.20	0.26	0.19
Zaire	NA	-0.17	0.16	0.16	0.25	0.10
Costa Rica	NA	-0.16	-0.61	-1.20	-0.87	-0.71
Sudan	NA	-0.12	0.04	0.43	0.07	0.11
Zambia	NA	0.38	-0.42	-0.17	0.38	0.04
Bolivia	NA	-1.35	-0.52	-0.53	-0.64	-0.76
Average	0.44	0.00	-0.01	-0.10	-0.07	

Data Appendix

The CPI inflation series are from International Financial Statistics, the primary balance series are from country sources and IMF country desk officers, and all other series are from the confidential IMF World Economic Outlook data base. Derivation of payments to creditors is shown in the following table. All entries are in U.S. dollars.

Contractual Interest to External Creditors
- Change in External Debt Stock
- Arrears
+ External Debt Reduction
+ Valuation Change
= Net Payments to External Creditors

Primary balance/GDP
- Net Payments to External Creditors/GDP
= Net Payments to Domestic Creditors/GDP

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FOOTNOTES

1. Dooley et al. (1986).

2. Reisen and van Trotsenburg (1988), Guidotti and Kumar (1991).

3. This paper abstracts from the spending-taxation-total borrowing tradeoffs and is instead concerned with the second order problem of minimizing financing costs along the lines of Barro (1979).

4. Khor and Rojas-Saurez (1990) compare yields on domestic and external debt of Mexico.

5. Boehmer and Megginson (1990), Fernandez and Ozler (1992), Ozler and Huizinga (1991).

6. Losses incurred by noncentral government public sector entities may accumulate as an unreported conditional liability, and thus should be included in the financing formula. The two most important cases are state enterprises whose income flows are not part of the central government budget, and central banks with losses that are not immediately financed by newly issued government credit. Because state enterprise profit/loss results are available for a limited number of sample countries, this potential financing need is not analyzed in this paper. A broader definition of financing needs that encompasses central bank losses is tested in the empirical section.

7. See data appendix.

8. For example, see Heffernan (1986).

9. Ratios of payments to foreign and domestic creditors could not be used as a measure of relative creditor standing because of both negative and positive flows.

10. Robinson and Stella (1987) review the impact of unfunded central bank losses on government financing.

11. Vatnick (1988), Stone (1991), Anayiotos and Depinies (1990), Boehmer and Megginson (1990).

12. Fernandez and Ozler (1990).

13. Ozler and Huizinga (1991).

14. Alexander and Kawash (1988) calculate sovereign risk spreads for a limited number of countries.

15. In addition to the problem of controlling for interest rate risk, the use of linear regression techniques may limit the empirical modelling of sovereign debt prices, since shifting creditor seniority implies a more general functional relationship between debt prices and fundamentals. Bartolini and Dixit (1990) base a theoretical model of debt values and creditor seniority on an option pricing framework. Debt prices have a nonlinear relationship with macroeconomic fundamentals: over intermediate price ranges a relatively small change in seniority (for a given debt servicing capacity) may result in a large change in the value of debt to the creditor. Unfortunately, because the parameter values characterizing such a functional form are country-specific, and only annual data are available for most of the fundamentals, testing the hypothesis of non-linearity must await the arrival of more price data.

16. The importance of fundamentals in the determination of debt values is consistent with the circumstances

underlying the reentry of indebted countries into capital markets (c.f. El-Erian (1992)).

17. See Bulow and Rogoff (1989), Eaton, Gersovitz and Stiglitz (1988), and Kletzer and Wright (forthcoming).

18. See Guidotti and Kumar (1991) and Calvo (1992) for analyses of government credibility and financing costs.