

NBER WORKING PAPER SERIES

RECENT PRIVATE CAPITAL
INFLOWS TO DEVELOPING COUNTRIES:
IS THE DEBT CRISIS HISTORY?

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Working Paper No. 4792

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
July 1994

This paper is part of NBER's research program in International Finance and Macroeconomics. Any opinions expressed are those of the authors and not those of the National Bureau of Economic Research.

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ABSTRACT

This empirical study finds that while debt reduction and policy reforms in debtor countries have been important determinants of renewed access to international capital markets, changes in international interest rates have been the dominant factor. We calculate the effects of changes in international interest rates for a "typical" debtor country. We conclude that increases in interest rates associated with business cycle upturn in industrial countries could depress the secondary market prices of existing debt to levels inconsistent with continued capital inflows.

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SUMMARY

The outlook for economic development for an important group of middle income countries has once again been buoyed by substantial private capital inflows in the 1990s. As in the 1970s, this development has been met with cautious optimism. On the one hand it is generally accepted that these countries need resource transfers from the rest of the world to support capital formation and growth. Moreover, it is also generally accepted that private capital flows contribute on a micro level to efficient allocation of resources. On the other hand, there is concern that a rapid reversal of market sentiment could impose considerable adjustment costs on these economies.

In this paper we attempt to quantify the factors that have been widely cited as the fundamental causes of return of market access for debtor countries. The three broad classes of fundamentals we consider include internal policy reforms in the debtor countries, debt and debt service reduction usually associated with Brady Plan restructurings, and changes in the external environment such as changes in interest rates in industrial countries.

We argue that a useful barometer for access to new lending is the market value of existing sovereign debt. It follows that a quantitative analysis of the factors that caused the rapid increase in market values of sovereign debts after 1989 would also provide a better understanding of the fundamental forces behind the return of access to new international capital.

The historical evidence suggests that fiscal reform, privatization, and debt reduction are useful in explaining the relative improvement in the standing of debtor countries in international credit markets. Thus, debtor countries with strong reform programs are better prepared to withstand a deterioration in the external environment. However, the reduction in dollar interest rates after 1989 appears to be the most important determinant in the widespread return of debtor countries to international borrowing.

To evaluate the potential impact of changes in the external environment, we calculate the effect of increases in dollar interest rates for a "typical" debtor country. This exercise suggests that debtor countries remain vulnerable to increases in interest rates that are well within the range of the experience in recent years.¹

¹Difficulties of some debtors in recent months following the rise of U.S. rates during early 1994, after this paper was prepared, point in the same direction.

1. Introduction

The turnaround in the external financial position of many debtor countries since 1989 has been phenomenal. Improvement is particularly impressive in countries that have completed Brady Plan restructuring of their external debt. In the first quarter of 1989 these countries' external debt sold for an average price of only forty cents on the dollar and private capital inflows were largely restricted to concerted lending or interest arrears. Various plans for dealing with the debt overhang, including the Brady Plan announced on March 10, 1989, were widely characterized as inadequate to restore access to international capital markets. Some observers, in fact, predicted that debtor countries might not return to private international capital markets for a generation.²

Today the recovery in real economic activity and capital formation in debtor countries is just beginning, but a financial recovery is well under way. These countries have experienced very large private capital inflows, real exchange rate appreciation, stock market booms, and dramatic increases in the prices of their external debt (Calvo, Leiderman and Reinhart, 1992). In some cases capital inflows have been associated with a return to resource transfers to these countries similar to those recorded in the 1970s as measured by the emergence of sizable balance of trade deficits.

Do we understand enough about the 1982 crisis to predict that renewed accumulation of external debt can avoid a repeat of 1982 and the considerable costs that followed for debtor countries? Unless the memories of investors and residents of debtor countries are very short, they must believe that there is a difference in the expected outcome of this new round of international investment. Is the debt crisis dead, as suggested by several observers recently? Or is it only sleeping?

²See "Implementation of the Brady Plan," US Senate (1990) for several prominent economists' views that Brady restructuring would have little effect on the outlook for debtor countries' access to international credit markets.

To understand this turnaround in market access it is necessary to identify the main factors that can account for the remarkable improvements in debtor countries' creditworthiness. We first argue that secondary market prices for syndicated credits are a useful measure of market access. We then show that changes in international interest rates, and induced changes in real exchange rates and real domestic interest rates in debtor countries, can account for all of the improvement in secondary market prices after the first round of Brady Plan restructuring agreements in early 1990. The empirical relationship between secondary market prices and international interest rates is robust to changes in model specification and to the time period considered. In particular, the dominance of international interest rates holds both before 1989, when yields on sovereign credits rose over time (prices declined), and after 1989 when yields generally declined (prices rose). This is further confirmed by recent developments outside the period of our estimations. After this paper was prepared, during February and March 1994 US interest rates increased substantially while secondary market prices dramatically declined.³

The decline in real long term interest rates on dollar denominated debt is certainly reversible, and, in fact, it might very well be reversed in the next year or so. If domestic real interest rates in debtor countries were to rise also and real exchange rates decline, as would be normal, many developing countries would probably again experience debt servicing difficulties.

In the next section the relationship between capital inflows and secondary market prices is developed further. In section 3 a simple model of secondary market prices is proposed and estimated. Section 4 applies these estimates to an "average" Brady plan country in order to evaluate the source of recent capital inflows. Section 5 summarizes the results.

³The ten-year US Treasury bond rate increased by about 15%, from 5.7% to 6.6% per year, while the market price index fell by a similar proportion.

2. Capital Inflows and Secondary Market Prices

The secondary market price of debt is a useful barometer for the climate for private capital inflows to a debtor country because it reflects both private investors' expectations concerning the ability of debtor governments to service existing debts and yields on alternative international investments. The secondary market price is a sensitive indicator because it is established in an active market for a relatively homogeneous financial instrument. Furthermore it is also more up to date and accurate than private capital flow data-useful properties for an indicator.

Rising secondary market prices (falling yields) suggest that residents of the debtor country can also issue new debt or equity on better terms. The important implication for understanding recent capital inflows is that a larger volume of new borrowing, or sales of equity, can credibly be serviced at lower yields. Thus, an improvement in secondary market prices was a precondition for recently observed private capital inflows to debtor countries. Moreover, a return of secondary markets to levels reached in 1989 would certainly stop and probably reverse recent capital inflows. While several recent papers have attempted to directly explain private capital inflows, this has proven to be a difficult task. The fact that private inflows have been offset by official outflows, generally in the form of increases in international reserve assets, makes the existence of a stable relationship between expected yields and private capital flows unlikely. Different policy reactions over time clearly contaminate reduced form relationships between expected yields and private capital flows. For this reason we focus on the expected yield required to induce investors to hold existing debt as the best proxy for the terms on which residents of emerging markets can issue new debt and equity.

There are two fundamental reasons for changes in the terms on which investors hold new and existing claims on residents of developing countries. The first is changes in yields available on alternative investments measured in this paper by an appropriate risk-free dollar interest rate. The second is a change in investors' evaluation of the credit risk peculiar to the developing

country.⁴ While easily observed secondary market prices undoubtedly reflect other factors such as the relative status of government and private debt, our working hypothesis is that the value of sovereign debt is closely related to investors' overall assessment of the outlook for expected returns on existing and new investments in the debtor country relative to expected returns on alternative investments (Dooley et al., 1990).

3. Quantitative Evaluation of Factors Affecting Secondary Market Prices.

While there have been a number of recent commentaries on the end of the debt crisis, it is interesting that there have been relatively few quantitative analyses of what went right. While it is natural for disasters to get more attention as compared to fair weather, a careful evaluation of recent developments can help evaluate the durability of the improvement in the situation. In this section we discuss measures of five factors that might explain secondary market prices for developing country debt: (a) Debt reduction; (b) Economic Policy Reform; (c) International Interest Rates; (d) Domestic Interest Rates; and (e) Exchange Rates

3a. Debt Reduction

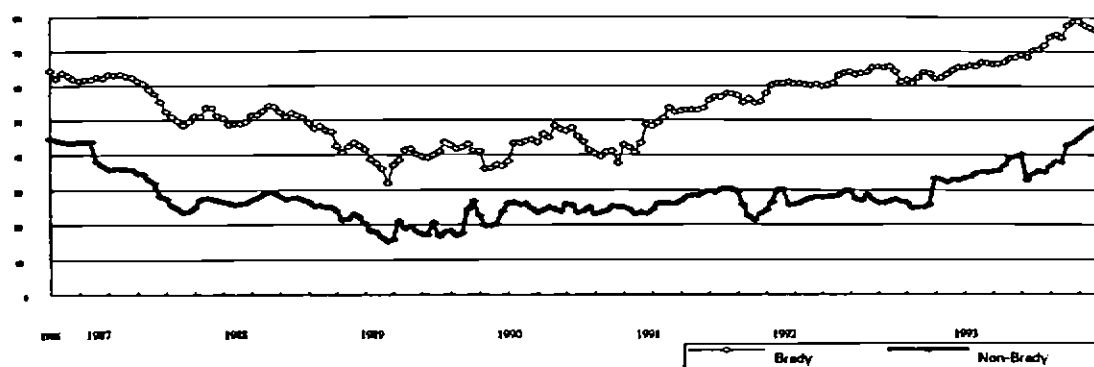
A simple model for secondary market prices sets the market price equal to the ratio of expected present value of debt service payments to the contractual value of outstanding debt. It follows that secondary market prices rise when the numerator, expected payments, rises relative to the denominator, the contractual value. Consequently, these prices are linked to country creditworthiness.⁵ Debt or debt service reduction is expected to increase the price if the present

⁴For a formal model of capital inflows adjusting to equalize alternative yields see Fernandez-Arias (1993).

⁵The relationship between prices and country risk is distorted in some of the instruments used in Brady operations by two factors, however. First, in the numerator, collateral enhancements increase the value of those instruments. Second, in the denominator, below-market interest rates such as in Brady par bonds, amounts to a lower effective contractual value. These two biases counteract each other and may conceivably offset in the case of par bonds, which would justify the usual practice of using par bond prices. In general, however, they do not offset each other and need to be adjusted to obtain the so-called stripped prices, whose level would better reflect country creditworthiness (See Table 2 for details). In practice, the changes in these stripped prices can be approximated by

value of expected payments does not fall proportionately with the reduction in the contractual value of the debt.⁶ As documented by Bacha (1992) and World Bank (1993), increases in debt prices since the announcement of the Brady Plan in 1989 have been larger for Brady Plan countries as compared to other debtor countries (Figure 1).

Figure 1
Secondary Market Price (cents on the dollar)



Calculated as a weighted average based on commercial bank debt.

Brady countries refer to Argentina, Costa Rica, the Philippines, Mexico, Nigeria, Uruguay and Venezuela.

Non-Brady countries refer to Albania, Algeria, Angola, Bolivia, Brazil, Bulgaria, Cameroon, Congo, Cote d'Ivoire, Ecuador, Jamaica, Jordan, Morocco, Panama, Peru, Poland, Syria, Chile, Egypt, Honduras, Hungary, Nicaragua and Senegal.

Source: Salmon Bros., IFR, LDC Debt Report, and World Bank data.

There is much less agreement concerning the quantitative importance of debt reduction. The initial skepticism about the Brady Plan on the part of many academic economists was based on a simple argument. The Plan was voluntary in the sense that banks would not be forced to exchange their existing claims for new claims with a lower expected market value. The implication was that debt reduction would be expensive in the sense that private debt retired by the changes in the prices of floating-rate instruments.

⁶ See Dooley (1988) for a general discussion of buybacks and market prices.

the Brady Plan would be purchased at a price higher than the market price that would prevail if the Plan were not implemented. As pointed out in Dooley (1988), such price can be expected to reflect the market value of debt remaining after the agreement was implemented if banks can free-ride as in open-market buybacks. If the banks were in a less strong bargaining position, the price would be lower and more debt reduction would be possible for the same amount of resources, but always limited by the banks' voluntary participation constraint.

Given these constraints it is possible to calculate the range of debt reduction that would result given the resources available to support the deal. As shown by Claessens, Diwan, and Fernandez-Arias (1992), Brady operations led to prices and debt reduction falling within the theoretical ranges.

Table 1 provides a summary of the debt reduction obtained by various countries. Column 1 shows debt retired as measured by the reduction in the present value of debt service obligations. Debt reduction reflects reductions of contractual debt and interest service as well as collateralization and new money promises. For example, in agreements where below-market interest rates on collateralized par Brady bonds were exchanged for old floating rate debt, we calculate the difference in the present value of the debt service obligations of the two bonds on the exchange day assuming that each would be serviced in full as contracted. The methodology used is almost identical to the one used in Claessens, Diwan and Fernandez-Arias (1992), where the reader is referred for details.⁷

⁷The only difference is the treatment of additional new money, whose negative effect on debt reduction is estimated as a fraction of its nominal value (the fraction being the ex-ante price). Since new money promises on the part of banks were often conditional on countries serving interest over a period of time (not a sure thing in the absence of the deal as reflected in low prices), this estimation is probably better.

Table I
Debt and Debt Service Reduction

Countries	Commercial Bank Debt Reduction Equivalent		Net Payments to Banks of which Additional Official Loans		Overall Debt Reduction Equivalent		Debt Prices	
	US\$ million	Percent of Commercial Bank Debt	US\$ million	US\$ million	US\$ million	Percent of Total Debt	Pre-Brady (cents)	Post Operation Stripped (cents)
	(1)	(2)	(3)	(4)	(5) = (1)-(4)	(6)	(7)	(8)
Mexico	19,033	40	6,812	3,732	15,301	16	36	51
*Philippines	3,553	54	1,451	154	3,399	12	40	76
Costa Rica	1,166	73	225	177	989	21	12	39
Venezuela	5,153	27	1,949	687	4,466	14	37	59
Uruguay	807	50	413	140	667	15	56	75
Nigeria	4,221	79	1,681	0	4,221	14	21	45
Argentina	10,723	37	3,732	2,117	8,606	14	18	63
Total	44,656	40	16,263	7,007	37,449	15	31	57

(*) Completed in two phases.

Source: Claessens, Diwan and Fernandez-Arias (1992) and authors' calculation

Column 3 shows the net payment received by commercial banks. This cash was used to purchase collateral for new bonds or more directly for buybacks, but in general the reduction in the contractual present value of debt was largely independent of the financial engineering involved. These calculations indicate that the amount of resources devoted to the agreements are more than a third of the reduction in the contracted present value of private debt. Substantial additional official lending partially offset the reduction in commercial bank debt. Column 4 shows the dollar amount of additional loans made to the debtor government by international organizations and creditor governments to support the Brady Plan. Thus the net debt reduction is lower and represents only 15 percent of total debt (columns 5 and 6). It is not difficult to see why many doubted that this level of debt reduction would be decisive in reestablishing access to capital markets.

One way to evaluate the direct effects of debt and debt service reduction on secondary market prices is to analyze the market price of debt remaining after the restructuring. Because prices of various instruments are distorted by various features and attachments, such as collateral, new money promises and below-market interest rates, column 8 shows stripped prices, that is the prices right after the operation adjusted for these distortions.⁸ These prices are a good indication of the market view on country creditworthiness once the benefits of the operation are fully factored in.

If future repayments to commercial banks are positively linked to the country's future performance, then the efficiency gains of these DDSR operations can be gauged by analyzing the impact of the operation on prices. In fact, in the absence of efficiency gains, in proportional terms (stripped) prices would not be expected to increase beyond the decrease in commercial bank debt (column 2). As pointed out by Dooly et. al. (1990), a full evaluation of the impact of debt reduction on the value of remaining private debt should consider the relative seniority of the various types of debt and the probability that the debtor would have received the loans for another purpose. If all creditors have the same implicit seniority and share the net present value of repayments in proportion to exposure, a hypothesis consistent with the findings in Demirguc-Kunt and Fernandez-Arias (1992) and in Bulow, Rogoff and Bevilacqua (1992), then in the absence of efficiency gains (stripped) prices would not increase beyond the decrease in total debt (column 6). Any excess price increase over the no efficiency gain benchmark could then be safely attributed to efficiency gains.⁹

Unfortunately, the task of estimating the increase in prices due to the operation is extremely difficult because the appropriate counterfactual price, the price prevailing in the

⁸ Like the calculation of debt reduction equivalent, the methodology for estimating stripped prices is taken from Claessens, Diwan, and Fernandez-Arias (1992), except with respect to the impact of additional new money.

⁹ But purely empirical results should deal with the theoretical implications explored in a recent study by Bulow, Bogoff and Zhu (1994), which suggests very low efficiency gains.

absence of the operation, is not observable. Long before the operation was consummated prices reflected the market expectations on the outcome of the future operation, which contaminate the observed prices to an unknown extent. For example, if the last price quoted before the operation incorporates a perfect forecast of the operation, its comparison with the stripped price does not provide any meaningful information on the effects of a given operation.

Prices before the Brady announcement in March 1989 may not be subject to this contamination but do not reflect the changes in fundamentals over the period leading to the operation date. For this reason, results based on these prices (shown in column 7) need to be taken with caution. Nevertheless, as analyzed in the next section, the evidence shows that the only important fundamental with significant variation that was identified is international interest rates after 1990. Therefore, except for the recent operations, especially Argentina, estimations and inferences made on this basis appear reasonable.

3b. Economic Policy Reform

A second important aspect of the Brady Plan agreements was the conditionality associated with the official credit. It is plausible that the conditionality associated with the Brady Plan agreements explains the increased market value of existing debt and the turnaround in access to external markets. It is even more difficult to quantify the effects of economic reform on market valuations of external debt, but it certainly appears that policies changed for the better in Brady Plan countries. The widespread adoption of market oriented reform programs along with aggressive fiscal reform may have been an additional important channel through which the Brady Plan workouts improved the financial position of debtor countries. It is perhaps not surprising that creditor governments emphasized this aspect of the Plan, *ex ante*, but it may have been a surprise that some of the debtor countries implemented fiscal reform changes as consistently and aggressively as they have. This suggests that the impact of fiscal reforms were not fully credible at the time of the exchanges. Perhaps the effect of improved fiscal policies on

secondary market prices may have been gradually incorporated into market prices in countries where the reform in fact occurred. One measure of a number of important policy changes is the increase in government revenue net of expenditures other than debt service - - what is usually called the primary fiscal surplus.¹⁰ As shown in Table 2, some Brady Plan debtors have made very impressive progress in placing their budgets on a basis where considerable debt service payments can be financed through taxation rather than additional borrowing.

TABLE 2
Primary Fiscal Surplus (PFS) and Operational Fiscal Surplus (OFS)

		(Percent of GDP)							
		1985	1986	1987	1988	1989	1990	1991	1992
Mexico	PFS	3.9	2.2	5.8	8.1	8.4	7.6	8.8	8.7
	OFS	-3.3	-7.0	1.8	-3.6	-1.7	2.3	6.7	6.0
Argentina	PFS	0.8	1.8	-0.9	-1.0	-6.3	1.6	3.5	3.8
	OFS	-6.0	-4.7	-5.6	-6.3	-21.9	-2.9	-0.2	1.5
Brazil	PFS	2.1	0.6	-2.8	-0.5	-0.5	2.2	1.0	2.5
	OFS	-4.3	-3.6	-5.7	-4.8	-6.9	1.3	-2.2	-2.2
Venezuela	PFS	4.7	0.9	-1.1	-6.1	3.8	6.1	7.1	-0.5
	OFS	-0.2	-9.9	-3.6	-9.9	-1.0	2.1	3.5	-4.5
Nigeria	PFS	4.7	2.6	2.4	-0.1	5.5	6.5	5.8	na
	OFS	-1.8	-5.4	-4.3	-5.9	0.5	0.4	0.2	na
Chile	PFS	0.6	0.5	2.5	6.6	7.5	5.0	2.2	na
	OFS	-2.9	-6.0	-1.0	-1.2	3.1	1.0	-1.2	na
Morocco	PFS	0.7	1.2	1.2	2.2	1.8	5.6	5.0	na
	OFS	-5.5	-6.8	-2.6	-1.1	-1.4	2.1	1.5	na
Philippines	PFS	2.4	-1.3	2.7	3.2	1.4	1.1	1.0	na
	OFS	-2.1	-6.1	-0.7	-0.1	-1.6	-2.7	-3.0	na

Source: Goldman Sachs (1991, 1992)

Another useful measure of fiscal performance is the operational budget balance. This is the primary surplus less real interest payments on both domestic and external debt. Improvements in this surplus relative to the primary surplus are caused by a fall in domestic or international real interest rates or a fall in the stock of debt. The impressive improvement of the operational balances in Table 2 reflects the combined impact of all of these factors.

¹⁰ Proceeds from privatization are included as a revenue.

Improvement in operational balance has been much more pronounced compared to the improvement in the primary balance. One of the important challenges for evaluating the future is to identify what part of the reduction in real interest payments is a permanent part of the debtor countries' positions. One aspect that is clearly permanent is real debt amortization. A surplus for this operational budget balance for past years means that the real value of outstanding debt is being reduced. As shown in Table 3, some debtor countries have made substantial gains in reducing the real value of their net government debt through a normal amortization of domestic and foreign debt. For some countries this has been more important than the debt reduction discussed above. It is also possible that the fiscal reform will generate a permanent reduction in the default premia incorporated in interest rates.

Table 3
Public Debt Ratio
(as a Percent of GDP)

	1985	1986	1987	1988	1989	1990	1991	1992
Hungary	42.5	46.7	56.9	52.6	55.5	54.0	NA	NA
Poland	43.2	48.5	67.2	65.0	73.0	88.9	NA	NA
Philippines	57.6	69.5	76.6	73.5	67.3	71.7	NA	NA
Morocco	137.1	127.5	136.3	125.3	117.3	105.2	NA	NA
Nigeria	50.1	88.2	133.6	118.7	113.3	114.3	NA	NA
Argentina	72.2	78.6	89.9	95.9	112.3	94.3	68.5	62.0
Brazil	50.6	48.0	48.7	45.6	42.2	40.1	47.1	46.5
Chile	76.9	85.6	83.7	67.7	52.2	39.8	NA	NA
Mexico	51.9	59.2	54.5	61.7	56.1	48.5	35.0	25.0
Venezuela	41.2	59.9	54.6	53.8	70.4	54.1	46.3	52.0

Note: Domestic and external indebtedness of the public sector minus official reserves.

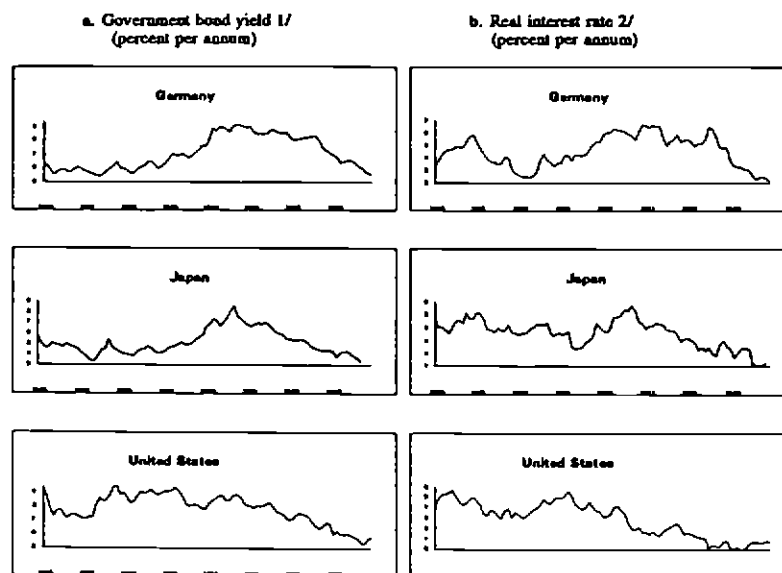
Source: Goldman Sachs (1991, 1992)

It is much less clear, however, that the real interest rates paid on remaining debt will remain at their current levels over the next few years. We turn to the complex and interdependent roles of domestic and international interest rates in the next two subsections.

3c. International Interest Rates

Another potential source of improvement in debtor countries' positions has been the change in the external environment. The dominant change after 1989 was a fall in nominal and real interest rates in the US and other major industrial countries (Figure 2). The role of interest rates is interesting for a number of reasons. First, as shown in Dooley and Stone (1993) the rise in international interest rates is the only variable in a regression analysis that has much power in explaining the widespread decline in secondary market prices through 1989. This result is consistent with the hypothesis that the expected present value of payments by debtor countries fell as international interest rates rose. Thus, the rise in debt prices after the Brady speech would be consistent with the observed fall in market interest rates.

Figure 2



1/ Line 61 in International Financial Statistics

2/ Six-month Libor (line 60eb) minus inflation (calculated as the change in the CPI index, line 64)

Source: IMF International Financial Statistics

The potential importance of the fall in international interest rates arises from two sources. First, there are good theoretical reasons to believe that the value of both fixed and floating rate Brady bonds should rise more than proportionally to percentage declines in international interest rates. Second, domestic interest rates paid by debtor governments should fall with international rates and there are good theoretical reasons to predict that the reduction will be more than proportional.

To evaluate the effects of changes in international interest rates it is necessary to identify a relevant "discount rate" at which investors translate expected payments from the debtor government into a present value. Since most of the external debt is denominated in US dollars, the appropriate discount rate is a risk-free real interest rate available on a dollar denominated investment that is similar in terms of maturity and in the terms on which the contractual interest rate is adjusted over time. This is not a straightforward problem. In particular it would at first seem natural to compare floating rate sovereign debt to floating rate risk free debt. The problem with this approach is that for risk free floating rate instruments, changes in market interest rates alter the nominal value of expected payments in future time periods. But this is exactly offset by the change in the discount rate so that the present value of these payments is unchanged.

With floating rate sovereign credits that trade at a considerable discount the effect of a change in real risk free rate is quite different. Assuming that the change in the real risk free rate does not change the government's ability or willingness to pay, the value of expected payments in future time periods does not change. It follows that the present value of these payments does change. Thus, both floating rate sovereign credits (and stripped prices) respond to a fall in international interest rates in a manner usually associated with fixed rate long term bonds. To the extent that repayments are shared by foreign creditors in proportion to contractual debt service, the response of fixed-rate sovereign credits would be even more pronounced because it would increase its share.

If future payments are expected to grow over time, as can be expected in a growing economy, then the increase in their present value would be proportionally larger than the decrease in the risk-free rate. Furthermore, if the foreign debt is lower in priority of payment to other types of debtor government expenditure, secondary market prices would tend to rise by more than the percentage increase in the present value of total expected payments.

This is a potentially important aspect in understanding the relationship between international interest rates and secondary market prices. Unlike substantially risk-free instruments, a fall in the discount rate increases the present value of both floating and fixed rate debt of over-indebted countries. Preliminary evidence of the relative performance of floating and fixed rate Brady bonds indicates that investors consider default on both bonds equally likely and that market prices of both types of bonds respond to changes in the discount rate as if they were fixed rate instruments.

3d. Domestic Interest Rates

A change in international interest rates is probably reinforced by changes in domestic interest rates. Most internal debt is rolled over several times a year in debtor countries, and so real debt service payments are very sensitive to changes in domestic real interest rates. This is an interesting part of these governments' expenditures because, relative to real interest payments to foreign creditors, real interest rates paid on their domestic debt show a much higher variance and much higher average levels before 1990. Although internal debt is typically smaller than external debt for these countries, changes in ex post real domestic interest payments have been an important component of total debt service costs.

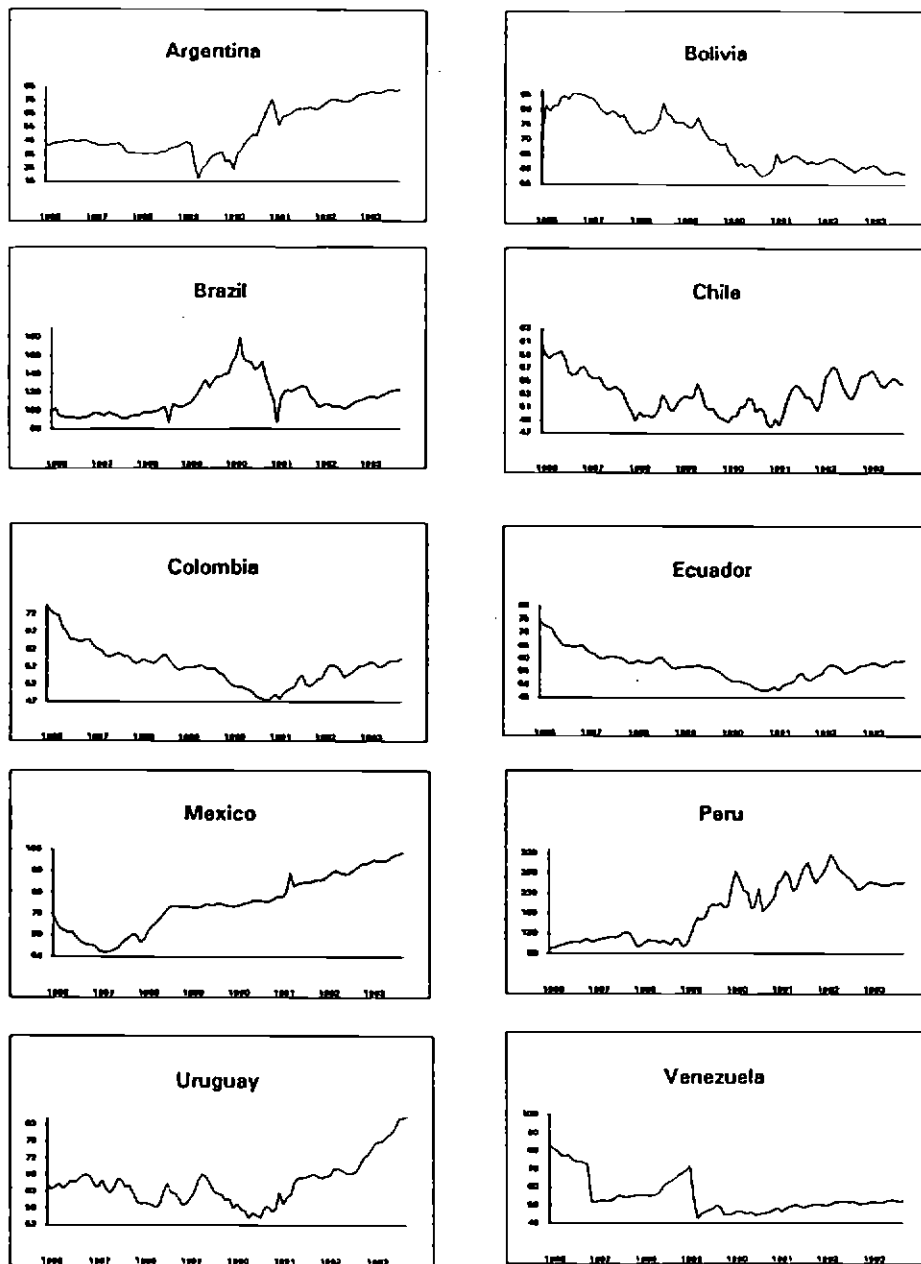
A rise in domestic debt service payments should, for a given overall capacity to pay, reduce expected payments on external debt and in turn lower secondary market prices for external debt. If changes in international interest rates generate qualitatively similar changes in domestic

rates, as would be expected if capital markets are at all integrated, this would clearly reinforce the effect of international interest rates on secondary market prices.

3e. Exchange Rates

The potential importance of the real exchange rate of the debtor country is straightforward. Government revenue in domestic currency can cover greater debt service payments if the foreign currency value of revenues rises, as happens when the local currency appreciates. Other things being equal, the real appreciation of debtor country currencies shown in Figure 3 increased the dollar value of government revenues devoted to external debt service. As with the other variables discussed above, the relevant measure of the real exchange rate is that expected to prevail over the life of the contract. For lack of a better prediction we can take the current value as an unbiased, but certainly poor, prediction of its future values. As with domestic interest rates it is also important to consider the relationship between exchange rates and international interest rates. Capital inflows associated with low international interest rates induce exchange rate appreciation that reinforces the improvement in secondary market prices.

Figure 3: Real Effective Exchange Rates



Source: Information Notice System, IMF.

Note: An increase in the index denotes a real exchange rate appreciation.

A Simple Model of Price Changes since March 1989

The arguments developed above suggests the following regression hypothesis:

$$p_{it} = c + \alpha_i + \beta LTX_{it} + \gamma LTG_{it} + \delta RCT_{it} + \varepsilon r_t + \tau t + u_{it}$$

where

- t = 1, 2, ..., T is the time index;
- i = 1, 2, ..., N is the country index;
- p is the logarithm of secondary market prices;
- LTX is the logarithm of the ratio of total long-term debt to exports;
- LTG is the logarithm of the ratio of total long-term debt to GNP;
- RCT is the logarithm of the ratio of commercial debt to total long-term debt
- r is the logarithm of the long-run (10 year) US interest rate;
- t is a time trend component
- c is the common constant term;
- α_i are the country specific intercept terms and
- u is the usual error term.

As shown in Dooley and Stone (1993) conventional regressors for secondary market prices such as the debt export and debt GDP ratios, measures of the composition of debt and fiscal variables explain cross section differences in prices from 1986 through 1990. But the international interest rate is the dominant determinant of the time series behavior of prices. An important reason to doubt this result is a clear common trend for prices and interest rates over the 1986 -89 time period. In this paper we extend the sample time period to 1992, a period in which there was a clear reversal in the trend for both interest rates and prices. Results reported in Table 4 summarize panel regressions for annual data for 21 developing countries over the 1986 to 1992 time period. Results for six countries for which we have data for fiscal balances are reported in table 5. (See Appendix for details on data and econometric methods).

Table 4: Logarithm of Secondary Market Prices
(Full sample, 1986-1992)

Variable	(1)	(2)
LTX	-0.50 (-3.10)	-0.75 (-5.04)
LTG	-0.36 (-2.30)	-0.32 (-2.40)
RCT	0.09 (0.86)	-0.11 (-1.08)
r	-0.87 (-3.17)	-1.70 (-6.61)
t		-0.16 (-6.91)
C	5.67 (8.70)	7.91 (12.35)
R ²	0.36	0.53
Adj R ²	0.22	0.43

Note: t-ratio in parenthesis.
See Appendix for more information.

Table 5
Logarithm of Secondary Market Prices
(Reduced Sample, 1986-1992)

LTX	-0.30 (0.16)	-0.23 (0.19)	-0.24 (0.19)	-0.24 (0.18)
LTG	0.22 (0.14)	0.20 (0.16)	0.22 (0.15)	0.20 (0.15)
RCT	-0.05 (0.13)	-0.06 (0.14)	-0.07 (0.14)	-0.05 (0.13)
r	-2.66 (0.47)	-2.57 (0.48)	-2.61 (0.47)	-2.58 (0.48)
LPFS		-0.03 (1.19)		0.32 (0.50)
LOFS		0.33 (0.74)	0.37 (0.80)	

Note: LPFS and LOFS are positive transformations of PFS and OFS (primary and operational fiscal surpluses) as a fraction of debt outstanding.
Standard deviation in parenthesis. See Appendix for information.

For the larger sample (Table 4) the conventional measures of debt relative to the economic resources available to service the debt have the expected signs and are statistically significant at conventional levels. These variables presumably capture the impact of debt reduction and improvements in the debt service capacity of the debtor country. We also tested the importance of dummy variables often utilized in this literature to capture the effect of the announcement of loan loss reserves by some US banks in 1986 and the announcement of the Brady plan in 1989. These variables were not significant and did not affect the results when a simple time trend to reflect the gradual settlement of the negotiation environment during the debt crisis was also included.

For the smaller sample of countries, table 5, the basic model is less satisfactory and inclusion of the primary fiscal surplus does not improve the statistical properties of the basic model and is not a significant variable. This is consistent with results reported in Dooley and Stone (1993).

Our primary interest however is on the size and stability of the interest rate effect. As shown in table 4, for the larger sample the interest rate has the expected negative sign and is near the expected value of a negative unit elasticity. That is a one percent change in the long term US Treasury bond interest rate, for example from 5 percent to 5.05 percent, generates about a one percent fall in market price. Moreover, if we add a time trend to the regression the effect of the interest rate variable increases and is considerably more precisely estimated.

To test the robustness of this result we also divided the sample into two time periods roughly corresponding to the period of generally rising prices before 1989 and generally rising prices thereafter (Table 6). Again the interest elasticity has the expected sign and is statistically significant, although the absolute size of the elasticity in the earlier time period is implausibly large. While the interest elasticity is -4.91 in the 1986-1989 period, it is -0.75 for the period 1989-1992. This discrepancy can perhaps be explained in terms of an omitted increasing investor

pessimism, biasing that elasticity downwards when interest rates made a negative contribution (1986-1989) and upwards when interest rates made a positive contribution (1989-1992). Such interpretation is further confirmed by the overall estimated elasticity of -1.70 when a time dummy is included (Table 4). What appears clear, however, is that interest rates exerted a substantial effect in the expected direction during both phases. This is reassuring because interest rates increased in the first period and declined in the second period.

**Table 6: Logarithm of Secondary Market Prices
(Full Sample)**

Variable	1986-1989	1989-1992
LTX	-.071 (-3.76)	-0.48 (-2.47)
LTG	-.053 (-3.13)	-0.55 (-3.24)
RCT	-0.20 (-1.47)	-0.07 (-0.55)
r	-4.91 (-9.25)	-0.75 (-3.24)
C	13.96 (12.01)	4.96 (8.01)
R ²	0.73	0.52
AdjR ²	0.61	0.33

Note: t-ratios in parenthesis.
See Appendix for more information.

Our interpretation of this evidence is that changes in international interest rates have had an important influence on market prices of existing debt of developing countries and, in turn, on the reentry of residents of these countries to international credit markets.¹¹

¹¹The remarkably parallel evolution of prices in Brady and non-Brady countries shown in Figure 1 further confirms the notion that the international interest rates are the key underlying factor.

4. A Simulation Exercise.

In this section we use the results reported in the previous section to assess the importance of interest rate changes and other factors to the evolution of secondary market prices for a composite "Brady Plan" country.

The econometric results support the use of the following simplified model for country i :

$$P_{it} = (c_i * B_{it}) / r_t \text{ where } B_{it} = (x_{it})^{1/2} (g_{it})^{1/2}$$

(x and g being the exports-to-debt and GNP-to-debt ratios). This simple model has a unitary interest rate elasticity and is homogeneous in the country specific variables exports, GNP and debt.¹²

A more concrete assessment of the factors discussed above can be generated by this simple model. For the purpose of illustration, the Brady deals concluded in 1990-1992 (Mexico, Philippines, Phases I and II, Venezuela, Costa Rica, Nigeria and Uruguay) are combined.¹³ Consider this "average" Brady country in March 1989 when the broad outline of the plan was presented to the market in a speech delivered by Secretary Brady. The contractual value of the outstanding commercial bank debt was about \$81 billion and the average market price was about \$0.35. Total external debt was about \$196 billion. The reduction in contractual value of the debt generated by the completed deals as measured by the debt reduction equivalent was about \$34

¹² One implication of this result is that what matters for the price of commercial bank debt is total debt rather than commercial bank debt. This is similar to findings in other empirical studies, for example, Bulow, Rogoff and Bevilacqua (1992). We stop short of concluding from that evidence that all creditors are equally senior, however, because this condition is necessary but not sufficient unless restrictive burdensharing models are assumed (for a discussion, see Demirgüç-Kunt and Fernandez-Arias (1992).

¹³ The Argentina operation is not included because, as noted above, its analysis is complicated by the inapplicability of pre-Brady prices as benchmarks. While these problems are also present to some extent in other Brady operations, the size of the Argentina operation may significantly distort the average.

billion in commercial bank debt and a total net debt reduction of about \$29 billion. The stripped price of the remaining commercial bank debt immediately after the restructuring was about \$0.54.¹⁴

The expected present value of payments to commercial banks after the restructuring can be estimated as the stripped price times the debt equivalent outstanding, about \$26 billion. "Pre-Brady" value of commercial bank debt was about \$29 billion. This simple calculation suggests that if the expected value of official debt was unchanged, the initial market reaction to the Brady plan focused on the debt reduction but did not generate a measurable revision of expectations about the payments on the debt that could be clearly associated with efficiency gains. This interpretation is consistent with the view that official creditors are senior to the banks.

Alternatively, the hypothetical assumption can be made that all creditors are equally senior. (Notice that this assumption is consistent with the simplified model where prices depend on total debt, rather than commercial bank debt.) In that case pre-Brady and stripped prices would apply to total debt. Under this assumption, the total expected present value of payments increased from about \$69 billion in the absence of the operation to \$92 billion after the operation. This would suggest that in the market's view Brady operations entail effects that go beyond the arithmetic effect of debt reduction.

For the purpose of this paper, the important points are: i) whatever the improvements brought about by the operations, they are relatively permanent and therefore unlikely to contribute to a down-side risk of falling secondary market prices, and ii) after the operations, sovereign risk in these countries, as measured by stripped prices, remains substantial.

We now analyze the evolution of the stripped price in the average Brady "country" after the operations to show that improvements thereafter can be fully accounted for by the decline in

¹⁴ Computed at the time of each country's restructuring.

international interest rates. This implies that, contrary to widespread belief, these improvements in creditworthiness need not be associated with new positive developments in fundamentals in the domestic economy or with the market learning that the benefits of the Brady operations were larger than anticipated as reflected in the initial market prices. At the completion of the deals the ten year US treasury bond rate was 8.59 percent. In March 1993 the rate stood at 5.85 percent. Other things being equal, our simplified model would predict that this would generate a 46 percent rise in the secondary market price, from \$0.43 to 0.63.¹⁵ The actual market price on May 8, 1993 was about \$0.66. This is a disturbing result. For the average Brady country virtually all the increase in secondary market prices since the March 1989 can be accounted for by the purely arithmetic effect of one permanent factor, debt reduction, and one reversible factor, international interest rates.

Moreover, the remaining increase in market prices can easily be accounted for by real exchange rate appreciations that averaged about 15 percent from March 1990 to March 1993, specially if the market expected this to be a permanent improvement. The corresponding increase in GNP measured in dollars would lead the model to predict a rise in market prices of about \$0.03, bringing the predicted price to the actual price of \$0.66.

An interesting possibility is even this calculation underestimates the role of international interest rates and that the rise in market prices can be overexplained when the indirect beneficial effect on growth (and therefore the increase in the exports and GNP ratios x and g) is taken into account. It seems quite likely that the decline in the dollar risk free interest rate also accounts for the fall in domestic real interest rates in debtor countries. As discussed above, a fall in international rates should put downward pressure on domestic rates through interest arbitrage. In addition each of these governments pays a premium to domestic holders of public debt which in

¹⁵ We assume here that the expected long run inflation rate for the United States did not change over this interval. If expected inflation fell the predicted change in the price would be less since in this case the dollar value of expected payments should increase.

many cases reflects expected inflation and exchange rate depreciation. A change in international interest rates that casts doubt on the ability of the government to finance debt service without resorting to the inflation tax could generate immediate increase in nominal and real domestic interest rates. Thus, a rise in international rates could generate even larger changes in domestic real rates. If a rise in international interest rates is associated with a more than proportionate rises in domestic rates, the possibility of a large fall in secondary market prices is even more likely.

This suggests that policy reforms may not have been crucial for the "average" country. The explanation is that the change in the primary fiscal surplus for the "average" country has been strongly negative since 1989. As mentioned above Mexico has managed a small increase in its operational surplus since 1989 but this is more than offset by Venezuela.

It is possible that the impressive levels of primary surpluses and expectations about improved policies have also played an important role in the observed capital inflows. The difficult question is whether or not these permanent factors could sustain market access if international interest rates and secondary market prices fell to levels seen only three years ago.

It could be argued that the volume of private capital inflows recorded in developing countries is evidence that the improved outlook for these countries is robust to plausible changes in the economic environment. After all, investors are surely aware that international interest rates could rise as the industrial countries recover. The answer to this may be that the volume of private capital inflows is a poor indicator of expectations. In particular, we can think of the debtor country government as offering foreign investors short-term, dollar-denominated investments that carry an interest rate far in excess of what can be currently earned in the creditor countries.

This is not to say that the debtor governments have again made the mistake of guaranteeing dollar-denominated debts of their residents explicitly as they did with syndicated credits. In this case the exchange and credit guarantee are both implicit. The dominant form of

private capital inflow this time is a domestic currency claim on the debtor government, domestic banks and other domestic firms. The dollar value of these positions depends on the debtor governments' commitment to defending an exchange rate with the dollar. In many cases the government's commitment is strong because it has based its inflation target on a fixed exchange rate. In these circumstances a devaluation is seen as a major departure from the objective of price stability.

The government's commitment is, to some extent, credible because it has accumulated a substantial war chest of reserves to be used to defend the exchange rate policy. In recent years, about one half of the private inflow to Latin American debtor countries has been matched by increase in official reserves. Thus, the investor has some comfort that the high domestic currency interest rate will also be a high dollar interest rate. Moreover, by keeping investments in the banking system or in government securities, the investor has some assurance that these investments will be backed by the government even if domestic firms become insolvent. This is all quite reminiscent of the late 70's in that, as long as the private capital flows in and the official capital flows out, there is no reason to limit the size of the capital inflow. In effect the government is acting as a financial intermediary that lends cheap and borrows dear. The only limiting factor on the volume of such a business is the net worth of the intermediary.

Suppose the debtor government let the exchange rate be determined in a clean float. Would private capital inflows continue to be very large? Our guess is that they would not, and in fact would not even match the very large current account deficits now being recorded.

5. Conclusions

Secondary market prices may be more informative as a barometer of the financial strength of a debtor country as compared to the volume of observed private capital inflows. A reversal in US interest rates could generate real trouble for debtor countries, particularly if it spreads to domestic markets. The related fall in secondary markets would signal a halt of recent

capital inflows, rapid declines in international reserves and exchange rate depreciation.

Fiscal reform has been impressive in a few countries but in general has not built the kind of cushion into the finances of most debtor countries that could easily offset debt service payments that would result. Moreover, additional fiscal adjustment might draw much less popular support if it merely underpins increased service payments.

There have been important "permanent" improvements in many debtors' financial positions. Debt reduction, both through external debt restructuring and amortization through operational budget balances, has reduced the vulnerability of a few debtor countries. Moreover, permanent reforms of fiscal systems have strengthened the debt service ability of some countries. Nevertheless, recent capital inflows have not been restricted to countries with strong economic adjustment programs. Falling dollar interest rates have dramatically reduced secondary market discounts, and in many cases brought them close to zero (the limiting situation that characterizes the unrestricted access to markets of solvent sovereign debtors). It seems likely that rising dollar interest rates could reverse this situation.

Appendix

Data

The investigation covers the period 1986-1992 for 18 countries and 1988-1992 for three countries for which secondary market prices are available. The countries considered starting in 1986 are Argentina, Bolivia, Brazil, Chile, Cote d'Ivoire, Colombia, Costa Rica, Ecuador, Guatemala, Jamaica, Mexico, Morocco, Nicaragua, Nigeria, Panama, Peru, Philippines, Senegal, Uruguay and Venezuela. Because of lack of availability of secondary market prices prior to 1988, the following three countries have a reduced time period (1988-1992): Colombia, Guatemala and Nigeria. Annual data were used because some of the relevant data are not available at higher frequencies. This should alleviate serial auto correlation due to omitted variables. The bulk of the data for secondary market prices come from Salomon Brothers' (end-of-year price). World interest rate is captured here by the long-run (10 year) US interest rate (Source: International Financial Statistics of the International Monetary Fund). Nominal interest rates are used because of the difficulty of estimating long-term *ex-ante* real interest rates.¹⁶ The other variables, that is, GNP, total long-term debt, commercial debt and export are extracted from the World Bank's World Debt Tables 1991-1992. Note that the 1992 figures for the latter variables are projected figures. The total long-term debt includes interest arrears. Commercial debt includes bond debt and interest arrears.

Econometric Methods

The statistical procedure used in this panel sample was Generalized Least Squares, where country-specific intercepts were considered random. To the extent that random effects are uncorrelated with the explanatory variables, GLS estimators are consistent and efficient. This hypothesis was tested and accepted at usual confidence levels using the Hausman misspecification test.

¹⁶To the extent that they are correlated, nominal rates are suitable proxies. See Fernandez-Arias (1993) for a justification.

The homogeneity implicit in the use of the (log) ratios LTX, LTG and RCT was tested and not rejected at the 95 percent confidence level in the context of a more general model involving the (log of) exports, GNP, commercial debt stocks and total debt stocks.

The robustness of the result was tested by including two time dummy variables: one to reflect the general drop in secondary market prices in 1987 following a change in the reserve policy of Citibank and another one to capture the anticipation effect of the announcement of the Brady Plan in 1989. They were both insignificant when a time trend component was included in the specification.

Serial auto correlation does not appear to be a problem according to the Sargan-Frazini test. Correcting for autocorrelation using the Prais-Winsten transformation introduces only marginal changes to the estimations of interest.

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