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Author(s): Ekkehart Boehmer and William L. Megginson

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Determinants of Secondary Market Prices for Developing Country Syndicated Loans

EKKEHART BOEHMER and WILLIAM L. MEGGINSON*

ABSTRACT

This paper presents our investigation of the factors that determine secondary market prices of developing country syndicated loans. Trading volume in this market has almost doubled yearly from 1985 to 1988 while average market prices declined from 73% to 41% of par value during the same period. We find that loan values depend on a country's solvency rather than its liquidity and show that a country's adoption of a debt conversion program significantly decreases its loans' market prices. Furthermore, the debt moratoria by Brazil and Peru, as well as the developing-country-specific provisions made by U.S. banks, impact loan prices negatively.

EVER SINCE THE MEXICAN debt moratorium in August 1982 precipitated the international "debt crisis," controversy has raged over the causes and permanence of this economic impasse. Debate has been particularly intense over whether the fundamental cause of the debt crisis is developing country illiquidity or insolvency since the policy implications for resolving the crisis differ fundamentally depending upon which diagnosis is accepted as accurate.

Bankers, creditor-country policy-makers, and some institutional researchers argue that the developing countries are simply illiquid (temporarily short of cash) which implies that no basic change in debt-repayment policy, or in the terms of the loans themselves, is required.¹ On the other hand, policy-makers in the debtor countries, as well as most academics, argue that these countries are economically insolvent (their debts exceed what they will ever be able to repay) and that basic changes are required either in the economic policies of the debtor countries or in the nominal value and terms of their external debts, or both.² The emphasis on debt forgiveness in the "Brady Plan," announced by the Bush Administration in early 1989, implicitly accepts the insolvency diagnosis.³

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¹ Since U.S. government bank regulators have consistently pressured large banks to maintain developing country loans on their books at face value and to continue extending credit to these countries, these policy-makers implicitly accept the liquidity theory.

² For academic papers presenting the solvency theory, see Bulow and Rogoff (1988b, 1989c), Corden (1988a, b), Sachs (1986) and Sachs and Huizinga (1987).

³ The first concrete agreement to be produced under this plan was an accord between Mexico and its commercial bank creditors which was signed in Mexico City on February 4, 1990. The terms of

A variety of financial innovations have emerged from the political and economic stalemate of the debt crisis. One of the most interesting is a secondary market for developing country syndicated loans. This has created a mechanism for continuously generating market valuations of debt claims on developing country borrowers, and the values assigned by this market have been far below book values. A number of debtor countries have exploited this market to repurchase (and then retire) their own debt at a discount while several more countries have used the secondary market to implement "debt-conversion" programs under which an investor can convert dollar-denominated syndicated loans purchased on the secondary market into local currency for fixed investments in the debtor countries.

These debt-conversion programs are extremely controversial. Market participants have been promoting these programs as a way in which developing countries may reduce their total debt outstanding and capture some of the secondary market discount. On the other hand, academics such as Bulow and Rogoff (1988b), Helpman (1989), and Errunza and Moreau (1989) argue that both debt repurchases and debt-conversion programs squander scarce developing country resources and are generally Pareto-inferior policies.

We have three principal objectives for this paper. First, we describe the workings of the secondary market for developing country loans and document its growth. Second, we develop and test an econometric model of secondary market loan prices that allows us to investigate whether liquidity or solvency factors better explain changes in loan prices. Finally, we empirically examine the secondary market's reaction to a country's adoption of a debt-conversion program.

This paper is organized as follows: Section I presents a brief historical description of the secondary market. Section II discusses possible determinants of the market prices for developing country loans while Section III discusses the sample, data, and methods. The results are presented and discussed in Section IV, and a detailed analysis of the relationship between loan price and debt-conversions is presented in Section V. The final section concludes and summarizes our paper.

I. History of the Secondary Market for Developing Country Loans

Between 1971 and 1982 the intermediate term, floating-rate, general-obligation, syndicated bank loan became the principal instrument for channeling capital to the developing countries of Africa, Asia, and especially Latin America. This debt grew from \$46 billion in 1972 to over \$300 billion in August 1982, when the Mexican debt moratorium shocked all market participants into more carefully assessing the true risks inherent in sovereign lending. A period of stalemate then

this agreement are detailed in Truell (1990) and discussed in Moffett (1990). It is interesting to note that this complex agreement, which was painstakingly crafted over the previous year, did not significantly lower the principal amount of Mexico's total external debt and only reduced the annual debt service payment by about \$1 billion.

ensued as the international banks struggled, unsuccessfully, to collect on the loans they had extended.⁴

While major loan reschedulings occurred between 1982 and 1986, voluntary lending to developing countries virtually stopped after 1982 to be replaced by net hard-currency repayments by borrowers to banks.⁵ Nonetheless, debt service was never adequate, and unpaid interest was simply capitalized as additional principal, causing the economic value of each dollar of principal to shrink even further. Finally, and perversely, this "debt overhang" made new external borrowing by the developing countries impossible, since any new credit extended at par would simply be rolled into existing creditor claims, and the new lender would experience an immediate capital loss.⁶

The first documented secondary market transactions involving developing country syndicated loans occurred in 1984, but these received little publicity, and the secondary market developed slowly.⁷ The main reason for the slow development of this market was the lack of a standardized financial instrument. Dillon and Oliveros (1987) showed that the debt reschedulings of the mid-1980s had the unintended effect of stimulating the secondary market by creating relatively few, homogeneous issues out of numerous, individual syndicated credits.⁸ This increasing degree of homogeneity facilitated country-specific pricing of loans on the secondary market.

Although regulatory and capital constraints discouraged U.S. money-center banks from selling large fractions of their Third World debt, regional banks in the U.S. and the major European banks were willing and able to actively trade or sell their developing-country loans.⁹ At first, much of the trading in the

⁴ For descriptions of the economic and political forces which propelled the build-up in Third World debt prior to 1982, see Diaz-Alejandro (1984), Sachs (1985), and McFadden et al. (1985). The post-1982 experience of creditors and debtors is examined in Sachs (1986) and Sachs and Huizinga (1987). Finally, Lessard and Williamson (1985) describe some of the financial problems which arise from using bank loans as vehicles for capital transfers to developing countries.

⁵ Each country included in our sample (except Colombia) experienced at least one official multi-lateral debt rescheduling during this period. See Dillon and Oliveros (1987).

⁶ The economic effects of the debt overhang problem are explored in depth in Bulow and Rogoff (1988a, 1989c), Corden (1988b), Dooley (1988) and, especially, Sachs (1986, pp. 413–418) and Sachs and Huizinga (1987, pp. 592–595). Not only does the existing, discounted debt preclude new borrowings, it also distorts domestic fixed investment incentives and makes significant lump-sum repurchases of external debt economically irrational—since most of the benefit of the repurchase would simply accrue to nonselling creditors who would experience an immediate capital gain.

⁷ The first recorded loan sale occurred in May 1984 in the form of a joint venture between European Inter American Bank (Eurinam) and Singer & Friedlander, UK. See Evans (1988b). An even earlier inception date, 1983, is mentioned but not detailed in Ioannou (1989).

⁸ For example, when Mexico encountered severe loan problems in 1982 it had no less than 52 separate public issues outstanding. After the rescheduling agreements in June 1983, it had only five.

⁹ U.S. banks may not count specific loan-loss provisions as part of their capital for supervisory purposes, and the level of general provisions that may be claimed for tax deductions is very limited. On the other hand, these banks are required to maintain a capital/asset ratio of 6%. Until May 1987 when Citicorp announced its \$3 billion provision, this regulatory framework made it, compared internationally, very expensive for U.S. banks to acknowledge secondary market prices as the loans' true value. See World Bank *World Debt Tables* (1988, pp. xxiv–xxvii).

secondary market involved debt-for-debt swaps, in which banks would trade loans to increase their exposure in one country while decreasing it in another.

A major boost to the secondary market came when Chile (May 1985), Mexico (May 1986), the Philippines (October 1986), Ecuador (February 1987), Venezuela (April 1987), Brazil (November 1987), and Argentina (November 1987) adopted debt-conversion programs. These allow an investor—often a multinational company—to purchase dollar-denominated debt on the secondary market at a discount from par value (e.g., for 60 cents on the dollar) and to convert it into local currency at a favorable exchange rate (e.g., for 80–90% of the free market exchange rate).¹⁰ The local currency obtained in these transactions must be used either to purchase an equity stake in a local company or to finance investment by a subsidiary already located in the developing country. This conversion feature has helped attract investor interest in many nations' debt on the secondary market.¹¹

Secondary market trading volume has grown steadily. As reported by Hanley et al. (1988) of Salomon Brothers, volume increased from approximately \$1.5 billion in 1985 to about \$6 billion in 1986, \$12 billion in 1987, and an estimated \$20 billion in 1988. As volume grew, more and more banks, securities firms, and independent dealers entered the market, and successful players achieved very attractive margins. From the start, the secondary market has been a negotiated (rather than an open) market where each transaction is complex and time-consuming, requiring skilled personnel and dedicated resources. Thin trading has always been a problem, especially for the debt of smaller countries. The market has long been dominated by a small group of firms, and three of these—Shearson Lehman Hutton, Salomon Brothers, and Bankers Trust—have been compiling and distributing actual transaction prices for the debt of the most actively traded countries.

The price list compiled by Shearson Lehman Hutton, summarized here as Table I, reveals several important pricing regularities. First, while there is significant intercountry variation in prices in any given month,¹² the prices of most countries' debts remained relatively constant from the first quarter of 1986 until the second quarter of 1987, after which prices began falling for almost all countries. As will be shown, this was almost certainly a reaction to events such as Brazil's suspension of interest payments to its external creditors in late February 1987 and Citicorp's charging \$3 billion of Brazilian debt against reserves in May 1987.

¹⁰ Debt conversion programs are examined theoretically in Errunza and Moreau (1989) and Helpman (1989), and much institutional detail concerning these programs is provided in Evans (1988a, b) and Newman (1986).

¹¹ According to Truell (1988), during the first eight months of 1988 alone Brazil and Chile converted debts worth about \$4.7 billion and \$1.4 billion out of their total external debts of \$121 billion and \$21 billion, respectively. Sharp (1989) puts the full-year 1988 conversion total for Brazil at \$6.1 billion, while Mark (1989) puts the cumulative total for Chile as of the end of 1988 at \$1.7 billion. The Chilean government has also been aggressively pursuing a privatization program tied to subsidized purchases by citizens which by year-end 1988 had sold 17 companies completely and 6 partially, raising around \$740 million.

¹² The hypothesis that the individual country mean prices are equal can be rejected at a 0.01% significance level ($F[9,310] = 71.42$).

Table I

Monthly Average Market Prices for Developing Country Debt

Monthly averages of quoted secondary market prices in percent of face value, based on actual transactions for Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, Peru, Philippines, Venezuela, and Yugoslavia. Data courtesy of Shearson Lehman Hutton.

Date	Arg.	Brazil	Chile	Col. ^a	Ecu.	Mex.	Peru	Phil. ^b	Ven.	Yugo.
07/85	62.5	78.0	67.0	82.0	67.5	81.0	47.5	—	82.0	75.5
01/86	64.0	78.0	67.0	83.0	69.5	71.0	27.5	—	81.0	79.5
02/86	64.5	76.0	66.5	82.0	70.0	67.0	25.5	—	79.5	79.5
03/86	65.5	75.5	66.5	81.5	70.5	63.0	23.5	—	79.0	79.5
04/86	65.0	74.5	66.5	81.0	67.5	60.0	22.5	—	78.5	79.5
05/86	64.5	74.5	67.0	81.0	67.5	59.0	20.0	—	78.0	79.5
06/86	65.0	74.5	65.5	81.0	64.5	57.0	20.0	—	76.5	78.0
07/86	65.0	74.5	65.5	81.0	64.5	57.5	20.5	—	76.5	76.5
08/86	66.0	74.5	66.5	82.0	64.5	57.0	20.0	—	75.0	76.5
09/86	65.5	75.5	66.5	82.0	65.0	56.5	18.5	—	74.5	76.5
10/86	65.8	76.5	66.3	82.5	65.0	55.5	19.5	74.0	74.5	78.5
11/86	64.3	76.0	66.3	—	64.5	55.5	18.5	74.0	73.8	79.0
12/86	64.0	75.5	66.5	—	64.0	55.5	17.5	74.0	73.0	79.0
01/87	63.5	75.3	66.5	—	64.3	55.5	17.5	74.0	73.0	79.0
02/87	63.5	74.5	67.5	87.5	63.3	57.5	17.5	74.0	73.0	79.0
03/87	63.0	69.0	67.5	87.5	63.0	58.0	17.5	74.0	73.0	79.0
04/87	59.0	64.5	68.5	87.5	54.0	57.5	16.5	71.5	73.0	79.0
05/87	59.0	63.5	68.5	86.5	53.5	58.5	16.0	71.3	73.0	78.5
06/87	58.0	62.0	69.0	86.5	52.5	58.0	15.5	70.8	72.0	76.0
07/87	47.5	59.5	68.5	82.0	46.0	56.0	11.0	69.8	71.0	74.0
08/87	46.0	53.0	65.0	81.0	42.0	52.0	8.5	66.0	66.0	73.0
09/87	39.5	42.5	57.5	81.0	33.5	47.5	3.5	65.5	56.5	66.0
10/87	36.0	37.5	51.5	77.5	32.5	47.5	4.5	58.5	52.0	59.5
11/87	35.0	39.0	51.5	74.0	32.5	50.0	4.5	57.5	51.0	57.5
12/87	36.5	46.3	61.5	69.5	36.0	52.5	4.5	50.5	50.5	54.0
01/88	31.5	45.5	61.5	63.5	35.0	51.0	4.5	51.0	56.0	54.0
02/88	28.5	44.0	61.5	63.5	35.0	48.0	4.5	50.0	55.0	48.5
03/88	27.0	45.5	59.0	63.5	34.0	46.5	6.5	48.0	54.0	45.5
04/88	28.5	50.0	59.0	63.5	31.5	49.5	6.5	48.0	54.0	45.5
05/88	29.0	51.0	58.5	63.5	31.5	50.5	6.5	50.0	54.0	45.5
06/88	28.0	53.5	58.5	63.5	26.5	51.0	6.5	50.0	55.0	45.5
07/88	23.5	51.0	58.5	62.5	25.0	51.0	6.5	51.5	54.0	44.5
08/88	25.5	51.0	59.0	62.5	25.0	51.0	6.5	51.5	54.0	46.0
09/88	21.0	46.0	59.5	64.5	23.0	46.0	6.5	53.0	51.0	47.0
10/88	23.0	46.0	59.5	65.0	19.5	46.0	6.5	53.0	49.0	47.0
11/88	20.5	42.5	58.0	60.5	15.0	45.5	6.5	52.5	44.5	47.5

^a The prices for Colombian debt from 11/86 to 1/87 were not available.

^b The prices for Philippine debt were not available prior to 10/86.

Citicorp's action in turn prompted many other large U.S. banks to take similar measures and signalled two important messages to the secondary market. First, these charges indicated a fundamental, negative reassessment by the large banks of the true value of their Third World loans. Second, the provisioning of these loans by the banks signalled a massive increase in the potential supply of loans

Table II
Developing Country Debt Index

The index is a value-weighted average value of bank debt based on actual transactions completed by Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, Peru, Philippines, Poland, Romania, Venezuela, and Yugoslavia. The weights are the respective face values of bank debt outstanding. Face Amount Indexed is the total amount of bank debt outstanding as provided by the Bank for International Settlements. Market Value is the product of Face Value and the corresponding Index number. Data courtesy of Shearson Lehman Hutton.

Year	Month	Index	Face Amount Indexed (\$billion)	Market Value (\$billion)
1986	January	73.3	274.8	201.6
	February	71.5	274.8	196.5
	March	70.3	274.8	193.1
	April	68.9	274.2	188.8
	May	68.5	274.2	187.8
	June	67.4	274.2	184.9
	July	67.4	277.2	186.9
	August	67.3	277.2	186.6
	September	67.4	277.2	186.7
	October	67.5	278.1	187.6
	November	68.1	278.1	189.4
	December	67.8	279.4	188.7
1987	January	66.7	279.4	185.2
	February	66.3	279.4	181.0
	March	64.8	279.4	182.7
	April	62.7	281.8	176.8
	May	62.6	281.8	175.2
	June	61.7	281.8	174.0
	July	58.7	284.4	166.5
	August	54.6	284.4	154.9
	September	47.9	284.4	135.8
	October	44.6	284.4	126.7
	November	45.3	284.4	128.6
	December	48.1	284.4	136.7
1988	January	47.3	284.4	134.4
	February	45.3	284.4	128.9
	March	44.8	284.4	127.4
	April	47.0	284.4	133.7
	May	47.7	284.4	135.7
	June	48.4	284.4	137.6
	July	47.0	284.4	133.7
	August	46.6	284.4	132.5
	September	43.8	283.1	124.0
	October	43.7	283.1	123.7
	November	41.7	283.1	118.1

on the secondary market.¹³ During the second half of 1987 and the first 3 months of 1988, secondary market prices for the debt of most countries continued to decline before stabilizing in April 1988. The Shearson Lehman Hutton Developing Country Debt Index, reproduced here as Table II, shows that there was a

¹³ While provisioning for loans does not necessarily imply that the loans will then be sold, Sudo (1989) reports that at least two large banks made extensive use of the secondary market in 1988.

drop in value of over 18% between August and October 1987. Although trading volume dropped precipitously immediately after Citicorp's announcement, by late 1987 it has returned to a level of approximately \$1 billion per month. Throughout 1988 the market prices represented in the index fluctuated in the range of 42% to 48%.

II. The Determinants of Secondary Market Loan Prices

To investigate whether insolvency or illiquidity is causing the developing-country debt crisis, we require an econometric model explaining the cross-sectional and intertemporal variation in secondary market prices of developing-country syndicated loans. In this section we argue that secondary market prices are a function of (1) a country's ability to pay off its external debts, (2) a country's willingness to service its debts, and (3) regulatory, legal, and other factors peculiar to the secondary loan market, particularly the availability and terms of national debt-conversion programs.

A. Factors Affecting a Country's Ability to Service its Debts

A generally accepted view is that the secondary market prices for developing country loans reflect the discounted value of all expected future debt service payments.¹⁴ To the extent that these expectations are based on a debtor country's "capacity" to pay, the factors determining a nation's debt service capacity also determine the secondary market value of its loans. Fortunately, there exists a large body of literature which models the determinants of the spreads on syndicated bank loans during the 1970s and early 1980s.¹⁵ These papers typically show the spread above the London Interbank Offered Rate (LIBOR) as a default risk premium at a time when deliberate (discretionary) default was considered almost inconceivable, and thus the methodologies these authors employed should be directly applicable to our objective of modeling a country's ability to service its debt.

In particular, Edwards (1984, 1986) analyzed spreads on syndicated bank loans and publicly-issued bonds floated by developing countries during the period 1976–1980. He finds that proxies for a nation's solvency (total indebtedness), debt service capacity, liquidity, and investment intensity significantly impact spreads. His models also have a high degree of explanatory power ($R^2 = 0.89$).

Chase sold debt with a face value of \$1 billion at an average of 65 cents on the dollar, and Citicorp shed \$1.6 billion face value of debt at an average price of 75 cents on the dollar.

¹⁴ See, for example, Dooley (1988), Sachs and Huizinga (1987), Corden (1988a), Bulow and Rogoff (1988a).

¹⁵ In addition to Edwards (1984, 1986), see Feder and Ross (1982) and McFadden et al. (1985) for empirical studies, and McDonald (1982) and Saini and Bates (1984) for surveys of the literature on quantitative analysis of country default risk. The debt servicing capacities of developing country borrowers have been analyzed by Feder, Just, and Ross (1981) and McFadden et al. (1985). Shapiro (1982) examines theoretically the particular risks involved in international banking while Cohen and Sachs (1986) analyze sovereign lending. Eaton, Gersovitz and Stiglitz (1986) provide an insightful analysis of the theoretical and practical differences between corporate debt and sovereign debt.

We employ the same estimation technique as Edwards (1984, 1986) and the same or similar empirical variables.¹⁶

B. Factors Affecting a Country's Willingness to Service its Debts

Specifically modeling a country's willingness to pay its external debts is inherently more difficult (and less quantifiable) than modeling its debt service capacity. First and foremost, one must identify the internal and/or external enforcement mechanisms which reward a country for paying its debt and penalize it for default. While several studies have addressed the enforcement issue, two approaches currently are dominant. The reputational approach, represented for example by Eaton and Gersovitz (1981) and Grossman and Van Huyck (1988), asserts that debt will not be repudiated because then the debtor would lose future access to capital markets.

A second approach, put forward by Bulow and Rogoff (1989a, 1989b), claims that a country will choose not to repudiate a burdensome debt only if a lender can impose direct sanctions on the defaulting debtor that restrict its ability to transact freely in the financial and product markets. In other words, they argue that a "reputational equilibrium" cannot exist and that a "good" reputation for repaying loans does not enhance a country's ability to borrow abroad.¹⁷ Elimination of trade credits or seizure of debtor assets held in the creditor country are possible sanctions.¹⁸ This argument is strengthened by that fact that most problem debtors owe money to banks in all major industrialized countries. Therefore, in the case of default a country would be excluded from trading with virtually all of the industrialized world. Moreover, repudiating debtors, especially Latin American countries, fear a "foreign policy rupture with the U.S." (Sachs 1988, p. 710), which provides further incentives for regularly servicing their debts.

One proxy for a nation's willingness to pay its debt is the level of payment arrears. In the last decade, many highly indebted developing countries have incurred these arrears on both interest and principal amounts due.¹⁹ This usually results from severe financial difficulties since most governments view incurring payment arrears as last ditch measures to "improve" their financial conditions. As soon as a country has incurred arrears, it has in fact defaulted on its external obligations. This act may be an acknowledgement of economic and financial mismanagement in the past, but it may also signal a desire not to acknowledge obligations in the future. For example, this is certainly the case for Peru which has limited its debt service payments to a fraction of its export revenues since

¹⁶ The variables he uses are total-external-debt/GNP; debt service/exports; imports/GNP; and gross investment/GNP.

¹⁷ The presumed reason for the nonexistence of a "reputational equilibrium" is the following. If reputation contracts are feasible, the maximum penalty creditors can impose in the case of default is to preclude the borrower from further reputational borrowing forever. But in this case, a debtor would still be able to transact on a cash-in-advance basis. Bulow and Rogoff (1989b) show that there is always some state of nature where the debtor is better off defaulting on its debt and trading on a cash-in-advance basis and, hence, that a "reputational equilibrium" is not sustainable.

¹⁸ See the appendix in Bulow and Rogoff (1989a) for "The Efficacy of Legal Sanctions."

¹⁹ Nations included in the sample which incurred arrears over the study period are Argentina, Brazil, Ecuador, Peru, and the Philippines.

late 1985. Accordingly, incurring payment arrears should decrease the market value of a country's outstanding loans.

The relative level of hard currency reserves may also proxy for the country's willingness to service its debts. The lower the amount of hard currency reserves the more likely the country will either have to lower its consumption of imported goods or dip into its "strategic" foreign exchange reserves. Therefore, as hard currency reserves dwindle political leaders will face increasing pressure to suspend (or at least delay) external debt service payments.

C. Regulatory, Legal, and Other Factors Influencing Secondary Market Prices

Two important factors influencing the secondary market supply of loans are the results of U.S. banking policy. On the one hand, U.S. banks are generally not allowed to undertake debt conversions themselves.²⁰ On the other hand, the potential magnitude of banks' loan sales on the secondary market is limited by the prescribed accounting treatment of recognized loan losses and by the pressure exerted on U.S. money center banks by the Federal Reserve to continue extending credit to developing countries.²¹

By September 1987, the fifteen largest U.S. banks' exposure to less developed countries totaled \$73 billion, with a corresponding secondary market value of \$37 billion. U.S. regional banks, and especially European banks (with the exception of British banks), have had a much freer hand than have American money-center banks to write off and sell loans they consider uncollectable because selling loans at a discount involved taking larger book losses than many large U.S. banks felt they could accept.²² After Citicorp's \$3 billion loan-loss provision in May 1987, which led many banks to invoke similar measures, these potential book losses were substantially reduced.²³ Furthermore, Citicorp explicitly stated that it planned to increase loan sales on the secondary market following its announcement. Given these considerations, increasing levels of provisions should be associated with declining market values of the developing countries' loans.

To date there have been very few large, documented loan purchases, where the investor's purpose is primarily to hold the loan as an investment or to resell the

²⁰ In particular, since Regulation K of the U.S. Bank Holding Company Act largely restricts banks to "activities of a banking nature," they cannot convert their loans into local currency for investment unless they intend to purchase a local financial institution. The August 1987 revision of this regulation widened the scope for investment in nonfinancial companies but only if they are being privatized. Since privatization programs have not been significant in most countries' debt-conversion programs and since banking is typically "off limits" to foreign investment, Regulation K constitutes a binding constraint on direct investment by U.S. banks.

²¹ The conflicting pressures on commercial banks and on the secondary market caused by U.S. banking policy are discussed extensively in Sachs and Huizinga (1987).

²² Before May 1987, most U.S. banks had a ratio of reserves to developing country exposure of less than 5%; by mid 1987 this ratio had increased to 20–35% for the 15 largest banks (compared to 35–70% for French, German, and Swiss banks). See World Bank *World Debt Tables* (1988), pp. xxiv–xxvii. Some large U.S. banks, however, are unable to write off major fractions of their Third World loans because it would either eliminate their capital base or drop it below current Federal Reserve minimum standards of 6%.

²³ Simultaneously, several British, Canadian and (indirectly) Japanese banks also increased their loan-loss provisions.

loans later. The majority of the potential buyers of developing country loans are individuals and companies (particularly multinational corporations) who purchase secondary market loans for use in debt-conversion programs. Thus the demand for a given issue on the part of these investors depends on the ease with which a debt conversion can be undertaken and on the terms offered by the debtor government. Since legislation for conversions generally eliminates uncertainty about transaction costs, eligible investments, and conditions for profit and capital repatriation, we predict that the presence of a formal debt conversion program should increase the demand for, and hence the market value of, a nation's loans.

A final variable, the market rate of interest on default-free debt, is potentially a very important influence on secondary market prices for developing country syndicated loans. These are technically floating-rate instruments (with the rate set as a percentage above LIBOR) which should be unaffected by rate fluctuations if default risk was negligible since the loans would always be valued at par. When the loans are being valued far below par, however, the original (or renegotiated) floating-rate terms on the syndicated credit may be irrelevant to pricing. For example, secondary market participants presumably value the loans based on the expected stream of hard-currency debt service payments which the debtor country is able to generate from its net exports, and there is no reason this stream should be fundamentally affected by rate fluctuations. In this case the stream of payments would be essentially fixed, and changes in the market interest rate on default-free, dollar-denominated debt would cause an opposite change in the loan's secondary market value, just as in the case of a fixed-coupon-rate bond.

III. Data and Empirical Methods

Our empirical tests require an econometric model of the cross-sectional and intertemporal variation in secondary market loan prices. The previous discussion suggests that the loan price is a function of the country's solvency and liquidity, regulatory factors affecting the secondary market, and the market rate of interest on default-free debt. In this section we describe the data on secondary market prices and proxies for the factors mentioned above. We then specify an empirical model of loan prices.

A. Data

A listing of monthly secondary market prices for twelve less developed countries has been provided by Shearson Lehman Hutton.²⁴ This list covers 39 months

²⁴ As a check on the consistency and accuracy of these prices, which Shearson states are based on actual transactions, we compare several months' prices with those compiled in similar listings by Salomon Brothers. In general, prices in the two lists are remarkably consistent. Differences of more than 5% are uncommon, while differences of 10% or more are very rare. Although lacking the precision of, for example, price quotations for exchange-listed stocks or bonds, the interested reader can judge the consistency of prices between listings by comparing the price quotes in Table I with similar quotations in Sachs and Huizinga (1987, p. 556), Bulow and Rogoff (1988b, pp. 677 and 680), Bulow and Rogoff (1989c, p. 25), and Evans (1988a, p. 8).

from July 1985 to November 1988 and is reproduced in Table I.²⁵ Monthly data on exports, imports, and hard currency reserves are contained in *International Financial Statistics* published by the International Monetary Fund (IMF). Trade figures denominated in local currency have been converted into U.S. dollars at the contemporaneous exchange rates.

Payment arrears are quarterly figures from the IMF's *Balance of Payments Statistics*, and yearly data (including projections for 1988) on total long-term debt, long-term debt service, and GNP are obtained from the *World Debt Tables* published by the World Bank and checked and completed using *International Financial Statistics* and *Country Reports* of London. Treasury bond rates are obtained from *Moody's Municipal and Government Manual* (1989), and LIBOR data are obtained from the IMF *International Financial Statistics*. Finally, developing country reserve allocations made by U.S. money-center banks in 1987 have been extracted from Musumeci and Sinkey (1990).

B. The Empirical Model

We examine the cross-sectional and intertemporal variation in secondary market loan prices for 10 countries over 32 months.²⁶ In this situation an error components model provides the greatest flexibility.²⁷ To test our hypotheses, we estimate the following two-way error components model:

$$P_{it} = \beta_1^* \text{Intercept} + \beta_2^* \text{TDGNP}_{it} + \beta_3^* \text{TDEX}_{it} + \beta_4^* \text{NETDS}_{it} \\ + \beta_5^* \text{NIRE}_{it} + \beta_6^* \text{INT}_t + \beta_7^* \text{ARR}_{it} + \beta_8^* \text{USP}_t + \beta_9^* \text{BDUM}_{it} \\ + \beta_{10}^* \text{PDUM}_i + \beta_{11}^* \text{CONVDUM}_{it} + U_{it} \quad (1)$$

where $i = 1, \dots, 10$, $t = 1, \dots, 32$, and $U_{it} = V_i + e_t + \epsilon_{it}$, with v_i and e_t being the random errors attributable to countries and time periods, respectively, and ϵ_{it} being a well-behaved residual error. The subscripts i and t indicate variation

²⁵ Shearson Lehman Hutton's listing of secondary market prices also includes Poland and Romania. These two countries are excluded from the analysis since the economic data available are not sufficient to conduct a meaningful empirical analysis.

²⁶ We estimate the model with data from the following 10 countries over 32 months from July 1985 to July 1988 (with August–December 1985 missing): Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, Peru, Philippines, Venezuela, and Yugoslavia.

²⁷ Simply pooling the data and estimating by an ordinary least squares (OLS) procedure can result in inefficiency as well as several sorts of biases due to heterogeneity of coefficients across countries and time (Hsiao 1986).

An analysis of covariance reveals that it cannot be assumed that there is homogeneity in the intercepts or slopes across countries. In other words, the data exhibit significant variation due to country effects. Given this heterogeneity, it is likely that the true error variances are not homoscedastic. The hypotheses that the variance components due to country and time effects are zero, respectively, are rejected at the 0.01% significance level. Hence, OLS will be biased. See Boehmer (1989) for a detailed discussion and test statistics.

Fuller and Battese (1974) show that time invariant or individual invariant independent variables have no undesirable effects on the properties of the estimator. They also present sufficient conditions for the feasible generalized least squares estimator with estimated covariance matrix (FGLS) to be unbiased and to have the same asymptotic distribution as the generalized least squares estimator (GLS), which is the best linear unbiased estimator. According to Taylor (1980), our sample size is large enough to draw inferences based on asymptotic properties.

over countries and time, respectively.²⁸ The variables are defined below:

B. 1. Dependent Variable

P = the secondary market price (as a percentage of par value) for developing country loans, observed monthly for each country.

B. 2. Independent Variables

TDGNP = the ratio of total long-term debt to GNP,
 TDEX = the ratio of total long-term debt to total exports,
 NETDS = the ratio of net exports to total-debt service (principal plus interest payments),
 NIRES = the ratio of net imports to hard currency reserves,
 INT = the market interest rate for default-free, dollar-denominated debt: the 1-year (LIBOR) in percent,
 ARR = payment arrears on interest or principal due to \$U.S.,
 BDUM = 1 for Brazil during the period February 1987 to January 1988 and 0 otherwise,
 PDUM = 1 for Peru over the entire sampling period and 0 otherwise,
 CONVDUM = 1 for countries with legislation regulating debt conversions and 0 otherwise, and
 USP = the country-specific reserve allocations made by 25 large U.S. banks and financial corporations in 1987 in \$U.S.²⁹

C. Discussion of the Independent Variables

C. 1. Solvency Measures

The ratio of total long-term debt to GNP represents the broadest measure of a nation's total indebtedness, and thus is a proxy for that country's solvency—defined as the ability to fulfill its obligations in the long-run. We expect this

²⁸ The major problem with error components models arises, as Mundlak (1978) shows, when country- or time-specific effects are correlated with the explanatory variables. Baltagi (1981) finds that for this purpose the test proposed by Hausman (1978) performs well in two-way error component models as compared to other specification tests. The hypothesis to be tested is that the error component model is the correct specification. Since it cannot be rejected at a reasonable significance level of 10% (or even higher), the error component GLS estimator is consistent and efficient. See Boehmer (1989) for a more detailed discussion of the specification tests.

²⁹ TDGNP, TDEX, NETDS, and NIRES are comparable across different nations. Of these four variables, only the TDGNP measure is exactly the same as that used by Edwards (1984, 1986), although our alternate measures are similar and, we believe, superior for our purposes. For example, our TDEX measure has total exports (rather than net exports) in the denominator for two reasons. First, exports are the best measure of a country's access to foreign goods markets and thus represent its ability to earn foreign exchange over the long-term. Second, total exports (rather than net exports) are used because imports can be controlled (or at least influenced) over the long-run by the debtor government through currency rationing, domestic product substitution, or outright prohibition of nonessential imports. Finally, the lack of consistent and timely data on gross investment during our study period preclude us from computing the gross investment/GNP variable which Edwards finds to be important. This measure is reported only intermittently for many of our more important sample countries (e.g., Brazil), and even when it is reported the information is usually quite old.

variable to have a negative coefficient. The ratio of total long-term debt to total exports represents a measure of a country's ability to service its external debts over the long-run. We again expect a negative coefficient value.

C.2. Liquidity Measures

The ratio of net exports to total-debt service (principal plus interest payments) is a proxy for both the short-to-intermediate-term debt service capacity and the liquidity of a country. Since net exports represent the principal source of hard currency for most developing countries this measure can be considered the international financial analog of a times-interest-earned measure for corporate debt. We expect the coefficient to have a positive value. The ratio of "net imports" to hard currency reserves is used to measure a given country's liquidity—defined as the ability to make hard currency payments in the short-term. If a country is in fact running net imports it is consuming its hard currency reserves, and thus this variable would measure liquidity as the inverse of "months-of-cash-available" for payment. So we expect a negative coefficient.

C.3. Market Interest Rate

Since a priori we cannot specify whether our sample syndicated loans are being valued as short-term or long-term securities, the choice of which risk-free rate to use is ambiguous. We therefore estimate the model three times using short-, intermediate-, and long-term interest rates, and we expect to observe a negative sign in all cases. We first use the 1-year LIBOR, then the 10-year U.S. Treasury bond rate, and finally the 30-year Treasury bond rate. Since our findings are similar with all three measures we report results using the 1-year LIBOR.

C.4. Willingness to Pay

Payment arrears are used as a proxy of the willingness to fulfill existing obligations. In the case of the unilateral measures of Peru (since 1986) and Brazil (February 1987 to January 1988) the arrears clearly were the result of a policy decision rather than of pure financial distress. In the other cases, payment arrears prevailed only for a short time. In general, any kind of arrears signals bad news to creditors and should be negatively correlated with *P*. The variables NETDS and NIRES, discussed above as liquidity measures, could also be proxies for a country's willingness to pay since they measure the immediate cost (in foregone consumption of imported goods) of continuing debt service payments. While we feel these variables most clearly measure liquidity, we will also discuss their potential as proxies for a country's political will to service its debts.

C.5. Other Variables

Since data on Brazil's arrears in 1987 were not available the BDUM dummy variable is included in the model to capture the effect of the debt moratorium from February 1987 to January 1988. A negative coefficient value is expected.

Since Peru is the only country that has limited its debt service payments to a fraction of its export revenues (since January 1986), another dummy variable PDUM is included to capture this distinguishing feature. A negative sign is expected.

Finally, the CONVDUM variable takes a value of unity if a given country has "legislation" for debt conversions and zero otherwise. This excludes, by construction, all cases where a nation approves conversions only on a case-by-case basis which in turn would only be an ambiguous incentive for a potential investor to purchase loans on the secondary market. Hence, it assures that the variable captures the value of a conversion option to the average investor. The existence of legislation is expected to increase the demand for loans and *ceteris paribus* increase the secondary market price P .

The country-specific reserve allocations made by 25 large U.S. banks and financial corporations in 1987 are used as proxies for the increase in the supply of developing country loans. These allocations also signal that banks consider the true value of the loans to be below face value. Therefore, USP is expected to be negatively correlated with P .

IV. Estimation Results

Table III presents the estimates for the parameters and variance components. The t -statistics and levels of significance correspond to the null hypothesis that the coefficient is not different from zero. We also examine whether any econometric problems arise from estimating a model using variables which have a noticeable trend. Among other steps, we estimate equation (1) using first differences of the independent and dependent variables. Since none of these alternative specifications fundamentally change the results presented below we do not report them separately, but a complete listing of the specifications tested is provided in footnote 32.

As expected, the estimated coefficient for the ratio of total debt to GNP is statistically significant and negatively correlated with the developing country loan price P . Hence, a country's solvency as measured by TDGNP significantly affects the market value of its loans. Also, as predicted, the ratio of total debt to exports TDEX is significantly and negatively related to P . The implication of these two results crucially depends on how the magnitude of debt service payments is determined. If debt service is constrained by the debtor's capacity to pay, an increase in TDEX or TDGNP implies a reduced ability to service outstanding debt in the long-run. As the present value of all expected repayments relative to total debt outstanding decreases, the loan prices decline.

On the other hand, debt service may be constrained by a country's willingness to pay rather than by its capacity to pay. In this case, an increase in TDEX or TDGNP implies an increased cost of continued debt service (in terms of export revenues or national income). Given that the cost of default is constant for individual debtors, it follows that the country is more likely to cease or cut back on debt service payments, thus decreasing the present value of expected payments and hence loan prices.

The two liquidity measures, on the other hand, are not significantly related to P . Neither the ratios of net exports-to-total debt service nor net imports-to-reserves significantly influence secondary market prices for syndicated loans. This finding, that the values of claims on heavily-indebted developing countries

Table III
Estimation Results

The Fuller-Battese generalized least squares estimates of the two-way error components model presented in equation (1). The sample consists of 10 countries observed over 32 months beginning in July 1985 and ending in July 1988. The following regression equation is estimated:

$$P_{it} = \beta_1^* \text{Intercept} + \beta_2^* \text{TDGNP}_{it} + \beta_3^* \text{TDEX}_{it} + \beta_4^* \text{NETDS}_{it} + \beta_5^* \text{NIRES}_{it} + \beta_6^* \text{INT}_t \\ + \beta_7 \text{ARR}_{it} + \beta_8^* \text{USP}_t + \beta_9^* \text{BDUM}_{it} + \beta_{10}^* \text{PDUM}_i + \beta_{11}^* \text{CONVDUM}_{it} + U_{it}$$

where:

TDGNP	= ratio of total long-term debt to GNP,
TDEX	= ratio of total long-term debt to exports,
NETDS	= ratio of net exports to debt service,
NIRES	= ratio of net imports to hard currency reserves,
INT	= monthly London Interbank Offered Rate (a short-term interest rate),
ARR	= level of incurred payment arrears,
USP	= cumulative developing country specific loan provisioning by U.S. banks,
BDUM	= unity for Brazil from 1/87 to 12/87 and zero otherwise (to capture the effects of the debt moratorium),
PDUM	= unity for Peru over the whole sampling period and zero otherwise (to account for the unilateral limitation of debt service payments), and
CONVDUM	= unity for all months in which a country maintained a legislation for debt-to-equity conversions. ^a

Parameter	Estimate	t-Statistic	p-Value
Intercept	88.51760	13.47	0.0000
TDGNP	-18.11610	-4.75	0.0000
TDEX	-0.10437	-3.57	0.0004
NETDS	-0.30754	-0.50	0.6204
NIRES	5.79548	1.28	0.2001
INT	0.22825	0.30	0.7619
ARR	-0.00574	-2.68	0.0077
USP	-0.00100	-13.69	0.0000
BDUM	-10.92820	-6.61	0.0000
PDUM	-36.07240	-8.31	0.0000
CONVDUM	-5.43157	-6.75	0.0000

^a Variance Component for countries: $\sigma_v^2 = 62.22$.

Variance Component for time series: $\sigma_a^2 = 7.21$.

Variance Component for error: $\sigma_e^2 = 17.38$.

Transformed Regression Mean Squared Error = 17.59.

Degrees of Freedom = 309.

Adjusted $R^2 = 0.96$.

are significantly related to a nation's solvency rather than its liquidity, answers one of the central questions of this study.³⁰ Our result implies that the current debt-repayment policy being pursued by the major creditor banks is based on a fundamentally flawed premise since these banks have long maintained that debtor countries can—and must—repay their debts in full. Based on that premise, the banks have been simply capitalizing a developing country's past-due interest and

³⁰ In earlier drafts of this paper we employed other proxies for solvency, debt service capacity, and liquidity, and the results were essentially identical to those reported here.

principal payments, hoping for short- or intermediate-term improvement. Our study indicates that this is a disequilibrium strategy in that it locks the debtor countries into a downward spiral of accelerating total indebtedness, yet it does not increase the economic value (as opposed to nominal value) of the creditor claims.

Moreover, these results have implications for the debt relief policy currently pursued by the U.S. government under the "Brady Plan." The significant negative relationship between TDEX as well as TDGNP and loan price P suggests that at any point in time there is significant uncertainty about a debtor's future export and growth potential. It follows from the recent contribution by Froot, Scharfstein, and Stein (1989) that, given this result, any form of debt relief should involve repayment contingent on a debtor's exports and/or total output rather than on an exogenous variable like world commodity prices.³¹

P is also not significantly related to the level of risk-free interest rates. We report the results of the estimation using the short-term LIBOR, but we also obtain similar results using the 10-year and the 30-year Treasury bond rate. Since none of these loans are selling at or even near par and there is no evidence that actual debt service payments vary with interest rate changes, it seems surprising that secondary market loan values are insensitive to fluctuations in market rates. The most plausible explanation is that whatever effect interest rate fluctuations might have is overwhelmed by country-specific macroeconomic variables.

Payment arrears ARR are, as expected, significantly negatively correlated with loan values. This confirms that the political and economic signal sent by incurring arrears results in lower loan values, even though most arrears to date of the countries studied have only been temporary (with the exception of Peru). On the other hand, the liquidity measures are not significantly correlated with P . This indicates either (1) that these variables are less clear signals of willingness to pay than is our arrears measure, or (2) the market ignores short term indications of political pressures in favor of an analysis based on legally significant actions (running payment arrears) and underlying political dynamics.

The coefficient of the country invariant variable USP, the cumulative level of U.S. banks' developing-country-specific reserve allocations, is also statistically different from zero. As expected, USP is negatively correlated with loan prices. This confirms that increasing levels of provisions either (1) reveal a downward reassessment of loan values, or (2) decrease the loan values via an increase in the potential supply of loans. Coupled with the results for the arrears variable, the significance of the USP variable indicates that the willingness of a country to pay its debts impacts significantly upon loan secondary market prices. While

³¹ Froot, Scharfstein, and Stein found that only two forms of debt reduction are efficient—indexation to an endogenous variable (e.g. output or exports) and indexation to an exogenous variable (e.g. commodity prices). The former entails a moral hazard problem (reduced incentives for the debtor to promote growth as the creditors' claim on output increases) but alleviates adverse selection costs (incentive to understate the growth potential of the debtor's economy) caused by the latter. This implies that the larger the uncertainty associated with a debtor's export or growth potential the more appropriate is an indexation to these variables.

neither of these variables is a perfect measure of political will, the magnitude and significance of both coefficients is certainly indicative.

The two dummy variables BDUM and PDUM both have significant coefficients and are negatively correlated with loan prices, as expected. These dummies capture the effects of the unilateral measures of Brazil during 1987 and Peru since late 1985, both of which suspended or limited debt-service payments, respectively.³²

The most surprising evidence from the estimation above is a significantly negative correlation of CONVDUM with P. This result suggests that the adoption of legislation for debt conversion has a negative effect on a country's loan price. Since such legislation most likely does not decrease the demand for loans on the secondary market and has no effect on supply, this finding initially seems puzzling. In order to provide a rational explanation for it, the next section first examines the robustness of this result and then provides a possible theoretical explanation.

V. Debt Conversion and Loan Prices

Table IV presents the results of a further analysis of the model specified in equation (1) with respect to the CONVDUM variable. Panel A contains the coefficient estimates of CONVDUM in five subsamples covering different groups of countries.³³ The first two subsamples include, respectively, all countries which have maintained debt-conversion programs at some time during the study period and those countries whose programs have experienced high conversion volume. Subsamples 3–5 include progressively narrower groupings of high-conversion-volume countries. It is evident that, for the entire July 1985–July 1988 estimation period the CONVDUM variable is always significantly and negatively correlated with P.

Panel B of Table IV presents the analysis of the same subsamples but excludes the potentially distorting time period after February 1987 when Brazil's debt

³² In order to test whether equation (1) may be misspecified, we examine four alternative specifications. First, we estimate equation (1) using first differences of the independent and dependent variables (but not the dummy variables, since differencing these would be meaningless) and the Fuller-Battese estimation methodology. We find that only the TDGNP solvency measure is significant at the 5% level, although we also document that changes in loan prices are significantly negatively related to changes in interest rates (LIBOR) at the 10% level.

Our second alternative specification involves estimating equation (1) assuming a first-order autocorrelation in addition to the contemporaneous correlation, using the method developed by Parks (1967). Third, equation (1) is augmented with 31 time (dummy) variables corresponding to all but one of the 32 calendar months in the sample. The estimation is then carried out (a) using Fuller-Battese, (b) assuming first-order autocorrelation, and (c) using OLS. Finally, equation (1) is estimated using the Fuller-Battese methodology but assuming that each country's error structure changes (a) after 16 months, and (b) after every 8 months. In all three cases (the last three alternative specifications), our results are essentially identical to those reported in the test for our basic model: solvency, willingness to pay, conversion, and country dummy variables are significant while liquidity variables are not.

³³ To avoid linear dependencies, subsamples 3 and 5 exclude the "arrears" variable, subsamples 4 and 5 exclude the dummy variable representing the Brazilian moratorium, and all subsamples exclude the dummy variable representing the Peruvian unilateral measure.

Table IV
Robustness of the Negativity of the Estimated Coefficient
For the Presence of Legislation for Debt Conversions
(CONVDUM)

To investigate the robustness of the negative correlation between the inception of a debt conversion program and loan prices, the model from equation (1) is estimated for different subsamples and net of the potentially disturbing effects of Brazil's debt moratorium and Citicorp's loan loss provisions in early 1987. All subsamples were estimated using the Fuller-Battese two-way error components model, and are constructed as follows:

- Subsample 1: Argentina, Brazil, Chile, Ecuador, Mexico, Philippines, Venezuela (excluding countries that never maintained conversion programs),
- Subsample 2: Brazil, Chile, Mexico, Philippines (countries with high conversion volume),
- Subsample 3: Brazil, Chile, Mexico (Latin American high volume countries),
- Subsample 4: Chile, Mexico, Philippines (high volume, excluding Brazil), and
- Subsample 5: Chile, Mexico (same as 4, excluding non-Latin American).

Subsample	CONVDUM	<i>t</i> -Statistic	Significance	DF
Panel A: July 1985–July 1988 (entire sample period)				
1	−7.17	−8.36	0.0000	216
2	−6.25	−6.38	0.0000	120
3	−8.95	−8.88	0.0000	89
4	−2.42	−2.04	0.0443	89
5	−7.06	−4.51	0.0000	58
Panel B: July 1985–February 1987 (excluding the period following the Brazilian debt moratorium in February 1987)				
1	−4.28	−4.96	0.0000	118
2	−4.62	−4.21	0.0001	64
3	−10.33	−7.61	0.0000	47
4	−4.44	−3.81	0.0004	47
5	−11.02	−8.42	0.0000	30

moratorium and Citicorp's subsequent addition to its loan-loss reserves might have changed the market's perception about the true loan values. In these cases, CONVDUM is also significant and negatively correlated with *P*. We therefore conclude that, regardless of sample or model specification, the estimated coefficient for CONVDUM is negative, statistically significant, and does indeed measure the impact of conversion legislation. Furthermore, in simple OLS regressions run individually on the seven countries which maintained legislation for debt conversion, the estimate for CONVDUM is always negative and in all but two countries significantly different from zero at a 0.05 significance level.³⁴

³⁴ No statement can be made about Chile, since CONVDUM is not distinguishable from the intercept.

A. Discussion

At least since Merton's (1973) paper on rational option pricing, a standard result in finance theory is that an option must have nonnegative value. Since debt conversion legislation confers on the secondary market purchaser of a nation's debt what amounts to a call option (with an attractive exercise price) on that country's domestic assets, this option itself must have at least zero value and should have positive value for some purchasers. The only plausible explanation for a price decline when a conversion feature is added to a debt security is that the assumption of a fixed stream of debt service payments on the syndicated loan following adoption of a debt-conversion program is incorrect. In other words, countries adopt conversion programs as a means of reducing their net hard-currency debt service payments below what they were expected to maintain in the absence of such a program, and the negative secondary market reaction to program adoptions represents a response to an informational signal by the debtor country that its stream of debt service payments will be reduced in the future.

The specific new information revealed by the program adoption could be one of at least three types. First, adoption could reflect a change in the debtor country's willingness to maintain external debt payments in the face of domestic hardship. Conversion program adoption (as opposed to an outright default or debt service moratorium) would therefore imply a willingness to allow greater foreign ownership of domestic assets in exchange for lower net resource outflows.

Second, program adoption could reveal new information about the debtor country's "ability" to maintain debt service payments at current levels. In this case, a country would probably adopt a program only after a period of unusually bad economic performance had begun and was expected to continue.

Third, adoption could reflect poor economic reasoning ability by debtor-country policy-makers if the market believes that the actual operation of a debt-conversion program harms the economy of the debtor country. This can easily occur since all debtor governments have financed their programs through either domestic borrowing (which drives up local interest rates) or by creating new money, with all the attendant inflationary impact. Unless the benefits to the debtor country from the operation of a debt-conversion program outweigh these costs, the net effort will be harmful for the country.

While it would seem irrational for a government to deliberately adopt a program harmful to its own interests, one should remember that (1) these programs are very new, (2) only a handful of countries have adopted them and no long-term performance results are yet available, and (3) opinion on their optimality within academic and government circles is still divided—although most of the academic literature on conversion programs has been negative.³⁵

³⁵ For example, Bulow and Rogoff (1988b) conclude that in a debt buy-back the debtor country uses scarce resources to subsidize its creditors. Realizing that a debt conversion involves a debt buy-back tied to a foreign direct investment, their argument claims that conversions represent an inefficient resource allocation. Furthermore, under fairly general conditions, Helpman (1989) shows that debt forgiveness may reduce investment in the debtor country, implying a reduction of debt service capacity. To the extent that debt conversions involve real forgiveness, the negative impact on

In order to further investigate the valuation impact of conversion program adoption, we use event-study methodology. If the three assertions above are true, the debt of a country implementing debt-conversion legislation should earn negative excess returns (relative to the returns on the loans of the other sample debtor countries), either before the implementation or after it or both. Table V shows the adjusted returns on the debt of countries that adopt conversion legislation.³⁶ Only the magnitude of abnormal returns, and not their general pattern, is sensitive to the index chosen to adjust individual returns for "market" movements.³⁷

The debt of countries adopting a debt-conversion program has earned significant negative abnormal returns over the 4-month period prior to adoption (−5% using the Shearson index and −9% using the equally weighted index), providing support for the assertion that these programs are adopted after a period of subpar economic performance. The same holds for the period starting with the second and ending with the seventh month after adoption (with only the second and seventh month's abnormal return being significant), which implies that conversion programs do nothing to remedy the subpar economic performance. The larger returns on the adoption date and the following month (significantly positive for the equally weighted index) indicate that a positive but very short lasting effect is associated with conversion legislation. This positive effect could be a premium paid by investors for the right to have first choice of debtor-country assets offered under the conversion program.³⁸

These results seem to indicate a market inefficiency. There are, however, two plausible reasons for opposing this view. First, while we identified a subpar performance before and after the adoption date, we cannot identify the underlying causal relations. Second, the positive abnormal returns in the 2 months including

the market value of the remaining loans becomes evident. Finally, a game-theoretic setting is analyzed by Errunza and Moreau (1989). They find that both under perfect and asymmetric information a debt conversion cannot be strictly preferred by all participants in this transaction. This result implies that if a conversion is actually observed it must be the case that preferable options were not available.

³⁶ The return (R_{it}) on the debt of country i in month t is calculated by $R_{it} = P_t/P_{t-1}$, and an abnormal return is calculated by subtracting the return on the market index from the individual return. The two indices used are the Shearson Lehman Hutton debt-weighted index consisting of returns on the debt of 12 highly indebted countries (see Table II) and an equally weighted index of the ten countries examined in the regression analysis above.

³⁷ The t -statistics T are calculated as follows: $T_t = (\sqrt{6}/6) \sum_i \text{SAR}_{it}$, where $t = 1, \dots, 31$, $i = 1, \dots, 6$, and $\text{SAR}_{it} = (1/\sigma_i)R_{it}$. R denotes the (abnormal) return, and σ the country-specific standard deviation, estimated over 31 months.

The empirical power of this analysis must not be overstated for obvious reasons. However, it is a meaningful tool for the purpose of illustrating a general pattern of debt returns surrounding the announcement.

³⁸ To investigate the robustness of these results, we also regressed (a) abnormal returns for countries adopting conversion programs on three dummy variables corresponding to event months −4 to −1, 0 to +1, and +2 to +8, and (b) raw returns on the market index as well as the same three dummies. We find negative coefficients for the pre- and post-event period and a positive coefficient for the event period. All results are significant (at the 10% level or better) using the equally weighted index, but only the pre-event period dummy is significant using the Shearson value weighted index. In summary, the regression results support our earlier findings of negative pre- and post-event period abnormal returns and a positive reaction during the announcement period.

Table V

Average Monthly Returns on Developing Country Debt Surrounding Adoption of Debt-Conversion Legislation^a

Month 0 corresponds to the implementation date of debt-conversion legislation. The dates are 11/87 (Argentina, Brazil), 2/87 (Ecuador), 5/86 (Mexico), 10/86 (Philippines), 5/87 (Venezuela). Abnormal returns are calculated as the difference between the raw return and the return on either the Shearson debt-face-value-weighted index or an equally-weighted index of the ten countries included in the regression analysis.

Month	Raw Return	Abnormal Return (Shearson Index)	Abnormal Return (Equally-Weighted Index)	Cumulative Raw Return	Cumulative Abnormal Return (Shearson Index)	Cumulative Abnormal Return (Equally-Weighted Index)
-4	-3.689 (-1.49)	-1.555 (-1.10)	-3.082*** (-2.77)	-3.689 (-1.49)	-1.555 (-1.10)	3.082*** (-2.77)
-3	-3.414 (-1.57)	-0.725 (-0.51)	-0.974 (-0.88)	-7.103** (-2.17)	-2.280 (-1.14)	-4.056** (-2.58)
-2	-6.781*** (-2.91)	-1.935 (-1.37)	-4.637*** (-4.17)	-13.885*** (-3.45)	-4.216* (-1.72)	-8.693*** (-4.52)
-1	-4.166* (-1.84)	-0.752 (-0.53)	-0.252 (-0.23)	-18.051*** (-3.91)	-4.968* (-1.76)	-8.946*** (-4.03)
0	0.129 (0.10)	-0.195 (-0.14)	3.309*** (2.98)	-17.921*** (-3.45)	-5.163 (-1.63)	-5.637** (-2.27)
+1	2.953 (0.89)	1.629 (1.15)	3.269*** (2.94)	-14.968*** (-2.79)	-3.534 (-1.02)	-2.367 (-0.87)
+2	-5.020** (-2.05)	-3.041** (-2.15)	-5.047*** (-4.54)	-19.988*** (-3.36)	-6.575* (-1.76)	-7.414** (-2.52)
+3	-3.610* (-1.77)	-0.714 (-0.51)	-1.491 (-1.34)	-23.597*** (-3.76)	-7.290* (-1.82)	-8.906*** (-2.83)
+4	-3.166** (-1.91)	-0.438 (-0.31)	-1.121 (-1.01)	-26.763*** (-4.19)	-7.727* (-1.82)	-10.028*** (-3.01)
+5	-1.111 (-0.89)	-0.438 (-0.31)	1.573 (1.42)	-27.875*** (-4.25)	-8.165* (-1.83)	-8.455** (-2.41)
+6	-1.707 (-0.95)	-0.909 (-0.64)	-0.049 (-0.04)	-29.582*** (-4.34)	-9.074* (-1.94)	-8.503** (-2.31)
+7	-3.352 (-1.44)	-2.727* (-1.93)	-1.967* (-1.77)	-32.934*** (-4.57)	-11.801** (-2.41)	-10.471** (-2.72)

^a All returns are in %; *t*-statistic in parentheses.

*** Significant at the 1% level.

** Significant at the 5% level.

* Significant at the 10% level.

and following the event could be misleading if the “net” announcement effect is still negative but dominated by a “first-choice” premium. While we do not attempt to answer these important questions in this paper we can nevertheless safely conclude that either conversion programs cause negative performance or they do nothing to remedy it.

Further evidence on the economic value of a conversion program is provided by examining the raw and adjusted returns on Mexican debt over the whole study period. Mexico is the only country in the sample that “ended” its debt-conversion program (during August 1987) in a period for which price data are available.

Based on the results from the regression analysis and the discussion above, debt-conversion abolition and implementation should have opposite effects. In particular, debt should earn positive abnormal returns shortly before and after the program is ended. This is the pattern observed on the Mexican debt. A sequence of 6 months with negative abnormal returns follows the implementation of the program. Then, after the negative cumulative abnormal returns have been substantially reduced 15 months after the implementation, the program is ended. This, in turn, is followed by a sequence of positive abnormal returns of more than 12% for both performance measures.³⁹

V. Summary and Conclusions

This paper presents our investigation of the factors affecting the secondary market value of developing country syndicated loans. Estimations based on the Fuller-Battese generalized least squares estimator lead to the conclusion that variations in the secondary market loan prices are well described (adjusted $R^2 = 0.96$) using the model presented in this paper. We answer an important, unresolved question by finding that the secondary market value of a developing country's loans is significantly related to variables which are proxies for a nation's basic economic solvency but not to variables which are proxies for that nation's liquidity. Moreover, the level of incurred payment arrears, the unilateral debt moratoria by Brazil and Peru, and the loan-loss provisions by U.S. banks have a significantly negative impact on loan prices. On the other hand, loan value is not significantly related to fluctuations in market interest rates on default-free debt.

Another important result we document is that the adoption of legislation for debt-conversion programs is associated with a decline in the secondary market loan price. Further investigation of this result shows that it is robust with respect to subsamples and model specification. The pattern of actual returns on developing country loans surrounding the implementation of debt-conversion programs supports the assertions that (a) a debt-conversion program is adopted only in a situation of economic distress and does not remedy it, and (b) such a program adversely affects the economy of the debtor country, thus depressing the market valuation of its debt.

³⁹ Again, it is beyond the scope of this study to disentangle cause and effect between program abolition and positive abnormal performance. The Mexican abolition example is, however, consistent with the results around implementation presented above.

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