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DEVELOPING COUNTRY DEBT AND THE  
MARKET VALUE OF LARGE COMMERCIAL BANKS

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Developing Country Debt and the  
Market Value of Large Commercial Banks

ABSTRACT

The effect on commercial banks of exposure to large amounts of developing country debt has been a topic of increasing concern in recent years. Fear of default on the part of the debtor countries has led to fears for the solvency of the creditor banks since in many cases the total of outstanding exposure to risky debtors exceeds the entire capital base of the banks involved. The paper presents a first effort towards measuring the effects of LDC debt exposure on the market value of large commercial value banks in the United States. Our results indicate that exposure to developing country debt has exerted a measurable and significant negative effect on the ratio of market to book value for these banks.

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valuation of bank stock. This paper presents a preliminary effort toward the goal, investigating the effects of debt exposure on the ratio of market to book value of the common stock of large commercial banks in the United States.

### The Market Value to Book Value Ratio

Unlike the Mexican bond shown in Figure 1, seasoned commercial bank loans to developing countries are not traded in organized markets. It is therefore not possible to infer the current market valuation of such claims from observed trading prices. There is some anecdotal evidence from the Euromarkets that some second-hand trading between banks does exist, and that these so-called "silent subparticipations" on Latin American debt have been selling at discounts of ten to twenty-five percent.<sup>3</sup> The pricing of new loans to LDCs also does not give a good indication of market discounts since in the major crisis cases (like Brazil and Mexico) no new creditors are making loans, and existing debt is being rolled over at below-market terms.<sup>4</sup>

Our strategy is to infer the market valuation of existing loans from changes in bank stock prices. As a rule, existing claims on debtor countries are carried at par in assessing the book value of commercial banks. Thus, despite re-schedulings and the risk of default, a \$1 claim on Brazil is carried at \$1 book value. The market value of the commercial bank holding this claim, however, should be below book value to the extent that the risks on the loan reduce the value of the claim. Thus, one determinant of the book value (BV) to market value (MV) ratio should be the extent of exposure to problematic LDC debt.

In this preliminary investigation, we take a standard equation for BV/MV from the literature, and add LDC debt exposure (EX) relative to book value, as

an explanatory variable. The regression equation is

$$MV/BV = \beta Z - \alpha EX/BV \quad (1)$$

where  $Z$  is a vector of traditional variables in bank stock pricing. A significant positive coefficient for  $\alpha$  will indicate that bank stocks are reduced in value as a function of their exposure to the LDCs.

Probably the most relevant previous study for our work is Kamath (1980), who analyses the determinants of the market to book value ratio for 52 banks in 1974, 1975 and 1976. A variety of variables prove significant: beta, volume of trading, growth in earnings, and payout ratio, as well as a capital adequacy variable in one year. This variable is interesting in that Kamath has utilized a capital adequacy test formulated by Vojta (1973) in which the ratio of loan loss chargeoffs to capital is used instead of the more commonly used asset/capital ratios. The fact that this variable is significant only in 1974 (the year of the Franklin National failure) seems to indicate that investor perceptions may be conditioned by highly visible events affecting bank capital. Therefore, in the context of exposure to developing country debt, this result suggests that there may be a similar significance of capital adequacy variables during periods of investor uncertainty such as the period following August 1982.

Using Kamath's framework, we added to his list of variables the LDC exposure variable. Our sample on LDC debt exposure includes 62 commercial banks in the United States (listed in the Appendix), observed on a quarterly basis from September 1982 through June 1983. Information on levels of outstanding exposure to particular countries was obtained from quarterly reports and 10-K

forms submitted to the Securities and Exchange Commission. It should be noted that small levels of LDC exposure are usually not reported to the SEC, as banks are not required to present disaggregated data of exposure to individual countries of amounts to less than 0.75% of total outstandings. We limited our focus to exposure to five Latin American countries: Argentina, Brazil, Mexico, Chile, and Venezuela. These are by far the largest debtors (with percent of the LDC loans of BIS banks as of end-1982), and are the only countries with a comprehensive representation on the 10-K forms. All other data was obtained from the Bank COMPUSTAT quarterly data tape, with the exception of beta values, which were obtained from the Value Line Investment Survey.

Table 1 provides some summary measures of interest from the data set. We show in the table the average exposure and MV/BV ratios for the entire sample, and for the most and least heavily exposed banks in the sample. The heavily exposed banks all have an exposure ratio of about 2.0 or higher, while the least exposed banks in the sample have no exposure. For all four quarters, the heavily exposed banks have a considerably lower MV/BV ratio, and the gap between the two sets of banks widens considerably in 1983:I and 1983:II. Thus, it will not be surprising to find a significant effect of EX/BV on MV/BV, and perhaps an effect that grows over time. On average, the commercial banks carried a large amount of LDC assets, amounting to more than 70% of total book value. The average MV/BV ratio indicates that banking stocks were in general selling at a significant discount relative to book value over the sample period.

Following the previous work on the capital adequacy of commercial banks discussed above, several different formulations were tested. As a first step, the formulation used by Kamath was repeated for the four quarters from

Table 1

## Exposure Data for Sixty-Two Commercial Banks

Average for Entire Sample				
	Exposure**	Book Value**	<u>Exposure</u> Book Value	<u>Market Value</u> Book Value
1982:III	827	787	.721	.712
1982:IV	829	806	.706	.789
1983:I	829	831	.681	.862
1983:II	825	867	.644	.911
Five Banks in Sample with Lowest Exposure/Book Value*				
	Exposure**	Book Value**	<u>Exposure</u> Book Value	<u>Market Value</u> Book Value
1982:III	0	893	0	.783
1982:IV	0	924	0	.851
1983:I	0	954	0	1.042
1983:II	0	1043	0	1.109
Five Banks in Sample with Highest Exposure/Book Value*				
	Exposure**	Book Value**	<u>Exposure</u> Book Value	<u>Market Value</u> Book Value
1982:III	19432	8783	2.21	.551
1982:IV	19556	8978	2.18	.628
1983:I	19486	9328	2.09	.666
1983:II	19266	9722	1.98	.664

\*As of September 1982.

\*\*Millions of \$U.S.

## DEVELOPING COUNTRY DEBT AND THE MARKET VALUE OF LARGE COMMERCIAL BANKS

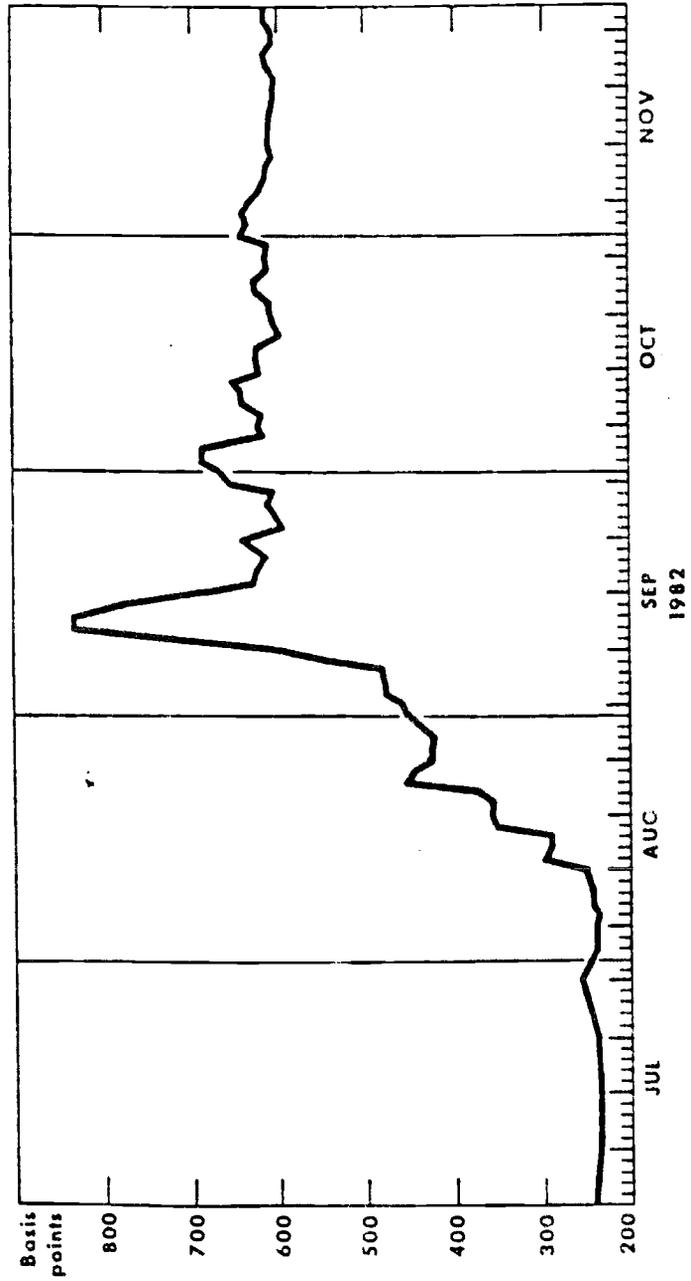
The effect on commercial banks of exposure to large amounts of developing country debt has been a topic of increasing concern in recent years. Fear of default on the part of the debtor countries has led to fears for the solvency of the creditor banks since in many cases the total of outstanding exposure to risky debtors exceeds the entire capital base of the banks involved. To take just one example, Citicorp's claims on Brazil alone amounted to 116% of bank equity at year end 1982.<sup>1</sup> Thus, it is clear that considerations of exposure to LDC debt could potentially have quite a large effect on the relative values of bank stocks.

It has long been acknowledged that the events of August 1982, in which the Mexican payments crisis focused attention on this problem, helped to stimulate a discount of the value of developing country obligations in international capital markets. Figure 1, showing the spread in yield to maturity of a Mexican bond over that of a relatively safe World Bank bond, shows that this discounting was quite substantial, and that the timing of the effect corresponds closely to the events of August 1982. Bank stock analysts have paid close attention to the level of exposure to developing country debt in analyses of bank stocks in U.S. securities markets. For example, the Value Line Investment Survey stated, "Stocks of major international banks such as Citicorp have lately been under pressure because of adverse news reports about Brazil."<sup>2</sup>

However, in spite of this recognition of the importance of foreign debt in this context, no attempt has been made to quantify its effects on the

FIGURE 1

SPREAD BETWEEN YIELD ON MEXICAN AND WORLD BANK BONDS



Nacional Financiera SA, Mexican State Financing Agency,  
DM 150 million 11 percent bonds issued March 1982, due 1990.  
World Bank DM 200 million 8 1/2 percent bonds issued April 1982,  
due 1992.

out a high percentage of earnings as dividends rather than retaining them for reinvestment. In theory, this should not make any difference to the investor since retained earnings should be capitalized in the price of the stock. In fact, a good case could be made for preferring low payout ratios if the bank's rate of return on reinvested profits is higher than the investor's next best alternative. Nevertheless, this variable has been included both because payout may affect investor perceptions regardless of its actual importance and also to facilitate comparison of the results presented here with those of Kamath;

6. Beta (BETA) - Beta values obtained from the Value Line Investment Survey. This variable was included as a proxy for systematic risk;

7. Exposure Variable (EX/BV) - This variable was constructed as the sum of outstanding exposure to Argentina, Brazil, Chile, Mexico and Venezuela divided by total book value.

The above formulation utilizes a very specific class of assets (claims on the LDCs) as an explanatory variable. We also felt that an additional set of regressions using more aggregate capital asset ratios, as a measure of bank capital adequacy would be of some interest. Of the various capital adequacy variables tested, only one proved significant, total assets divided by the total book value of common equity plus the value of preferred equity (KADQ2).

#### Regression Results

The first of the regressions discussed above, in which the developing country exposure variable is used along with a vector of additional variables to explain variation in the market/book value ratio, was performed for each of

September 1982 through June 1983, with the addition of EX/BV. In these regressions for following variables were chosen to explain variations in the market/book value ratio:

1. Rate of Return on Book Value (RORBV) - This variable measures the profitability of the bank and would be expected to have a positive relationship with the market/book value ratio;

2. Earnings Stability (ERST) - This variable was constructed in a two-step process. First net current operating earnings for each bank were regressed on a time trend. Next, the variance of the regression was divided by the mean value of earnings over the period to provide a measure of the stability of bank earnings. It is expected that this variable should have a negative relation with the dependent variable;

3. Growth Rate of Book Value (BVGRS) - This variable is used as a proxy for expected future growth. Insofar as recent experience provides an accurate measure of such expectations, this variable would be expected to enter with a positive sign. Average annual growth rates over the thirty months preceding each observation were used;

4. Common Stock Trading Value (TRDVOL) - This variable was used as a proxy for the marketability of the stock. It is assumed that a larger trading volume would increase the liquidity and hence the desirability of a given stock. Thus, this variable is expected to enter with a positive sign;

5. Payout Ratio (POUT) - Many observers have maintained that investors have a preference for current income. That is, they prefer banks to pay

Table 2

## Determination of Market Value/Book Value

	1982:III	1982:IV	1983:I	1983:II
Constant	-.428 (.95)	-.534 (1.30)	-.755 (1.38)	-.934 (2.35) <sup>a</sup>
RORBV	.149 (7.03) <sup>c</sup>	.136 (5.75) <sup>c</sup>	.180 (6.69) <sup>c</sup>	.150 (6.39) <sup>c</sup>
ERST	-.001 (.34)	-.002 (.60)	-.727 E-4 (.03)	-.791 E-4 (.34)
BVGRS	.544 (1.71)	1.000 (2.93) <sup>b</sup>	.886 (2.51) <sup>a</sup>	1.057 (4.33) <sup>c</sup>
TRDVOL	.338 E-5 (.56)	.112 E-4 (1.82)	.614 E-5 (1.11)	.392 E-5 (.75)
POUT	.002 (.00)	-.231 (.30)	1.070 (.93)	.673 (.79)
BETA	-.018 (.08)	-.354 (1.46)	-.069 (.24)	.226 (1.02)
EX/BV	-.090 (2.56) <sup>a</sup>	-.079 (2.04) <sup>a</sup>	-.059 (1.43)	-.16 (4.39) <sup>c</sup>
R <sup>2</sup>	.65	.63	.64	.71
$\bar{R}^2$	.61	.59	.59	.68

<sup>a</sup>Significant at p = .05.

<sup>b</sup>Significant at p = .01.

<sup>c</sup>Significant at p = .001.

the four quarters from September 1982 through June 1983. The results are presented in Table 2. As can be seen, all variables enter with the expected signs with the exception of beta and the payout ratio, which switch signs in one period but are not significant. In general, the most important determinants of the market/book value ratio over this period appear to be the rate of return on book value, the volume of common stock trading and exposure to developing country debt. This last variable enters negatively in all four regressions and is significant in all but the third period. The magnitude of the coefficients indicates that developing country debt was discounted significantly during this period.

To test for the possibility that the bulk of the effect of developing country exposure on the market/book value ratio might be felt after the issue of quarterly reports containing such information rather than contemporaneously, the above regressions were rerun using the closing market/book value ratio for the quarter after that corresponding to the independent variables. In effect, this is an indirect indication of the extent to which such quarterly reports contain new information which is acted on subsequent to publication. As can be seen in Table 3, this formulation results in a comparable  $R^2$  together with considerably greater levels of significance for estimates of the coefficient of LDCEX. It is interesting to note that both the magnitude and the level of significance of this coefficient increase for later periods. This seems to indicate that investor perceptions show a "learning effect" as the full implications of the developing country debt crisis became apparent.

A pooled regression over all four quarters were performed and the results are presented in Table 4. This regression also indicates a substantial discount of the value of developing country obligations over the period. Also

Table 4

Determination of Market Value/Book Value  
(Pooled regressions, explanatory variables lagged one quarter)

	Pooled	Pooled, Dummies for Exposure in Each Quarter
Constant	-.632 (2.54) <sup>a</sup>	-.609 (2.50) <sup>a</sup>
RORBV	.121 (9.16) <sup>c</sup>	.129 (9.88) <sup>c</sup>
ERST	-.002 (.95)	-.002 (1.11)
BVGR	1.046 (5.92) <sup>c</sup>	1.010 (5.86) <sup>c</sup>
TRDVOL	.588 E-5 (1.81)	.643 E-5 (2.02) <sup>a</sup>
POUT	.112 (.23)	.159 (.33)
BETA	-.072 (.52)	-.095 (.70)
EX/BV	-.128 (5.81) <sup>c</sup>	--
EX0 (82:III)	--	-.202 (6.86) <sup>c</sup>
EX1 (82:IV)	--	-.121 (4.05) <sup>c</sup>
EX2 (83:I)	--	-.081 (2.32) <sup>a</sup>
EX3 (83:II)	--	-.078 (2.32) <sup>a</sup>
R <sup>2</sup>	.54	.57
$\bar{R}^2$	.53	.55

<sup>a</sup>Significant at p = .05.

<sup>b</sup>Significant at p = .01.

<sup>c</sup>Significant at p = .001.

Table 3

Determination of Market Value/Book Value  
(Explanatory Variables Lagged One Quarter)

	1982:IV <sup>a</sup>	1983:I	1983:II	1983:III
Constant	-.639 (1.30)	-.174 (.40)	0.530 (1.06)	-1.171 (2.31) <sup>b</sup>
RORBV	.133 <sup>d</sup> (5.75) <sup>d</sup>	.156 <sup>d</sup> (6.28) <sup>d</sup>	.138 <sup>d</sup> (5.57) <sup>d</sup>	.140 <sup>d</sup> (4.68) <sup>d</sup>
ERST	-.003 (.74)	-.003 (.90)	-.001 (.53)	.440 E-3 (.14)
BVGRS	1.029 <sup>c</sup> (2.97) <sup>c</sup>	.637 (1.77)	.758 <sup>b</sup> (2.34) <sup>b</sup>	1.359 <sup>d</sup> (4.37) <sup>d</sup>
TRDVOL	.866 E-5 (1.32)	.138 E-4 (2.12) <sup>b</sup>	.746 E-6 (.15)	-.846 E-6 (.13)
POUT	-.062 (.07)	.226 (.28)	.368 (.35)	1.194 (1.10)
BETA	-.282 (1.09)	-.306 (1.19)	.191 (.74)	.223 (.792)
EX/BV	-.082 <sup>b</sup> (2.15) <sup>b</sup>	-.090 <sup>b</sup> (2.20) <sup>b</sup>	-.125 <sup>c</sup> (3.28) <sup>c</sup>	-.215 <sup>d</sup> (4.63) <sup>d</sup>
R <sup>2</sup>	.64	.62	.63	.65
$\bar{R}^2$	.59	.57	.58	.60

<sup>a</sup>Quarter refers to date of dependent variable.

<sup>b</sup>Significant at p = .05.

<sup>c</sup>Significant at p = .01.

<sup>d</sup>Significant at p = .001.

presented in Table 4 are the results of a pooled regression in which dummies were used to allow unrestricted estimation of coefficients for the debt exposure variable for each of the four quarters. An F-test of the stability of this coefficient is rejected at the 5% level. An F-test of the equality of the coefficients for exposure to individual countries could not reject the hypothesis that the coefficients for exposure to each country were equal.

As discussed above, several additional capital adequacy variables were formulated and tested along with EX/BV and the same vector of additional explanatory variables. As shown in Table 5, only KADQ2, a very aggregated ratio consisting of total assets divided by total equity capital, is significant. It is interesting to note that the aggregate capital adequacy is significant only in 83:I while the coefficient for EX/BV increases both in magnitude and significance over the four quarters. The size of the coefficient and its trend over time are comparable to the results obtained above where the aggregate asset/capital ratio was omitted. The trends in the coefficients over the four quarters suggest that while overall capital adequacy concerns may have been important in late 1982, investor perceptions became more focused on the overseas portions of bank portfolios in 1983.

The estimated coefficient for the exposure variable, EX/BV, is of particular interest and its interpretation merits some additional discussion. In general, we would like to infer the market discount on LDC debt from the size of this coefficient. A rigorous derivation of this value requires an asset pricing model with a more precisely defined theoretical basis than that presented here. Nevertheless, the regression results presented allow us to make inferences which shed some light on our question.

Table 5

## Determination of Market Value/Book Value

(Using aggregate asset/capital ratio KADQ2, and explanatory variables lagged one quarter)

	1982:IV	1983:I	1983:II	1983:III
Constant	-.400 (.78)	.166 (.26)	-.459 (.86)	-1.07 (1.92)
RORBV	.129 (5.57) <sup>c</sup>	.157 (6.50) <sup>c</sup>	.139 (5.54) <sup>c</sup>	.140 (4.65) <sup>c</sup>
ERST	-.004 (1.04)	-.003 (1.10)	-.001 (.50)	-.001 (1.68)
BVGRS	.986 (2.86) <sup>b</sup>	.626 (1.80)	.739 (2.24) <sup>a</sup>	1.327 (4.13) <sup>c</sup>
TRDVOL	.128 E-4 (1.81)	.196 E-4 (2.86) <sup>b</sup>	.139 E-5 (.26)	.474 E-7 (.01)
POUT	-.129 (.14)	.173 (.22)	.352 (.33)	1.209 (1.10)
BETA	-.261 (1.01)	-.261 (1.05)	.198 (.76)	.240 (.84)
KADQ2	-.012 (1.44)	-.019 (2.15) <sup>a</sup>	-.004 (.40)	-.005 (.44)
EX/BV	-.043 (.91)	-.035 (.75)	-.116 (2.64) <sup>b</sup>	-.203 (3.77) <sup>c</sup>
R <sup>2</sup>	.65	.65	.63	.65
$\bar{R}^2$	.60	.59	.58	.60

<sup>a</sup>Significant at p = .05.<sup>b</sup>Significant at p = .01.<sup>c</sup>Significant at p = .001.

survive a major default. The fact that bank managers can expect to be penalized in the marketplace to an extent related to their decisions to participate in developing country debt demonstrates that there is a built-in disincentive to pursuing such lending, even in the absence of an explicit default. Admittedly, this effect was either not operative in previous years or proved an insufficient check on asset expansion overseas, to provide a safeguard from the current crisis. Nevertheless, evidence that the market does provide rewards for good performance and disincentives to poor performance may render redundant some of the recent regulations designed to prevent a recurrence of these problems.

Further research will focus on two areas. First, an event study of the effect of the Mexican announcement of August 1982 on bank stock prices should prove an interesting complement to the results presented here in that they would give an indication of the "impact effect" of these announcements. To the extent that the onset of the crisis was unanticipated, a portfolio of bank stocks relative to that of the market portfolio should give added information as to the effect on the net worth of banks.<sup>6</sup>

Secondly, we will seek to use independent measures of market perceptions and valuations of different classes of assets and liabilities to better analyze the effects of differing portfolio composition on the market value of bank capital. Risk premia on sovereign developing country bonds traded in Euromarkets provide an independent measure of such perceptions in the case of developing country obligations. Goodman and Sharpe (1978) provide examples of the use of other market indices in conjunction with various asset and liability classes, although performed at a much more aggregate level. Extension of this type of analysis to the problems discussed here should prove fruitful, in

Let  $P$  be the market value of a \$1 claim on the LDC's. Assume that on the margin a \$1 increase in the bank's liabilities (to depositors or CD holders) reduces, cet. par., the market value of the bank by \$1. Then, a purchase of \$1 of claims on the LDC's financed by a \$1 increase in bank liabilities will lower market value by  $\$(P-1)$  while leaving book values unchanged. But the coefficient on EX/BV,  $\alpha$ , is in principle the measure of the change in market value from such a purchase. Thus,  $\alpha = P-1$ , or  $P = 1 + \alpha$ . Using the data from Table 3, for example, our point estimates for the price of a \$1 of LDC debt is:

Date	82:IV	83:I	83:II	83:III
Estimated				
Price:	\$ .92	\$ .91	\$ .88	\$ .82

The magnitude of these estimates is comparable to anecdotal evidence cited earlier that silent subparticipations in syndicated loans to Latin American borrowers have sold in this period at a discount of between thirteen and twenty-five percent. Of course, this calculation is very crude. As we stated earlier, sounder measures of  $P$  will have to await a better pricing model than we have offered.

### Conclusions and Further Research

Our results indicate that exposure to developing country debt has exerted a measurable and significant effect on the ratio of market to book value for large commercial banks. The implications of this for bank management and regulation are of particular interest in light of continuing doubt about the ability of developing countries to service debt and the ability of banks to survive a major default. The fact that bank managers can expect to be penal-

NOTES

1. "A Review of Bank Performance: 1983 Edition," Solomon Bros. Inc. Bank Securities Dept.
2. Value Line Investment Survey, Sept. 23, 1983, p. 2001.
3. Grant, Charles (1983), "The Liquifaction of the Euromarkets," Euromoney, Oct.
4. It is below market in the precise sense that new creditors are not available at the re-scheduled rates, and "fair-share" rules are required even to maintain the loans from existing creditors.
5. For a survey of event study methodologies see: Brown, S. and J. Warner (1980), "Measuring Security Price Performance," Journal of Financial Economics (8).

that an emphasis on proxying actual changes in market values in lieu of accounting ratios should provide a much more accurate determination of the value of bank capital.

Appendix 1

Banks Included in Sample

Ameritrust Corp.	Harris Bankcorp Inc.
Amsouth Bancorporation	Interfirst Corp.
Banc One Corp.	Irving Bank Corp.
Bancal Tri-State Corp.	Key Banks Inc.
Bank of Boston Corp.	Manufacturers Hanover Corp.
Bank of New England Corp.	Manufacturers National Corp.
Bank of New York Co., Inc.	Marine Midland Banks
Bank of Virginia Co.	Mellon National Corp.
Bankamerica Corp.	Mercantile Texas Corp.
Bankers Trust New York Corp.	Morgan (J.P.) & Co.
Barnett Banks of Florida	National City Corp.
Centerre Bancorporation	NBC Bancorp Inc.
Chase Manhattan Corp.	NCNB Corp.
Chemical New York Corp.	Norstar Bancorp Inc.
Citicorp	Northern Trust Corp.
Citizens & Southern Ga. Corp.	Norwest Corp.
Comerica Inc.	PRN Financial Corp.
Continental Illinois Corp.	Republic New York Corp.
Crocker National Corp.	Republicbank Corp.
Fidelity Union Bancorp	Security Pacific Corp.
First Atlanta Corp.	Shawmut Corp.
First Bank System Inc.	Southeast Banking Corp.
First Chicago Corp.	Southwest Bancshares
First City Bancorp (Texas)	Sun Banks Inc.
First Interstate Bancorp	Texas American Bancshares
First National State Bancorp	Texas Commerce Bancshares
First Union Corp. (N.C.)	United Jersey Banks
First Virginia Banks Inc.	United Virginia Bankshares
First Wisconsin Corp.	Valley National Corp. Arizona
Fleet Financial Group Inc.	Wachovia Corp.
General Bancshares	Wells Fargo & Co.

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