THE RELATIONSHIP BETWEEN BANK EQUITY RETURNS AND THE BRAZILIAN INTEREST PAYMENTS MORATORIUM

Iqbal Mansur, Finance, Widener University
Steven J. Cochran, Finance, Villanova University
Dave T. Cahill, Financial Consultant, Pittsburgh

ABSTRACT

The purpose of this study is to examine the effects of the Brazilian announcement to suspend interest payments on the equity return levels of several large U.S. commercial banks. Using event study methodology, the evidence suggests that the equity prices of the sample banks fully and immediately reflected the relevant information associated with the Brazilian announcement. Additionally, the patterns of portfolio excess returns revealed that the less exposed banks experienced less loss than either the total bank sample or the more exposed group.

INTRODUCTION

On February 20, 1987, Brazil announced that is was indefinitely suspending interest payments on approximately 67 billion dollars of foreign debt. Brazil, like its predecessor Mexico, hoped to obtain a restructuring of its debt and possibly new financing as well. The objective of this study is to examine the effects of the Brazilian announcement to suspend interest payments on the equity return levels of several large U.S. commercial banks. A primary concern is to test the speed with which the market reacts to an unanticipated news event. If the market prices securities efficiently, the response to an unanticipated event should be immediate, and should not offer investors the opportunity to earn excess profits. On the other hand, if the market is not efficient, it may be possible to observe a significant pattern of abnormal returns during the periods surrounding the event.

The possible investor responses to Brazil's open-ended interest suspension announcement can be expressed in two alternative hypotheses. The information effect hypothesis holds that new information about the deteriorating quality of Brazilian loans (as provided by the Brazilian open-ended moratorium announcement) will be fully and immediately reflected in the security prices of the affected banks. Thus, investors cannot earn excess profits on the basis of this published information. The alternative hypothesis, the absorption-learning lag hypothesis, states that the Brazilian moratorium announcement was either only partially anticipated or that the market reacted with a lag following the disclosure of the event. In either case, a significant market response to the announcement would not be expected to occur.

A second major concern of this study is to determine whether the market is able to distinguish between banks based upon the degree of loan exposure. The discriminating-exposure hypothesis contends that in an efficient market the size of the market response will be related to the level of bank exposure. The alternative hypothesis, the non-discriminating exposure hypothesis, holds that although the market does react to economic news events, it is unable to distinguish between banks with known varying degrees of loan exposure. In effect, the lesser exposed banks, as well as the heavier exposed

banks, are penalized by the market.

This study is similar in scope and methodology to that performed by Bruner and Simms (1987) (hereafter BS), which investigated the effects of the 1982 Mexican principal payments moratorium on the equity return levels of several large U.S. commercial banks. In that study, daily common stock returns for a sample of 48 large banks were examined for a period of 100 trading days prior to the August 19 moratorium announcement and for 57 days after the event. The authors found that the average excess returns for the sample banks were negative on the announcement day and continued to decline for the next four days. However, only the excess returns on the event day were statistically significant. These results are consistent with the information-effect hypothesis, since the new information contained in the Mexican moratorium announcement was immediately reflected in the security prices of the affected banks.

Dividing the sample into high exposure and low exposure groups, BS found that the highly exposed banks sustained their losses on the event day (ED), whereas the less exposed banks had significant losses on days ED and ED+1. The cumulative excess returns for the two subgroups revealed that the less exposed banks suffered significant negative returns for five days after the event, while the more exposed banks experienced negative returns from day ED+4 through day ED+7. Although it appears that the less exposed banks were penalized to a greater extent than were the more exposed banks, a result which conflicts with the discriminating-exposure hypothesis, the authors state that investors seemed to be rationally re-pricing bank stocks by day ED+5 The overall conclusion reached by BS was that, in the absence of reliable information on loan exposure, investors appeared to respond rationally and quickly to the Mexican announcement.

Smirlock and Kaufold (1985) (hereafter SK) investigated the Mexican debt crisis in order to determine whether the market pricing of exposed bank equities was consistent with actual exposure levels, even though this information was not publicly available at the time of the crisis.[1] The authors examined daily equity returns for a sample of 23 banks for a period of 60 trading days on both sides of the announcement day. SK found that the market was able to effectively discriminate among banks with varying levels of exposure.

In a study dealing with the international debt crisis, Cornell and Shapiro (1986) (hereafter CS) studied the relationships between bank stock prices and Latin American loan exposure levels in order to determine if the market response in 1982 differed from the response in 1983. The authors examined the bi-annual, annual, and monthly returns of 43 banks over the two-year period. Without using specific event dates, CS found that the degree of Latin American loan exposure was a statistically significant determinant of the 1982 and the 1982-83 annual and bi-annual returns but not, in general, of the monthly returns. The authors accounted for this result by postulating a "dribs and drabs" hypothesis which states that the predominantly negative loan information was released gradually over the 24 month period.[2] The main conclusion of the study was that despite the absence of specific publicly available information, the market was able to differentiate among banks possessing varying degrees of Latin American loan exposure.

DATA AND METHODOLOGY

The sample consists of nine major U.S. commercial banks meeting the following selection criteria: 1) a reported level of Latin American loan exposure; 2) common equity traded on the New York Stock Exchange; and 3) available daily returns for 60 trading days prior to the event day of February 20, 1987 and for 30 trading days thereafter. Daily common stock returns are calculated from equity prices obtained from the *Wall Street Journal* with adjustments made for stock splits. In the empirical estimation, the standard event study methodology is used.[3]

The excess returns for each security are generated using the market model proposed by Fama (1976):

$$e(it) = R(it) - (\alpha + \beta R(mt)) \qquad (1)$$

where

e(it) = the excess returns on security i for day t;
R(it) = the return on security i for day t; and
R(mt) = the return on the S&P 500 composite

index for day t.

The parameters of equation (1) are estimated over the period ED-60 to ED-31 using Ordinary Least Squares.[4] The 30 trading days immediately preceding the event, ED-1 to ED-30, are excluded from the estimation period in order to reduce the possibility of introducing noise into the model. The parameter estimates obtained from equation (1) are used to generate the excess returns over the event period ED-30 to ED+30.

Daily excess returns are aggregated into portfolio excess returns, AR(t), where

$$AR(t) = 1/N \sum_{i=1}^{N} e(it) \quad (2)$$

and N is the number of banks in the sample. The portfolio excess returns are then cumulated over time in order to determine cumulative excess returns, CARs, for days T(1) to T(2):

$$CAR(T1,T2) = \sum_{t=T(1)}^{T(2)} AR(t) \quad (3)$$

In efficient markets, the portfolio and cumulative excess returns should not be statistically different from zero, except in those instances where new information is anticipated by or actually reaches the market. In order to determine whether the portfolio excess returns are significantly different from zero, the following t-test is used:

$$TAR(t) = AR(t)/\sigma \quad (4)$$

where σ is the standard deviation of the average residuals and is calculated over days ED-60 to ED-31.[5] If the portfolio excess returns are normally, independently, and identically distributed, then TAR(t) will conform to a Student's t distribution with 29 degrees of freedom. This procedure is consistent with that of Brown and Warner (1980) and takes into account the cross-sectional dependence in performance measures.

The significance of the cumulative excess returns is tested with the following statistic:[6]

$$CAR = CAR(T1,T2)/\sigma(T1,T2) \quad (5)$$

The estimate of the standard deviation of the cumulative excess returns is calculated as:

$$\sigma(T1,T2) = [T.\ Var(AR(t)) + 2(T-1)\ Cov(AR(t), AR(t-1))](\tfrac{1}{2}) \quad (6)$$

where T = (T(2) - T(1) + 1) is the number of days in the test interval.

In order to ascertain whether the market is able to effectively distinguish among banks based on their levels of Brazilian loans, individual bank returns are regressed against their loan exposure ratios. Following BS, the regression model is specified as follows:

$$CR(iL) = a(i) + b(i)(EXP(i)) + e(i) \quad (7)$$

where

CR(iL) = the cumulative excess returns for bank i from the event day to day ED+10, the last day of the accumulation period; and

EXP(i) = the degree of loan exposure for bank i, measured as the ratio of Brazilian loans to stockholder equity, as disclosed in the sample banks' 1986 annual reports.

The significance of the slope coefficient is of primary importance in this analysis. Under the discriminating-exposure hypothesis, the coefficient should be statistically significant on those days in which new Brazilian loan information reaches the market.

EMPIRICAL RESULTS

The daily portfolio excess returns realized by stockholders in their holdings of the equities of the nine sample banks are presented in Table 1. On both the announcement day (ED) and the following day (ED+1) negative abnormal returns were present and equal to -1.3366 percent (t=-1.45) and -3.7426 percent (t=-4.05), respectively. The abnormal returns for days ED+2 through ED+9, with the exception of days ED+3 and ED+4, were positive. However, none of the abnormal returns for this eight-day period were found to be statistically significant. These results are consistent with the information-effect hypothesis, which holds that equity prices of relevant banks should immediately and fully reflect any new and pertinent information concerning the risk levels of Brazilian loans.

TABLE 1

DAILY PORTFOLIO EXCESS RETURNS

RETURNS PERIOD	ALL BANKS	HIGH EXPOSURE GROUP	LOW EXPOSURE GROUP	RETURNS PERIOD	ALL BANKS	HIGH EXPOSURE GROUP	LOW EXPOSURE GROUP
ED -30	1.2778	1.2919	1.2692	ED 0	-1.3366	-1.7870	-0.7736
ED -29	0.8114	-0.0953	1.9447	ED + 1	-3.7426**	-4.7353**	-2.5017*
ED -28	0.1162	0.3790	-0.2127	ED + 2	0.0600	0.7127	-0.7560
ED -27	-0.2810	-0.3576	-0.1852	ED + 3	-1.0230	-1.2294	-0.7650
ED -26	-0.0818	-0.3424	0.2364	ED + 4	-1.0500	-1.2369	-0.8163
ED -25	-0.1467	0.0644	-0.4106	ED + 5	0.9448	1.3903	0.3880
ED -24	0.2671	1.0465	-0.7072	ED + 6	0.5713	0.0647	1.2046
ED -23	0.4543	0.3535	0.5802	ED + 7	0.1362	0.6499	-0.5058
ED -22	0.6904	0.6111	0.7895	ED + 8	0.0638	0.3422	-0.2842
ED -21	-0.2849	-0.0338	-0.5987	ED + 9	0.2077	0.3000	0.0923
ED -20	1.3258	1.5639	1.0281	ED +10	-0.0140	0.0826	-0.1348
ED -19	-0.1853	-0.2672	-0.0829	ED +11	-0.8714	-0.7958	-0.9658
ED -18	-1.4688	-1.9471	-0.8709	ED +12	0.5281	0.7482	0.2529
ED -17	0.4556	0.0868	0.9166	ED +13	-0.7672	-0.8616	-0.6493
ED -16	-0.2845	-0.6998	0.2346	ED +14	-0.0566	0.1862	-0.3601
ED -15	-0.0952	-0.4053	0.2925	ED +15	-0.0743	0.0722	-0.2576
ED -14	0.5079	0.0933	-0.0024	ED +16	-1.1946	-1.3762	-0.9658
ED -13	-0.3470	-0.1581	-0.5832	ED +17	0.3004	0.6640	-0.1542
ED -12	-0.8721	-0.6889	-1.1011	ED +18	-0.6002	-0.4525	-0.7850
ED -11	0.3684	0.6638	-0.0007	ED +19	-0.2696	-0.2779	-0.2593
ED -10	1.2703	1.6830	0.7544	ED +20	0.5737	0.7173	0.3942
ED - 9	0.0813	-0.1350	0.3518	ED +21	0.5271	0.5086	0.5502
ED - 8	-0.5798	-0.7254	-0.3977	ED +22	-0.2202	-0.1547	-0.3020
ED - 7	-2.0735*	-2.8621*	-1.0878	ED +23	-0.0721	0.6174	-0.9341
ED - 6	0.5533	0.6364	0.4495	ED +24	-0.3146	-0.5604	-0.0073
ED - 5	-1.0589	-0.8811	-1.2812	ED +25	-0.8622	-0.4938	-1.3228
ED - 4	1.2145	1.0436	1.4282	ED +26	-2.0217	-2.0100	-2.0364
ED - 3	1.0460	0.4592	1.7798	ED +27	-0.6853	0.1462	-1.7247
ED - 2	1.4001	1.8881	0.7900	ED +28	0.6201	-0.2045	1.6508
ED - 1	1.4319	1.2226	1.6936	ED +29	1.3948	1.6141	1.1207
				ED +30	-0.1393	-0.3833	0.1658

* Significant at the 5 percent level
** SIgnificant at the 1 percent level

To further investigate the validity of the information-effect hypothesis, the sample was divided into two groups based on the magnitude of the market exposure ratio.[7] From the analysis, it was determined that the daily average excess returns for both groups revealed patterns similar to those given above. For more exposed group, abnormal negative returns of -1.787 percent (t=-1.84) and -4.735 percent (t=-4.88) were present on the event day and on day ED+1, respectively. On days ED+2 through ED+10, the abnormal returns were positive except for days ED+3 and ED+4. As was the case with the total sample, none of the abnormal returns for this nine-day period were statistically significant.

The relatively less exposed banks experienced negative abnormal returns for the period of the event day through day ED+4. As with the total sample and the more exposed group, the less exposed group showed a significant loss (-2.502 percent, t=-2.05) on day ED+1. However, the less exposed banks sustained less loss during this period than did either the total sample of banks or the more exposed bank group. These findings are consistent with the information effect hypothesis. In the presence of publicly available exposure information, the market appears to have been able to discriminate among banks according to the level of Brazilian loan exposure.

The cumulative excess returns for the nine-bank sample and the two sub-groups are presented in Table 2. The eleven day CAR (Day 0 to 10) for all banks is -5.1823 percent (t=-1.47), while the eleven day CAR is -5.4462 percent (t=-1.56) for the more exposed group and -4.8526 percent (t=-1.18) for the less exposed group. None of the eleven day cumulative excess returns were found to be statistically significant. The CARs over shorter time periods reveal that the nine bank sample experienced statistically significant negative cumulative excess returns from the event day to day ED+6. The losses for these days were approximately -5.08, -5.02, -6.04, -7.09, -6.15, and -5.58 percent, respectively. The more exposed banks possessed a statistically significant negative cumulative return pattern similar to that of the total sample. These losses, which exceeded those of the total sample, were -6.52, -5.81, -7.04, -8.28, -6.89, and -6.82

TABLE 2

CUMULATIVE EXCESS RETURNS[a]

RETURNS PERIOD	ALL BANKS		HIGH EXPOSURE GROUP		LOW EXPOSURE GROUP	
-30 to -21	2.3195	(3.359)	2.9174	(3.323)	2.6966	(3.916)
-20 to -11	-1.0522	(3.359)	-1.7585	(3.323)	-0.1694	(3.916)
-10 to - 1	3.2853	(3.359)	2.3291	(3.323)	4.4805	(3.916)
0 to + 1**	-5.0791	(1.419)	-6.5223**	(1.436)	-3.2752	(1.618)
0 to + 2*	-5.0192	(1.781)	-5.8096	(1.785)	-4.0312	(2.046)
0 to + 3**	-6.0422	(2.081)	-7.0389*	(2.076)	-4.7962	(2.404)
0 to + 4**	-7.0922	(2.343)	-8.2759*	(2.330)	-5.6152	(2.715)
0 to + 5*	-6.1473	(2.578)	-6.8856*	(2.560)	-5.2245	(2.994)
0 to + 6*	-5.5760	(2.794)	-6.8209*	(2.770)	-4.0199	(3.249)
0 to + 7	-5.4398	(2.994)	-6.1710	(2.966)	-4.5257	(2.486)
0 to + 8	-5.3760	(3.181)	-5.8228	(3.150)	-4.8099	(3.707)
0 to + 9	-5.1683	(3.359)	-5.5288	(3.323)	-4.7177	(3.916)
0 to +10	-5.1823	(3.527)	-5.4462	(3.488)	-4.8524	(4.114)
+11 to +20	-2.4318	(3.359)	-1.3760	(3.323)	-3.7498	(3.916)
+21 to +30	-1.7735	(3.359)	-0.9206	(3.323)	-2.8397	(3.916)

a Standard deviations are given in parentheses

* Significant at the 5 percent level

** Significant at the 1 percent level

TABLE 3

ESTIMATED EXPOSURE COEFFICIENTS

DAILY RETURNS DURING CUMULATIVE PERIOD Day 0 to L	a	t	b	t	R(2)
0	0.005	0.243	-0.041	-0.921	0.1080
0, + 1	-0.011	-0.352	-0.064	-1.400	0.2190
0, + 2	-0.043	-1.270	-0.016	-0.231	0.0080
0, + 3	-0.052	-1.182	-0.018	-0.195	0.0054
0, + 4	-0.055	-1.463	-0.034	-0.435	0.0264
0, + 5	-0.061	-1.646	-0.002	-0.026	0.0001
0, + 6	-0.047	-1.224	-0.019	-0.234	0.0078
0, + 7	-0.061	-1.665	0.015	0.197	0.0055
0, + 8	-0.066	-1.810	0.027	0.351	0.0173
0, + 9	-0.060	-1.850	0.019	0.282	0.0112
0, + 10	-0.065	1.810	0.282	0.380	0.0202

* Significant at the 5 percent level

** Significant at the 1 percent level

percent, respectively. The less exposed bank group also showed negative cumulative excess returns over this six day period, but none were statistically significant. These results are consistent with the discriminating-exposure hypothesis, which states that the magnitude of the market response to the Brazilian announcement is related to the degree of bank exposure risk.

Further evidence concerning the validity of the discriminating-exposure hypothesis has been obtained from the estimation of equation (7). The results, presented in Table 3, reveal a generally declining negative association between the exposure ratio and cumulative excess returns for the six days subsequent to the event day. Although none of the exposure coefficients are significant, the effect of the loan exposure ratio was strongest on day (0, +1), when news of the interest payments moratorium reached the market. Although statistically significant negative coefficients would have provided strong support for the discriminating-exposure hypothesis, these cross-sectional tests appear to provide limited evidence that the market was able to distinguish among banks on the basis of exposure to Brazilian loans.

CONCLUSION

The evidence suggests that the equity prices of the sample banks fully and immediately reflected the relevant information associated with the Brazilian interest payments moratorium announcement. Additionally, the patterns of portfolio excess returns revealed that the less exposed banks experienced less loss than either the total bank sample or the more exposed group. These two results lend credibility to both the information-effect hypothesis and the discriminating-exposure hypothesis.

The cumulative excess returns possessed patterns similar to those of the portfolio excess returns. The more exposed banks had the largest cumulative negative returns and the less exposed banks the smallest. This result indicates that the market reacted efficiently to the information concerning the deteriorating credit quality of Brazilian loans.

Finally, the exposure ratio coefficients exhibited the expected declining negative pattern, although no coefficient was found to be statistically significant. These results are contrary to those of the BS study, which found that the degree of exposure to Mexican loans was initially positively related to bank abnormal returns and that before adjustment took place a temporary investor contagion effect occurred. A possible explanation of this conflict in results is that while the exposure ratios related to Brazilian loans were publicly available during the time frame of this study, Mexican loan exposure was not publicly available for the time period of the BS study.

ENDNOTES

1. Beginning with their 1982 annual reports, banks were required by the Securities and Exchange Commission to disclose foreign loans in one of two ways: 1) if, in the bank's opinion, the borrowing country was experiencing liquidity problems, it must report loans to any country which exceeded one percent of the bank's total outstanding loans and state the proportion received by the borrower; or 2) report all countries to which the bank had loaned more than one percent of total assets. In 1983, the Federal Reserve Board, the Federal Deposit Insurance Corporation, the Comptroller of the Currency, and the Securities and Exchange Commission standardized the exposure reporting guidelines. Banks must report, by maturity composition and category of borrower, all loans to any country which exceed 0.75 percent of bank assets.

2. CS found that Latin American loan exposure was not significant at the 5 percent level in any individual month except for July 1982 and March 1983, but the loan exposure ratio coefficient was negative in 16 of 24 months during 1982 and 1983.

3. The event study methodology was pioneered by Fama, Fisher, Jensen and Roll (1969) and has been used by Ruback (1982), Dann and James (1984), Smirlock and Kaufold(1985), and Bruner and Simms (1987). The methodology and empirical tests used in this study are very similar to those of the Bruner and Simms' study.

4. CS adjusted their parameter estimates for the effects of infrequent trading, but reported that no substantial differences in their findings resulted. BS examined the daily trading volume of banks

in their sample and concluded that no adjustment was deemed necessary. No adjustment was considered to be necessary in this study.

5. Standard deviations were estimated for the entire sample of nine banks, for the five banks comprising the high exposure group, and for the four banks comprising the low exposure group. The standard deviation are 0.00924, 0.00970, and 0.01, respectively.

6. The estimates of the standard deviations take into consideration the autocovariance terms. See Ruback and BS for a discussion.

7. A 50 percent market equity exposure ratio, as of December 31, 1986, was used to separate the banks into high and low exposure groups. The banks forming the high exposure group are (exposure ratios are given in parentheses): Chase Manhattan (74.31 percent), Manufacturers Hanover (62.02 percent), Bank of America (61.65 percent), Citicorp (60.53 percent), and Chemical Bank (New York) (50.85 percent). The banks forming the low exposure group are: Wells Fargo (41.26 percent), First Chicago (38.56 percent), Bankers Trust (34.63 percent), and Security Pacific (24.19 percent).

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grams, need to support those with the greatest potential for success and those that offer the greatest economic impact upon their communities. The above is offered as a mechanism for measuring that impact.

Endnotes

1. For a complete discussion see *The Community Economic Base Study*, by Charles M. Tiebort, Committee for Economic Development, New York, 1962.
2. For a full discussion of this regional cycle and multiplier analysis see *Methods of Regional Analysis*,. by Walter Isard, M.I.T. Press, 1960; especially Chs. 5, 6, and 7.
3. This information is found in "Report 3: Social Indicators for Planning and Evaluation", Table 17, *1980 Census of Population*, Bureau of the Census, Washington, D.C., I982.
4. For a full discussion see David L. Birch, "The Job Generation Process", unpublished manuscript, M.I.T., Cambridge, Ma, 1979.
5. For a discussion of expansion due to increased manufacturing jobs see "What 100 New Jobs Mean to a Community", U.S. Chamber of Commerce, Washington, D. C., 1985.