Do Capital Markets Predict Problems in Large Commercial Banks?

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In the present climate of intense debate over deposit insurance reform, the nature and limits of market discipline become especially important. The widely accepted argument for greater reliance on market discipline is that it will restrain managerial risk-taking and reduce potential losses to the deposit insurance fund.

Opponents of this view favor the traditional reliance on supervision by the bank regulatory agencies as the primary method to maintain the safety and soundness of the banking system and the integrity of the deposit insurance fund. They question the ability of outsiders, in particular uninsured depositors, to evaluate the credit quality of commercial bank portfolios and thus to assess their risk without the more detailed inside information available to bank examiners.

This article attempts to shed some empirical light on this issue by studying the effectiveness of market discipline as it is exercised by bank stockholders. The interesting question to ask is whether the market may have recognized problems in a bank's loan portfolio before the regulators became aware of them. If that is in fact the case, then monitoring returns to bank shareholders can help bank regulators identify a problem bank earlier and target bank examinations where they are most needed.

Bank Examinations

Traditionally, bank supervisors have relied extensively on on-site bank examinations to identify problems in individual commercial banks and to ensure their compliance with existing laws and regulations. During on-site examinations, examiners assess five dimensions of a bank's operations, rating them on a 1 to 5 scale, with 1 being the best rating. These five dimensions are the bank's Capital, Assets, Management, Earnings, and Liquidity. A composite rating, which combines the

above dimensions and is known by their acronym CAMEL, is also assigned. As a rule of thumb, banks with a CAMEL rating of 4 or 5 are considered to be problem banks.

In recent years, the deteriorating credit quality of bank loans in many regions of the country has placed an increasing strain on the limited resources available to bank regulators. An FDIC study of the Texas banking crisis (O'Keefe 1990) placed part of the blame for the severity of the crisis on the infrequency of bank examinations in the preceding years. The study found that the frequency of examinations for failed banks in the Southwest had been lowest in the nation for most of the previous decade. The study also found that the frequency of bank examinations declined significantly in 1984 and 1985 for the nation as a whole and for Texas in particular. This decline in supervision was due to a reduction in examination staff, caused by a hiring freeze precisely at the time when more supervisory resources were necessary.

Given that bank regulators have limited manpower to respond to bank problems, it is especially important that their resources be deployed in an optimal manner. It would be useful if deteriorating banks could be identified prior to scheduled examinations, so that bank examiners could concentrate their efforts on those banks most in need of supervision.

The Stock Market as an Early Warning Device

One method of identifying problem banks early that has been suggested in the academic literature is monitoring stock market returns of publicly traded bank holding companies. If, prior to a bank's classification as a problem bank, returns to its shareholders fall significantly below levels implied by previous results, it may be possible to use changes in the bank's stock price as an early warning signal for changes in its condition. Such a fall in stock returns would also imply that market discipline can, indeed, be effective in augmenting and even supplanting traditional periodic bank examinations.

Pettway (1980), Pettway and Sinkey (1980), and Shick and Sherman (1980) test whether bank shareholder returns are below estimated levels prior to the examination in which the bank's CAMEL rating is downgraded to problem level. These articles find some evidence suggesting that unexpectedly low stock market returns may precede a bank's inclusion on the problem bank list and thus have the potential to be used as early warning signals.

This article follows the literature in examining stock returns for a sample of problem banks for a time period before their downgrade. This study also looked beyond the pattern of stock returns by investigating what information stockholders may have possessed before the banks were downgraded to problem-bank status. This was done by examining the news items about the banks reported in the financial press before the downgrade and by examining the pattern of insider transactions. The results show that, in the aggregate, shareholder returns fail to anticipate bank downgrades by examiners. In addition, examination of individual problem banks fails to reveal convincing instances of specific information that had been known to investors before the downgrade.

This study shows that, in the aggregate, shareholder returns fail to anticipate bank downgrades by examiners.

Sample and Methodology

Selected for the analysis was a sample of publicly traded bank holding companies in which the lead bank was a national bank that had its composite CAMEL rating downgraded to either 4 or 5 between 1981 and 1987. Twenty-two bank holding companies fitted this criterion. For each of these holding companies, weekly market returns were calculated for two years preceding downgrading.

In order to test whether the stock market anticipated the bank's downgrade to problem-bank status, the study employed the residual analysis technique first popularized by Fama, Fisher, Jensen, and Roll (1969) and now standard in event studies. The market-model residuals for each of the 22 bank holding companies were calculated using weekly market returns:

$$(1) \qquad e_{jt} = R_{jt} - (a_j + b_j(R_{mt}))$$

where R_{jt} is the return to holders of security j at time

t, a_j and b_j are parameters of the one-factor market model, R_{mt} is the return on the market portfolio at time t (defined as the Standard & Poor's 500 stock average), and e_{jt} is the residual. Parameter estimates were generated using data from weeks −103 to −52 prior to the examination in which the bank was downgraded to problem status, and residuals were computed by comparing actual to forecast returns in weeks −51 to 0 prior to the downgrade.

The residuals were then cumulated through time to form cumulative residuals, CR_{jt},

$$(2) \qquad CR_{jt} = \sum_{t=-51}^{0} e_{jt}.$$

The cumulative residuals were then averaged over the sample of 22 banks to arrive at cumulative average residuals, CAR_t,

$$(3) \qquad CAR_t = \sum_{j=1}^{22} CR_{jt}/22.$$

Each cumulative residual, as well as the cumulative average residual, was then tested to determine whether the return for that week was of unusual size. The t-test used is described in the Appendix, which also points out some methodological differences between our approach and the previous literature.

If the model adequately captures the determination of returns to the holders of a bank holding company's common stock[1] and if capital markets anticipate a downgrading of a bank's CAMEL rating, then cumulative residuals for these problem banks should become negative and remain negative prior to their examination dates, period 0. They should become negative at the time at which new, unfavorable, information about a bank's future earnings becomes known.

Results

The cumulative average residuals for the group of problem banks, and their respective t-statistics, are presented in Table 1. The table shows that the residuals are consistently negative throughout all but one week of the 52-week forecast period. They are, however, too small to be statistically significant. The analysis of the residuals on a company-by-company basis revealed that in the group of 22 problem banks,

Table 1
Cumulative Average Residuals and T-Statistics

Weeks Prior to Exam	22 Problem Banks	
	Cumulative Average Residuals	t-statistics
51	−.00735	−.18547
50	−.01251	−.22320
49	−.00492	−.07163
48	.00128	.01612
47	−.02684	−.30285
46	−.02787	−.28713
45	−.03384	−.32277
44	−.05264	−.46965
43	−.05733	−.48223
42	−.05451	−.43497
41	−.06055	−.46070
40	−.04877	−.35530
39	−.03747	−.26226
38	−.03761	−.25364
37	−.04655	−.30327
36	−.04096	−.25841
35	−.04732	−.28959
34	−.03925	−.23347
33	−.04152	−.24037
32	−.03668	−.20697
31	−.03936	−.21676
30	−.03212	−.17278
29	−.01526	−.08031
28	−.01340	−.06902
27	−.01965	−.09918
26	−.02852	−.14114
25	−.03173	−.15409
24	−.05288	−.25217
23	−.06013	−.28176
22	−.05378	−.24777
21	−.04837	−.21921
20	−.05479	−.24443
19	−.05564	−.24440
18	−.06268	−.27128
17	−.06000	−.25591
16	−.07406	−.31149
15	−.06235	−.25865
14	−.06185	−.25318
13	−.07050	−.28485
12	−.05699	−.22738
11	−.06810	−.26837
10	−.08850	−.34458
9	−.09579	−.36863
8	−.09138	−.34763
7	−.07809	−.29375
6	−.09328	−.34704
5	−.08409	−.30951
4	−.07653	−.27875
3	−.08006	−.28862
2	−.06485	−.23143
1	−.07412	−.26191
0	−.08789	−.30756

the cumulative residuals were consistently negative in only 12 cases. They were generally positive in the other 10 cases, suggesting no systematic capability of detecting problem banks prior to an examination using only security returns.[2]

To determine if the 12 banks where the market appeared to have anticipated the downgrade had any special characteristics, the study looked at their geographic location and the timing of their downgrade, as well as the specific events surrounding their deterioration. The 12 banks that appeared to have been singled out by the market were not concentrated in any particular location or time period.[3]

Further, *The Wall Street Journal* Index was searched for any mention of these 12 banks during the time period when they had significant negative residuals. Presumably, the market needs specific events reported in the media in order to react. The results of this exercise were surprisingly unrevealing. Two banks did not rate any mention in the Index at all. Two other banks had downgrades of commercial paper and subordinated debt, in one case because of a "reduction in flexibility due to an acquisition and troubled energy loans." Five banks reported either a loss or an expected loss for the quarter or year in question, in one case because of bad real-estate loans. Two banks revised earnings downward to include a charge-off, but were still profitable. Finally, one bank was put on Standard & Poor's Credit Watch, two weeks before its examination.

In view of subsequent problems due to the poor credit quality of energy and real-estate loans and, of course, with the benefit of hindsight, the paucity of reported news of these problems is rather striking. There appeared to be little appreciation of the importance of these factors in the news coverage before the banks were downgraded by examiners.

Little news of lending problems appeared before the banks were downgraded by examiners.

Next, to determine if the managers themselves were aware of the deterioration in their banks' condition before the examination, we studied the pattern of insider transactions in the six months before the downgrade, as reported on the Security and Exchange Commission's "Official Summary of Security Transactions and Holdings." If the managers were aware of the problem, we would expect to find a pattern of insider stock selling during the time of deterioration of the loan portfolio.

In fact, the opposite seemed to be the case. Of the 12 banks with the negative residuals, only three cases showed a clear selling pattern. Even in these three cases, moreover, only one was by an officer, while the other two were by outside directors, who are not true insiders with access to detailed relevant information.

Of the other nine banks, six had a clear pattern of purchases of stock, while three more had a mixed pattern of both buying and selling. It appears that even the managements were not aware of the magnitude of the deterioration of their loan portfolios until the downgrade during the bank examination. In view of this, it is hardly surprising that the stock market was not able to predict bank problems.

Control Sample

Residual analysis was also performed on a control sample of non-problem banks. The sample consisted of 15 bank holding companies that are members of the Keefe-Bruyette Bank Stock Index. These companies, for which stock price and examination data were available, have lead banks that maintained composite CAMEL ratings of 1 and 2 between 1981 and 1987.

For these banks the study followed an estimation procedure similar to the one used for problem banks, with one difference. This group had no "event"; they had not suffered a decline in their CAMEL ratings. Therefore, the reference date selected (period 0) for the control banks was the date at which an examination began, one in which no change was made in the banks' composite CAMEL ratings of 1 or 2. As for the problem bank sample, parameter estimates were generated using data from periods −103 to −52, and residuals were computed by comparing actual to forecast returns in periods −51 to 0. We found that cumulative residuals were negative for about one-half of the individual banks, and were positive for the other half, about the same split as among the problem-bank group.

The cumulative average residuals and their respective t-statistics for the control sample are presented in Table 2. The cumulative average residuals for the control group are positive, but not statistically

Table 2
Cumulative Average Residuals and T-Statistics

Weeks Prior to Exam	Control Group	
	Cumulative Average Residuals	t-statistics
51	.01297	.40828
50	.02357	.52485
49	.02161	.39288
48	.02916	.45913
47	.03269	.46044
46	.04719	.60672
45	.05598	.66633
44	.05164	.57493
43	.06255	.65663
42	.07230	.71997
41	.06972	.66197
40	.07090	.64451
39	.07670	.66990
38	.07682	.64652
37	.09224	.74998
36	.08108	.63832
35	.06595	.50373
34	.05592	.41503
33	.03736	.26991
32	.04654	.32770
31	.04146	.28492
30	.06642	.44594
29	.07505	.49280
28	.08200	.52712
27	.08377	.52760
26	.07224	.44613
25	.06732	.40797
24	.07590	.45170
23	.09125	.53360
22	.07988	.45926
21	.08535	.48274
20	.09553	.53179
19	.09078	.49763
18	.08129	.43901
17	.07121	.37904
16	.06199	.32535
15	.07241	.37486
14	.07922	.40468
13	.06740	.33986
12	.07694	.38309
11	.07769	.38210
10	.08058	.39155
9	.07448	.35768
8	.08615	.40899
7	.09695	.45512
6	.08935	.41485
5	.09456	.43436
4	.08966	.40751
3	.09650	.43413
2	.09727	.43318
1	.09441	.41633
0	.08234	.35959

significant. A consistent trend of positive residuals is somewhat puzzling because these residuals should cluster around zero if the model is representative of the return process.

Conclusion

The results of this study offer no reason to believe that the prices of bank holding company stocks can be monitored to improve the supervision of commercial banks. This is true both for the sample as a whole and for individual banks. In the sample, only 12 out of 22 problem banks had negative cumulative residuals. Moreover, neither the market nor the management of these banks seemed to be aware of the impending problems before the examinations took place. These results cast serious doubt on the supposed advantages investors, and particularly uninsured depositors, would have over bank regulators in restraining risk-taking by banks and in monitoring their management.

Appendix

T-statistics

The t-statistics for the individual cumulative residuals and for the cumulative average residual in each week of the prediction period (weeks −51 to 0) are calculated as:

(1A) $$T_{cr} = CR_{jt}/\sigma_j(e_{jt})\nu\tau$$

and

(2A) $$T_{car} = CAR_t/\sigma(e_{jt})\nu\tau$$

where $\tau = t + 52$, $\sigma_j(e_{jt})$ is the standard deviation of the individual (non-cumulative) residuals for bank j over the estimation period (weeks −103 to −52), and $\sigma(e_{jt})$ is the standard deviation calculated globally over individual residuals of all banks over the estimation period.

The Market Model

The one-factor market model is usually estimated for residual analysis in the form

(3A) $$R_{jt} = a_j + b_jR_{mt} + u_{jt},$$

where R_{jt} is the return to holders of security j at time t, a_j and b_j are parameters of the one-factor market model (the latter representing the security's beta, or systematic risk coefficient), R_{mt} is the return on the market portfolio at time t, and u_{jt} is the error term.

It has been argued in the literature that the market model estimated for individual securities has low predictive power and that its parameter estimates are unstable. The estimates may also be biased by industry effects, in addition

to reflecting the financial conditions of individual firms. These problems may be overcome by estimating the market model for a portfolio of securities in the same industry in the form

$$R_{pt} = a_j + b_j R_{mt} + u_{jt}, \quad (4A)$$

where R_{pt} is the return on the industry portfolio.

Pettway (1980) and Pettway and Sinkey (1980) estimate the market model for a portfolio of banks constituting the Keefe-Bruyette Bank Stock Index. This created another problem, however, in that returns for failed banks are forecast using parameters estimated for non-problem banks making up the Index. This assumes that the systematic risk associated with owning a problem bank stock is the same as with owning a portfolio of non-problem banks. If this assumption is not valid, then significant negative residuals would reflect a systematic market bias against the sample banks, rather than a change in market perceptions anticipating a rating downgrade.

This problem is somewhat less severe if one uses a portfolio of problem banks in the sample in place of the healthy-bank portfolio. This still assumes, however, that the risk associated with a portfolio of problem banks is the same as that of owning a stock of an individual problem bank. If the risk of owning an individual bank is, in fact, greater, this would overstate the ability of the market to anticipate a rating downgrade.

We have made portfolio estimates for our sample of problem banks, as well as individual estimates. The results are essentially the same, and the main conclusions do not change with the estimation method. Table 1A presents the comparison of the cumulative residuals for the 22 problem banks and their t-statistics, both for the individual banks and for the portfolio of problem banks.

Table 1A
Cumulative Residuals and T-Statistics

	Individual Estimation		Portfolio Estimation	
Bank	Residual	t-statistic	Residual	t-statistic
1	.13275	.81472	.18576	1.12400
2	−.40778	−2.13564	.05900	.32210
3	−.07459	−.35588	−.01384	−.08410
4	−.50603	−1.52030	−.15765	−.88430
5	−.10740	−.29630	−.16974	−.83160
6	−.53804	−1.48552	−.23951	−1.26910
7	−.39697	−1.14377	−.26617	−.95360
8	.55838	2.30513	.13587	.74237
9	.10273	.34828	.21180	1.33431
10	−.79960	−1.49212	−.53860	−2.94090
11	.62207	2.34198	.43046	2.29336
12	−.21925	−.71756	−.45996	−2.75560
13	.04934	.15597	−.08600	−.46990
14	−.27526	−.99084	.03078	.16358
15	.13350	.35946	−.11782	−.64080
16	.40647	.80114	.23294	1.26960
17	.17811	.71027	.25905	1.41528
18	−.07478	−.22097	−.13167	−.71940
19	−.33833	−1.29929	−.21583	−1.09580
20	.21493	.47393	.03061	.16060
21	.21785	.71595	−.33628	−1.86630
22	−.81171	−2.00411	−.28258	−1.20250

[1] The power of this model is somewhat weakened in the case of bank holding companies, where the put option value of deposit insurance might mitigate the effect of a downgrade on bank stock prices, because the insurer shares the losses associated with a worsening of a bank's portfolio.

[2] The choice of the forecast period, or "event window," is necessarily arbitrary, since banks could have realized negative returns at different times before their examinations. If the event window is too short, and the banks realized negative returns more than a year before the downgrade, our results would fail to show it.

On the other hand, making the event window longer increases the standard error of the cumulative abnormal returns and dilutes the power of the test. If the one-year event window is too long, and the banks' financial condition deteriorated at a time closer to the examination, then the large standard errors may be responsible for the lack of significance of the results. To check against this possibility, 26-week and 13-week forecast periods have been tried. The results remained essentially unchanged, with only one-half of the problem banks having consistently negative cumulative residuals.

[3] Nine of the 22 problem banks in the sample were located in the Southwest (seven in Texas and two in Oklahoma), reflecting the fact that many problem banks during the period in question were suffering the consequences the oil slump brought to their borrowers. The market did not appear to be capable of anticipating problems at the Southwestern banks any better than in other regions of the country—six of the 12 banks with negative residuals were located in the Southwest. Nor did the market seem to become aware of developing problems at a particular time—five of the 12 banks with negative residuals were downgraded from 1981 through 1983, and seven from 1984 to 1986. Of the 10 banks without negative residuals, five were downgraded before 1984, and five between 1984 and 1986.

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