

An Intracyclical Analysis of the Risk Sensitivity of Bank Stock Returns

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Abstract

Using a two index market model, this paper tests for the responsiveness of bank stock returns to changes in stock market returns and unanticipated interest rate changes over the period January 1978 through June 1984. Based on daily data, the empirical results indicate significant differences in sensitivities to stock market movements and unanticipated interest rate changes (i.e., structural changes) over the business cycle. Previous studies implicitly have assumed that such risk sensitivities are constant over the cycle or that differences over the cycle are not significant. This research shows that the assumption is untenable and that the differences over the cycle are statistically significant.

Introduction

The determinants and measurement of bank risk are important to bank managers, investors, depositors, and regulators. Previous studies have measured the contribution of the different risk factors.¹ But they have not considered whether the contribution differs over the business cycle. The implicit assumption is that bank risk sensitivities are constant over the business cycle or that differences over the cycle, if they exist, are not significant.

The stability question is interesting for at least three reasons. First, empirical tests of the efficient market hypothesis almost without exception have assumed that the stock market coefficient for a given security is stationary over time. Second, bank regulators and others often have asked whether market

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¹See, for example, Lloyd and Shick [13], Lynge and Zumwalt [14], Chance and Lane [4], Flannery and James [5], Booth and Officer [2], and Scott and Peterson [17]. These studies have used the two factor model developed by Stone [18] to examine the return required of a bank by the stock market.

discipline of banks exists. This is a key public policy questions for bank regulation because if market discipline is present, the rationale for bank regulation is less compelling. To investigate this question, banks' decisions, as reflected by their accounting statement data, are related to stock market betas. If these stock market betas are nonstationary, then the difficulties in evaluating the information content of accounting statement data are more complex than is suggested by most of the research in this area (e.g., Pettway [16], Jahankhani and Lynge [10], and Lee and Brewer [12]).

Finally, risk sensitivity coefficients obtained from various versions of the market model have been used to investigate the effects on bank stock returns of changes in economic or financial activity, such as mergers and acquisitions, and to identify the response of banks to particular or general changes in regulation.² Failure to account for nonstationarity in the risk sensitivity measures makes it difficult to determine whether movements in bank stock returns are associated with particular events or cyclical variation.

There may be several reasons for business cycle effects on bank stock returns. For example, an important source of bank stock returns variability over the business cycle is related to earnings variability due to the business risk of a bank represented by the demand and supply shifts for its services and inputs, specifically loans, deposits, and transactions services. Bank stock returns are related to future cash flows from changing levels of bank activities, such as lending. The present value of loan business may change, in part, with expected changes in economic activity. Business expansions increase the quantities of bank loans, securities, and deposits. These factors are thought to have a positive impact on the expected earnings stream and, as a result, bank stock returns. Conversely, business recessions may affect the performance of the existing loan portfolio and decrease the quantities of bank loans, securities, and deposits. This would tend to have a negative implication for bank stock returns.

Alternatively, monetary policy is likely to shift over the business cycle. Homa and Jaffee [9] indicate that changes in stock prices are related to change in money supply. As the Federal Reserve system shifts, for example, from tight to easy monetary policy during the business cycle, this may lead to a shift in the relationship between bank stock returns and the market index.

This paper examines the stability of the relationship between bank stock returns and market and interest rate risks over the January 1978 through June 1984 period. The empirical results indicate significant differences in risk sensitivity estimates for many banks over the sample period, which includes three economic upswings and two downswings. The risk sensitivity estimates

²See, for example, Aharony, Saunders, and Swary [1] and Brickley and James [3].

are stationary over the business cycle for a small number of banks. These results have important implications for bank stock market studies. They suggest that failure to account for the nonstationarity of the estimated coefficients in bank stock market studies can make it difficult to evaluate the financial performance of banks and to identify the response of these firms to changes in particular or general changes in regulation and to nonbank acquisitions.

Empirical Specification, Data, and Methodology

To assess the relationship between bank stock returns and market and interest rate risks, the following equation is estimated:

$$(1) \quad R_{j,t} = \alpha_j + \beta_{Mj} R_{M,t} + \beta_{Ij} R_{I,t} + \varepsilon_{j,t}$$

where:

$R_{j,t}$ = the rate of return on security j in excess of the risk free rate of interest over time interval t ;

$R_{M,t}$ = the rate of return of the market portfolio in excess of the risk free rate of interest over time interval t ;

$R_{I,t}$ = a measure of unanticipated changes in interest rates over time interval t ;

α_j = the regression intercept for security j ;

β_{Mj} = the beta coefficient, measures the relative riskiness of security j in comparison with the market as a whole;

β_{Ij} = measures the effect of unanticipated changes in interest rates on the stock returns of bank j given its relation to the market index; and

$\varepsilon_{j,t}$ = a disturbance term having zero expectation, variance σ_ε^2 over all time t , uncorrelated with $R_{M,t}$, $R_{I,t}$, and $R_{k,t}$ ($k \neq j$), and not autocorrelated.

Banks' stock returns are sensitive to unanticipated changes in interest rates because banks typically engage in interest rate intermediation in which the

interest sensitivity of their assets differs from that of their liabilities.³ Thus, unanticipated changes in interest rates will affect the market value of the two sides of their balance sheet differently and impact both their net worth and stock return. Because different banks are not likely to have the same exposure to interest rate risk, there need not be a unique relationship between unanticipated interest rate changes and the return on the stocks of each and every bank. Moreover, because banks can and do change the direction of their interest rate exposure through time, the relationship may not be unique for a particular bank or group of banks through time. This paper tests for structural changes in stock market and interest rate sensitivities over the business cycle.

Equation (1) was estimated using 1,642 daily time series observations on return data for a sample of 45 banks between January 2, 1978, and June 29, 1984. Daily common stock total returns (including dividends) were obtained for the sample of banks from the Automatic Data Processing, Inc. (ADP) Security Price File.⁴ The bank returns data are technically for bank holding companies (BHCs) because most of the publicly traded stock of banking organizations is that of the BHC.

For each of the bank holding companies included, commercial banking was the major activity of the holding company in terms of assets.⁵ Assets at the commercial banks subsidiaries accounted for over 88 percent of the consolidated BHC assets for each of the 45 firms in the sample. The market index employed in this study was the value-weighted portfolio (NYSE and AMEX) obtained from the Center for Research in Security Prices (CRSP) data base.

A measure of unanticipated changes in interest rates was constructed from yields on U.S. Treasury obligations to ensure that the estimation of the relation between bank stock returns and unanticipated changes in interest rates is free from contamination resulting from changes in default premia. The appropriate interest rate should be for a security whose maturity does not far exceed that of the bulk of bank assets and liabilities. Following Aharony, Saunders, and Swary [1], this research chose to relate bank stock returns to unanticipated

³If the duration gaps are not zero, then any interest rate change will affect both sides of the balance sheet differently. It is assumed that the expected change in interest rates is incorporated in beta.

⁴Automatic Data Processing, Inc. of Ann Arbor, Michigan provides publicly available daily prices and trading volume, dividends and interest payment data, and descriptive data items for stocks, bonds, and options.

⁵Other BHC subsidiaries include savings and loan associations, mortgage banking, consumer and commercial finance, investment advising, various types of leasing concerns, insurance brokerage and underwriting, and data processing firms.

changes in the rate on three year Treasury notes. The unanticipated change in the rate for any day is measured by the difference between the actual three year Treasury note rate and the (estimated) expected rate of the relevant day,

$$(2) \quad ({}_tR_3 - {}_t\hat{R}_3^e),$$

where ${}_tR_3$ is the actual yield in time t on a three-year Treasury note; and ${}_t\hat{R}_3^e$ is the (estimated) expected rate in period t .

To estimate expected rates, an ARIMA model was used based on one year of previous daily interest rate data. The original coefficient estimates are taken from the January 3, 1977, to December 30, 1977 estimation period. These estimates are used to generate the daily expected rates for the period January 2, 1978 through January 6, 1978. Then the estimation sample is updated to include the actual data for January 2, 1978 through January 6, 1978 and exclude the data for January 3, 1977 through January 7, 1977. The model is reestimated, and a forecast of the daily expected rates for the period January 9, 1978 through January 13, 1978 is generated. This updating, dropping, reestimation, and forecast procedure is continued throughout the forecast sample until June 29, 1984, the last date of the sample period.⁶

⁶The following Theil decomposition statistics are used to check the unbiasedness of the interest rate forecasts:

$$UM = \frac{[{}_t\hat{R}_3^e - {}_t\bar{R}_3]^2}{MSE},$$

$$UR = \frac{[STD({}_t\hat{R}_3^e) - \rho(STD({}_tR_3))]^2}{MSE}, \text{ and}$$

$$UD = \frac{(1 - \rho^2) [STD({}_tR_3)]^2}{MSE}$$

where:

MSE = the mean square error;

${}_t\bar{R}_3$ and ${}_t\hat{R}_3^e$ = the sample means of ${}_tR_3$ and ${}_t\hat{R}_3^e$;

The parameters in equation (1) were estimated for each of the 45 banks. To capture the effects of intracyclical behavior, equation (1) is estimated over five time periods: three economic upswings and two economic downswings. To test for overall structural changes, the standard "Chow" F-test is used. Designation of the upswings and downswings utilizes National Bureau of Economic Research (NBER) definitions of peaks and troughs. Using these definitions, the period from January 1978 through January 1980 is designated as upswing I; the period from February 1980 through July 1980 is designated downswing I; the period from August 1980 through July 1981 is designated upswing II; the period from August 1981 through November 1982 is designated downswing II; and the period from December 1982 through June 1984 is designated upswing III.

Empirical Results

The results of estimating equation (1) over the entire sample period for each of the 45 banks are reported in Table 1.⁷ The results indicate that market and

$STD(tR_3)$ and $STD(t\hat{R}_3^e)$ = the sample standard errors of tR_3 and $t\hat{R}_3^e$; and

ρ = the correlation coefficient between tR_3 and $t\hat{R}_3^e$.

U^M is called the bias proportion, U^R the regression proportion, and U^D the disturbance proportion. Granger and Newbold [8] show that unbiased forecasts should have values of U^M and U^R close to zero and, therefore, U^D should be close to 1. The results (in percent) for the forecast of the three year Treasury note rate are $U^M = 0.03$, $U^R = 0.12$, and $U^D = 99.66$. The Granger and Newbold conditions of unbiasedness, therefore, are satisfied. Unbiasedness is a necessary condition for these forecasts to be rational in Muth's sense [15]. A complete test of rationality also would require testing for efficiency.

⁷The simple correlation coefficient between R_M and R_I is -0.18 and is statistically significant from zero. Because these two factors exhibit some degree of multicollinearity, several studies (see Lloyd and Shick [13], Lyngne and Zumwalt [14], Flannery and James [5], Booth and Officer [2]) have used orthogonalizing procedures to remove this multicollinearity. The procedures used were equivalent to using only the residuals from a regression of the return on the second factor against the other explanatory variable or variables. Such orthogonalization procedures are equivalent to a transformation that extracts the common dependence between the variables, assigning such dependence to the explanatory variables in each orthogonalizing regression equation. This procedure will change the OLS estimators and their standard errors on the variables that are orthogonalized, but it does not add any additional explanatory power. For example, if the true equation is

$$R_{j,t} = \alpha_j + \beta_{Mj} R_{M,t} + \beta_{Ij} R_{I,t} + e_{j,t} \text{ but}$$

interest rate risks are statistically significant in explaining bank stock returns.⁸ Although all of the estimated stock market coefficients are significantly different from zero, banks are sensitive to market risk to different degrees. Economic risks will have a differential impact on banks because regulation and market forces have led banks to develop different exposures to risk. When banks are ranked by stock market sensitivity, the average beta coefficient of banks in the top quartile was 0.8929, whereas banks in the bottom quartile have an average beta coefficient of 0.1722. The results indicate that for every 100 basis point change in the return on the market portfolio, returns will change, on average, 89 basis points for banks in the top quartile and 17 basis points for banks in the bottom quartile.

An analysis of the estimated interest rate coefficients indicates that all but nine of the coefficients are significantly different from zero at the 10 percent level. Of the 45 banks for which $\beta_{I,t}$ is estimated, 44 of them have a negative sign for this coefficient (36 of these are statistically significant). Thus, in the case of only one bank does unanticipated interest rate changes produce a positive response, and this coefficient is not significant.

Parameter estimates for each of the five subperiods were obtained for each of the 45 banks. The results are reported in Table 2. A review of the table indicates that the relationship between bank stock returns and stock market and interest rate risks may not necessarily be constant for a particular bank over the business cycle. Chow F-tests were used to determine if the market and interest rate coefficient estimates in Table 2 were significantly different over the business cycle. These tests are reported in Table 3. The tests indicate that 27 of the 45 banks have significant differences in market coefficient estimates over the business cycle, while only 12 banks have significant differences in interest rate sensitivities. Only eight banks, however, exhibit statistically significant

$R_{j,t} = \alpha_j + b_{Mj} R_{M,t} + b_{Ij} R_{I,t}^* + e_{j,t}$ is estimated. Where

$$R_{I,t}^* = R_{I,t} - [\text{Cov}(R_{M,t}, R_{I,t}) / \text{Var}(R_{M,t})] R_{M,t}$$

it can be shown that

$$\hat{\beta}_{Mj} \neq \hat{b}_{Mj} \text{ but } \hat{\beta}_{Ij} = \hat{b}_{Ij}.$$

It also can be shown that the standard errors will change for all but the second factor, $R_{I,t}$ (see Giliberto [7]). Giliberto [7] points out that this orthogonalization technique, if anything, will bias results in favor of finding an interest rate effect. As a result, such a procedure was not used in this paper.

⁸No problems resulting from infrequent or nonsynchronous trading were experienced.

differences in both stock market and interest rate sensitivities over the estimation period.

These results suggest that for many banks the risk sensitivity estimates for various phases of the business cycle are not likely to be representative of risk sensitivity estimates either of other phases of the cycle or of the full cycle.⁹ Bank risk sensitivity coefficients can be expected to change because of shifts in governmental policies in the areas of deposit insurance and forbearance and demand and supply shifts for its services and inputs, specifically loans and deposit services. These supply and demand shifts are due to changes in real economic activity over the business cycle. Banks' equity returns are related to future cash flows from changing levels of bank activities affected by general economic activity such as lending. These profits represent, in effect, future investment opportunities for banks. There is reason to expect that changes in future investment opportunities will be reflected in the percent of the bank's resources committed to various activities (both on and off balance sheet) at a given time. The evidence presented in this paper suggests that researchers and practitioners alike should consider the variation in bank risk sensitivity measures over the business cycle before drawing any conclusions about the correct pricing of bank stocks relative to the market, the interest sensitivity of banks, and the effects on bank stocks of particular events.

Future research, therefore, would do well to develop a model of bank stock return movements that considers the financial characteristics of the bank as well as the economic environment.

Conclusions

This paper has investigated the intracyclical pattern of bank sensitivities to market and unanticipated interest rate changes over the period January 1978

⁹To identify structural change in market and interest rate sensitivities further, two additional tests were conducted. The first compares coefficient estimates for adjacent economic swings of the business cycle. F-statistics are calculated for each bank comparing upswing I with downswing I, downswing I with upswing II, upswing II with downswing II, and downswing II with upswing III. These F-tests are available from the authors on request. The tests indicate that significant differences in stock market and interest rate sensitivities exist between adjacent economic swings of the business cycle for most banks. All but four banks have at least one significant structural change between adjacent economic swings of the business cycle. The second set of tests examines whether the different risk sensitivity measures are equal across all upswings or all downswings. These tests are also available from the authors on request. The results indicate significant differences in market risk sensitivity measures over upswings for 23 of the 45 banks and downswings for 16 of the banks. Only six banks had significant differences in interest rate risk sensitivity measures over downswings, while 15 had significant differences over upswings.

through June 1984. The findings suggest that bank risk sensitivity coefficient estimates for different firms are significantly distinguishable, on average; banks' market risk sensitivity coefficients tend to be more nonstationary than the interest rate risk sensitivity coefficient; and the risk sensitivity coefficients are stationary over the business cycle for a small number of banks. A few banks tend to be subjected only to structural changes in either stock market sensitivity or interest rate sensitivity over the business cycle, while some banks appear to experience fundamental changes in interest rate sensitivity as well as stock market sensitivity over the business cycle. Because the findings of this paper indicate that bank risk sensitivities can vary for some banks over the business cycle, these patterns should be incorporated into commercial banking studies to avoid misleading interpretations and implications. In particular, failure to account for the nonstationarity of the risk sensitivity measures makes it difficult to use market models to evaluate the financial performance of banks and identify the response of these firms to changes in particular events.

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Table 1
Estimates of Bank Risk Sensitivities
Panel A: Entire Period

	Market	Interest Rate	$\bar{R}^2$	F-Statistics
Marine Midland Banks, Inc.	0.8086 (0.0573)***	-42.0270 (17.6692)**	0.1195	112.312
Old Nat'l Bancorporation	0.2973 (0.0497)***	-8.5684 (15.3197)	0.0218	19.319
United Virginia Bancshares, Inc.	0.2114 (0.0231)***	-33.0124 (7.1219)***	0.0698	62.563
Bankers Trust NY Corp.	0.8530 (0.0445)***	-62.2193 (13.7030)***	0.2090	217.851
Lincoln First Banks, Inc.	0.3502 (0.0443)***	-76.7023 (13.6663)***	0.0640	57.059
Bank of NY Co., Inc.	0.5369 (0.0400)***	-45.6018 (12.3345)***	0.1170	109.694
Northern Trust Corp.	0.2124 (0.0235)***	-25.8995 (7.2452)***	0.0618	55.050
Merchant's Nat'l Corp.	0.2032 (0.0390)***	-20.4173 (12.0282)*	0.0194	17.206
Harris Bankcorp, Inc.	0.4056 (0.0462)***	-26.1569 (14.2349)*	0.0506	44.756
Suburban Bancorporation	0.0917 (0.0243)***	-23.8524 (7.4823)***	0.0167	14.944
Union Trust Bancorp	0.0801 (0.0364)**	-25.3012 (11.2087)**	0.0062	6.100
Security Pacific Corp.	0.6508 (0.0388)***	-48.9929 (11.9438)***	0.1690	167.836
Sovran Financial Corp.	0.3238 (0.0352)***	-39.0990 (10.8378)***	0.0639	56.977
Union Planters Corp.	0.1057 (0.0421)**	-20.5649 (12.9636)	0.0052	5.330

Table 1 (continued)
Estimates of Bank Risk Sensitivities
Panel A: Entire Period

	Market	Interest Rate	$\bar{R}^2$	F-Statistics
Northeast Bankcorporation	0.0874 (0.0327)***	-13.4043 (10.0794)	0.0052	5.290
Hartford Nat'l Corp.	0.4599 (0.0418)***	-35.2641 (12.8857)***	0.0799	72.255
CBT Corporation	0.2366 (0.0377)***	-46.5472 (11.6320)***	0.0380	33.418
NBD Bankcorp, Inc.	0.3247 (0.0373)***	-31.8623 (11.4993)***	0.0539	47.788
First Jersey Nat'l Corp.	0.2676 (0.0540)***	-20.4659 (16.6372)	0.0164	14.666
Manufacturers Hanover Corp.	0.7873 (0.0415)***	-71.7647 (12.7980)***	0.2127	222.669
First Empire State Corp.	0.5026 (0.0514)***	-52.5620 (15.8467)***	0.0685	61.350
J.P. Morgan & Co., Inc.	0.7244 (0.0304)***	-48.5731 (9.3774)***	0.2867	330.854
Chemical NY Corp.	0.7130 (0.0421)***	-49.5126 (12.9825)***	0.1692	168.142
Citytrust Bancorp, Inc.	0.1176 (0.0337)***	-0.7287 (10.3896)	0.0065	6.350
Chase Manhattan Corp.	0.9282 (0.0382)***	-51.5664 (11.7691)***	0.2900	336.081
Citicorp	1.2120 (0.0462)***	-57.2210 (14.2458)***	0.3184	384.339
Manufacturers Nat'l Corp.	0.5136 (0.0425)***	-54.3041 (13.0994)***	0.1018	94.034
Fidelcor, Inc.	0.5635 (0.0594)***	-40.8535 (18.3067)**	0.0598	53.213
First Pennsylvania Corp.	0.8618 (0.0888)***	-21.4392 (27.3584)	0.0570	50.560

Table 1 (continued)
Estimates of Bank Risk Sensitivities
Panel A: Entire Period

	Market	Interest Rate	$\bar{R}^2$	F-Statistics
Equimark Corp.	0.3631 (0.0734)***	-59.8221 (22.6183)***	0.0212	18.789
Pittsburg Nat'l Corp.	0.4467 (0.0335)***	-51.7435 (10.3192)***	0.1247	117.905
Maryland Nat'l Corp.	0.3983 (0.0365)***	-31.3004 (11.2406)***	0.0792	71.560
NCNB Corporation	0.6578 (0.0442)***	-52.6984 (13.6095)***	0.1392	133.653
Wachovia Corporation	0.3695 (0.0420)***	-19.3132 (12.9422)	0.0495	43.734
American Fletcher Corp.	0.3290 (0.0371)***	-32.7480 (11.4209)***	0.0563	49.911
Continental Illinois Corp.	0.8392 (0.0579)***	-40.6988 (17.8513)**	0.1245	117.669
First Chicago Corp.	(1.0192) (0.0534)***	-26.9048 (16.4645)*	0.1918	195.761
Indiana Nat'l Corp.	0.3916 (0.0370)***	-33.0851 (11.4124)***	0.0756	68.096
First Oklahoma Bancorp, Inc.	0.2809 (0.0423)***	8.9587 (13.0277)	0.0252	22.230
U.S. Bancorp.	0.5192 (0.0373)***	-33.0348 (11.4896)***	0.1195	112.334
BankAmerica Corp.	0.9809 (0.0427)***	-64.0815 (13.1517)***	0.2718	307.213
Wells Fargo & Company	0.8071 (0.0449)***	-49.5621 (13.8379)***	0.1841	186.186
Crocker Nat'l Corp.	0.5440 (0.0455)***	-30.8500 (14.0281)**	0.0893	81.464
City Nat'l Corp.	0.5251 (0.0607)***	-31.4846 (18.7108)*	0.0487	42.970

Table 1 (continued)
Estimates of Bank Risk Sensitivities
Panel A: Entire Period

	Market	Interest Rate	$\bar{R}^2$	F-Statistics
U.S. Trust Corp.	0.3302 (0.0345)***	-12.2522 (10.6368)	0.0565	50.177

Panel B: Summary Statistics for the Two Factor Market Model

	Arithmetic		Interquartile
	Mean	Median	Range
Market	0.4941	0.4467	0.7206
Interest Rate	-36.7801	-33.0851	-45.6943

$\bar{R}^2$ is the coefficient of determination corrected for degrees of freedom. The number of observations in each equation is 1642. The numbers in parentheses beneath the regression coefficients are the corresponding standard errors of estimate

- * Indicates significance at the 10 percent level
- ** Indicates significance at the 5 percent level
- *** Indicates significance at the 1 percent level

Table 2
Estimates of Bank Risk Sensitivities by Business Cycle

	Upward I Market	Upward I Interest Rate	R ²	Downward I Market	Downward I Interest Rate	R ²	Upward II Market	Upward II Interest Rate	R ²	Downward II Market	Downward II Interest Rate	R ²	Market	Upward III Interest Rate	R ²
Marine Midland Bank, Inc.	0.7511 (0.1213)***	-117.177 (64.1139)*	0.0835	0.7913 (0.2432)***	-22.083 (54.0485)	0.0671	0.8872 (0.1368)***	-17.912 (31.7738)	0.1439	0.9022 (0.1048)***	-60.930 (30.5346)**	0.2169	0.6382 (0.1114)***	-22.567 (57.6444)	0.0776
Old National Bancorporation	0.3594 (0.0663)***	-113.962 (33.9702)**	0.0909	0.3426 (0.0905)***	9.947 (20.1060)	0.0902	0.0275 (0.0275)	10.325 (16.4347)	-0.0061	0.2226 (0.1035)***	-39.842 (30.146)	0.0192	0.4910 (0.1681)***	102.610 (86.991)	0.0168
United Virginia Bancshares, Inc.	0.2755 (0.0387)***	-35.877 (20.4442)*	0.1046	0.4080 (0.0869)***	-44.028 (19.7489)**	0.1700	0.0556 (0.0556)	-20.885 (17.949)*	0.0111	0.1708 (0.0396)***	-35.224 (15.401)***	0.0973	0.1931 (0.0636)***	-76.049 (32.9167)**	0.0396
Bankers Trust New York Corp.	0.7137 (0.0713)***	-99.073 (37.7138)***	0.1918	0.4896 (0.1321)***	-54.334 (29.358)*	0.1531	0.6541 (0.1198)***	-34.013 (27.811)	0.1124	0.9784 (0.0988)***	-78.539 (28.7634)***	0.2773	1.1197 (0.1038)***	-64.052 (53.691)	0.2420
Lincoln First Bank, Inc.	0.4485 (0.0681)***	-116.039 (35.9874)***	0.1112	0.3224 (0.1429)**	-37.769 (31.7666)*	0.0531	0.2210 (0.0990)**	-99.145 (22.9976)***	0.0897	0.4544 (0.0799)***	-64.926 (23.2794)***	0.1320	0.2122 (0.1322)	-36.250 (68.3751)	0.0035
Bank of New York Company, Inc.	0.5405 (0.0828)***	-22.493 (43.7848)	0.0791	0.6798 (0.1261)***	-66.731 (28.0250)**	0.2172	0.3714 (0.0870)***	-43.870 (20.216)**	0.0871	0.5237 (0.0820)***	-42.442 (23.8877)*	0.1352	0.6230 (0.0699)***	-45.024 (46.5072)	0.1161
Northern Trust Corporation	0.2794 (0.0482)***	-43.999 (25.4720)*	0.0738	0.2712 (0.0894)***	-23.656 (19.875)	0.0683	0.2358 (0.0619)***	-25.416 (14.383)*	0.0664	0.2231 (0.0516)***	-30.814 (15.0168)**	0.0775	0.0658 (0.0336)*	10.234 (18.4097)	0.0036
Merchant's National Corporation	0.0617 (0.0609)	-59.186 (32.1992)*	0.0068	0.1145 (0.1304)	-24.486 (28.9916)	-0.0033	0.0098 (0.0749)	-4.389 (17.3907)	-0.0077	0.4155 (0.1065)***	-23.662 (31.0332)	0.0480	0.2670 (0.0793)***	26.900 (41.0444)	0.0228
Harris Bankcorp, Inc.	0.4034 (0.0757)***	-94.642 (40.0379)**	0.0713	0.0938 (0.1420)	-8.477 (31.5684)	-0.0119	0.3035 (0.1016)***	-38.212 (23.5990)	0.0424	0.6457 (0.0987)***	-23.747 (28.7365)	0.1261	0.3294 (0.1207)***	81.570 (62.4348)	0.0147
Suburban Bancorporation	0.1147 (0.0447)***	-66.557 (23.6454)***	0.0314	0.2348 (0.0956)***	-32.736 (20.8027)	0.0556	0.0100 (0.0440)	-5.737 (10.2226)	-0.0064	0.0544 (0.0558)	-26.910 (16.2620)*	0.0088	0.0860 (0.0355)	-28.662 (27.8872)	0.0065
Union Trust Bancorp	-0.0079 (0.0590)	-83.026 (31.1868)***	0.0101	0.1641 (0.1307)	16.857 (28.0454)	-0.0014	-0.1092 (0.0932)	-3.883 (12.6447)	-0.0025	0.1873 (0.0671)***	-58.269 (19.5310)***	0.0592	0.0812 (0.0951)	-22.557 (49.2088)	-0.0021
Security Pacific Corporation	0.8227 (0.0747)***	-146.102 (39.4756)***	0.2354	0.7903 (0.1232)***	-80.012 (27.3761)***	0.2879	0.3214 (0.0866)***	-60.183 (20.1831)***	0.0886	0.5384 (0.0748)***	-29.116 (21.788)	0.1650	0.7803 (0.0943)***	40.724 (48.8039)	0.1443
Sovran Financial Corporation	0.3503 (0.0723)***	-131.880 (38.2197)***	0.0771	0.4542 (0.1092)***	-26.965 (24.278)	0.1213	0.2414 (0.0711)***	3.092 (16.5090)	0.0369	0.1976 (0.0656)***	-77.693 (19.1136)***	0.0898	0.3945 (0.0814)***	-34.875 (45.1937)	0.0514
Union Planters Corporation	0.0579 (0.0833)	-139.588 (44.0375)***	0.0192	0.2057 (0.1124)*	19.264 (24.978)	0.0139	0.0334 (0.0651)	-1.992 (15.115)	-0.0068	0.1248 (0.0616)**	-54.584 (17.9572)***	0.0460	0.0526 (0.1309)	9.633 (67.7054)	-0.0046

Table 2 (continued)
Estimates of Bank Risk Sensitivities by Business Cycle

	Upwaving I			Downwaving I			Upwaving II			Downwaving II			Upwaving III		
	Market	Interest Rate	R ²	Market	Interest Rate	R ²	Market	Interest Rate	R ²	Market	Interest Rate	R ²	Market	Interest Rate	R ²
Northeast Bankcorporation	-0.0104 (0.0544)	-86.086 (28.7779)***	0.0147	0.1862 (0.1139)*	-38.4671 (25.3107)	0.0261	0.0690 (0.0563)	5.711 (13.0643)	-0.0017	0.1497 (0.0562)***	3.468 (16.3756)	0.0158	0.0304 (0.1002)	-8.644 (51.8192)	-0.0045
Hartford National Corporation	0.4376 (0.0701)***	-108.474 (37.0517)***	0.1054	0.6931 (0.1524)***	-114.049 (33.8632)***	0.2054	0.4939 (0.0971)***	3.425 (22.5355)	0.0879	0.3797 (0.1056)***	-24.287 (30.7466)	0.0412	0.4317 (0.0783)***	34.878 (40.5280)	0.0665
CBT Corporation	0.1277 (0.0521)***	-106.771 (27.5305)***	0.0456	0.2876 (0.1151)***	-45.700 (25.5810)***	0.0862	0.1273 (0.0950)	-60.923 (22.0467)***	0.0333	0.3314 (0.0881)***	-20.169 (23.6698)	0.0449	0.3032 (0.0955)***	1.614 (49.425)	0.0209
NBD Bancorp, Inc.	0.1567 (0.0519)***	-79.362 (27.4175)***	0.0384	0.4723 (0.1368)***	-37.271 (30.4130)	0.0880	0.2874 (0.1091)***	-16.649 (22.5432)	0.0233	0.3757 (0.0736)***	-27.663 (21.4255)	0.0872	0.3754 (0.0939)***	-53.469 (48.5937)	0.0432
First Jersey National Corp.	0.4272 (0.1135)***	-18.010 (60.0101)	0.0254	0.3512 (0.3061)	2.301 (67.8000)	-0.0054	0.1804 (0.1070)*	19.270 (24.8428)	0.0045	0.0294 (0.0800)	-59.895 (23.3064)***	0.0172	0.3802 (0.1010)***	-127.316 (52.2745)***	0.0551
Manufacturers Hanover Corp.	0.4928 (0.0675)***	-99.012 (35.3875)*	0.1992	0.7300 (0.1366)***	-38.898 (30.3656)	0.1898	0.5068 (0.1000)***	-68.236 (23.214)***	0.1290	0.8312 (0.0810)***	-77.474 (23.5803)***	0.3006	1.0474 (0.1099)***	-161.130 (56.8558)***	0.2222
First Empire State Corp.	0.7431 (0.1164)***	-55.030 (62.5984)	0.0762	0.5587 (0.2185)***	-64.867 (48.5960)	0.1137	0.3610 (0.1073)***	-81.591 (24.9038)***	0.0859	0.2657 (0.0758)***	-23.221 (22.0698)	0.0420	0.4877 (0.1079)***	-99.343 (55.8176)*	0.0621
J.P. Morgan & Company, Inc.	0.8782 (0.0536)***	-27.718 (29.5083)	0.3385	0.4306 (0.0962)***	-68.610 (21.5805)***	0.1960	0.4405 (0.0782)***	-57.390 (18.637)***	0.1534	0.8199 (0.0644)***	-33.508 (18.7584)*	0.3624	0.8302 (0.0659)***	-44.467 (34.0925)	0.3032
Chemical New York Corp.	0.6368 (0.0860)***	-68.469 (35.9511)*	0.1650	0.5751 (0.1444)***	-27.149 (32.0832)	0.1080	0.5124 (0.0904)***	-47.053 (20.5927)***	0.1357	0.7281 (0.0903)***	-63.064 (26.5920)***	0.2047	0.9978 (0.1084)***	-63.465 (56.5988)	0.1860
Citytrust Bancorp, Inc.	0.0466 (0.0491)	-32.638 (29.9519)	0.0023	0.1030 (0.1172)	25.724 (26.0578)	-0.0029	0.2373 (0.1114)*	5.737 (23.8614)	0.0100	0.0540 (0.0782)	-16.126 (22.7871)	-0.0019	0.1651 (0.0603)***	-36.384 (31.2009)	0.0215
Chase Manhattan Corp.	1.1421 (0.0676)***	-107.949 (35.8567)***	0.3885	0.5497 (0.1061)***	-56.446 (23.5962)***	0.2060	0.6818 (0.0695)***	-43.689 (20.7834)***	0.2249	0.9441 (0.0855)***	-11.455 (23.7693)	0.2705	1.0553 (0.0848)***	-127.692 (43.8749)***	0.3177
Citicorp	1.3253 (0.2884)	-18.167 (44.1129)	0.3386	0.5962 (0.1347)***	-28.122 (29.9355)	0.1328	1.0055 (0.1167)***	-94.148 (27.0832)***	0.2734	1.3557 (0.0925)***	-39.516 (26.9359)	0.4231	1.4053 (0.1118)***	-101.186 (57.8407)*	0.3071
Manufacturers National Corp.	0.2884 (0.0510)***	-68.081 (26.9885)***	0.0801	0.5953 (0.1256)***	-34.392 (27.9231)	0.1548	0.3911 (0.0965)***	-76.820 (22.4064)***	0.1087	0.7488 (0.1148)***	-60.234 (33.4345)*	0.1402	0.5205 (0.0991)***	72.497 (51.2748)	0.0603
Fideller, Inc.	0.6527 (0.1744)***	-41.104 (92.1876)	0.0258	0.5651 (0.1692)	-100.082 (37.5955)***	0.1232	0.4785 (0.1118)***	-38.644 (25.9590)	0.0762	0.6444 (0.0891)***	-23.879 (23.9518)	0.1508	0.4729 (0.0752)***	66.217 (38.8986)*	0.0861

Table 2 (continued)
Estimates of Bank Risk Sensitivities by Business Cycle

	Upwarding I			Downwarding I			Upwarding II			Downwarding II			Upwarding III		
	Market	Interest Rate	R ²	Market	Interest Rate	R ²	Market	Interest Rate	R ²	Market	Interest Rate	R ²	Market	Interest Rate	R ²
First Pennsylvania Corp.	0.4676 (0.1071)***	-143.624 (56.6125)***	0.0350	1.7714 (0.4039)***	12.660 (89.7684)	0.1213	0.7977 (0.1981)***	-15.351 (45.9914)	0.0565	0.6629 (0.2270)***	-70.866 (66.1105)	0.0300	1.1124 (0.1832)***	141.052 (94.7934)	0.0802
Equitrust Corporation	0.2368 (0.0902)***	-96.344 (47.6904)**	0.0229	0.6174 (0.1486)***	-64.881 (33.0363)**	0.1400	0.0876 (0.1698)	-74.615 (39.4305)*	0.0087	0.1480 (0.1940)	-28.357 (56.3072)	-0.0026	0.8927 (0.1875)***	-149.276 (96.9969)	0.0647
Pittsburg National Corp.	0.3872 (0.0680)***	-101.415 (34.8750)***	0.0836	0.7389 (0.1256)***	-81.990 (21.907)***	0.2597	0.3703 (0.0713)***	-24.275 (16.5456)	0.0783	0.4512 (0.0871)***	-47.149 (19.5518)**	0.1582	0.4709 (0.0748)***	-57.761 (39.7157)	0.1037
Maryland National Corp.	0.4985 (0.0774)***	-60.542 (40.9105)	0.0855	0.4164 (0.1348)***	-21.943 (28.9668)	0.0574	0.4479 (0.0764)***	-58.285 (17.7287)**	0.1647	0.3433 (0.0683)***	-27.097 (19.8819)	0.0860	0.2873 (0.0815)***	-25.591 (42.1644)	0.0324
NCNB Corporation	0.9066 (0.0790)***	-109.503 (41.7782)***	0.2334	0.7239 (0.1832)***	-113.069 (41.1519)***	0.1522	0.5361 (0.1126)***	-33.593 (26.1452)	0.0888	0.5401 (0.0797)***	-23.326 (23.2277)	0.1362	0.6178 (0.1016)***	-36.820 (32.5545)	0.0895
Wachovia Corporation	0.4980 (0.0817)***	-34.293 (43.191)	0.0716	0.0690 (0.1259)	-37.295 (27.9782)	0.0015	0.3783 (0.1274)***	-3.179 (29.5745)	0.0275	0.3721 (0.0836)***	-28.203 (34.3506)	0.0668	0.3814 (0.0823)***	23.203 (42.6037)	0.0469
American Plumber Corp.	0.3363 (0.0631)***	-67.467 (33.3572)**	0.0672	0.1751 (0.1136)	-56.352 (25.2495)**	0.0448	0.3546 (0.0993)***	-10.306 (23.0469)	0.0444	0.3167 (0.0767)***	-34.037 (22.3317)	0.0636	0.4013 (0.0899)***	-16.375 (46.4949)	0.0472
Continental Illinois Corp.	0.8431 (0.0707)***	-73.699 (37.3887)**	0.2386	0.8016 (0.1357)***	-2.764 (30.1682)	0.2087	0.4710 (0.1056)***	-43.142 (24.5171)**	0.0861	1.0600 (0.1170)***	-35.339 (34.0779)	0.2184	0.7688 (0.1909)***	-163.364 (98.7763)*	0.0498
First Chicago Corp.	1.0036 (0.0956)***	-173.232 (50.5471)***	0.2167	0.8972 (0.2137)***	15.634 (47.4098)	0.1111	-81.52 (12.19)***	-21.023 (28.3105)	0.1535	0.9035 (0.1078)***	-41.023 (31.4048)*	0.1974	1.3712 (0.1228)***	-10.303 (63.5997)	0.2446
Indiana National Corp.	0.3623 (0.0777)***	-125.450 (41.0663)***	0.0676	0.6049 (0.1303)***	-44.643 (28.9537)	0.1556	0.3454 (0.0906)***	-20.718 (21.0252)	0.0560	0.3410 (0.0585)***	-30.449 (17.0470)*	0.1171	0.3888 (0.0883)***	1.469 (45.6957)	0.0437
First Oklahoma Bancorp., Inc.	0.1148 (0.0416)***	-14.923 (21.987)	0.0141	0.3657 (0.1287)***	17.832 (28.5976)	0.0477	0.4313 (0.0899)***	9.904 (20.8883)	0.0774	0.3272 (0.0840)***	9.436 (24.4797)	0.0391	0.1935 (0.1374)	-53.803 (71.0836)	0.0029
U.S. Bancorp	0.6143 (0.0601)***	-110.353 (31.8007)***	0.2094	0.4309 (0.0894)***	-74.408 (19.8623)***	0.2329	0.3193 (0.0610)***	0.021 (14.1663)	0.0936	0.5451 (0.0851)***	-22.416 (34.7999)	0.1224	0.5443 (0.1059)***	-52.127 (54.7994)	0.0698
BankAmerica Corp.	1.1358 (0.0713)***	-96.066 (37.6805)***	0.3593	0.6649 (0.1375)***	-68.147 (30.5621)**	0.1829	0.8110 (0.1028)***	-18.277 (23.8704)	0.2025	1.0124 (0.0943)***	-77.058 (52.4582)***	0.3084	1.0226 (0.1018)***	-142.374 (52.6747)***	0.2368
Wells Fargo & Company	0.8717 (0.0737)***	-64.354 (38.9768)*	0.2323	0.6857 (0.1390)***	-65.090 (30.8857)**	0.1849	0.6598 (0.1203)***	-60.456 (27.9242)**	0.1278	0.8524 (0.0976)***	-20.104 (28.4219)	0.2020	0.8560 (0.1064)***	-107.870 (55.0338)**	0.1620

Table 2 (continued)
Estimates of Bank Risk Sensitivities by Business Cycle

	Upwarding I			Downwarding I			Upwarding II			Downwarding II			Upwarding III		
	Market	Interest Rate	R ²	Market	Interest Rate	R ²	Market	Interest Rate	R ²	Market	Interest Rate	R ²	Market	Interest Rate	R ²
Crocker National Corp.	0.6785 (0.0731)***	-95.021 (38.6635)***	0.1694	0.7943 (0.1350)***	0.660 (34.4584)	0.1631	0.3324 (0.0759)***	-32.420 (17.6133)*	0.0849	0.4478 (0.0957)***	-18.298 (27.8774)	0.0668	0.4926 (0.1282)***	-146.991 (66.3238)***	0.0534
City National Corp.	0.4196 (0.1193)***	-44.633 (63.0901)	0.0239	0.7629 (0.1717)***	-38.708 (38.1691)	0.1348	0.4301 (0.1458)***	-73.307 (33.8500)***	0.0508	0.6337 (0.1401)***	-12.181 (40.8195)	0.0594	0.4525 (0.1225)***	52.003 (63.3597)	0.0283
U.S. Trust Corp.	0.5269 (0.0831)***	-88.276 (43.4256)***	0.0890	0.3614 (0.1310)***	-14.481 (29.1189)	0.0464	0.3442 (0.0801)***	-4.227 (18.6079)	0.0639	0.2431 (0.0597)***	-2.130 (17.4019)	0.0462	0.1800 (0.0572)***	-10.403 (29.6081)	0.0221
Number of observations	526			126			252			337			401		

R² is the coefficient of determination corrected for degrees of freedom. The numbers in parentheses beneath the regression coefficients are the corresponding standard errors of estimate

* Indicates significance at the 10 percent level

** Indicates significance at the 5 percent level

*** Indicates significance at the 1 percent level

