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## BANK FUNDS MANAGEMENT: INTEREST-MARGIN MEASURES AND RELATIVE PROFITABILITY\*

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This study reports the results of a longitudinal analysis of the association between selected bank funds measures and relative profitability, with emphasis on high-performance banks. Bank funds management is an increasingly major component of bank financial management.

Bank funds management has been described as the key to short-to-intermediate term decision making in today's dynamic and volatile environment [1, 6, 11, 12, 13]. Broadly defined, funds management includes all policies and approaches designed to obtain funds from deposits and borrowing and to allocate them to loans and investments. More specifically, the emphasis in funds management is on the funds over which management has discretionary control.

The concept of funds management may be thought of as incorporating two major systems-oriented approaches: (1) **dynamic balance sheet management**—application of optimizing management science models in a multi-period context and (2) **asset/liability management**—application of deterministic, computer-based financial planning models in a short-run context.

Asset/liability management is the primary focus of bank funds management today. It continues to grow in importance due to the increasing scope and complexity of banking. It incorporates features of other approaches to funds management as well as management experience and judgment. Asset/liability management involves the acquisition of funds (liability management) and their allocation (asset management). Its basic purpose is to structure the resulting bank asset/liability portfolios consistent with the maximization of shareholder wealth, subject to constraints.

Conceptually, every decision should be considered for its impact on the maximization of shareholder wealth. However, in a world of uncertainty, regulation, and limited action/reaction time and resources, it is usually not possible to follow the conceptually correct approach for the multitude of decisions bankers face. Therefore, they use operational decision rules which are designed to approximate the results of conceptually correct decisions. One practical approach to the complex, interactive nature of bank decisions is to disaggregate them into key variables for financial management: (1) spread (net interest margin) management, (2) overhead expense control, (3) liquidity management, and (4) capital management [7, 8, 9, 10, 12]. Both net interest-margin management and overhead expense control are primarily related to the income component of bank financial management, while the other two variables are primarily related to the risk component [12].

### Nature of the Study

Because this study analyzes the nature of the association between selected interest-margin and related measures and **relative** bank profitability, it takes as given that net interest-margin management is important in an **absolute** sense to

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profitability in the sample banks. The analysis is carried out annually and longitudinally for the years 1978-1980 on large U.S. commercial banks with both domestic and foreign operations. While it is expected that these banks are relatively sophisticated financial managers, any differences in levels of profitability should reflect differences in decision making, including those affecting asset/liability portfolios [5].

### Sample Data

The sources of data are the 1978-1980 year-end, individual consolidated reports of income, reports of condition, and supplemental schedules of federally-regulated banks [3]. Data were taken from the financial statements of all 155 banks which, in 1978, had both foreign and domestic operations. These banks should be relatively sophisticated funds managers. The risk/return characteristics of these banks were computed and analyzed in an effort to make the sample relatively homogeneous with respect to such factors as banking structure, competitive environment, bank services, legal form of organization, and scale economies. To do this, the coefficient of variation ( $\sigma / \bar{X}$ ) of the mean ratio of net income after taxes to total assets (NI/TA) was calculated for each total assets size category of the 155 banks.<sup>1</sup> The analysis of the computed coefficients resulted in an initial sample of 99 banks—those with total assets of \$1 billion to \$5 billion.<sup>2</sup> The largest and smallest categories of banks were omitted from the study because their coefficients differed significantly from those of the other categories.

### Methodology

To analyze the behavior (association) of the interest-margin and related measures with respect to relative bank profitability, the 99 banks in the initial sample were ranked by the NI/TA ratio and placed into four **profitability quarters** of approximately equal size. **High performance banks** are defined as those in the first profitability quarter; these have the highest mean NI/TA. After the banks were placed into quarters, one bank in the fourth profitability quarter was deleted in all years because of lack of complete data; another bank (in the first quarter) was deleted for the same reason from the 1979 and 1980 analysis. Thus, either 97 or 98 banks were included in the final sample analyzed in the study.

The banks in the 1979 and 1980 analysis were assigned to the same profitability quarter in which they were ranked in the 1978 analysis. This was done because of the longitudinal component of this study. Asset/liability management decisions are made on the basis of risk/return considerations (including liquidity) both in anticipation of and in reaction to a particular interest-rate environment. Thus, these decisions may provide short-run results that are not indicative of those over a complete credit cycle. By keeping the banks in their 1978 profitability quarters, it can be seen whether significant changes occurred over the study period in the mean profitability ranking of the banks in each quarter. This procedure also facilitates assessment of the longitudinal behavior (association) of interest-margin and related measures with respect to relative profitability.

A major operational goal of asset/liability management is stability of earnings growth over the credit cycle through use of interest-sensitivity and gap management. The years chosen for analysis were the latest then available from the data

source. These years do not represent a complete credit cycle since interest rates had an upward trend over this period. For example, the prime rate was 11.75 percent on December 26, 1978, 15.25 percent on December 7, 1979, and 21.50 percent on December 19, 1980 [4]. Thus, it would be expected that the ratio of variable-rate assets to variable-rate funds would be larger than one (interest-sensitivity management). Alternatively, it would be expected that banks would have larger holdings of variable-rate assets than variable-rate funds (gap management).<sup>3</sup> These relationships provide relatively high earnings during a period of increasing interest rates.

The **interest-margin and related measures** analyzed in this study include the following ratios: (1) interest income to earning assets (II/EA); (2) interest expense to earning assets (IE/EA); (3) net interest-margin ratio (II/EA-IE/EA); (4) interest-sensitivity ratio (VRA/VRF)—variable-rate assets to variable-rate funds; (5) variable-rate assets to earning assets (VRA/EA); (6) variable-rate funds to earning assets (VRF/EA); and (7) gap ratio (VRA/EA-VRF/EA). Several of these measures are suggested in Olson, et al. [13] and generally follow the definitions in the bank guide to the National Bank Surveillance System [2].

Based on the bank guide and the specific accounts in the regulatory financial statements, **earning assets** are defined to include: (1) interest-bearing balances; (2) U.S. Government securities; (3) U.S. Government agency and corporation securities; (4) state and political subdivision securities; (5) trading account securities; (6) all other securities; (7) Federal funds sold and securities purchased under agreements to resell; (8) total loans, net of allowances for loan losses; and (9) lease financing receivables.

**Interest income** is defined to include: (1) interest fees on loans, net of provision for loan losses; (2) interest on balances with depository institutions; (3) income of Federal funds sold and securities purchased under agreements to resell; (4) interest on U.S. Government securities; (5) interest on U.S. Government agency and corporation securities; (6) interest on state and political subdivision securities (on a taxable-equivalent basis using the bank's marginal income tax rate); (7) net income on trading securities; (8) income on all other securities; and (9) income from lease financing.

**Interest expense** is defined as the sum of: (1) interest on domestic certificates of deposit (\$100,000 and over); (2) interest on foreign office deposits; (3) interest on all other deposits; (4) expense of Federal funds purchased and securities sold under agreements to repurchase; (5) interest on subordinated notes and debentures; and (6) interest on all other borrowings.

**Variable-rate assets** are defined as the sum of: (1) interest-bearing balances; (2) domestic securities with maturities of one year or less;<sup>4</sup> (3) trading account securities; (4) Federal funds sold and securities purchased under agreements to resell; (5) total variable-rate loans; and (6) fixed-rate loans with maturities of one year or less.

**Variable-rate funds** are defined to include: (1) Federal funds purchased and securities sold under agreements to repurchase; (2) liabilities for borrowed money (one year or less); (3) domestic certificates of deposit (\$100,000 and over) with maturities of one year or less; (4) other domestic time deposits (\$100,000 and over); and (5) foreign office certificates of deposit (\$100,000 and over) with maturities of one year or less.

To assess the **annual relationships** of the interest-margin and related measures to profitability, the mean and standard deviation were computed for NI/TA and each ratio for the banks in each profitability quarter and the entire sample for each of the years 1978-1980. The rank order of the size of each ratio in each profitability quarter was used to determine the nature of the annual association between the ratio and relative profitability. The ratio of NI/TA was selected as the profitability criterion because it is the "bottom line" measure of bank performance under the constrained control of management.<sup>5</sup>

To assess the **longitudinal relationships**, the mean, standard deviation and coefficient of variation were computed for NI/TA and each interest-margin and related ratio from their annual mean values in each profitability quarter for the period 1978-1980. The rank order of the size of each ratio in each profitability quarter was used to determine the nature of the three-year association between the ratio and relative profitability. Two variability measures were also related to relative profitability for each interest-margin and related ratio. The standard deviation was used to provide an "absolute" measure of variability and, for the reason discussed previously, the coefficient of variation was used to provide a "relative" measure of variability.

## Results

The results of the **overall** analysis of the NI/TA performance of all sample banks are presented in Table 1. First, as mentioned previously, the banks were assigned to the same profitability quarters in 1979 and 1980 as determined by their 1978 NI/TA ranking. The banks in each 1978 quarter maintained the same mean NI/TA ranking in each of the succeeding two years. For example, banks in the first quarter in 1978 also had the highest NI/TA ratio in 1979 and 1980. As indicated for the entire sample, the standard deviation of the mean NI/TA increased somewhat in each succeeding year. This is to be expected because the banks were not re-ranked and reassigned to quarters in the 1979 and 1980 analysis. Second, the differences in mean NI/TA between successive quarters were quite stable from year to year, especially between quarters 1-2 and 2-3. Third, the mean NI/TA ratio in each quarter increased with the level of interest rates over the period. Fourth, as suggested above, both the annual and three-year mean NI/TA ratios (for all profitability quarters) had a consistent, positive association with relative profitability (as measured by profitability quarters). For example, in each year, banks in the first quarter had the largest ratio, and those in the fourth quarter had the smallest ratio. Fifth, the standard deviation and coefficient of variation of the three-year mean NI/TA ratios had a consistent, negative association with relative profitability. For example, both the deviation and coefficient were smallest for banks in the first quarter and largest for those in the fourth quarter.

In summary, the 1978 **high-performance** maintained their relative rank over the remaining two years of the study. These banks were strikingly consistent in the level of their profitability performance. This consistency resulted in very low variability in their NI/TA performance and was accomplished in an economy characterized over this period by declining growth rates in GNP, very high and increasing rates of inflation, and high and increasing interest rates.

The results of the **overall** analysis of interest **income** to earning assets (II/EA) indicated (Table 2) that the three-year mean ratios had no apparent association

with relative profitability.<sup>6</sup> However, the annual total mean ratios had a consistently increasing trend over the period, indicating an **absolute** increase in II/EA.<sup>7</sup> The absolute and relative variability of the three-year mean ratios were consistently, negatively associated with relative profitability.

Table 1

Net Income to Total Assets Ratio (NI/TA)  
by Relative Performance, 1978-1980  
(Mean Data in Percentages)

Profitability Quarter <sup>a</sup>	1978	1979	1980	$\bar{x}$ <sup>b</sup>	$\sigma / \bar{x}$
1	0.95	0.96	0.97	0.96	0.01
[1-2] <sup>c</sup>	[0.22]	[0.18]	[0.22]	[0.01]	
2	0.73	0.78	0.75	0.75	0.03
[2-3]	[0.14]	[0.15]	[0.11]	(0.026)	
3	0.59	0.63	0.64	0.62	0.04
[3-4]	[0.22]	[0.16]	[0.16]	(0.027)	
4	0.37	0.47	0.48	0.44	0.14
				(0.06)	
All <sup>b</sup>	0.66	0.71	0.71		
	(0.23)	(0.27)	(0.28)		

Notes:

<sup>a</sup>Banks placed into profitability quarters based on their 1978 NI/TA ranking.

<sup>b</sup>Standard deviation in parenthesis.

<sup>c</sup>Differences in brackets, i.e., quarter 1 minus quarter 2, etc.

**High-performance** banks had the smallest overall and annual II/EA ratios, with the exception of 1978. This suggests a general, strong negative association with relative profitability. However, their annual total mean ratios had a consistently increasing trend over the period, reflecting an **absolute** increase in II/EA. The three-year mean ratio had the smallest absolute and relative variability as annual changes occurred in the ratio. These results suggest that high-performance banks managed their II/EA ratios conservatively to maintain their generally smallest size (within the context of absolute increases in II/EA) and with the smallest variability over time.

The results of the **overall** analysis of interest **expense** to earning assets (IE/EA) indicated (Table 3) that the three-year mean ratios had a consistent, negative association with relative profitability. However, the annual total mean ratios had a consistently increasing trend over the period, indicating an **absolute** increase in IE/EA. The absolute and relative variability of the three-year mean ratios had no apparent association with relative profitability.

Table 2

**Interest Income to Earning Assets Ratio (II/EA)  
by Relative Profitability, 1978-1980  
(Mean Data in Percentages)<sup>a</sup>**

Profitability Quarter <sup>b</sup>	1978	1979	1980	$\bar{x}$ <sup>c</sup>	$\sigma/\bar{x}$
1	8.11	9.70(S)	10.90(S)	9.57(S) (1.40)	0.15(S)
2	8.13(L)	9.73	11.34(L)	9.73(L) (1.60)	0.16
3	7.90	9.83	11.17	9.63 (1.65)	0.171
4	7.89(S)	9.86(L)	11.24	9.66 (1.68)	0.174(L)
All <sup>c</sup>	8.01 (0.57)	9.78 (0.60)	11.16 (0.96)		

Notes:

<sup>a</sup>Measures ranked as largest (L) or smallest (S).

<sup>b</sup>Banks placed into profitability quarters based on their 1978 NI/EA ranking.

<sup>c</sup>Standard deviation in parenthesis.

**High-performance** banks had the smallest overall and annual IE/EA ratios. This suggests a consistent, strong negative association with relative profitability. However, their annual mean ratios had a consistently increasing trend over the period, reflecting an **absolute** increase in IE/EA. The three-year mean ratio had the smallest and second smallest relative and absolute variability, respectively, as annual changes occurred in the ratio. These results suggest that high-performance banks managed their IE/EA ratios conservatively to maintain their smallest size (within the context of absolute increases in IE/EA) and with the generally smallest variability over time.

The results of the **overall** analysis of interest income to earning assets less interest expense to earning assets (net interest margin) indicated (Table 4) that these ratios were dominated by IE/EA. This is seen in the fact that their three-year mean ratios had the exactly opposite association (rank) with relative profitability. The three-year mean ratios had a consistent, positive association with relative profitability. The annual total mean ratios had a consistently increasing trend over the period, indicating an **absolute** increase in II/EA-IE/EA. The absolute and relative variability of the three-year mean ratios had a general and consistent, respectively, negative association with relative profitability.

Table 3

**Interest Expense to Earning Assets Ratio (IE/EA)  
by Relative Profitability, 1978-1980  
(Mean Data in Percentages)<sup>a</sup>**

Profitability Quarter <sup>b</sup>	1978	1979	1980	$\bar{x}$ <sup>c</sup>	$\sigma / \bar{x}$
1	4.34(S)	5.89(S)	7.15(S)	5.79(S) (1.41)	.24
2	4.44	5.96	7.46	5.95 (1.51)	.254(L)
3	4.59	6.43	7.69	6.24 (1.56)	.250
4	4.82(L)	6.54(L)	7.79(L)	6.38(L) (1.49)	.23(S)
All <sup>c</sup>	4.54 (0.59)	6.20 (0.80)	7.52 (1.01)		

Notes:

<sup>a</sup>Measures ranked as largest (L) or smallest (S).

<sup>b</sup>Banks placed into profitability quarters based on their 1978 NI/TA ranking.

<sup>c</sup>Standard deviation in parenthesis.

**High-performance** banks had the largest overall and annual II/EA-IE/EA ratios, with the exception of 1980. This suggests a general, positive association with relative profitability. However, their annual mean ratios had a slightly decreasing trend over the period, reflecting a modest **absolute** decrease in II/EA-IE/EA. The three-year mean ratio had the smallest absolute and relative variability as annual changes occurred in the ratio. These results suggest that by managing II/EA and IE/EA conservatively, high-performance banks maintained their generally largest net interest-margin ratios (within the context of slight absolute decreases in net interest margin) and with the smallest variability over time.

The results of the **overall** analysis of interest-sensitivity ratios — variable-rate assets to variable-rate funds (VRA/VRF)—indicated (Table 5) that each ratio significantly exceeded one. This interest sensitive position is to be expected because banks generally hold more variable-rate assets than variable-rate funds. This is especially so for banks with a relatively large proportion of stable, "core" deposits. Also, a relatively large ratio is usually considered appropriate in periods of increasing interest rates (i.e., 1978-1980) because of the sensitivity of variable-rate asset returns to changes in interest rates. The three-year mean ratios had a general, positive association with relative profitability. The annual total mean ratios had an overall decreasing trend over the period, indicating a slight **absolute**



Table 4

Net Interest-Margin Ratio (II/EA-IE/EA)  
by Relative Profitability, 1978-1980  
(Mean Data in Percentages)<sup>a</sup>

Profitability Quarter <sup>b</sup>	1978	1979	1980	$\bar{x}$ <sup>c</sup>	$\sigma/\bar{x}$
1	3.77(L)	3.82(L)	3.75	3.781(L) (0.03)	.01(S)
2	3.69	3.76	3.88(L)	3.779 (0.095)	.025
3	3.31	3.40	3.48	3.39 (0.088)	.026
4	3.07(S)	3.32(S)	3.44(S)	3.28(S) (0.19)	.06(L)
All <sup>c</sup>	3.47 (0.79)	3.58 (0.93)	3.64 (1.13)		

Notes:

<sup>a</sup>Measures ranked as largest (L) or smallest (S).<sup>b</sup>Banks placed into profitability quarters based on their 1978 NI/TA ranking.<sup>c</sup>Standard deviation in parenthesis.

decrease in VRA/VRF. The absolute and relative variability of the three-year mean ratios had a consistent and general, respectively, positive association with relative profitability.

**High-performance** banks had the largest annual VRA/VRF ratio in 1978 and the second largest ratios in the other years and overall. This suggests a general, strong positive association with relative profitability. However, their annual mean ratios had an overall decreasing trend over the period, reflecting a slight **absolute** decrease in VRA/VRF. The three-year mean ratio had the largest absolute and relative variability as annual changes occurred in the ratio. These results suggest that high-performance banks managed their VRA/VRF ratios aggressively to maintain their large size (within the context of absolute decreases in VRA/VRF) and with the largest variability over time.

The results of the **overall** analysis of variable-rate assets to earning assets (VRA/EA) indicated (Table 6) generally moderate mean amounts of these ratios. For example, the annual total mean ratios of the sample banks ranged between 50-54 percent. This ratio is a component of the gap ratio, VRA/EA-VRF/EA, which affects the significance of the **size** of the interest-sensitivity ratio (VRA/VRF) on the net interest-margin ratio (II/EA-IE/EA). The larger the gap ratio, *ceteris paribus*, the greater the impact of a given interest-sensitivity ratio on the net interest-margin ratio. The three-year mean ratios had a consistent, negative association with relative profitability. The annual total mean ratios had

Table 5

**Interest-Sensitivity Ratio (VRA/VRF)  
by Relative Profitability, 1978-1980  
(Mean Data in Ratios)<sup>a</sup>**

Profitability Quarter <sup>b</sup>	1978	1979	1980	$\bar{x}$ <sup>c</sup>	$\sigma / \bar{x}$
1	1.42(L)	1.29	1.31	1.34 (0.07)	.05(L)
2	1.41	1.30(L)	1.35(L)	1.35(L) (0.06)	.0426
3	1.21	1.15(S)	1.25	1.21 (0.05)	.0430
4	1.17(S)	1.17	1.20(S)	1.18(S) (0.02)	.02(S)
All <sup>c</sup>	1.30 (0.37)	1.23 (0.29)	1.28 (0.32)		

Notes:

<sup>a</sup>Measures ranked as largest (L) or smallest (S).<sup>b</sup>Banks placed into profitability quarters based on their 1978 NI/TA ranking.<sup>c</sup>Standard deviation in parenthesis.

an overall increasing trend over the period, indicating a slight **absolute** increase in VRA/EA. The absolute and relative variability of the three-year mean ratios had a general, negative and no apparent association, respectively, with relative profitability.

**High-performance** banks had the smallest annual VRA/EA ratios in 1979, 1980 and overall, and the second smallest ratio in 1978. This suggests a general, strong negative association with relative profitability. However, their annual mean ratios had an overall increasing trend over the period, reflecting a slight **absolute** increase in VRA/EA. The three-year mean ratio had the smallest absolute and relative variability as annual changes occurred in the ratio. These results suggest that high-performance banks managed their VRA/EA ratios conservatively to maintain their small size (within the context of absolute increases in VRA/EA) and with the smallest variability over time.

The results of the **overall** analysis of variable-rate funds to earning assets (VRF/EA) indicated (Table 7) generally moderate mean amounts of these ratios. For example, the annual total mean ratios ranged between 42-45 percent. Thus, as discussed previously, the sample banks held smaller amounts of variable-rate funds than variable-rate assets. This ratio is also a component of the gap ratio, VRA/EA-VRF/EA, discussed previously. The three-year ratios had a consistent, negative association with relative profitability. The annual total mean ratios had an increasing trend over the period, indicating a slight **absolute** increase in

Table 6

Variable-Rate Assets to Earning Assets Ratio (VRA/EA)  
by Relative Profitability, 1978-1980  
(Mean Data in Percentages)<sup>a</sup>

Profitability Quarter <sup>b</sup>	1978	1979	1980	$\bar{x}$ <sup>c</sup>	$\sigma / \bar{x}$
1	50.77	49.72(S)	52.17(S)	50.89(S) (1.23)	.024
2	50.42(S)	50.24	52.91	51.19 (1.49)	.029
3	51.32	50.29	52.83	51.48 (1.28)	.025
4	56.20(L)	53.36(L)	55.74(L)	55.10(L) (1.52)	.028
All <sup>c</sup>	52.09 (12.27)	50.86 (12.96)	53.37 (12.81)		

## Notes:

<sup>a</sup>Measures ranked as largest (L) or smallest (S).

<sup>b</sup>Banks placed into profitability quarters based on their 1978 NI/TA ranking.

<sup>c</sup>Standard deviation in parenthesis.

VRF/EA. The absolute and relative variability of the three-year mean ratios had a general, positive association with relative profitability.

**High-performance** banks had the smallest annual VRF/EA ratios in 1978, 1979 and overall, and the second smallest ratio in 1980. This suggests a general, strong negative association with relative profitability. However, their annual mean ratios had an increasing trend over the period, reflecting a moderate **absolute** increase in VRF/EA. The three-year mean ratio had the largest absolute and relative variability as annual changes occurred in the ratio. These results suggest that high-performance banks managed their VRF/EA ratios very conservatively to maintain their small size (within the context of absolute increases in VRF/EA) but with the largest variability over time.

The results of the **overall** analysis of gap ratios—variable-rate assets to earning assets minus variable-rate funds to earning assets (VRA/EA-VRF/EA)—indicated (Table 8) a reasonable amount of variability in the three-year mean ratios. Also, standard deviations of the annual total mean ratios were extremely large. The three-year mean ratios had a general, positive association with relative profitability. The annual total mean ratios had an overall decreasing trend over the period, indicating a slight **absolute** decrease in VRA/EA-VRF/EA. The absolute and relative variability of the three-year mean ratios had a general, positive and no apparent association, respectively, with relative profitability.

Table 7

Variable-Rate Funds to Earning Assets Ratio (VRF/EA)  
by Relative Profitability, 1978-1980  
(Mean Data in Percentages)<sup>a</sup>

Profitability Quarter <sup>b</sup>	1978	1979	1980	$\bar{x}$ <sup>c</sup>	$\sigma/\bar{x}$
1	38.41(S)	40.57(S)	42.99	40.66(S) (2.29)	.06(L)
2	39.27	41.26	42.37(S)	40.97 (1.57)	.04
3	44.14	45.44	45.04	44.87 (0.67)	.01(S)
4	48.59(L)	46.71(L)	48.07(L)	47.79(L) (0.97)	.02
All <sup>c</sup>	42.48 (13.83)	43.46 (14.05)	44.56 (15.65)		

Notes:

<sup>a</sup>Measures ranked as largest (L) or smallest (S).<sup>b</sup>Banks placed into profitability quarters based on their 1978 NI/TA ranking.<sup>c</sup>Standard deviation in parenthesis.

**High-performance** banks had the largest annual VRA/EA-VRF/EA ratios in 1978, 1979 and overall, and the second largest ratio in 1980. This suggests a general, strong positive association with relative profitability. However, their annual mean ratios had an overall decreasing trend over the period, reflecting a slight **absolute** decrease in VRA/EA-VRF/EA. The three-year mean ratio had the largest absolute and second largest relative variability as annual changes occurred in the ratio. These results suggest that high-performance banks managed their gap ratios aggressively to maintain their large size (within the context of absolute decreases in gap ratios) and with the generally largest variability over time. This is consistent with the aggressive management of their interest-sensitivity ratios. However, while the gap ratios were aggressively managed, it was at a low level of earning assets.

#### Summary and Conclusions: High Performance Banks

To provide focus for the myriad of results, it is useful to review the association of the interest-margin and related measures to high-performance banks and to draw some conclusions for this level of performance. High-performance banks (1978) evidenced the subsequent ability to maintain their relative NI/TA profitability advantage and did so with the highest degree of stability. This suggests concern for consistency and stability in the profitability management of high-performance banks.

Table 8

**Gap Ratio (VRA/EA-VRF/EA)  
by Relative Profitability, 1978-1980  
(Mean Data in Percentages)<sup>a</sup>**

Profitability Quarter <sup>b</sup>	1978	1979	1980	$\bar{x}$ <sup>c</sup>	$\sigma / \bar{x}$
1	12.36(L)	9.15(L)	9.18	10.23(L) (1.85)	0.18
2	11.14	8.98	10.54(L)	10.22 (1.12)	0.11
3	7.18(S)	4.85(S)	7.79	6.61(S) (1.55)	0.23(L)
4	7.61	6.65	7.67(S)	7.31 (0.57)	0.08(S)
All <sup>c</sup>	9.61 (8.74)	7.40 (8.18)	8.81 (9.16)		

## Notes:

<sup>a</sup>Measures ranked as largest (L) or smallest (S).

<sup>b</sup>Banks placed into profitability quarters based on their 1978 NI/TA ranking.

<sup>c</sup>Standard deviation in parenthesis.

The relationship between interest income on earning assets and high-performance banks may not have been as expected. High-performance banks generally had the smallest interest income on their earning assets. Also, changes in interest income to earning assets were managed over time with the highest degree of stability. These results suggest that high-performance banks follow a conservative interest-income policy with a high degree of stability. The nature of the association of interest income to high profitability suggests several possible explanations, including higher quality (and lower yielding) earning assets, a more conservative (and lower yielding) mix of earning assets, and shorter-maturity marketable securities. This association could also have resulted from such factors as superior knowledge of credit and financial markets.

The relationship between interest expense on earning assets and high-performance was very consistent. High-performance banks had the smallest interest expense on their earning assets. Also, changes in interest expense to earning assets were managed over time with a very high degree of stability. These results suggest that high-performance banks follow a conservative interest-expense policy with a high degree of stability. The nature of the association of interest expense to high profitability suggests several possible explanations, including larger proportion of core deposits to total deposits, more conservative (and lower cost) mix of interest-paying funds, and/or lower interest costs of given types of interest-paying funds. This association could also have resulted from superior knowledge

of customer and financial market sources of funds.

The relationship between net interest-margin ratios and high performance was also very consistent. High-performance banks generally had the largest net interest-margin ratios. Also, the changes in the net interest-margin ratio were managed over time with the highest degree of stability. These large net interest-margin ratios resulted because their interest-expense ratios were relatively smaller than their interest-income ratios. These results suggest that high-performance banks generate large net interest-margin ratios with a high degree of stability by successfully coordinating their conservative interest-income and interest-expense ratio policies.

The impact on net interest-margin ratios of these coordinating policies can be seen by analysis of the interest-sensitivity ratios, gap ratios, and the gap component ratios. The relationship between the interest-sensitivity ratios and high performance was generally consistent. High-performance banks generally had the second largest interest-sensitivity ratios. Also, changes in the sensitivity ratios were managed over time with the highest degree of variability. The larger the sensitivity ratio, *ceteris paribus*, the greater the need for portfolio adjustments as interest-rate expectations change if relatively stable net interest-margin ratios are to be maintained. It should be remembered that high-performance banks had the largest and most consistently stable net interest-margin ratios. These results suggest that high-performance banks follow an aggressive interest-sensitivity ratio policy with a high degree of variability. The differences in the interest-sensitivity ratios for the sample banks could have reflected differences in such factors as interest-rate expectations (Were high-performance banks better forecasters?), risk-return preferences, desired net interest-margin and stability, other facets of revenue and expense, and gap positions.

The significance of an aggressive (large) interest-sensitivity ratio policy for the net interest-margin ratio depends on the dollar amount of the gap (variable-rate assets less variable-rate funds) with respect to earning assets (gap ratio). The ratios of variable-rate assets to earning assets and variable-rate funds to earning assets were generally consistently associated with high performance. High-performance banks generally had the smallest ratios of variable-rate assets and variable-rate funds to earning assets. These results suggest that high-performance banks are conservative in their total use of variable-rate assets and, especially, variable-rate funds. However, they differed significantly with respect to the variability of these ratios over time. High-performance banks managed their variable-rate assets to earning assets with the highest degree of stability; however, they managed their variable-rate funds to earning assets with the highest degree of variability. These results suggest that high-performance banks follow a conservative variable-rate assets policy with a high degree of stability. They also follow a more conservative variable-rate funds policy but with a high degree of variability. This difference in variability could be because variable-rate funds may be more subject to management discretion and less subject to realized market losses than variable-rate assets (e.g., more discretion in selling/renewing purchased funds than in refusing loans to established customers, and no chance of realized losses due to interest-rate risk, etc).

The relationship between the gap ratio and high-performance was generally consistent. High-performance banks generally had the largest gap ratios. These

large ratios were consistent with their large interest-sensitivity ratios and, *ceteris paribus*, had the potential for causing a large impact on net interest-margin ratios as interest rates changed. However, as evidenced by the conservative total use of variable-rate assets and variable-rate funds, these relatively large gap ratios had limited implications for the net interest-margin ratios. High-performance banks also managed their gap ratios with a high degree of variability. This behavior was generally consistent with the high degree of variability evident in their management of variable-rate funds to earning assets. These results suggest that high-performance banks follow a large gap policy with a high degree of variability.

Overall, high-performance banks achieve their generally largest net interest margins with the highest degree of stability through a combination of several factors: (1) conservative interest income policy with highest degree of stability; (2) very conservative interest expense policy with high degree of stability; (3) relatively aggressive interest-sensitivity policy with high degree of stability; (4) conservative total use of variable-rate assets with highest degree of stability; (5) very conservative total use of variable-rate funds with highest degree of variability; and (6) aggressive gap policy with high degree of variability. The impacts of the "aggressive" interest-sensitivity and gap policies on the net interest margin were constrained by the conservative, relatively small total use of variable-rate assets and, especially, variable-rate funds. Thus, this constraint limits the potential effects of changing interest-rate expectations on the behavior of the net interest-margin ratio over time.

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### Footnotes

<sup>1</sup>The coefficient of variation of NI/TA was computed for each total asset size category. This single statistic incorporates both the mean and the standard deviation of the ratio. Otherwise, it would be difficult to make inter-group performance comparisons, for example, where both the mean and standard deviation of the NI/TA ratio in one category are larger than those in another category. In this use, the coefficient of variation provides the number of units of standard deviation per unit of mean NI/TA in a given asset size category.

<sup>2</sup>The initial sample is reasonably homogeneous with respect to location, legal form of organization, charter, and Federal Reserve District is eight and ranges from three in Minneapolis to 14 in Richmond. As to legal form of organization, 95 banks are affiliates of bank holding companies. Eighty-eight banks have more than one domestic banking office. Thus, the vast majority of the banks are affiliated branch banks. This fact suggests a high degree of uniformity in legal form of organization. With respect to charter authority, 66 are national banks and the remaining 33 are state-chartered banks. Eighty-six banks are subject to Federal Reserve regulation, and 13 banks are subject only to FDIC regulation at the federal level.

Alternatively, a future study could use a control sample to facilitate analysis of paired bank samples. This less general approach could better control any significant lack of homogeneity in the sample data.

<sup>3</sup>It should be noted that banks that practice asset/liability management in a serious

way go well beyond simple gap management. However, these data do not provide the information needed for more sophisticated measures of the balance between the maturity structures of bank assets and liabilities.

<sup>4</sup>The data for the foreign operations are not available. This shortcoming is at least consistent for all sample banks.

<sup>5</sup>If the focus of the study had been less on asset/liability management and more on overall aspects of bank management, the ratio of the net income to total capital accounts might have been more appropriate to use. In either case, the general results were similar with respect to the nature of the association of the interest-margin and related measures and relative profitability.

<sup>6</sup>A detailed discussion of these results follows: First, in each year the mean II/EA ratios had a different association with relative profitability. In 1978 there was a general, positive association; in 1979 there was a consistent, negative association; and in 1980 there was no apparent association. For example, in both 1979 and 1980 the ratio was smallest for banks in the first profitability quarter. However, in 1978 the ratio was smallest for banks in the fourth quarter. In both 1978 and 1980, the ratio was largest for banks in the second quarter. However, in 1979 the ratio was largest for banks in the fourth quarter. In 1978 those banks in the first quarter had the second largest ratio. Second, there was no apparent association between the three-year mean II/EA ratios and relative profitability. For example, the banks in the first quarter had the smallest ratio and those in the second quarter had the largest ratio. Thus, high-performance banks tended to have below average mean II/EA ratios on both an annual and three-year basis. Third, both the standard deviation and coefficient of variation of the three-year mean II/EA ratios had a consistent, negative association with relative profitability. For example, both the deviation and coefficient were smallest for banks in the first quarter and largest for those in the fourth quarter. Thus, high-performance banks had below average absolute and relative variability in their three-year mean II/EA ratio. Finally, this analytical framework also applies to the subsequent tables.

<sup>7</sup>The word "absolute" is used here to refer to whether the size of a ratio (for a particular profitability quarter or overall) increased or decreased over the three-year period. This use contrasts with the relative size of a ratio among the other profitability quarters for a given year or for the three-year period.

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