The Quarterly Review of Interest Rate Risk

Volume 4, Number 2 Second Quarter, 1999

Sensitivity Increases Substantially in Second Quarter

INDUSTRY TRENDS

Median sensitivity for the thrift industry rose 28 percent in the second quarter. This increase continues the upward trend in aggregate sensitivity for the third consecutive quarter. As shown in Figure 1, median sensitivity rose to 184 basis points in the second quarter of this year. Median sensitivity was 144 basis points in March of this year and 130 basis points in December 1998. The industry's median sensitivity had been steadily declining from its last peak of 201 basis points in March 1997.

Figure 2 shows the distribution of the sensitivity measure for the entire industry for the second quarter of 1999. Figure 2 also reports several key descriptive statistics for the distribution. Approximately 67 percent of the 1,010 reporting savings associations have a sensitivity measure between 50 and 250 basis points, down from 76 percent in the first quarter. In addition, the number of thrifts with a sensitivity measure above 400 basis points almost doubled to 74 in the second quarter. Similar to the first quarter, an increase in interest rates in the second quarter combined with higher asset duration associated with larger thrift holdings of 30-year fixed-rate mortgages caused the increase in median interest rate sensitivity.

Figure 3 shows that the yield curve shifted upward and steepened in the short-term maturity range between the first and second quarters of 1999. The yield curve in June 1999 is at roughly comparable levels, but slightly steeper than the June 1998 yield curve. Yields at the shortest maturities are currently lower

Figure 1. Sensitivity Measure

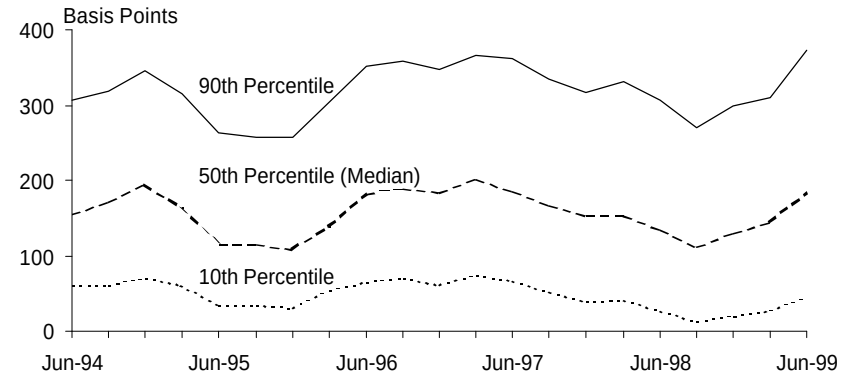
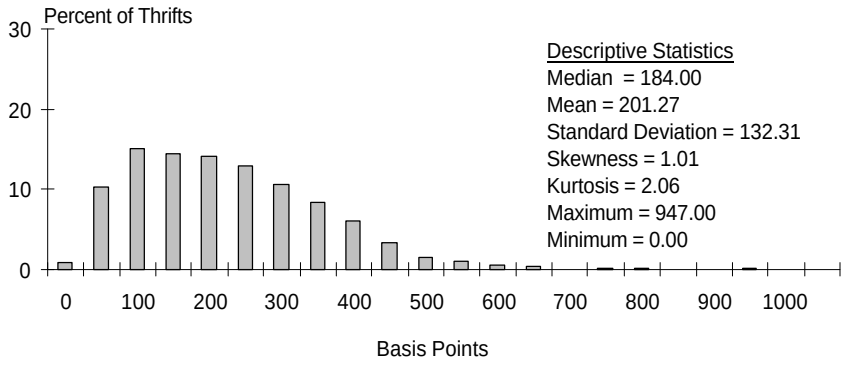


Figure 2. Sensitivity Measure Distribution



than they were, while longer maturity yields are higher than those one year ago. The flat and relatively low yield curves during the past several quarters generated the recent refinancing boom and increased homebuyer demand for long-term fixed-rate mortgages. Mortgage refinancing activity has dropped dramatically in recent months, however, as interest rates have risen from their October 1998 low point.

Figure 3. Treasury Yield Curves

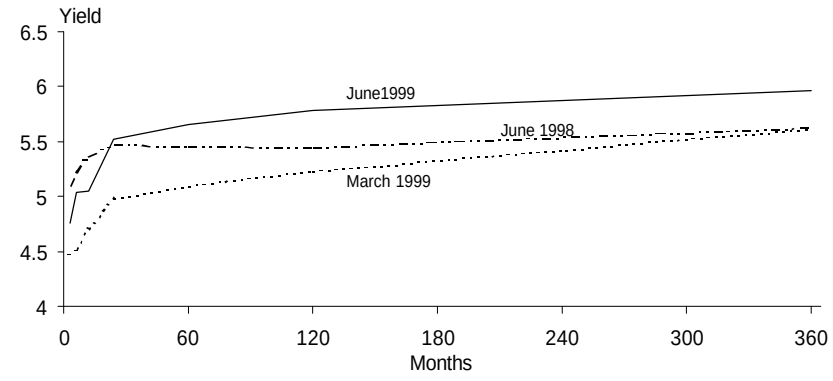
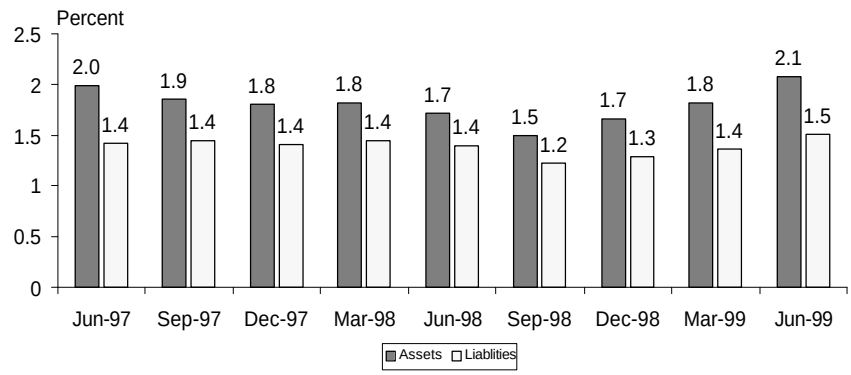


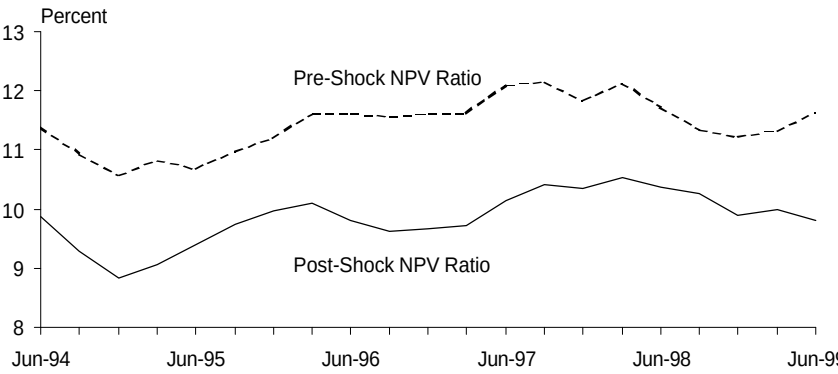
Figure 4 shows that the median effective durations of the industry's assets and liabilities rose during the second quarter. The median effective duration for assets rose from 1.8 in the first quarter of 1999 to 2.1 in the second quarter of this year, while the median effective duration for liabilities rose from 1.4 to 1.5 during the same period. The faster increase in asset durations widened the gap between asset and liability durations this quarter.

Figure 4. Median Duration of Assets and Liabilities



As was the case since the fourth quarter of last year, mortgage durations continued to increase as a result of recent refinancing activity and the strong demand for 30-year fixed-rate mortgages. Similarly, the increase in liabilities duration appears to be due, once again, to the increased use of FHLB advances as a source of funding by savings associations.

Figure 5. Median Pre-Shock and Post-Shock NPV Ratios



As shown in Figure 5, the industry's median post-shock NPV ratio fell to 9.8 percent in the second quarter. This represents the fifth consecutive quarterly decline in this aggregate measure of the industry's ability to absorb additional interest rate shocks. This decrease is driven primarily by the industry's higher sensitivity reflecting higher asset duration associated with greater portfolio holdings of 30-year fixed-rate mortgages. Unlike the industry's post-shock NPV ratio,

the industry's median pre-shock NPV ratio in the second quarter increased to 11.6 percent, the highest level since second quarter 1998. An increase in the premium on core deposits accounts for the rise in the aggregate pre-shock NPV ratio.

Gains and Losses

Table 1 reports the percentage change in the aggregate NPV and NPV ratio for the industry under different interest rate scenarios. In the second quarter of 1999, the thrift industry would lose 25.3 percent of its net portfolio value if rates rose by 200 basis points, up from 19.7 percent in the first quarter, and up from 15.5 percent in June 1998. The industry would gain 9.9 percent in value if rates fell by 200 basis points. This measure demonstrates the high sensitivity of savings associations to increases in interest rates. Historically, most thrift institutions have been adversely affected by rising interest rates.

Figure 6 displays the impact of a 200 basis point increase in interest rates on the NPV of individual institutions. Of the 1,010 reporting savings associations, 92 percent would experience a loss of net portfolio value in this scenario, up from 86 percent in the first quarter of this year. About 42 percent of the industry would lose more than 20 percent of their economic value, if interest rates rose by 200 basis points, up from 30 in the first quarter. This result is consistent with the increase in median interest rate sensitivity.

Figure 6. Estimated Change in NPV: +200bp Rate Change
(Second Quarter 1999)

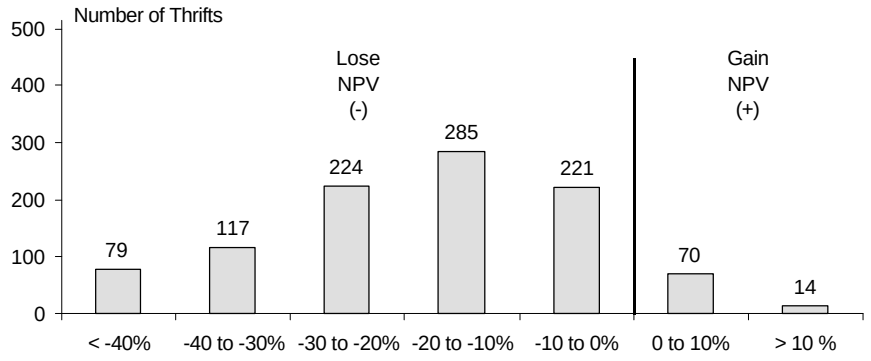


Figure 7. Estimated Change in NPV: -200bp Rate Change
(Second Quarter 1999)

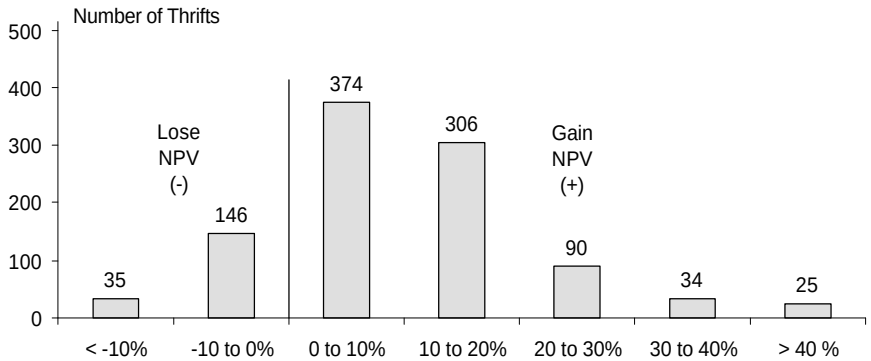


Table 1. Interest Rate Risk Measures
(Industry Aggregate Data)

Change in Interest Rates (Basis Points)	Percentage Change in NPV			Ratio of NPV to Assets		
	Jun-98	Mar-99	Jun-99	Jun-98	Mar-99	Jun-99
+300	-27.3	-34.0	-41.3	7.7	6.3	5.8
+200	-15.5	-19.9	-25.3	8.8	7.5	7.3
+100	-6.1	-8.3	-11.3	9.6	8.5	8.5
Base Case	0.0	0.0	0.0	10.1	9.1	9.4
-100	3.0	4.0	6.3	10.3	9.4	9.9
-200	4.6	6.7	9.9	10.4	9.5	10.1
-300	8.5	11.6	14.2	10.7	9.8	10.4

Figure 7 displays the industry's distribution of gains and losses in net portfolio value for a decrease of 200 basis points in interest rates. Under this scenario, approximately 82 percent of reporting thrifts would experience increases in their net portfolio values. This represents the same percent as in the first quarter of this year.

Figures 8 and 9 compare the distributions of gains and losses for the first and second quarters of 1999 for both a 200 basis point increase and decrease in interest rates. Figure 8 confirms the higher sensitivity of the industry to interest rate increases by showing the higher proportions of thrifts losing 20 percent or more of their NPV in the second quarter compared to the first quarter.

Figure 8. Estimated Change in NPV: +200bp Rate Change

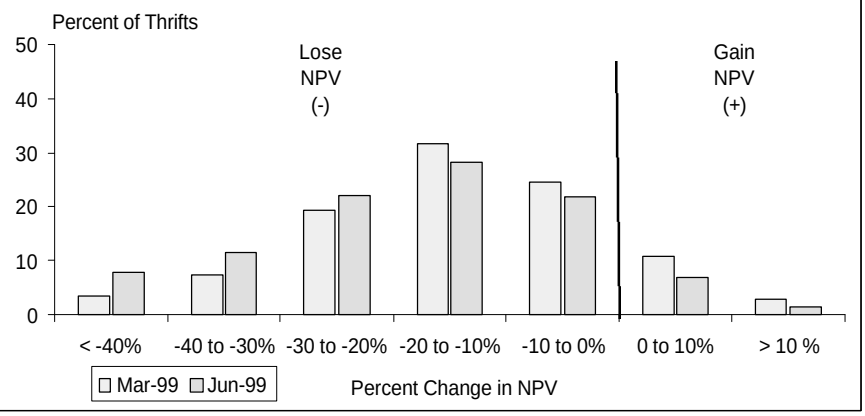
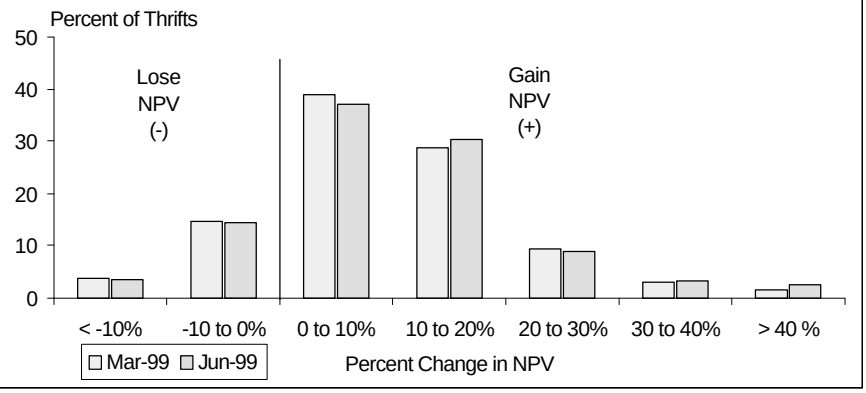


Figure 9. Estimated Change in NPV: -200bp Rate Change

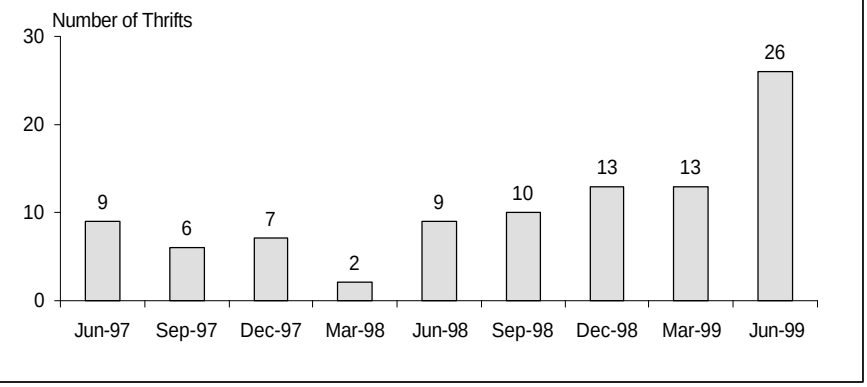


Highly Exposed Thrifts

As Figure 10 shows, the number of thrifts with post-shock NPV ratios below 4 percent increased dramatically in the second quarter. The number of thrifts highly exposed to interest rate risk rose to 26, up from 13 in the previous two quarters. This increase most likely reflects the continued decline in post-shock NPV ratios caused by the longer mortgage durations associated with recent mortgage refinancing activity.

Figure 11 shows that the percent of thrifts with post-shock NPV ratios below 4 percent more than doubled to 2.57 percent of the industry in the second quarter, up from 1.26 percent in the first quarter. A thrift with a post-shock NPV ratio below 4 percent either has a relatively low level of capital, a high degree of NPV sensitivity, or both. These highly exposed thrifts are subject to heightened OTS supervision.

Figure 10. Thrifts with Post-Shock NPV Ratio Under 4.0 Percent



Regional Trends

Figure 12 shows the median sensitivity measures for the entire industry and for each OTS region for the first and second quarters of 1999. The Northeast Region had the largest median sensitivity measure of 224.5 in the second quarter of 1999. The Midwest Region had the smallest measure

of 148.5 in the second quarter, although this region experienced the largest percentage increase in sensitivity between the first and second quarters of this year.

Figure 13 shows the median post-shock NPV ratio for the thrift industry and for each OTS region. For the industry, there was a decrease of 18 basis points in the post-shock NPV ratio between the first and second quarters of 1999. The West Region had the smallest post-shock NPV ratio of 8.87 in the second quarter of 1999. The Northeast Region had the largest relative decline, as its median post-shock NPV fell from 9.73 percent to 9.28 percent.

Appendices B1 to B5 present distributions for sensitivity, pre- and post-shock NPV ratios, and assets and liabilities durations for each OTS region.

Figure 11. Thrifts with Post-Shock NPV Ratio Under 4.0 Percent

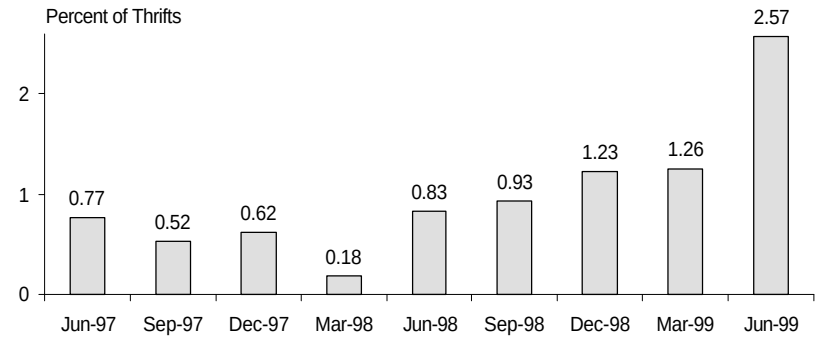


Figure 12. Median Sensitivity Measure by OTS Region

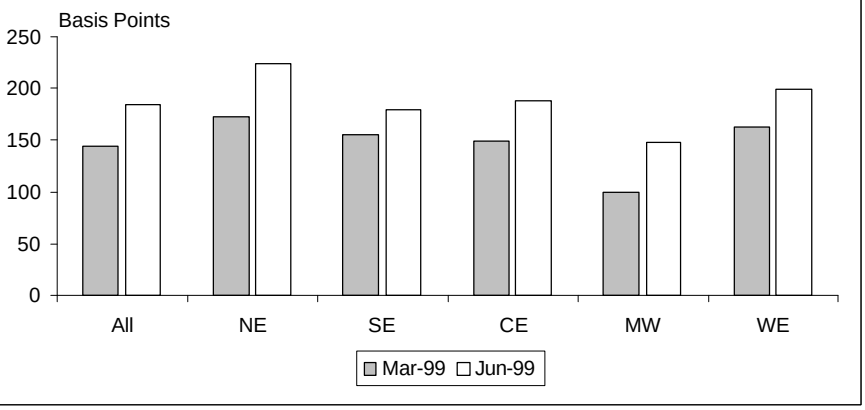
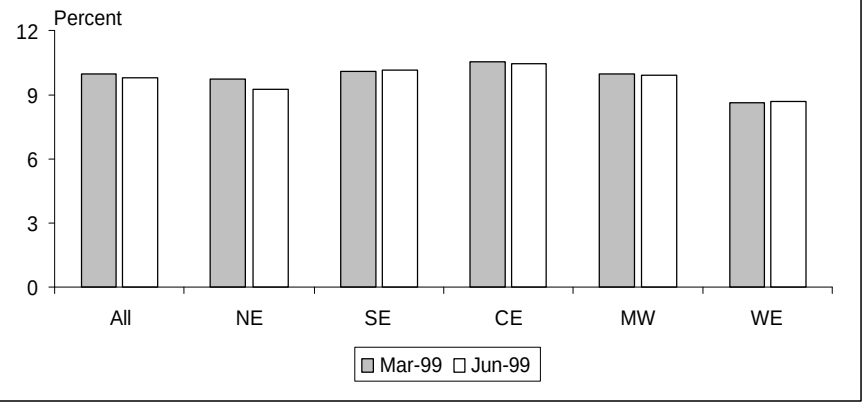


Figure 13. Median Post-Shock NPV Ratio by OTS Region



PORTFOLIO MORTGAGE HOLDINGS AND INTEREST RATE SENSITIVITY

This section examines whether the sharp increase in median sensitivity in the second quarter of this year is related to the substantially greater proportion of fixed-rate mortgages currently held by thrifts in their portfolios. Recent mortgage refinancing activity has caused the asset portfolio composition of thrifts to change dramatically. As noted in previous issues of this *Review*, recent mortgage refinancing activity frequently involved homeowners switching from adjustable-rate mortgages into longer-term fixed-rate mortgages, especially 30-year mortgages, in order to take advantage of historically low 30-year mortgage rates. Holding all else constant, the increase in asset duration associated with increased holdings of long-term fixed-rate mortgages and mortgage-backed securities makes thrifts more sensitive to interest rate increases.

Table 2 reports median portfolio holdings of various mortgage and mortgage-backed securities (MBS) assets for two thrift groups---those with the largest (top 10 percent) and smallest (bottom 10 percent) increase in sensitivity between the first and second quarters. Mortgages and mortgage-backed securities are shown as a percentage of total mortgages and MBS.

As expected, the results show that the change in sensitivity and the type of mortgage portfolio holdings are closely related. Those thrifts with the largest sensitivity increase held substantially greater proportions of their assets as long-term 30-year fixed-rate mortgages and MBS. As Table 2 shows, thrifts with sensitivity increases in the top 10 percent held 17.6 percent of their mortgage portfolio in 30-year fixed-rate mortgages and MBS. In sharp contrast, thrifts with the smallest sensitivity increases held only 7.9 percent of their mortgage portfolio in fixed-rate 30-year mortgages and MBS.[1]

Table 2
Median Percentage Portfolio Holdings by Mortgage Type for the Top and Bottom 10% of the Sensitivity Distribution as of June 1999

Mortgage Asset Category	Top 10% (%)	Bottom 10% (%)
	Sensitivity Increase	
30 year fix rate 1-4 family mortgage	17.6	7.9
30 year fix rate 1-4 family MBS	2.2	0.0
15 year fix rate 1-4 family mortgage & MBS	20.2	11.8
Balloon 1-4 family mortgages & MBS	1.4	1.2
ARM 1-4 loans & MBS LE 6 mth	0.5	0.3
ARM 1-4 loans & MBS GT 6 mth LE 2 yr	10.8	8.2
ARM 1-4 loans & MBS GT 2yr LE 5 yr	1.4	1.9
ARM 1-4 loans & MBS 1 mth lagging index	0.0	0.0
ARM 1-4 loans & MBS GE 2 mth LE 5 years	0.0	0.1

Table 3. Post-Shock NPV Ratio and Sensitivity Measure Matrix

June 1999	Sensitivity Measure				
	Under 100bp	101-200bp	201-400bp	Above 400bp	
Post-Shock NPV	# of Thrifts (% of Total)	# of Thrifts (% of Total)	# of Thrifts (% of Total)	# of Thrifts (% of Total)	Total
Over 10%	169 **16.7%** Minimal Risk (1)	138 **13.7%** Minimal Risk (1)	156 **15.4%** Minimal Risk (1)	20 **2.0%** Moderate Risk (2)	**483 47.8%**
6% to 10%	90 **8.9%** Minimal Risk (1)	135 **13.4%** Minimal Risk (1)	163 **16.1%** Moderate Risk (2)	26 **2.6%** Significant Risk (3)	**414 41.0%**
4% to 6%	5 **0.5%** Minimal Risk (1)	15 **1.5%** Moderate Risk (2)	52 **5.1%** Significant Risk (3)	15 **1.5%** High Risk (4 or 5)	**87 8.6%**
Below 4%	0 **0.0%** Moderate Risk (2)	0 **0.0%** Significant Risk (3)	13 **1.3%** High Risk (4 or 5)	13 **1.3%** High Risk (4 or 5)	**26 2.6%**
Total	**264 26.1%**	**288 28.5%**	**384 38.0%**	**74 7.3%**	**1010 100%**

THRIFT BULLETIN 13a AND THE "S" RATING

Table 3 shows the Summary of Guidelines for the "Level of Interest Rate Risk" using post-shock NPV ratios and sensitivities produced by the NPV Model for the second quarter of 1999. For comparison, Table 3 reports results using the NPV Model for the first quarter of 1999. Each cell of the tables shows both the number of thrifts and the corresponding percent of thrifts with the various combinations of post-shock NPV ratio and sensitivity specified in Thrift Bulletin 13a (TB 13a).

Of the 1,010 reporting thrifts in the second quarter of 1999, 47.8 percent had post-shock NPV ratios that exceeded 10 percent. With regard to interest rate sensitivity, 54.6 percent of thrifts had sensitivity measures of 200 basis points or less. Based on the "Level of Interest Rate Risk" guidance provided in TB 13a, 68.6 percent of thrifts might initially be assigned a "1" risk rating, 19.6 percent a "2" rating, 7.7 percent a "3" rating, and 4.1 percent a "4" or a "5" rating.

A comparison of Tables 3 and 4 reveals several important dif-

ferences between the first and second quarters. First, there was a dramatic increase in the number of thrifts with post-shock NPV ratios below 4 percent in the second quarter. Second, there was a substantial decrease in the number of thrifts with sensitivity under 100 basis points in June 1999. In March, 36.5 percent of thrifts had sensitivity measures below 100 basis points, while in June, that percentage dropped to 26.1 percent.

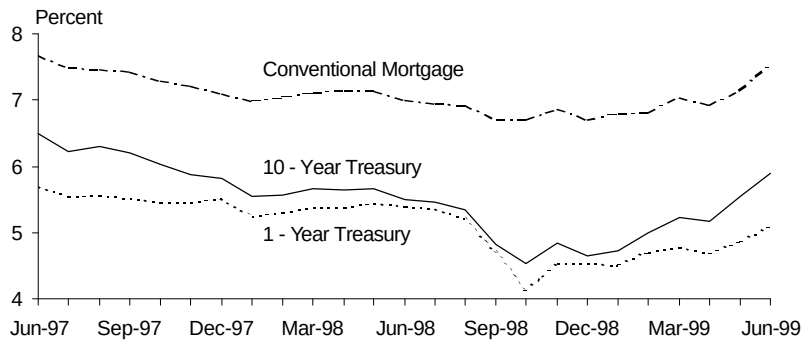
Third, there were substantial increases in the number of thrifts with sensitivities over 400 basis points. That high sensitivity group almost doubled from 3.7 percent of the industry in the first quarter to 7.3 percent in the second quarter.

Finally, the number of thrifts that might initially be considered to bear "significant" or "high" interest rate risk increased from 71 thrifts (8.6 percent) in the first quarter to 119 thrifts (11.8 percent) by the end of the second quarter. While consistent with the sharp increase in sensitivity and decrease in post-shock NPV ratio for the industry in the second quarter, these results need careful monitoring. The crucial issue is whether the results reflect only a temporary shift in portfolio composition as thrifts responded to the recent refinancing boom or represent a permanent change in thrift interest rate exposure.

Table 4. Post-Shock NPV Ratio and Sensitivity Measure Matrix

March 1999	Sensitivity Measure				
	Under 100bp	101-200bp	201-400bp	Above 400bp	
Post-Shock NPV	# of Thrifts (% of Total)	# of Thrifts (% of Total)	# of Thrifts (% of Total)	# of Thrifts (% of Total)	Total
Over 10%	210 **20.3%** Minimal Risk (1)	137 **13.2%** Minimal Risk (1)	149 **14.4%** Minimal Risk (1)	19 **1.8%** Moderate Risk (2)	**515** **49.8%**
6% to 10%	160 **15.5%** Minimal Risk (1)	140 **13.5%** Minimal Risk (1)	112 **10.8%** Moderate Risk (2)	11 **1.1%** Significant Risk (3)	**423** **40.9%**
4% to 6%	7 **0.7%** Minimal Risk (1)	29 **2.8%** Moderate Risk (2)	42 **4.1%** Significant Risk (3)	6 **0.6%** High Risk (4 or 5)	**84** **8.1%**
Below 4%	1 **0.1%** Moderate Risk (2)	3 **0.3%** Significant Risk (3)	7 **0.7%** High Risk (4 or 5)	2 **0.2%** High Risk (4 or 5)	**13** **1.3%**
Total	**378** **36.5%**	**309** **29.9%**	**310** **30.0%**	**38** **3.7%**	**1035** **100%**

Figure 14. Mortgage-Related Interest Rate Indices



MORTGAGE-RELATED INTEREST INDICES

Figure 14 displays plots of two mortgage-related interest indices and the Freddie Mac Commitment rate for 30-year fixed-rate mortgages, as reported by the Federal Reserve Board. The two interest indices are the one-year constant maturity Treasury (one-year CMT), which is representative of the various indices used to set one-year adjustable-rate mortgages (ARMs), and the ten-year (ten-year CMT). As shown in the figure, the ten-year CMT index tracks the commitment rate for 30-year fixed-rate mortgages well.

Recent concerns about inflationary pressure associated with the ongoing economic expansion and the Federal Reserve's decision to raise the federal funds rate by 25 basis points in June have caused the three series to increase. It is likely that the three

interest rate series will continue to rise during the rest of the year, since both financial markets and the Federal Reserve remain worried about pent up inflationary pressures. Consistent with the continued concern over inflation, the Federal Reserve raised the federal funds rate another 25 basis points in August.

[1] Similarly, those thrifts with the smallest sensitivity decrease between the first and second quarters also had the largest percentage portfolio holdings of long-term 30-year fixed-rate mortgages and MBS.

Tidbit for the Quarter

Analysis and software that uses the risk-adjusted-return-on-capital (RAROC) approach offer insights to profitability within financial institutions that will be common within the next decade, according to a report released by Meridien Research, based in Newton, Mass.

One part of the profitability measurement formula is to analyze revenues as they relate to risk of loss. Risk/profitability analysis offers a rational basis to price transactions and to manage investments and customer relationships. It also provides a tool to manage the capital costs associated with risk.

The risk-adjusted-return on capital approach is "surfacing as a valuable tool" for financial institutions that want "an analytical approach that permits the comparison of business lines as well as the evaluation of the entire bank," says James D. Brown, a principal at Darling Consulting Group in Newburyport, Mass. That view is endorsed by Deborah Williams, Meridien research director. She terms the RAROC approach and attendant software as an "incredibly powerful management tool." She notes the RAROC ratio is "relatively easy to calculate, if the underlying infrastructure is in place." Williams stresses, "The biggest challenge in a RAROC implementation is aligning the data from the risk engine and from the financial systems."

In a report titled "Risk Adjusted Return on Capital," Meridien examines the technology underlying the most advanced calculations of risk-adjusted returns, and the solutions and policies being implemented at banks and insurance companies. The 26-page report examines the RAROC solution elements, which fall into three components:

- The risk and financial systems that generate and analyze detailed financial data to estimate future potential losses
- Methodologies that use the risk calculations for allocating economic capital to risk
- The RAROC calculator

The RAROC calculation uses a relatively straightforward equation that evaluates the relationship between risk and revenues. The complexity lies in the breadth of information required and in the underlying calculations.

The technology to support the approach remains a relatively recent phenomenon. Williams predicts that the relatively small amount spent on RAROC today is about "to explode as RAROC becomes recognized as a major factor in both product pricing and institutional performance."

This material was taken from "RAROC Approach Offers Tool to Enhance Profitability," *Financial Managers Update*, Financial Managers Society, August 10, 1999, page 7.

Appendix A (All Thrifts)

This appendix presents distributions for sensitivity, pre-shock and post-shock NPV ratios, and assets and liabilities duration for all reporting thrifts at second quarter end 1999. Also included in each figure are descriptive statistics.

Figure 1. Sensitivity Measure Distribution

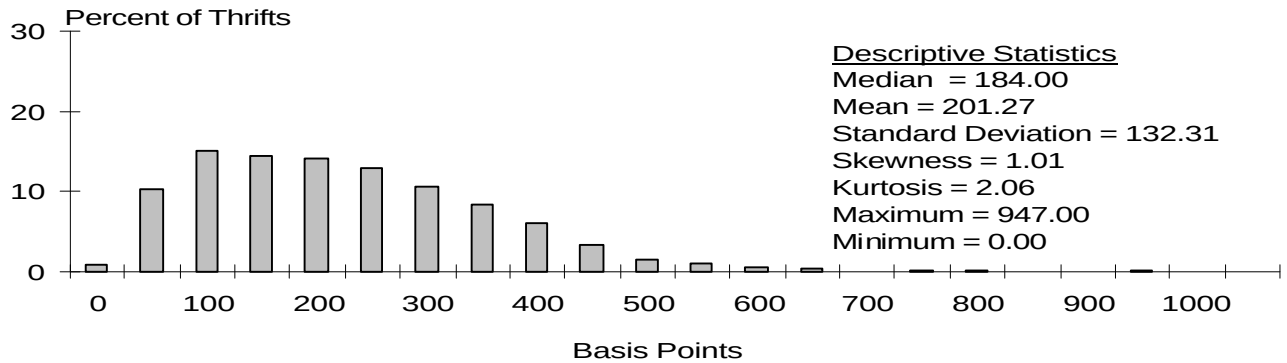


Figure 2. Pre-Shock NPV Ratio Distribution

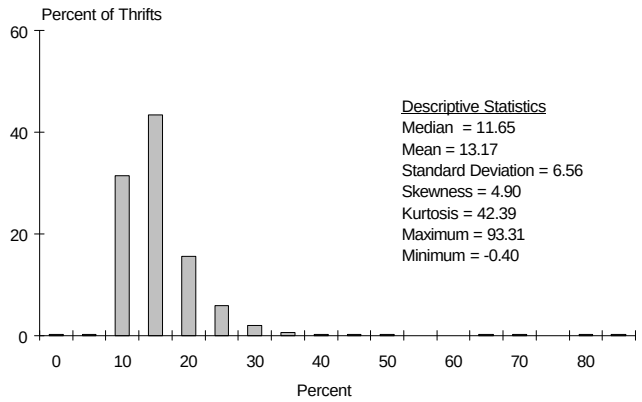


Figure 3. Post-Shock NPV Ratio Distribution

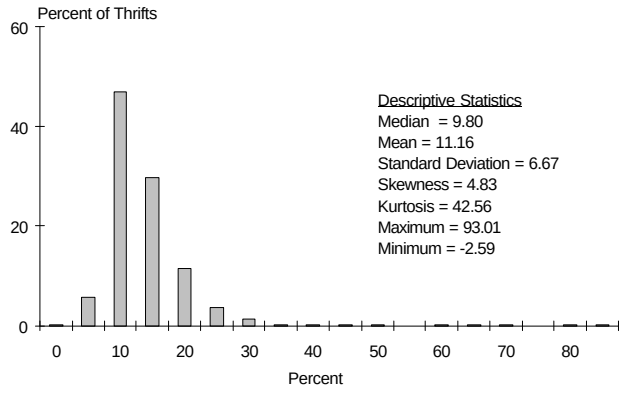


Figure 4. Assets Duration Distribution

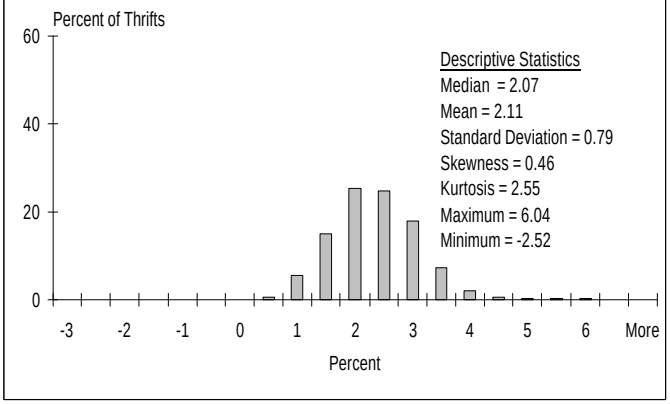
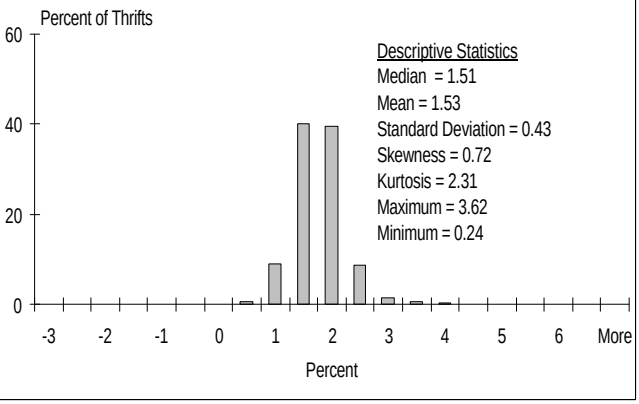


Figure 5. Liabilities Duration Distribution



Appendix B 1 (Northeast Region)

This appendix presents distributions for sensitivity, pre-shock and post-shock NPV ratios, and assets and liabilities duration for reporting thrifts in the Northeast Region at second quarter end 1999. Also included in each figure are descriptive statistics.

Figure 1. Sensitivity Measure Distribution: Northeast

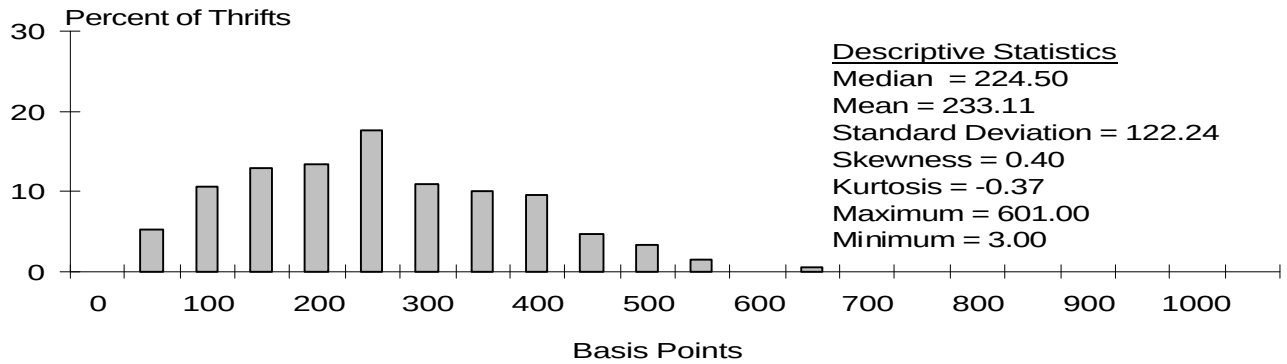


Figure 2. Pre-Shock NPV Ratio Distribution: Northeast

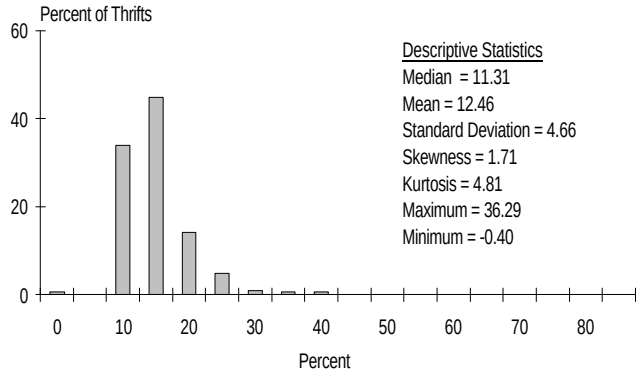


Figure 3. Post-Shock NPV Ratio Distribution: Northeast

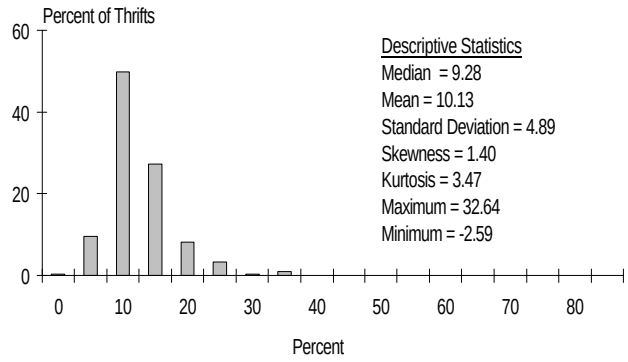


Figure 4. Assets Duration Distribution: Northeast

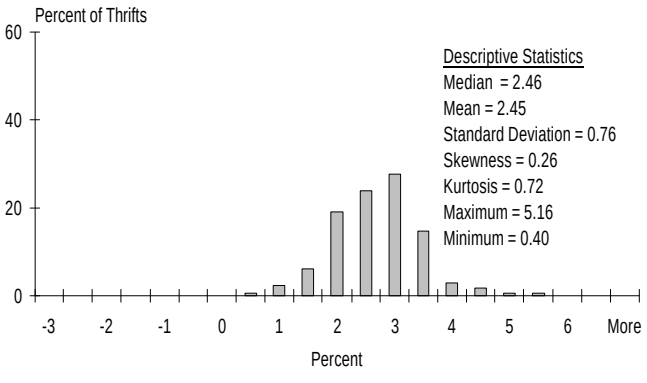
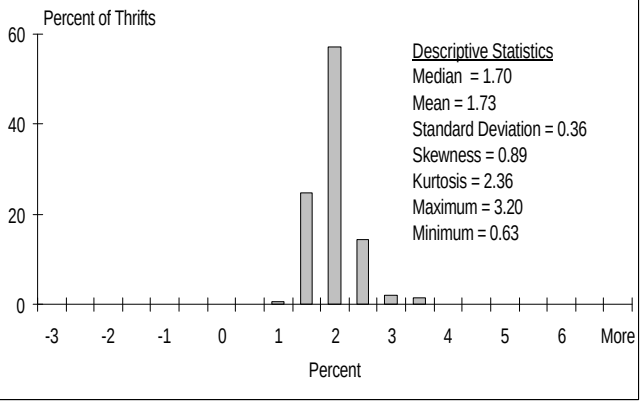


Figure 5. Liabilities Duration Distribution: Northeast



Appendix B 2 (Southeast Region)

This appendix presents distributions for sensitivity, pre-shock and post-shock NPV ratios, and assets and liabilities duration for reporting thrifts in the Southeast Region at second quarter end 1999. Also included in each figure are descriptive statistics.

Figure 1. Sensitivity Measure Distribution: Southeast

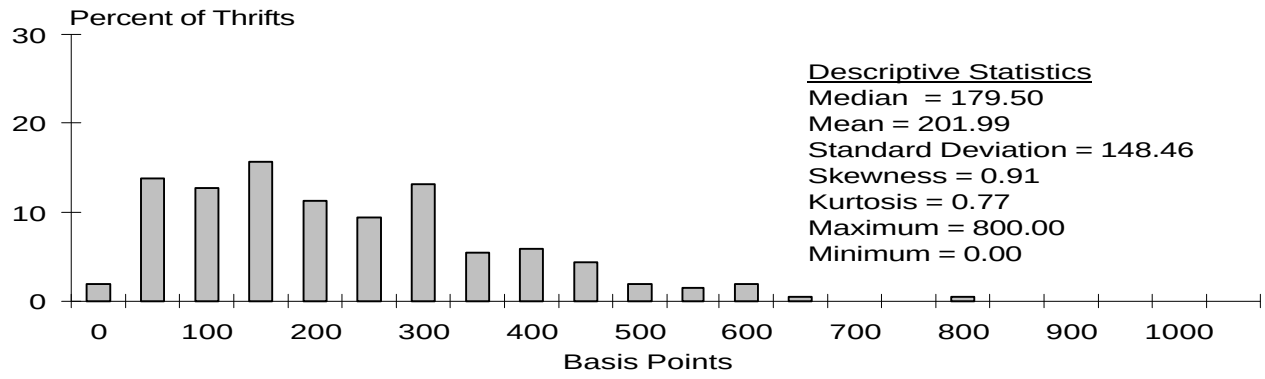


Figure 2. Pre-Shock NPV Ratio Distribution: Southeast

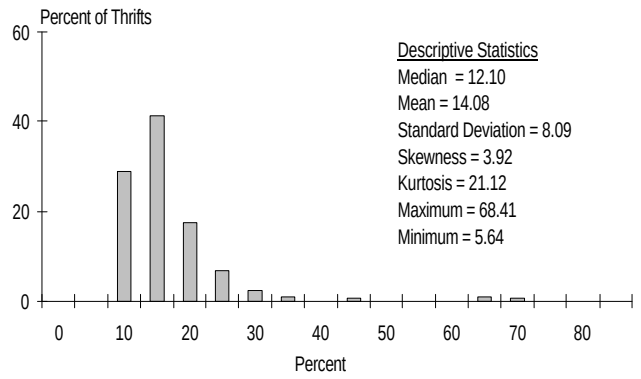


Figure 3. Post-Shock NPV Ratio Distribution: Southeast

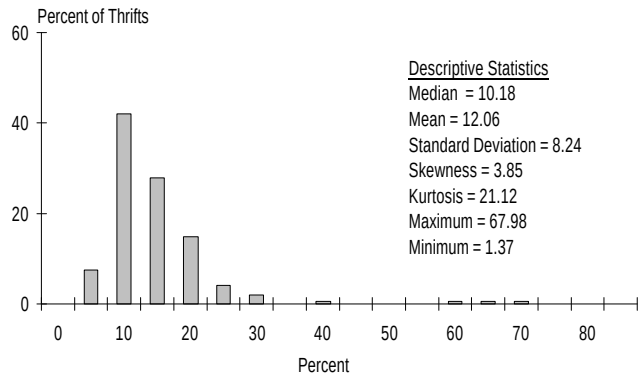


Figure 4. Assets Duration Distribution: Southeast

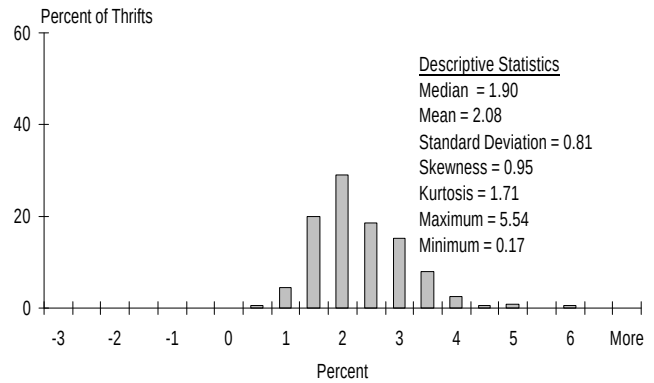
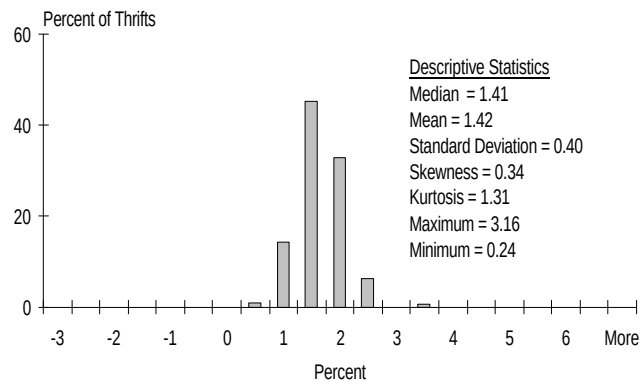


Figure 5. Liabilities Duration Distribution: Southeast



Appendix B 3 (Central Region)

This appendix presents distributions for sensitivity, pre-shock and post-shock NPV ratios, and assets and liabilities duration for reporting thrifts in the Central Region at second quarter end 1999. Also included in each figure are descriptive statistics.

Figure 1. Sensitivity Measure Distribution: Central

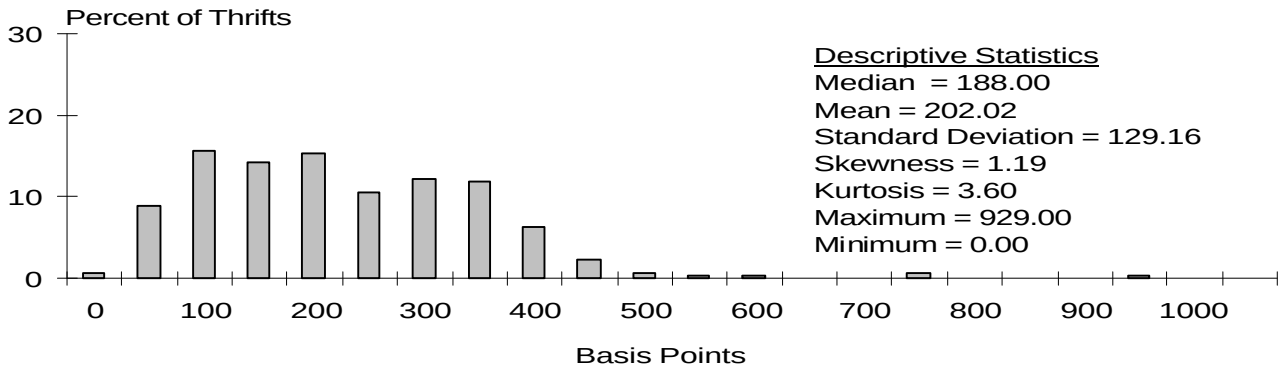


Figure 2. Pre-Shock NPV Ratio Distribution: Central

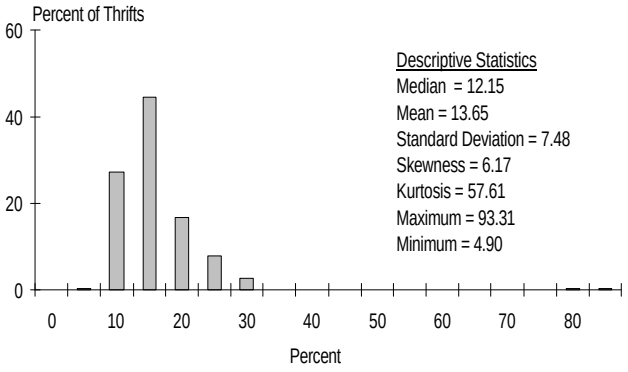


Figure 3. Post-Shock NPV Ratio Distribution: Central

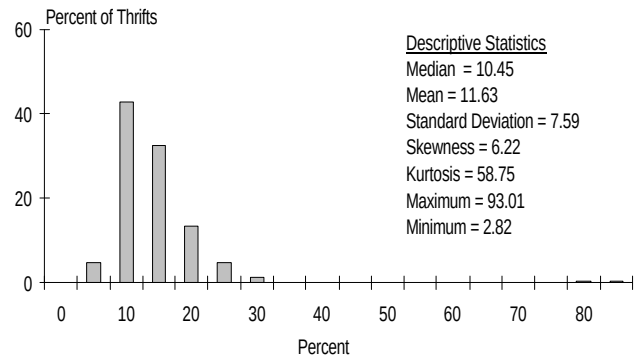


Figure 4. Assets Duration Distribution: Central

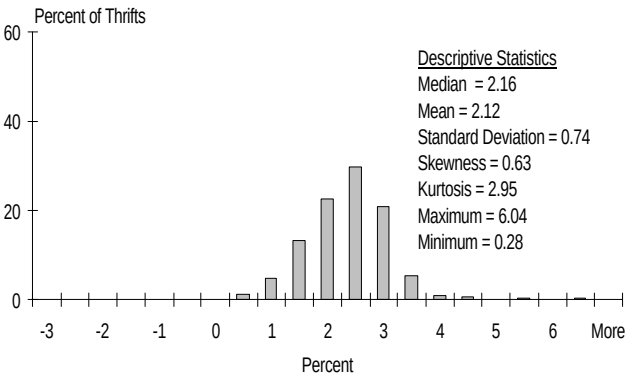
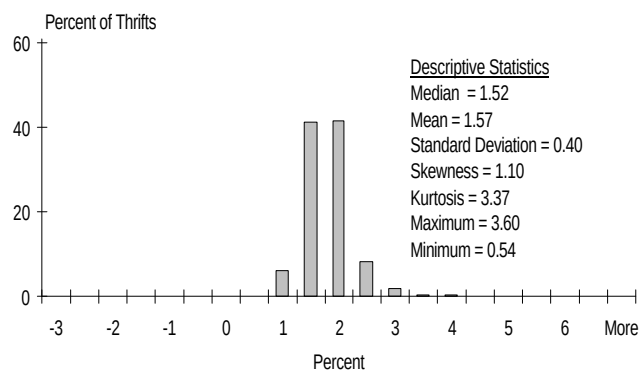


Figure 5. Liabilities Duration Distribution: Central



Appendix B 4 (Midwest Region)

This appendix presents distributions for sensitivity, pre-shock and post-shock NPV ratios, and assets and liabilities duration for reporting thrifts in the Midwest Region at second quarter end 1999. Also included in each figure are descriptive statistics.

Figure 1. Sensitivity Measure Distribution: Midwest

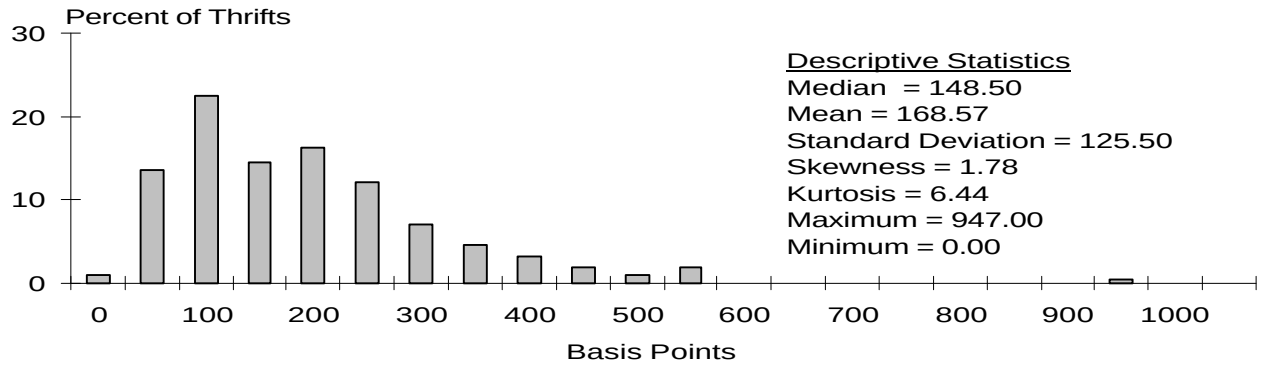


Figure 2. Pre-Shock NPV Ratio Distribution: Midwest

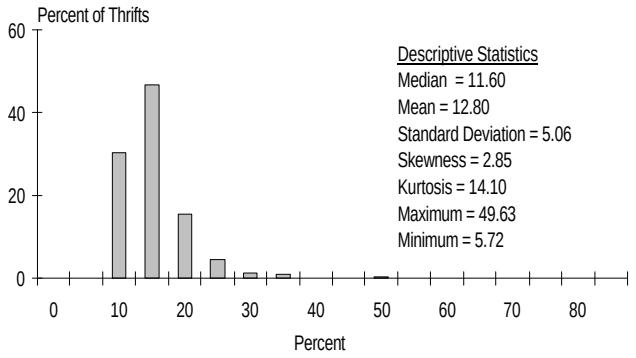


Figure 3. Post-Shock NPV Ratio Distribution: Midwest

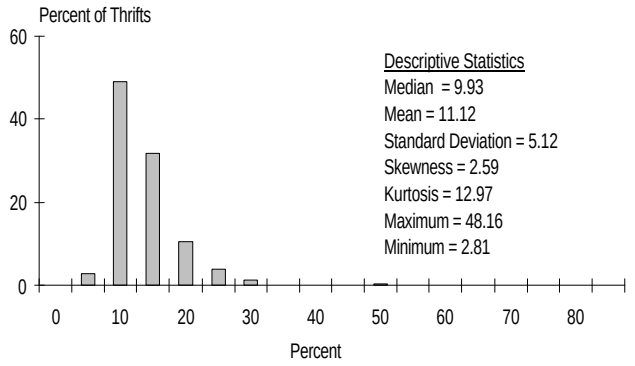


Figure 4. Assets Duration Distribution: Midwest

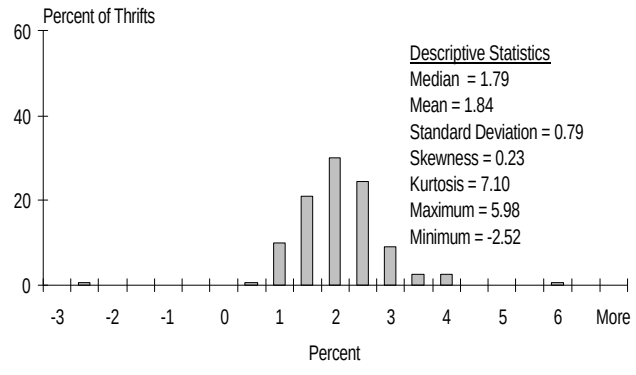
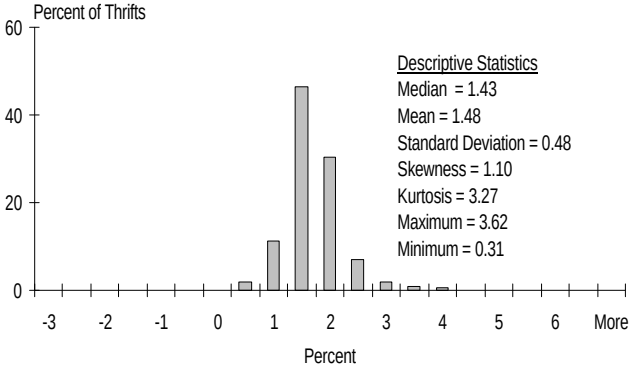


Figure 5. Liabilities Duration Distribution: Midwest



Appendix B 5 (West Region)

This appendix presents distributions for sensitivity, pre-shock and post-shock NPV ratios, and assets and liabilities duration for reporting thrifts in the West Region at second quarter end 1999. Also included in each figure are descriptive statistics.

Figure 1. Sensitivity Measure Distribution: West

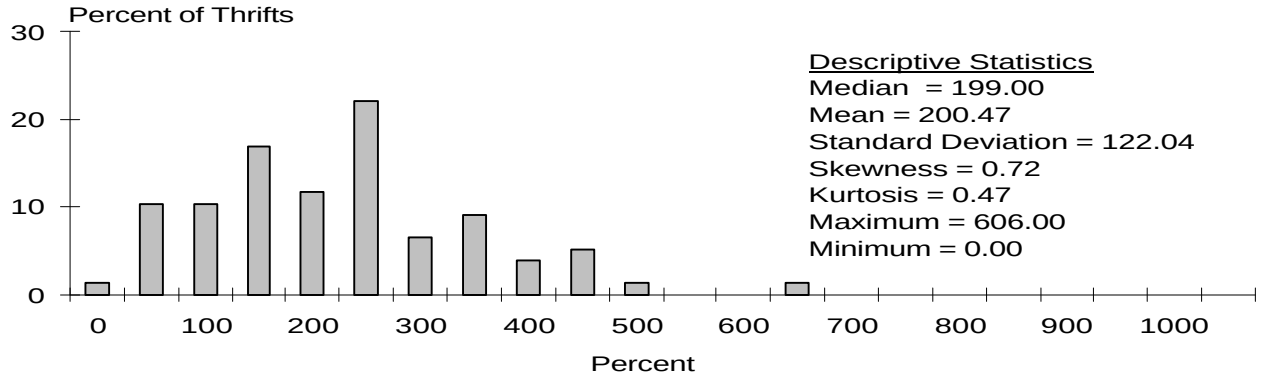


Figure 2. Pre-Shock NPV Ratio Distribution: West

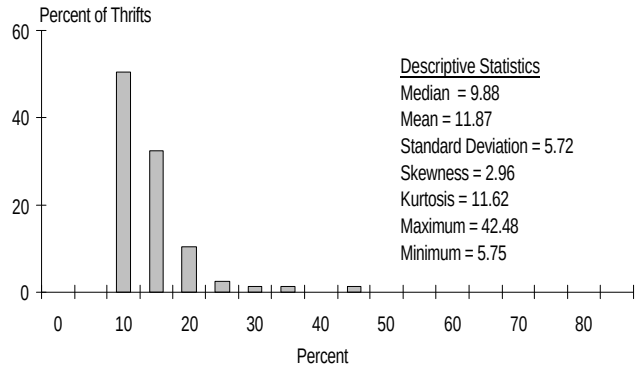


Figure 3. Post-Shock NPV Ratio Distribution: West

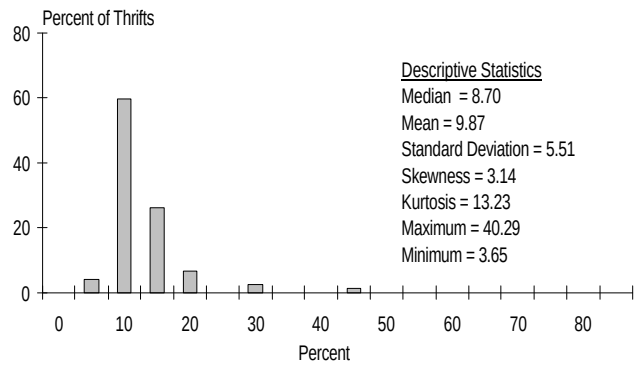


Figure 4. Assets Duration Distribution: West

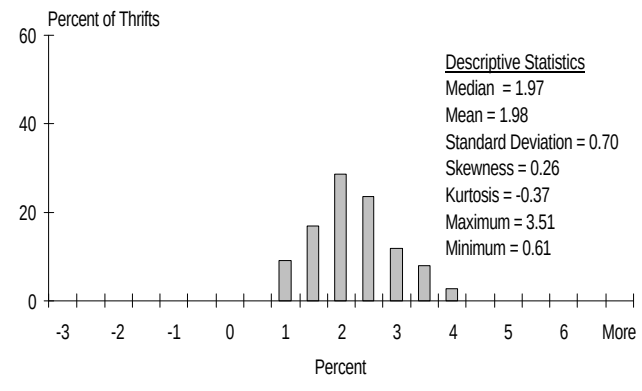
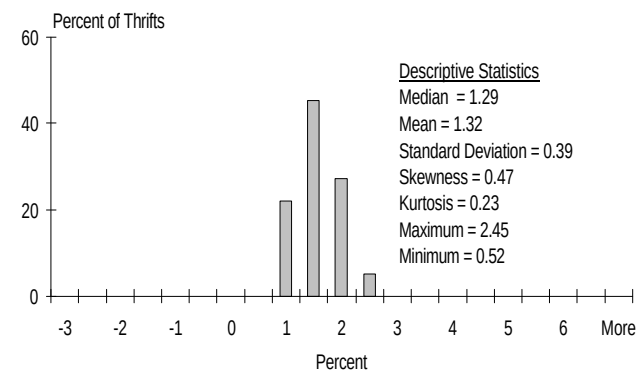


Figure 5. Liabilities Duration Distribution: West



GLOSSARY

Pre-Shock NPV Ratio	Equity-to-assets expressed in present value terms (i.e., base case NPV divided by present value of assets).
Post-Shock NPV Ratio	Equity-to-assets ratio expressed in present value terms following an adverse 200 basis point interest rate shock. Also referred to as the exposure ratio.
Sensitivity Measure	Difference between Pre-shock and Post-shock NPV Ratios (expressed in basis points).
Estimated Change in NPV	The percentage change in base case NPV caused by an interest rate shock.
Duration	Duration is a measure of the price sensitivity of a financial instrument for small changes in yield. The higher the duration of an instrument, the greater is its price sensitivity. For example, an asset with duration of 1.6 will appreciate in value by about 1.6 percent for a one percentage point (100 basis points) decline in yield. The reverse would hold if yields rose by one percent.
Kurtosis	The kurtosis statistic measures the tendency of data to be distributed toward the tails, or ends, of the distribution. A distribution that is approximately normal has a kurtosis statistic close to 0.
Skewness	The skewness statistic measures the degree to which the data of a distribution are more spread out on one side than the other. A distribution that is approximately symmetric has a skewness statistic close to 0.

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