



# The Quarterly Review of Interest Rate Risk

Volume 4, Number 3

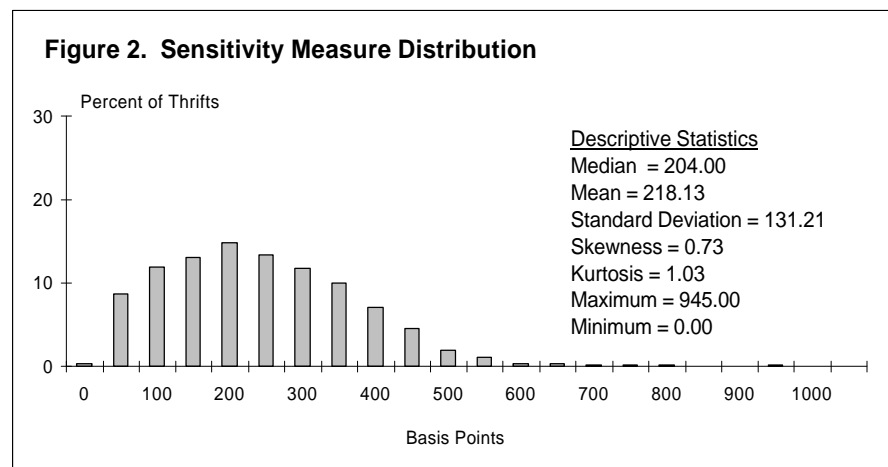
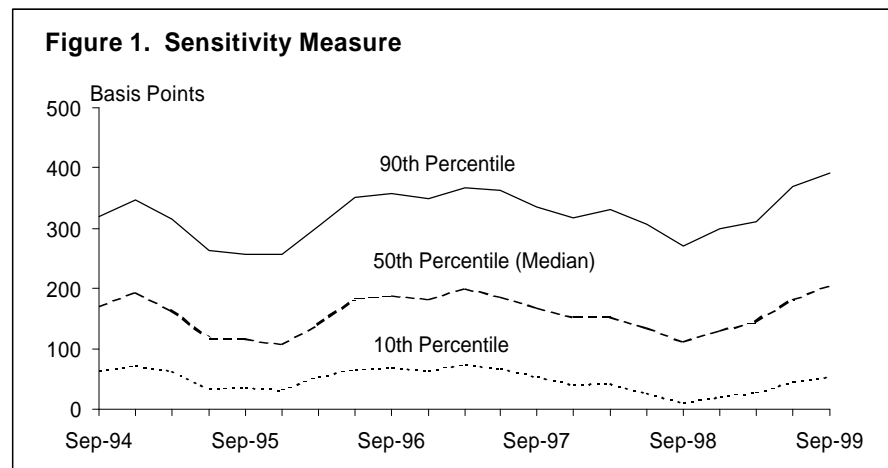
Third Quarter, 1999

## Sensitivity Reaches Record High in Third Quarter

### INDUSTRY TRENDS

The thrift industry's median sensitivity measure rose sharply in the third quarter, continuing an upward trend for the fourth consecutive quarter. Median sensitivity increased to 204 basis points in the third quarter of this year. As shown in Figure 1, this represents the highest level of median sensitivity for the thrift industry since OTS began tracking sensitivity with the Net Portfolio Value Model in 1992. An increase in interest rates in the third quarter and an increase in asset duration associated with larger thrift holdings of 30-year fixed-rate mortgages caused median sensitivity to rise. Figure 2 shows the distribution of the sensitivity measure for the entire industry for the third quarter of 1999.

Figure 3 shows that the yield curve shifted upward in the third quarter of 1999. With the exception of the six-month maturity yield, where the yield fell slightly in the third quarter, yields generally rose between 8 and 10 basis points for the other maturities. Figure 4 shows that the median effective duration of the indus-



try's assets increased, while the effective duration for liabilities remained unchanged at 1.5 during the same period. 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

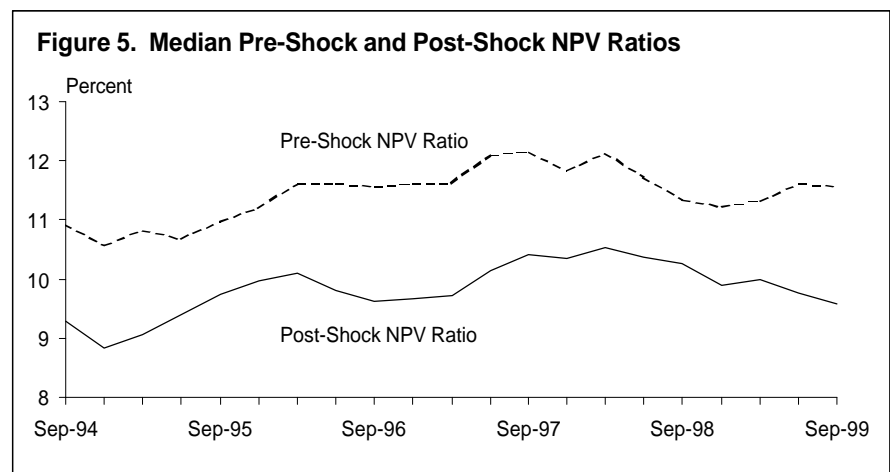
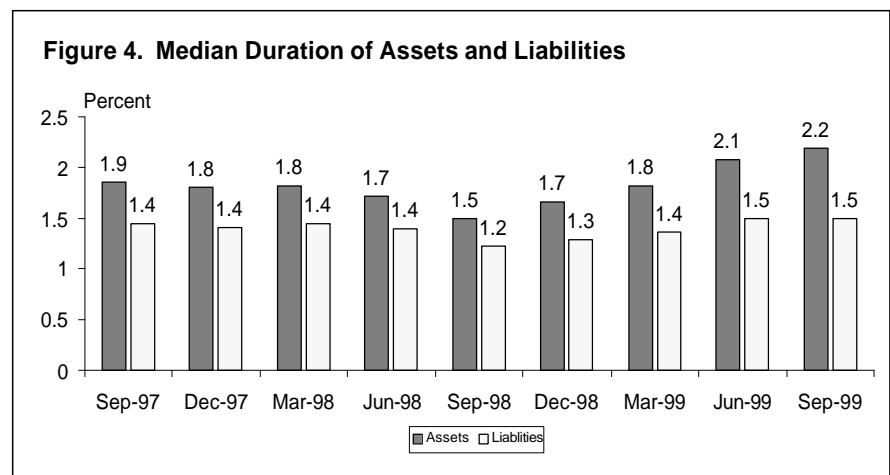
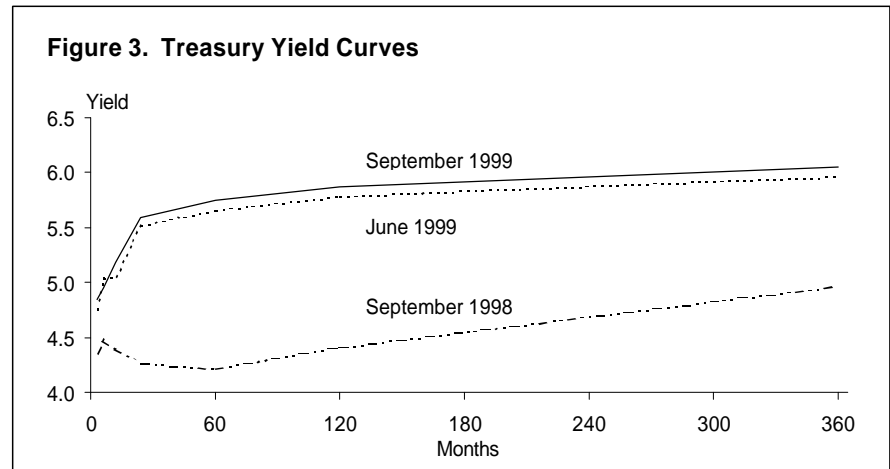
strong demand for 30-year fixed-rate mortgages.

As shown in Figure 5, the industry's median post-shock NPV ratio fell to 9.6 percent in the third quarter, the second consecutive quarterly decline in this aggregate measure of the industry's ability to absorb additional interest rate shocks. The median pre-shock NPV ratio in the third quarter fell slightly to 11.58 percent.

**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 third quarter of 1999, the thrift industry would lose 26.6 percent of its net portfolio value if rates rose by 200 basis points, up from 25 percent in the second quarter, and up from 12.3 percent in September 1998. The industry would gain 11.3 percent in value if rates fell by 200 basis points. These results are consistent with the substantially higher sensitivity displayed by the industry during the past year or so.

Figure 6 displays the effect of a 200 basis point increase in interest rates on the NPV of individual institutions. Of the 1,007 reporting savings associations, 93.3 percent would experience a loss of net portfolio value in this scenario, up from 92 percent in the second quarter of this year. About 48.4 percent of the industry would lose more than 20 per-



cent of their economic value, if plays the industry's distribution interest rates rose by 200 basis of gains and losses in net portfo- points, up from 42 in the second lio value for a decrease of 200 quarter. This result is consistent basis points in interest rates. Un- with the increase in median inter- der this scenario, approximately est rate sensitivity. Figure 7 dis- 83.7 percent of reporting thrifts

would experience increases in their net portfolio values, a number slightly higher than the 82 percent from the second quarter of this year.

Figures 8 and 9 compare the distributions of gains and losses for the second quarter of 1999 with those for the third quarter of 1999 for both a 200 basis point decrease and increase in interest rates. Figure 8 shows distribution changes that are consistent with greater industry exposure to interest rate movements. About 11 percent of thrifts would lose more than 40 percent and 24 percent of thrifts would lose 20-30 percent of net portfolio value in the third if interest rates rose by 200 basis points, up from 7.62 percent and 21.7 percent, respectively, in the second quarter.

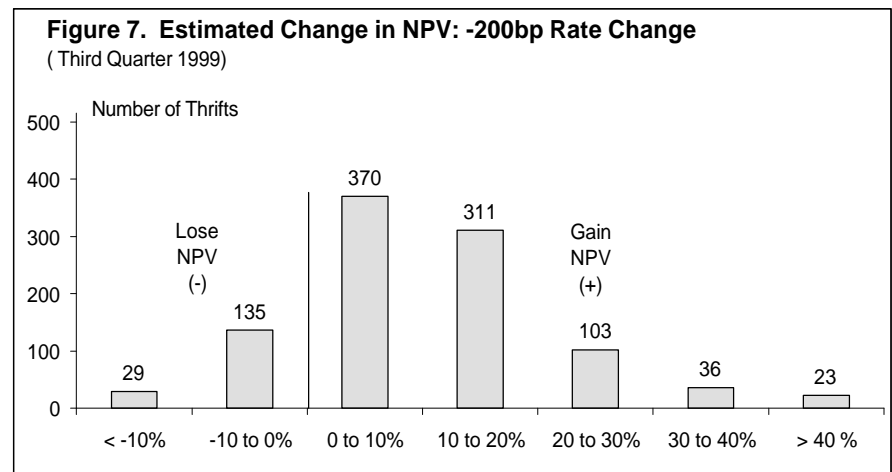
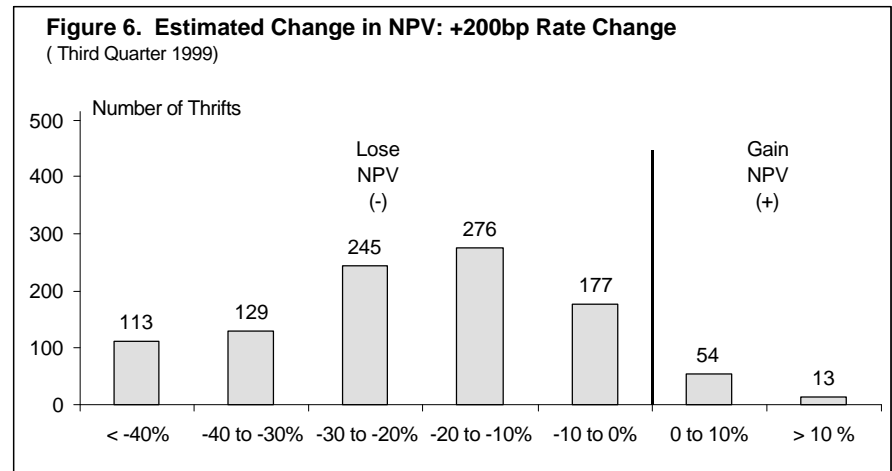
**Highly Exposed Thrifts**

As Figure 10 shows, the number of thrifts with post-shock NPV ratios below 4 percent increased dramatically in the third quarter. This represents the second consecutive quarterly increase in the number of thrifts below this capital threshold. The number of thrifts highly exposed to interest rate risk rose to 35, up from 24 in the previous quarter. This increase most likely reflects the continued decline in post-shock NPV ratios caused by the longer mortgage durations associated with recent refinancing activity.

Figure 11 shows that the percent of thrifts with post-shock NPV ratios below 4 percent also

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

Change in Interest Rates (Basis Points)	Percentage Change in NPV			Ratio of NPV to Assets		
	Sep-98	Jun-99	Sep-99	Sep-98	Jun-99	Sep-99
+300	-23.0	-41.0	-43.8	7.7	5.8	5.4
+200	-12.3	-25.0	-26.6	8.7	7.2	6.9
+100	-4.5	-11.1	-11.9	9.3	8.4	8.1
Base Case	0.0	0.0	0.0	9.6	9.3	9.0
-100	1.7	6.2	7.5	9.7	9.7	9.6
-200	5.3	9.7	11.3	9.9	9.9	9.8
-300	11.0	14.1	15.8	10.3	10.2	10.1



increased to 3.48 percent of the capital, a high degree of NPV industry in the third quarter, from 2.35 percent in the second quarter. A thrift with a post-shock NPV ratio below 4 percent either has a relatively low level of sensitivity, or both. These highly exposed thrifts are subject to heightened OTS supervision.

**Regional Trends**

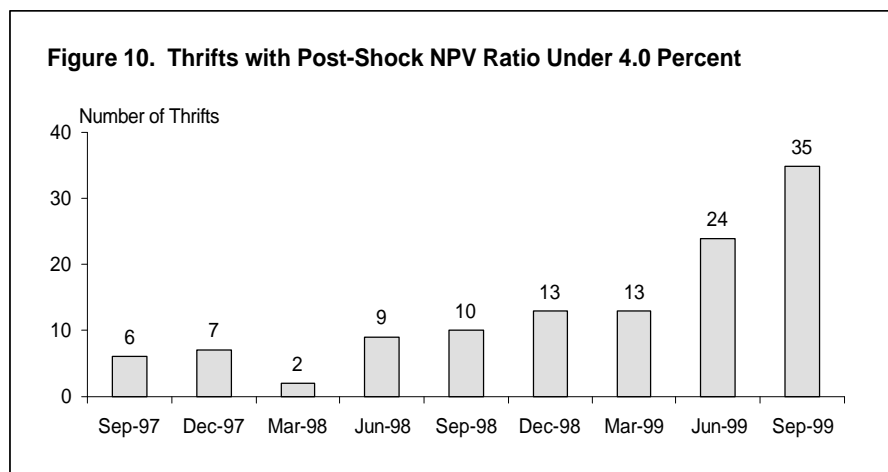
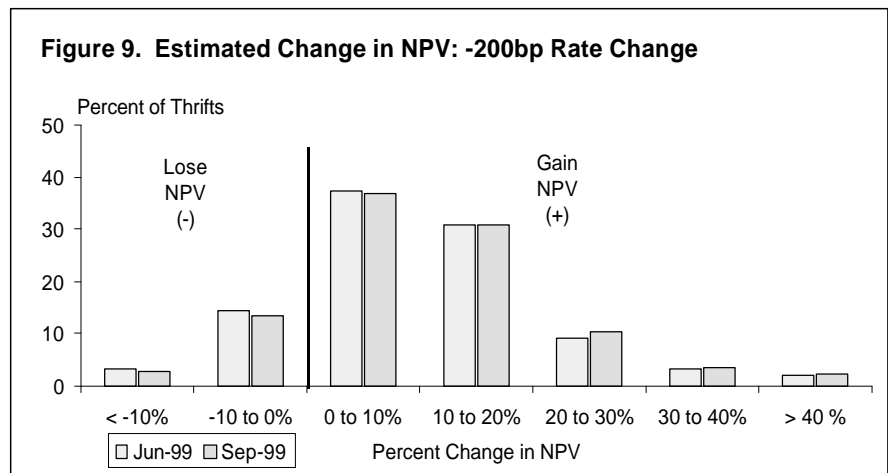
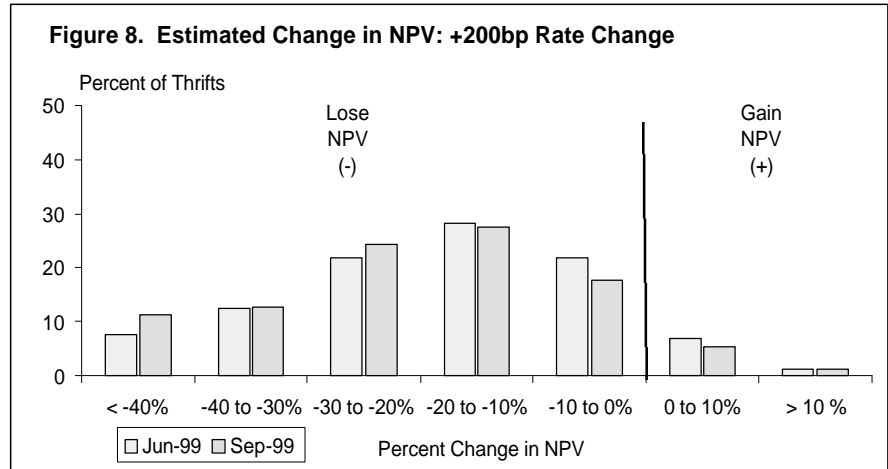
Figure 12 shows the median sensitivity measures for the entire industry and for each OTS region for the second and third quarters of 1999. The Northeast Region had the largest median sensitivity measure of 251.5 in the third quarter of 1999, while the Midwest Region had the smallest measure of 164.5 in the third quarter. The Northeast Region’s increase of 26 basis points in sensitivity represented the largest quarterly change in sensitivity.

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 second and third quarters of 1999. The West Region had the smallest post-shock NPV ratio of 8.12 in the third quarter of 1999. The Northeast Region had the largest relative decline, as its median post-shock NPV fell from 9.17 percent to 8.68 percent.

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

**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



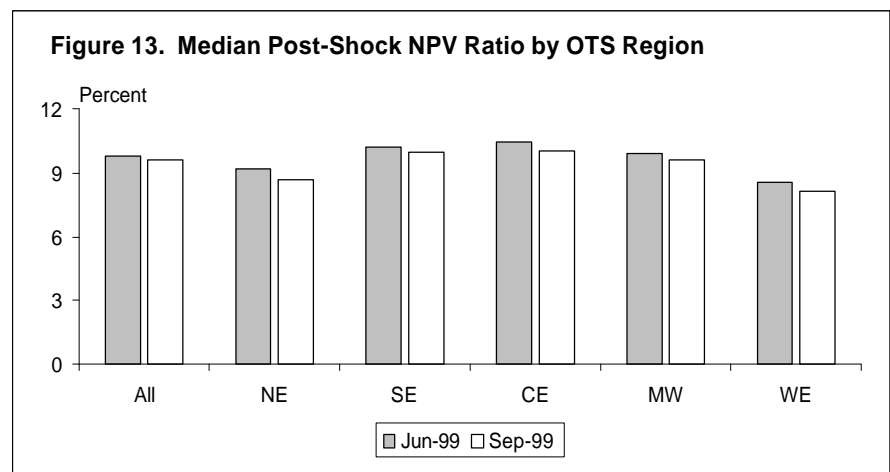
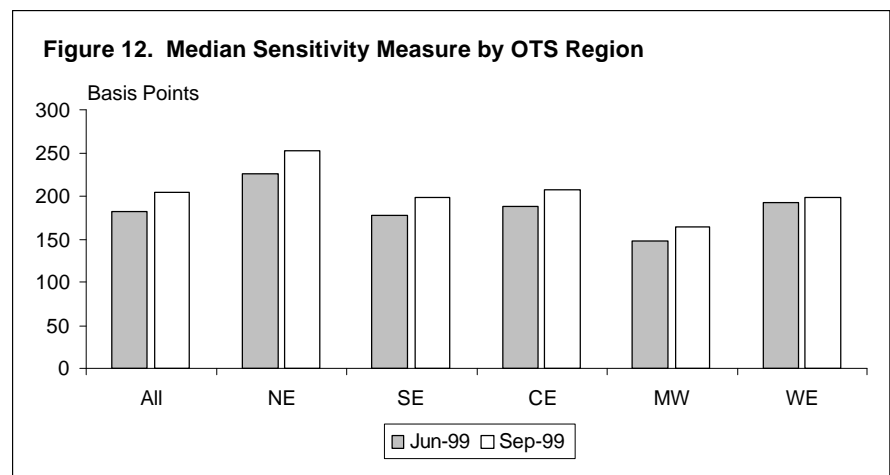
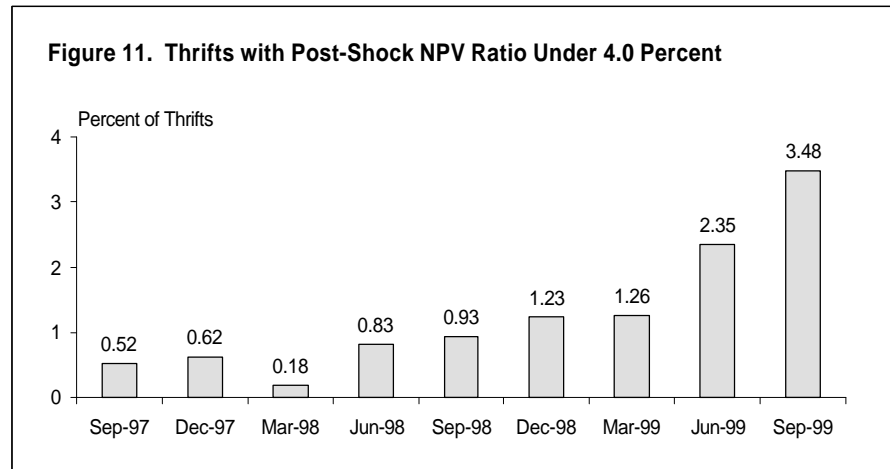
for the third quarter of 1999. For comparison, Table 3 reports results using the NPV Model for the second quarter of 1999. Each cell of the tables shows both the number of thrifts and the corresponding percent of thrifts with the various combinations of post-shock NPV ratio and sensitivity specified in Thrift Bulletin 13a (TB 13a).

Of the 1,007 reporting thrifts in the third quarter of 1999, 45.1 percent had post-shock NPV ratios that exceeded 10 percent, down from 47.6 percent in the second quarter. With regard to interest rate sensitivity, 49.1 percent of thrifts had sensitivity measures of 200 basis points or less, down from 54.6 percent in the second quarter. Based on the "Level of Interest Rate Risk" guidance provided in TB 13a, 64 percent of thrifts might initially be assigned a "1" risk rating, 19.9 percent a "2" rating, 10.7 percent a "3" rating, and 5.5 percent a "4" or a "5" rating.

A comparison of Tables 3 and 4 reveals several important differences between the second and third quarters. First, there was an increase in the number of thrifts with post-shock NPV ratios below 4 percent in the third quarter. Second, there was a substantial decrease in the number of thrifts with sensitivity under 100 basis points in September 1999. In June, 26.2 percent of thrifts had sensitivity measures below 100 basis points, while in September, that percentage dropped to 21.2 percent.

Third, the number of thrifts with sensitivities over 400 basis points increased substantially. This high sensitivity group grew almost 25 percent, increasing from 7 percent of the industry in the second quarter to 8.7 percent in the third quarter.

Finally, the number of thrifts that might initially be considered



to bear "significant" or "high" increase in sensitivity and decrease in post-shock NPV ratio for the industry in the third quarter, these results need continued careful monitoring. As noted in the previous issue of the *Quarterly Review*, these results need continued careful monitoring. As noted in the previous issue of the *Quarterly Review*, these results need continued careful monitoring.

terly Review, 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.

**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 CMT (ten-year CMT). As shown in the figure, the ten-year CMT index tracks the commitment rate for 30-year fixed-rate mortgages well.

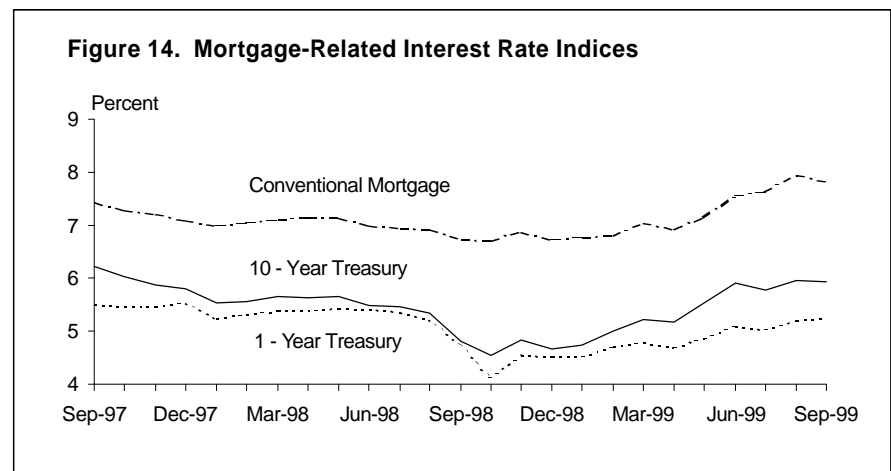
Despite recent concerns about inflationary pressure associated with the ongoing economic expansion, both the ten-year CMT and the Commitment rate fell in the third quarter. The one-year CMT rose slightly, probably reflecting the increased demand for ARMs brought about by recent increases in the rates on 30-year fixed-rate mortgages.

**Table 2. Post-Shock NPV Ratio and Sensitivity Measure Matrix**

September 1999	Sensitivity Measure				Total
	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)	
Over 10%	140 13.9% Minimal Risk (1)	132 13.1% Minimal Risk (1)	160 15.9% Minimal Risk (1)	22 2.2% Moderate Risk (2)	454 45.1%
6% to 10%	69 6.9% Minimal Risk (1)	139 13.8% Minimal Risk (1)	169 16.8% Moderate Risk (2)	30 3.0% Significant Risk (3)	407 40.4%
4% to 6%	4 0.4% Minimal Risk (1)	9 0.9% Moderate Risk (2)	77 7.6% Significant Risk (3)	21 2.1% High Risk (4 or 5)	111 11.0%
Below 4%	0 0.0% Moderate Risk (2)	1 0.1% Significant Risk (3)	19 1.9% High Risk (4 or 5)	15 1.5% High Risk (4 or 5)	35 3.5%
<b>Total</b>	<b>213</b> 21.2%	<b>281</b> 27.9%	<b>425</b> 42.2%	<b>88</b> 8.7%	<b>1007</b> 100%

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

June 1999	Sensitivity Measure				Total
	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)	
Over 10%	172 16.8% Minimal Risk (1)	138 13.5% Minimal Risk (1)	157 15.3% Minimal Risk (1)	20 2.0% Moderate Risk (2)	487 47.6%
6% to 10%	91 8.9% Minimal Risk (1)	137 13.4% Minimal Risk (1)	168 16.4% Moderate Risk (2)	25 2.4% Significant Risk (3)	421 41.2%
4% to 6%	5 0.5% Minimal Risk (1)	18 1.8% Moderate Risk (2)	52 5.1% Significant Risk (3)	16 1.6% High Risk (4 or 5)	91 8.9%
Below 4%	0 0.0% Moderate Risk (2)	0 0.0% Significant Risk (3)	13 1.3% High Risk (4 or 5)	11 1.1% High Risk (4 or 5)	24 2.3%
<b>Total</b>	<b>268</b> 26.2%	<b>293</b> 28.6%	<b>390</b> 38.1%	<b>72</b> 7.0%	<b>1023</b> 100%



## Tidbit for the Quarter

### Integrating Stress Testing with Risk Management

#### MANY DO IT BUT FEW ARE SATISFIED

Although many firms have stress-testing programs, few are satisfied with their efforts or the results. Our experience suggests that one or more of the following attributes of effective stress testing are usually missing:

- **Must be stressful enough.** Smaller moves are not relevant for stress testing and are already taken care of in risk and capital measures. As long as the events are not impossible, no matter how unlikely or draconian it may seem, it is important to include it. Also, it is important to account for the speed and duration of the stress event.
- **Must identify key assumptions.** It must answer “What key assumptions when changed would substantially change my results and comfort level with the portfolio and risks?” Unless explicitly examined, key assumptions tend to remain hidden.
- **Must make risks transparent.** It must describe and measure the difficult-to-visualize, nonlinear, asymmetric risks, such as options and prepayment risks.
- **Must not compartmentalize risks.** It must identify linkages across risks and markets and describe how these can change, for example, the impact of correlations on liquidity, the impact of extreme correlations on prices. Stress tests must also take into account the ripple effect across markets, industries, and institutions, for example, LTCM.
- **Must be updated systematically.** Stress tests must be refreshed and updated systematically to capture new sources of surprises and current portfolio characteristics.
- **Must be aligned to the firm’s culture.** To be effective, methods selected should take into consideration the culture, management style, and processes of the firm. For example, how quantitative or qualitative a stress testing program is will be driven primarily by the firm’s style and comfort.

#### WHAT TO DO WITH THE RESULTS OF STRESS TESTING

In our experience, the following process works well:

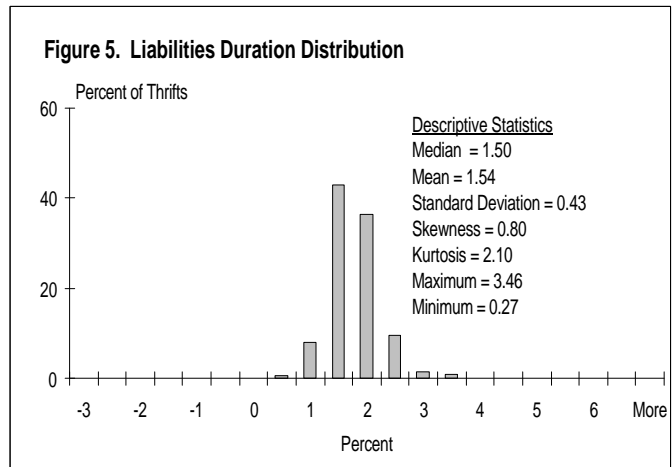
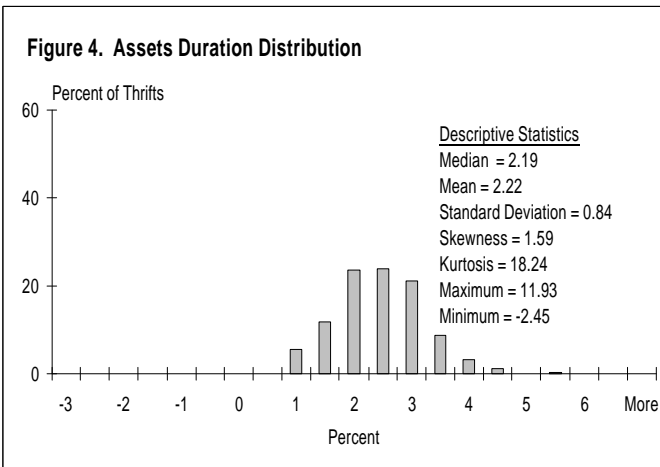
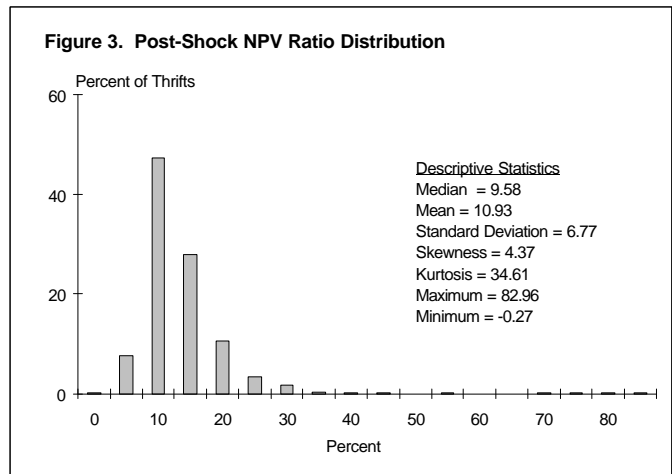
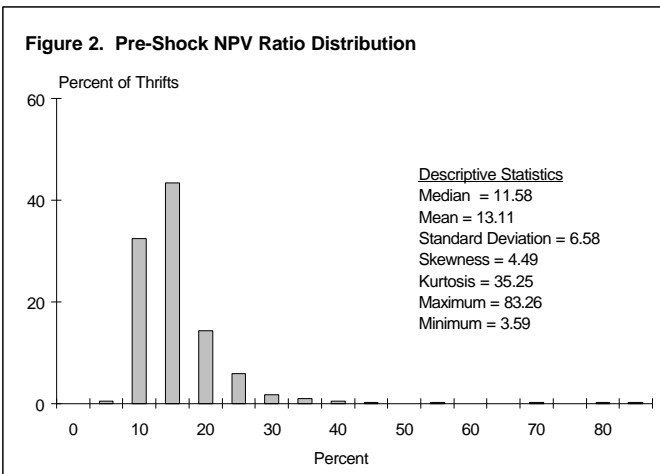
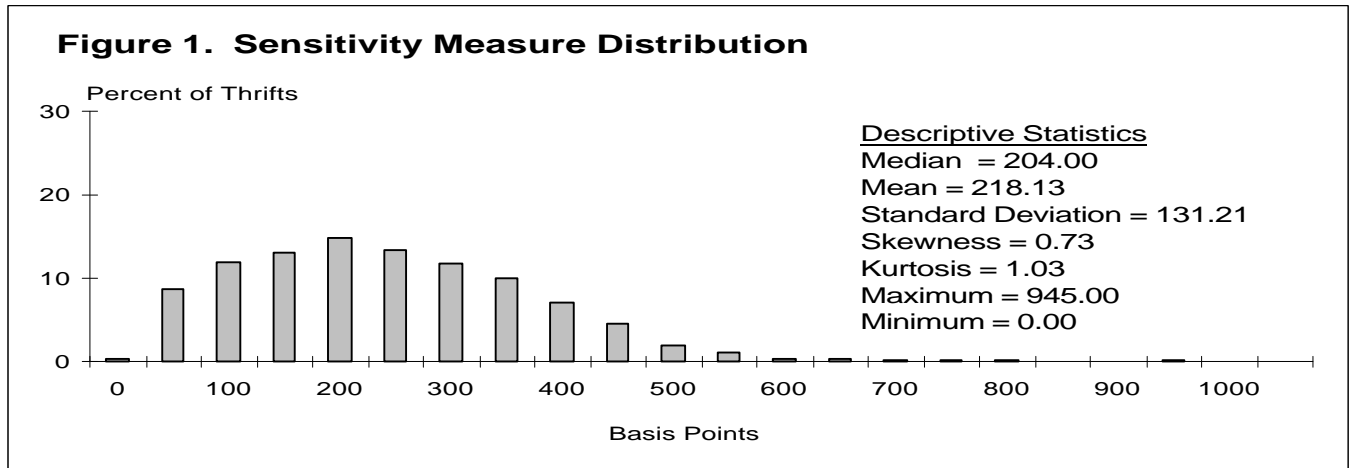
- Senior management must take the lead in designing the stress-testing program and in asking the extreme and difficult questions.
- Scan all markets and extraordinary risk events to learn the lessons from history.
- Identify the key assumptions, common drivers, and other vulnerabilities affecting the portfolio and earnings.
- Run stress tests and scenarios appropriate for the portfolio and risks.
- Systematically refresh the battery of stress tests specific to the portfolio and repeat periodically (some tests weekly, others yearly, others as needed).

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This material was taken from “Integrating Stress Testing with Risk Management,” *Bank Accounting & Finance*, L-S. Wee and J. Lee, Spring, 1999, pp. 16-17.

## Appendix A (All Thrifts)

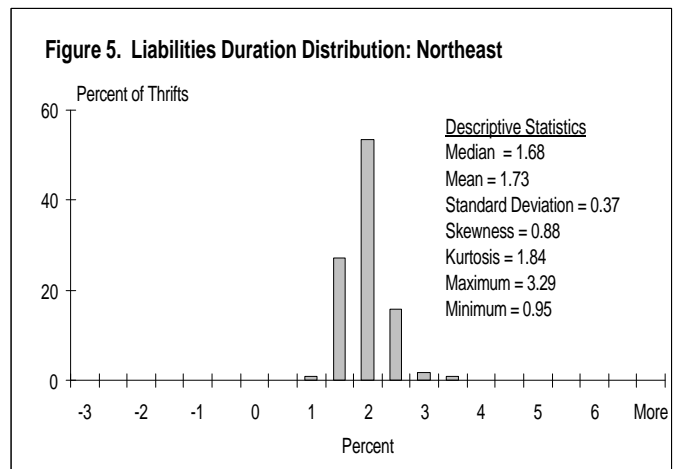
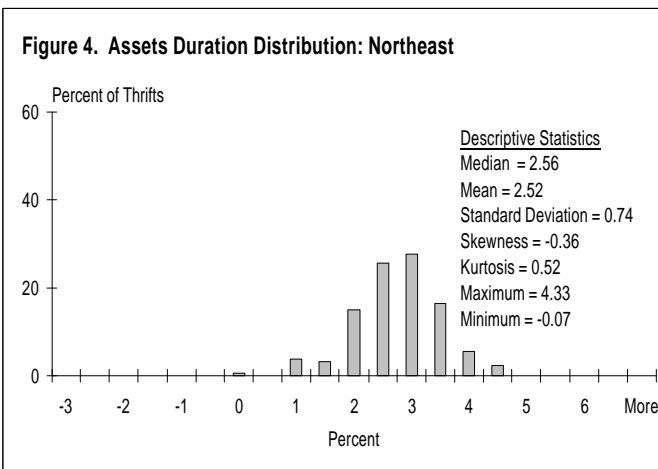
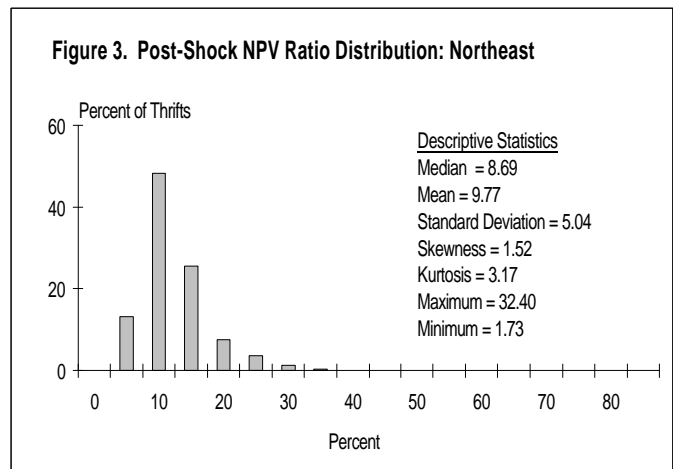
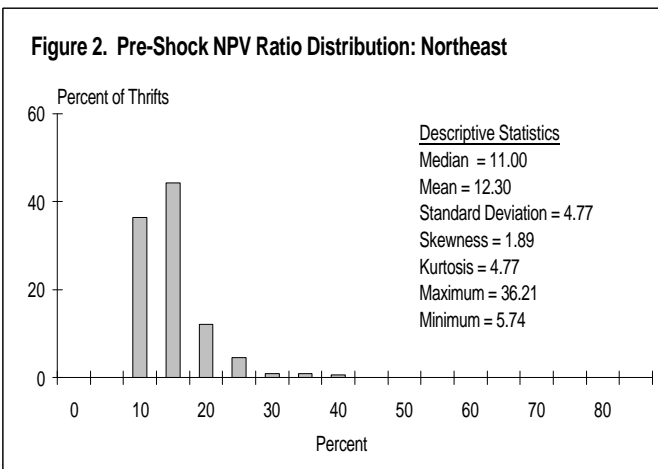
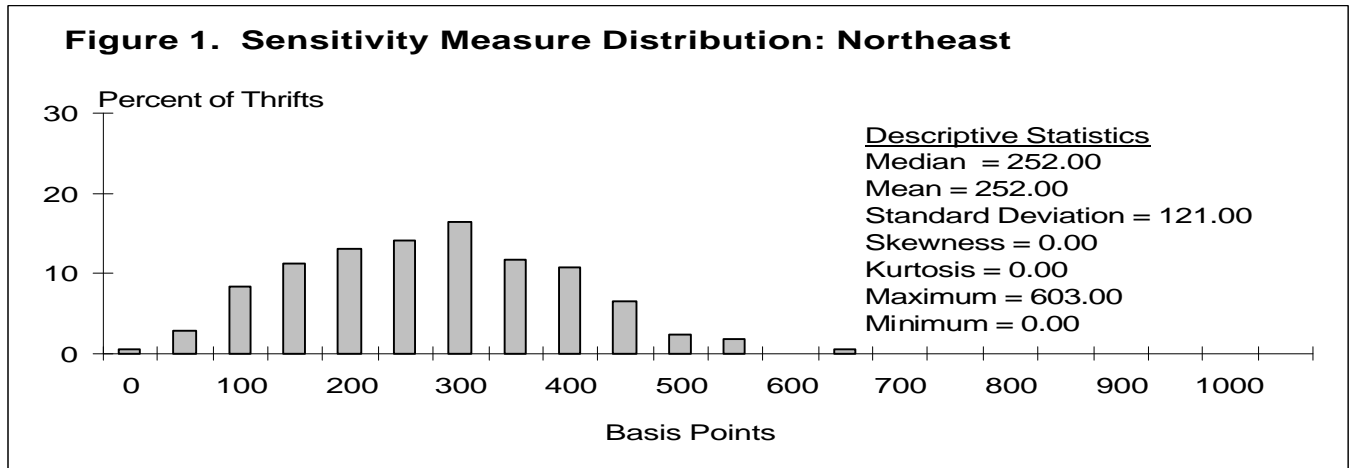
This appendix presents distributions for sensitivity, pre-shock and post-shock NPV ratios, and assets and liabilities duration for all reporting thrifts at third quarter end 1999. Also included in each figure are descriptive statistics.





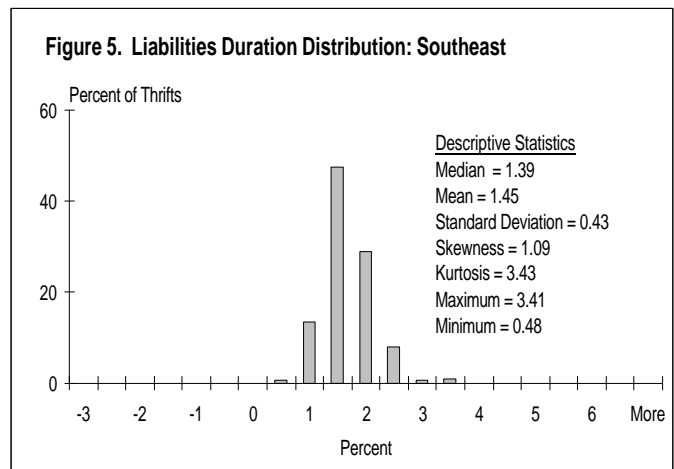
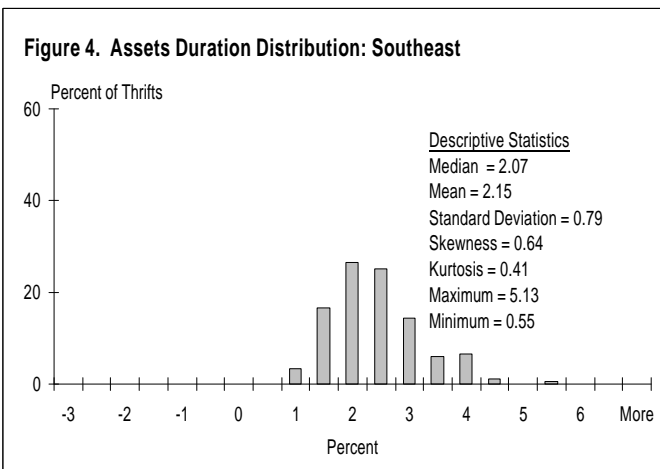
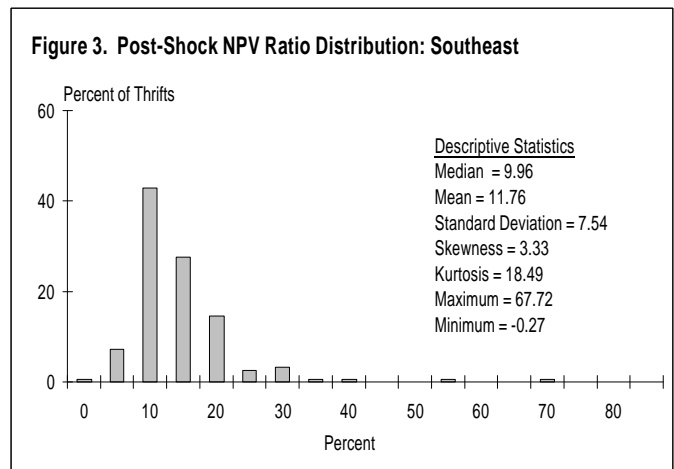
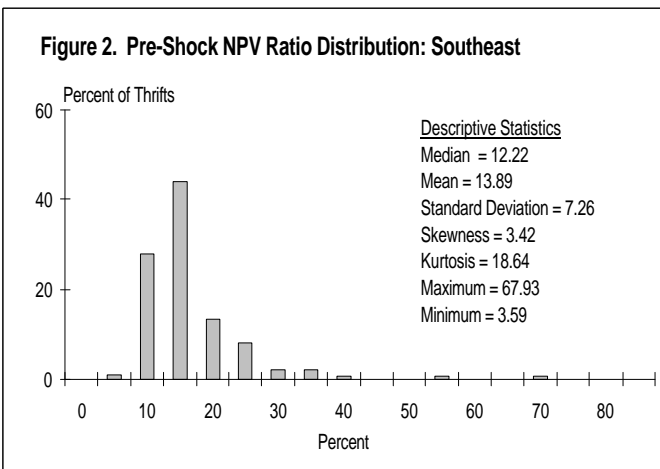
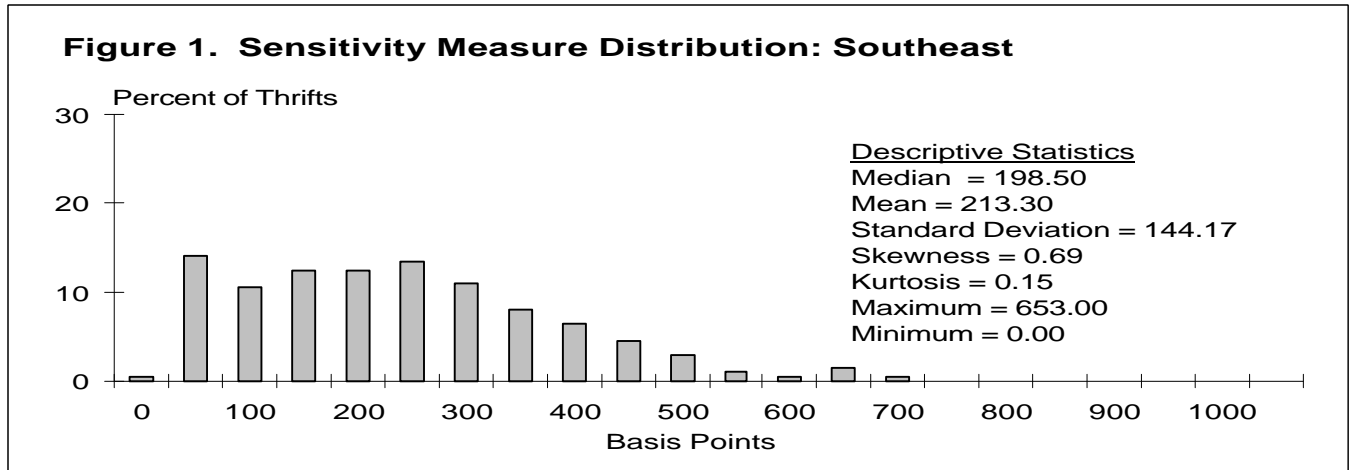
## Appendix B 1 (Northeast Region)

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 third quarter end 1999. Also included in each figure are descriptive statistics.



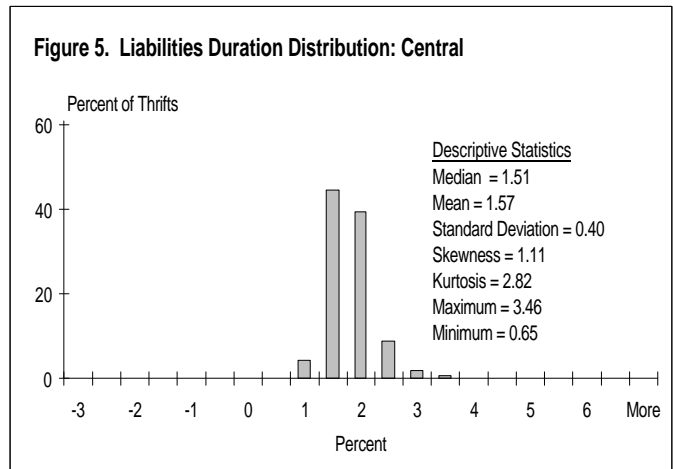
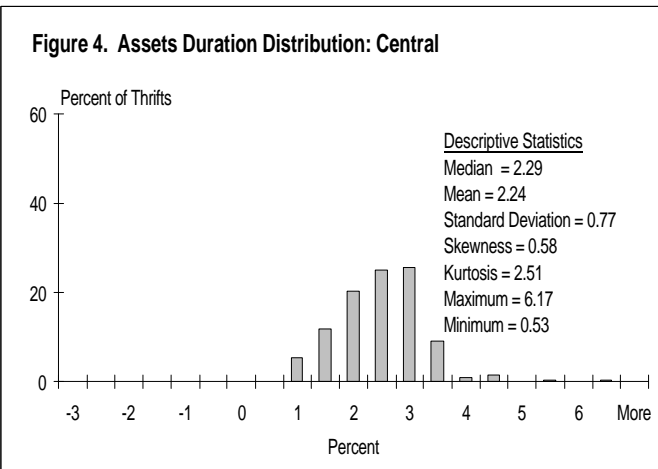
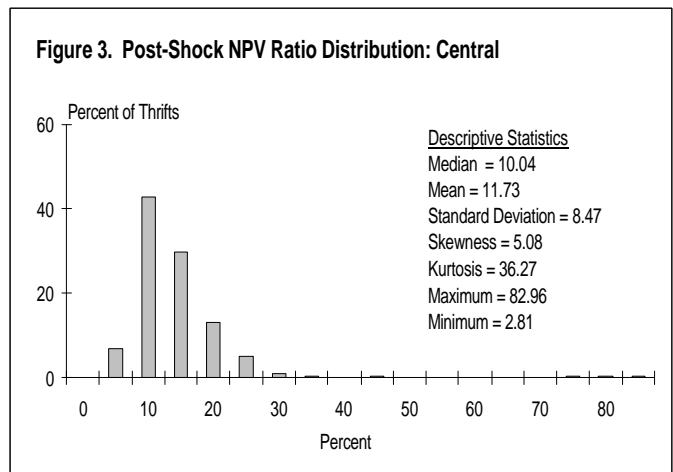
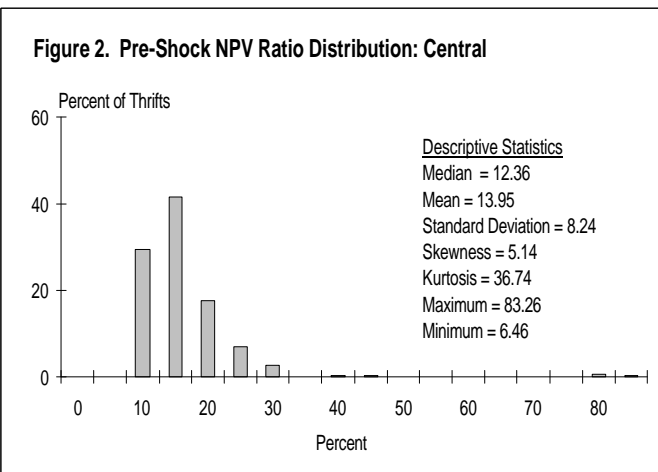
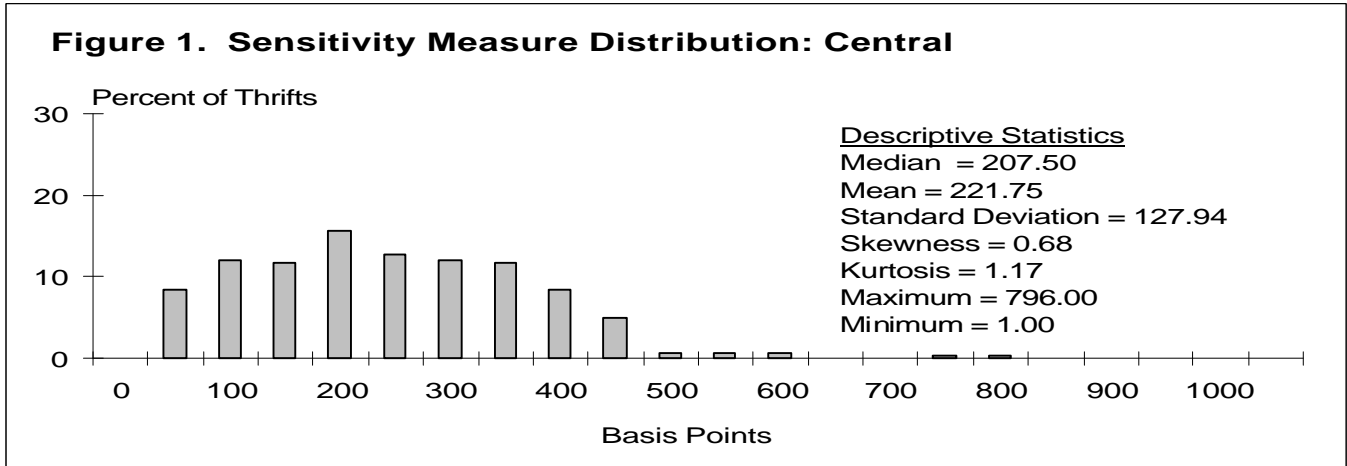
## Appendix B 2 (Southeast Region)

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 third quarter end 1999. Also included in each figure are descriptive statistics.



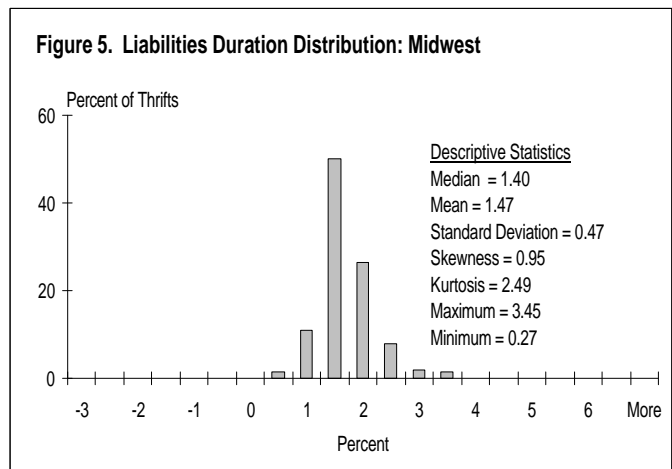
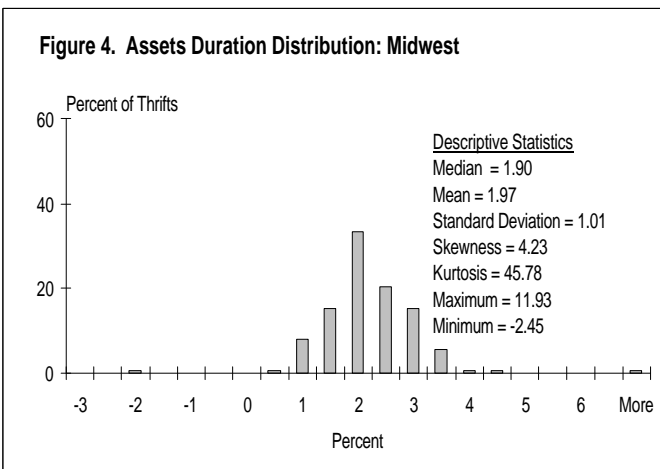
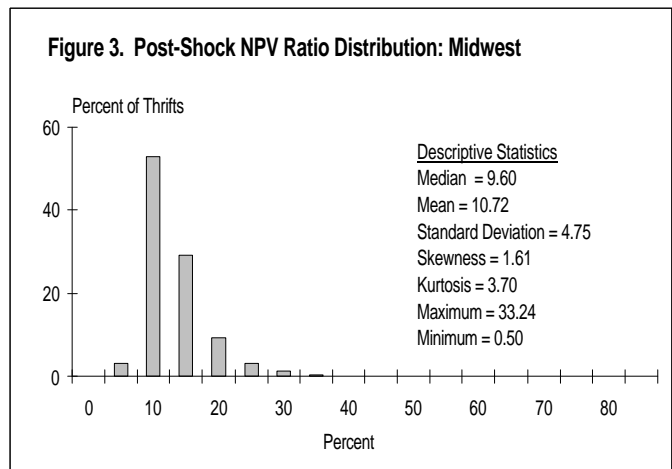
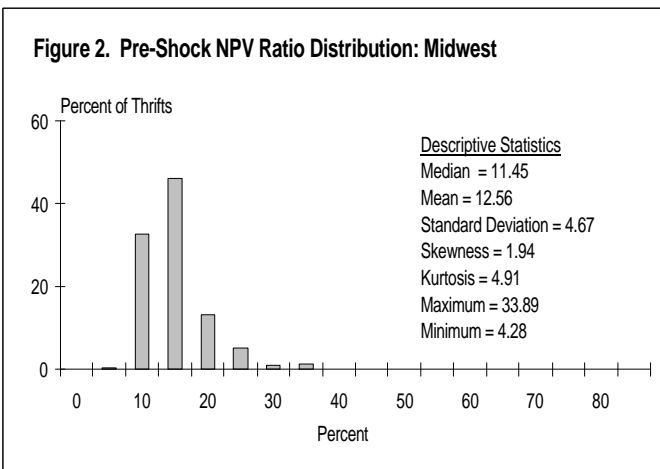
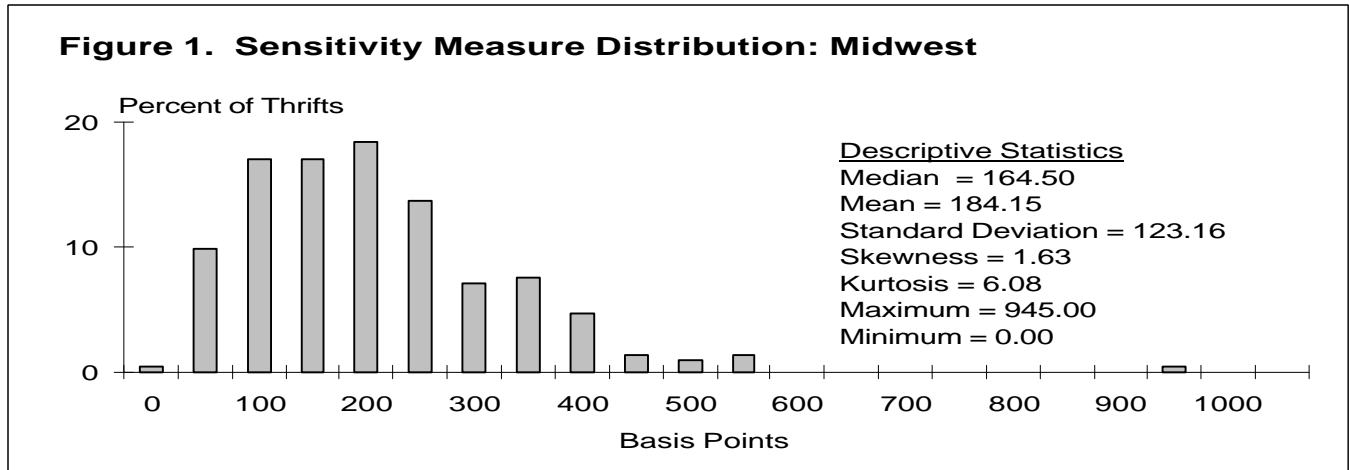
## Appendix B 3 (Central Region)

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 third quarter end 1999. Also included in each figure are descriptive statistics.



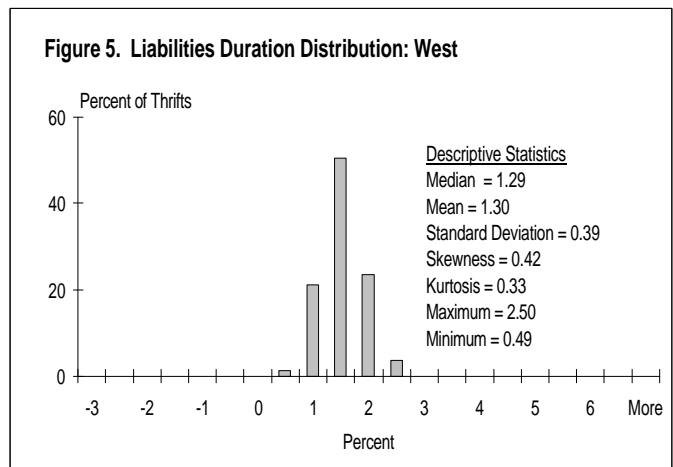
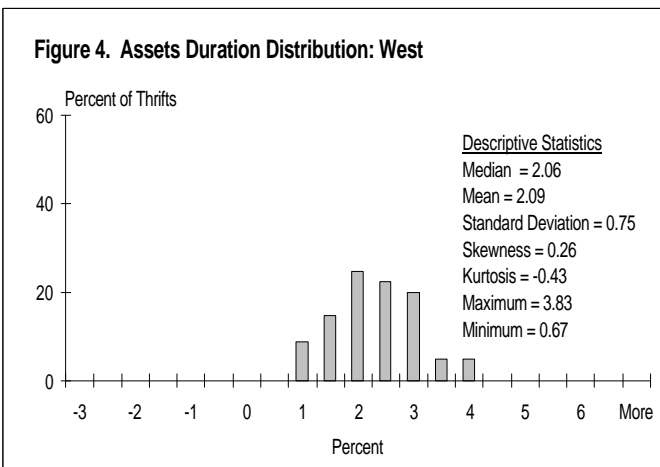
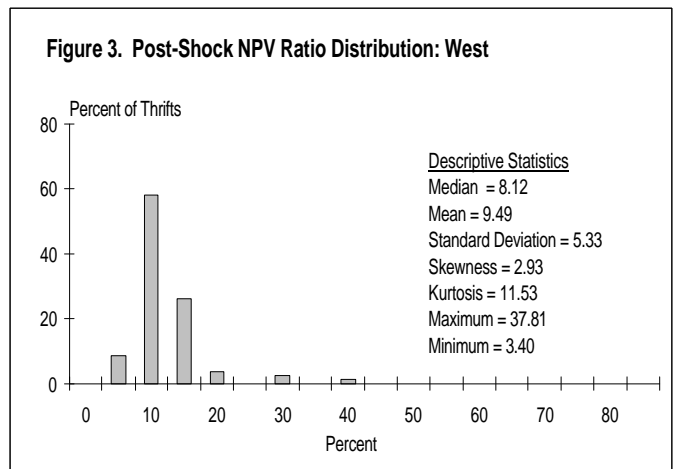
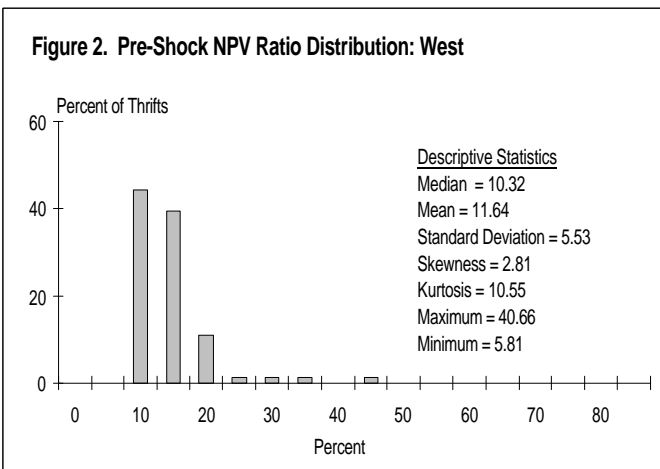
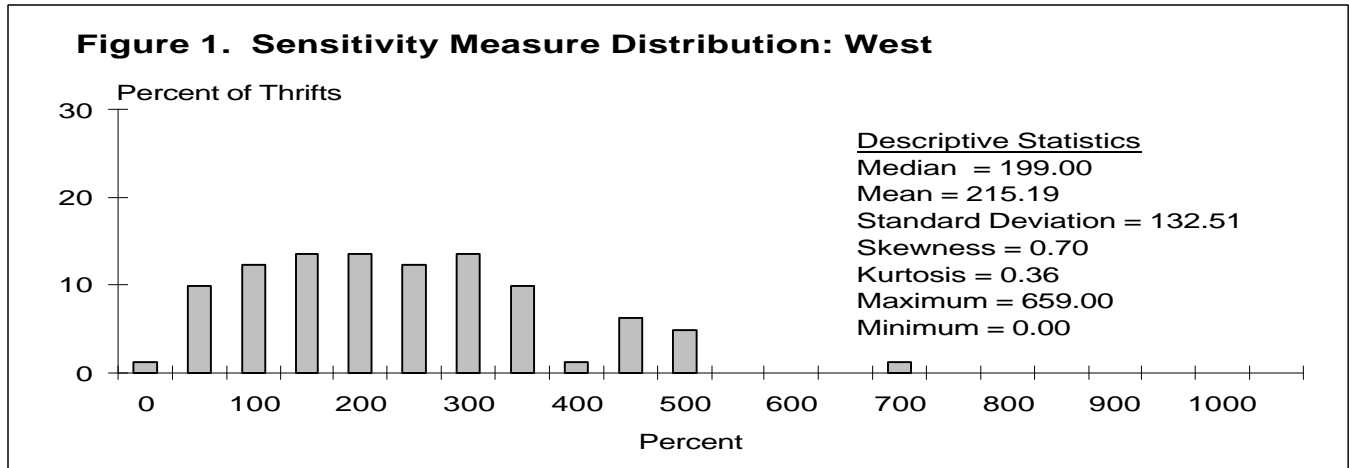
## Appendix B 4 (Midwest Region)

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 third quarter end 1999. Also included in each figure are descriptive statistics.



## 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 third quarter end 1999. Also included in each figure are descriptive statistics.



**GLOSSARY**

<b>Pre-Shock NPV Ratio</b>	Equity-to-assets expressed in present value terms (i.e., base case NPV divided by present value of assets).
<b>Post-Shock NPV Ratio</b>	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.
<b>Sensitivity Measure</b>	Difference between Pre-shock and Post-shock NPV Ratios (expressed in basis points).
<b>Estimated Change in NPV</b>	The percentage change in base case NPV caused by an interest rate shock.
<b>Duration</b>	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.
<b>Kurtosis</b>	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.
<b>Skewness</b>	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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