



# The Quarterly Review

## of Interest Rate Risk

Volume 2, Number 3

Third Quarter 1997

### EXECUTIVE SUMMARY

#### Interest Rate Sensitivity Continues to Decline in the Third Quarter

The OTS Net Portfolio Value (NPV) Model showed that interest rate sensitivity for the thrift industry continued to fall during the third quarter of 1997. At the end of the third quarter, the median sensitivity measure was 168 basis points, a decrease of 19 basis points from the previous quarter. The decline in interest rates during the third quarter accounted for most of the decrease. The industry's ability to absorb interest rate shocks improved slightly, as the median post-shock NPV ratio rose to 10.4 percent. Although the overall financial condition of the thrift industry remains strong, a substantial segment of the industry remains vulnerable to potential interest rate shocks. Approximately 35 percent of OTS-regulated thrifts would lose more than 20 percent of their net portfolio value with a 200 basis point rise in interest rates.

#### QUARTERLY TREND ANALYSIS

The median sensitivity measure declined to 168 basis points at the end of the third quarter, falling 19 basis points from the end of the second quarter (Chart 1, page 4). A downward shift in the yield curve accounted for most of the decrease in sensitivity over the period. The yield curve at the end of September was lower and flatter than the yield curve at the end of June (Chart 2, page 4). As a result, the effective durations of the industry's assets decreased slightly, while the effective durations of liabilities remained constant (Chart 3, page 5).<sup>1</sup>

The median pre-shock NPV ratio for the industry increased to 12.2 percent in

September, and the median post-shock NPV ratio increased to 10.4 percent (Chart 4, page 5). Higher post-shock NPV ratios provide thrifts with the ability to better withstand interest rate shocks.

#### ASYMMETRY OF GAINS AND LOSSES

Table 1 (page 8) reports the percentage change in both the aggregate net portfolio value and NPV ratio for the industry under different interest rate scenarios. For the thrift industry, the loss in net portfolio value when interest rates increase is greater than the gain in aggregate net portfolio value when interest rates decrease. For example, in the third quarter of 1997, the thrift industry would lose about 18 percent

of its net portfolio value if rates rose by 200 basis points, but would gain only 5.6 percent in value if rates fell by 200 basis points. This asymmetry between gains and losses is largely a result of the embedded call option in mortgage loans and mortgage-backed securities. As interest rates fall, the market value of most mortgages increases, but at a diminishing rate, because declining interest rates make it more likely that mortgages will be prepaid.

As in past quarters, exposure to changes in interest rates was particularly pronounced at some thrifts. The right panel of Chart 5 (page 6) shows the distribution of the percentage change for an increase in interest rates of 200 basis points. Of the 1,134 reporting thrifts, 92 percent would experience a loss of net portfolio value in that scenario. Moreover, about 35 percent of the industry (398 thrifts) would lose more than 20 percent of their economic value if interest rates rose by 200 basis points. The left panel of Chart 5 shows the industry distribution of gains and losses in net portfolio value for a decrease of 200 basis points in interest rates. Under this usually favorable scenario, 75 percent of reporting thrifts would experience increases in their net portfolio values.

Chart 6 (page 6) compares the distributions of gains and losses for the third quarter of 1997 with those for the third quarter of 1996 given both a 200 basis point decrease and increase in interest rates.

### **INDUSTRY PROFILE**

The pre- and post-shock NPV ratios of each reporting thrift are plotted in the NPV

Sensitivity Chart (Chart 8, page 7). In this chart, the horizontal axis represents a thrift's pre-shock NPV ratio and the vertical axis represents its post-shock NPV ratio. The 45 degree line represents the "zero sensitivity line," where pre- and post-shock NPV ratios are equal. Each dot denotes the pre- and post-shock NPV capital ratios for a thrift. The six thrifts with post-shock NPV ratios of less than 4 percent appear in the area below the dotted horizontal line. A thrift whose post-shock NPV ratio is below the 4 percent line either has a relatively low level of capital, a high degree of NPV sensitivity, or both. Thrifts with exposure ratios below 4 percent should strengthen their capital position or reduce their interest rate sensitivity.

As Chart 7 (page 7) shows, the number of thrifts with exposure measures below 4 percent decreased in the third quarter to six, well below the recent peak level of 142 in December 1994. The low number of thrifts with exposure ratios below 4 percent is consistent with both the historically high equity capital ratios in the industry and the percent of individual thrifts that are "well capitalized."

### **THRIFT SIZE AND INTEREST RATE RISK**

Table 2 (page 9) reports the pre-shock and post-shock NPV ratios and the sensitivity measures for three different thrift-size categories. Not surprisingly, the pre-shock and post-shock NPV ratios vary inversely with thrift size. That is, as thrift size increases, both ratios fall. It is well-known that smaller thrifts have larger capital ratios than bigger thrifts.

The relation between thrift size and the sensitivity measure, however, displays a

different pattern. As noted in previous issues of this publication, an upside down U-shape characterizes the relation between thrift size and sensitivity. This result seems counterintuitive, since bigger thrifts might be expected to have lower interest rate sensitivity due to their greater use of financial derivatives for hedging purposes. Differences in the percentages of fixed- and adjustable-rate mortgages (ARMs) held by small and medium sized thrifts appears to account for the U-shape pattern. Thrifts with assets below \$500 million hold fewer COFI ARMs and more 15-year fixed-rate mortgages in their portfolios than thrifts with assets between \$500 million and \$1 billion. Holding the number of adjustable- and fixed-rate mortgages in a thrift's loan portfolio constant, sensitivity rises as the number of COFI ARMs increases, but falls as the number of 15-year fixed rate mortgages increases. Consequently, interest rate sensitivity for small thrifts is lower than for medium sized thrifts. The greater use of derivatives for hedging interest rate risk accounts for the lower sensitivity of the large thrifts, those with assets over \$1 billion.

All three asset size groups increased their post-shock NPV ratios over the last year. Thrifts with assets under \$500 million as well as thrifts with assets between \$500 million and \$1 billion sustained a reduction in interest rate sensitivity. Thrifts with assets greater than \$1 billion had little change in their median sensitivity over the past year.

### **INTEREST RATE RISK AND THRIFT PORTFOLIO COMPOSITION**

Table 3 (page 9) compares the composition of mortgage loan portfolios for thrifts in the top and bottom deciles

when thrifts are ranked by the size of their sensitivity measure in the third quarter 1997. As shown in the table, thrifts in the top decile (the most sensitive thrifts) of the sensitivity measure distribution hold a smaller percentage of ARMs and a larger percentage of fixed-rate mortgages (FRMs) than those thrifts with sensitivity measures in the bottom decile (the least sensitive thrifts). The results in Table 3 suggest that ARMs can be used by thrifts to lower their exposure to interest rate shocks.

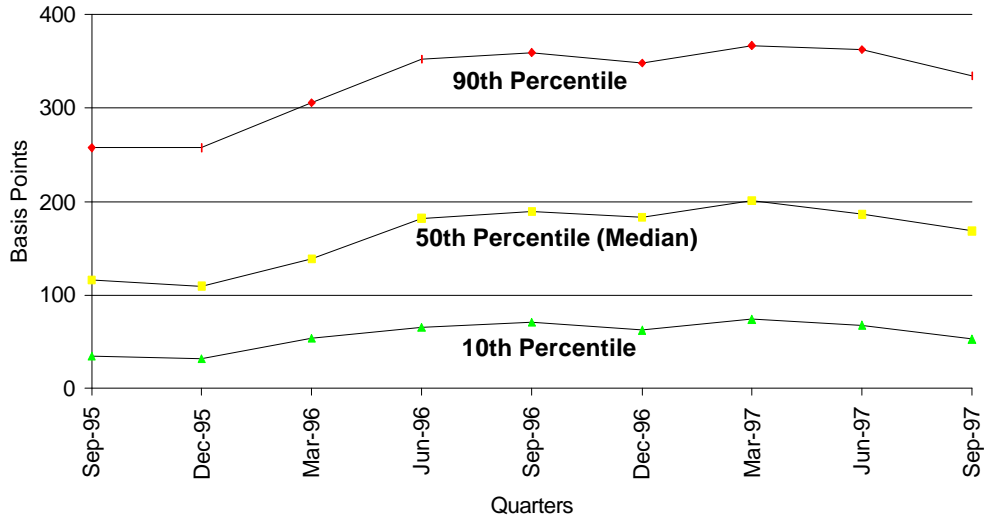
### **REGIONAL PROFILE**

The top panel of Chart 9 (page 8) presents the median sensitivity measures for the entire industry and each OTS region for the third quarter of 1996 and 1997. The Northeast Region had the largest median sensitivity measure in the second quarter of 1997, while the Midwest Region had the smallest. In comparing the third quarter of 1996 and 1997, the Midwest Region experienced the largest decrease in median interest rate sensitivity. Over the same period, the Southeast Region had the smallest decrease in the median sensitivity measure.

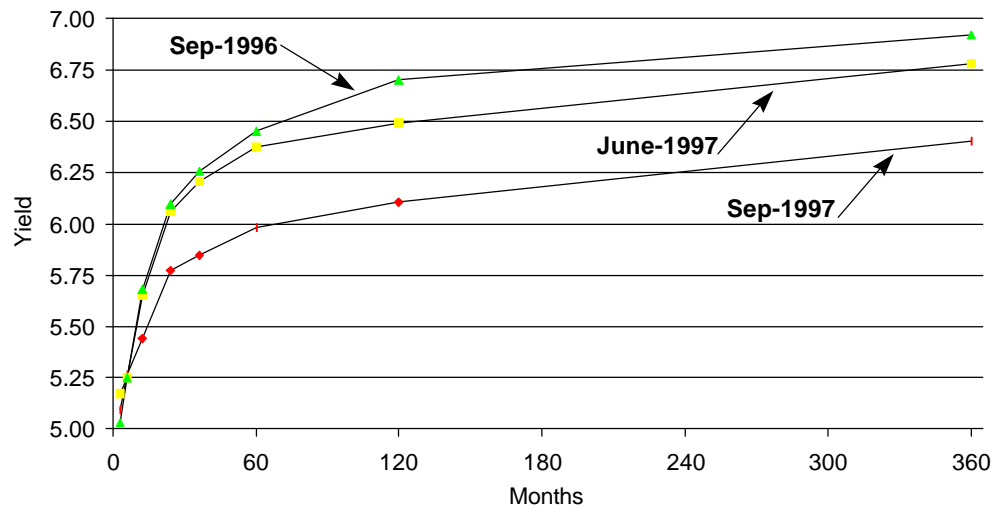
The lower panel of Chart 9 shows the median post-shock NPV ratio for the thrift industry and each OTS region. The increase in post-shock NPV ratios between the third quarter of 1996 and 1997 for the entire industry and each region suggests the decrease in interest rate risk exposure was widespread. The Central Region had the highest post-shock NPV ratio, while the West Region had the lowest post-shock NPV ratio.

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Jonathan Jones, Ph.D.

**Chart 1  
Sensitivity Measure**

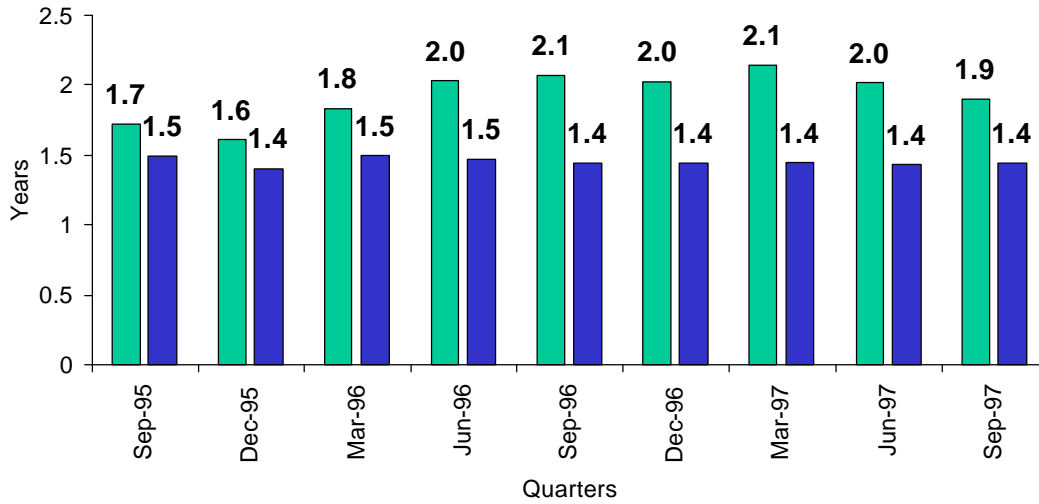


**Chart 2  
Treasury Yield Curves**



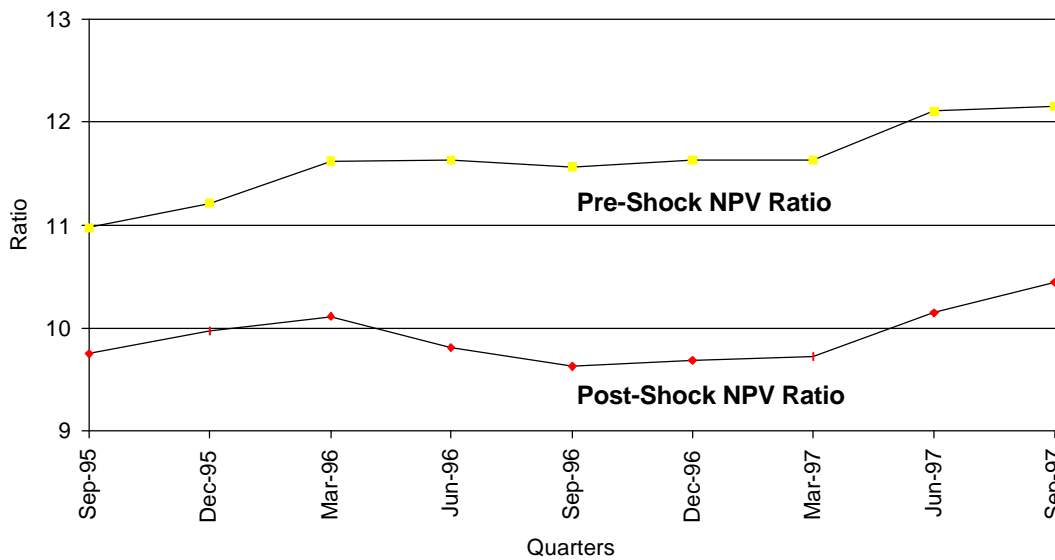
Source: Bloomberg

**Chart 3**  
**Duration of Assets and Liabilities**

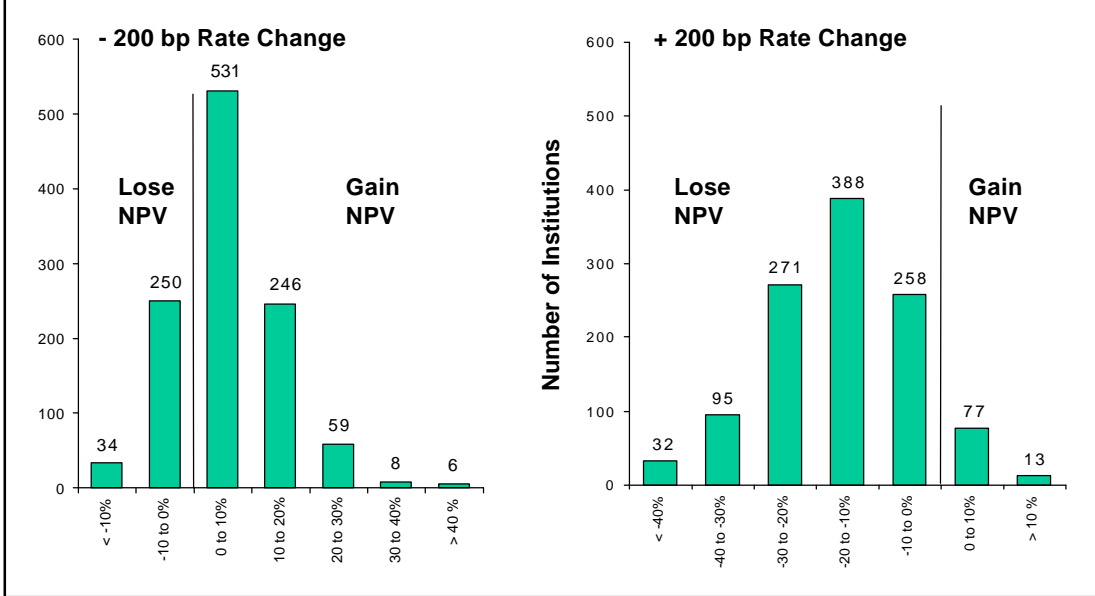


Note: Aggregate industry data. Asset durations have been adjusted to exclude deposit intangibles; liability durations have been adjusted to include deposit intangibles.

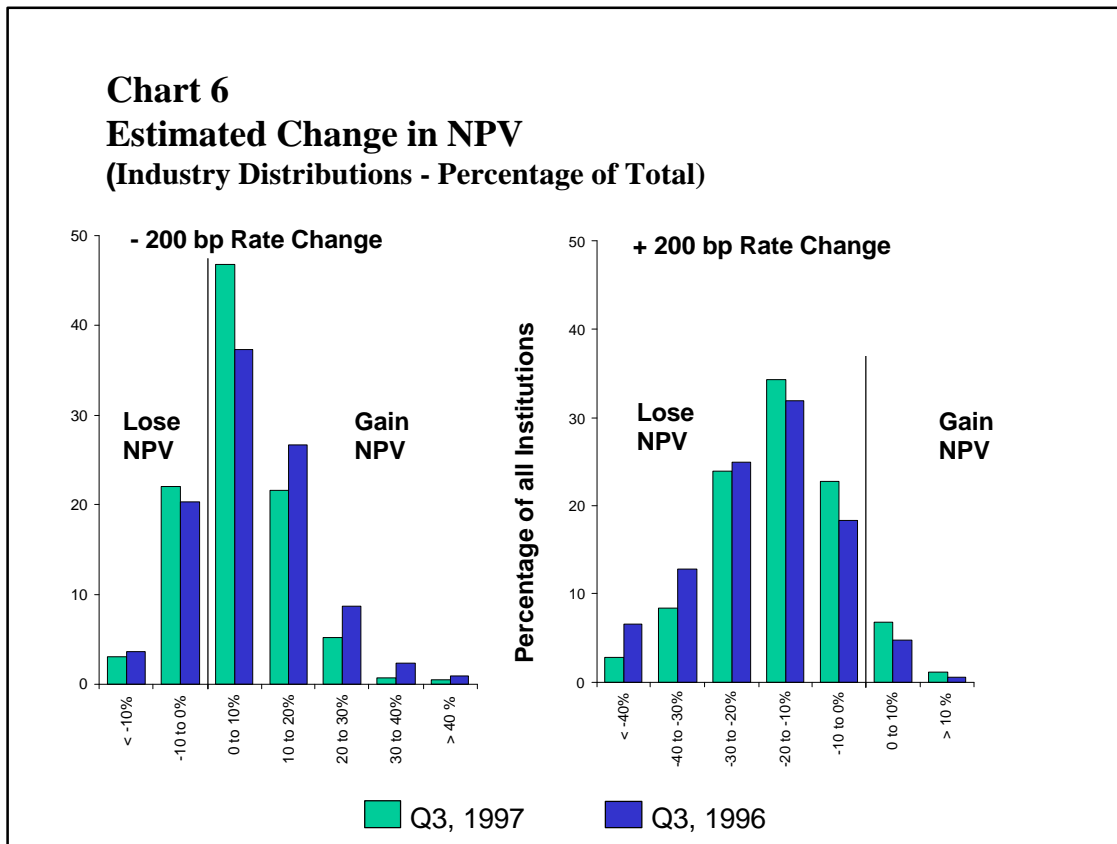
**Chart 4**  
**Median Pre-Shock and Post-Shock NPV Ratios**



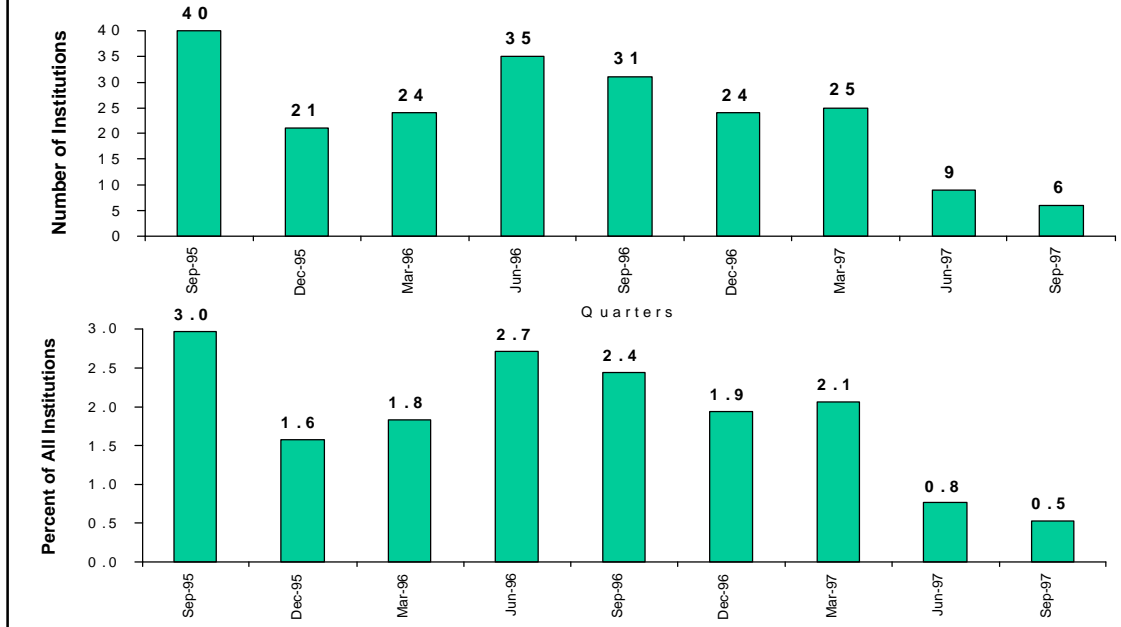
**Chart 5**  
**Estimated Change in NPV**  
**(Industry Distributions, Third Quarter 1997)**



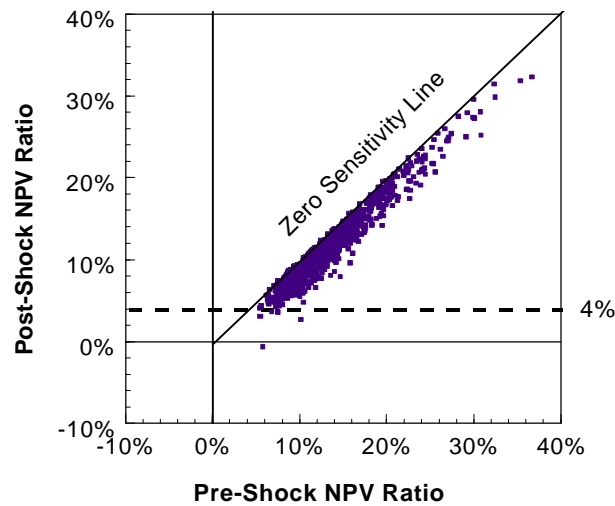
**Chart 6**  
**Estimated Change in NPV**  
**(Industry Distributions - Percentage of Total)**

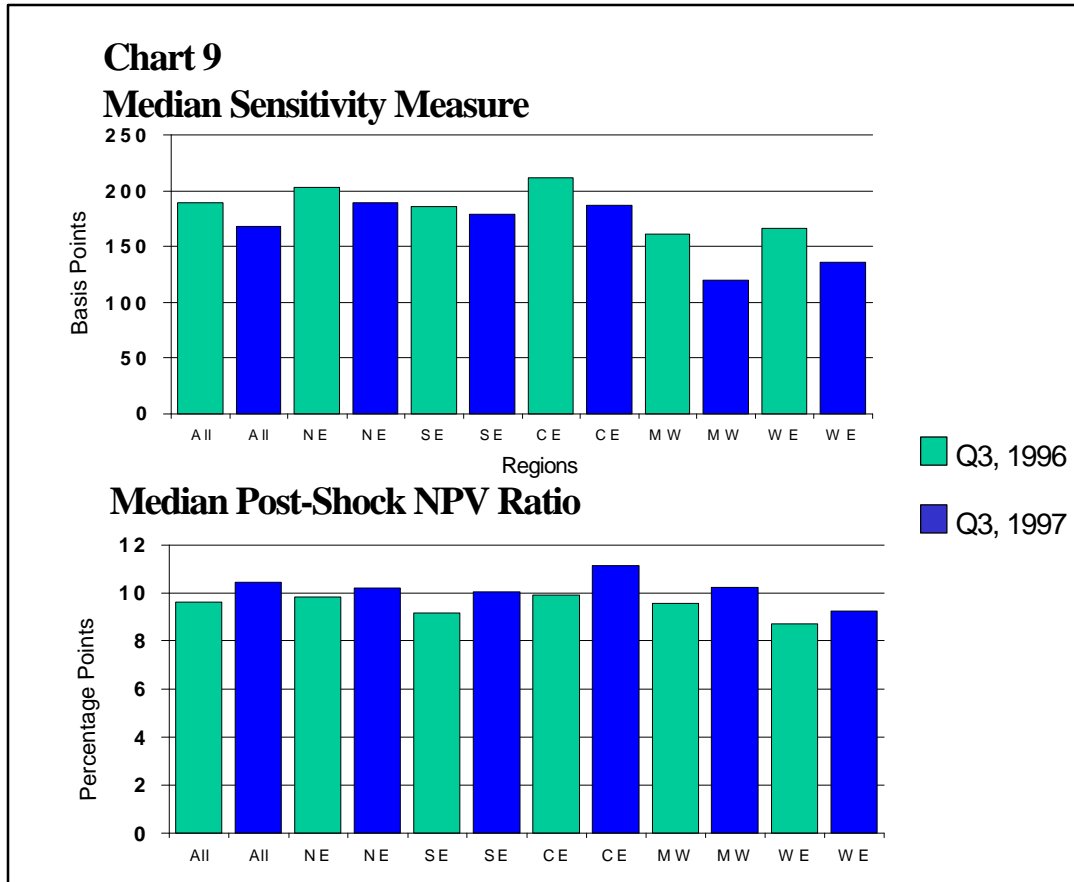


**Chart 7  
Institutions with Exposure Ratios Under 4.0 Percent**



**Chart 8  
Sensitivity Chart  
(Third Quarter 1997)**





**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-96	Jun-97	Sep-97	Sep-96	Jun-97	Sep-97
+300	-33.6	-33.4	-30.4	6.9	7.2	7.5
+200	-20.4	-20.2	-18.1	8.1	8.5	8.6
+100	-8.9	-8.8	-7.6	9.2	9.5	9.6
Base Case	0.0	0.0	0.0	9.9	10.3	10.2
-100	5.4	5.0	3.8	10.3	10.7	10.5
-200	7.0	6.3	5.6	10.4	10.7	10.6
-300	8.5	8.0	8.4	10.5	10.8	10.8



**Table 2**  
**Thrift Size and Interest Rate Risk Measures**  
**(Industry Medians)**

Base Case	Number of Institutions	NPV Ratios		Sensitivity Measure
		Pre-Shock	Post-Shock	
<b>September 1997</b>				
Under \$500 Million	941	12.600 %	10.900 %	165.0
\$500 to \$1 Billion	87	11.440	9.590	195.0
Over \$1 Billion	106	9.640	7.905	182.5

**Table 3**  
**Sensitivity and Thrift Portfolio Composition**  
**(Third Quarter 1997)**

**Sensitivity Ranking**

	Most Sensitive	Least Sensitive
Mortgage Loan Portfolio Percentage:		
% ARMs	22%	69%
% FRMs	78	31

Note: Most sensitive refers to the 90th percentile, while the least sensitive refers to the 10th percentile of the sensitivity measure distribution.

**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.

*This publication is available from the OTS PubliFax by calling (202) 906-5660 and requesting document 11730. Additional interest rate risk publications from the Risk Management Division may be obtained from:*

*\* The OTS web site at <http://www.ots.treas.gov/quarter.html>*

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End Notes:

<sup>1</sup> 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 a 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