Volume 1, Number 4 Fourth Quarter, 1996

# The Quarterly Review of Interest Rate Risk

## EXECUTIVE SUMMARY

### Interest Rate Sensitivity Falls Slightly in the Fourth Quarter

Results of the OTS Net Portfolio Value (NPV) Model showed a small decrease in the interest rate sensitivity of the thrift industry during the fourth quarter of 1996. At the end of the fourth quarter, the median **sensitivity measure** for the industry was 182 basis points, representing a decrease of 6 basis points from the previous quarter. Interest rates, which fell slightly between the third and fourth quarters, accounted for the small decrease in the interest rate sensitivity of thrift balance sheets. A small improvement in the thrift industry's ability to absorb interest rate shocks was also evident in the fourth quarter, as the median **post-shock NPV capital ratio** increased slightly to 9.7 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. An estimated 73 percent of OTS-regulated thrifts would lose more than 10 percent of their net portfolio value should a 200 basis point interest rate increase occur. This represents a substantial increase from December 1995, when only an estimated 53 percent of OTS-regulated thrifts would experience such a loss.

## QUARTERLY TREND ANALYSIS

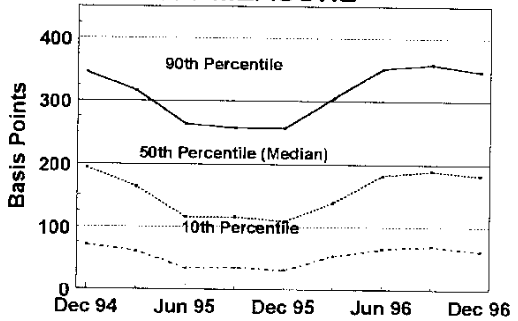
The median **sensitivity measure** - a key measure of the industry's interest rate sensitivity - decreased slightly to 182 basis points at the end of the fourth quarter, falling a modest six basis points from the third quarter (Chart 1, page 2). Despite the recent decrease in sensitivity, it is still the case that the industry remains quite sensitive to interest rate movements when viewed historically. The median sensitivity for the thrift industry in the fourth quarter lies well above the level for December 1995.

The relative stability in the sensitivity measure between the third and fourth quarters of 1996 can be traced to two factors.

Note: See glossary on page 7 for notes and definitions of the terms highlighted throughout this article.

Chart 1

**SENSITIVITY MEASURE**

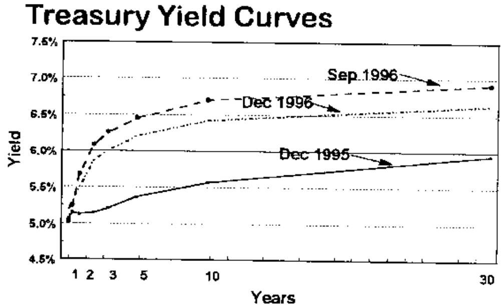



First, the yield curve at the end of December was slightly lower and flatter than the yield curve at the end of September (Chart 2). And second, the effective durations of the industry's assets and liabilities remained constant (Chart 3). As might be expected, given the similarity of the yield curves for September and December, the duration of fixed- and variable-rate mortgages in those two quarters was essentially unchanged.[1]

The median **pre-shock NPV ratio** for the industry remained essentially unchanged at 11.6 percent in the fourth quarter, while the median **post-shock NPV ratio** increased slightly from 9.6 percent in the third quarter to 9.7 percent in the fourth quarter (Chart 4). The higher the post-shock NPV ratio, the less interest rate risk a thrift institution poses.

Chart 2

**Treasury Yield Curves**

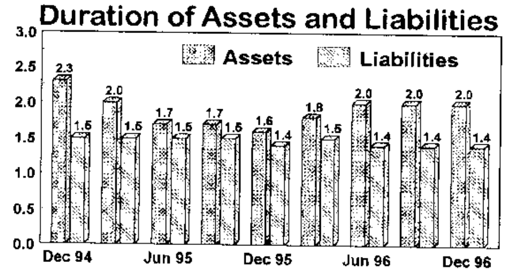



Source: Bloomberg

Despite the slight improvement in the fourth quarter median post-shock NPV ratio, the median ratio for the end of 1996 is below the level reached a year ago. The deterioration in the industry's interest rate exposure during 1996 (as measured by the median post-shock NPV ratio) is primarily due to the increase in interest rate sensitivity. As Chart 4 shows, the pre-shock NPV ratio rose during the first quarter of 1996 and then remained relatively stable through the rest of the year. This reflected a general increase in industry capital levels. However, as Chart 1 shows, the industry's sensitivity measure increased steadily during the first half of 1996, as Treasury yield curves both increased and steepened (Chart 2).

Chart 3

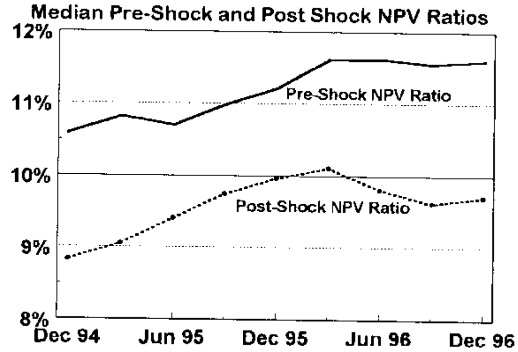
**Duration of Assets and Liabilities**




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**



## ASYMMETRY OF GAINS AND LOSSES

Table 1 shows the estimated percentage change in the industry's aggregate net portfolio value and its NPV capital ratio under different interest rate scenarios for the last two quarters in 1996 and the fourth quarter in 1995. For the thrift industry as a whole, the loss in net portfolio value when interest rates increase is greater than the gain in net portfolio value when interest rates decrease. For example, the thrift industry would lose about 20 percent of its net portfolio value if rates rose by 200 basis points, but would gain only 6.4 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 decline, the market value of most mortgages increases, but at a decelerating rate, since falling interest rates increase the likelihood that mortgages will be prepaid. As shown in Table 1, the percentage change in the aggregate industry NPV was considerably larger in the third and fourth quarters of 1996 than it was in the fourth quarter of 1995. Also, the ratio of NPV-to-assets was smaller for interest rate increases, but larger for decreases in interest rates in the third and fourth quarters of 1996, compared to the fourth quarter of 1995. These results are consistent with the thrift industry's greater sensitivity to interest rate shocks in 1996 relative to one year ago.

Table 1

**Interest Rate Risk Measures**

(Industry aggregate data)

| Change in Interest Rates (basis points) | Percentage Change in NPV | | | Ratio of NPV-to-Assets | | |
|---|---|---|---|---|---|---|
| | Dec 95 | Sep 96 | Dec 96 | Dec 95 | Sep 96 | Dec 96 |
| +300 | -21.4 | -33.6 | -32.5 | 8.0 | 6.9 | 7.1 |
| +200 | -11.8 | -20.4 | -19.5 | 8.8 | 8.1 | 8.3 |
| +100 | -4.5 | -8.9 | -8.4 | 9.4 | 9.2 | 9.2 |
| Base Case | 0.0 | 0.0 | 0.0 | 9.8 | 9.9 | 9.9 |
| -100 | 2.2 | 5.4 | 4.8 | 9.9 | 10.3 | 10.3 |
| -200 | 2.2 | 7.0 | 6.4 | 9.8 | 10.4 | 10.4 |
| -300 | 3.7 | 8.5 | 7.7 | 9.9 | 10.5 | 10.5 |

As in past quarters, exposure to changes in interest rates was particularly pronounced at some thrift institutions. The right panel of Chart 5 on page 4 shows the distribution of the estimated percentage change in individual thrift net portfolio values for an increase in interest rates of 200 basis points. Of the 1,233 reporting thrifts, 94 percent would experience a loss of net portfolio value in that scenario. Moreover, about 43 percent of the industry (525 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 (in both absolute and percentage terms, respectively) for a 200 basis point decrease in interest rates. Under this usually favorable scenario, 77 percent of the reporting thrifts would experience increases in their net portfolio values.

Chart 6, also on page 4 shows how the distribution of gains and losses at year-end 1996 compares with that at year-end 1995 for both a decrease and an increase in interest rates of 200 basis points. As shown in the left panel of Chart 6, the distribution of gains and losses in the fourth quarter of 1996 has more observations in the upper tail (gains) and fewer observations in the lower tail (losses) compared to the same distribution in the fourth quarter of 1995. The reverse situation holds for the distribution of gains and losses when interest rates rise by 200 basis points, as shown in the right panel of Chart 6. These

Chart 5

**Estimated Change in NPV**

(Industry Distributions, Fourth Quarter 1996)

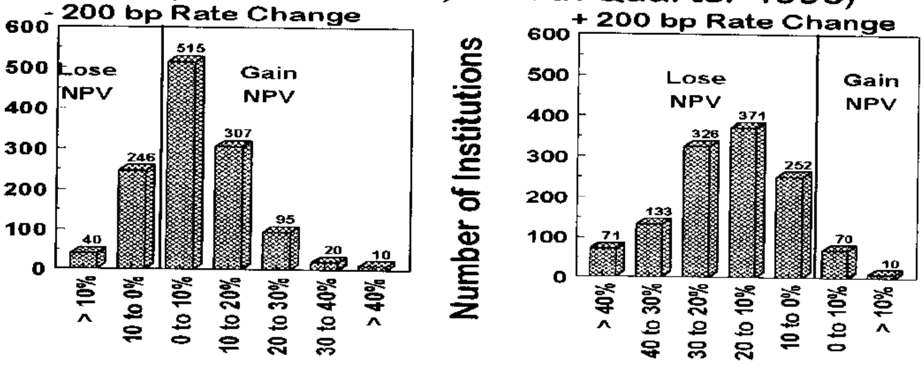
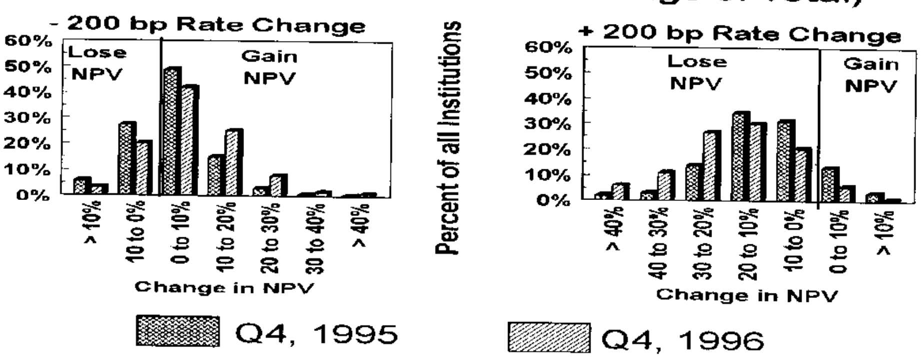



Chart 6

**Estimated Change in NPV**

(Industry Distributions - Percentage of Total)



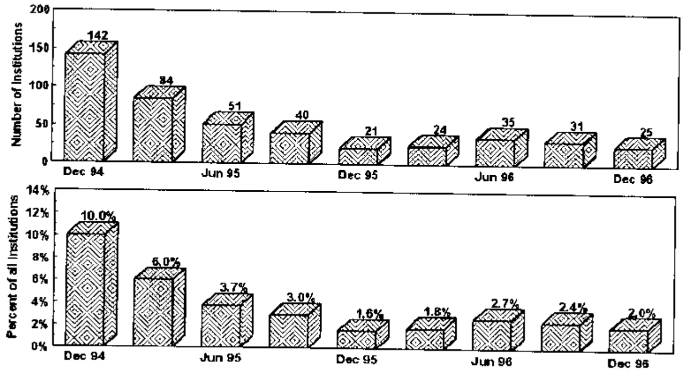

results are consistent with the thrift industry displaying a greater interest rate sensitivity at year-end 1996 compared with that a year ago.

## EXPOSURE MEASURES UNDER 4 PERCENT RAISE CONCERNS

Any thrift with a post-shock NPV ratio below 4.0 percent gives cause for supervisory concern. The number of thrifts with exposure measures below that level decreased slightly in the fourth quarter to 25, well below the recent peak level of 142 in December 1994 (Chart 7, page 5). At the end of the fourth quarter, 2.0 percent of all thrifts had exposure measures below the 4.0 percent level. Chart 7 also shows that, despite the decline in both the number and percentage of highly exposed thrift institutions during the last half of 1996, the number of highly exposed thrifts as of December 1996 remains greater than that in December 1995.

Chart 7

**Institutions with Exposure Ratios under 4.0 Percent**




## INDUSTRY PROFILE

The pre- and post-shock NPV capital ratios of each reporting thrift are plotted in the NPV Sensitivity Chart (Chart 8). 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 in the chart 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 25 thrifts with post-shock NPV ratios of less than 4.0 percent appear in the area below the dotted horizontal line. A thrift institution whose post-shock NPV ratio is below the 4.0 percent line either has a relatively low level of capital, a high degree of NPV sensitivity, or both. In general, thrifts with exposure ratios below that level should take steps to strengthen their capital position or reduce their interest rate sensitivity.

Further analysis indicates that 20 of the 25 thrifts with exposure measures below 4.0 percent also had sensitivity measures in excess of the industry median of 182 basis points. This suggests that these thrifts with exposure measures below 4.0 percent are highly exposed primarily due to excessive interest rate sensitivity rather than to inadequate capital levels. Chart 8 also shows that a limited number of points (institutions) below the dotted 4.0 percent line are close to the "zero sensitivity" line.

Chart 8

**SENSITIVITY CHART**

(Fourth Quarter, 1996)

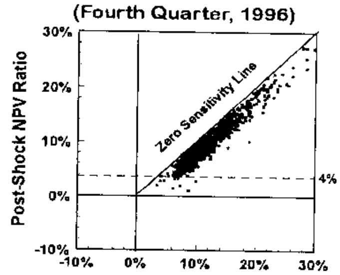
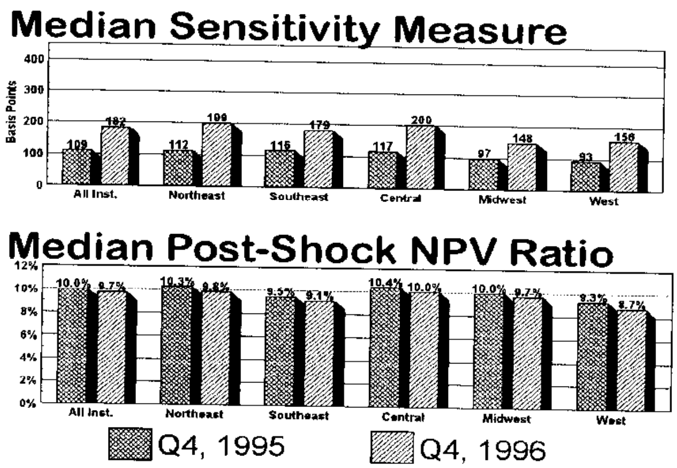


Chart 9




## REGIONAL PROFILE

The median sensitivity measures for the entire industry and by OTS region for the fourth quarter of 1995 and for the fourth quarter of 1996 are presented in the top panel of Chart 9. As shown in the chart, the Central Region had the largest median sensitivity measure in the fourth quarter of 1996, while the Midwest Region had the smallest. In comparing year-end 1995 with year-end 1996, the Northeast Region experienced the largest increase in median interest rate sensitivity. Over the same period, the Midwest Region had the smallest increase in the median sensitivity measure. Overall, the chart shows not only that sensitivity has increased during 1996 for all regions, but also that there is greater variation among regional median sensitivity measures now than a year ago.

The lower panel of Chart 9 shows the median post-shock NPV ratio (exposure ratio) for the entire industry and by OTS region. The results indicate that the entire industry as well as each of the five regions experienced an increase in interest rate exposure as manifested by a fall in post-shock NPV ratios between the end of 1995 and the end of 1996. In the fourth quarter of 1996, the Central Region had the highest post-shock PV ratio, while the West Region had the lowest. There has also been an increase in inter-regional differences in median exposure to interest rate risk from December 1995 to December 1996.

## WHAT'S NEXT?

Interest rates have moved sharply higher in the first quarter of 1997 and the benchmark 30-year Treasury bond has climbed over 7 percent. Most thrifts are likely to see an increase in their sensitivity measures and downward movement in their post-shock NPV ratios during the first part of 1997, unless they have adjusted their portfolios to accommodate these changes. ■

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Jonathan D. Jones, Ph.D.

End Notes:

1. *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.*

## GLOSSARY

**Pre-Shock NPV Ratio** — Equity-to-assets ratio expressed in present value terms (i.e., base case NPV divided by present value of assets).

**Post-Shock NPV Ratio (Exposure 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.

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