



A Graphical Framework for Assessing Interest Rate Risk Exposure

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Introduction

The visual display of quantitative information can often clarify complex financial relationships. This *Risk Management Release* introduces a graphical framework for analyzing interest rate exposure in the thrift industry.

Measures of IRR Sensitivity and Exposure

An evaluation of the Interest Rate Risk (IRR) position of a thrift institution typically entails an examination of two key factors:

- 1) sensitivity of the institution's balance sheet to changes in interest rates, and
- 2) the capacity of the institution to absorb losses resulting from movements in interest rates.

The sensitivity of an institution's balance sheet depends on the composition of the institution's assets, liabilities, and off-balance sheet contracts. The capacity of an institution to absorb losses depends in large part on its capital position.

In evaluating the loss-absorption-capacity and the balance-sheet-sensitivity of a thrift institution, the OTS focuses on *Net Portfolio Value* (NPV), which is a proxy for the economic value, or net present value, of an institution's worth. (NPV which is defined as the present value of assets, less the present value of liabilities, plus the net present value of off-balance sheet contracts.) OTS measures an institution's vulnerability to interest rate risk by examining three key metrics: the pre-shock NPV ratio, the post-shock NPV ratio, and the sensitivity measure.

- **Pre-Shock NPV Capital Ratio.** The pre-shock NPV capital ratio is a leverage ratio (equity-to-assets) expressed in present value terms, calculated by dividing an institution's base-case NPV by the present value of assets.
- **Post-Shock NPV Capital Ratio (Exposure Measure).** The post-shock NPV ratio, also referred to as the Exposure Measure, is an estimate of what an institution's NPV capital ratio would be

after a hypothetical adverse 200-basis-point shock in interest rates.

- **Sensitivity Measure.** The sensitivity measure gauges the magnitude of loss that an institution would suffer from a 200 basis point movement in interest rates. The measure is calculated as the difference between the post- and pre-shock NPV ratios, expressed in basis points. A high degree of balance sheet sensitivity is not necessarily cause for con-

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cern. Whether it is depends on the institution's tolerance for risk and its capacity to absorb losses.

The NPV Sensitivity Chart

Table 1 shows the pre- and post-shock NPV capital ratios and sensitivity measures of four hypothetical thrifts. Those ratios are used to determine the position of each thrift in Figure 1, which is referred to as an *NPV Sensitivity Chart*. The horizontal axis represents a firm's pre-shock NPV ratio and the vertical axis represents its post-shock NPV ratio. The line which bisects the horizontal and vertical axes at a 45 degree angle represents the *zero sensitivity line*. Firms situated on this line have pre- and post-shock ratios that are equal.

Which of the four institutions has an interest rate risk problem? As shown, Thrift A has a pre-shock ratio of 19 percent and a post-shock ratio of 16 percent. Its sensitivity measure is 3 percent, or 300 basis points, which is relatively high by industry standards.

Thrift A's *sensitivity measure* is depicted in the chart by a vertical line from the point designating Thrift A to the zero sensitivity line. The longer the vertical distance between an institution's position on the chart and the zero sensitivity line, the greater is its sensitivity.

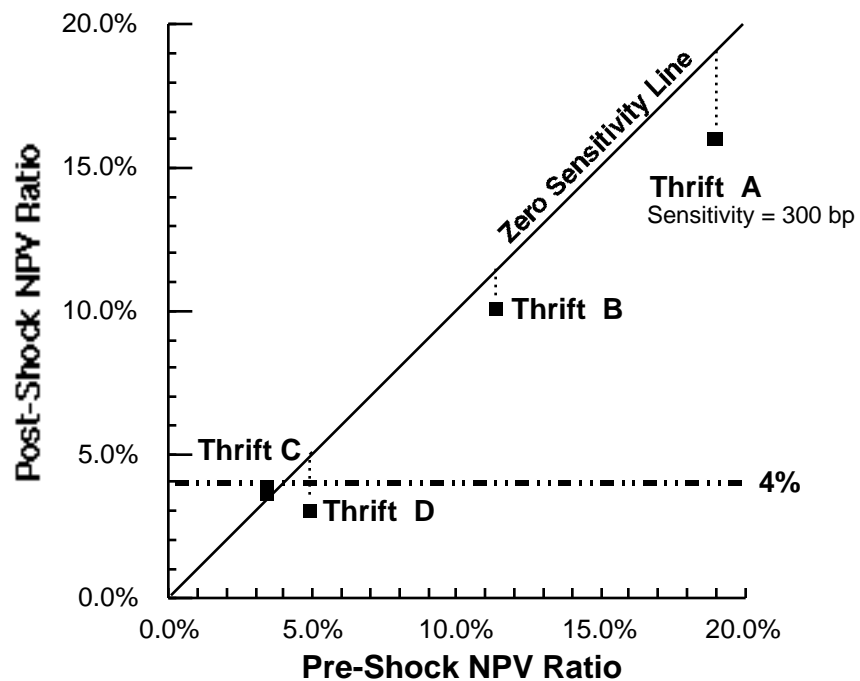
Thrift B has a pre-shock ratio of 11.4 percent and a post-shock ratio of 10.0 percent. Thrift B is less interest rate sensitive than

Table 1. Pre and Post-Shock NPV Capital Ratios and Sensitivity Measures

	Pre-Shock NPV Capital Ratio	Post-Shock NPV Capital Ratio *	= Sensitivity Measure (in Basis Points)
Thrift A	19.0 %	16.0 %	300
Thrift B	11.4	10.0	140
Thrift C	3.5	3.5	0
Thrift D	5.0	3.0	200

* After adverse 200 Basis Point rate shock

Figure 1. Net Portfolio Value Sensitivity Chart



Thrift A. Its sensitivity measure is only 140 basis points.

Thrift C's pre-shock and post-shock ratios are both 3.5 percent. Thrift C sits on the zero sensitivity line, meaning that Thrift C's NPV capital ratio is "perfectly hedged" for this particular rate scenario (but not necessarily other interest rate scenarios). While Thrift C's post-shock NPV ratio is relatively low, it does not

have an interest rate risk problem; A 200 basis point rate shock does not cause its NPV capital ratio to decline. In short, Thrift C has a capital problem. The low-post shock ratio is merely a reflection of its low pre-shock capital ratio.

Thrift D has a pre-shock ratio of 5.0 percent, a post-shock ratio of 3.0 percent, and a sensitivity measure of 200 basis points.

Relative to Thrift A, Thrift D's interest rate risk profile is more troublesome even though it exhibits less interest rate sensitivity than Thrift A.

As a general rule, OTS views any institution with a post-shock NPV ratio below 4 percent as giving cause for supervisory concern. The NPV sensitivity chart, therefore, has a horizontal dashed line drawn at the 4 percent post-shock NPV level. An institution that is operating below this line either has a low base-case capital position or a sensitivity measure that is too high in relation to its base-case capital position. Thrifts operating below the 4 percent line should consider reducing their sensitivity or strengthen their capital position.

The NPV Sensitivity Chart illustrates that the degree of interest rate sensitivity that a firm can prudently tolerate depends importantly on its capital strength, as measured by its pre-shock NPV ratio. Firms with strong capital positions are better positioned to operate further below the zero sensitivity line than those with weak capital positions.

Industry Profile

The sensitivity chart can also be used to monitor industry trends. Figures 2 and 3 show the sensitivity and exposure profile of the thrift industry at two different points in time (March 31, 1995 and March 31, 1996).

Figure 2 shows that a significant number of institutions – 84 institutions, or 6.0 percent of the reporting institutions – had post-

Figure 2. Distribution of Pre-Shock and Post-Shock NPV Ratios (1st Quarter, 1995)

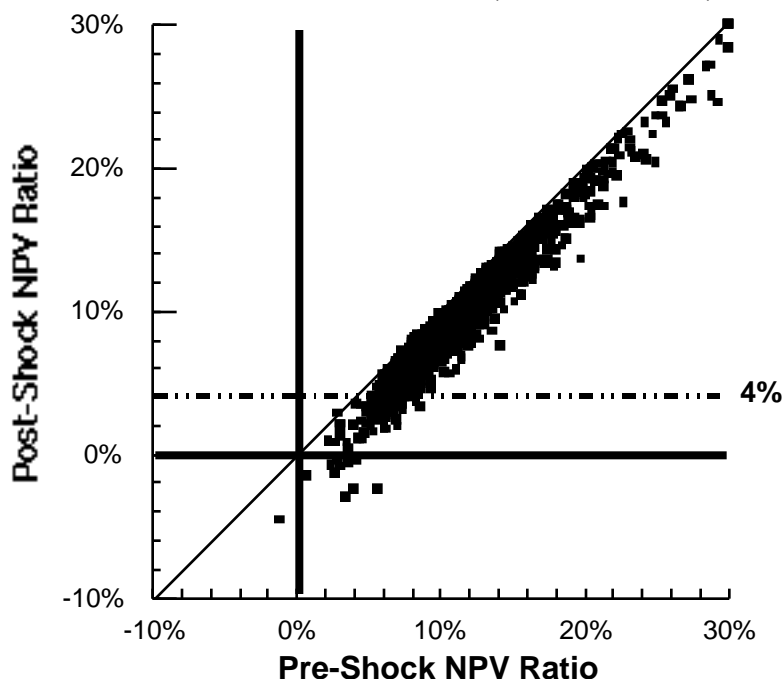
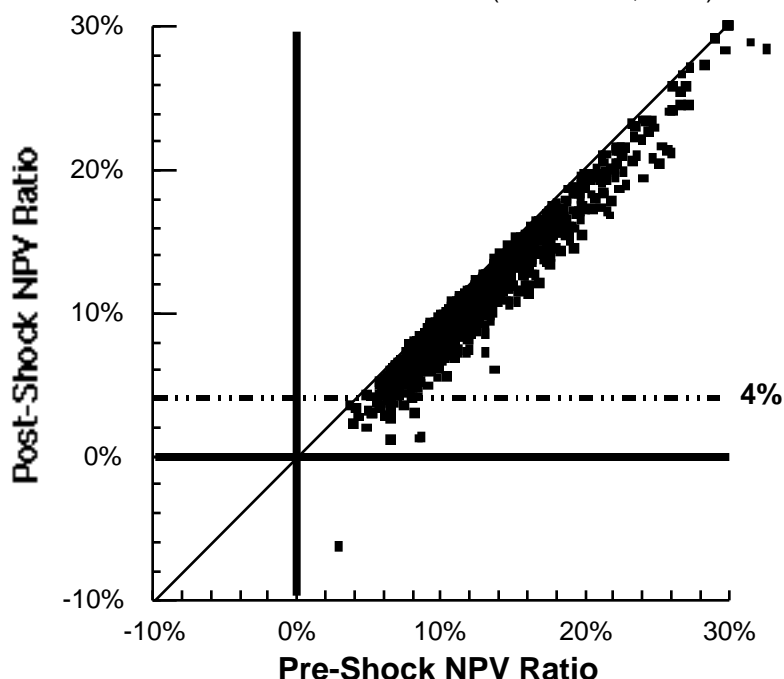


Figure 3. Distribution of Pre-Shock and Post-Shock NPV Ratios (1st Quarter, 1996)



shock NPV ratios of less than 4.0 as of March 31, 1995. A few also had post-shock NPV ratios less than zero. Many of these institutions have relatively low pre-shock NPV capital levels.

By the end of the first quarter of 1996, however, the number of institutions below the 4 percent line had decreased to 24, or 1.9 percent of the reporting institutions. Note that a significant number of thrifts operating below the 4 percent post-shock ratio line as of March 31, 1996 exhibit excessive interest rate sensitivity. Compared to the industry profile a year earlier (Figure 2) these institutions, for the most part, have higher pre-shock NPV levels but operate further below the zero-sensitivity line ■

— August, 1996