

# The Quarterly Review Of Interest Rate Risk

Economic Analysis Division,  
 Office of Thrift Supervision



### Special points of interest:

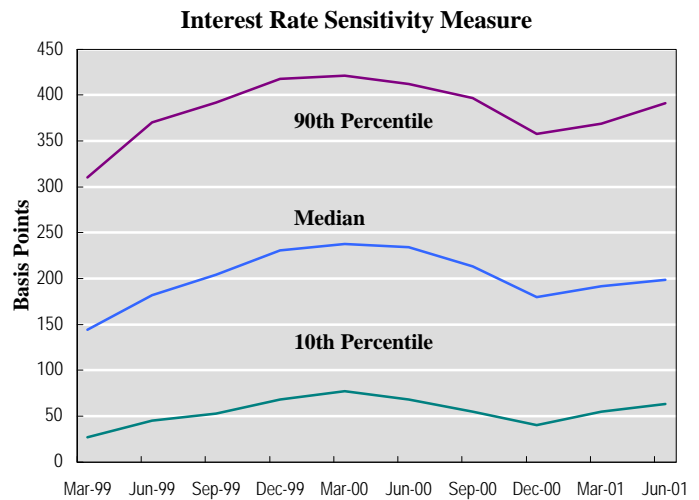
- Second quarter sees Interest rate sensitivity increase modestly
- Yield curve becomes more steeply sloped
- Federal Home Loan Bank Advances and Terminology
- Median pre-shock NPV ratio increases
- Mortgage rates rise
- Federal Home Loan Banks Update

## Second Quarter Sees Modest Rise in Sensitivity

Median thrift sensitivity climbed to 199 basis points in the second quarter, up from 190 basis points in March. This increase reflects the rise in medium- and long-term interest rates between the first and second quarters.

Although median sensitivity increased, the median post-shock Net Portfolio Value (NPV) ratio remained unchanged. In addition, the second quarter saw the number of thrifts with higher interest rate risk rise for the first time in six quarters.

See details inside,



starting on page 3.

## Federal Home Loan Bank Structured Advances and Terminology

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Federal Home Loan Bank (FHLB) advances can be grouped into two broad categories: plain-vanilla (or non-structured) advances and structured advances. Of the two types, structured advances can raise safety and soundness concerns because of the embedded options these instruments contain. (See Thrift Bulletin 13a-2.) Starting with the March 2001 reporting cycle, OTS required all savings associations to report market value estimates of their structured borrowings.

For reporting purposes, these structured borrowings include FHLB ad-

vances with embedded options where the advance's coupon, average life, and redemption value depend on a reference rate, index, or formula of some kind. Structured advances include puttable, callable, and convertible advances; variable-rate advances with embedded caps, floors, or collars; step-up variable-rate advances; and amortizing advances.

Savings associations report estimated market values of their holdings of structured advances for the base case and each of the six parallel-shift interest rate shock scenarios on the "Supplemental Reporting of

Market Value Estimates" section of CMR using the appropriate contract codes from Appendix D.

For the most part, FHLB structured advances are classified according to: (1) the type of option that can be exercised and (2) who holds (i.e., has the right to exercise) the option associated with an advance. The type of option associated with a structured advance should be classified according to standard option terminology.

In viewing a structured advance, it is important to know whether it is the

(Continued on page 2)

## FHLB Structured Advances and Terminology (continued)

(Continued from page 1)

thrift or the FHLB that actually holds the option associated with a structured advance. In the case of a callable advance, the member institution holds the option, while in the case of a puttable advance, it is the Federal Home Loan Bank that holds it.

In a **puttable advance**, a Federal Home Loan Bank effectively purchases a put option from the borrowing thrift and pays for it in the form of a lower interest rate received on the advance. This option grants the Federal Home Loan Bank the right to “put” the loan contract back to the member institution; i.e., to demand early termination of the contract. With this type of contract, the Federal Home Loan Bank is likely to ask for early payoff of the advance when interest rates rise.

According to regulations promulgated by the Federal Housing Finance Board pursuant to Section 10 of the Federal Home Loan Bank Act, “... the term puttable advance means an advance that a Bank may, at its discretion, terminate and require the member to repay prior to the stated maturity date of the advance.” See FHFB Advances Rule, 12 C.F.R. § 950.5(d)(3) (2001). Market value estimates of any structured advance with such contractual terms should be reported on Schedule CMR using contract code 280.

Published definitions notwithstanding, all the Federal Home Loan Banks do not apply the regulatory definition of a puttable advance consistently in the

marketing of this type of instrument. While some Federal Home Loan Banks correctly refer to such advances as puttable advances, others refer to them as callable advances.

From the perspective of standard option theory, and the Federal Housing Finance Board’s own published definition, the term “callable” should not be used to describe this kind of structured borrowing.

A **callable advance**, on the other hand, allows the borrowing savings association to “call” the loan contract back from the FHLB and to prepay the advance under the terms specified in the contract. For such an advance, the member institution pays for the call option in the form of a higher interest rate on the advance. The market value estimates of callable advances should be reported on Schedule CMR using contract code 282.

In contrast, ordinary, plain-vanilla advances do not contain a call option. While it is possible for a savings association to repay a non-callable FHLB advance prior to its maturity date, such prepayment subjects the thrift to a significant prepayment penalty.

The prepayment fee for a non-callable advance is calculated pursuant to a specified formula, which makes the Home Loan Bank financially indifferent to the borrowing thrift’s decision to prepay the advance. However, prepayment fees are not charged for (1) advances with original terms to maturity or repricing periods of six months or less; (2) ad-

vances that a Home Loan Bank funds with callable debt; or (3) advances which are otherwise appropriately hedged so that the Bank is financially indifferent to their prepayment. See 12 C.F.R. § 950.6(b)(2)(i)-(iii) (2001). However, the effect of these regulatory exceptions is likely to be negligible. First, because the interest rate effects on advances whose maturity is six months or less is very small, there is little, if any, incentive for member institutions to prepay. Second, the mere existence of such substantial prepayment penalties on plain-vanilla advances, leaves the Home Loan Banks with no incentive to either fund the advances with callable debt or to otherwise hedge them.

Besides callable and puttable advances, there are several other types of structured borrowings. If the structured advance allows the Federal Home Loan Bank to convert the advance from a fixed to floating rate, then the advance should be reported as a **convertible advance** on Schedule CMR using contract code 281. While the convertible advance is contractually different from either the callable or puttable advance, its behavioral characteristics, from a valuation standpoint, are much the same as those of the puttable advance.

Another structured advance is the **periodic float-ing-rate advance**. For this kind of advance, the interest rate is periodically reset to LIBOR, and the borrowing savings association sells a floor to the Federal Home Loan Bank. This lim-

its the reduction in interest payments if LIBOR falls. For reporting purposes, these structured advances should be reported on Schedule CMR using contract code 283.

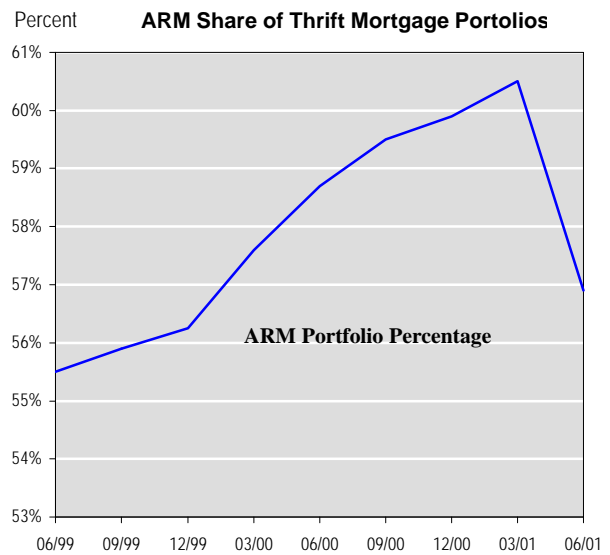
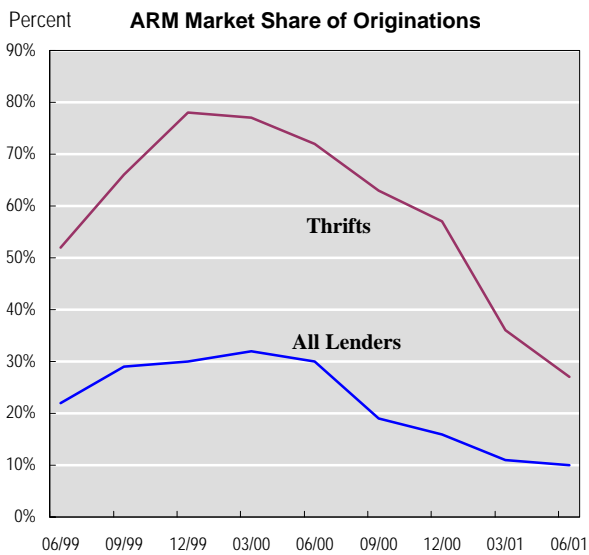
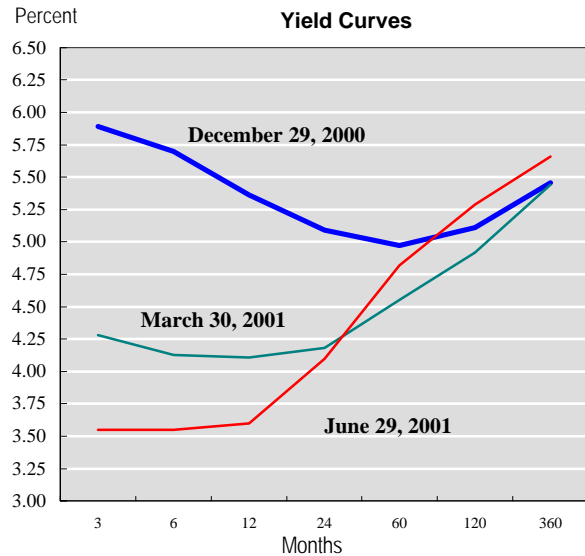
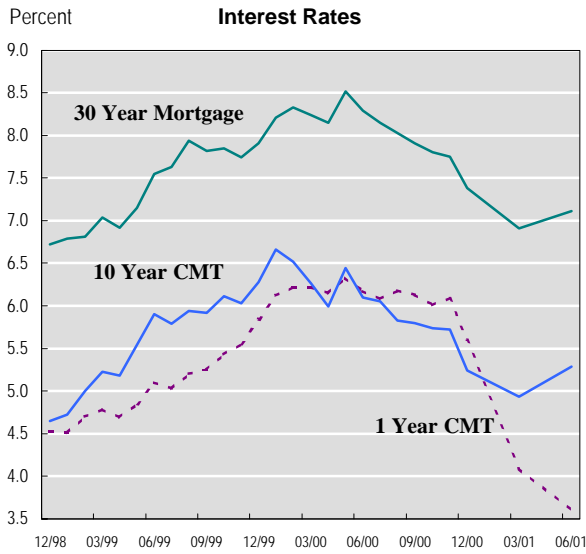
For the typical thrift, the callable advance is the one that should have the greatest benefits from the asset/liability management and safety and soundness perspectives. With a callable advance, the individual thrift decides when the option associated with the advance should be exercised, not the FHLB. As a result, it is the thrift that determines the timing of repayment.

Despite the benefits associated with callable advances, as of June 2001, there was four times more combined volume in puttable and convertible advances than in callable advances. It is possible that the observed use of puttable advances has resulted from educated business decisions to increase yield spread, with knowledge of the potential for increased interest rate risk.

It is also possible, however, given confusion over terminology, that some of these decisions have not been as fully informed as they should have been. Thus, some savings associations may have made less than optimal funding choices, leading to increased exposure to interest rate risk.

In a future article in this publication, we will explore the statistical linkages between structured advance use by thrifts and their exposure to interest rate risk.

## Interest Rates and ARM Market Share



(Continued from page 1)

While medium- and long-term interest rates rose, short-term interest rates fell in the second quarter. The 30-year mortgage rate rose to 7.11 percent in the second quarter. This represents the first increase in the long-term mortgage rate in the last four quarters.

With the fall in short-term rates, the yield curve became more steeply upward-sloping, improving the lending environment for the typical thrift. This resulted from the Federal Reserve's combined cuts in the target federal funds

rate totaling 100 basis points in the second quarter. As a result, thrifts saw their net interest margins rise. The industry's average net interest margin improved to 282 basis points in the second quarter, up from 268 basis points in the prior quarter.

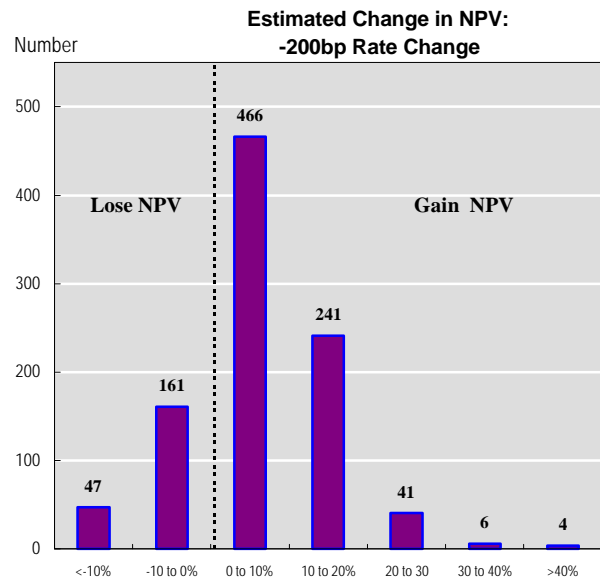
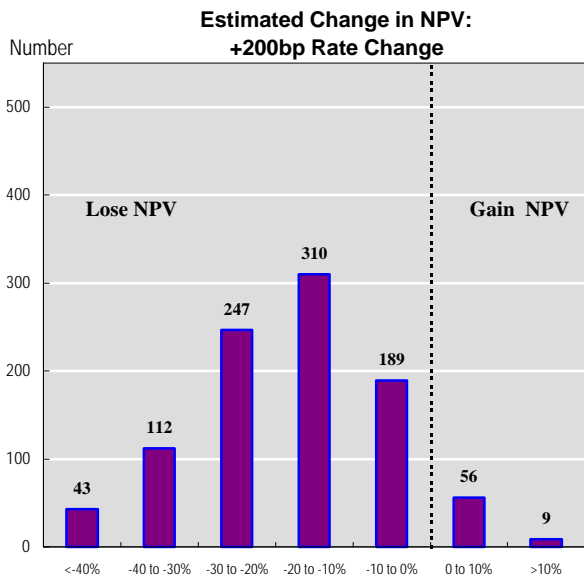
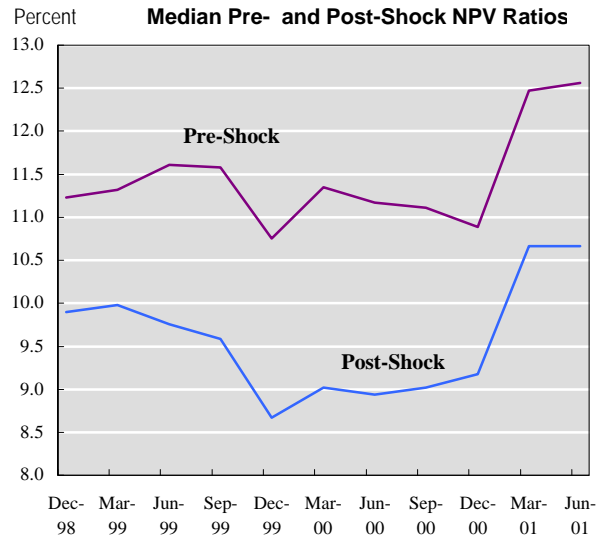
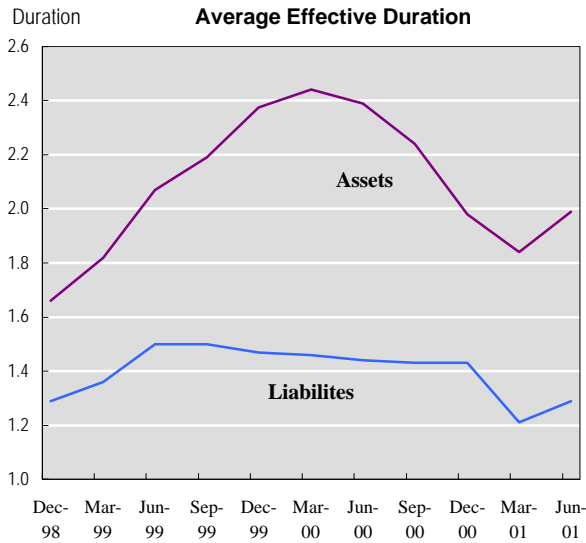
Although the 30-year mortgage rate rose between the first and second quarters, the demand for long-term, fixed-rate mortgages remained strong in the second quarter. The strong demand for long-term, fixed-rate mortgages was evidenced by a fall in ARM origina-

tions by thrifts in the second quarter. The ARM share of total thrift mortgage originations fell to 27 percent, down from 36 percent in the prior quarter. Along with the relative drop in ARM originations, the share of ARM mortgages held in portfolio fell sharply in the second quarter to 56.9 percent from 60.5 percent in the prior quarter.

Second-quarter 1-4 family mortgage originations by thrifts stood at \$109.6 billion, up 48 percent from \$74.3 billion in the first quarter. Total mortgage origina-

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## Duration and NPV Sensitivity Measures



(Continued from page 3)

tions in the second quarter were at a record level of \$125.0 billion, topping the previous record of \$93.7 billion in the fourth quarter of 1998.

Thrifts' share of all 1-4 family originations was 22.9 percent in the second quarter, up from 21.2 percent in the first quarter.

Refinancing activity of all mortgages accounted for 22.2 percent of thrift originations in the second quarter, up sharply from 14.9 percent in the first quarter.

Overall, mortgage originations rose substantially in the second quarter, despite the increases in medium- and long-term mortgage rates. Much of this volume may have resulted from loans that were already in the pipeline at the end of the first quarter when these rates were lower.

Second-quarter earnings rose sharply to a record \$2.51 billion, up from \$2.16 billion in the first quarter.

The industry's average effective duration of assets rose from

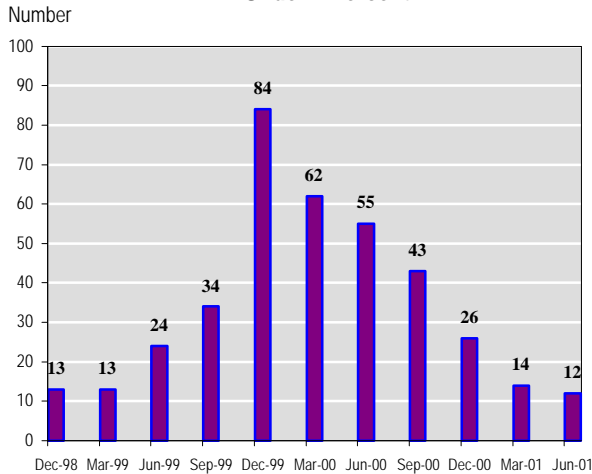
1.84 to 1.99 between the first and second quarters, due to the rise in medium- and long-term interest rates. As rates rise, the NPV Model yields a decrease in the predicted rate of mortgage prepayments. This decrease in the predicted rate of mortgage prepayments causes, in turn, increases in the durations of mortgage assets.

The industry's average effective duration of liabilities rose to 1.29 in the second quarter, up from 1.21 in the prior quarter.

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## Interest Rate Risk Measures

**Thrifts with Post-Shock NPV Ratios Under 4 Percent**



**Interest Rate Risk Measures Industry Aggregates Last Two Quarters**

	Ratio of NPV to Assets		% Change	
	Mar-01	Jun-01	Mar-01	Jun-01
+300	7.7	7.9	-29%	-30%
+200	8.7	9.0	-18%	-19%
+100	9.6	10.0	-8%	-8%
Base	10.3	10.7	0	0
-100	10.5	10.9	+2%	+3%
-200	10.4	10.9	+3%	+4%
-300	10.3	11.1	+3%	+6%

**Post-Shock NPV Ratio and Sensitivity Measure Matrix March 2001**

	Under 100bp	101-200bp	201-400bp	Over 400bp	Total
Over 10%	154	160	203	31	548
6% to 10%	73	110	157	17	357
4% to 6%	2	6	24	8	40
Below 4%	0	2	10	2	14
<b>Total</b>	<b>229</b>	<b>278</b>	<b>394</b>	<b>58</b>	<b>959</b>

Minimal    Moderate    Significant    High

**Post-Shock NPV Ratio and Sensitivity Measure Matrix June 2001**

	Under 100bp	101-200bp	201-400bp	Over 400bp	Total
Over 10%	163	148	208	39	558
6% to 10%	50	116	161	26	363
4% to 6%	0	8	22	13	43
Below 4%	0	0	9	3	12
<b>Total</b>	<b>213</b>	<b>272</b>	<b>400</b>	<b>81</b>	<b>966</b>

Minimal    Moderate    Significant    High

*(Continued from page 4)*

The median pre-shock NPV ratio for the industry rose from 12.5 percent to 12.6 percent between the first and second quarters. The median post-shock NPV ratio remained unchanged at 10.7 percent in the second quarter.

At the end of the second quarter, a 200 basis point increase in rates would result in a loss in net portfolio value for 901 thrifts, while 65 thrifts would see their net portfolio value rise.

In the unlikely event that rates fell by 200 basis points, 758 thrifts would see their net portfolio values rise, while 208 thrifts would see a decrease in their net portfolio values.

The number of thrifts with a post-shock NPV ratio below 4 percent fell to 12. This represents the sixth consecutive quarterly fall in the number of thrifts that are highly exposed to fluctuations in interest rates.

With a 200 basis point in-

crease in interest rates, the thrift industry would lose 19 percent of its net portfolio value. This net portfolio loss is up slightly from 18 percent in the previous quarter.

The number of thrifts with a post-shock NPV ratio over 6 percent increased between the first and second quarters. In the second quarter, the number of such thrifts was 921 compared to 903 in the fourth quarter.

The number of thrifts with a

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post-shock NPV ratio below 6 percent rose to 55 in the second quarter. The number of thrifts with a sensitivity of 200 basis points or less decreased to 485 in the second quarter, down from 507 in the first quarter. The number of thrifts with over 400 basis points in sensitivity rose to 81 in the second quarter, up from 58 in the first quarter. As a result, the number of thrifts with high interest rate risk rose from 20 to 25 between the first and second quarters.

## Federal Home Loan Banks Update

The relative share of total FHLB membership accounted for by savings associations has fallen recently, due to a series of statutory and regulatory changes that took place over the last dozen years. First, commercial banks were permitted to join in the late 1980s. Then, in the early 1990s, mandatory membership by state-chartered savings associations was eliminated. Finally, in 1999, under Gramm-Leach-Bliley, federally chartered institutions were no longer required to be members. Nevertheless, thrifts still hold the largest stake in FHLBs' equity and are the largest users of FHLB advances. As of June 2001, thrifts accounted for about 57 percent of the \$450.3 billion in advances, and had equity stakes in the FHLBs amounting to 50 percent of the system's capital.



## 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, following an adverse 200 basis point interest rate shock, expressed in present value terms (i.e., post-shock NPV divided by shocked present value of assets). 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:** A measure of the price sensitivity of a financial instrument to changes in yield. The higher the duration, the greater the price sensitivity. For example, an asset with duration of 1.6 will appreciate in value by about 1.6 percent for one percentage point (100 basis points) decline in yield.

**NPV Model:** Measures how six hypothetical changes in interest rates (three successive 100 basis point increases and three successive 100 basis point decreases) affect the model's estimate of a thrift's market value of net worth.

**Kurtosis:** A statistical measure of the tendency of data to be distributed toward the tails, or ends, of the distribution. A normal distribution has a kurtosis statistic close to 0.

**Skewness:** A statistical measure of the degree to which a distribution is 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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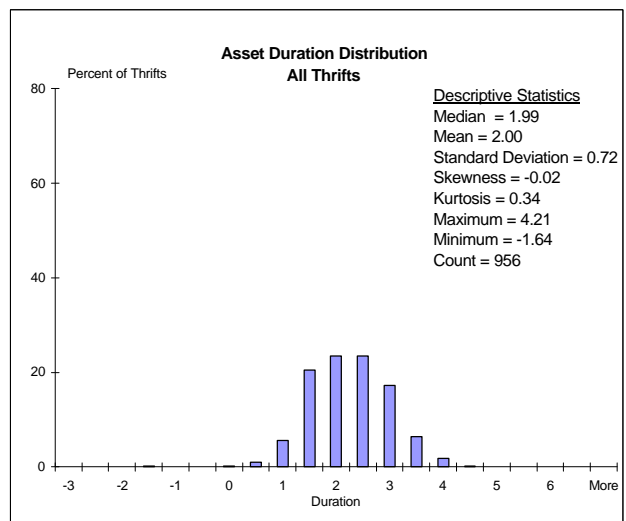
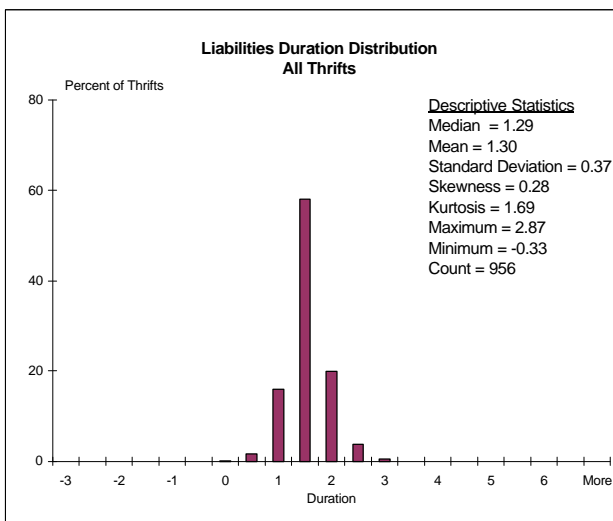
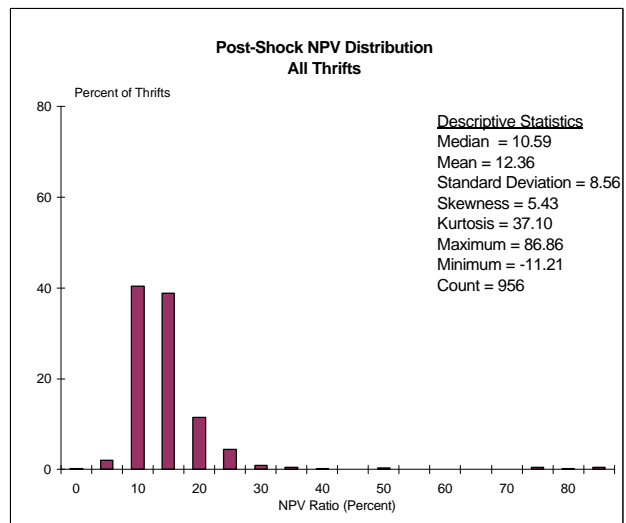
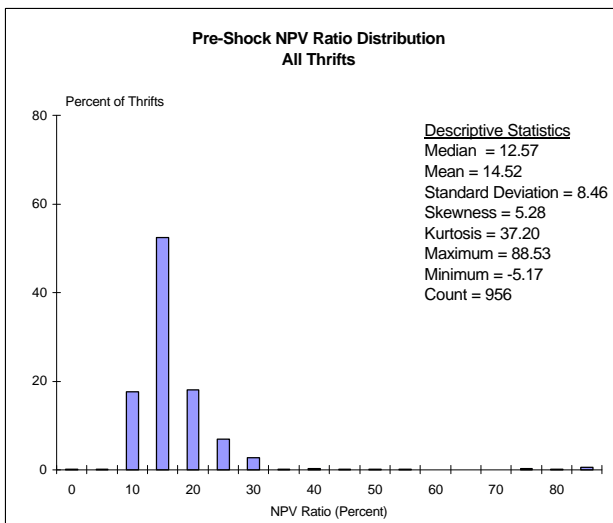
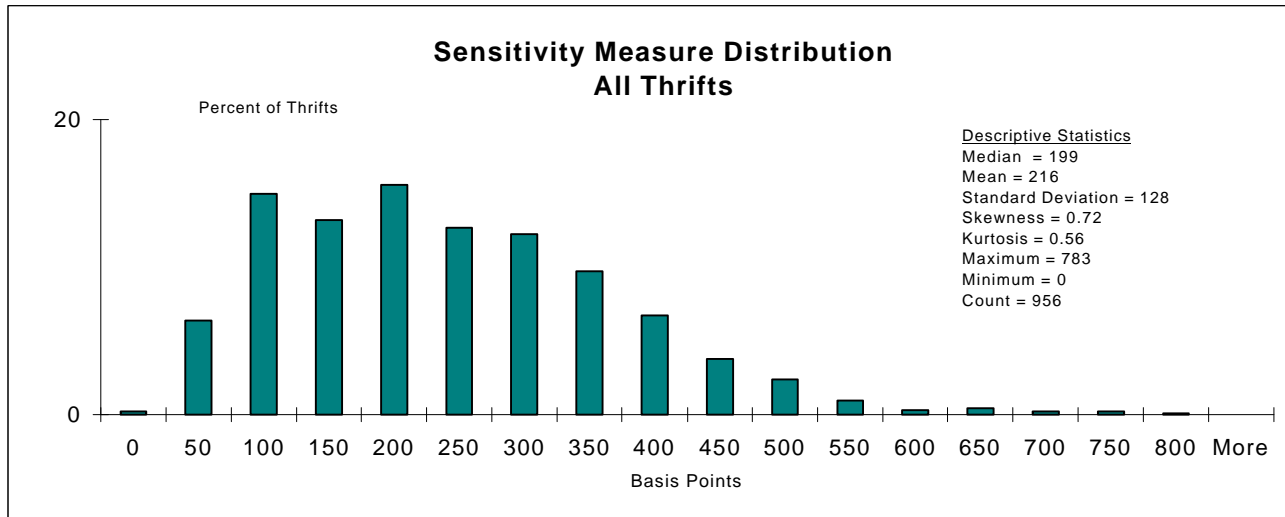
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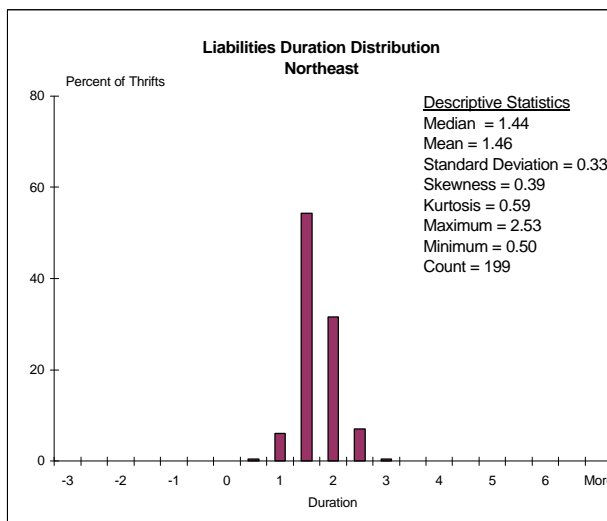
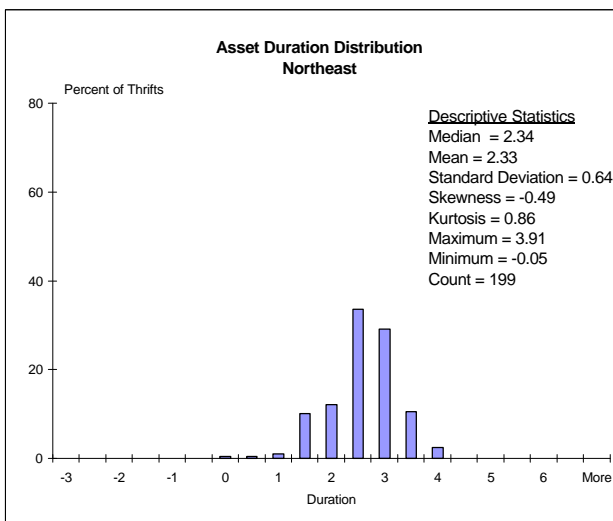
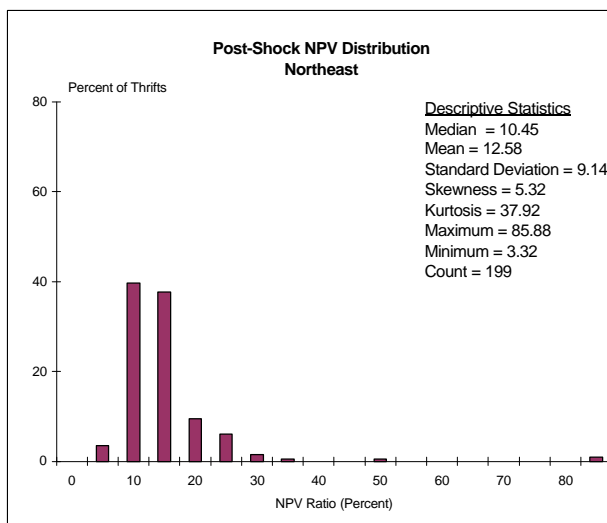
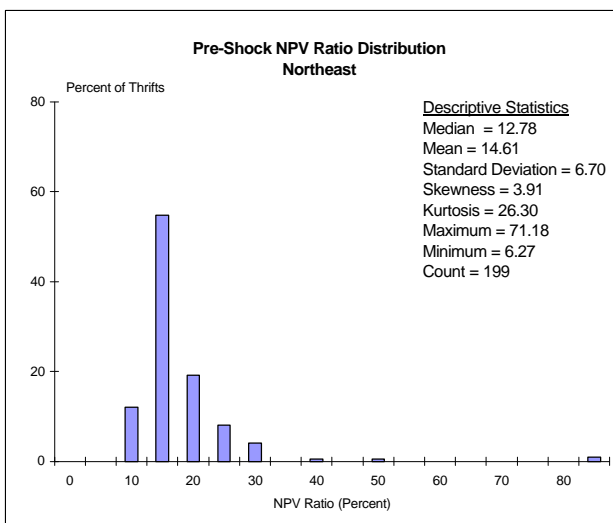
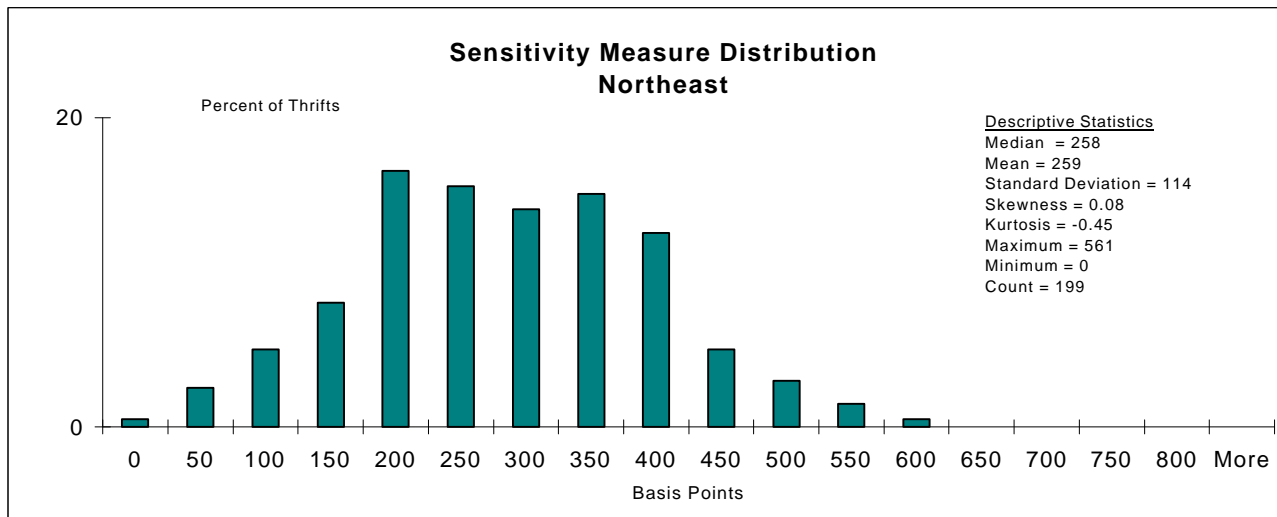
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## Appendix A – All Thrifts

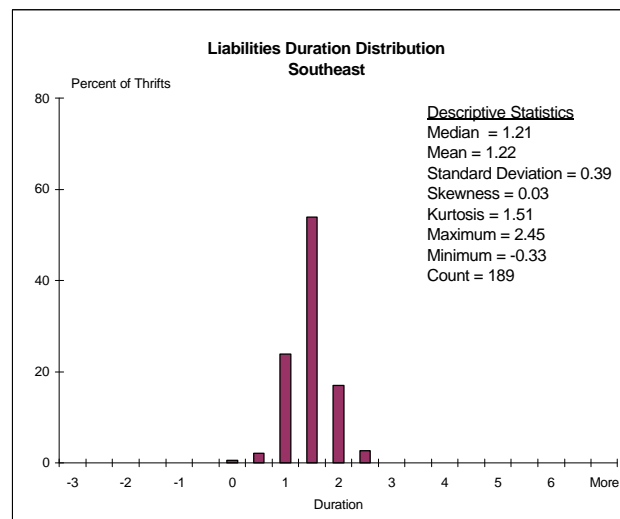
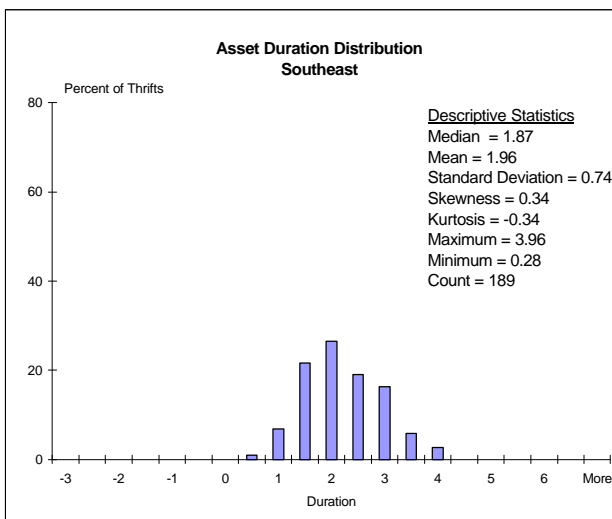
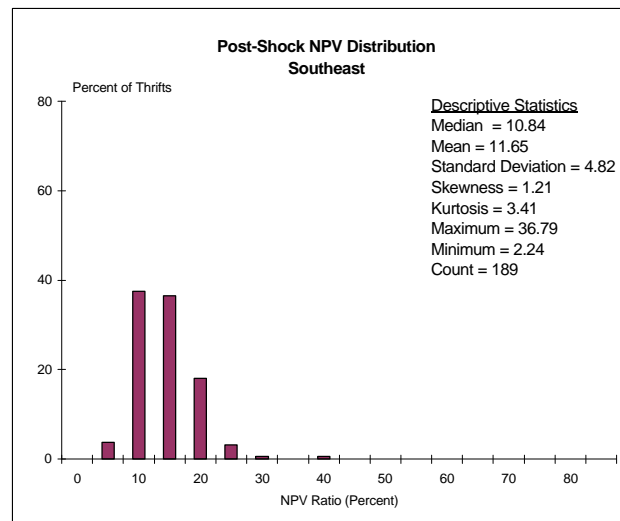
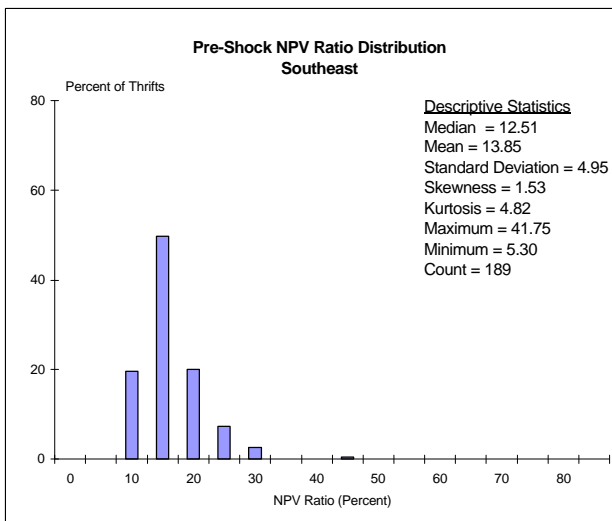
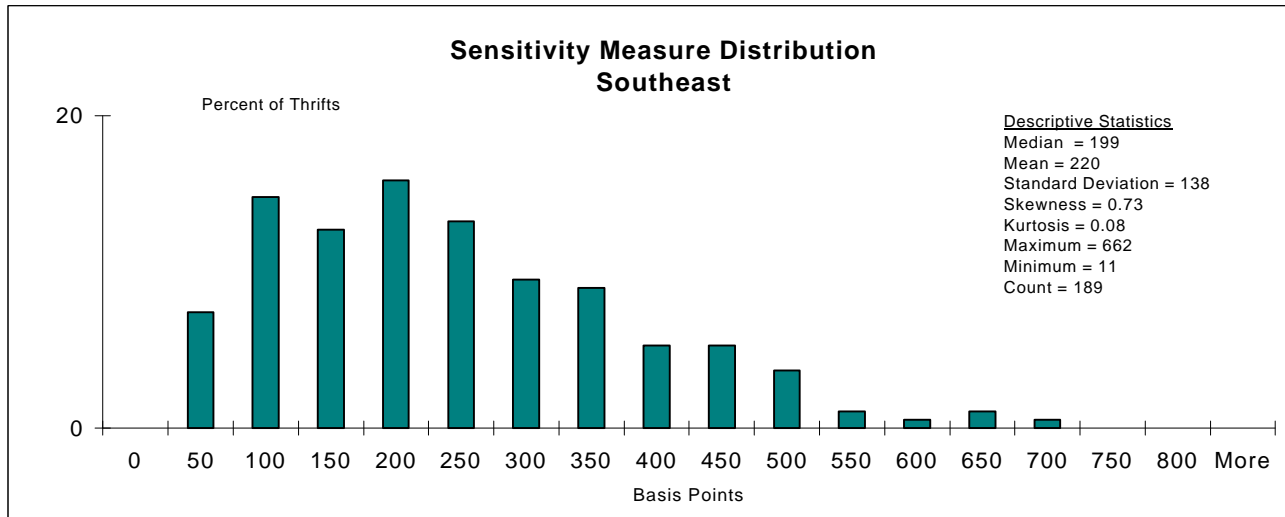


## Appendix B – Northeast Region

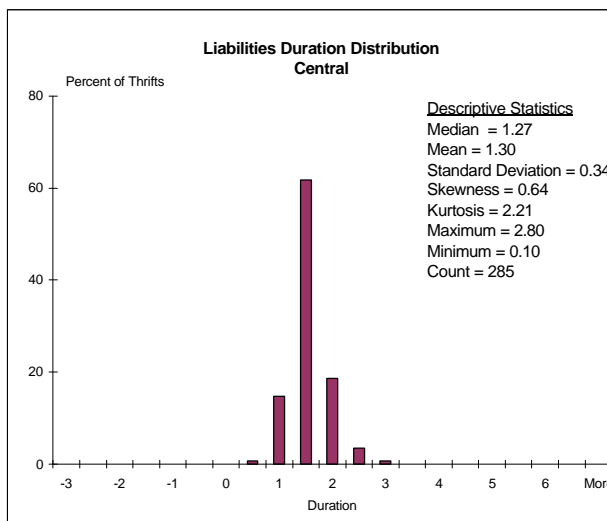
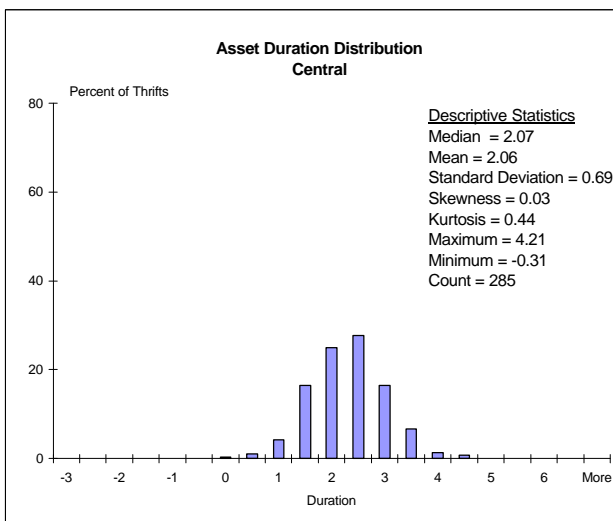
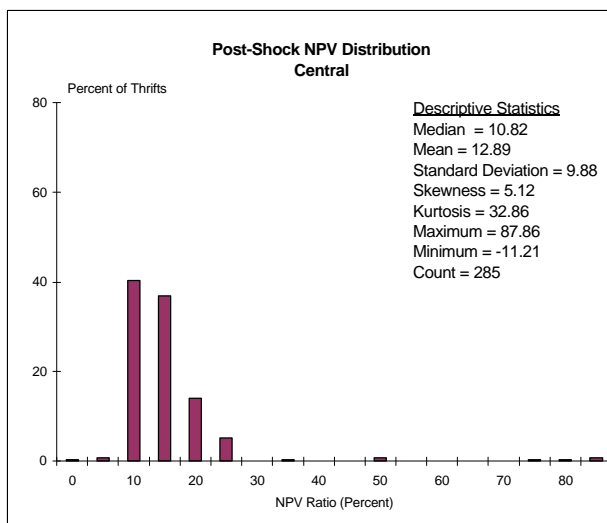
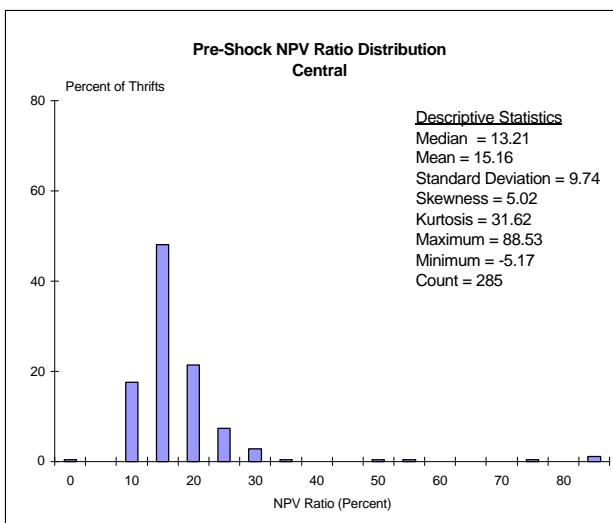
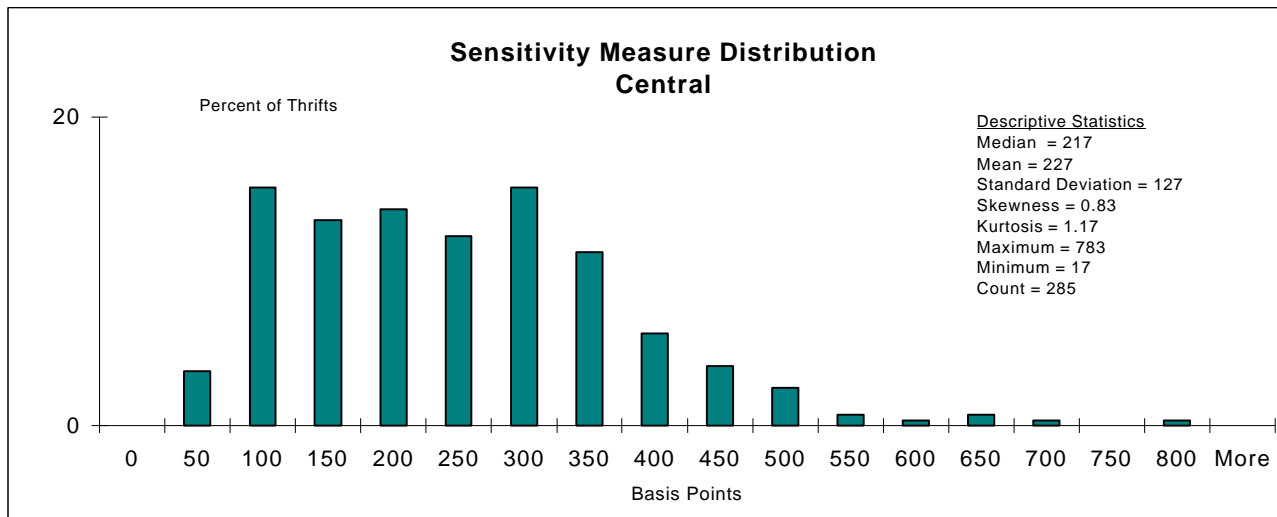




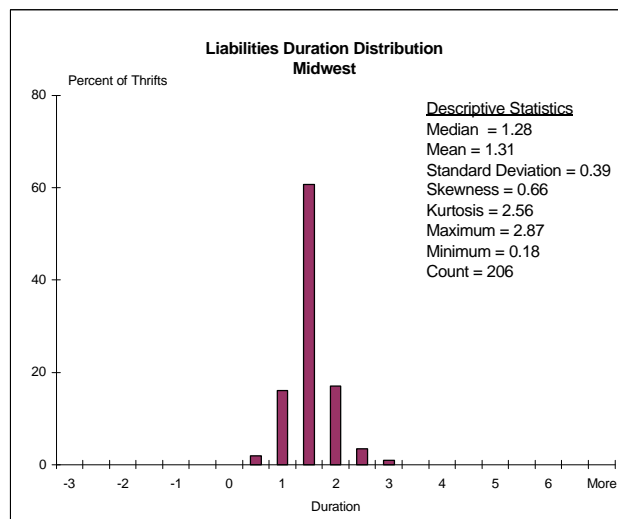
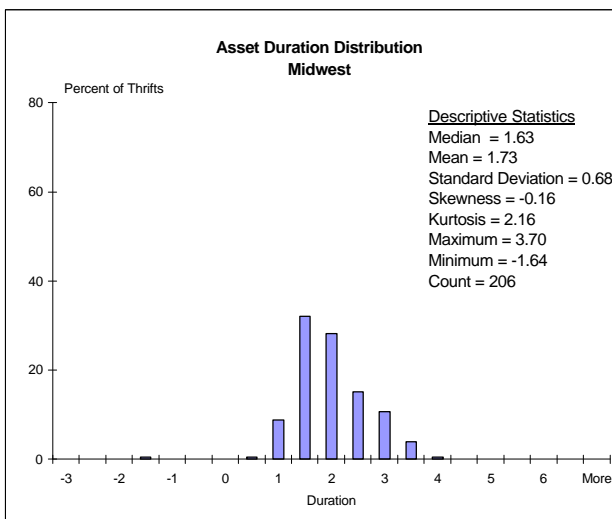
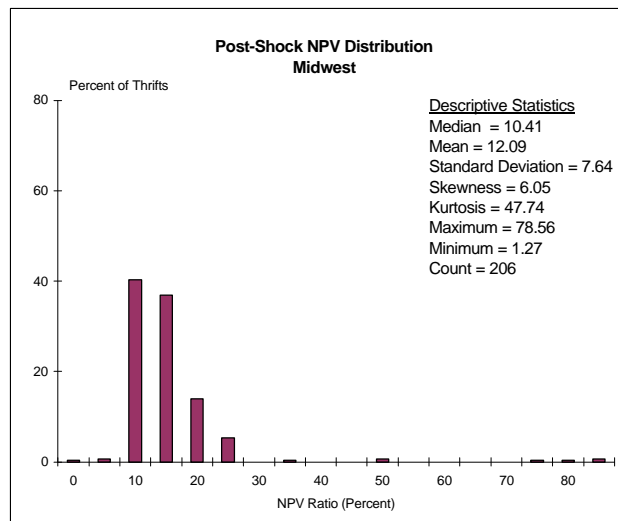
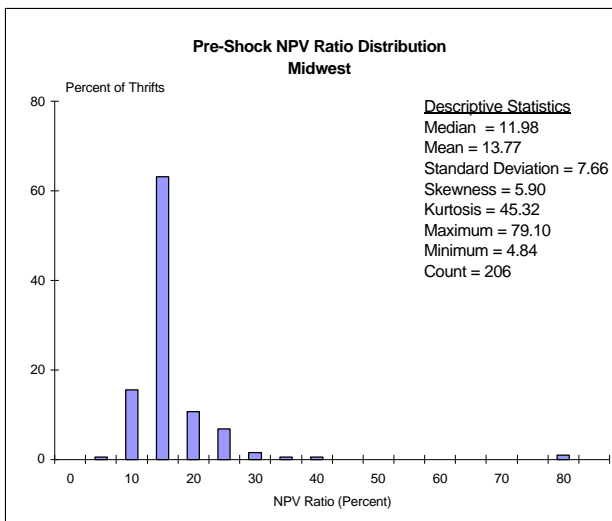
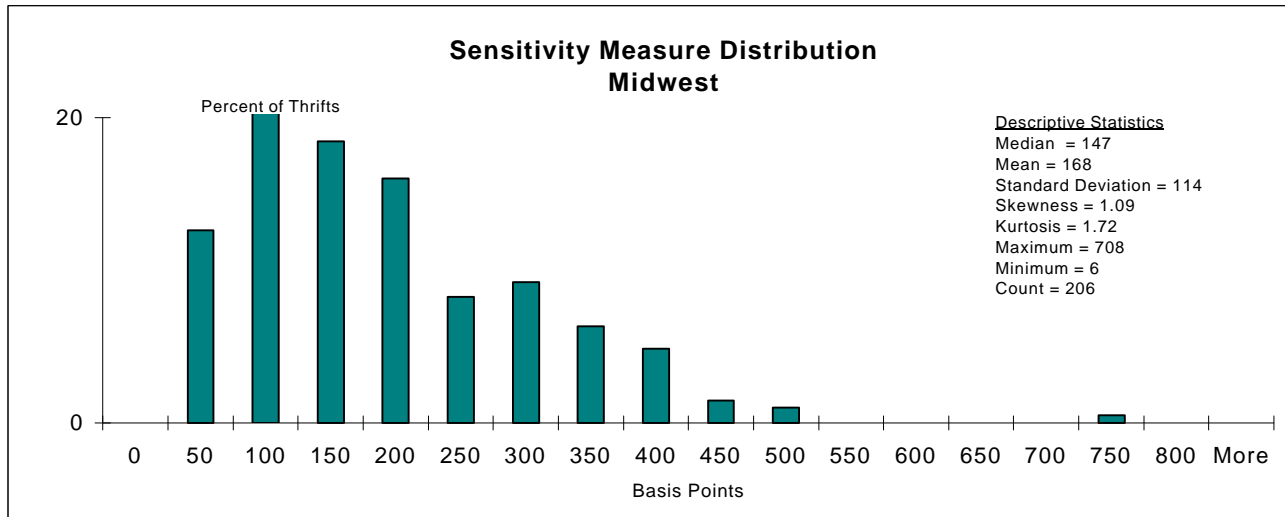
## Appendix C – Southeast Region



## Appendix D – Central Region



## Appendix E – Midwest Region



## Appendix F – West Region

