An Empirical Analysis of Thrift Futures Market Activity

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In 1981 and 1982, regulations were adopted by the Federal Home Loan Bank Board (FHLBB) that allowed FHLBB-regulated savings institutions to trade exchange-listed futures and option contracts. The set of permissible activities was changed from allowing limited positions in mortgage futures to permitting unlimited trading in debt futures and option contracts, provided that the trading reduces interest-rate risk. The new regulations place limits only on thrift long futures and short put positions which, when combined, are not allowed to exceed the thrift's short forward mortgage commitments plus 10% of the thrift's assets.

This study examines thrift usage of their new futures trading flexibility using financial data reported to the FHLBB. This overall investigation of actual thrift futures activity complements existing evidence from previous surveys of thrift futures participation (Booth, Smith, and Stolz, 1984) and provides further perspective on trading abuses at savings institutions already reported in the popular press (Knight, 1989). Although Koppenhaver (1990) examines futures usage by commercial banks, the hedging situation for thrifts is somewhat different due to thrifts' heavy emphasis on mortgage lending. A separate study of thrift futures participation is therefore merited. The importance of a thorough investigation of this issue is magnified by the large losses suffered by the government insurer of thrift deposits in the 1980s. Problems and oversights in all thrift regulations must be detected to avoid the excessive risk-taking activities, bad management, and outright fraud that leads to losses (Barth, Bartholomew, and Bradley, 1989).

THRIFT INTEREST-RATE RISK AND FUTURES HEDGING PROCEDURES

A thrift balance sheet usually consists of long-term prepayable mortgage assets financed by short-term deposit liabilities. The mismatch of maturities and prepayment rights implies interest-rate risk, which can be defined as fluctuations in market value caused by changes in interest rates. Although interest-rate changes also can affect short-term manipulatable figures, i.e., book income and capital, fluctuations in market value should be of primary concern to both thrifts and regulators since they represent the realizable present value of all future cash flows. The risk of market value fluctuations caused by interest-rate changes can be hedged or

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managed in several ways: by lengthening the maturity of liabilities (e.g., by offering long-term CDs), by making adjustable-rate mortgages (ARMs), by engaging in swaps of fixed-rate cash flows for variable-rate flows, by investing in mortgage derivative products like Collateralized Mortgage Obligation (CMO) tranches, by using over-the-counter (OTC) options and forward contracts, and by taking positions in exchange-traded financial futures options and contracts.

For thrifts with fixed-rate mortgages (whose market value varies with interest rates but whose income is fixed) that are financed by short-term deposits (whose market value is insensitive to interest-rate changes but whose cost is variable), overall interest-rate risk could be hedged by simply selling futures contracts on the mortgages. However, the lack of a viable mortgage futures contract (Sandor and Mains, 1985) necessitates cross-hedging with other futures or option positions. Arnold (1987) shows that prepayable mortgages represent a package consisting of a medium-term debt instrument and a series of short call options on the instrument and can, therefore, be hedged with a combination of short T-note futures and long calls on T-note futures. Jones and Jain (1987) demonstrate that the combined short futures and long call position has a combined payoff identical to a long put option on a T-note futures contract, which can be used also to hedge mortgages. Although basis risk exists whenever the correlation between the hedged and hedging instruments is not perfect, Murphy and Gordon (1990) show, empirically, that long puts on T-note futures contracts with a hedge ratio of 1 are effective hedges against mortgage price risk.

Batlin (1987) demonstrates that synthetic put options on fixed-rate mortgages also can be created dynamically using Treasury futures contracts. The hedge ratio for the short Treasury futures position must be adjusted over time, similar to the synthetic put options created in portfolio insurance strategies (Etzioni, 1986). Although the prepayment feature on mortgages would tend to cause the optimal hedge ratio to be less than 1, frequent changes in the hedge ratio caused by fluctuating prepayment values would tend to result in greater transaction costs than in the direct purchase of a put option. As shown by Batlin (1983), failure to dynamically change the hedge ratio can result in increased risk.

Alternatively, liability costs can be hedged by shortening futures on short-term debt instruments like 90-day Eurodollar time deposits, which might be more highly correlated with thrift short-term deposit funding costs than futures contracts on alternative instruments like T-bills. This hedging effectively extends the maturity of thrift short-term liabilities. Although liability hedging is sufficient to match the duration or weighted-average maturities of the assets and liabilities, liability hedging must still be combined with long Treasury futures calls to hedge the prepayment risk of the mortgage assets.

In the typical thrift, therefore, interest-rate risk can be hedged with a combination of long option and short futures positions. These positions can be combined with any or all of the other interest-rate management instruments previously mentioned, like long-term CDs, ARMs, swaps, CMOs, and OTC contracts.[1]

[1]Although some of these alternative hedging instruments have complex features that can create additional sources of interest-rate risk, this additional risk usually can be hedged using a combination of long options and short futures. For instance, cap risk on ARMs could theoretically be hedged using simple long puts on short-term debt futures contracts, which could be synthetically constructed by using a combination of long calls and short futures, or by using a dynamic hedge ratio on short futures contracts (Goldfarb, 1987).

Short put option and long futures positions normally serve no useful hedging purpose for thrifts. Although short put option and long futures positions can be used as a micro hedge of short forward commitments on thrift mortgage banking operations, risks relating to mortgage banking operations are dwarfed by cash portfolio risk for most thrifts.[2] Thus, short put and long futures positions might magnify, instead of reduce, overall risk for these thrifts.

Similarly, short call options, by themselves, normally are not useful to thrifts for hedging purposes. Although short calls could theoretically be used in some dynamic hedging strategies based on delta or option volatility ratios (Bookstaber, 1987), the lack of a viable mortgage futures contract that could be employed for such a purpose would make these hedging positions extremely ineffective, unstable, and costly in terms of turnover costs. In addition, short calls magnify the prepayment risk of mortgages. In particular, when interest rates fall, losses are incurred on short call positions which may not be offset by gains on the cash mortgage portfolio because of prepayments. Thus, short call positions may increase instead of decrease overall thrift risk.

In a survey of savings and loan institutions, Booth, Smith, and Stolz (1984) report that thrifts tend to perceive futures contracts as tools for hedging against future increases in the cost of funds. Scarcely one-third of the sampled thrifts perceive futures as a means to manage the risk of mortgage lending. The focus on liability hedging may reflect a greater concern among thrifts for hedging short-term fluctuations in book income and capital than in hedging actual changes in market value. This preoccupation with accounting figures may be caused, at least in part, by the book capital constraints placed on thrifts by the FHLBB (Edwards, 1981).

The survey also reveals that approximately one-quarter of the thrifts feel futures trading could be used to insure against future decreases in investment returns, or to synthetically extend asset maturities to profit from higher yields. These trading motivations might lead to taking long futures positions on debt instruments which could increase thrift interest-rate risk. Such trading is permitted according to current regulations, which only impose a fairly nonbinding constraint of interest-rate risk reduction for some myopic or microhedged position (Goldfarb, 1987), and might be undertaken not only by thrifts seeking to profit from interest-rate forecasts but also by insolvent thrifts attempting to maximize the probability of future solvency by gambling. While optimal for individual thrifts, futures and option positions that increase overall risk may be worse for the government insurer of deposits than unhedged spot positions (Guttentag, 1983).

DATA AND INVESTIGATIVE FRAMEWORK

Rather than relying on survey results, actual thrift usage of the futures market can be investigated by analyzing the quarterly financial report data collected by the FHLBB from all savings institutions. These reports show each thrift's total positions on futures contracts and options on futures that are open at the end of each quarter, broken down by type of position (long and short positions on: futures contracts on long-term debt instruments, futures on short-term debt instruments, calls, and puts). These reports also show gains and losses from futures and option trad-

[2]Short forward commitments in mortgage banking refer to contracts to sell mortgages in the future in the cash market (as opposed to the futures market) and represent short mortgage forward positions.

ing, broken down by the deferred and immediately recognizable amounts. Unfortunately, the data do not indicate thrift futures positions unless held open at the end of the quarter and do not reveal trading gains and losses incurred during a quarter on futures positions that are closed out in conjunction with the termination of an identified hedged spot position in the same quarter (trading income associated with terminated spot positions are buried in a general capital gains account). Although the data permit thrifts to conceal their futures participation, thrifts are usually more concerned with manipulating their vital capital accounts than with hiding their less strictly monitored futures activities. As a result, any biases in the data should be small and should consist largely of some good performance not being included. For instance, when interest rates rise (fall), thrifts attempting to maximize reported income and capital to satisfy regulatory requirements would be motivated to sell only those mortgages identified (not identified) with a short futures hedging instrument, in order to be able to add to income the full market value gain on the hedging instrument (on the mortgage while deferring the loss on the short futures position). Therefore, more futures gains than losses should go undetected because of burial in the intraquarter capital gains account. Although an analysis with such data cannot be totally conclusive, the results can provide an additional perspective on thrift futures behavior and performance.

Thrifts can be analyzed for frequency of use to provide perspective on previous survey findings. Booth, Smith, and Stolz (1984) find that a greater number of large thrifts use the futures markets than small thrifts. They hypothesize that the cause may be that larger institutions have a greater capacity to absorb the costs of obtaining qualified personnel, training management, and developing control systems. In addition to size, users can be compared with nonusers on the basis of reported tangible capital and income (measured according to Generally Accepted Accounting Principles), as well as on interest-rate risk (as proxied by the difference between the weighted-average maturities of the asset and liability coupon repricings, hereafter defined as *net maturity*).[3] Although thrifts reporting losses might have less incentive to hedge (Guttentag, 1983), thrifts with negative capital might have greater incentive to speculate, as mentioned in the previous section.

Continuity of usage can be examined also to investigate the effect of past experience on thrift futures behavior, and thereby complement previous survey findings for other financial institutions. Veit and Reiff (1983) find that a significant portion of bank futures participants discontinue usage, and a significant portion are dissatisfied with futures trading. Possible reasons for thrifts to interrupt usage include: poor futures trading experiences (Lam, 1989); the replacement of futures hedges with other hedges, such as swaps (Quinn, 1989); and the lifting of hedges to enable speculation on interest-rate movements, as commodity dealers and processors do to speculate on commodity price movements (Szala and Wiesemeyer, 1988). To analyze this issue, thrifts that continue usage from one quarter to the next can be compared with thrifts that interrupt usage on the basis of asset size, income, tangible capital, trading losses, changes in net maturity, and changes in swap positions.

In addition, it is possible to examine what portion of the large losses incurred by the government regulators on failed thrifts (Barth, Bartholomew, and Bradley,

[3]The difference between the average repricing maturity of assets and liabilities (weighted by book value and defined as the time between coupon repricings for variable-rate instruments) is used as the proxy because insufficient data exists on the FHLBB financial reports to compute duration exactly. A simple 1- or 3-year gap is not used since such calculations do not take into consideration the total maturity and interest-rate risk of the instruments.

1989) can be attributable to futures trading. Futures trading losses on tangibly insolvent but not yet closed thrifts can be investigated as well.

A further comparison can be made among groups broken up according to the type of futures usage. The financial characteristics of thrifts using total futures hedges for mortgages can be contrasted with thrift futures participants not using either long puts or a combination of long calls and short futures. A similar analysis can be conducted for thrifts that use straight debt hedging strategies (short futures contracts on long-term debt instruments without using long calls), for thrifts that use strictly liability hedges (short futures contracts on short-term debt instruments), for thrifts that use short put or long futures positions, and for thrifts that use short calls.

It is possible also to examine thrifts with very large futures positions in relation to the size of the thrift. Although any definition of "very large" must be somewhat arbitrary, it can be assumed from the discussion in the previous section that thrifts can comfortably hedge their interest-rate risk using a hedge ratio no greater than 1:1 for *all* assets and liabilities. Actually, long call positions, whose size does not exceed assets, plus other positions (like short futures), whose size does not exceed assets, would be sufficient to hedge thrift mortgage risk, and in no case would the size of any reported position category (i.e., short and long positions on each of the following: futures contracts on long-term debt instruments, futures contracts on short-term debt instruments, puts, and calls) need to be greater than the value of the thrift's assets. However, because liability hedging positions could be over 10 times the value of liabilities if a thrift wishes to extend liability maturities just 3 years with short 3-month Eurodollar futures, all short futures positions on short-term debt instruments must be disregarded for purposes of screening for very large users. Very large positions, then, are defined here as (i) total futures and option positions (less short futures on short-term debt instruments) that exceed either twice the thrift's assets or assets plus long call positions, or (ii) some position category (other than short futures on short-term debt instruments) whose value is in excess of assets.

INITIAL DATA ANALYSIS

The number of thrifts using futures and options on futures in each quarter from 1984 through 1988 is listed in Table I. Although the number fluctuates somewhat and has trended downward since 1985,[4] the range of thrift futures and option participants remains in a fairly narrow band between 206 and 444 institutions. These participation figures represent between 6.3% and 14.1% of all thrifts in existence. Out of a total of 3608 thrifts in existence between 1984 and 1988, 1119 (31.0%) of these use the futures and option market at some point. In an industry that averages $1,033.9 billion in assets over the interval 1984–88, the aggregate, time-series, average size of thrift futures and option positions is a relatively low $32.3 billion. For thrifts that actually use the futures and option market, the average ratio of total futures and option positions to assets is 17.7%, which provides some indication of the relative size of the participation.

Table II compares the characteristics of thrift futures and option users with nonusers for each quarter. As indicated by Analysis of Variance (ANOVA) F tests,

[4]The decline in futures usage in 1985 may attribute to FHLBB regulations introduced, in that year, that no longer permit thrifts asymmetric treatment of gain and loss recognition on option positions through discretionary amortization procedures used to measure income and regulatory capital.

Table I
NUMBER OF THRIFTS USING THE FUTURES AND OPTION MARKET

Year	Quarter	Users*
1984	1	319
	2	367
	3	349
	4	359
1985	1	444 (14.1%)
	2	337
	3	330
	4	237
1986	1	227
	2	206 (6.3%)
	3	213
	4	206
1987	1	242
	2	252
	3	246
	4	235
1988	1	243
	2	229
	3	231
	4	206
1984–88		1119 [31.0%]

*The highest and lowest percent of users in any quarter over the interval are denoted in parenthesis, while the percent of thrifts using futures and options over the entire interval is denoted in brackets.

thrift users of the futures and option market tend to have lower tangible capital ratios, have higher reported net income as a percent of assets, are larger in terms of assets, and have higher interest-rate risk as measured by the net maturity. The larger size may proxy for greater resources to procure and train the necessary staff which may be required just to choose and monitor and activities of a reliable consultant (as evidenced by the existence of numerous lawsuits against thrift futures trading advisors for abusive trading activities). The higher level of interest-rate risk and the lower capital ratios for users may provide some evidence of a more urgent

Table II
COMPARISON OF THRIFT FUTURES AND OPTION PARTICIPANTS WITH NONPARTICIPANTS

	Nonusers	Users	*F*
Tangible capital (% of assets)	3.04%	1.42%	35.01*
Quarterly net income (% of assets)	−0.06%	0.01%	13.18*
Assets ($ millions)	$290.21	$937.84	1278.46*
Weighted-average asset maturity minus liability maturity (years)	7.704	8.077	44.90*

*Statistic significant at the .01 level.

need to hedge and reduce risk. The statistically significant losses for the nonusers is consistent with money-losing thrifts having no incentive to hedge in operating losses, instead preferring to speculate on future interest-rate declines with unhedged spot positions.

The consistency with which individual thrifts use futures and options is illustrated in Table III. Here are shown the small percentage of thrifts (1.8%) that use the futures and option market continuously since 1984. Of the remaining thrift futures and option participants, 40.4% use the market continuously for some period of time and then apparently discontinue usage without re-entering the market; while the largest percentage of the remaining thrifts (57.8%) use the futures and option market intermittently. These findings indicate that very few thrifts use the futures and option market to construct continuous, static hedges.

An analysis of thrifts closing out all positions in the futures and option market in a subsequent quarter is provided in Table IV. ANOVA tests indicate thrifts which remain in the futures and option market from one quarter to the next are significantly different from thrifts which leave the market only with respect to asset size. As is listed in Table IV, thrifts that use the futures and option market on a more continuous basis tend to be significantly larger, with an average of over $1 billion in assets compared to under $700 million for thrifts that interrupt futures activity. These results are confirmed by Chi-squared statistics from a multivariate maximum-likelihood logistic regression (MMLLR) that is conducted to determine which characteristics can be used to maximize the probability of discriminating continuous from noncontinuous users. The larger size for the more continuous users may reflect the greater resources they have to maintain a sophisticated futures trading staff.

Table IV indicates that, on average, thrifts which interrupt usage of the futures and option market in any period do not suffer increases in interest-rate risk as a result. In fact, the interest-rate risk, as proxied by the net maturity, tends to decline in the quarter subsequent to the interruption of futures and option usage, although the decline is statistically insignificant from that of other thrifts. The failure to detect an increase in interest-rate risk is consistent with the hypothesis that thrifts tend to replace their futures and option hedges with other hedges. Although a portion of the futures and option positions that are removed may be replaced with swaps, further ANOVA *F* tests (not shown in Table IV) do not indicate any significant difference between swap usage for thrifts that interrupt participation and continuous participants. In fact, only 4.7% of the thrifts that interrupt usage in any quarter increase the dollar amount of swaps outstanding. The bulk of the thrifts may adopt other positions that replace the futures and option hedges, such as issuing longer-term deposits and investing in more ARMs.

Further investigation of this subject reveals that 37.8% of the hedgers that interrupt futures and option usage (in comparison with 36.5% of hedgers that continue

Table III
THRIFT CONTINUITY OF USAGE

Percentage of 1984 1st quarter users who:	
(A) Used futures and options continuously through 1988	1.8%
(B) Terminated futures and option usage	40.4%
(C) Used futures and options intermittently	57.8%

Table IV
COMPARISON OF THRIFTS INTERRUPTING FUTURES AND OPTION ACTIVITY WITH OTHER FUTURES AND OPTION USERS*

(1) Characteristic	(2) Usage Continued	(3) Usage Interrupted	(4) ANOVA (*F*)
Tangible capital (% of assets)	1.41%	1.42%	0.00
Quarterly net income (% of assets)	0.27%	−0.25%	2.46
Assets ($ millions)	$1072.83†	$661.35	39.10*
Futures trading gains (% of assets)	−1.41%	−0.31%	1.15
Quarterly change in:			
Weighted-average asset maturity minus liability maturity (years)	−0.60	−0.54	0.53
Swaps ($ millions)	$7.00	$4.59	1.04

*Characteristics based on quarter prior to interruption of futures and option participation.
*Statistic significant at the .01 level.
†Significant at the .01 level in a Chi-squared test from a multivariate maximum-likelihood logistic regression of a dummy variable (indicating usage continuing) on independent variables listed in column 1.

usage) incur increases in interest-rate risk the following quarter, as measured by the net weighted-average maturity. These findings indicate that over one-third of the thrifts that interrupt futures usage are not replacing the hedges with other risk-reducing positions, but instead may be attempting to time their hedges to be in place only when they expect interest rates to rise.

Table IV shows that the average loss on futures trading for thrifts which interrupt futures and option trading is not significantly different from that of more continuous users. These results provide no evidence that in–out users and market timers are able to significantly outperform more continuous users. These results also provide no evidence that thrifts interrupt futures and option hedging because of relatively unsatisfactory experiences and losses. Another test of the latter hypothesis that compares trading losses of those thrifts which only use the futures and option market in the first 10 quarters of the sample (and not in the last 10 quarters) with other futures and option participants, yields the same insignificant results (not shown).

An examination of whether shaky or insolvent thrifts are more likely to engage in futures activity and/or suffer larger losses than other thrifts is provided in Table V. The evidence indicates that thrifts which, at some time in the 1984–88 interval tangibly insolvent according to Generally Accepted Accounting Principles, are significantly more likely to use the futures and option market than solvent thrifts. However, aggregate futures and option trading losses for insolvent thrifts total $552 million compared with $931 million for solvent thrifts, and there is no statistically significant evidence from ANOVA *F* tests that the insolvent users suffer significantly higher losses than the solvent users. Although these thrifts are less able to afford futures losses, it is possible that, with appropriately constructed hedges during this sample period of falling interest rates, the futures and option trading losses might be at least partially offset by gains on cash positions.

Table V also provides a comparison of the trading experience of failed users (defined as thrifts that have been involuntarily closed or merged by the FHLBB at a loss) with nonfailed users. Although 106 of the 333 thrifts that failed between 1984

Table V
AGGREGATE THRIFT FUTURES AND OPTION TRADING LOSSES[a]

Category	Percent in Category Using Futures	Usage Likelihood (F)	Average Loss Per User	Average Loss (F)	Aggregate Futures Trading Losses
Solvent institutions	28.4%		$1.343	0.15	$930.5
Insolvent institutions	36.5%	24.45[b]	$1.295		$551.7
Nonfailed institutions	30.9%		$1.339	0.01	$1356.8
Failed institutions	31.8%	0.01	$1.183		$125.4

[a]Dollar amounts in millions.
[b]Statistic significant at the .01 level.

and 1988 participate in the futures and option market at some point, the evidence indicates these failed thrifts exhibit no significantly higher tendency to use the futures and option market nor do they suffer higher average futures and option trading losses than other thrifts. In fact, total losses for this category of futures and option users is only $125 million (or $1.2 million per user), compared with aggregate futures and option losses for all thrifts of $1.482 billion (or $1.3 million per user).

Although there is little evidence that losses from futures trading in the past contribute to or result from thrift insolvencies or failures, the results presented here represent aggregates from an incomplete data base that possibly mask major problems at individual institutions, such as at several small thrifts which are under investigation for futures trading abuses (Knight, 1989). Moreover, even though aggregate futures trading losses of $1.482 billion over a 5-year interval for an industry with over $1 trillion in assets seem fairly mild, it must be observed that thrift participation in the futures market is, to date, fairly uncommon and erratic. Only a small percentage of total thrift assets are hedged with futures and options.

EMPIRICAL COMPARISON OF DIFFERENT TYPES OF THRIFT FUTURES ACTIVITY

In the analysis of the characteristics and performance of different types of futures hedging activities, it is discovered that: only 26.1% appear to be using total mortgage hedges, 2.9% appear to be using only straight debt hedges, 28.5% appear to be hedging liabilities, 27.2% of all thrift futures activity includes short puts and long futures positions, 33.5% included short call positions, and 0.7% have aggregate futures and options positions whose size can be defined as very large, with the various groupings obviously overlapping. The comparisons of each focused grouping with the universe of other hedgers are summarized in Table VI.

The roughly one-quarter of thrift futures and option participants using total mortgage hedges, defined as long puts and/or a combination of short futures on long-term debt instruments and long calls, tend to be larger and have net maturities than other thrift futures participants. The evidence of larger size might reflect a larger amount of resources and sophistication.

The very small number of straight debt hedgers, defined as thrifts taking short futures positions on long-term debt instruments without complementing them with

Table VI
COMPARISON OF DIFFERENT TYPES OF HEDGERS[a]

(1) Type of Hedger	(2) Percent of Observations	(3) Tangible Capital	(4) Quarterly Net Income	(5) Assets ($ Millions)	(6) Net Maturity	(7) Futures Trading Gains
Total mortgage	26.1%	1.54%	−0.02%	$1175.93*	7.27	−1.22%
Others	73.9%	1.37%	0.02%	$835.60	8.36*†	−0.99%
Straight debt	2.9%	1.32%	−0.13%	$667.16	8.10	−1.07%
Others	97.1%	1.42%	0.01%	$945.92	7.33	−0.45%
Liability	28.5%	1.20%	0.06%	$1232.84*†	7.92	−3.00%*
Asset	71.5%	1.50%	−0.01%	$820.48	8.47*†	−0.27%
Long	33.5%	1.58%	0.05%	$998.65	8.58*†	−0.21%
Short	66.5%	1.35%	0.00%	$915.14	7.89	−1.37%
W/short calls	27.2%	1.17%	−0.02%	$1059.60*†	8.07	−0.34%
W/o short calls	72.8%	1.54%	0.02%	$876.52	8.08	−1.41%
Very large	0.7%	2.02%	−1.54%	$217.82	5.50	−2.35%
Others	99.3%	1.43%	0.01%*	$946.67	8.01*†	−1.20%

[a]All percentage figures are expressed in terms of assets. Net maturity is defined as the weighted-average maturity between coupon repricings of the assets less the weighted-average maturity of the liabilities. Total mortgage hedgers are defined as those that have puts or combinations of long calls and short futures positions on long-term debt instruments (like T-note futures). Straight debt hedgers are defined as those that have short futures positions on long-term debt instruments but do not have long call positions. Liability hedgers are defined as those using short futures positions on short-term debt instruments (like Eurodollars). Long hedgers are defined as those that have long futures or short put option positions. W/short calls denotes users with short calls. Users with very large positions are defined as those which have total futures and option positions less their short futures on short-term debt instruments that exceed twice the amount of their assets (or their assets plus their long call positions), or which have some position category (other than short futures on short-term debt instruments) that exceeds their assets. All other hedgers are defined as those that are not in the previous category.

*Significant at the .01 level in an ANOVA *F* test.

†Significant at the .01 level in a Chi-squared test from a multivariate maximum-likelihood logistic regression.

long calls, do not tend to differ significantly from other thrifts in any of the tested financial characteristics. The failure to find that these thrifts are larger in size provides no evidence that these hedgers actually have the sophistication to dynamically change hedge ratios and, therefore, their hedging activities may actually be increasing risk (Batlin, 1983).

The evidence indicates that thrifts using liability hedges, defined as short futures positions on short-term debt instruments, are larger than average and have longer net maturities. Their trading losses also are significantly higher. The higher trading losses could result from a failure to complement the liability maturity extension with long call hedges of mortgage prepayment risk. Further investigation reveals that only 15.9% of the thrift liability hedgers actually use long call hedges.

The ANOVA results indicate no significant difference between long hedgers, defined as those using either long futures or short put option positions, and other futures participants, except that the long hedgers tend to have larger differences between the weighted-average repricing maturity of their assets and their liabilities. This finding, which is confirmed by MMLLR tests conducted to determine what characteristics can be used to discriminate between the two groupings, implies that the long hedgers have greater interest-rate risk than the short hedgers, and that the long hedges may actually increase their interest-rate risk. In a further investigation of this issue, using a complex, discounted cash-flow model developed by Murphy (1989), it is found that only 4 of the 54 thrift long hedgers in existence at the end of December 1988 have present values of shareholders' net worth that declines when interest rates fall. In addition, even the average forward commitment position of the mortgage banking operations of these 54 long hedgers is net long. These results provide some evidence that thrifts do not utilize long hedging positions to reduce their overall risk but instead to increase it, perhaps to profit from an interest-rate forecast.

Table VI indicates that thrifts which use short calls are significantly different from other hedgers only in terms of size. The larger size for such hedgers provides no evidence that the short call positions can be attributable to a lack of sophistication as opposed to attempts to increase overall risk.

The findings in Table VI show that thrifts with very large futures and option positions in relation to assets are significantly smaller in size, report significantly lower net income, and have significantly lower net maturities. The average ratio of futures positions to assets for these thrifts is 3.11, with a high of 21.32. Although the exact purpose of these very large futures positions is not entirely clear, the net reported losses for these futures could provide some incentive to speculate on large futures positions as one way out of a poor financial condition. The smaller size of these thrifts might also indicate a lack of sophistication.[5] It is interesting to observe, however, that the larger trading losses suffered by these thrifts are not statistically significant.

CONCLUSION

The findings of this research indicate that only a very small number of thrifts use the futures market continuously, although almost one-third of the thrifts have taken futures positions at some time. The average thrift futures participant tends to be larger than nonparticipants. The majority of thrifts appear to exit the futures market when they replace futures hedges with other means of reducing asset-liability maturity mismatching. Very few thrifts, however, are found to replace futures hedges with swaps. In addition, for a large minority of thrifts, lifting futures hedges coincides with an increase in interest-rate risk and may, therefore, represent an attempt at market timing.

Although futures trading losses in the past do not appear to be extremely large and do not appear to be significantly concentrated in thrifts with poorer financial conditions, and although less than 1% of the end-of-the-quarter futures positions are found to be extremely large in size, this study does show that a significant por-

[5]The use of delta (Bookstaber, 1987) and/or static regression (Benninga, Eldor, and Zilcha, 1984) parameter hedge ratios to set futures positions could result in large positions on out-of-the-money options and on low-volatility futures contracts. As previously mentioned in the first section, however, such strategies may increase instead of decrease risk.

tion of thrift futures positions may be increasing overall thrift risk. For example, over one-quarter of the futures activity includes long hedging positions that appear to magnify their overall interest-rate risk. Over one-third of the futures activity includes short call option positions that could increase both risk and transaction costs. Scarcely one-quarter of the thrift futures participants are using total mortgage hedges, and over three-fourths of thrift liability hedgers are not addressing the prepayment risk problem in the futures market (although they may be addressing this problem in other markets).

These general findings indicate that changes in regulatory supervision over thrift futures usage may be worthy of consideration. For instance, greater restrictions on short option and long futures positions might be imposed, with such positions being allowed only for thrifts that can show their *total* net worth position is adversely affected by declines in interest rates. Required reporting of all intra-quarter futures activity might also permit more rapid regulatory reaction to speculative usage of the futures market. Although the new capital regulations imposed in 1989 on thrifts are largely oriented to controlling credit risk, they also establish capital requirements as a function of the risk of both rising and falling interest rates, and thereby represent a step in the right direction by providing greater incentives to engage in more risk-reducing hedges and to hedge prepayment risk.

Bibliography

Arnold, T. (1987): "The Current Status of Hedging Tools for Mortgage-Backed Securities," in *Mortgage-Backed Securities,* F. Fabozzi, Ed., Chicago: Probus, pp. 357–365.

Barth, J., Bartholomew, P., and Bradley, M. (1989): "Reforming Federal Deposit Insurance: What Can Be Learned From Private Insurance Practices?" Federal Home Loan Bank Board Research Paper #161.

Batlin, C. (1983): "Interest Rate Risk, Prepayment Risk, and the Futures Market Hedging Strategies of Financial Intermediaries," *Journal of Futures Markets,* 3:177–184.

Batlin, C. (1987): "Hedging Mortgage-Backed Securities with Treasury Bond Futures," *Journal of Futures Markets,* 7:675–693.

Benninga, S., Eldor, R., and Zilcha, I. (1984): "The Optimal Hedge Ratio in Unbiased Futures Markets," *Journal of Futures Markets,* 4:155–159.

Bookstaber, R. (1987): *Option Pricing and Investment Strategies,* Chicago: Probus, pp. 95–102.

Booth, J., Smith, R., and Stolz, R. (1984): "Use of Interest Rate Futures by Financial Institution," *Journal of Banking Research,* (Spring):15–20.

Edwards, F. (1981): "The Regulation of Futures and Forward Trading by Depository Institutions: A Legal and Economic Analysis," *Journal of Futures Markets,* 1:201–218.

Etzioni, E. (1986): "Rebalance Disciplines for Portfolio Insurance," *Journal of Portfolio Management,* 13:59–62.

Goldfarb, D. (1987): "Hedging Interest Rate Risk in Banking," *Journal of Futures Markets,* 7:35–47.

Guttentag, J. (1983): "A Note on Hedging and Solvency: The Case of a Phoenix." *Journal of Futures Markets,* 3:137–141.

Jones, F., and Jain, A. (1987): "Hedging Mortgage-Backed Securities." *Mortgage-Backed Securities,* F. Fabozzi, Ed., Chicago:Probus, pp. 367–442.

Knight, J. (1989): "At Least Four S&L Failures Laid to High-Risk Trading," *Washington Post,* (June 3):16–17.

Koppenhaver, G. (1990): "An Empirical Analysis of Bank Hedging in Futures Markets," *Journal of Futures Markets,* 10:1–12.

Lam, J. (1989): "Futures Techniques Have Improved," *Federal Home Loan Bank Board Journal,* 19:10–13.

Murphy, A. (1989): "An Analysis of the Capacity of Thrift Institutions to Raise Equity Capital," Working Paper, Oakland University.

Murphy, A., and Gordon, D. (1990): "An Empirical Note on Hedging Mortgages with Puts," *Journal of Futures Markets,* 10:75–78.

Quinn, L. (1989): "Thrift Industry Hasn't Learned How to Handle Its Risks by Hedging," *Futures,* 18:54–57.

Sandor, R., and Mains, N. (1985): "Financial Futures and Mortgage-Backed Securities," *Handbook of Mortgage-Backed Securities,* F. Fabozzi, Ed., Chicago:Probus, pp. 373–401.

Szala, G., and Wiesemeyer, J. (1988): "How Keebler Traders Smooth Out Market Peaks and Valleys," *Futures,* 17:45–47.

Veit, T., and Reiff, W. (1983): "Commercial Banks and Interest Rate Futures: A Hedging Survey," *Journal of Futures Markets,* 3:283–293.