

Bank Asset/Liability Management



Prepared by Mary Brookhart

Backtesting the Asset/Liability Management Model

ALCO professionals in the financial services industry are expected to convey information about interest rate risk to governing bodies such as the bank ALCO, often composed of non-specialists, which assume responsibility for taking actions to manage risk based on that information. Other consumers of this information beyond bank management and directors may include regulators, internal auditors, third party model/process reviewers, and shareholders or analysts who review 10-Ks or 10-Qs. All of them rely on the ALCO professional's ability to present information either to execute risk management strategies, or to evaluate the ALCO's effectiveness at managing risk. Backtesting of the ALCO process can help us evaluate our effectiveness, as long as we have the following questions in mind:

- Do we review if the information we generate in theory reflects actual financial performance in practice?
- Do we know how much our decision making process is dependent on key modeling assumptions made by the ALCO professional, and do we test those assumptions for validity or sensitivity?
- Most importantly, is the information reliable enough when viewed in retrospect to support decision making?

Backtesting Premise. At its most basic, backtesting can consist of a comparison of actual net interest income or net interest margin over a

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short horizon (for example, one or two quarters of information) to results projected by the interest rate risk modeling process. This short-term approach has several advantages:

- The shorter the period of time reviewed, the less likely it is that asset and liability composition will change dramatically, either for static or *best forecast* balance sheets—the modeled outcome will be less likely to drift away from actual results.
- Over a short period of time, market interest rate changes are not as likely to deviate from *standard* interest rate scenarios commonly used in ALCO modeling (unchanged rates or modest parallel rate shifts), since interest rate cycles

generally take more time to unfold than a few months.

- Validating short-term results can give the ALCO comfort that the modeling process is producing reasonably accurate short-term information, which may give them confidence in its use for decision-making purposes.

But one of the chief purposes for interest rate risk modeling is to capture the longer term risk inherent in balance sheets. Making changes to cope with an unfavorable risk position through product pricing or wholesale balance sheet restructuring can take time to implement, especially since customer behavior in changing rate environments often works directly counter to what we would like to happen. We should also recognize that it would be a poor modeling process indeed that did *not* produce reasonable parallels to reality over the span of a few months. If we are lulled into a false sense of security about the *accuracy* of short-term modeling results compared to actual results, we may lose sight of the bigger purpose of why we hold periodic ALCO meetings and why we do all this complex modeling in the first place—to have the confidence that we can identify long-term interest rate risk inherent in today’s balance sheet in order to have sufficient time to implement decisions to manage tomorrow’s risk.

Consider the broader canvas of reviewing multiple quarters or years of recent results as a better basis for assessing the effectiveness of the modeling process as a basis for making interest rate risk management decisions. Since June 2004, the shape of the yield curve and the structure of bank balance sheets have both changed dramatically. Short-term interest rates have risen by over 400 basis points, while the long end of the yield curve has remained relatively unchanged. Deposit funding costs generally have risen more sharply than most asset yields, and the influx of low-cost core deposits many institutions experienced when interest rates were at all-time lows has shifted to growth in higher cost money market accounts and time deposits. How well did our modeling processes predict what would happen in such an environment? Did net interest margin change in the direction we thought it would? In retrospect, did we make appropriate

decisions to manage risk, or did the results catch us by surprise?

A good first step is to consider the time horizon of the risk management process. A brief overview of Form 10-Ks and 10-Qs for banks who measure interest rate risk using income simulation suggests that a two-year horizon is most common, with a few institutions going out to five years or beyond and a few looking out no further than one year. Bear in mind that the long-term effects of changes in the interest rate environment can be at their most pronounced in later periods of simulation modeling, since the impact of assumed interest rate changes and the effect of balance sheet shifts accumulate over time. A short time horizon may conceal dangers lurking in the undiscovered country a few months beyond a self-imposed time limit, as the following example comparison of one year, two year and five year risk graphs suggests (see Exhibits 1 through 3). Given the capacity of current-generation rate risk models, extending your horizon comes at little cost and can provide a warning of things to come. The directional trend of risk over time can be a better indicator of an institution’s sensitivity position than theoretically more precise numbers measuring projected net interest margin or net interest income.

An Example of Model Results. Let us compare an example of model results from the beginning of the Federal Reserve’s tightening cycle (June 2004) to the end of the typical two-year modeling horizon (June 2006). The first problem will be finding interest rate scenarios which matched the actual path of interest rates over this period. Parallel rate shifts do not provide any analog to the pronounced rate flattening over this period, pointing out the importance of incorporating simulations involving changes in the slope of the yield curve when developing risk management strategies. Here is an example of rate risk measurements for two rate scenarios involving curve shape change, produced in June 2004, which provided the closest, but still quite inexact fit over the two-year period in question. Exhibit 4 shows the path of net interest income assuming a 500 basis point flattening of the yield curve phased in over 12 months, while Exhibit 5 shows

the results of a 200 basis point flattening over the same period. In both cases, rates are assumed to remain unchanged after month 12 (another *standard practice*).

Part 2 of this series will begin with a discussion on the reasons for differences between modeled and actual results, and continue with the topic of core deposit rate behavior and the problems that they entail.

Mark Gim
The Washington Trust Company

Exhibit 1. One Year Risk

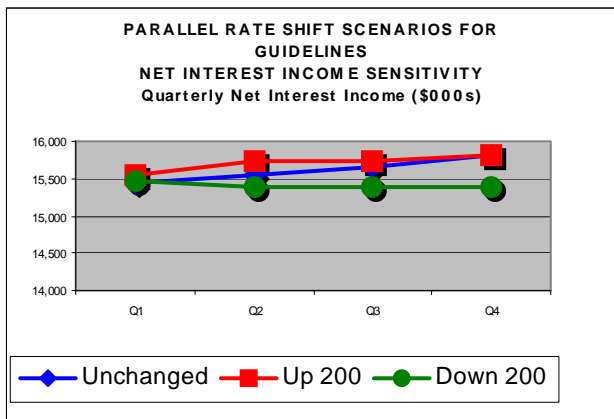


Exhibit 2. Two Year Risk

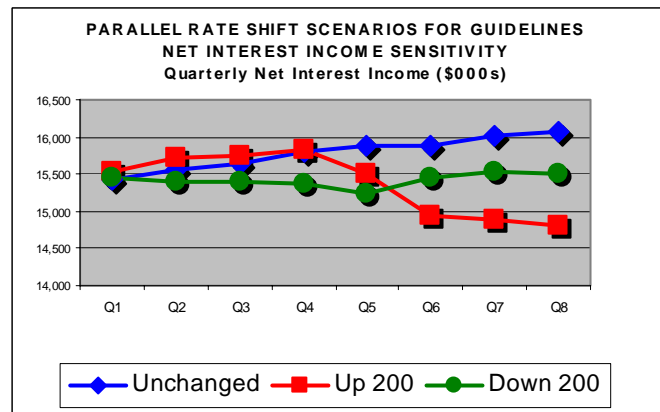


Exhibit 3. Five Year Risk

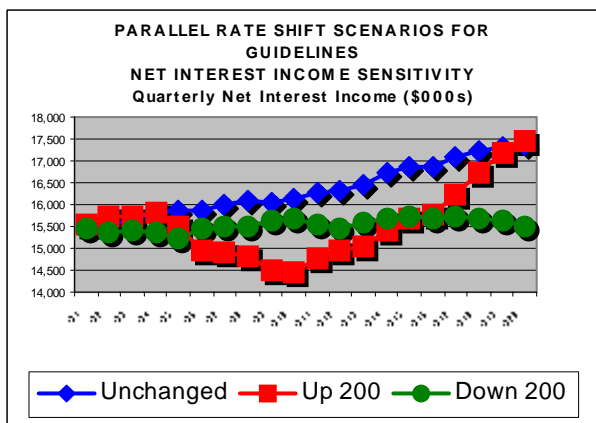


Exhibit 4.

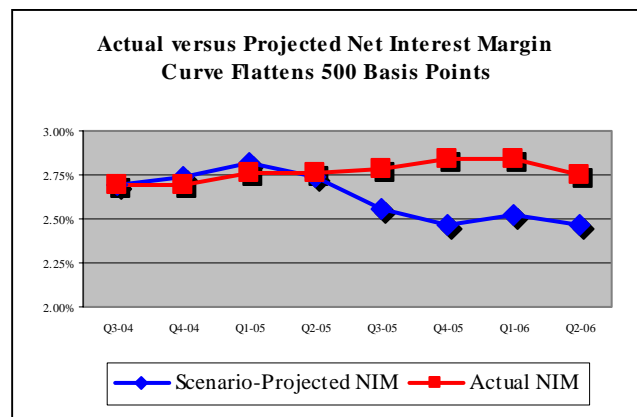
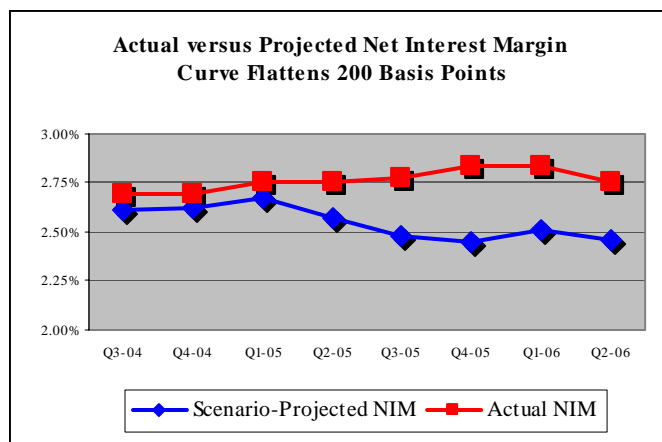


Exhibit 5.



Bank Size, Performance and Derivatives Use

We all know that bank performance and derivatives use tend to vary by asset size. What you might not know is how related they can be. Using Sept 30, 2006 Call Report data from the FDIC, we shall quickly examining derivatives use and then move on to overall bank performance. Finally, we will look at a challenge facing banks today and how it might be solved.

Performance Differences. According to the FDIC, virtually all banks over \$10 billion asset size use derivatives, while less than 10 percent of smaller banks do so. This lack of use might contribute to performance differences between different sized banks, especially in times of interest rate volatility. Exhibit 6 reflects how bank financial performance looks.

Exhibit 6.

	100m -1B	1B - 10B	Over 10B
Interest Income	6.45%	6.20%	5.50%
Interest Expense	<u>-2.51%</u>	<u>-2.65%</u>	<u>-2.68%</u>
Net Interest Income	3.94%	3.55%	2.82%
Non Interest Income	1.28%	1.85%	2.63%
Non Interest Expense	-3.29%	-3.14%	-3.09%
Other	<u>-0.20%</u>	<u>0.21%</u>	<u>-0.26%</u>
PreTax NOI	1.73%	2.05%	2.10%

Examination of balance sheet characteristics leads us to the following general conclusions. The smaller sized banks tend to be more highly capitalized, have shorter and less risky balance sheets, and are less reliant on wholesale funding. Of course, as noted above, their use of derivatives is substantially less than their larger peers. Now, let us turn to the income statement, shown in Exhibit 7.

Exhibit 7. Income Statement

	100m -1B	1B - 10B	Over 10B
Cash	6.02%	8.45%	12.05%
Securities	19.59%	19.38%	15.79%
Loans	68.77%	65.81%	55.29%
Other	<u>5.62%</u>	<u>6.36%</u>	<u>16.87%</u>
Total	100.00%	100.00%	100.00%
Deposits	81.10%	70.97%	62.56%
Other Liab	8.61%	17.51%	27.29%
Equity	<u>10.29%</u>	<u>11.52%</u>	<u>10.15%</u>
Total	100.00%	100.00%	100.00%
Tier 1 (core) Capital	9.56%	9.52%	7.12%
LT (5yr+) Assets	16.75%	19.66%	23.42%
Volatile Liab	21.85%	28.19%	39.09%
FHLB Advances	4.88%	6.65%	2.18%
Derivatives	1.18%	8.00%	1701.32%

Again, the general observations tend to agree with our natural perceptions concerning bank size and performance. That is, smaller banks tend to have an advantageous net interest margin position (both a higher yield on earning assets and a lower cost of funds), earn less fee income, suffer from the lack of economies of scale, and are ultimately less profitable than larger banks.

Interest Rate Cycles. In fact, given their structural disadvantage in the non-interest component, it could be argued that community banks cannot afford to squander any more of their existing NIM advantage. Yet, consider the current status of the interest rate cycle, using prime rate as a proxy for community bank earning asset yields (see Exhibit 8).

Exhibit 8. Current Status of the Interest Rate Cycle

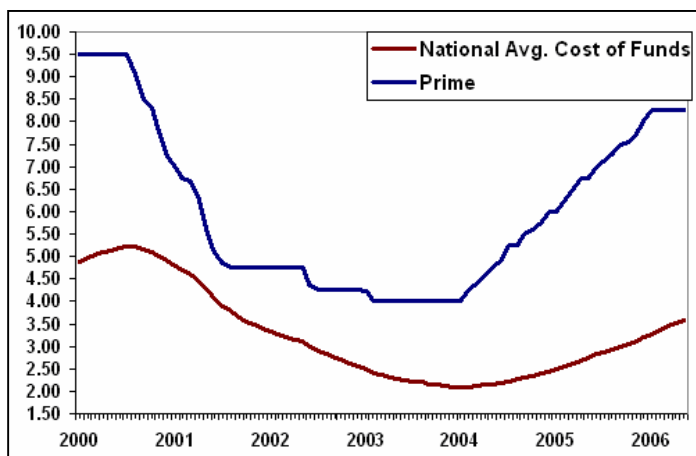
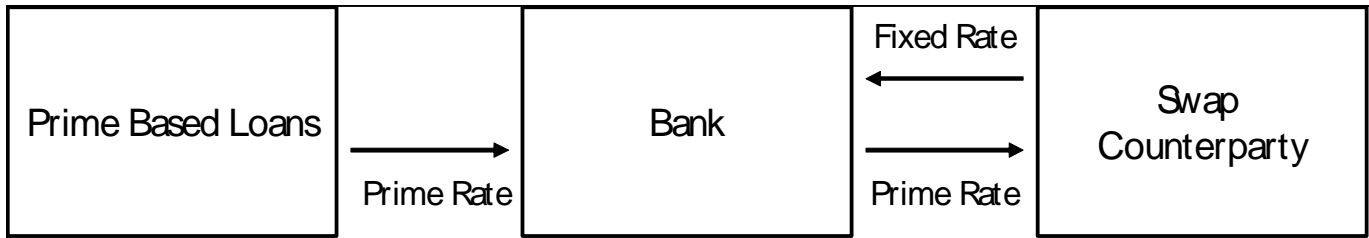


Exhibit 9. Derivatives Hedge

Quick-adjusting prime outpaces lagging cost of funds in both up and down markets. This cycle, cost of funds will start nearly 200 basis points lower than the last rate cycle. How can community banks avoid declining asset yields and margin compression if rates fall?

Typically, the answer would be to adjust the investment portfolio, selling short or floating rate securities while purchasing longer term fixed rate bonds so as to extend the duration of the portfolio. The downside here is that bond swaps are expensive, unrealized gains/losses become realized, basis risk is increased, and future liquidity is reduced. Perhaps a better solution is a derivatives hedge reflected in Exhibit 9.

Here, the bank exchanges prime rate cash flows directly for fixed rate cash flows, so no basis risk need be accepted. Further, given the efficiency of the hedging markets, the transaction should have a lower cost than a cash market trade. Finally, since notional values only serve as references to calculate the fixed and floating cash flows, and are never exchanged, no liquidity impact should be realized.

Requirements of Derivatives Transactions. The derivatives trade, more efficient from a direct cost perspective and less capital intensive, is both better and cheaper. Still, derivatives transactions have their own set of exacting requirements. For example:

- Does top management possess a working knowledge of derivatives?
- Are appropriate policies in place?
- Is the accounting framework developed?
- Are the auditors in agreement as to the proposed method of accounting?
- Have hedging strategies been developed?
- Are reporting and documentation issues clearly identified and assigned to the proper parties?

An independent third-party advisor can assist the bank in understanding and meeting the requirements needed to safely implement these powerful and effective tools.

Howard J. Lothrop, CFA
Managing Director
Echo Partners

Banking Consolidation and Asset/ Liability Management Modeling

Financial institutions are seeing change coming so rapidly these days that it is almost impossible to keep up. A/L managers must continuously stay ahead of the wave of new regulatory requirements, advancing software capabilities, and increasingly more detailed information. Add to this environment a continuing surge of banking consolidations, and the problems increase exponentially. Still, it is not all gloom and doom. There are some significant issues that require attention, and each one is answerable with a bit of effort and ingenuity. This article focuses on some of those issues that surround a consolidation of the asset/liability management functions of several financial institutions.

Data Availability and Compatibility. When one financial institution is consolidated with another, either through purchase or merger, a great deal of research is directed at loan and portfolio quality, liability make-up, and other hard but measurable pieces of information. What a thorough due diligence review should also examine though are the procedures in place for asset/liability management. Banks of varying sizes can be found

all along the evolutionary path of A/L management, and the capabilities and technological sophistication of each one will be as different as one snowflake from another.

However, there are three basic mechanical elements required for any asset/liability management modeling effort:

- General Ledger balances
- Maturity and Repricing data for loans and liabilities, and
- Similar data for the Investment Portfolio.

The portfolio has been treated as a separate item here because many institutions have turned to third-party vendors for their accounting function, as a result of the plethora of regulatory requirements surrounding investment securities. Larger financial institutions that have developed mainframe capabilities have the built-in flexibility to tailor their information in whatever fashion is the most effective. Small to midsized institutions, however, continue to rely on outside data providers for their input. Just as tourists have trouble with language barriers in a foreign country, asset/liability management models have difficulty in reading the various data formats and layouts that are used by different data providers.

The solution to this problem goes back to the particular A/L model being used. There are now sufficient modeling providers available in the market to offer plenty of flexibility and capability in the data that they can read. The problem comes into play as the asset/liability manager tries to have one vendor develop a relationship with another vendor's data. Proprietary programs and methodology are jealously guarded secrets, and the only way to protect oneself as an A/L manager is to make sure that the chosen provider is not only flexible but can incorporate a wide range of data formats. Any vendor who claims that their system will do anything, and that you will never need to look further is asking the A/L manager to give up any future option to switch systems as the industry develops. Let the buyer beware!

Level of Detail Needed and Desired. A second issue in consolidating asset/liability management functions is the degree of detail needed at each level of the financial institution. If the A/L

manager is providing the majority of the budgeting function as well as interest rate analysis, he or she will probably need to maintain a significant level of account detail in order to forecast non-interest sensitive items. If he/she is able to separate these functions, however, simply creating a few summary non-interest income and expense accounts will allow them to focus more attention on interest-sensitive assets and liabilities. This approach may make even more sense in a holding company environment, because the complexity of analyzing the interest sensitivity of individual entities as well as cumulative analysis can be quite complicated.

Separate or Combined Analysis. As to whether the asset/liability manager should maintain a separate analysis for each entity or evaluate them from the holding company level, the most appropriate methodology would be to use both techniques. Each entity has its own market environment that will influence product pricing, rate floors and ceilings, and many other specifics. Regulators will also look to the ability of individual financial institutions to manage their own risk. From the opposite perspective, stockholders will be looking for overall performance from the holding company, and only a consolidated asset/liability analyst will enable management to choose corporate-wide strategies that maximize total profitability.

Reporting Requirements. One last issue to consider is the level of reporting and what information is desired. A good ALM model should provide most if not all of the following information, although there are specific times when each of these is needed for management level decision making.

- *Equity and income volatility.* This demonstrates what happens to both the value of the bank and its income if interest rates move suddenly. Also, it provides information about how much interest rate risk is embedded in the bank's balance sheet.
- *Repricing gap analysis.* This is an especially useful tool for pointing out timing mismatches.
- *Maturity/cash flow analysis.* This is useful for planning purposes, and even more so with

- slowing prepayments of mortgage products.
- *The ability to evaluate different combinations of entities within the holding company structure.* Remember, banks can be sold as well as bought!
- *The ability to pass reports to various spreadsheet programs.* With the progress made in many software applications, numerous Board quality reports and presentations can now be easily created with only a few keystrokes of a computer.

Summary. The thrust of this article is to point out some of the issues that need attention in the increasingly complicated environment of asset/liability management, in light of the trend toward mergers and consolidations. Information compatibility and sophistication, flexibility of operational procedures, and common denominators make a set of equally important questions in any consolidation review.

Dale Hancock

Assessing Underlying Assumptions and Model Risk

Modeling core share account rates is difficult. You can speculate on what will happen, but you know with almost complete certainty that something quite unexpected is likely to happen before you are done. This, of course, does not qualify as a reason for not doing the best job you can in forecasting these rates.

But it does introduce another element of risk to your risk management process: model risk. Model risk is the risk that your interest rate risk model is *wrong*, meaning it does not give you the information you need to understand your interest rate risk. For example, core share rates are a significant source of model risk because all the balances in an account, such as money market share accounts, change at the same time. This can have a remarkable effect on your interest rate risk profile if you have not modeled these products appropriately.

One of the most important things the asset/liability manager has to do is to communicate interest rate risk results, and at the same time convey the limitations of the modeling process. It is very easy for a board of directors to look at an

ALCO report, see the various rate paths modeled and the resulting income, and walk away thinking they understand their risk profile. If that is all they see, they are missing an important piece of information and, in fact, they will not understand their risk at all.

Interest rate risk models are inherently full of model risk. Many, many assumptions are made. Some of these are difficult to make but, once done, you are confident that your resulting simulations are accurately modeled. Some of them, such as your model of core share account rates, are almost certainly wrong, especially in the more extreme rate environments, or in scenarios where there is a change in the direction of rates. For example, if you did a simulation as of the end of January for a rising rate environment, you would have to get the timing of the change in core share rates right, as well as the magnitude of the change. The most sophisticated model in the world will not be able to do this accurately, other than by chance. This is model risk.

When you present your income simulations, it is important that you disclose to management the assumptions in which you have the least confidence. In many cases, this will be share rates and mortgage prepayments.

It is also important that you quantify the impact of these assumptions. A summary content of the presentation should look something like Exhibit 10. Listed below are the four steps to present model risk to the ALCO:

1. *Present simulation results with your best assumptions.* This is your base case set of simulations, including all your best assumptions about balance sheet behavior.
2. *Explain why you made the assumptions you did.* Focusing on the assumptions that are most likely to be wrong, show ALCO why you made the assumptions you did. You might want to show them a graph of core share rates the last time there was a similar rate path. Or you may display input from branch managers or pricing analysts that indicate what rates are likely to do in certain scenarios that you used as part of your assumption making. In other words, convince them that you have made your assumptions rationally and that these are the assumptions you think are reasonable to include in your risk assessment.
3. *Explain why your assumptions might be incorrect.* Now show them why you might be wrong - or are almost certainly wrong. Show them aberrant core

share behavior in past rate environments. Tell them why this is an assumption you have less confidence in than other assumptions in the model.

4. *Quantify the impact of your assumptions being incorrect.* Now you have to show them what happens to your interest rate risk profile if your assumptions are incorrect. You can do this in a pretty straightforward manner, as shown in Exhibit 11. It can be helpful if you can give them a rule of thumb, such as, "It will affect our earnings by about \$7,000 for every 10 bps we are wrong on our core share assumptions."

Making senior management understand your model risk should be one of your priorities. You should never let them walk away from an ALCO meeting believing that you have shown them a set of scenarios and results that clearly defines your risk profile. Your base set in a simulation scenario only defines your risk profile within a somewhat narrow set of assumptions. Only when they understand your assumptions, why you made them, why they might be wrong, and how much they will affect your results, will you have really made them understand your risk.

Exhibit 10. Four Steps to Present Model Risk to ALCO

1. Present simulation results with your best assumptions.
2. Explain why you made the assumptions you did.
3. Explain why your assumptions might be incorrect.
4. Quantify the impact of your assumptions being incorrect by some rule of thumb that is easy for ALCO to remember.

Exhibit 11. Range of Income Impact for a Change in Core Share Assumptions

	Balance Affected	Assumption is Wrong By		
		10 bp	50 bp	100 bp
Money market share accounts	\$3,000,000	\$3,000	\$15,000	\$30,000
Share Savings	\$2,500,000	\$2,500	\$12,500	\$25,000
Interest bearing share deposit accounts	\$1,300,000	\$1,300	\$6,500	\$13,000
TOTAL	\$6,800,000	\$6,800	\$34,000	\$68,000

**BALM Compensation Survey—
REMINDER**

The Annual *Asset/Liability Management Compensation Survey* form is enclosed. Your participation in this important analysis is central to our findings. The results will assist management in budgeting, hiring and recruiting decisions, and will provide decision-making options in the purchase of ALM software.

This survey is proprietary in nature and all individual data points will be held in strict confidence.

Please send in your responses on the attached form. The survey results will be published in the May issue of the *Bank Asset/Liability Management* newsletter.

Please fax or e-mail your forms to 704-541-0661 or SECI@aol.com, or send them through our Internet Web-

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