

**1993 VALUATION ACTUARY
SYMPOSIUM PROCEEDINGS**

SESSION 2

General Modeling Issues

Jacquelyn Abdella

Paul A. Hekman

Barbara L. Snyder

GENERAL MODELING ISSUES

MS. JACQULYNN ABDELLA: I am a consultant in the Atlanta Life office of Tillinghast.

Our panel members will discuss general modeling issues associated with the completion of the opinion and memorandum required by revisions to the Standard Valuation Law. Since other sessions are devoted to asset modeling issues, this session will concentrate on liability modeling.

All of the panel members are experienced with liability modeling. I have asked each to share what he or she has learned having been through the modeling process for one year-end. I believe they will be able to provide us with useful information that we can apply in developing our models. I do not know what your particular experiences have been, but I have found that the modeling process can be a tremendous learning experience, combined with a fair amount of frustration, stress, and unknowns.

Paul Hekman is a vice president of Polysystems, Inc. He supervises actuarial consulting and systems installations. Paul has long-term experience with asset/liability cash-flow analysis in addition to his many years of experience in several large stock company environments. Paul's presentation will address:

- sensitivity testing,
- aggregation issues,
- federal income tax issues,
- cash-flow testing with unsegmented assets,
- scenarios, and
- AIDS.

Barbara Snyder is a vice president and the appointed actuary for the life companies of American Bankers Insurance Group. She will be chair of the Academy Committee on Life Insurance Financial Reporting and is a member of the Academy Committee on Relations with Accountants.

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Barbara was extensively involved in the cash-flow testing performed for the completion of American Bankers' 1992 year-end opinion. I, along with other consultants in the Atlanta office, worked with American Bankers to develop the cash-flow-testing models. American Bankers' mix of business presented many interesting issues for cash-flow testing.

In Barbara's presentation, she will share her experiences in modeling American Bankers' business and in particular will address:

- modeling short-term liabilities,
- modeling miscellaneous lines of business, and
- data collection issues.

GENERAL MODELING ISSUES

MR. PAUL HEKMAN: My primary subject is sensitivity testing. We will proceed from sensitivity testing to aggregation issues and federal tax. We'll conclude with a brief discussion of AIDS and scenario testing.

Sensitivity testing is the missing component in far too much cash-flow testing. The NAIC practice note, which was distributed recently, indicated that one-third of the appointed actuaries neglected to do sensitivity testing on lapse assumptions, and almost half neglected mortality and/or morbidity in 1992.

The reason why we need to do sensitivity testing is that statutory reserves have not proven themselves capable of consistently providing a statement of the company's real liabilities. I have seen numerous cases, for example, of GAAP reserves that exceed statutory. The NAIC's reaction to this fact is the correct one: make the actuary determine what the "real" reserve should be. This is what I consider to be the central purpose of sensitivity testing.

Let's think a moment about how we might evaluate what the "real" reserve should be. Clearly, we have to consider all forms of cash flow associated with the products. We need to consider associated expenses and taxes. We need to consider actual investment income. To the extent that any uncertainty exists about components of that cash flow, we have to do sensitivity testing to determine how significant the uncertainty is and the range of its impact.

We mentioned the purpose of sensitivity testing. Before discussion of how much sensitivity testing is appropriate, I'd like to define the method. Sensitivity testing is synonymous in my mind with cash-flow testing. Sensitivity testing is the process of:

- a. identifying the factors in a line of business that cause variations in profitability;
- b. measuring the financial impact of each factor;
- c. estimating the likelihood of significant factors;
- d. measuring the impact of each significant factor over a range of values.

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In case you haven't done a lot of sensitivity testing for an entire block and want to see how much variation there is, I ran some tests on a generic block of universal life (UL) business. In each case, I computed the gross premium reserve at the earned rate.

Chart 1 shows the impact of a number of changes on the gross premium reserve. First, note that the statutory reserve, the bottom graph, is \$1.6 million.

The base run gross premium reserve is actually negative \$1.8 million for this block, reflecting a high inherent profitability under the initial set of assumptions.

The initial base run was made with a 100% premium persistency assumption. We then changed this to assume that premiums grade down at 10% per year, leveling off at 50%. This single assumption, which is definitely plausible, clearly has a major impact, changing the gross premium reserve from negative \$1.8 million to negative \$378,000.

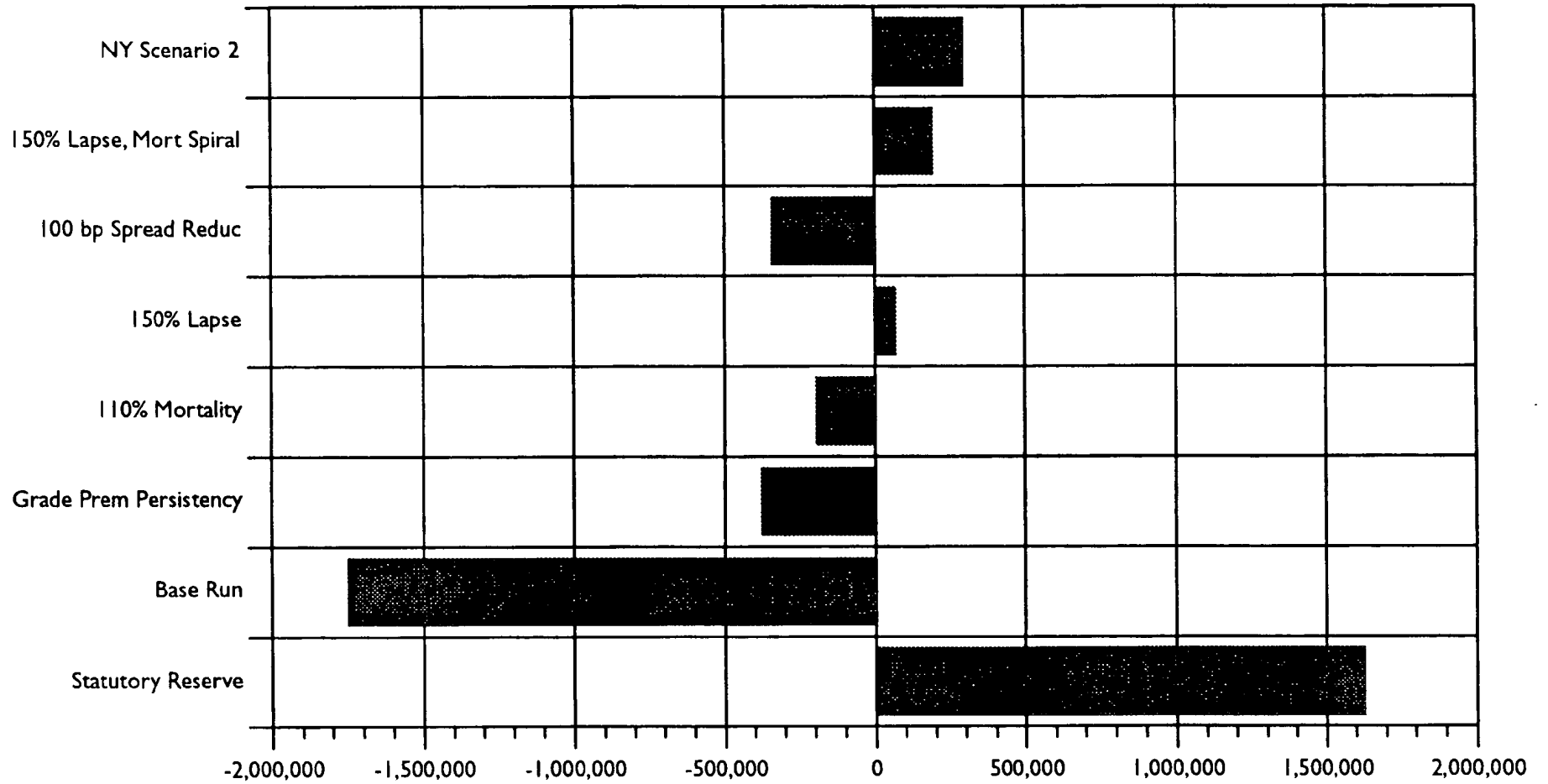
Superimposing a 10% increase in mortality has a relatively minor impact comparable to an independent superimposed 50% increase in the assumed lapse rate.

We tested the interest spread component by reducing the earned rate assumption by 100 basis points. This reduced the spread from 150 to 50 basis points. Notice that the impact of a spread differential compared with the impact of premium persistency is minimal.

I wondered about the impact of a combined lapse/claims spiral effect, so layered additional mortality on top of the 150% lapse scenario, which, as expected, produces an even worse result.

Finally, I combined the reduced premium persistency, the mortality/lapse spiral, and a New York #2 increasing interest environment, to produce the top result. Notice that the interest environment by itself is less of a sensitivity factor than the premium persistency.

CHART 1
Sensitivity Testing Results



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Which factors do we test when we do sensitivity testing? Since we're really looking for variations in profitability, it seems reasonable to look at customary sources of profit. We need to test every profit component that we don't completely control. We have seen some of these already.

Let's talk just a little more about investment spread: I prefer the term *investment spread* to just *interest spread*. This is a broader term that takes into account several components in addition to the interest spread: defaults and mismatches of liquidity, duration, and convexity. Each of these components is subject to sensitivity testing. Let's not forget to do some historical checking to see if the spread has actually been achieved. I know of a couple of companies that routinely carry investible funds as commercial paper for six months while they hunt for the best place for the money. This practice has a significant impact on annuity profitability.

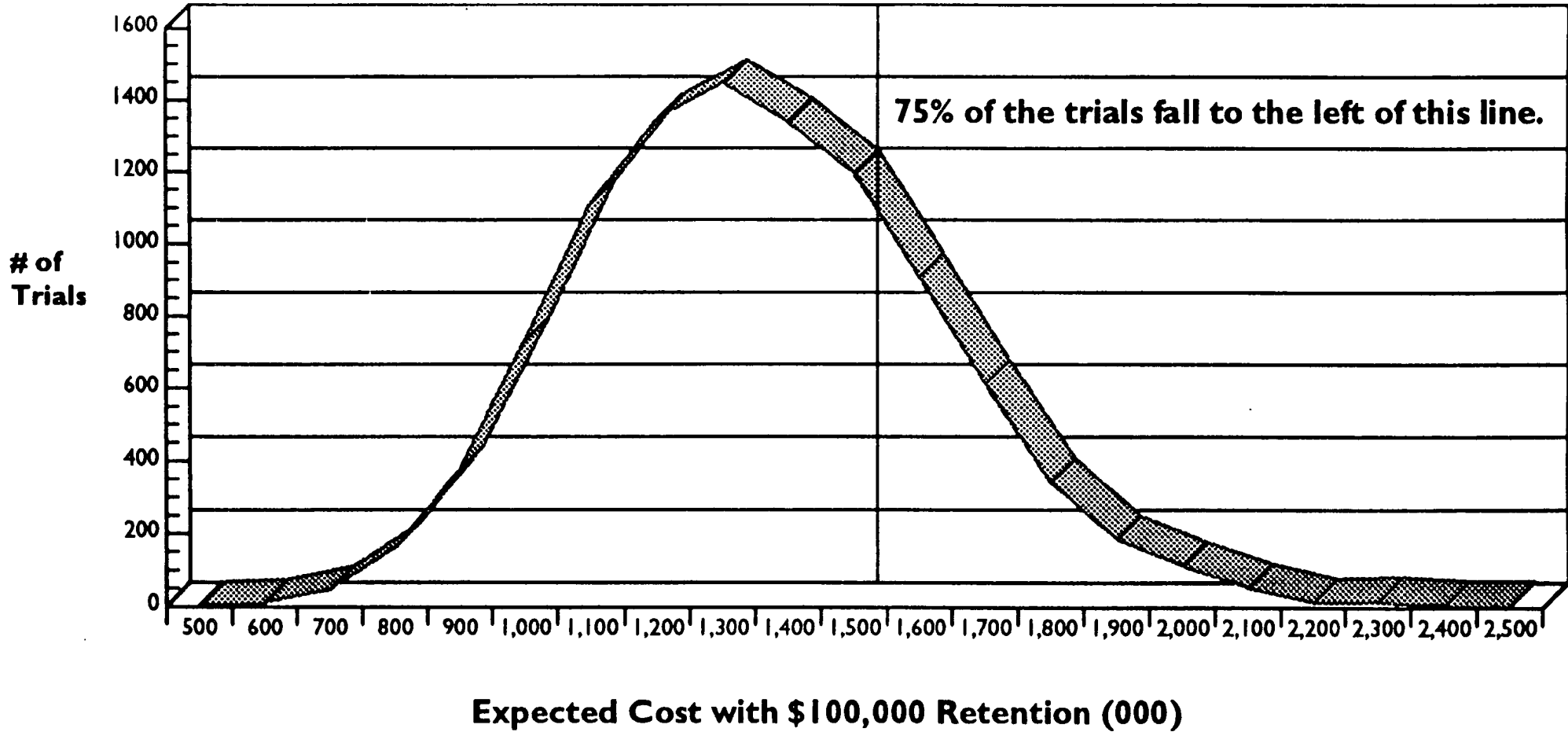
Expense is another area where a recent historical review is mandatory. For some types of product, particularly where the average policy size is low, the administrative expense may be the single largest component of the net GAAP premium.

We have already seen what impact the premium persistency assumption can have.

Mortality and morbidity components may be significant on many plans, but not all. AIDS testing falls into this category. We'll return to discuss AIDS.

A frequent question about mortality testing is, "How do I know how much variance in mortality to test?" One way to answer this question involves performance of a Monte Carlo analysis of the block. Here is a sample (Chart 2) showing distribution of aggregate death claims, assuming a \$100,000 retention. Some 75% of the trials on this block produced an annualized claim amount of \$1,560,000 or less. Comparing this with projected claims using our current expected mortality table would provide the answer to the question.

CHART 2
Distribution of Expected Monte Carlo Analysis
Claim Cost



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Surrender charges need to be investigated very carefully. I believe that many agents lie awake nights trying to find ways to avoid surrender charges. Companies frequently assist in this process by careless construction of policy forms. Here are some recent examples:

- I see quite a few cumulative penalty-free options. These can present some difficult modeling issues. Clearly it's best to know which policies have used up their options and which ones haven't. If I know which policies are which, I think I'd want to project them in separate cells.
- Early annuitization of annuity contracts is another potential problem that I frequently see. We recently met with the president of a company with a block of deferred annuities. The contracts had very high surrender charges that run off over a fairly long period -- seven or eight years. However, the policyholder had the right to move the maturity date and apply the full annuity value to a fixed payment option for five years. To make matters worse, a one-year option was illustrated in the back of the policy form in one of those settlement option tables that too few people take the trouble to review.
- Variable contracts, which have both fixed and variable buckets, may contain the right to move the entire fund value from the general to the variable account. While the surrender charge remains in place, the action may still create a cash and surplus drain to the general account.

Let's keep in mind that good reinsurance diminishes our profit margin. The cost of reinsurance may become a variable if our reinsurance premiums aren't guaranteed. If our retention is small, this could be a very significant sensitivity factor.

Look for other vulnerabilities in product design and test potential utilization rates of those weaknesses. Agents, as I said before, are experts at finding these. Some additional items are:

- There could be an inadvertent right of renewal at guaranteed rates.
- "Wash" loans on life contracts can destroy part of the expected spread.
- Bonuses may, by virtue of their wording in either the policy or the illustration, become guaranteed rather than discretionary.

- Texas recently promulgated a new regulation covering accelerated benefits. The regulation is confusing, and I recently encountered a filing technician who insisted, based on the wrong portion of the code, that the accelerated benefit could not be discounted. The company elected to accept rather than fight, which means, effectively, an increase in the death benefit for the affected policies.

Modeling, or compression techniques, are an inherent part of sensitivity testing. The model itself should not have to be a subject of sensitivity testing. I personally prefer to build richly detailed models, for the following reasons:

1. Modern software and hardware are very fast.
2. Machine time is less expensive than actuarial time. It's often more efficient to build a more detailed model than to try to figure out which products can be combined and which can't.
3. A coarse model that fits this year may not fit next year. Modeling is time-consuming work, and I prefer not to have to repeat it.
4. I like multiple-use projections. I have worked with small models in large corporate environments, and I find that small models require continual justification and proof. I prefer spending my time looking at the results.

Sometimes, the perception of the model is just as important as the model itself. In a prior job I came into a situation in which the actuarial staff people were already performing budget projections that were sent to the corporate office. This projection consisted of 40 cells covering each issue year, or about 200 cells in all. When I looked at the final result coming out of the corporate office, it wasn't anything like what the actuarial staff people were providing. I finally discovered that the corporate accountants were literally throwing the actuarial projections away and doing their thing in LOTUS.

Why were corporate staff throwing the actuarial projections away? They didn't mesh with recent history. The corporate staffers assumed that the reason was the "40-cell model," as they called it. That wasn't the entire reason, but since they thought it was the reason, the first thing I did

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was to expand the number of cells by a factor of 15. Then I adjusted the premium persistency, the expenses, and the investment income, and lo! Overnight the actuarial projection becomes the focus of corporate planning. It wasn't that the 40-cell model was so bad; it was in part the perception that was causing the problem. Once I had my 3,000-cell model, I never again had to deal with model size questions.

Here are some potential uses of projections:

- a. Cash-flow testing
- b. Risk-based capital planning
- c. Tax planning
- d. Corporate budgets
- e. Actual/expected financial reports
- f. Financial Accounting Standard (FAS) 97
- g. Embedded value accounting
- h. Real volume pricing

With all of these potential uses, it just makes sense to me to build a solid foundation. The real test question is, can I use my cash-flow testing for my budget? If the answer is yes, then we have actuarial efficiency.

Now, to the question which of how much sensitivity testing is enough?

I'm venturing my opinion on this knowing that the actual number of answers probably exceeds the number of actuaries in the universe. (Notice that I'm allowing for at least one actuary to be able to say, "On the other hand...").

The Academy has given us very general guidance. Actuarial Standard of Practice 7 intones: "The actuary should be satisfied that the issue of sensitivity testing has been adequately addressed." Now, if that doesn't tell you everything you need to know about sensitivity testing, I don't know what would. However, the key word appears to be satisfied.

The final decision about whether the sensitivity testing is adequate must be made by the valuation actuary. It has a lot to do with the volatility of the results. If, for example, a 10% mortality differential produced only a 1% difference in my projected tenth year surplus, I would not spend a lot of additional testing time on mortality sensitivity.

Do our standards of practice provide any basis for decision for concluding that we're satisfied? Yes, some. Actuarial Standard of Practice 22 says, paraphrasing, "Reserves ... must be adequate to cover obligations under moderately adverse conditions."

In this simple statement lies the whole answer to our original question, "How much sensitivity testing is enough?" In the current regulatory environment, in which we're testing reserve adequacy, we've done enough when we have tested for moderately adverse experience.

So, what does "moderately adverse" mean?

Moderately adverse is not defined in actuarial literature. There is no current safe harbor, nor any current standard of practice. So I'll summarize my understanding of it with the following series of statements:

- Moderately adverse means you might have to say you're sorry.
- Moderately adverse is worse than best estimate.
- Moderately adverse depends on how much surplus we have to cover events beyond moderately adverse.
- Moderately adverse is realistic; more than one bad thing can happen at the same time.
- Moderately adverse is not apocalyptic; not everything bad has to happen at the same time. (This is Corollary 17 of Murphy's law: Bad news is usually followed by ... more bad news!)
- Moderately adverse probably falls in a 65-80% confidence interval range.
- Moderately adverse requires definition by the opining actuary.

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I conclude this section by stating that no cash-flow-testing project can be considered complete unless sensitivity testing has been an integral part of the process.

AIDS

AIDS testing is a subset of the mortality/morbidity sensitivity analysis. If you're responsible for testing a line of business which may have increasing exposure to this disease, I think that a good case could be made for building a model which has zip code as a variable in addition to plan, issue date, and so on. Whether we spend much time testing AIDS vulnerability may depend on where the business is sold and how it was priced.

Here are some statistics from a recent edition of the *National Underwriter* (Chart 3). The graph shows AIDS claims as a percentage of total claims. Although the graphs seem to show a capping of AIDS exposure as a proportion of claims paid, I believe that this is more a reflection of companies' ability to avoid the risk than a capping of the progress of the disease among us. I was reminded of this earlier this month by a visit to my dental hygienist to have my teeth cleaned. She wore, in addition to the rubber gloves, a combination face mask and surgical filter that would have done credit to the riot police.

I think, therefore, that these graphs are cause for concern rather than complacency. Don't ignore AIDS; I don't think it's going away any time soon.

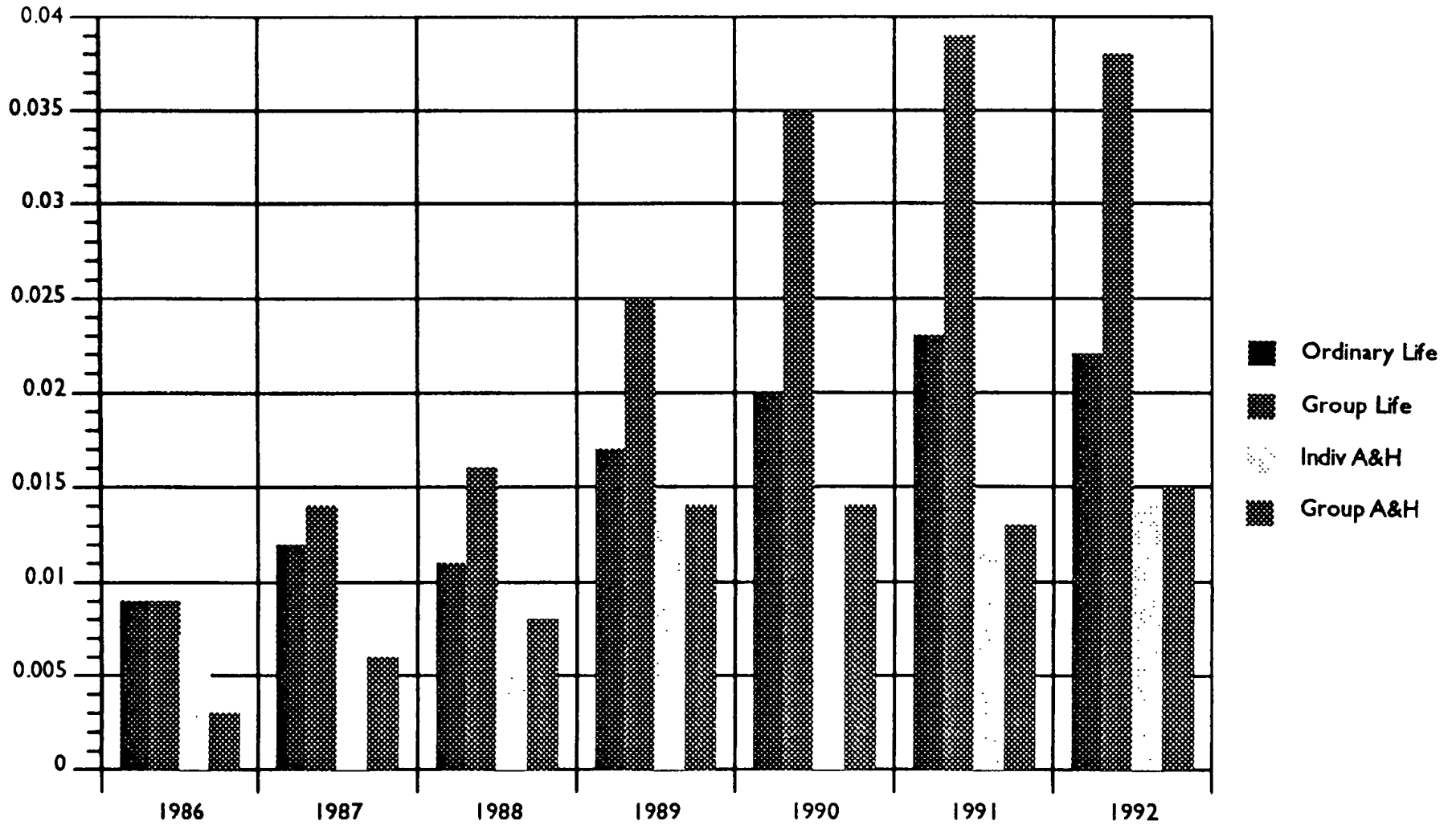
Aggregation Issues

What's meant by "aggregation issues?" Let's suppose that we have two lines of business, an immediate annuity line and a universal life (UL) line. Normally, under rising interest scenarios, the UL line will show diminished profits while the immediate annuity profits will tend to rise.

The aggregation issue is, if these balance out, can I opine that my reserves are OK?

Actuarial Standard of Practice 22 deals with this. The items that have to be considered in the aggregation process are listed on page 9 of that document.

CHART 3
AIDS-Related Claims



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The first aggregation requirement is that consistent methods of analysis be employed. This is pretty reasonable. If we're proposing to add a negative result in one line to a positive result in another, the methods should be arithmetically "addable." An example that would not meet this requirement is to use dynamic scenario analysis on one block and a gross premium valuation on the other.

The second requirement is that the aggregated blocks be subject to independent risks. For example, immediate annuities and deferred annuities aggregate well because they are adversely affected by mutually exclusive interest scenarios. They are also oppositely affected by claims experience: high deaths on deferred annuities will usually cost us some surrender charges, but may release a lot of reserves on immediate annuities.

An aggregation that would be on weaker ground would be an aggregation of a traditional life block with a UL block. Both would be subject to the same mortality, lapse, and expense risks. The only reason to aggregate them might be that the level of designed profitability might be greater on the traditional product line. If this is the case, I think some corporate soul-searching needs to be done before aggregation is allowed to cover up this subsidy of one line by another.

The third item, contradictory assumptions, seems straightforward. As an example, the actuary testing block A might assume that expenses don't respond to interest rate changes, while the block B actuary might assume that they do. It would not be appropriate to aggregate these lines until the apparent inconsistency is resolved.

Finally, the question arises as to the point at which the aggregation should take place. Does it make any difference whether we aggregate two lines of business at the projection level, or at the result level?

I think that the strongest method of aggregation is at the projection level. Using the same projection system with consistent modeling and consistent assumptions produces a result that's hard to argue with.

Aggregation at the results level means just that: If the projected surplus from line A is always positive and line B occasionally negative, we add the surplus together to judge the aggregate results. One circumstance under which I would feel uncomfortable doing this is if the asset portfolio is not segmented between the two lines of business.

If we are using pro-rata portions of the same assets in two separate projections, this means that, because of the differing cash flows in the two lines of business, we're doing different things with the same asset portfolio. In other words, in block A, we're selling 20% of that 12% Treasury bond, but in block B we're not. If the assets aren't segmented, interest scenario aggregation should be done at the projection level.

Federal Tax

Actuarial Standard of Practice 7 requires that we use "all other material items affecting cash flows ... reinsurance arrangements, federal income taxes, provisions for shareholder dividends, and administrative expenses (including allowances for overhead expense)."

A typical concern might be that, because of some characteristic of my business, I might generate early tax profits that would exceed what I might be able to recover later. Because of the level of expert analysis needed, this is the strongest possible reason for doing sensitivity testing at a time other than year-end.

As part of the initial analysis for a cash-flow-testing project, I break the balance sheet into major, projected elements and comparatively minor unprojected elements (Table 1). For each element, I try to find matching assets and liabilities.

I usually separate the tax component of cash-flow testing into two components, short term and long term.

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For example, if at year-end, a tax is accrued and payable, I usually set it up as a short-term unprojected liability and match it with a short-term asset such as recoverable expense or reinsurance.

Future tax over the projected life of the business is messier. There's no great problem with an algorithm, which computes tax deferred acquisition cost and multiplies an average tax rate times the tax profit after provision for tax reserves. The problem is that tax is always based on the company as a whole, or even perhaps a consolidated group of companies, so we have to make the assumption that future tax payments will be based pro rata on the actual tax profits that emerge from each line of business.

Even in this simplified case, a couple of problem cases emerge. First of all, if tax profits are negative, most systems pay negative taxes, which assumes that the carryforward/carryback rules are fully functional. This requires at least some review by the valuation actuary to make sure that the software isn't recovering more than it's entitled to recover. We also have to make assumptions about the presence of other lines of business and their ability to offset our tax losses with tax gains.

Finally, there's another sensitivity testing issue: Should the federal tax rate also be a subject of sensitivity testing? There seems to be a regulatory consensus that regulatory changes don't need to be an object of testing, but let's keep in mind that the emphasis is on "real."

How Do We Deal With Unsegmented Assets?

Usually, we encourage clients to use cash-flow testing as an opportunity to segment the asset portfolio. Part of the purpose of this work is to analyze the ability of the assets to support the liabilities, and segmenting the portfolio will help identify which assets are not appropriate.

Where segmentation is not possible, it's an acceptable alternative to use a pro-rata portion of the entire asset portfolio. However, this raises an aggregation issue. If we run scenarios using 47% of the entire portfolio for UL, then run the same scenarios using 20% of the same portfolio for

TABLE 1
Algorithm Life Insurance Company
Cash-Flow Testing Balance Sheet
12/31/93

<u>Assets</u>		<u>Liabilities</u>	
Projected		Projected	
Bonds	\$425,000	UL	\$555,000
CMOs	255,000	Annuity	125,000
Subtotal Proj.	680,000	Subtotal Proj.	680,000
Unprojected		Unprojected	
Reins. Recov.	5,000	Tax Due	5,000
Other Assets	<u>100,000</u>	Surplus	<u>100,000</u>
Grand Total	\$785,000	Grand Total	\$785,000

immediate annuities, I don't think that we can aggregate the results with certainty. In this case, the aggregation should be done in the projection.

Scenarios -- What Kind and How Many?

This topic has been the subject of actuarial bar talk for many years. The usual point of conflict is whether a limited set of deterministic scenarios, such as the New York 7, is adequate for cash-flow testing.

My personal revelation on this is that it all depends!

On what? Well, on the same rules we established for sensitivity testing in general. I view scenario testing as just a subset of sensitivity testing. In scenario testing, we're testing one risk component, the C-3 risk. (This should also involve associated expense inflation and C-1 default aspects).

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First of all, consider the purpose for which the work is being done. If the purpose is for reserve testing, as we've described above, the requirement is that the tested scenario be "moderately adverse." The reason why the requirement is "moderately adverse" instead of "severe" is that surplus is intended to cover scenario deviations beyond "moderately adverse." This, in my mind, doesn't require the breadth of outcomes that stochastic testing provides.

I do believe, on the other hand, that reserve testing requires going beyond the usual "New York 7." Historically, for example, an inverted yield curve is a common phenomenon, and the impact should be evaluated.

However, if we're testing solvency, the argument is compelling for a broader range of scenarios, and I think that stochastic testing becomes mandatory. I believe that stochastic testing can also be useful in the product development process.

Please don't misunderstand me; there's a great deal right about stochastic testing of economic scenarios. We can always throw out the extreme results. It's just that I see some practical aspects of stochastic scenario testing that concern me.

For example, I still remember what a revelation it was to me when I was introduced for the first time to the concept of significant digits. For my chemistry course I had access to a calculator which, for me, produced longer decimals than anything I had ever dealt with before, and I was both delighted and deluded by the belief that I was producing results of unprecedented accuracy. Reality struck when I was reminded my seven digit results contained information with no useful content, simply because the scales, which I used for measuring chemical quantities, were not capable of that kind of precision. The extra decimals were created in the calculator.

My concern with stochastic scenario processing is that a similar potential exists to provide information without content. We already mentioned that many actuaries at year-end 1992 did no sensitivity testing other than C-3 analysis.

The essence of the problem is that more scenarios require more computer time and more actuarial analysis. I suspect that there's an inverse correlation between the quality of the work and the number of scenarios. Shortcuts are often made in data quality and in the actuarial review process.

For example, models are often vastly simplified. (I've heard of one-cell models). We all know that those formulas that relate cash surrender activity to interest rate differentials are only actuarial algorithms. Is it actually good in all 100 scenarios? It's the valuation actuary's responsibility to ensure that each of those scenarios is a valid and consistent representation of reality.

The same shortcuts apply to the asset side, maybe even more. What about those real estate holdings? Those collateralized mortgage obligations (CMOs)? That National Football League (NFL) franchise?

Does it make sense to run 100 economic scenarios while ignoring the stochastic nature of lapse and mortality?

So, to summarize what I've tried to say, it is the actuary's unique privilege to be in a position to generate information with valuable content. The information that we produce must be relevant and consistent. Our product must be the synthesis of our thoughts, our training, and our software. Let each actuary run as many scenarios as he or she considers necessary. But let's make sure, above all, that the quality of the work is not subordinated to the quantity.

I'll close with a quotation from Ben Franklin's Almanac: "Handle your tools without mittens."

GENERAL MODELING ISSUES

MS. BARBARA L. SNYDER: Each of us was asked to present some information about our experiences in getting through the first year of the formal appointed actuary requirements with regard to general liability modeling issues.

If you will allow me, I thought it would be fun to interject a little bit of my personal experience starting as a new employee slightly over one year ago. On August 23, 1992, I arrived in Miami, Florida, with my husband and two children with the most organized of plans. To describe them briefly, we would move into a house on August 25, spend the next six days getting settled, and on August 31, the kids would start school, and I would begin my career at American Bankers Insurance Group. I was not at that time even going to be the appointed actuary.

These dates probably don't mean much to people outside of South Florida, but on Monday, August 24, a small wind called Hurricane Andrew swept through South Florida from 3:00 a.m. to 6:00 a.m., and my family and I found ourselves living through the largest national disaster ever.

Since the house we were supposed to move into was blown away, I decided to show up at the office on Wednesday, August 26 to see if I still had a place to work. At American Bankers we moved 1,200 employees to office space 30 miles north, to downtown Miami. We completed our move in the last week of September, just in time for third-quarter close and just in time for the then appointed actuary to leave the company. I coincidentally discovered that absolutely zero work had been done toward preparing for or doing any asset adequacy testing.

First, I'd like to describe American Banker's business base.

American Bankers Insurance Group can be described as a group of insurance companies that write primarily specialty insurance. The group includes both casualty and life companies. I am the appointed actuary for the life companies, the largest of which is American Bankers Life

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Assurance Company of Florida. This is the company that I will be referring to in the rest of my remarks.

American Bankers writes a wide variety of life and health business. We have traditional individual ordinary life business, individual interest sensitive and universal life, annuities, pre-need, group life (both permanent and term), accidental death and dismemberment, group long-term disability, group short-term disability, single premium and monthly outstanding balance credit life and disability, mortgage life and disability, special products, and student accident and sickness business. We also have, of course, the normal assortment of supplementary contract with and without life contingencies and other small deposit funds.

In beginning the asset adequacy testing, we first had to determine how the lines of business for testing would be defined. These lines generally followed the types of business I just described. Within each line of business, we set up a number of submodels, grouping plans for which a single projection of liability cash flows were made and which had similar technical aspects.

Our business base and company origins led to some difficulty I had in explaining and justifying to senior management the need to spend large amount of resources on cash-flow testing. Senior management was looking at premium and downplaying the need for cash-flow testing based on the large amount of premium from short-term business. However, when you look at liabilities, over 60% of the company's liabilities was from long-duration contracts, which could be subject to exposure when looked at in relation to assets and interest rate environments.

We used a couple different methodologies in completing the asset adequacy testing, as I'm sure most companies did. First, we used the standard cash-flow testing for a vast majority of the liabilities -- approximately 95%. We used two systems, TAS and TAHS, in making our projections.

TAS was used for individual traditional life, individual interest sensitive life, annuities, group paid-up life and premium waiver-disabled. TAHS was used for single premium credit life and

credit A&H including special products. Group long-term disability -- disabled lives, group mortgage disability -- disabled lives, and group short-term disability -- disabled lives were projected on a seriatim basis using a stand-alone Tillinghast program.

There are a number of blocks of business, which are of a short-duration nature and which have a relatively small amount of liabilities. The liabilities, because of the short duration or business type, are relatively insensitive to changes in interest rates, and are about 2-3% of the total. These blocks were reviewed using margin analysis. They include credit monthly outstanding balance business, group traditional term, group long-term disability -- active lives, group short-term disability -- active lives, group accidental death and dismemberment, individual A&H, mortgage life, and mortgage disability and AD&D.

The remaining 2-3% of liabilities were not tested in any way, although assets were assigned to match these liabilities, which are small pieces that for all practical purposes are insensitive to interest rate changes or too insignificant in size to have any impact on the testing.

What I'd like to spend a little more time on is the credit business, which is a large part of our business from the premium standpoint, and requires handling that is different from that which most of you encountered with the individual permanent type of business. Our credit business can be split into four main coverage types: single premium credit life, single premium credit disability, monthly outstanding balance credit life, and monthly outstanding balance credit disability.

Monthly outstanding balance business provides only one month of coverage for each premium payment. This business is not included in the cash-flow-testing model since the master contract can be canceled at any time and the only liability is remaining payments on claims incurred prior to the cancellation date. The runoff of the claim reserve is included in the single premium credit model.

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The monthly outstanding balance business was analyzed for overall profitability. Actual experience was used to develop the loss ratio assumptions by coverage and market. Commission assumptions were developed from internal management reports and GAAP profits and losses. Expenses and premium taxes were similarly developed based on historical experience. Finally, the results by market and type of business were weighted to give the overall profitability margin.

The single premium credit insurance is modeled using a loss ratio approach using TAHS. The key in-force factor that drives the model is the unearned premium reserves in force at the model start date split by issue year and modeled original term. Approximately five original term periods are assumed for each model plan. Assumptions are determined by market and by type of coverage and will be described shortly.

Model plans were determined based on the markets used by the company in internal reporting. Minor markets were included with the market having similar business based on original term and type of coverage. The model plans are:

- Banks (including credit unions and special)
- Consumer finance (including manufacturing housing)
- Dealer (excluding West Coast Life, including unclassified)
- Mortgage
- Retail
- West Coast Life (assumed block of dealer business)
- Security Assurance (assumed block of consumer business)

The earnings pattern on the single premium credit life depends on the type of coverage:

- Uniform decreasing coverage -- Rule-of-78 earnings
- Net Pay-off coverage -- 75% Rule-of-78 and 25% Pro-rata earnings
- Level Coverage -- Pro-rata earnings
- Truncated coverage -- Pro-rata earnings

Two separate models were developed for each model plan, one based on Rule-of-78 earnings pattern and one based on pro-rata earnings pattern. No other assumptions -- commission, loss ratios, etc. -- varied between the two models. The unearned premiums were allocated to each model based on the coverage type. For dealer, retail, and West Coast, only a Rule-of-78 model was used since less than 5% of the unearned premium relates to the pro-rata method.

The single premium disability business was all modeled with premiums earned based on the mean of the Rule-of-78 and pro-rata methods.

The assumptions which were determined by market and by type of coverage were:

- Premium tax -- Percentage of written premium
- Advance commission -- Percentage of written premium
- Contingent commission -- Percentage of earned premium
- Loss ratio -- Percentage of earned premium
- Acquisition expenses -- Percentage of written premium
- Maintenance expenses -- Percentage of earned premium
- Lapse rates
- Mortality reserves -- Percentage of unearned premium reserve (UPR) (credit life)
- Tax reserves -- Percentage of UPR (Credit Life)
- Claim reserves -- Percentage of earned premium or incurred claims

The TAHS system was used for projections. An in-force file was created, which summarized the model plans by original term, issue year, and earnings method.

The only sensitivity test run was to increase loss ratios by 10%. All other assumptions were deemed to be stable or would have little effect on the results.

Special products include single premium life and accident and health credit "look-alikes" and single premium accidental death products. These products are sold mainly in our consumer market. A significant amount of single premium accidental death is also sold in the retail

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market. The credit "look-alikes" imitate credit insurance except that the products have cash values instead of premium refunds and the premium rates vary by age.

Special products were modeled using the TAHS system and loss ratio techniques similar to credit insurance. However, the modeling was done by major plans rather than by market. For the life special products, there were two major plans. The plans are single premium level and decreasing term insurance sold on an ordinary basis with cash values. The model plans represented about 96% of statutory life reserves for special products and the model was "grossed up" so that it covered 100% of the actual reserves. For A&H special products, there are two model plans. One is the single premium AD&D plan. The other is a disability income product with coverage periods from one month to twenty years and a two-year benefit period. The model plans represent 99% of the A&H special product statutory reserves. The model was then "grossed up" so that it covered 100% of actual reserves.

For special products, the key modeling factors are claim cost and remaining term period. The in force (original premium in force) was split into five-year attained-age groupings. So in force did not expire in lumps every five years, the in force was further divided uniformly between the five ages making up the age grouping. The credit loss ratio modeling approach was used. Assumptions for loss ratio, commissions, expenses, lapses, and reserves were developed based on a review of actual experience as with the credit model work.

For both credit business and special products, coinsurance percentages, reinsurance bases -- written or earned -- and ceding allowances were determined from recent company experience. Different assumptions were determined for each of the markets and life versus A&H. Special products were modeled net of reinsurance.

One other challenge we had at American Bankers was in the availability of data and the multiple systems we use to keep track of our business. We have information on different blocks on numerous systems, as follows:

- Individual traditional life -- Old Life Comm

- Individual interest sensitive -- Life Comm III
- Mortgage business -- Direct Mail System
- MOB credit business -- PMS
- Single premium credit business -- Credit Life System
- Special products -- Special Product System
- Group business -- GMS
- Claims for all lines except individual and group -- Financial Claims Systems
- Group claims -- Group Claims System
- Individual claims, supplementary contracts, student medical -- Manual Worksheets

Obviously, having so many different kinds of business on so many different systems complicates our life quite a bit, and not just from the standpoint of cash-flow testing. My only advice here is to allow a lot of time and try to simplify, simplify, simplify. Drawing data from so many sources only lengthens the process and complicates the validation of your model and the steps required to complete the project.

On a happier note, I am hopeful that all the work we have done and are doing around asset adequacy testing will yield valuable information for internal management purposes beyond just meeting a regulatory requirement. In particular, I hope to expand the models for internal analysis to look at a horizon basis for large block of business such as credit monthly outstanding balance and group term. That is, we can determine the average length of time we actually keep either an insured or a group of insureds on the books and look at a more helpful measure of cash flow for various blocks of business that technically renew on a monthly basis.

We are in the process of updating our models, adding new plans and types of coverage, and trying to refine the assumptions from last year. I can only say that this has been quite an experience, and it's not over! It may never be, as we all look forward to dynamic solvency testing in the U.S.

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To bring the American Bankers and Miami saga to completion, we moved back into the refurbished headquarters in June 1993, and a "bunker" is being built adjacent to this building. It will withstand a hurricane much worse than Andrew, if there can be such a thing, and will house the computer operations as well as other vital areas for the continuance of business and servicing of customers. The bunker is due to be completed and moved into in November 1993. We hope to make it through the rest of this hurricane season untouched.