

**1998 VALUATION ACTUARY
SYMPOSIUM PROCEEDINGS**

SESSION 7PD

SOURCES OF PROFITS

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MR. BRETT E. MORRIS: I'm an actuary with PolySystems. We were supposed to have Tony Tokarz of Allianz speaking at the symposium; however, Tony separated his shoulder last week and was advised not to come. Tony was gracious enough to record his presentation for us. I'll play Tony's presentation, and then I'll do my presentation. He is an associate actuary of pre-need marketing at Allianz Life of North America. He deals with financial reporting and pricing of pre-need insurance.

MR. ANTHONY J. TOKARZ: In my opinion, GAAP financials really need to be dissected and rearranged to provide anything meaningful. The current GAAP income statement format, at least for the products I deal with, really mask the true condition of the business. Because of the prevalence of monthly reporting in the industry and the importance of GAAP return on equity, being able to explain earnings to upper management is critical. I'm going to present two source-of-earnings (SOE) analyses case studies that are based on live data. This is nothing earth-shattering or complicated. Some of you may be using this today. I have experience as an auditor, and in the past several years, I've worked in the pre-need area. In that time, I've rarely, if ever, seen any such analysis used in the traditional life arena. I've chosen two limited pay plans for the case studies—a single-pay and a 10-pay life. I hope to present this in a way that'll help you more clearly explain emerging earnings. The two plans are fairly representative of what is sold and what I deal with in the pre-need marketplace.

Because of *Financial Accounting Standard (FAS) 120* and the proliferation of interest-sensitive products that have retrospective deposit approaches to GAAP, reserving mechanics on traditional life, *FAS 60* or *FAS 97* limited pay are things actuaries don't often deal with these days. Pre-need life insurance is an exception to this. Most pre-need insurers account for their life products using *FAS 60* or *FAS 97* limited pay. Though some pre-need insurers have been required to use GAAP for their products as though they were UL or interest sensitive (due to flexibility of premiums,

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nonguaranteed growth or certain profit-sharing elements included in their contracts), the current prevailing method is *FAS 97* limited pay. In addition to the benefit reserve, maintenance reserve, and deferred acquisition cost (DAC) assets, we'll have to contend with the unreleased profit reserve (UPR) element in our analysis. Thus, in addition to the other earnings generated by the release of provisions for adverse deviation, a portion of the profits should emerge as a uniform percentage of the face amount if all GAAP assumptions are realized.

The two products I'm analyzing have the following characteristics: they are traditional life products with fixed and level premiums. They have death benefits that increase continuously at a rate of 3% and 4% simple interest—3% for the single-pay product and 4% for the 10-pay product. Note that the growth rate for the death benefit is not contractually guaranteed. The average size of the policy is roughly \$4,000–\$5,000. For the examples we're dealing with here, I believe the average size is \$4,200. The mortality rate assumptions include a significant degree of antiselection in the early years. This reflects limited form underwriting that's commonplace in the pre-need industry. The commissions are paid at issue based on face value. They're subject to charge-backs for deaths and withdrawals during the first policy year. The charge-back item yields an interesting result for the single-pay product. I'll discuss this a little bit later. We also assume no lapses, and this is typical for pre-need insurance. However, we'll see later that this isn't appropriate for the multi-pay life example.

I should discuss some of the distortions that can occur in the SOE analysis. Generally, the annual mechanics included in most factor-based GAAP valuation systems aren't really designed for monthly reporting. It can make monthly and fractional year results harder to interpret. One of the most obvious situations is when issues aren't uniformly distributed by calendar month under a mean reserve factor system, such as the one I'm operating under. This is especially true for single-pay plans where deferred premium adjustments don't come into play. This situation can be improved if monthly interpolation of terminal reserves is used. Also, a reserve factor system which is based on monthly mechanics, such as the one Brett will describe, can produce monthly terminals which would improve things substantially. Deferred net premiums and cost of collection (also referred to as deferred expenses) are linear and can provide a small distortion because they don't reflect any

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interest and persistency. This, in itself, doesn't pose much of a problem. However, some companies, like mine, apply aggregated ratios of gross deferred to gross annualized premium by blocks of business that tend to distort things. The monthly mechanic base reserve that's included in the PolySystems software would probably offer an improvement in this area. Finally, manual adjustment should always be kept in mind as a potential for distortion in the SOE analysis.

Policy level master files for detailed records were used in the analysis. These files include both active as well as inactive records in order to produce historical transactions. I use the master files at the beginning and the end of the reporting period so that, in some cases, I could take differences in fields such as premiums paid-to-date to produce accurate premium income. I also needed to store and use basic GAAP assumptions of interest, mortality, expense, death benefit factors, and the uniform percentage of death benefits for each issue age.

Now we can get into a little bit of formulation here. The first step in the process is to create an analysis of the increase in the GAAP net liability similar to that found in the Blue Book for the statutory reserves. For limited pay plans the generalized retrospective formula for the GAAP net liability is shown below:

FAS 97 Limited Pay Reserve Increase

$$VF(t) = VF(t-1) + GP + I - E - qD \times DB - k \times DB / (I - qD)^*$$

* Refer to Variable Key (Appendix B) at end of session chapter

Note that I'm using a gross premium rather than a net premium. This is basically because the sum of the individual component net premiums in the *FAS 97* limited pay case (the benefit, the maintenance, DAC, and the profit net premium) sum to the gross premium. This is shown in Appendix A in the algebraic development handout. I feel this approach simplifies the analysis and,

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in general, makes it much easier to work with. I've also moved the survivorship term out of the denominator, and this is what I refer to as the GAAP release of reserve due to termination. It'll be compared to the actual liability released in the case studies to yield a GAAP basis that is tabular less the actual reserve released margin. The other identities that I've used as foundations of the liability increase segmentation are the fact that reserve increases consist of the difference in any in-force business times the corresponding liability factors less the beginning in-force business times the corresponding liability factors. This can then be split by using another very basic identity: the ending in-force business is equal to the beginning in-force business less business terminations plus new issues.

Now we can proceed to break a liability increase into its component parts. The GAAP-required interest or GAAP interest is: $U(t-1) \times I \times [VF(t-1) + GP - E - qD \times DB - k \times DB] + N(t) \times I \times [GP' - E' - k' \times DB']/2$. Note that the effective interest rate times the average at the beginning and ending liabilities may serve as the more practical alternative to this fairly complicated formula.

The GAAP net premium, which is the gross premium, reflects the gross premium assumptions as to the average premium within the modeled age ranges, as well as a modal distribution. In general, this is not the actual gross premium. This is what the GAAP assumptions say the gross premium is: $+ U(t-1) \times GP + N(t) \times GP'$.

GAAP expense includes commissions, acquisitions, maintenance, and premium tax, each of which will be presented separately later. They were kind of condensed here just for purposes of economy: $- U(t-1) \times E + N(t) \times E'$.

I prefer this form for the GAAP death benefits rather than a mortality rate times the net amount at risk because it tends to more clearly present the differences between expected mortality and active mortality: $U(t-1) \times qD \times (DB - VF(t))$.

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Note that under the GAAP expected reserve release, no withdrawal terms are included:

$$- D(t) \times VF(t).$$

Finally, we have the uniform percentage of death benefits that are used to amortize the profit reserve element: $- U(t-1) \times k \times DB + N(t) \times k' \times DB'$.

Now we move into the case study results where the application of all this formulation and theory takes place. Table 1 represents six-month results from December 1997 through the end of June 1998 for the two plans. I've directly calculated each of the liability increase components that we discussed earlier, and that will inevitably leave us with a balancing item which we all refer to as the actuary's best friend. As discussed earlier, I also paired the GAAP basis increase in the reserve components with its income statement counterparts. Note that though the actual reserve released is part of the total liability increase, it's listed in the actual column. The sum of the individual margins is, of course, the GAAP net profit. Table 1 shows the single-pay case study results. The case study basic assumptions are listed below.

Case Study Basic Assumptions

GAAP Mortality:	110% of 75–80 Select & Ult. Table assuming 40%/60% Male/Female Distribution—modified with select factors
GAAP Lapses:	0% all years
GAAP Interest:	6%
GAAP Administration Expenses:	\$6.00/policy/year (SPL), \$17.50/policy/year (10PL)
GAAP Acquisition:	\$45/issue
GAAP Average Size:	\$4,200
GAAP & Actual Premium Tax Rate:	2.25%
GAAP Reserve and DAC Factor Type:	Mean with deferred premium adjustments
Net Investment Earnings Rate:	7%
Actual Acquisition:	\$50/issue
Actual Administration:	\$20/policy/year

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The premium line seems to reconcile fairly well, as it should, considering there are no modal premium considerations here. The investment margin looks reasonable since we've earned 7% on assets that are slightly larger than the GAAP net liability, which is assumed to earn 6%. A fairly large discrepancy exists in the death benefits, indicating one should take a closer look at the pricing and GAAP mortality assumptions. However, another possible explanation is that actual death benefits may be distributed more heavily in the early months while GAAP factors assume uniformly distributed deaths. Also, since the initial net amount at risk is so small for single-pay plans, a gain from the actual, less tabular reserve basically offsets this problem. Again, there are no lapses that justify our basic assumption for the single-pay example.

TABLE 1
Case Study Results
Single-Pay

12/97-6/98	Actual	GAAP	Margin
(+) Premiums	\$4,150,784	\$4,143,438	\$ 7,346
(+) Investment Income	147,600	130,005	17,595
(-) Death Claims	196,648	94,062	(102,586)
(+) Reserve Release Death	178,558	76,073	102,485
(-) Surrender Benefits	0	0	0
(+) Reserve Release Surrender	0	0	0
(-) Maintenance Expense	15,465	3,795	(11,670)
(-) Premium Tax	93,393	93,227	(166)
(-) Acquisition Cost	61,000	46,266	(14,734)
(-) Commissions	721,705	736,758	15,053
(-) % of Face	0	14,582	14,582
(+) Balance Item		50,468	(50,468)
Total	\$3,388,731	\$3,411,294	\$(22,563)
Actual Increase in GNL		\$3,232,736	

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The maintenance expense margin or loss is due primarily to allocated overhead. There is also some influence from the average size assumption being different than actual. Premium tax differs in basically the same proportion as the premium differs, which is a fairly small difference. The acquisition cost margin reflects the loss from nondeferrable acquisition costs and acquisition-type overhead. The commission difference can be attributed primarily to GAAP actual mortality differences. Remember, the GAAP factors reflect charge-back, which brings up an interesting point I referred to earlier. This will apply to any single-pay life with commissions paid at issue with first-year charge-backs. To correctly reflect the liability, a DAC should really be held for this single-pay life plan during the first year only because it really reflects the present value of charge-backs during that period. Normally, one would not expect a DAC asset on a single-premium life (SPL) product. However, in this case, I believe it's appropriate. Finally, I usually check the reasonability of the percentage of face UPR component by dividing the result by the average face of the in-force business over the reporting period. Then I annualize it and compare it to the K factor stored for the individual ages.

Though the balancing item is roughly only 1–2% of the total reserve increase, it obviously has a great impact on the total margin or the GAAP net profit which is disappointing (Table 2). One could distribute the balancing item over the other increased components. However, when you do this, it just masks the inaccuracy. Also, it tends to give greater weight to the adjustment if it happens to be greater for the greater components of the reserve increase liabilities. The margin is the same. However, the sign on the premium margin is actually flipped around now. It was a positive \$7,000, and now it's almost a negative \$60,000.

In the 10-pay example, the premium difference can be attributed primarily to the modal assumptions (Table 3). The GAAP factors are assuming 100% monthly, and this is obviously not the case. The actual premium number includes lower modal factors applied to less frequent payments. The investment income looks a bit strange, but in this case, GAAP-required interest was on a net asset since the DAC exceeds the reserve in the early years on such plans. So it is negative. Death claims

TABLE 2
Case Study Results
Single-Pay (Adjusted)

12/97-6/98	Actual	GAAP	Margin
(+) Premiums	\$4,150,784	\$4,209,149	\$ (58,365)
(+) Investment Income	147,600	132,067	15,533
(-) Death Claims	196,648	95,554	(101,094)
(+) Reserve Release Death	181,390	77,279	104,110
(-) Surrender Benefits	0	0	0
(+) Reserve Release Surrender	0	0	0
(-) Maintenance Expense	15,465	3,855	(11,610)
(-) Premium Tax	93,393	94,705	1,312
(-) Acquisition Cost	61,000	47,000	(14,000)
(-) Commissions	721,705	748,442	26,737
(-) % of Face	0	14,813	14,813
(+) Balance Item			
Total	\$3,391,563	\$3,414,126	\$ (22,563)
Actual Increase in GNL		\$3,232,736	

again exceed GAAP claims by a healthy margin. However, the net amount at risk is substantial, and net assets are released, which exacerbates the situation. The surrenders add to the dismal picture since we assume none in the GAAP factors. We incur a negative margin. The same comments that apply to the expense and percentage of face components margins apply to the single-pay life example. The balancing item here, like the SPL case, is only 3% of the reserve increase but a large portion of the total profit.

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TABLE 3
Case Study Results
10-Pay

12/97-6/98	Actual	GAAP	Margin
(+) Premiums	\$217,223	\$256,703	\$ (39,480)
(+) Investment Income	4,604	(22,150)	26,754
(-) Death Claims	65,562	26,547	(39,015)
(+) Reserve Release Death	(14,685)	(6,232)	(8,453)
(-) Surrender Benefits	616	0	(616)
(+) Reserve Release Surrender	(18,594)	0	(18,594)
(-) Maintenance Expense	8,510	5,837	(2,673)
(-) Premium Tax	4,888	5,776	888
(-) Acquisition Cost	37,300	28,671	(8,629)
(-) Commissions	677,654	711,238	33,584
(-) % of Face		40,729	40,729
(+) Balance Item		16,843	(16,843)
	\$(605,982)	\$(573,634)	\$ (32,348)
Actual Increase in GNL		\$(540,355)	

We can show the balancing item again distributed in proportion to the GAAP reserve increase components (Table 4). The same comments apply here as well. The larger the GAAP increase reserve components, the larger the effect of that distributed margin or adjustment.

In closing I'd like to discuss some disadvantages to the SOE approach. You can see the work that's involved. The resource and time commitments to this are obviously substantial. It may be more of a front-end commitment, though, in that once an automated system is developed, you might only have to commit to minimal maintenance. The backing into the components that we did in the two

TABLE 4
Case Study Results
10-Pay (Adjusted)

12/97-6/98	Actual	GAAP	Margin
(+) Premiums	\$217,223	\$248,943	\$ (31,720)
(+) Investment Income	4,604	(21,480)	26,084
(-) Death Claims	65,562	25,745	(39,817)
(+) Reserve Release Death	(14,241)	(6,044)	(8,197)
(-) Surrender Benefits	616	0	(616)
(+) Reserve Release Surrender	(18,032)	0	(18,032)
(-) Maintenance Expense	8,510	5,661	(2,849)
(-) Premium Tax	4,888	5,601	713
(-) Acquisition Cost	37,300	27,804	(9,496)
(-) Commissions	677,654	689,739	12,085
(-) % of Face		39,498	39,498
(+) Balance Item			
	\$(604,976)	\$(572,628)	\$ (32,348)
Actual Increase in GNL		\$(540,355)	

case studies here is tempting; however, you always have to keep in mind how this may dilute the credibility of the analysis. In addition, if you have a significant backed-into type item, it might reveal that there's some systemic error with what you're doing. If this is developed in conjunction with existing GAAP factor software, you have to keep in mind the idiosyncrasies of the various software factor generating the routines. It makes the analysis a lot more complex. Any manual adjustments need to be allocated appropriately and added to the complexity of the process.

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In contrast there are some distinct advantages. There can be much clearer understanding of the source of emerging earnings. Errors in the GAAP factors may be more easily uncovered. This usually comes about from unintended or erroneous assumptions being applied via some user-defined modifications in the standard algorithms. Deteriorating experience may also be uncovered more quickly than through formal actuarial experience studies. On-the-fly or first-principle valuation systems like that of PolySystems are readily adaptable to this kind of analysis, and, of course, PolySystems has a ready-made module for this. Because of the internal consistency between reserve mechanics and cash flows in most projection software, business plan income can be readily presented in the SOE format. Finally, the significance or sensitivity of the assumptions is revealed in this kind of analysis.

I've actually applied the SOE approach in the business plan projection situations. I've used it to check the correctness or accuracy of GAAP factors and to split cell level GAAP profit study results into a source-of-earnings format. I've also presented new business projection results in this format. I found it informative to present expected purchase GAAP results for purchased blocks of business in this format. Finally, testing and understanding the effects of various levels of GAAP Provisions for Adverse Deviations (PADs) is quite easy to do when the SOE approach is used.

MR. MORRIS: Why use a source of earnings? One reason as Tony pointed out, is to decompose the change in reserves. This can help when communicating with nonactuaries who don't really understand the change in reserve, and even some actuaries who only think they do. As Tony pointed out, this will allow us to compare, on a historical basis, our actual results to the expected results that are embedded in our reserves.

I'm going to show it to you a little bit differently than Tony did. I'm going to compare the *FAS 60* format of reporting earnings to a source-of-earnings format. One thing about the *FAS 60* format is that it doesn't really show you where the gains came from. For example, if you had losses in mortality, that's a little bit hard to see in a traditional life *FAS 60* format. The gross premium in your *FAS 60* statement is composed of a net premium component and a profit margin. The net premium components are benefit net premium, maintenance net premium, DAC net premium, and the like.

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The profit margin is what is left over. The SOE format can take the change in reserves and express it as net premiums, benefit costs, interest paid, and expense provision. We'll see that later. We can take those pieces and then reassemble them with their counterparts.

Table 5 is an example of a *FAS 60* income statement, with revenue items such as premiums and investment income. Investment income is on net liability. That's why it's negative. The DAC is greater than the reserves. Typical deductions are expenses in benefits, death claims, and surrenders. There's your change in reserve for benefit and expense. These are our actual expenses and commissions incurred during the year. There's a change in DAC and in our total deductions. Finally, we do have income. By the way, this is the one-year income for a small block of annual renewable term (ART)-type policies. They're 20-year ART and have a level premium thereafter, commonly referred to as graded premium whole life.

TABLE 5
***FAS 60* Income Statement—12/31/97**

Revenue	
Premiums	\$3,542,370
Investment Income	(110,910)
Total Revenue	3,431,460
Benefits	
Death Claims	1,800,000
Surrenders	1,488
Change in Benefit Reserves	135,710
Change in Expense Reserves	(32,121)
Expenses	116,915
Commissions	335,199
Less Change in DAC	(71,811)
Total Deductions	\$2,285,380
GAAP Income	\$1,146,080

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Let's look at this statement in the sources-of-earnings format (Table 6). We broke out the net income on Table 5 into sources. The GAAP income in Table 6 balances to Table 5. We'll look at the details for each of these income items. The first one is a gain from premium. You can get a gain from investment income, mortality, surrenders, and other benefits. We'll see what that is in a minute. We get gains from expenses and then a subtotal from expenses. There is no gain from reinsurance because it's not included in this model. Even though I'm doing this example with *FAS 60*, this could be done for *FAS 97* universal life or even annuities. You'd have a mortality gain that might be a comparison of your cost of insurance (COI) to your actual incurred claims. You might have surrender charges, and you could have, in the expense area, loads compared to actual company expenses. You could have earned interest compared to your actual credited interest in the investment income figure.

TABLE 6
Gains by Source—Summary (12/31/97)

Premiums/Revenues	\$1,042,126
Investment Income	6,211
Benefits	
Mortality/COI	(208,534)
Surrenders/Maturities	628
Other Benefits	137,849
Subtotal Benefits	(70,057)
Expenses	
Acquisition Expenses	(1,369)
Recurring Commissions	400
Maintenance Expenses	0
Other Expenses	168,768
Subtotal Expenses	167,798
Reinsurance	0
GAAP Income	\$1,146,078

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One of the things that I like to look at when I'm doing the historical sources of earnings is the projected sources of earnings (Table 7). The first column reflects the one-year actual GAAP income, and then the next two columns are just the same block of business projected out with slightly different assumptions than are embedded in the GAAP reserves. That's why we get some mortality gain there. We could have shown December 1997 projected and put the December 1997 actual next to it, but I just decided to project forward. Let's get into the components.

TABLE 7
Gains by Source—Summary

	12/31/97	12/31/98	12/31/99
Premiums/Revenues	\$1,042,126	\$ 965,140	\$ 925,866
Investment Income	6,211	3,984	3,823
Benefits			
Mortality/COI	(208,534)	337,151	324,132
Surrenders/Maturities	628	0	0
Other Benefits	137,849	(7)	(10)
Subtotal Benefits	(70,057)	337,143	324,122
Expenses			
Acquisition Expenses	(1,369)	0	0
Recurring Commissions	400	0	0
Maintenance Expenses	0	0	0
Other Expenses	168,768	34	39
Subtotal Expenses	167,798	34	39
Reinsurance	0	0	0
GAAP Income	\$1,146,078	\$1,306,301	\$1,253,850

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Table 8 shows this gain from premiums as a gain from loading. It's just the actual premium collected (the \$3.5 million), less all the net premiums, the benefit premium, the DAC net premium, and the maintenance premium. The DAC net premium there is indicated by the "Acq" or acquisition. You could project that forward and look for anything that's out of line or look for trends. This is trending pretty nicely.

TABLE 8
Gains by Source—Premium Detail

	12/31/97	12/31/98	12/31/99
Premiums/Revenues			
+ Gross Earn Premium Before Reinsurance Ced	\$3,542,370	\$3,256,122	\$3,122,641
– Net GAAP Benefit Premium	1,794,141	1,648,746	1,584,004
– Net Acquisition Com Expense Premium	490,453	446,931	427,350
– Net Acquisition Non-C Expense Premium	56,767	51,046	48,117
– Net Maintenance Expense Premium	158,883	144,260	137,304
Gain from Premiums/Revenues	\$1,042,126	\$ 965,140	\$ 925,866

Table 9 shows how we came up with the gain from investment income. There's actual net income on net liabilities and then the required interest components on the various liabilities and assets and the difference is a gain. We could project that out, and we do have a small gain going forward, which is not material.

TABLE 9
Gains by Source—Investment Income Detail

	12/31/97	12/31/98	12/31/99
Investment Income			
+ Net Investment Income	\$(110,910)	\$(106,871)	\$ (91,253)
+ Required Interest on Commission DAC	161,572	161,645	152,524
+ Required Interest on Non-Commission DAC	23,443	23,280	21,194
– Required Interest on GAAP Benefit Reserve	75,419	83,661	89,180
– Required Interest on Expense Reserve	(7,525)	(9,590)	(10,539)
Gain from Investment Income	\$ 6,211	\$ 3,984	\$ 3,823

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Mortality is definitely the most significant item for this block of business because it's term type insurance (Table 10). We have the actual death benefits incurred, the \$1.8 million, and the expected death benefits that would be calculated using the mortality embedded in our GAAP factors. That's why we have a loss for mortality. There are other items included. There is a comparison of reserve release, so that we can balance to the *FAS 60* statement. We can look at this projected out as well and see that we were actually expecting quite a bit less mortality. The expected claims continue to trend nicely, but the actual was quite a bit higher in our historical period of December 1997.

TABLE 10
Gains by Source—Mortality Detail

	12/31/97	12/31/98	12/31/99
Benefits			
- Death Benefit Incur, Before Reinsurance Ced	\$1,800,000	\$1,318,869	\$1,267,206
+ Expected Death Claim, Before Reinsurance Ced	1,591,723	1,654,657	1,589,963
- Expected Benefit Reserve Released on Death	3,712	4,918	6,196
+ Expected Com DAC Released on Death	8,350	10,098	11,224
+ Expected Non-Com DAC Released on Death	921	1,095	1,175
- Expected Expense Reserve Released on Death	(361)	(527)	(661)
+ Benefit Reserves Released on Death	5,876	3,932	4,953
- Commission DAC Released on Death	10,377	8,074	8,973
- Non-Com DAC Released on Death	1,191	875	940
+ Expense Reserves Released on Death	(485)	(421)	(528)
Gain from Mortality	\$ (208,534)	\$ 337,151	\$ 324,132

Table 11 shows our gain from surrenders and other benefits. This is term insurance, so there's practically no surrender benefits. We compare the reserve released on actual-to-expected surrenders to get the gain from persistency. We can see the total gain from all the benefits up to this point and we can look at the projected as well. This might indicate an area for investigation where the benefit released on surrenders is somewhat different for the history compared to the projected. It compares 1997 to 1998.

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TABLE 11
Gains by Source—Surrenders and Persistency Detail

	12/31/97	12/31/98	12/31/99
Benefits			
- Surrender Benefits	\$ 1,488	\$ 3,255	\$ 4,174
+ Expected Surrender Benefits	2,115	3,255	4,174
Gain from Surrender	628	0	0
+ Benefit Reserve Release on Surrender & Lapses	218,907	105,052	124,397
- Expected Benefit Reserve Release on Surrender & Lapses	81,058	105,059	124,407
Gain from Persistency	137,849	(7)	(10)
Total Gain from Benefits	\$ (70,057)	\$337,143	\$324,122

Table 12 shows the detail on the gain from acquisition expenses and recurring expenses. We can project those out as well. Notice the acquisition expenses and the first-year expenses go away in the projection because this is a closed block of business. There are no more new issues.

TABLE 12
Gains by Source—Expense Detail

	12/31/97	12/31/98	12/31/99
Expenses			
- First Year Commissions – Deferrable	\$ 73,734	\$ 0	\$ 0
- Renewal Commissions – Deferrable	172,905	162,806	156,132
- Acquisition Expenses	34,707	0	0
+ Expected First Year Commissions – Deferrable	73,734	0	0
+ Expected Renewal Commission – Deferrable	173,705	162,806	156,132
+ Expected Acquisition Expenses	32,538	0	0
Gain from Acquisition Expenses	(1,369)	0	0
- First Year Commissions – Recurring	2,107	0	0
- Renewal Commissions – Recurring	86,453	81,403	78,066
+ Expected First Year Commissions – Recurring	2,107	0	0
+ Expected Renewal Commissions – Recurring	86,853	81,403	78,006
Gain from Recurring Commissions	\$ 400	\$ 0	\$ 0

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Finally, we have the maintenance expenses and gain from persistency due to the DAC and expense reserves released shown in Table 13. We can project that out as well. There is practically no gain projected there because the projection and GAAP assumptions are identical.

TABLE 13
Gains by Source—More Expense Detail

	12/31/97	12/31/98	12/31/99
Expenses			
– Maintenance Expenses	\$ 82,208	\$ 69,719	\$ 57,008
+ Expected Maintenance Expenses	82,208	69,719	57,008
Gain from Maintenance Expenses	0	0	0
+ Expected Reserve Release on Surrender & Lapses	(11,583)	(30,194)	(32,648)
– Expected Expense Reserve Release on Surrender & Lapses	(24,014)	(30,196)	(32,650)
– Commission DAC Release on Surrender & Lapses	322,195	463,971	437,999
– Non-Commission DAC Release on Surrender & Lapses	44,725	67,518	61,583
+ Expected Commission DAC Release on Surrender & Lapses	455,350	464,001	438,033
+ Expected Non-Commission DAC Release on Surrender & Lapses	67,906	67,521	61,587
Gain from Persistency	\$168,768	\$ 34	\$ 39
Gain from Other Expenses	\$168,768	\$ 34	\$ 39
Total Gain from Expenses	\$167,798	\$ 34	\$ 39

Table 14 shows the kinds of things you would look at if you were doing a gain from reinsurance. That's not included in my example. I didn't include any ceded reinsurance. This is one way that you could look at the gain from reinsurance. You'd pool all of the pieces together and look at one gain.

Another way to do it would be to pull out the individual pieces and roll them into the summary items that we've looked at until now. For example, you could take the ceded premium and put that into the gain from premium, and pull out the ceded death benefits and put that in the death benefit section. There are probably reasons for looking at it both ways. Another item that you might consider for this type of block of business is a gain from supplemental benefits. A gain from a waiver of premium or an accidental death may or may not be material, depending on your block.

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TABLE 14
Gains by Source—Reinsurance Detail

	12/31/97	12/31/98	12/31/99
Reinsurance			
– Reinsurance Ceded Premiums Paid	\$ 0	\$ 0	\$ 0
+ Reinsurance Ceded Experience Refunds	0	0	0
+ Reinsurance Ceded Death Benefits	0	0	0
+ Reinsurance Ceded WP Benefits Incurred	0	0	0
+ Reinsurance Ceded Increase in Policy Reserve	0	0	0
+ Reinsurance Ceded Expense Allowances	0	0	0
– Reinsurance Ceded Increase in Commission DAC	0	0	0
– Reinsurance Ceded Increase in Non-Commission DAC	0	0	0
+ Reinsurance Ceded Premium Tax Reimbursements	0	0	0
Gain from Reinsurance	\$ 0	\$ 0	\$ 0

How can this SOE help with reserve adequacy analysis? It can shed light on why bad scenarios go bad. Sometimes it's difficult to see why the bad scenarios went bad just by looking at accumulated surplus or the present value of surplus. You can look at the individual pieces to find problems, and it can highlight areas needing further analysis. I say this with a little bit of humor. Being able to explain your earnings and increases better your chances of being around next year to prepare your opinion.

MR. EDWARD M. MOORE: Is the major idea behind source of earnings to look at your GAAP factors when you lock them in for 20 years ago, and to look at the differences in mortality and the differences in persistency?

MR. MORRIS: I think you kind of hit the nail on the head as far as traditional is concerned. There are assumptions that are locked into your GAAP factors, and this is a way of analyzing those assumptions compared to what you might actually expect.

MR. MOORE: If we did a new mortality study, would we use those results in our source of earnings?

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MR. MORRIS: Your expected could be your GAAP assumptions, your pricing assumptions, and you could do this on a statutory basis as well. You could look at your statutory net income and then bust that out and show the sources of earnings where that would balance back to the statutory net income.

FROM THE FLOOR: Many of us are interested in *FAS 97* and *FAS 120* products. This type of analysis gets confused, in my opinion, because when you do your year-end reserves there's a term for recalculating the prior history. When you look at your GAAP gain, that can be a large source of gain or loss. Do you have some way that you normally handle that particular component in this kind of analysis for universal-life-type products?

MR. MORRIS: We would show that universal life is almost identical to the sources that you just saw. There would be a change in the DAC component—an expected change in DAC and an actual change in DAC—but it is complicated by the fact that you're going back and recalculating DAC based on what your actual history was.

FROM THE FLOOR: In a source of profit analysis, one thing you have to keep in mind in putting this together is the particular audience you're looking at. We often do this as an actuarial exercise for our internal knowledge. We may talk to the CFO about it, but if this information is moving beyond actuarial, or to a tight-knit financial group, and then onto the board, that creates a great deal of work for the actuary who must take responsibility that these things hang together. There's a whole checklist of items you need to cover if this analysis is going beyond the actuarial department. Other things that tie into that are your goals and objectives for this type of work. Again, is it going to other actuaries, financial folks, or the board of directors? You need to do some work beforehand. I think both individuals talked about the difference bases. You can do this analysis on statutory, tax, and value-added financial reporting. That's another item you need to think about in terms of whether you're going to do this analysis, and on what basis you really want to do it. Do you want to do it on all the bases or just a few of the bases? Do you want to do it on a basis of premiums as revenue or on a margin basis? They all have a lot of value associated with them, but they create more work again.

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One item that Tony just touched on was allocation issues. How do you allocate investment income? We get these questions every time. What's the actuary doing? What are the various financial folks doing? Tony touched on overhead. That's a big issue. Where did the maintenance expenses go? What happened to the overhead? Federal income is allocated to the various lines and sublines and down to the various source-of-profits analysis. There are also capital gains.

The last thing I want to mention pertains to some of the pooling issues. One example of that is allocation of actual mortality. If you allocate actual mortality down to a particular plan, subplan, or year of issue, it really doesn't make a whole lot of sense. That's not how all of us do it in terms of setting mortality assumptions. You can pool some experience so that when you're looking at gains by mortality you're looking at a pool of mortality concept instead of the actual mortality for age 25, male, nonsmoker, universal life-1. On the lapse issues we tend to pool things by major plan. Some of this analysis makes a little more sense to management and financial folks if you do some pooling beforehand so they're not looking at variations that are just a random fluctuation.

MS. LYNN A. POGAS: I was wondering where in the model that you presented, reduced paid up (RPU) insurance or extended term insurance (ETI) would show up. Would they show up in the surrender gain or would you just have an out-of-balance item because that reserve might be different than what you were expecting once it becomes the RPU or ETI?

MR. MORRIS: There is an accounting for that. It's rolled into the analysis that we just looked at. Another way to look at the ETI and the RPU is to just break those gains or losses out as kind of a footnote. It is rolled into the analysis and would not cause you to be out of balance.

MR. ROBERT G. MEILANDER: It has been a while since I've looked at sources of profits, but one of the issues I remember from a few years ago was what goes first, and what I mean by that is obviously your interest component is going to be different if everybody lapses than if no one lapses. How do you decide whether that's an interest gain or a mortality gain? Is there any standardization of practice that's coming together in the profession?

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MR. MORRIS: I'm not sure I follow the question.

MR. MEILANDER: One of the questions that I get asked about sources of profits pertains to calculating your interest gain. You have to make certain assumptions as to what mortality is for the year, and if mortality turns out to be different, is that now an interest gain, is there an interest component to that gain, or is that all tossed into mortality gain? Where do you draw the lines?

MR. MORRIS: One way that we have dealt with that is to do monthly mechanics so that we look at an individual policy monthly. We check if policyholders are alive or lapsed or dead. Calculate interest on a monthly basis so that you don't have to worry about whether a policyholder died in the middle of the year or at the end of the year.

APPENDIX A
Source of Earnings Analysis Mathematics
Limited Pay Pre-Need Products

The first step in the process is to create an analysis of increase in the GAAP net liability similar to that found in the blue book for statutory reserves.

For our limited pay plans the generalized retrospective formula for the GAAP Reserve Factor is:

$$VF(t)=[(VF(t-1)x(1+i)+(1+i/2)x(P-C)]/(1-qD)=$$

....rearranging terms...

$$VF(t)=[VF(t-1)x(1+i)]+(1+i/2)x(P-C)+qDxVF(t);$$

Where P = net premium and C = cost, i.e. benefits or expense

Spitting the limited pay reserve into its components, we have:

$$VFben(t)=[VFben(t-1)x(1+i)]+[(1+i/2)x(NPben-DBxqD)]+qDxVFben(t)$$

$$VFmexp(t)=[VFmexp(t-1)x(1+i)]+[(1+i/2)x(NPmexp-Mexp-Ptax)]+(qD+qW)xVFmexp(t)$$

$$VFdac(t)=[VFdac(t-1)x(1+i)]+[(1+i/2)x[Acq+Comm-NPdac]]+qDxVFdac(t)$$

$$VFprf(t)=[VFprf(t-1)x(1+i)]+(1+i/2)x[p\%xGP-kxDB]+qDxVFprf(t)$$

Therefore, combining the above into one retrospective formula for the GAAP net liability; and recognizing that the sum of the component net premiums and the *FAS 60* percentage of premium profit (p%) equals the gross premium, we have:

$$VF(t)=[VF(t-1)x(1+i)]+[(1+i/2)x(GP-DBxqD-Mexp-Ptax-Acq-Comm-kxDB)]+qDxVF(t)$$

The change in reserve can therefore be expressed as:

$$N(t)xVF(1)+U(t)xVF(t)-U(t-1)xVF(t-1)=$$

$$N(t)x[GP'-Mexp'-Ptax'-Acq'-Comm'-k\%xDB']x(1+i/2)+[U(t-1)-D(t)]x[VF(t-1)x(1+i)]-(1+i/2)x[GP-DBxqD-Mexp-Ptax-k\%xDB]+qDxVF_GNL(t)-U(t-1)xVF(t-1)=$$

APPENDIX A
Source of Earnings Analysis Mathematics
Limited Pay Pre-Need Products (continued)

Rearranging and categorizing terms, the increase in net liability can be expressed as follows

$$\text{GAAP Interest} = N(t) \times i \times (GP' - M_{exp}' - P_{tax}' = Acq' - Comm' - k \times DB) / 2 + U(t-1) \times i \times [VF(t-1) + (GP - M_{exp} - P_{tax} - Acq - Comm - qD \times DB - k \times DB) / 2]$$

$$\text{GAAP Gross Premium} = U(t-1) \times GP + N(t) \times GP'$$

$$\text{GAAP Maint Expense} = -U(t-1) \times (M_{exp} + P_{tax}) - N(t) \times (M_{exp}' + P_{tax}')$$

$$\text{GAAP Acquisition Expense} = -N(t) \times Acq'$$

$$\text{GAAP Commissions} = -N(t) \times Comm'$$

$$\text{GAAP Mortality Cost} = -U(t-1) \times qD \times (DB - VF(t))$$

$$\text{GAAP \% of DB Amortization} = -U(t-1) \times k \times DB - N(t) \times k' \times DB'$$

$$\text{Actual Reserve Released} = -D(t) \times VF(t)$$

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APPENDIX A Source of Earnings Analysis Mathematics Limited Pay Pre-Need Products (continued)

In practice, I have either:

- (1) backed into one of the more “vague” items, such as the GAAP or assumed reserve released or the uniform % of the death benefit; or,
- (2) applied an adjustment factor to each of the component items so that the total reconciles to the reserve increase.

Maybe the best approach is to back into “k” and compare it to the directly calculated “k” as a check on the correctness of the reserve factors.

Given the GAAP income statement lines of:

- (+) Premium Income
- (+) Investment Income
- (-) Death Benefits
- (-) Maintenance and Premium Tax
- (-) Acquisition Expense
- (-) Commissions
- (-) Overhead
- (-) Increase in GAAP Net Liability

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APPENDIX A Source of Earnings Analysis Mathematics Limited Pay Pre-Need Products (continued)

Noting that the increase in net liability has already been dissected, the other items above can then be paired off with their corresponding GAAP income statement lines to provide a modified income statement, as follows:

Premium Modeling Error:

GAAP Gross Premium – Premium Income

Interest Margin:

Investment Income – GAAP Interest

Mortality Margin:

GAAP Mortality Cost – (Death Benefits – Reserve Released)

Maintenance Expense Margin:

GAAP Maintenance Expense – Maintenance Expense + Premium Tax

Acquisition Expense Margin or Non-Deferred Expense:

GAAP Acquisition Expense – Acquisition Expense

Commission Margin or Nondeferred Commissions:

GAAP Commissions – Commissions

[Note, that this may also include some modeling error from the GAAP Gross Premiums]

Overhead (Maintenance expenses not included in GAAP factors)

APPENDIX B
Variable Key

$VF_{ben}(t)$ =Benefit Reserve Factor at time t
 $VF_{mexp}(t)$ =Maintenance Expense (including premium tax) Reserve Factor at time t
 $VF_{dac}(t)$ =Deferred Acquisition cost (DAC) asset factor at time t
 $VF_{prft}(t)$ =Unreleased or deferred profit reserve factor at time t
 $VF_{GNL}(t)$ =GAAP net liability factor at time t = $VF_{ben}(t)+VF_{mexp}(t)+VF_{prft}(t)-VF_{dac}(t)$
 NP_{ben} =Benefit net premium received during reporting period t
 NP_{mexp} =Maintenance expense premium received during reporting period
 NP_{dac} =DAC amortization net premium received during reporting period
 GP = gross premium received during reporting period
 $p\%$ =FAS60 percentage of gross premium profit margin
 $k\%$ =annual uniform percentage of death benefit used to amortize the profit reserve
 I =effective interest rate during reporting period
 DB =death benefit exposed during reporting period
 qD =effective mortality rate during reporting period
 M_{exp} =Maintenance expense (per unit) incurred during reporting period.
 P_{tax} =premium tax incurred during reporting period
 Acq =acquisition cost incurred during reporting period
 $Comm$ =Commission (net of chargebacks) incurred during reporting period
 $N(t)$ =new issue units generated during the reporting period
 $U(t)$ =Units in force at time t
 $D(t)$ =Actual Death (in units) incurred during reporting period
 [Note: primed variables represent those quantities associated with new business generated during the reporting period]

