EFFECT OF LAPSE RATES ON PROFITABILITY: REINSURANCE VIEW

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o   How does persistency influence the profitability of individual life reinsurance?
  --   An update on recent persistency patterns
  --   The effect of lapse rates on profitability
  --   Some examples
  --   Antiselection on renewal
  --   Lapse supported products

MR. MICHAEL R. WINN: As the program suggests, we will review the effect of lapse rates on reinsurance profitability. To the extent that actual lapse rates deviate from those utilized in pricing, you could either see more profit coming from a particular product or you could see less profit or perhaps no profit at all. Our panel will view the simple statements I just made from several facets.

I have managed to assemble a group of panelists who are experts in their own field and will share with you some of the benefits of their experience in working and pricing and studying life reinsurance. First of all, we have Jim Sweeney, Senior Vice President and Actuary for Munich American Reassurance Company, based in Atlanta. He has been with Munich since 1975. Phil Polkinghorn is a principal with Tillinghaust/Towers Perrin in the Jacksonville, Florida office. Lee Christenson is very active, as most of these gentlemen are, in the reinsurance section and Lee is Vice President and Actuary of American United Life. Our recorder is Bob Holliday. Bob works for North American Reinsurance in the Dallas Regional Office. Last but not least but certainly someone who I want to thank for being with us is Gordon Jardin. Gordon got drafted at the very last minute. We had another speaker who you will notice in the program who had a change in his responsibilities and had to bow out so we really appreciate Gordon joining us and giving us some perspective of the Canadian market.

In some quarters, experience study actuaries have been politely referred to as uninteresting people. Well, a good friend of mine who works for a large company wanted to change this perception. He wanted to substitute facts for impressions, and so he contacted the National Aeronautics and Space Administration (NASA). He was very ambitious and pleaded to be allowed to show his interesting side by participating in one of the very first space shuttle tests. NASA mentioned to him that this was a very dangerous operation and had planned to send only a monkey into space on the maiden voyage of this particular space shuttle. Still, my friend wanted to change the perception of experience study actuaries so he pleaded some more and finally NASA conceded and decided to let him join the monkey on this space shuttle.

The day of the launch came and as the monkey and actuary were going into the space shuttle, the base commander gave each of them an envelope and told them to read it after they were in orbit. As luck would have it, it was a very successful launch and both were in great spirits, and the monkey opened his envelope, read its contents and began taking the space shuttle through intricate maneuvers while the actuary watched. The actuary was a little bit concerned because he wondered what type of instructions he had in his envelope, so he opened his envelope and read its contents, looked at the monkey and his instructions were, "Please feed the monkey every four hours." So he tried to substitute facts for impressions and somewhere stumbled along the way.

I am going to give you a brief illustration of the experience of my company, Business Men's Assurance Company in Kansas City. We have been in the reinsurance market place for many, many years. Table 1 represents our experience from study years 1981 through 1987.

TABLE 1

Coinsurance Lapse Rates
Standard Issues
Term Only By Policy Duration
(%)

DUR	1981	1982	1983	1984	1985	1986	1987
1	21.5	18.7	17.5	16.3	14.7	14.4	11.3
2	29.0	26.2	19.1	18.2	18.5	17.7	15.7
3	26.0	27.7	22.6	16.1	16.8	18.8	20.1
4	22.0	23.1	19.0	21.3	17.9	16.4	17.7
5	20.2	20.0	20.5	20.7	21.8	19.1	16.0

Draw your attention to study years 1981 and 1987. Termination rates are 21.5 and 29% for the first and second duration in 1981. By study year 1987 the first and second durations had dropped to 11.3 and 15.7%. It's safe to say that for study years 1982-1986 lapse rates are trending toward 1987 levels.

I think it is pretty clear showing overall lapse rates for coinsured term business during the period of 1981 to 1987.

Table 2 illustrates lapse rates by cession size. We see here that lapse rates don't appear to decrease significantly by cession size. This was our traditional group.

TABLE 2

Coinsurance Lapse Rates
Standard Issues
Term Only By Cession Size

	1983	1984	1985	1986	1987
CESSION SIZE	LAPSE RATE	LAPSE RATE	LAPSE RATE	LAPSE RATE	LAPSE RATE
1 - 24,999	21.2	18.4	17.5	16.2	14.6
25,000 - 49,999	20.3	18.6	17.1	13.1	11.1
50,000 - 99,999	17.7	16.7	15.7	14.1	13.8
100,000 - 249,999	19.1	17.4	17.9	16.3	15.6
250,000 +	19.3	18.6	17.4	20.4	18.0
ALL	19.1	17.8	17.1	16.9	15.5

MS. RAJA R. BHAJAVATULA*: The lapse rates that you are showing are so much lower than what is shown in the Life Insurance Marketing and Research Association (LIMRA) lapse studies which were in the 20% range. I was wondering if you had compared them to your numbers.

MR. WINN: We have refined our studies, we checked them and double-checked them over a period of time, and we have confidence in the product we are putting out in terms of experience studies.

* Ms. Bhajavatula, not a member of the Society, is an Actuary at Cologne Life Reinsurance Company in Stamford, Connecticut.

I think that as some of the other panelists make their presentations, you will begin to see some lapse rates that are higher. Outside of that, I would like to say that we have an edge on the market, but that would be folly for me to think so.

Table 3 illustrates that lapse rates on coinsured term reinsurance generally improve with increasing age. However, this was not true in study years 1984 and 1985. It is apparent for all age groups that lapses improved substantially from the 1983 study year to the 1987 study year.

TABLE 3

Coinsurance Lapse Rates
Standard Issues
Term Only By Issue Age Group
(%)

Issue Age Group 20-29

Duration	1983	1984	1985	1986	1987
1	29.6	23.2	19.4	17.8	16.8
2	21.7	22.1	21.2	16.1	16.7
3	22.1	17.2	20.7	20.7	17.6
4	21.7	23.6	21.0	17.8	18.0
5	17.3	19.7	20.3	17.3	15.5
6+	13.8	17.4	13.2	14.3	13.8
ALL	24.3	21.2	19.7	17.3	16.2

Issue Age Group 30-39

Duration	1983	1984	1985	1986	1987
1	16.9	14.8	13.9	12.1	11.8
2	18.5	17.5	18.2	17.3	13.8
3	21.4	15.2	16.2	15.4	19.9
4	17.6	20.9	16.6	15.6	17.7
5	19.1	17.4	20.2	18.2	17.1
6+	14.6	15.2	15.6	17.5	15.6
ALL	18.3	16.7	16.5	15.7	15.6

Issue Age Group 40+

Duration	1983	1984	1985	1986	1987
1	13.2	15.3	14.2	15.3	10.1
2	19.1	17.7	18.0	18.4	16.9
3	24.1	16.6	16.0	21.6	20.9
4	19.8	21.3	18.3	16.5	17.5
5	23.5	24.6	24.2	20.6	15.1
6+	19.1	16.8	16.2	17.6	15.2
ALL	18.2	17.8	16.9	17.8	15.3

MR. WILLIAM J. BRIGGS: I noticed that in the first table and this table on the 1987 experience that there seems to be a bump up in the third duration. Is there any reason for that?

MR. WINN: That's just the experience. We have noticed that and we have looked at it and it seems to be real. In some of our pricing, what we will do is start the lapse rate at a lower rate of 12-15%, increase it through the third duration, and either keep it level or have it drop a little bit after that.

Table 4 is an internal lapse index which is reviewed monthly. As you will note the index shows record lapses in 1981 to 1984 with marked improvement in 1985 through 1988.

TABLE 4
Reinsurance Lapse Experience
(%)

	YRT	COINS	MOD CO	POOL	TOTAL REINS
1981	20.1	16.8	6.7	24.8	18.5
1982	24.2	28.9	11.0	17.7	25.2
1983	24.3	24.3	9.8	20.3	23.3
1984	24.2	22.2	15.2	18.4	22.4
1985	22.8	18.6	28.7	14.2	19.3
1986	21.5	18.6	24.0	10.2	17.4
1987	17.9	18.5	21.2	12.3	16.5
JANUARY	17.9	18.0	21.9	13.1	16.5
FEBRUARY	18.1	17.7	22.3	12.7	16.2
MARCH	19.2	18.9	21.3	12.9	17.1
APRIL	19.0	19.5	21.3	12.7	17.2
MAY	18.9	18.8	18.6	12.4	16.7
JUNE	19.0	19.0	18.9	11.5	16.5
JULY	18.5	18.9	18.4	11.6	16.3
AUGUST	17.9	19.5	21.2	11.2	16.2
SEPTEMBER	18.3	20.0	18.8	12.5	16.9
OCTOBER	17.9	19.8	15.1	12.7	16.8
NOVEMBER	17.0	19.5	15.1	12.8	16.5
DECEMBER	16.8	19.6	16.2	13.0	16.5

There is an entire range of numbers up there, but it is still reinforcing the fact that lapses have improved over the period from 1981 to 1987. The other tables were actually termination rates based on exposure formulas. This is just an internal index we use monthly to see what is happening in terms of our lapse experience. The top of this particular table shows the index for each one of the respective years. The bottom part shows it for the 1988 year, month by month and obviously it is broken between YRT, coinsurance and pool business. The category under pool represents self-administered term business in the early durations but is primarily self-administered interest sensitive products in the later durations.

Bear in mind again that these are indexes, not pure lapse rates.

All of us are happy that lapse rates are declining to more reasonable levels. The balance of the presentations will enforce how lapses affect the profits of the companies we serve.

MR. LEROY H. CHRISTENSON: The purpose of my discussion will be to give you some examples of the way different lapse assumptions affect the reinsurance pricing for some of the major individual products currently being reinsured. I will show you six examples; a Select and Ultimate ART product, a five- and a ten-year term, as well as three Universal Life (UL) products. I will also discuss briefly American United Life's (AUL) lapse rates by product type.

At most companies, lapse rates tend to get less of our research and discussion time due to the fact that they are viewed to have a relatively minor impact in the pricing process. However, given the current competitiveness in the reinsurance marketplace, this minor part can have a significant impact in the profitability of a product. You will see a wide range of the effect of lapses among the products that I show here.

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Certainly in traditional indemnity reinsurance pricing, the mortality factor is the factor of prime importance. As much as 85% or 90% of the reinsurance cost is made up of mortality. The remainder is made up primarily of expenses and the associated ability, or lack thereof, to recover expenses. While lapse has its major impact on the recovery of expenses, it can also, however, affect the mortality assumption to be used. This effect of lapse on mortality is currently little understood, and I will not discuss this in much detail in my examples.

The results in lapse sensitivity testing vary according to several factors They vary by product, by the slope of the premium scales, by the age mix assumed for the business, by the average size of the business, by the level of first-year surplus strain, and even by the profit measure chosen. In my examples, I have assumed a consistent age mix, average size, and expense assumption for all products. I will compare profitability using a 20-year present value of book profits to present value of premiums using a model office calculation.

In my presentation, I have assumed no deterioration in mortality for even the highest lapse scenarios. The intent is to show purely the affect of a change in lapse on the profitability independent of any change in mortality assumptions. I have also maintained the same lapse slope by duration in the various scenarios. The variance made was to increase and decrease each durational lapse rate by one third. If a decreasing schedule of lapses was used such as: 20, 20, 15, 15, and so on for durations 1, 2, 3, 4, etc., 133% and 67% of each duration's lapse rates were used for the high and low lapse assumptions.

AUL LAPSE EXPERIENCE
First, some comments about AUL's overall lapse rates. Our overall lapse rates for 1986, 1987, and 1988 were 21.0%, 21.2% and 16.6%. In 1986 and 1987 these are considerably higher than the ones Mike just shared for BMA. The dramatic improvement in 1988 occurred in all areas except Select and Ultimate term or Graded Premium Whole Life products. During the remainder of my presentation, I will use the term Select and Ultimate to refer also to Graded Premium Whole Life products with "term like" rates. Part of the explanation for the overall lapse rate reduction is that these products are a much smaller portion of our block now than in years past because of the high lapse rate. Perhaps the rest of the explanation is less rollover activity. Other reinsurers have also experienced these improvements in lapse rates as you have seen.

MR. WINN: To answer the young lady's question again, the LIMRA study is focusing on lapse rates which I guess is looking at direct issue. I know in my own experience I work with direct companies and the reinsurance experience is not a mirror image of their own direct issue experience and that may impart an explanation of the difference also.

MS. BHAJAVATULA: The reinsurer's experience will be based on larger size policies because it would be above the direct company's retention and your table shows as size increases, lapse rates increase. It will not be a mirror arrangement but to the contrary, it would be greater.

MR. WINN: Actually that is another thought. I do not have a full explanation.

MR. CHRISTENSON: We have had the same experience. Of course, the average size is not huge. I do not have that figure off the top of my head, but I did split out our lapse rates in a few general areas.

Now, let's look at our lapses in three product categories: Select and Ultimate Term, UL, and other. We have followed the Select and Ultimate block of business closely since AUL cancelled, for new business, all outstanding treaties on this type at the end of 1984. The lapse rates have been 20%, in 1984; 18.5% in 1985 and then; 27%, 29.5%, and 40.7% for the last three years. AUL skipped the 30% altogether for Select and Ultimate lapse rates. If anything, the deterioration in lapse rates for these products is accelerating and I don't see any hope for that changing. We skipped the 30s entirely -- went from 29 up to 41 almost. Unfortunately, AUL did not, and I am sure few of us did, price for that level of lapse. I am still unimpressed with the performance of this product for reinsurance. For 1988, AUL's overall lapse rate for the remaining block, non-Select and Ultimate was approximately 14%. This splits between a UL lapse rate of about 10% and a lapse rate of about 19% on all other products combined. Now let's look at some examples.

EXAMPLES OF LAPSE VARIATIONS

The next three tables show variability of profit as a percentage of premium for three types of Universal Life products. The first product has a Select and Ultimate scale of Costs of Insurance (COIs) and shows what I would call a normal pattern of profits. Low lapses improve profits, high lapses reduce profits as a percentage of premium. These tables show 20 year present value of premium and profits in thousands from one year of issue in a model office study, and profit as a percentage of premium. Again, the high and low lapse rates represent lapses one third higher and one third lower than the middle lapse rates. We vary lapses by ages: somewhere in the low 20s for the first year and we grade down to about a 6-8% ultimate rate after about ten years.

TABLE 5
Universal Life
Select and Ultimate COIs
(000)

	PV Premium	PV Profits	% Premium
High	611	18	3.0
Middle	791	40	5.0
Low	1,032	67	6.4

The area where lapse rates had the biggest impact on a UL product in these examples was for a product with, what I call, a reverse select and ultimate rate. These are COIs where amounts are added in the early years for expense recovery.

TABLE 6
Universal Life
(Reverse Select and Ultimate COIs)
(000)

	PV Premium	PV Profits	% Premium
High	780	40	5.1
Middle	981	49	5.0
Low	1,239	48	3.9

Here we see that a high lapse rate tends to have a lesser impact because the expenses are recovered more quickly and the fact that the COIs in the later durations don't cover mortality and have less impact. A low lapse rate produces about the same dollar profit but reduces the percent of premium profit about 1%. Again, the COIs don't completely cover the mortality in later durations, resulting in reduced profits.

Table 7 shows the lapse effect on a typical attained age COI pattern. As in the previous example, losses in later years due to mortality increases cause the low lapse scenario to reduce percentage of premium profit. The Select and Ultimate mortality rates we use in pricing eventually become higher than the aggregate COIs that are built into the UL product.

TABLE 7
Universal Life
(Attained Age COIs)
(000)

	PV Premium	PV Profits	% Premium
High	1,067	47	4.4
Middle	1,382	69	5.0
Low	1,798	89	4.9

Non-recoverability of expenses in the early years causes the reduction in profit for the high lapse scenario.

MR. JOSEPH PAESANI: How do you define a lapse on the UL examples?

MR. CHRISTENSON: It is face amount. These are totally based on face amount, not number or amount of premium or anything else. For reinsurance, certainly any other lapse definition does not make much sense. It is almost all ART type reinsurance, and so we do not participate in the premiums or the reserve changes, whatever.

My next two tables are examples of a ten- and a five-year term product. These products, of course, have become quite popular in the last couple of years as a replacement for the Select and Ultimate Term product.

Table 8 displays a ten-year term with, what I considered, the most surprising results of this study. While the lapse rate affects the premium significantly, it does not affect the profit as a percentage of premium much at all. In fact, the pattern is what I termed "normal" with lower lapses increasing profits and higher lapses reducing profits. Because of the low level of the 10-year term rates, I had expected a reduction in profits at the low lapse rates similar to the result for a UL with aggregate COIs.

TABLE 8

10-Year Term
(000)

	PV Premium	PV Profits	% Premium
High	767	26	4.7
Middle	970	35	5.0
Low	1,277	49	5.2

You will notice that for my first four examples, the lapse rate variances have not had a large enough impact to result in a loss. This is in keeping with the normal assumption that lapse has a relatively minor impact on pricing.

Our next table (Table 9), however, shows the profitability of a five-year term product. Here we have our first situation in which, under these assumptions, lapse throws us from a profit to a loss position. The 33% increase in lapse will lower our profit almost ten percentage points and our premium by almost 30%; the reverse is also true, a 33% reduction in lapse rate will increase profits over 8% of premium and increase PV premium by over 40%.

TABLE 9

5-Year Term
(000)

	PV Premium	PV Profits	% Premium
High	729	(24)	(4.7)
Middle	1,013	35	5.0
Low	1,456	134	13.2

Finally, my last table (Table 10) shows a select and ultimate term product. It appears that despite the discussions in the past about the high lapse rate of the select and ultimate term product, the product is going through a resurgence of sorts. At first when we quoted on five- and ten-year term products, it was five- and ten-year term only with no associated Select and Ultimate term product. This has changed and now term portfolios we see are more often including a Select and Ultimate term. These products are just as aggressive as before with premiums doubling within three or four years. I have seen premiums as low as $.46 a thousand at age 35 with the

second-year premium also being under $.50. This product, as you might expect, has a great variance in profitability as lapse rates change.

TABLE 10

Select and Ultimate Term
(000)

	PV Premium	PV Profits	% Premium
High	3,887	(46)	(13.0)
Middle	627	29	5.0
Low	1,076	174	17.6

The middle lapse scenario here assumes a level 22 1/2% lapse. In varying the lapse rates up 33% and down 33%, we see that the profit moves all the way from a loss of 13% to a gain of almost 18%, depending how your lapse rates actually develop. Again, this assumption ignores the fact that there will most likely be extra mortality in a select and ultimate term product in the later durations. The only policyholders that will be around after eight or ten years to pay premium will be those who have no other place to go for insurance. Obviously, there will be a few that are so lethargic that they won't change their policy even though they are healthy. However, they will be the exception, not the rule.

Well, again, my purpose was to show you several examples of how lapse rates can affect the pricing of reinsurance products, and as you have seen, the results can vary dramatically by product depending on the type of product. You really almost can't set up rules for how this will vary by product. You almost have to look at each one and see what the variance results are.

MR. PAESANI: You showed the impact of checking lapses expressed just as profit to premiums. Is that a sense of what might happen if we were to look at return on equity on a GAAP basis versus this analysis?

MR. CHRISTENSON: I did not look at that for this. I know that some of the other panelists have looked at it that way so why don't we defer that until later.

MR. PAESANI: And all of these are coinsurance type approaches where you have large up-front allowances?

MR. CHRISTENSON: Yes, they are all 100% first-year allowances.

MR. PAESANI: So a traditional YRT scale would certainly show it different.

MR. CHRISTENSON: On Select and Ultimate term, for example, if you got a first-year premium, that would have a big impact, but still the general relationship would hold because all the products that I showed here are 100% first-year allowances.

As a final comment, AUL has long been on record as a company that does not price Select and Ultimate term favorably. In 1982, we quit quoting on Select and Ultimate term products. In 1984, we cancelled all of our outstanding Select and Ultimate term reinsurance contracts. Recently, we have begun to quote on the product again, but only at lapse rates commensurate with the lapse rates we have experienced on our own Select and Ultimate products. In addition, we do assume deteriorating mortality in those calculations, so we have not been very successful at attracting these accounts. In fact as I see the number of Select and Ultimate term quote requests increase, it makes me begin to think that we are revisiting and trying to find solutions to problems we didn't solve before.

With regard to my view of what we are doing to ourselves by trying to solve our profit and growth problems by using the Select and Ultimate term market, it's like these poor individuals are trying to hang a man, but due to the ineptness of their application of the technique, have managed only to hoist the horse up as well. "O.K., O.K., O.K., ... Everyone just calm down and we'll try this one more time."

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MR. PHILIP K. POLKINGHORN: I am going to talk briefly about loss recognition which is just one of the bad things that could happen to you if you have poor persistency, and then I am going to talk a little about changes in the way certain of the newer products are reinsured that might reduce the persistency risk to reinsurers and perhaps even to direct writers. I will preface my comments by saying that only in certain instances will this work. As I think Lee has pointed out, the impact of persistency on different products is different depending on the cross structure of that product.

I believe that loss recognition is probably more of a problem for those blocks of term insurance that were priced four to eight years ago. I think today more and more direct companies and reinsurers are using lapse rates and pricing that are more indicative of the experience that is likely to emerge. People are more frequently pricing with mortality deterioration associated with the excess lapses that might be expected on these blocks of business. So, the likely changes from pricing assumptions for some of the newer blocks of business are much smaller than some of these older blocks of business. I think Mike illustrated with BMA's experience, and perhaps to a lesser extent AUL's experience, the lapse rates in these markets have been improving slightly at the same time that companies are getting a bit more realistic in their assessment of the lapse risk.

I think we are all aware that at least one major reinsurer had a significant write-off of its deferred acquisition cost (DAC). The lapses have been particularly high for Select and Ultimate term without very many margins to begin with. There are variations in the degree of assumed mortality deterioration, and the combination of these two items is likely to produce loss recognition problems; however, I think one of the reasons we may not have seen more frequent examples of loss recognition on these blocks of business is that the projection of the mortality deterioration: is somewhat subjective. There are three published models for projecting mortality deterioration. The Dukes/MacDonald method which was developed primarily to project the mortality of the non-reentry group on Select and Ultimate term, the Shapiro/Snyder paper and more recently the Becker/Kitsos paper. All of these methods involve some assumptions regarding what proportion of your lapses in excess of your baseline lapses are fully select lives and in that respect these models are all very subjective. Both the Shapiro/Snyder and the Becker/Kitsos methods have a factor that is referred to as an effectiveness factor. What it really is, is that when you assume all the excess lapses are fully select lives, you get a really high mortality deterioration number and by applying the effectiveness factor, you cut back based on judgment that you do not believe all of those lives are fully select. So as with a lot of things, if the answer we get using our theoretical approaches is bad enough, you will find a way to modify it to be not quite so bad.

But I decided to look at an example of a product that was priced with lapse rates more indicative of what people a year to 18 months ago might have been using on select term type products and probably fits in reasonably well with the experience presented by the previous panelists. The assumed lapse rates graded from 27% down to 15% in the ultimate, and fortunately for my example, all these policies were issued on January 1st on an annual mode, so we were able to keep track of the actual lapses rather easily. The first year experience matched up with expected but in the second and third years, we were roughly 30% above expected and the financial actuary said, "Okay, fine, I will revise my estimate of future lapses and do some loss recognition testing and I will assume that this 30% extra lapses continues indefinitely into the future for this product." The actuary in the pricing had included provision for mortality deterioration but the financial actuary decided to look at his loss recognition testing in the future. Two methods, one saying that there would be no mortality deterioration in excess of what was originally planned in pricing and another basis saying that the lapses should not only be 30% higher than priced for but also mortality would deteriorate at a rate faster than originally projected by an extra 1% per year.

This small difference in the mortality was enough to move them over the line. Using a gross premium valuation at that point in time, the extra 30% lapses didn't quite put you in a loss recognition position. You were close but not quite there. But almost any sort of extra mortality assumption associated with those extra lapses would push you over. Now, if you are the financial actuary and you have these very theoretical models for projecting mortality deterioration, your lapse rates have been very high in recent years on term business, but it is difficult to actually pin down how much mortality deterioration has there been due to this. There is a great deal of subjectivity in saying, how much mortality deterioration we are going to have in the future.

I thought I would also discuss where the company's direct products are going, and what the persistency risk is looking like to them, and analyze a little bit where the reinsurers want to be.

You might say you would like to be indifferent to persistency if you could. There is an argument that says you would like to be in a parallel economic position with a direct writing company, sort of a partnership that if persistency has a certain impact on their profitability you would like it to have the same impact on your profitability.

I think in certain cases, reinsurers today on some products may be at odds with a direct writing company. There are probably situations where higher than expected lapses will hurt the reinsurer's profitability more than it might hurt the direct writer's profitability, and I am sure there are situations going the other way.

If you look at the bread and butter products of a lot of the small and medium sized stock companies that perhaps make up the bulk of the reinsurance market, these products have been changing over the past few years. By and large, the changes have led to products which are less lapse sensitive for the direct writing company and, in some cases, products which are lapse supported: higher renewal lapses will mean higher profitability for some companies. This has been brought about by a trend to higher, direct surrender charges charged against policyholders and policyholder persistency bonuses.

The policyholder persistency bonuses are merely an enhancement to the policyholder's fund value. These enhancements have been achieved in any number of different ways. Probably one of the first ones, and the ones where it makes maybe the most sense for the reinsurer to participate, is the return of COI deductions. A company would return, at the end of specified periods, all the cumulative COI charges made to that policyholder, perhaps at the end of the tenth and twentieth year. More recently, more elaborate schemes have developed where different portions of the charges have been returned at different dates. Bonuses have been expressed as a percentage of cumulative expense charges, percentages of premiums paid, and a number of different ways. Cash values might be recalculated using a higher interest rate than was declared each and every year.

I thought it would be interesting to take a look and say what is the impact from the view of the direct writing companies? Many of their products are relatively sensitive to renewal lapse rates and some products are lapse supported, and the result is that these companies still have a lapse risk; it is just a different lapse risk. Occasionally their risk is that lapses in renewal years won't be high enough.

The question I want to pose is, "Where do you want to be as a reinsurer if that is the risk your customers are facing?" I have an example looking at things with coinsurance of COI rates, with 100% first-year allowance, and no sharing of policyholder persistency bonuses. I think the opportunity that presents itself in certain instances is that the reinsurers can share this new persistency risk with the direct writers. Another advantage is that the degree of sharing can be negotiated. The reinsurers doesn't necessarily have to participate in this risk to the same degree or extent that they do in the mortality risk. They can balance how much persistency risk the direct writer wants to get rid of and how much the reinsurer wants to take on to perhaps balance out its persistency risk. I think if we are in a situation where the reinsurer has what I call traditional lapse risk (if lapses are too high, it loses money) and the direct writer is in sort of a non-traditional risk situation (if lapses are too low, it does not make money), this shifting can provide benefits for both parties.

Graph 1 shows an example of a product that has a return to the policyholder of all the premium and per policy loads assessed to date at the twentieth year. By today's standard, this might be considered relatively middle of the road policyholder persistency bonuses. They are bonuses that have much, much greater impact on the policyholder's long duration values and on the lapse risk facing the company than this product. This is a graphic representation of the impact from the direct writer's point of view and from the reinsurer's point of view of changing lapse rates from standard lapse rates which is the 100% baseline to 75% or 125% of standard.

The clear area of the graph represents the sort of movement in profitability compared to "standard" profitability if lapses are reduced to 75% of standard or if they are increased to 125% of standard. You can see from the direct writing company's point of view, those changes in lapse rates really do not have much impact on its profitability. Its profitability goes up or down a little bit. You cannot see it from the graph, but it does in the traditional pattern; higher lapses mean lower profits to this company, but not by much.

No Reinsurer Participation
Profits as Percent of Standard
Renewal Lapse 75-125% of Standard
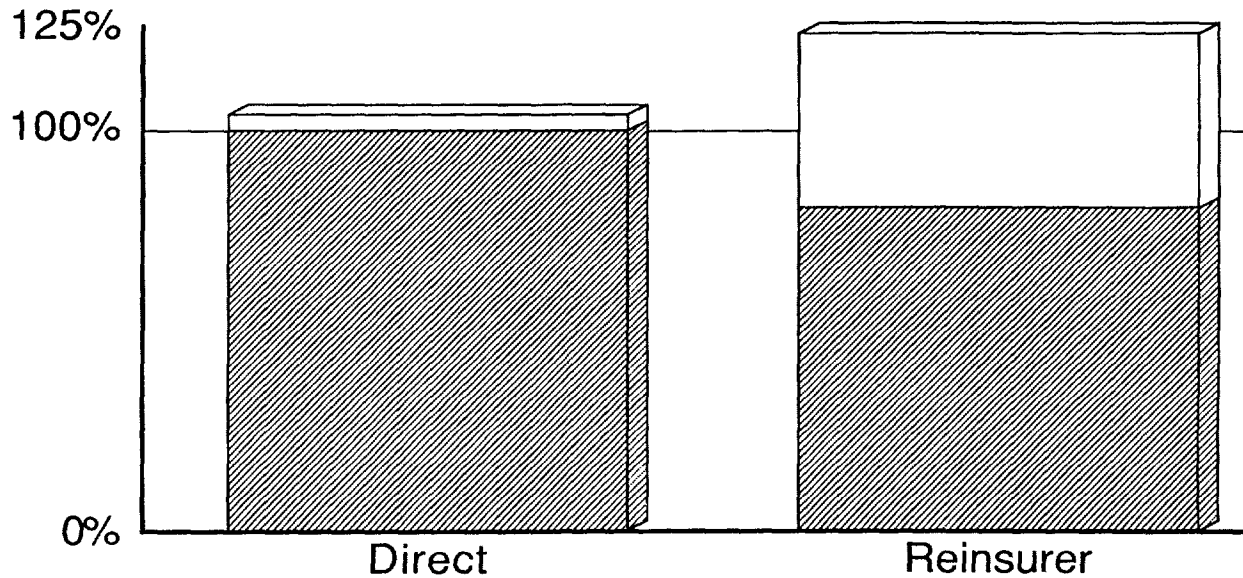
GRAPH 1

The reinsurer has a pretty good swing in profitability as lapse rates change. One of the reasons for this is probably that some products with policyholder persistency bonuses might have healthier COI rates than those without because the higher charges will help to pay for the bonus and the illustrated values in the later years are supported not by having competitive COI charges but by having the bonus. In this example, the reinsurer's profitability would have been a bit more sensitive to lapsation, but because of the allowances leveling out at some point, eventually true mortality costs exceeded the COI net rate of mortality.

I think that one of the other panelists is going to discuss methods of measuring profitability when you have renewal losses. Sometimes the picture we get when we just count renewal losses at a high discount rate can be deceiving, but in any event we have a situation here where the reinsurer's profitability is relatively sensitive to lapsation and the direct writer's isn't.

If we were to use a more substantial policyholder persistency bonus, the direct writer might have been more sensitive to lapse rates, but it would have been in the other direction. On Graph 2, the reinsurer participates in the bonus to the same extent that it participates in the mortality risk. Also it receives a reinsurance premium for this, which is a percentage of the expense loads deducted relative to its share designed to cover its share of the return benefit when the return benefit arises. This is something that is possible.

I chose this example (Graph 2) rather than a return of COI rate example because it illustrates that the reinsurer can participate in all different types of bonuses not just COI rate returns. The COI rate return just seems more logical because that is what the reinsurer is receiving, and if it has been grossed up a bit to provide for a bonus, the reinsurer should have different allowances or participate in the bonus.

But in this example you can see that things really have not changed much for the direct company. It is rather inperceptible. They change by a percentage point or two, but the direct company's profitability isn't really that much more sensitive to lapsation now than it was before, and the reinsurer's profitability is much less sensitive to persistency than it was before. The direct company's original position was one that higher renewal lapses hurt it. Now it has its underlying mortality risk reinsurance component where the higher renewal lapses hurt it, but on its sharing of the policyholder persistency bonus, it goes the other way so that is an offset.

MR. STEPHEN F. KRAYSLER: In the first one where the company is not on a sharing basis, the reinsurer had to price for a higher lapse risk or it should have. The next situation is a sharing one, it is now going to share in paying the bonus so it is going to be in a lapse-supported situation. The reinsure is going to load up the premium a little bit, on the other hand, it is now less sensitive to a lapse situation. Could you give us an indication of how this appears to the ceding company in terms of the increase of the rates that it is paying? The really interesting thing is that the ceding company's position has not changed much.

MR. POLKINGHORN: It did change, but it was on such a small scale that going from 99 to 101% of standard did not (say) go from 98.4 to 101.6. It may have almost doubled the sensitivity, but it was so insensitive to begin with. It is a good point, and actually I covered it a bit here.

From the direct company's point of view the lapse support is substantial for many products. It was not in the example I gave. It was rather lapse insensitive, so in the cases where the company does have substantial lapse support it might be anxious or willing to pay a little bit to transfer that over to the reinsurer.

In my first example, the direct company was relatively insensitive to persistency to begin with, and it was only the reinsurer that was sensitive to persistency. When we went from this first example to this second one, the pricing I did for the additional risk or benefit for the reinsurer was on a very low margin basis. The reinsurers does not make much additional profit by reinsuring this benefit. It has its baseline profit and then just a tiny profit, nearly break even, on its pricing of the persistency bonus. The main thing is it gets enough to cover what it has to pay but its risk is reduced. In cases where there is substantial lapse support, the reinsurer has two potential advantages. One, it might be able to reduce the lapse sensitivity and two, it might be able to get some profits.

Reinsurer Participation
Profits as Percent of Standard
Renewal Lapse 75-125% of Standard
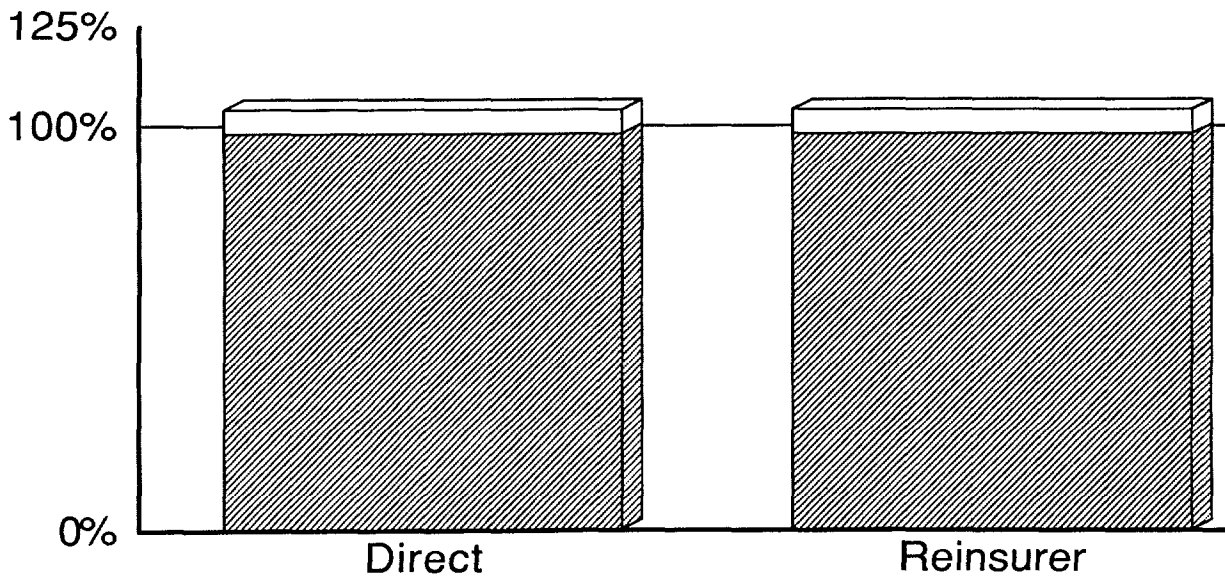
125%

100%

0%

Direct   Reinsurer

GRAPH 2

In the situation where the ceding company's product is rather insensitive to lapsation, it is questionable how much profit it might be able to get out of that arrangement. There is little incentive for the direct company to reinsurer that on a basis that gives perhaps a lot of profit to the reinsurer. In cases where both of them were in a position where the policyholder bonus was so significant, they both had a profit picture that looked like the reinsurer's. By transferring some of the risk, they could both even out their lapse sensitivity, then the direct company might be willing to transfer that risk on for profit basis.

There may also be an impact on GAAP financials for the direct company because with most persistency bonuses the direct company has to defer the recognition of income, and it sort of levels things out. Now depending on what the reinsurer charges for transfer of some of this risk, it might get a slightly more favorable GAAP picture but it might not.

In some way, from the direct writer's view, it might be able to eliminate some of the lapse support, if it has a lapse-supported product. From the reinsurer's point of view, if it is in the opposite position to begin with, it might be able to reduce its lapse sensitivity, so everybody might win.

MR. JAMES L. SWEENEY: My presentation will focus mainly upon measuring of the financial effects of lapses due to the environment which is unique to the reinsurance arena. Most reinsurance treaties have a recapture provision in them, and it is something that needs to be looked at when you do your pricing. With the advent of Universal Life and self-administration of Universal Life we have found that the concept of a level retention has gotten a lot more attention. And finally, fill-up provisions are often asked for in the reinsurance treaties. This is particularly important if the ceding company operates in a small geographical region and has many policies on the same life. Fill-up is where the retention on a single life is kept constant, and if one of the policies lapses, it will fill up its retention of one of the policies that is reinsured.

I will follow a single example through to illustrate the effects of each of these items. Also, I will examine the effect upon profitability of excess lapses both with and without the anti-selection. I will then talk about the effect of lapses on a reinsurance product whose profitability is negative after the first 10 years, a "lapse supported" type of product due to high reinsurance commissions which was negotiated because of competitiveness. The active COI's charges are adequate, but the commission level is high enough in the ultimate years that the product does not make a profit.

In Table 11 are the pricing assumptions that I have used throughout the entire model. I have used a standard, male age 35 nonsmoker. I looked at a product which is coinsured. It is an attained age type of product, so it could be COI charges for Universal Life or ART or even a select or ultimate term product. For all of the analysis, I have used the mortality at 90% of the 75/80 age last birthday table, and I have modified that for nonsmoker. I started out with Linton B lapses, but then I modified that throughout, and finally, I assume expenses at thirty cents per thousand first year and ten cents per thousand renewal year and use an interest discount rate of 8.5% in all years.

TABLE 11

Pricing Assumptions

o   Male age 35 nonsmoker
o   Reinsurance commissions (either term or COI rates for universal life)
o   Mortality: 90% of 1975-1980 Basic Tables ALB modified for nonsmoker
o   Lapses: Linton B, but modified throughout the presentation
o   Expenses: $0.30 per thousand first year
          $0.10 per thousand renewal years
o   Interest rates/Discount rate: 8.5% all years

Graph 3 is the first ten years of book profits from this particular study. The product requires a significant first-year investment. The product, with level amount at risk, breaks out in the sixth or seventh policy year and at the end of ten years, has a 2% of present value of premium book profits and that remains level at the twentieth year, too. The second line is level retention. It also on its own has a 16% ROI, and I was allowed to give a reinsurance commission of 100% first year, 20% renewal. The third line is proportional retention. The reinsurance company and the ceding company share that decrease in amount at risk proportionately. The portion reinsured remains

794

Universal Life Profitability
Present Value of Profits

Cumulative Profits

Policy Year

— LEVEL AMOUNT AT RISK   —+— PROPORTIONAL RETENTION

—*— LEVEL RETENTION   —□— LEVEL RETENTION B
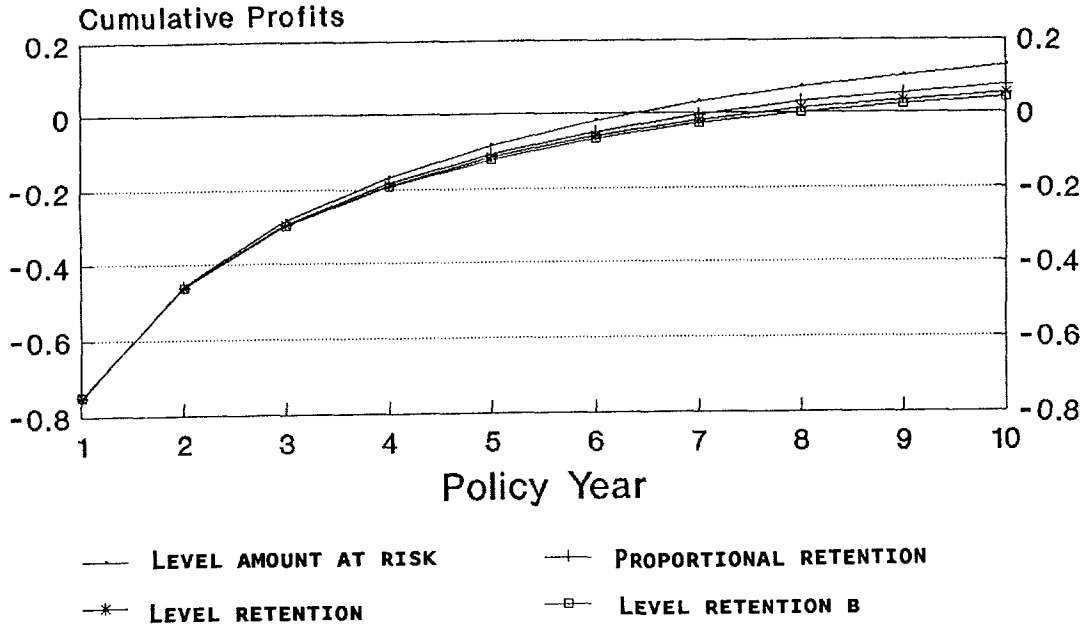
constant and does not greatly affect the earlier years. Toward the tenth year it starts showing more of an effect. The present value of profits in this case is 1.3% of premium which is down from the 2% at the end of 10 years, 1.1 at the end of 20 years. The profit has dropped from 16 to 13% in 20 years.

Graph 4 illustrates the difference in profitability. You will notice that the second block has not increased too much in the second ten years. After you had signed this treaty, your administrative people have come to you and told you that the company is reinsuring on a level retention basis. The direct company is keeping its risk level, and the reinsurer is taking the entire decrease, so you have been asked to look at the pricing assumptions again with the level amount at risk in mind. That is shown here by the third line, a little smaller and coming a little bit closer to the zero up at ten years. The profitability is now down to 11.6% from your original 16, and the profits are now less than 1% of the premium at 10 years and not much more at the 20-year rate. This shows the effects of the level retention.

Finally, I assumed a $100,000 average policy size and a $30,000 retention, but if the policy size is actually about $70,000, instead of that original $100,000 and the company is doing the level retention, the result is the last line (level retention b) which is again below the rest. The profits are lower, the ROI is now 10.7% from the 16, and the profits are only a half percent of premium as shown by the fourth line here. So this graph will show you the difference in measured profitability due to the different kinds of ways you price for your Universal Life products especially at the 20-year measure. There is a very big difference between your original $1,000 level amounts at risk and level of retention at a smaller retention, a smaller average size policy. In the first block of Graph 5, we are back to our Universal Life profitability with the original assumptions and the original assumed lapses here, and we are now going to vary the lapse rates. In the second block I have assumed that the lapses are 20% higher than the original pricing. As you can see it really does make an effect on your first 10 years, as well as 20-year profitability. In this case there is not a whole lot of improvement in the first and second ten years again. In the third block, I have used an anti-select q in line with the Shapiro paper and modified it just as Phil had talked about and looked at the 20% higher lapses as well as a higher mortality. In this case there are no profits at all. You lose eight cents after ten years and 37 cents at the 20-year picture and losses are occurring each year after the tenth year because of the higher mortality rates. In the fourth block I used a 20% level lapse rate. I have not used an anti-select factor, and the profitability is slightly negative but nowhere near as bad as the 20% higher lapses with the anti-selection. Finally, I am going to look at 20% level lapses with an anti-selection factor and this is the ominous last box here. You remember how bad the lines looked earlier. They seem fairly small in comparison with these lines. I have a forty-eight cent loss at the end of 10 years, and even with a 20% lapse rate, I have $1.74 loss after 20 years due to a higher mortality. So you need about ten times of the first box to make up for the bad last box business.

Graph 6 illustrates another point altogether. In this case, the reinsurer has quoted a 100% allowance in the first year and 18% in renewals. This would give it a classic ROI of 16%. The first line is the year-by-year annual profits that are undiscounted. You cross over at the tenth year and become negative after that. The second line is the cumulative profits at 8 1/2% and they peak out in the tenth year and head back down to zero. Using the prudent banker's method, where you calculate your position as being a lender or borrower, the ROI, adjusted to the prudent banker's method, is 12.5%. The premise is, of course, that you should not discount those future losses to the present at the 16% rate. You should use your after-tax interest earnings rate, in this case 8.5%, when the asset share becomes positive. This method is described by Claude Paquin in *Transactions* XXXIX, I think and by David Becker in *Transactions* XL.
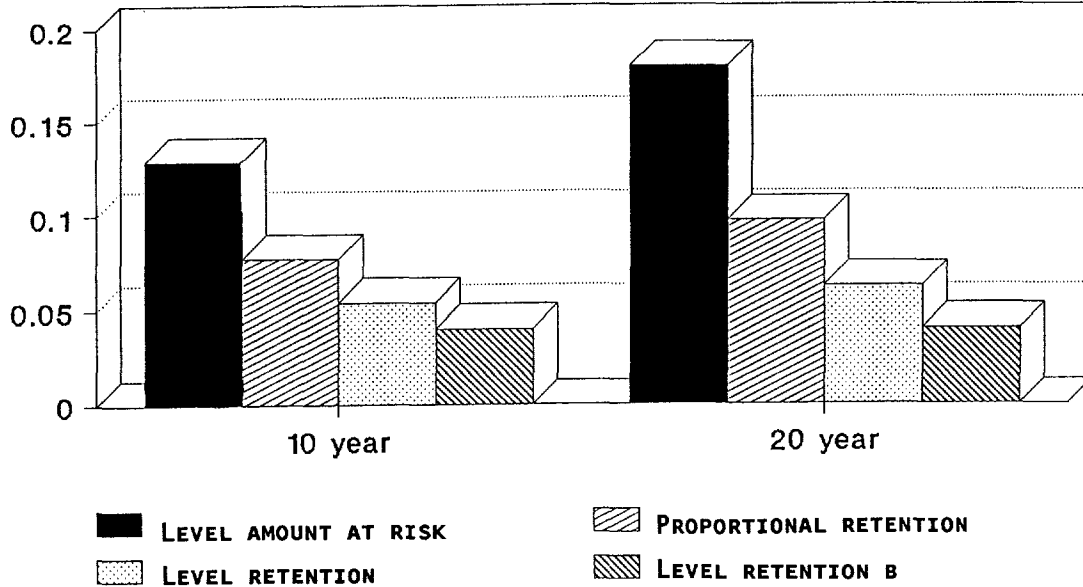
My point here is that the reinsurer is earning less than 16% ROI. If the 13% ROI appears to be too low, one may attempt to raise it by raising the lapse assumption. Although this may usually be a conservative approach, it is not in this case. You may have a lapse-supported product.

In cases where you have negative results in the later durations, you should do two things. Use a discount rate which is much lower than the "hurdle rate" to discount those losses. The second thing you should examine is the lapse rate. If it is too high, there may be some surprises ahead of you.
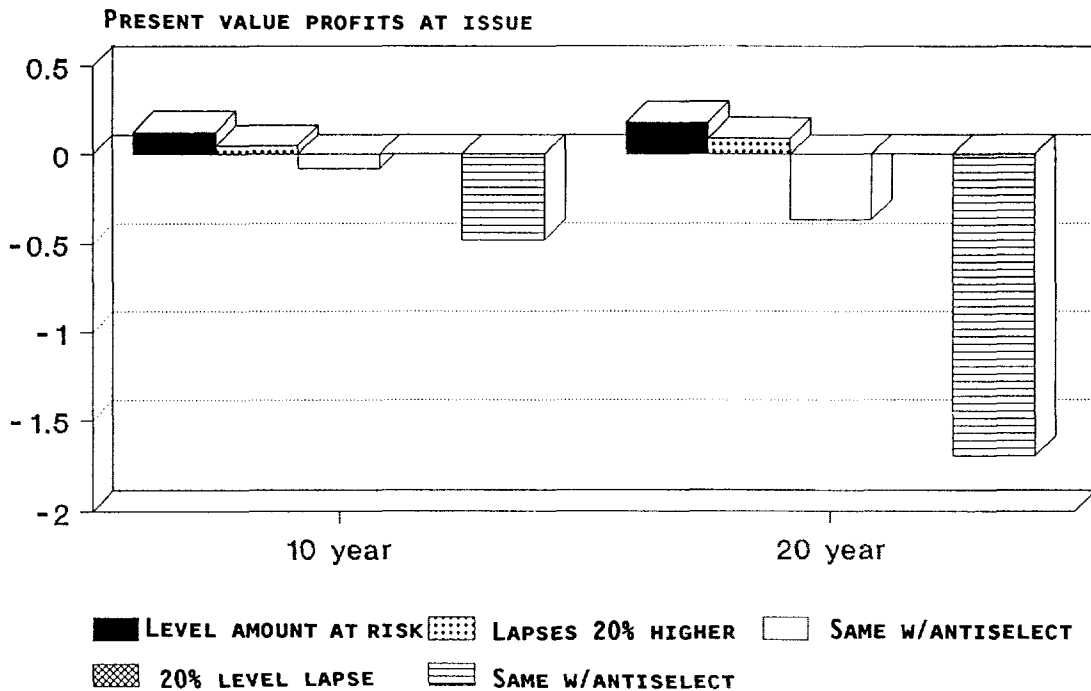
Universal Life Profitability
Cumulative Profits

PRESENT VALUE PROFITS AT ISSUE

Legend:
- ■ LEVEL AMOUNT AT RISK
- ▨ PROPORTIONAL RETENTION
- ▦ LEVEL RETENTION
- ▨ LEVEL RETENTION B

Profitability with Excess Lapses
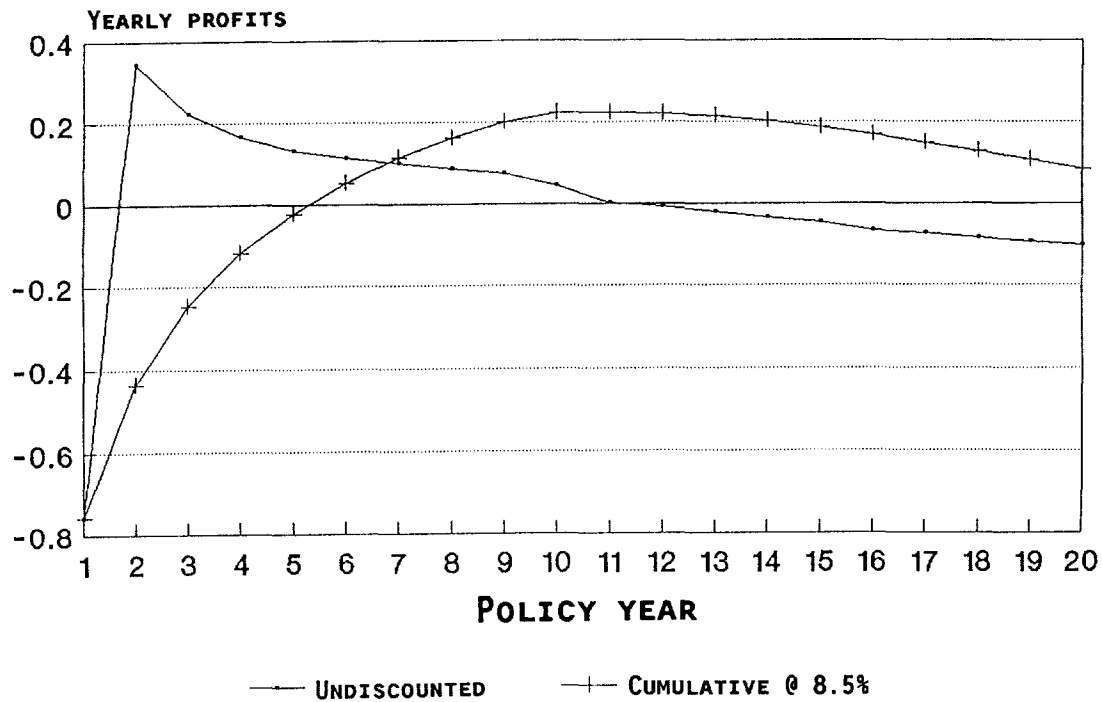
PRESENT VALUE PROFITS AT ISSUE

Legend:
- ■ LEVEL AMOUNT AT RISK
- ▓ 20% LEVEL LAPSE
- ▦ LAPSES 20% HIGHER
- ▤ SAME W/ANTISELECT
- ☐ SAME W/ANTISELECT

PRUDENT BANKERS METHOD

YEARLY PROFITS

POLICY YEAR

—•— UNDISCOUNTED   —+— CUMULATIVE @ 8.5%

Reinsurers must look at their profitability beyond a 10-year time horizon and not ignore it by using high discount rates or high lapse rates to eliminate the problem. Finally, reinsurers and ceding companies must be on the same wavelength when it comes to lapses. Their interests in the book of business should be the same. Reinsurance is still a partnership, and like any partnership it works only if the partners have the same interests.

MR. A. GORDON JARDIN: My presentation will deal with a Canadian perspective on the effect of lapses on profitability from a reinsurer's perspective on Canadian products.

I will review the effect that different ultimate lapse patterns have on reinsuring two popular product lines in Canada. The "Term to 100" product and the 5-year or 10-year renewable term product. I will look at profitability measurement on a coinsurance basis only. YRT on a yearly risk premium basis will eliminate the lapse risk except to the extent anti-selective lapses affect mortality. Since this will be reviewed under the coinsurance options as well, it does not bear repeating.

"Valuation Technique Papers" are being used by the Canadian Institute of Actuaries (CIA) to recommend guiding principles for valuation of Canadian life insurance business. There have been six papers recommending valuation techniques on issues, including reinsured policies, adjustable products, expected mortality experience, cash flow investment, etc. Two papers, I believe, have been accepted as binding standards of practice for the CIA. These are "The Valuation of Lapse Supported Products" and "The Valuation of Individual Renewable Term Insurance."

A lapse supported product is defined as a product that requires a materially higher gross premium if, in the pricing calculation, the Ultimate Lapse Rates are set to zero (assuming all other pricing parameters remain the same).

The most popular product in this genre is T-100. A "T-100 product" is described as a product with a level or adjustable death benefit for the whole of life, or endowing or expiring at or about age 100, with no non-forfeiture values or with non-forfeiture values set at a level lower than the Natural Reserve. In some cases there may be no, or minimal, non-forfeiture values only up to some specific age or policy duration (the "cliff"), with partial or full non-forfeiture benefits after that point. Premiums may be payable for the whole of life, or only to some age or for a limited period of years.

Lapse and interest are the two most significant assumptions for lapse-supported products. I will not get into any more specifics on the valuation techniques papers other than to say that they deal with the relationship between lapse rates, other assumptions and profitability or solvency. Some of the information that follows comes from the valuation techniques papers, and I would suggest to any of you who are interested in these products, to try to get a copy and read them through.

There are specific historical data available on T-100 products since they are relatively new phenomena. However, we can look at both historical lapse studies of other products and socio-economic factors to try to quantify what long-term lapse experience will be.

Comparing Term 100 to regular term and whole life, one could assume that since it seems to be a combination of both, the lapse rate assumptions should fall somewhere in between whole life and term. Beware, however, of other product features and marketing considerations that will affect lapse rates.

Product features that might affect lapse rates would include the length of time the policy is in force. The longer the policy is in force, the less likely it is to lapse. Why? Financial loss on lapse will increase with duration. The premium rate for an in-force policy looks more and more attractive compared to a new issue as duration increases. The T-100 products typically are level premium for life products. No cash value means no incentive to surrender policy to meet a cash need; on the other hand, no cash value means no automatic premium loan feature and no incentive to keep the policy in-force as a savings vehicle. Another product feature which was mentioned before is the presence of a "cliff" and an associated windfall cash value. Also, a return of premium rider is an incentive to keep your policy in force. Levelized commissions eliminate the agent's incentive to replace. Also, we have to look at the degree of loss to the policyholder on the lapse.

EFFECT OF LAPSE RATES ON PROFITABILITY: REINSURANCE VIEW

Here are some marketing considerations to look at: buyer sophistication, the permanent or temporary need for the insurance, review the quality of sale, lapse experience with large versus small policies, and how does size tie in with buyer sophistication. Another possible factor would be the possibility of a secondary market with sophisticated purchasers buying policies from people who do not realize the values inherent with their policies. Packages such as Term to 100, combined with an immediate life annuity, could be sold which could guarantee payment of T-100 premium.

Let's look at the effect of lapses on T-100 profitability (Graph 7). The product is loosely described as a level premium to age 65 subject to a minimum of 15 premiums. The plan endows at age 100. Cash values start at the end of the premium paying period thus creating a "cliff."

Let's look at the profitability of a T-100 product so described under differing ultimate lapse rates. The product was priced to make a profit of 9% of premium with an ultimate lapse rate of 5%. Assuming all other assumptions stay the same, the profitability will vary with the ultimate lapse rate as follows. An ultimate lapse rate much below 4% means a loss on the product. Conversely, a lapse rate much higher than 5% will result in very high profits.

It has been suggested that lapse rates and mortality are directly correlated (Graph 8). That is lower lapse rates lead to lower mortality; higher lapse rates lead to higher mortality. This graph shows the annual improvement in mortality needed to maintain the 9% profit level as ultimate lapse rates vary from 5%. For instance, we would have to assume a 2% annual mortality improvement forever if we wanted to use a 2% ultimate lapse rate. On the other hand, we could price in a 2% annual mortality deterioration if we assume a 7% ultimate lapse rate.

The relationships between lapse and interest rates are very similar (Graph 9). As we decrease our lapse assumption, we must increase our assumed investment return to maintain profit levels. Again, conversely, if we increase our ultimate lapse rate we can get away with a lower return.

MR. KRAYSLER: Could you go over a little bit more slowly just what is the relationship between mortality and lapses?

MR. JARDIN: On the left hand side of Graph 8 is the level of mortality improvement. Zero is what we have priced in the product assuming a 5% ultimate lapse rate which follows from this previous slide right here. Now as we decrease our ultimate lapse rate from 5% down toward zero as I said there are some studies as we heard before correlating mortality improvements with ultimate lapse rates. In this particular product in order to keep our profit as a percentage of premium at 9% level, we would have to include in our pricing a particular annual mortality improvement. Or we could build in a particular mortality deterioration if we expected lapse rates in excess of SYO. I am not really looking in this case at any theory behind the correlation between lapse rates and mortality improvement or deterioration. I guess I am really saying to try to correlate the two in terms of keeping profit at the same level of premium.

MR. KRAYSLER: In a recent mortality seminar, it looked like you could probably justify about a 1% long-term improvement after various adjustments were made between what I call the apparent improvements just because of a shift from smokers to nonsmokers. Therefore, if I assume a 2% improvement in mortality, are you saying that might be stretching it a little bit?

MR. JARDIN: Again, I don't want to comment on how much we could expect in respect to overall mortality improvement.

MR. POLKINGHORN: I think you were referring to the amount of mortality improvement expected in the industry given that the industry has so many lapses. I think what Gordon is saying is above and beyond that. If your mortality experience comes from a block of business that has a set of lapse rates say 20% grading down to four and you have a select and ultimate term product that has 30% level lapses, you would expect the mortality to get continuously worse and worse relative to that experience due to the specific population that you have which is not the general insured population. He is saying, conversely, that if you have a product that has zero lapses, you might say, if those people who went away were good lives and then the people who were staying are such good lives, then my mortality might be better. So I might have a 1% natural improvement in mortality that is already built in, and I might get something extra because I have very low lapses, not because the general population or the insured population is improving but
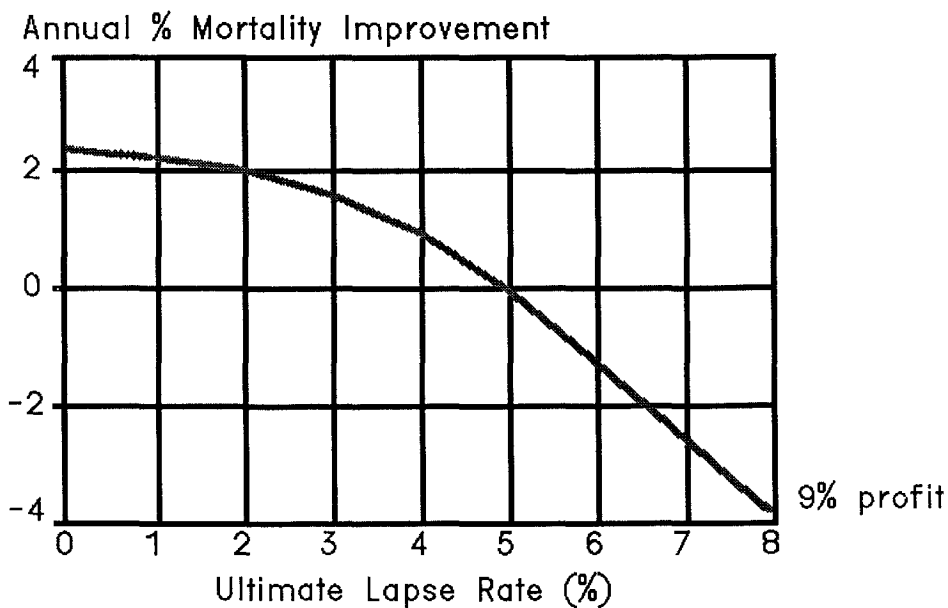
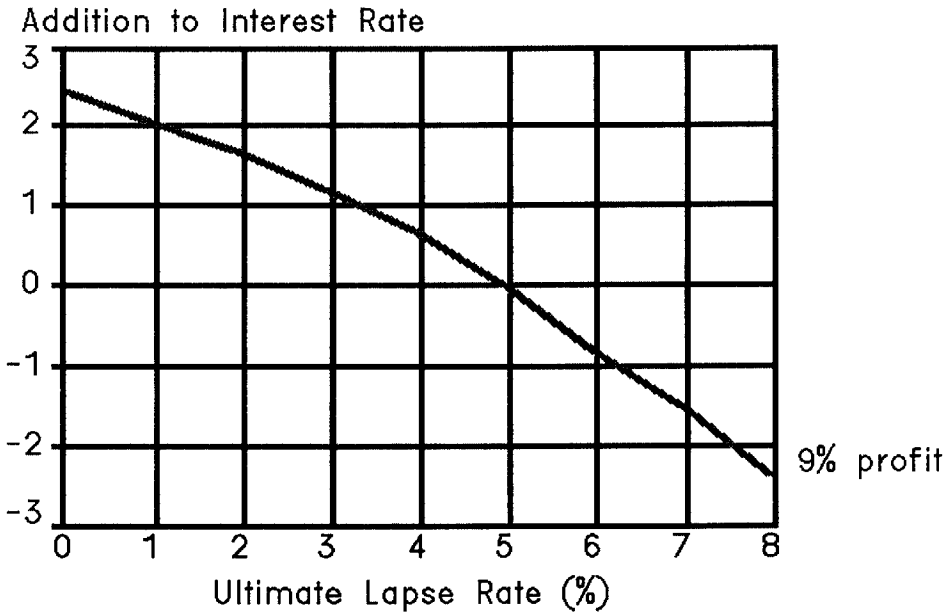# T-100 PRODUCT

Effect of Lapse Rate

on Profitability

Profit as % of Net Premium

Ultimate Lapse Rate (%)
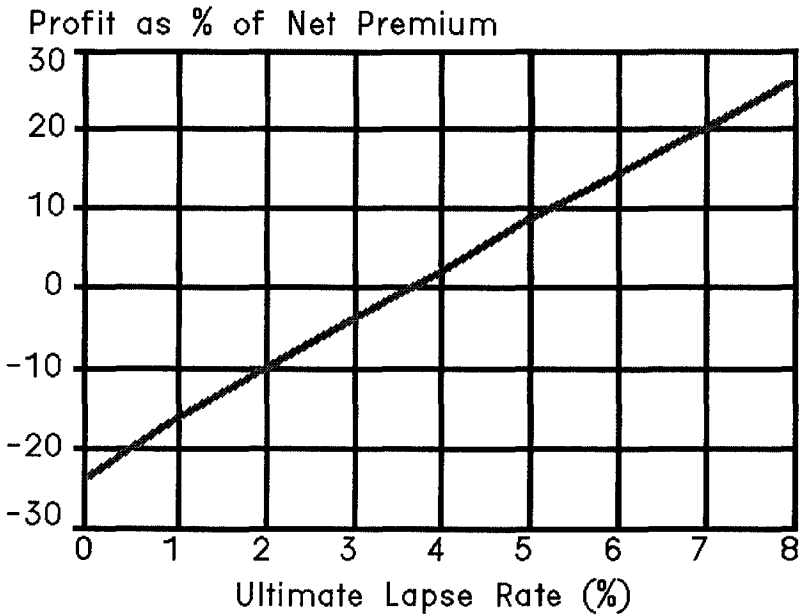
T-100 PRODUCT

Mortality Improvement

& Lapse Rate

Annual % Mortality Improvement

Ultimate Lapse Rate (%)

9% profit

T-100 PRODUCT

Interest & Lapse Rate

Relationship

Addition to Interest Rate

Ultimate Lapse Rate (%)

9% profit

because of my particular lapse situation. The graph was really sort of interesting because it went from a 2% improvement to a 2% deterioration. You can argue about it all day long, but I think it is within the realm of possibility that if this slide had showed 6% improvement and 6% deterioration, it would have been perhaps less worthwhile for the pricing actuary to consider.

MR. JARDIN: I think some of the information that the evaluation technique papers talked about as well is the relationship between your pricing assumptions and the overall mortality tables and how mortality tables have been affected by the underlying lapse rates of the business that were incorporated in the studies.

Now go back to Graph 9 on the relationship between ultimate lapses and the interest rates. If you had an ultimate lapse rate on this T-100 product of 2%, you would have to price in terms of your interest rate assumption a rate 1.5% higher in every year than what you would need at 5%.

Now let me talk about renewable term products.

MR. WINN: Gordon, before you begin on renewable term, what has been the effect of the technique papers on the marketplace for T-100 plans in Canada or is it too soon to tell?

MR. JARDIN: No, I don't think it is too soon to tell. Perhaps some people in the audience might be able to share some information even more than I could, but I would say it certainly has caused companies to build in a lot of these factors that we are looking at. You know, the "cliff" factor, and the recognition of what will happen if indeed your ultimate lapse rates are closer to zero than you had priced for in the first place. A substantial valuation reserve would be needed in that case to offset that additional risk.

Renewable term products in Canada usually have a renewal premium rate based on attained age only. The rate is the same as for new issues. Renewal date lapses can be split into lapses reflected in the underlying mortality table, additional lapses with the same mortality as all policyholders, additional lapses with newly select mortality, i.e., selective lapses.

When we look at single scale products, the following points are made. Healthy lives are more likely to lapse at renewal. Not only then, however. Selective lapses can take place at any duration. Mortality deterioration will increase with the selective lapse rate.

What is a selective lapse rate as defined in the techniques papers? The "Selective Lapse Rate" is the ratio of selective lapses to in-force business immediately prior to renewal. This rate will be affected by several factors which are mentioned in the valuation techniques papers, including premium increase at renewal, duration since last increase, 5-year versus 10-year, attained age or duration since issue: (It is felt that, as we go away from the original issue, the chance of lapsing is probably falling off as people continue paying their premiums.) Other factors are policy size, distribution system, market (upscale or not, again, looking at buyer sophistication), the incentive to an agent to lapse your product, your external market conditions at renewal, new product innovations in the marketplace (that will encourage your clients or agencies to replace policies), and the number of healthy lives remaining in the group. Obviously if all your healthy lives have left the group, your ultimate lapse rates are going to be low and conversion rates will vary also.

For those actuaries dealing with only the U.S. market, this question of "selective lapsation" on renewable term products in Canada pales in comparison to that of "Select and Ultimate" or "Reentry" products in the U.S.

I have some graphs to relate lapses and profitability on 5-year renewable product. Expenses have been leveled by duration since I did not feel comfortable making an expense assumption for reinsurers. Obviously, high first-year acquisition costs and high early lapses will hurt profitability. The product is a T5 renewable to age 70 convertible to age 65.

Graph 10 shows a 13% of premium profit assuming an ultimate lapse rate of 10% (renewal year lapse rates are 5% higher than ultimate lapse rates).

Profit actually increases, assuming no selective lapses, until we have an ultimate lapse rate of 15%. If we incorporate mortality deterioration, you can see the effect on profit. In Graph 11 on your
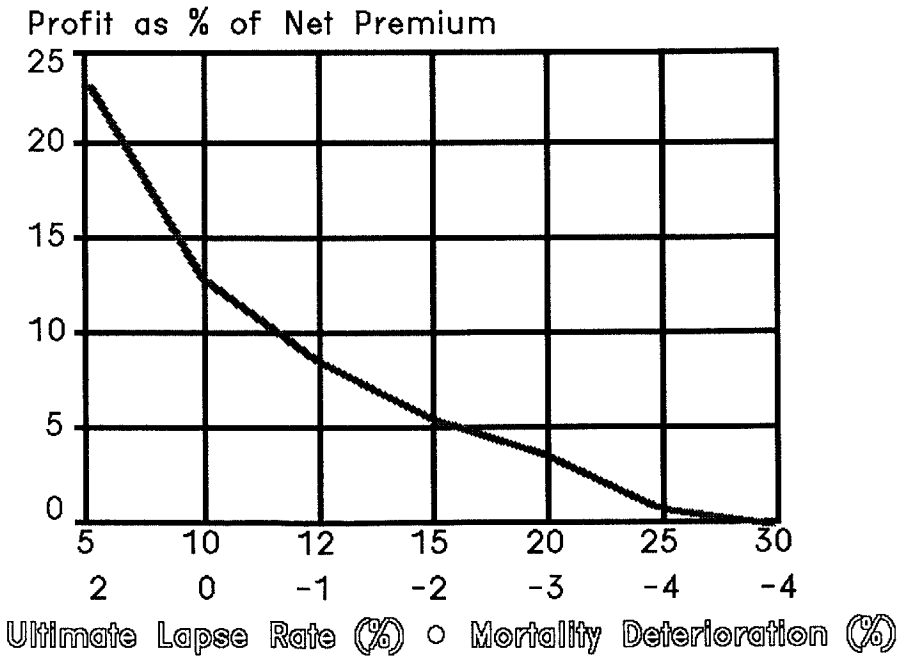
T 5 PRODUCT

Effect of Lapse Rate

on Profitability

Profit as % of Net Premium

Non-Renewal Year Ultimate Lapse Rate (%)
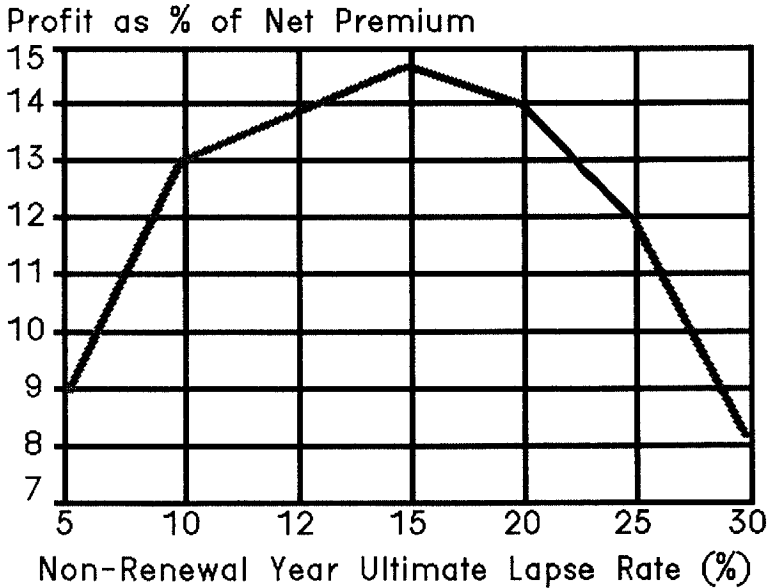
T 5 PRODUCT

Effect of Mortality

Deterioration

Profit as % of Net Premium

Ultimate Lapse Rate (%) ○ Mortality Deterioration (%)

horizontal axis you have a relationship between ultimate lapse rates and overall mortality deterioration. This is not a theoretically sound basis but just shows the combination of higher ultimate lapse rates and actual mortality deterioration. A 30% ultimate lapse rate combined with an annualized 4% mortality deterioration will produce a loss in this example.

MR. POLKINGHORN: I am wondering if many people have looked at total model office type projections under these lapse scenarios. I think one of the things we do not consider when we look at these high lapse scenarios is if your in-force business is running off at a fast rate, what is happening to your unit expenses? In the profit tests that we are doing, unit expenses go down as the units go down. In real life that is probably not going to happen, and especially, I think some of the direct writers may be sitting in situations where they really don't care what renewal lapse rates are because they make money off of lapses. I am just wondering if we have done some work to see if we make enough to cover the expenses that are left over that do not go away. I guess not.