

## EXCESS OF LOSS PREMIUM RATING

### Introduction

The purpose of this note is to demonstrate the part which actuaries can play in assisting underwriters to rate excess of loss business. I stress the word "assist" because it is important that we do not see ourselves as in any way replacing underwriters.

### Basic Approach

As with Life Assurance, the actuary's job is to construct a rating framework for the underwriter to do his rating. Such a framework would be built from an amalgamation of claims experiences and the rates so derived could be said to be representative of the whole portfolio.

So for example, a reinsurance company transacting Motor Excess of Loss business in the UK would have in its records the claims experience for all its ceding companies. Each one of these companies has been individually rated by the underwriter and the rating has been made on the company's own experience.

We know as actuaries that this is not an entirely satisfactory way of doing things since a bias can occur in the following manner.

1. Those companies who have had a light claims experience will negotiate strongly for a generous premium rate. But,
2. Those who have, for example, had a big claim which spoils their experience will argue that they should not be penalised too strongly because the large claim could have happened to any one company.

Now we know that in any large portfolio we must expect a certain number of "large claims". What we do not know is which ceding companies they will fall upon. Because of the bias mentioned above, there is the danger that nobody will end up paying for the large claims. That said, there is no guarantee that actuarial assistance will ensure that this happens either! What I tried to do in my previous job was to draw attention to this danger by confronting the underwriter with a set of Excess of Loss premium rates based on his whole portfolio.

So for example, if the underwriter who is about to rate treaty X arrives at a rate of 1.5% of company X's gross premium income, he would look at my rating framework and see that the rate for the same excess point and upper limit was say 3.2%; it would make him stop and think.

### Construction of Rating Framework

We suppose we have the following port folio of experience.

#### Motor Excess of Loss Treaties

Company	Excess Point £000	Upper Limit £000
A	15	100
B	25	150
C	10	50
D	50	250

Also we will have information over a number of underwriting years during which time companies will come and go, and inflation will be affecting the claims. Without making this note more complicated than it already is I would refer readers to the paper by Vernon Harding in JSS Vol. 17 where a more complete exposition will be found.

In combining the claims data it might be more helpful to look at it graphically as in the attached table.

It is clear from the start that we cannot use all the data. For example, since we have no information on the claims between 15 and 50 on Company D. We can only combine the experience of A and D by discarding all the claims between 15 and 50 in Company A! So it might be better to leave D out completely. The process which is rather time-consuming, consists in moving along the scale until we find that combination of companies which give the highest number of claims.

Once this is done we are eventually in possession of a truncated distribution.

In practice it has been found that a log-normal, or pareto (including some of Benktander's variations on the pareto!) can be used. We tended to use the log-normal since the book by Aitchison and Brown on the log-normal contains a helpful chapter on truncated distributions.

In an exercise, which it can be seen, I carried out some years ago, the following log-normal fit was obtained.

Size of Claim in 1968 terms	Number of Claims	"Expected Number"
3,346- 4,000	112	111
4,001- 5,000	109	108
5,001- 6,000	57	66
6,001- 7,000	46	43
7,001- 8,000	32	30
8,001- 9,000	20	21
9,001-10,000	23	16
10,001-20,000	49	55
20,001-30,000	12	10
30,001-40,000	4	4
40,001-	3	3
TOTAL	467	467

Once the characteristics of the whole range of the distribution have been derived we can calculate the mean and standard deviation and hence produce some net premiums. These are loaded for claims fluctuation, profit, expenses and commission (if any). The final table looks as follows.

	<u>Upper Limit</u>			
Excess Point	50,000	100,000	20,000	...
5,000				
10,000				
15,000				

I have naturally left out a goodly number of steps but hope I have succeeded in demonstrating that actuaries have a powerful part to play in the rating of Excess of Loss Business.

#### Conclusion

One last thought is that the process of building a working relationship with the underwriter based on his confidence in the actuary is something that can take a long while. The important thing is not to rush this process.



# RANGE OF COVER.

