REINSURANCE AND RETENTIONS

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REINSURANCE AND RETENTIONS

1.0 INTRODUCTION - It is as well to admit at the start that Reinsurance is such a vast subject that in the time available the working Party could barely scratch the surface. We deliberately set out to avoid constructing elaborate theories since these rarely have any practical applications. In particular the much-neglected field of Retentions can only be approached empirically in practice.

TERMS OF REFERENCE - We adopted the following as a guide to our work.

1.1 Reinsurance programmes for a direct office and how they work for particular lines of business.

1.2 Retention levels for direct offices in practice.

2.0 GENERAL REMARKS - Over many years, insurance and reinsurance experts have generated an amazing variety of forms of reinsurance cover to a considerable level of complexity. However when one thinks about it, the objectives of underwriters, claims managers and general management reduce to two basic aims.

2.1 to put a limit on the size of any particular claim.

2.2 to limit the aggregate amount paid in claims in any one year.

2.3 Actuaries are more used to thinking of these two aims in terms of Severity and Frequency respectively.

3.0 Because very little is known about the distribution of sums insured by size and even less about the independence or otherwise of the portfolio of risks carried by an insurer for any particular class of business, most of the mathematical theories have little or no relevance. Reinsurance programmes are put together on the basis of erring on the side of safety i.e. the underwriter and the claims manager want to sleep soundly at night! Retentions are determined by what is done at the moment and any proposal to increase the retention for a class of business is considered by reference to the growth in business and the most recent claims experience. Any increase in retention will certainly not be violent and the emphasis will be on gentle progressions at not too frequent intervals. Such practical studies as have been made tend to indicate that insurers are aware of each other's retentions for any particular class of business and it is not too surprising that one rarely sees a retention which is out of line with the general level.

4.0 The reinsurance programme has to satisfy the test of comprehensiveness; in other words when a bad claims experience comes along the operation of the reinsurance programme will leave the insurer in a reasonable financial state. One of the ways in which actuaries may be able to help here is in testing out the programme with different claims experience and it may be that there is scope for simulation techniques here. We are of course talking about how a reinsurance programme works and not about the ability or willingness of the reinsurer to pay up, although this is itself of crucial importance.

5.0 CAN ACTUARIES HELP? The quick answer is yes but only if we are careful how we apply any mathematical theories. Given the evolution of reinsurance over many years and the state it has now reached, it may be stating the obvious to say that it is vitally important for us to start with what is already done. In other words we have to analyse the existing framework and pattern of the reinsurance market and find out if we can how it works.

6.0 The main part of the work of the group was devoted to looking at the DTI returns in order to form some idea of the types of reinsurance cover. (Please note that the information was obtained from published DTI data and may not include any particular company's overseas business.)

It is apparent that in spite of the existence of many forms of esoteric reinsurance cover, most companies stick to the traditional types. Nevertheless it can be seen that in the case of the larger companies the reinsurance programme is fairly detailed and it is difficult to comprehend it at first glance. What we should be looking for is a way in which the programme can be tested. Is it possible for example to construct a model which "bombards" a company with claims so as to gauge the effect on the programme. This could take the form of testing for a large number of claims, or an unusual number of large claims or any other combination that could be thought of.

At the same time we could look at the effect of trying different retention sizes.

7. In appendix 1 we have examined a number of companies in order to get some idea of the scope and size of the problem. The graph shows an interesting relationship between the upper limit to the catastrophe covers and the size of the premium income. We refrain from drawing conclusions but merely comment that a graph like this constructed from actual cases might bear an interesting comparison with an exercise carried out using the theory of risk.

8. OTHER FORMS OF REINSURANCE The main interest lies in testing the effects of traditional reinsurance on the main classes of business, but we thought it might be instructive and fascinating to take a brief look at one of the more topical not to say controversial classes, namely Medical malpractice. In appendix 2 we give a brief outline of the problems and the attempts made to overcome them.

9. Finally we looked quickly at something which actuaries could well find themselves being asked to help with, namely the calculation of the value of an aggregate deductible.

10. CONCLUSION Actuaries are well placed to play a very useful part in the area of reinsurance and retentions but it is clear that what is required is a vast increase in the available data on insured values and claim sizes. A lot of practical work and analysis must precede the application of theory. We would do well to remember that very little is known about the independence of individual risks; moreover in the realms of catastrophe cover where natural disasters rule it is obvious that assumptions about independence break down not only within each class of business but between classes. Just think of the effects of a major earthquake in, say, San Francisco, on life policies, commercial buildings, houses, the aircraft on the ground at the airport, ships in the bay, and all those big motor cars!

APPENDIX I

PREMIUM SPLIT OF GENERAL INSURANCE BUSINESS BY DTI ACCOUNTING CLASSES

source:Forms 20,21 DTI RETURNS 1986
units £000s
20.19 = net earned premium (1 year business)
20.51 = net written premium (funded business)
21.29.1 = gross earned premium i.r.o business written in 1986
21.31.1 = gross earned premium i.r.o business written prior to 1986

notes
class 1 includes personal accident business
solvency margin calculated using 20.19+20.51 as proxy for net written premium

PREMIUM SPLIT OF GENERAL INSURANCE BUSINESS BY DTI ACCOUNTING CLASSES

accounting class			1	2	3	4	5	6	7	8	9	10
company name	item	summary	accident & health	motor vehicle	aircraft	ships	goods in transit	property damage	general liability	pecuniary loss	non-prop treaty	prop treaty
General Accident	20.19	867894	28400	334684		1167	8790	351811	93988	49054		
	20.51	78261			18837	20478	8343				21663	9105
	21.29.1		16320	197825		792	8164	211869	64268	28040		
	21.31.1		12938	145766		431	2009	162322	37961	25286		
Economic Insurance	20.19	7807	211	1539				3925	1147	985		
	20.51	623			50	-200	267				82	424
	21.29.1		239	254				2685	804	849		
	21.31.1		40	1430				1632	403	240		
Commercial Union	20.19	590314	39176	156694	2	7028	35053	262728	65522	24111		
	20.51	250299			18499	129842	29837				31767	40354
	21.29.1		30513	90245	4	5150	38117	177929	47158	31368		
	21.31.1		10573	71525	1	3294	4624	142100	25872	16633		
Black Sea & Baltic	20.19	2008	14	1501				372	51	60		
	20.51	2271			650	912	571					138
	21.29.1		16	1073				871	60	124		
	21.31.1		11	566				561	53	43		
Westgate Insurance	20.19	29441	7631	11337				473	3850	6150		
	20.51	30				3	1				9	17
	21.29.1		11024	10790				270	2278	4241		
	21.31.1		937	6990				246	1645	5221		
Guardian Royal Exchange	20.19	564831	6713	231383			1346	211494	96152	17743		
	20.51	116154			10951	22639	21048				21747	39769
	21.29.1		4636	125394			807	130312	65494	11834		
	21.31.1		2180	107071			584	87397	37761	7823		
Sentry Group	20.19	13114		12818				229	47	20		
	20.51	-2356	1		-615	3	1	-592	-1	768	-1723	-198
	21.29.1		2	18025				561	67	1039		
	21.31.1		2	8751				215	33	1071		
Legal and General	20.19	172381	864	36620				125967	9042	-112		
	20.51	4553			164	129	520				32	3708
	21.29.1		801	20314				90715	6140	2443		
	21.31.1		504	16909				51578	3581	314		
Pearl Assurance	20.19	77189	1873	18223			99	51082	3760	2152		
	20.51	25100			4237	12559	2700				2397	3207
	21.29.1		1110	9620			48	29097	1889	1453		
	21.31.1		801	8856			53	26146	2012	954		
United Friendly	20.19	53010	18677					34308	25			
	20.51											
	21.29.1		18677					27599	25			
	21.31.1							7075				
Prudential	20.19	452043	6386	160387			2225	225761	48620	8664		
	20.51	66210			7217	25354	8616			4592	1346	19085
	21.29.1		3877	91121			1086	143174	31840	9745		
	21.31.1		2898	74164			1168	120451	19309	5077		

PERCENTAGE SPLIT OF GROSS EARNED PREMIUM BY ACCOUNTING CLASS

DIRECT & FACULTATIVE BUSINESS ONLY i.e excludes reinsurance classes 9&10

accounting class company name	1 accident & health	2 motor vehicle	3 aircraft	4 ships	5 goods in transit	6 property damage	7 general liability	8 pecuniary loss	gross earned premium	proportion reinsured	solvency margin
General Accident	3%	38%	0%	0%	1%	41%	11%	6%	913991	5%	181%
Economic Insurance	3%	20%	0%	0%	0%	50%	14%	13%	8576	9%	82%
Commercial Union	6%	23%	0%	1%	6%	46%	11%	7%	695106	15%	114%
Black Sea & Baltic	1%	49%	0%	0%	0%	42%	3%	5%	3378	41%	81%
Westgate Insurance	27%	41%	0%	0%	0%	1%	9%	22%	43642	33%	33%
Guardian Royal Exchange	1%	40%	0%	0%	0%	37%	18%	3%	581293	3%	132%
Sentry Group	0%	90%	0%	0%	0%	3%	0%	7%	29766	56%	91%
Legal and General	1%	19%	0%	0%	0%	74%	5%	1%	193299	11%	73%
Pearl Assurance	2%	23%	0%	0%	0%	67%	5%	3%	82039	6%	89%
United Friendly	35%	0%	0%	0%	0%	65%	0%	0%	53376	1%	79%
Prudential	1%	33%	0%	0%	0%	52%	10%	3%	503910	10%	70%

Retention levels & limits of cover of selected Insurance companies.

Accounting class		2 MOTOR VEHICLE			
Company name	Cover description	net retention	Limit	a.o.r=0 a.o.e=1 both =2	premium payable 30.8+30.10
General Accident	Commercial Vehicle Excess of Loss	1000,	5000	0	15
	Accident Excess of Loss	5000	unlimited	0	396
Economic Insurance	Excess of Loss (includes gen liab)	50 (indexed)	unlimited	0	141
United Friendly	N/A				
Commercial Union	Accident Excess of Loss	500	unlimited	2	-23
	7.5% Quota Share,Singapore	35	107	0	80
	2.5% of 5%,Singapore	35	274	0	30
	Quota Share Excess of Loss Argentina	(low)	unlimited		243
	MultiLine Excess of Loss:				
	Philippines	174	917	1)	
	Japan	404	1307	1)	
	Hong Kong	268	1000	1)	11
	Singapore	287	972	1)	
	Other Territories	Various	Various		49
	Accident Excess of Loss	1000	unlimited	2	605
Black Sea & Baltic	Excess Loss (also Liabilty)	35	unlimited	2	126
	20% Quota Share	25	unlimited	2	8

Retention levels & limits of cover of selected Insurance companies.

Accounting class		2 MOTOR VEHICLE			
Company name	Cover description	net retention	Limit	a.o.r=0 a.o.e=1 both=2	premium payable 30.8+30.10
Westgate Insurance	Excess of Loss also Liability	250	unlimited		271
	Quota Share 35%				6151
	Excess of Loss also Liability		BC adjustment		53
Guardian Royal Exchange	Excess of Loss	1650	13825	1	192
Sentry Group	50% Quota Share		unlimited		13998
	Excess of Loss 85/6	125	unlimited		181
	5% Quota Share AA Business		unlimited		269
	Excess of Loss 86/7	150	unlimited		170
Legal & General	Excess of Loss	250	unlimited	2	520
	Quota Share		unlimited		1
Prudential	UK Motor & Liability Excess of Loss	1000	unlimited	2	873
	O/S Motor & Liability Excess of Loss	500	2000	1	106
	UAE Motor Excess of Loss	37000	unlimited	1	-2
	Canada Motor & Liability Excess of Loss	366	1831	0	1558
Pearl	Excess of Loss	275	unlimited	0	135

Retention levels & limits of cover of selected Insurance companies.

Accounting class		6 PROPERTY DAMAGE			
Company name	Cover description	net retention	Limit	a.o.r=0 a.o.e=1 both =2	premium payable 30.8+30.10
General Accident	Misc.Acc.Surplus	93	525	0	18
	Eng. Excess of Loss	1000	4000	0	345
	Acc. Excess of Loss	5000	20000	0	54
	Fire Per Risk Excess of Loss	5000	20000	0	1638
	Fire Cat. Excess of Loss	17250	65000	1	799
	Livestock	122	500	0	1609
Economic Insurance	Excess of Loss	100	500	0	248
	Excess of Loss	100	3000	1	185
United Friendly	Excess of loss	100	600	0	8
	Catastrophe Excess of Loss	350	3450	2	124
	Quota Share Travel 50%			0	31
	Quota Share Liability 50%			0	10
	Public Liability Excess of Loss	50	1000	2	12
	Employers Liability Excess of Loss	50	unlimited	2	22
Commercial Union	Group Excess of Loss	500	5000	2	32
	Fac/Home/Acc/Treaty	100	600	2	104
	Engineering Excess of Loss	500	15000	2	514
	Engineering/R.O.T.Fac/Oblig	500	1350	0	-1
	Engineering/Fac/Oblig/Swiss/Re	500	2500	0	-8
	Engineering	750	8250	0	767
	Worldwide Fire(Ex.U.S.A)	4000	20000	0)	
	Engineering/Treaty	1500	13500	0)	33425
	Group Excess of Loss	1000	10000	2	324
	Engineering/PAC/Oblig(Munich Re)	500	2500	0	0
	Group Excess of Loss	2000	100000	2	4959
	7.5% Lombard/Quota/Share/Singapore	various	various	0	115
	2.5%of5%Singpore/oblig/treaty	various	various	0	2
	Fire 1st surplus-Philippines				-4
	Fac/Oblig Philippines	various	various	0	23
	Jardine Thomson 1stSurplus	various	various	0	2
	MultiLine Excess of Loss:				
	PhilippinesA	434	1833	1	
	PhilippinesB	174	917	1	
	PhilippinesC	139	458	1	
	JapanA	808	2613	1	
	JapanB	404	1307	1)	
	JapanC	344	654	1)	
	HongKongA	536	2001	1)	160
	HongKongB	268	1000	1)	
	HongKongC	223	500	1)	
	SingaporeA	510	1943	1)	
	SingaporeB	287	972	1)	
	SingaporeC	239	486	1)	
	Other Terriories	various	various	1)	
		Not Know	Not Known	0	610
	AllRisks&Burglary,ACC,Fac/Oblig treaty	150/250	1000	2	182
	AllRisks&Burglary,ACC,PAC/Oblig treaty	312	936	2	241
	Home Foreign Fire Fac Oblig treaty	2000/250	2250	2	16
	Home Foreign Fire Surplus treaty	400/250	2400	2	122
	Fire Excess of Loss	250	1500	2	49
	Car&Engineering Surplus treaty Malawi	various	various	1	15
Black Sea & Baltic	50% Q/S	25	525	2	5
	30.625% Q/S	25	1025	2	28
	28.625% Q/S	25	1025	2	4
	14.125% Q/S	25	1025	2	-4
	18.225% Q/S	25	1025	2	7
	39.375% Q/S	40	1040	2	129
	37.375% Q/S	40	1040	2	87

Retention levels & limits of cover of selected Insurance companies.

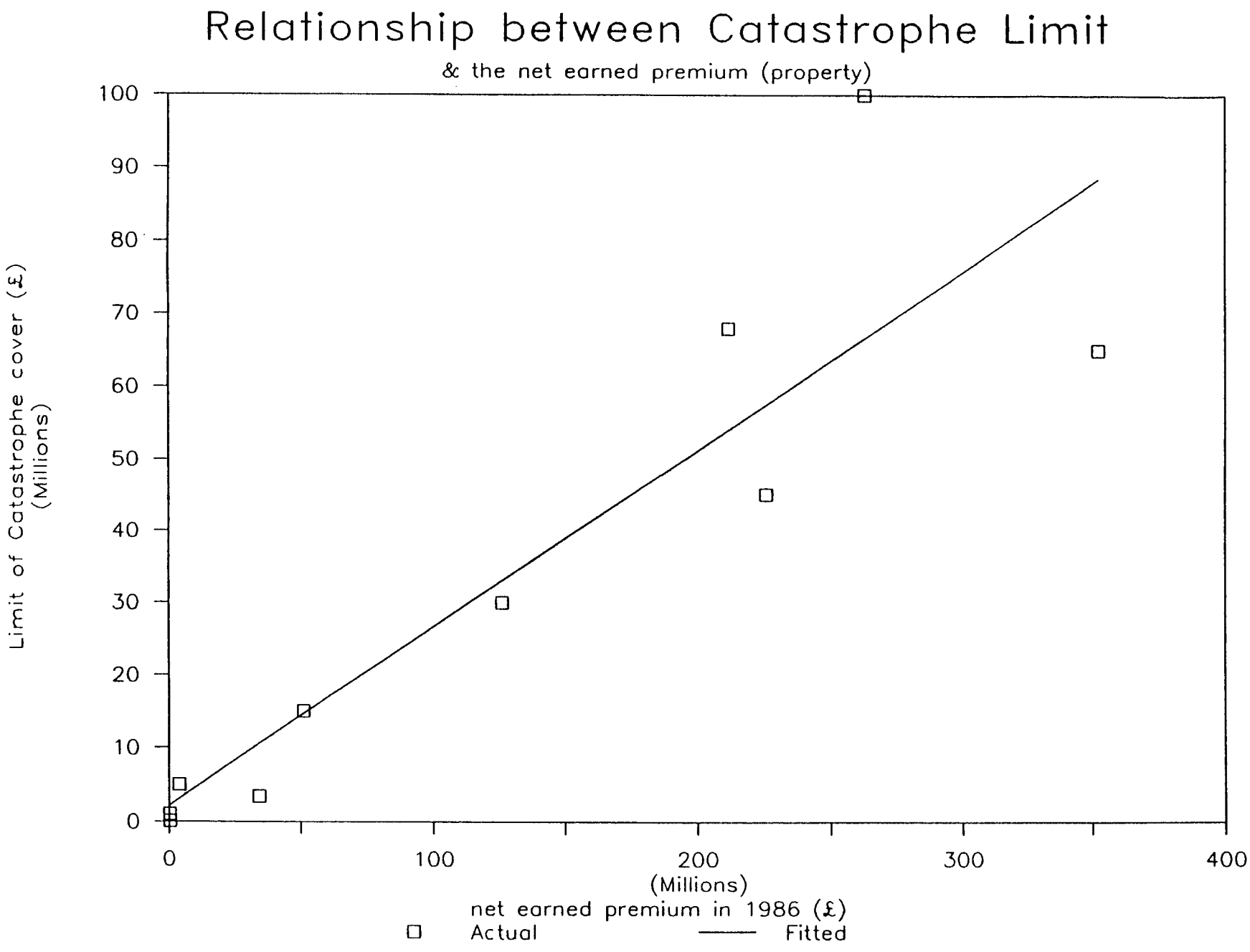
Accounting class		6 PROPERTY DAMAGE			
Company name	Cover description	net retention	Limit	a.o.r=0 a.o.e=1 both=2	premium payable 30.8+30.10
Westgate Insurance	All risks Musical Instruments X/Loss	10	75	1	7
Guardian Royal Exchange	Engineering Full Cover		100%		8
	Surplus	2500	10000		3502
	Surplus(TA)	250	1000		23
	Catastrophe Excess of Loss	10000	68000	1	1373
	Catastrophe Excess of Loss(85)	15000	85000	1	159
	Excess of Loss	1650	13825	1	51
	I.C.I.Excess of Loss	2100	21000	1	111
Sentry Group	Quota Shares 50% & 75%		Unlimited	0	794
	Excess of Loss	100	250	2	32
Legal & General	Quota Share Liability & Pecuniary Loss	100	1100	0	1223
	Fac/oblig	500	3200	0	300
	Surplus also acc,pec loss	1500	16500	0	10982
	Excess of Loss also acc,liab,pec loss	250	5000		223
	Fac/Oblig also pec loss	500	3200	0	107
	Excess of Loss also pec loss	15000	30000		376
	Excess of Loss,also acc,motor,liab,pec/l	82	182	2	62
	Excess of Loss,also acc,motor,liab,pec/l	100	1750	2	75
	Surplus also acc,pec loss	400	6400	0	8368
	Excess of Loss also pec loss	500	8000	1	190
Prudential	UK First & Second Surplus	1500	8300	0	9879
	UK Stop Loss	800	5800	0	98
	UK First & Second Surplus Excess of Loss		3753		56
	UK Facultative Obligatory	1500	3000	0	490
	UK 7.5% Quota Share	1500	4002	0	159
	UK & Eire 100% Quota Share	0	Unlimited	0	1283
	UK 100% Quota Share Intn. Oil Pool	0	600	0	707
	UK 100% Quota Share Atomic Energy Pool				160
	UK Prpty Dmge Catastrophe Excess of Loss	10000	45000	1	2204
	Overseas Priority Surplus	500	2500	0	10071
	Overseas Priority Surplus Excess of Loss	100	750	1	19
	Overseas Specified Surplus	60	660	0	2663
	Overseas Property Excess of Loss	3000	38000	1	433
	Europe Facultative Obligatory 1	150	750	0	-18
	Europe Facultative Obligatory 2	100	1715	0	20
	Home Foreign (HF) Engineering Surplus	125	625	0	203
	HF & Inward treaties Excess of loss	1500	4500	1	88
	HF Bloodstock/Livestock Excess of Loss	75	575	1	11
	HF Facultative Obligatory		388		1220
	Oman Engineering Treaty				4
	Oman Quota Share				26
	Prufrance Quota Share	370	2220	0	606
	PruGermany Facultative Obligatory	338	1353	0	10
	PruHolland Surplus	243	1213	0	1136
	Middle East Excess of Loss	1518	3710	1	51
	Canadian Surplus Treaty	488	976	0	4648
	Canadian 4% Quota Share		unlimited		3255
	Canadian Property Excess of Loss	244	5127	0	707
Pearl	Excess Loss Working Cover	500	5000	0	432
	Excess Loss Cat. Cover	1250	15000	1	519
	Excess Loss Cat.Drop Down Cover	625	1250	1	47
	Quota Share Engineering(100% reins'd)	0	unlimited		145
	Bloodstock Quota Share (1981 to 1986)		180		2874
	Excess of Loss retention 1984	4	45	2	2
	Excess of Loss retention 1985	5	45	2	11
	Catastrophe Excess of Loss 1986	20	140		13

SUMMARY OF MAIN REINSURANCE COVERS OF THE SELECTED GENERAL INSURANCE COMPANIES

source:Form 30 DTI RETURNS 1986
units :£000s

accounting class / company name	2 motor vehicle		6 property damage		
	cover description	Net Retention	cover description	Net Retention	Net Limit (Catastrophe only)
General Accident	Excess of Loss	5000	Excess of Loss - per risk	5000	
			Excess of Loss - Catastrophe	17250	65000
Economic Insurance	Excess of Loss	50	Excess of Loss - per risk	100	
			Excess of Loss - Catastrophe	100	5000
Commercial Union	Excess of Loss	1000	Excess of Loss - per risk		
			Fire exc. USA	4000	
			Engineering	1500	
			Excess of Loss - Catastrophe	2000	100000
Black Sea & Baltic	Excess of Loss	35	Various Quota Shares	25	1025
Westgate Insurance	Excess of Loss	250	Excess of Loss - per risk		
	35% Quota Share		Musical Instruments	10	75
Guardian Royal Exchange	Excess of Loss	1650	Surplus	2500	
			Excess of Loss - Catastrophe	10000	68000
Sentry Group	Excess of Loss	150	Quota Shares 50%,75%:£1M PML		
	50% Quota Share		Excess of Loss - per risk	100	
Legal and General	Excess of Loss	250	Surplus	1500	
			Surplus	400	
			Excess of Loss - per risk	250	
			Excess of Loss - Catastrophe	500	30000
Pearl Assurance	Excess of Loss	275	Excess of Loss - per risk	500	
			Excess of Loss - Catastrophe	1250	15000
			Quota Share - Bloodstock		
United Friendly	N/A		Excess of Loss - per risk	100	
			Excess of Loss - Catastrophe	350	3450
Prudential	Excess of Loss		Surplus		
	UK	1000	UK	1500	
	Canada	366	Overseas	500	
	Overseas	500	Canada	488	
			Excess of Loss - Catastrophe		
			UK	10000	45000
			Overseas	3000	38000

Note: The source of this information (DTI Returns) was in many instances unclear.
Data has sometimes been interpreted and in doing so may have given rise
to an improper presentation.


Relationship between Catastrophe Limit
& the net earned premium (property)
Limit of Catastrophe cover (£)
(Millions)
100
90
80
70
60
50
40
30
20
10
0
0
100
200
300
400
(Millions)
net earned premium in 1986 (£)
Actual
Fitted

EXAMPLE OF OPERATION OF A SURPLUS/EXCESS OF LOSS REINSURANCE PROGRAM

The insurance company in this simple example writes only fire and allied perils. The main function of the surplus treaty is to provide the company with capacity, whilst the excess of loss covers provide protection against large claims from either one loss (the working cover) or one event giving rise to a series of losses (the catastrophe cover)

The surplus cover is based on EMLs (Expected Maximum Loss). The definition of EML will vary by insurance company, depending on their assessment of the maximum damage. Clearly this is very subjective , and the ratio of EML to sum insured can be very different between insurers. However the use of EMLs is widespread as it provides the insurer with the opportunity to increase his net premium and his gross capacity.

Details of reinsurance programme

1.Surplus

Surplus #	Number of lines	Capacity (based on max retention)
First	9	$14,400,000
Second	5	$8,000,000

Surplus retention	$1,600,000
Implied EML	$24,000,000

The treaty has a table of limits as follows:-

Risk category	Surplus retention	
A	$1,600,000	The risk categories
B	$1,200,000	represent different
C	$1,000,000	building types
D	$800,000	
E	$600,000	
F	$400,000	

It is assumed that the treaty has a 'stop' on it of $22,400,000 (ie 14 x $1,600,000). If this were not the case then any gross claim exceeding an EML of $24,000,000 would still be shared in the ratios determined from apportioning the EML.

2.Working Risk Excess of loss(on surplus retention)

Deductible	$300,000
Cover	$1,300,000

3.Catastrophe Risk Excess of loss(on surplus retention)

Layer	Deductible	Cover
1	$1,000,000	$4,000,000
2	$5,000,000	$10,000,000
3	$15,000,000	$10,000,000

EXAMPLE 1:EFFECT OF USING DIFFERENT SURPLUS RETENTIONS ON SAME EML

Risk number	1	2	3	4	5	6
Risk category	A	B	C	D	E	F
Surplus retention	$1,600,000	$1,200,000	$1,000,000	$800,000	$600,000	$400,000
Sum insured	$55,000,000	$36,666,667	$27,500,000	$22,000,000	$18,333,333	$15,714,286
EML %	10%	15%	20%	25%	30%	35%
EML	$5,500,000	$5,500,000	$5,500,000	$5,500,000	$5,500,000	$5,500,000
Claim	$4,000,000	$4,000,000	$4,000,000	$4,000,000	$4,000,000	$4,000,000
Split of:-						
EML						
Gross Retention	$1,600,000	$1,200,000	$1,000,000	$800,000	$600,000	$400,000
First surplus	$3,900,000	$4,300,000	$4,500,000	$4,700,000	$4,900,000	$3,600,000
Second Surplus	$0	$0	$0	$0	$0	$1,500,000
Total to surplus	$3,900,000	$4,300,000	$4,500,000	$4,700,000	$4,900,000	$5,100,000
Total	$5,500,000	$5,500,000	$5,500,000	$5,500,000	$5,500,000	$5,500,000
Claim						
Gross Retention	$1,163,636	$872,727	$727,273	$581,818	$436,364	$290,909
First surplus	$2,836,364	$3,127,273	$3,272,727	$3,418,182	$3,563,636	$2,618,182
Second Surplus	$0	$0	$0	$0	$0	$1,090,909
CC Net retention	$300,000	$300,000	$300,000	$300,000	$300,000	$290,909
WXL any one risk	$863,636	$572,727	$427,273	$281,818	$136,364	$0
Proportion of claim paid by:-						
Ceding company	7.50%	7.50%	7.50%	7.50%	7.50%	7.27%
First Surplus	70.91%	78.18%	81.82%	85.45%	89.09%	65.45%
Second Surplus	0.00%	0.00%	0.00%	0.00%	0.00%	27.27%
WXL	21.59%	14.32%	10.68%	7.05%	3.41%	0.00%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

EXAMPLE 2:EFFECT OF USING DIFFERENT CLAIM/EML RATIOS

Risk number	1	2	3	4	5	6
Risk category	C	C	C	C	C	C
Surplus retention	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000
Sum insured	$75,000,000	$75,000,000	$75,000,000	$75,000,000	$75,000,000	$75,000,000
EML%	20%	20%	20%	20%	20%	20%
EML	$15,000,000	$15,000,000	$15,000,000	$15,000,000	$15,000,000	$15,000,000
Claim	$3,750,000	$7,500,000	$11,250,000	$15,000,000	$18,750,000	$26,250,000
Claim/EML	25.00%	50.00%	75.00%	100.00%	125.00%	175.00%
Split of:-						
EML						
Gross Retention	$1,600,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000
First surplus	$13,400,000	$9,000,000	$9,000,000	$9,000,000	$9,000,000	$9,000,000
Second Surplus	$0	$5,000,000	$5,000,000	$5,000,000	$5,000,000	$5,000,000
Total to surplus	$13,400,000	$14,000,000	$14,000,000	$14,000,000	$14,000,000	$14,000,000
Total	$15,000,000	$15,000,000	$15,000,000	$15,000,000	$15,000,000	$15,000,000
Claim						
Gross Retention	$400,000	$500,000	$750,000	$1,000,000	$1,250,000	$1,600,000
First surplus	$3,350,000	$4,500,000	$6,750,000	$9,000,000	$11,250,000	$14,400,000
Second Surplus	$0	$2,500,000	$3,750,000	$5,000,000	$6,250,000	$8,000,000
CC Net retention	$300,000	$300,000	$300,000	$300,000	$300,000	$300,000
WXL any one risk	$100,000	$200,000	$450,000	$700,000	$950,000	$1,300,000
Proportion of claim paid by:-						
Ceding company	8.00%	4.00%	2.67%	2.00%	1.60%	1.14% (but see note be
First Surplus	89.33%	60.00%	60.00%	60.00%	60.00%	54.86%
Second Surplus	0.00%	33.33%	33.33%	33.33%	33.33%	30.48%
WXL	2.67%	2.67%	4.00%	4.67%	5.07%	4.95%
	100.00%	100.00%	100.00%	100.00%	100.00%	91.43%

Notes:

Risk 5:The claim exceeds the EML, but is still apportioned in the same ratio as the 1 EML since the maximum capacity of the Surplus treaty (as determined by the 'stop' point) is not exceeded.

Risk 6:The claim exceeds the EML by a higher amount than in Risk 5 and the 'stop' point is exceeded.In this case the Surplus treaties are limited to $22,400,000. Unless the company has purchased EML error cover, it will have to pay the additional 8.57% of the claim (ie $2.25m).

In both cases there is likely to be an investigation as to why the EML was exceeded.

EXAMPLE 3:EFFECT OF A CATASTROPHE ON THE REINSURANCE PROGRAMME

Suppose an explosion at a site gave rise to the following 9 claims

AFTER SURPLUS

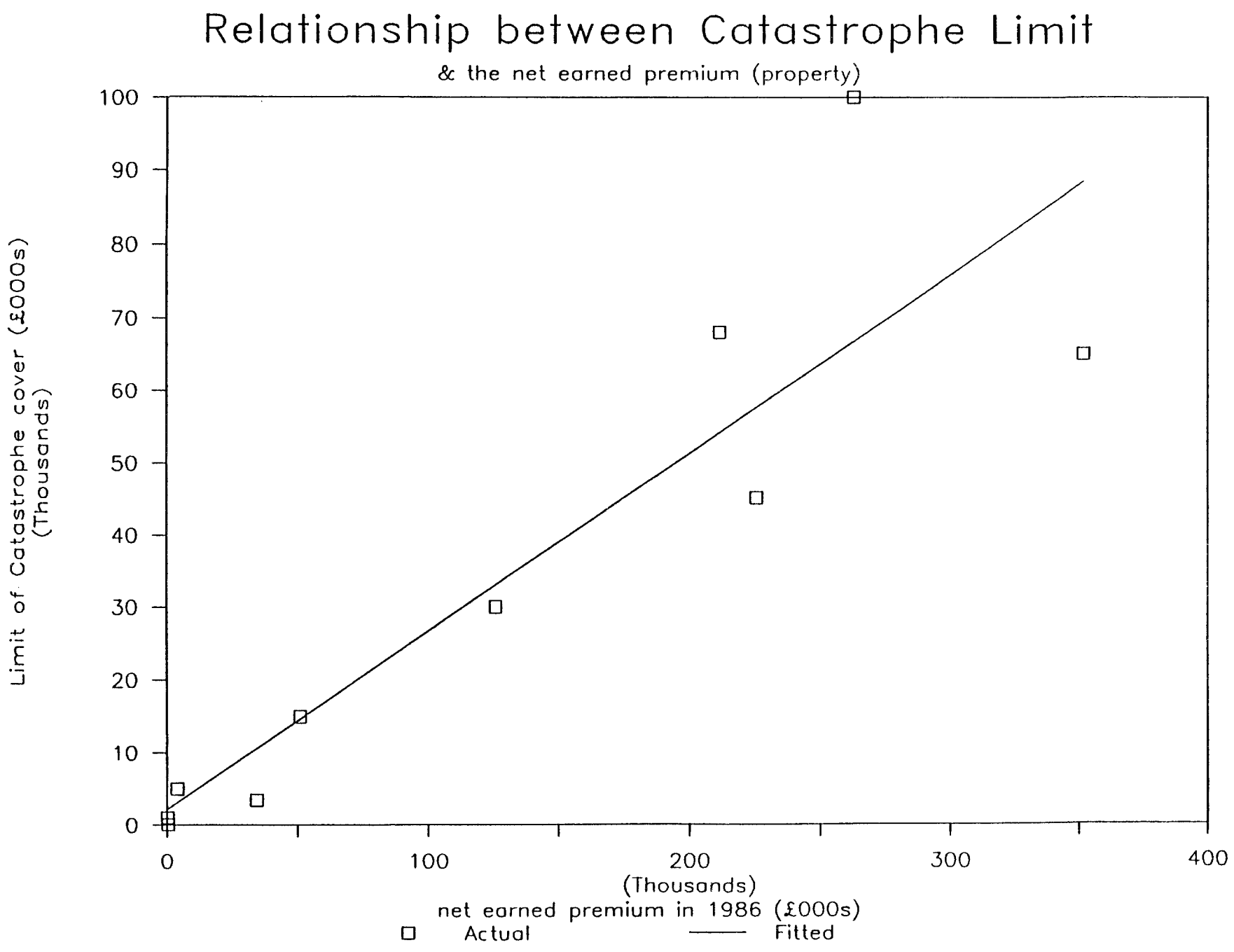
risk category	EML	CLAIM	CEDING COMPANY	1ST SURPLUS	NO. OF LINES
A	$12,000,000	$6,000,000	$800,000	$5,200,000	7.50
A	$10,000,000	$5,000,000	$800,000	$4,200,000	6.25
B	$8,000,000	$4,000,000	$600,000	$3,400,000	6.67
C	$8,000,000	$3,000,000	$375,000	$2,625,000	8.00
C	$6,000,000	$2,000,000	$333,333	$1,666,667	6.00
D	$3,000,000	$2,000,000	$533,333	$1,466,667	3.75
E	$2,000,000	$2,000,000	$600,000	$1,400,000	3.33
F	$1,800,000	$2,000,000	$444,444	$1,555,556	4.50
F	$1,000,000	$1,500,000	$600,000	$900,000	2.50
TOTAL		$27,500,000		$22,413,889	

AFTER WXL

risk category	EML	CLAIM	CEDING COMPANY	WXL
A	$12,000,000	$6,000,000	$300,000	$500,000
A	$10,000,000	$5,000,000	$300,000	$500,000
B	$8,000,000	$4,000,000	$300,000	$300,000
C	$8,000,000	$3,000,000	$300,000	$75,000
C	$6,000,000	$2,000,000	$300,000	$33,333
D	$3,000,000	$2,000,000	$300,000	$233,333
E	$2,000,000	$2,000,000	$300,000	$300,000
F	$1,800,000	$2,000,000	$300,000	$144,444
F	$1,000,000	$1,500,000	$300,000	$300,000
TOTAL			$2,700,000	$2,386,111

AFTER CATASTROPHE	CEDING COMPANY	$1,000,000
	CATASTROPHE REINSURER	$1,700,000

The per risk excess of loss reinsurer, and indeed the surplus reinsurer may impose limits on the amount paid out for an event.


Relationship between Catastrophe Limit
& the net earned premium (property)
Limit of Catastrophe cover (£000s)
(Thousands)
100
90
80
70
60
50
40
30
20
10
0
0
100
200
300
400
(Thousands)
net earned premium in 1986 (£000s)
Actual
Fitted

Notes on Medical Malpractice Programmes

Introduction

Physicians and surgeons in the U.S.A. have to buy insurance cover for malpractice claims against them. There are a number of factors contributing to high frequency and severity of claims e.g.

1) A greater propensity by Americans to sue for damages.

2) A long history of successful actions.

3) The high coverage bought by doctors means high damages can be claimed (a catch-22 situation).

4) The law is such that it easier to attach blame to a doctor.

5) Awards decided by jury.

6) Contingency fees, the attorney being paid up to 30% or more of the claim for a successful case.

7) Joint and several liability may be applied meaning that if the doctor is only, say, 10% to blame, he can still be made to pay 100% of the claim.

Because of the rising costs of claims and the long time that can occur before a case is reported and again before it is paid, there was a period in the late 70's and early 80's when claims were far in excess of premiums. Rates charged by insurance companies increased dramatically with companies trying to recoup their losses and a number of insurers and reinsurers stopped writing this class of business. The main effect of this was the emergence of a fair number of doctor-owned companies insuring their own members. Because of the large possible size of some of the claims, reinsurance of these doctor companies was required. As the U.S.A. companies offering medical malpractice reinsurance are those the doctors felt compelled to leave originally there was a tendency to look elsewhere for reinsurance. London was a natural place to look and so much of this reinsurance is now placed in London.

Because the doctor companies are reliant on their reinsurance arrangements to remain solvent the way in which they insure their members is in part dictated by the reinsurers' requirements. The structure of the insurance is that a doctor buys primary cover which may cover him for up to, say, $100,000 for a family physician or $1,000,000 for a surgeon or gynaecologist. If the doctor then requires further cover he will buy excess reinsurance (in layers e.g. $1m xs $1m, $3m xs $2m, $5m xs $5m). The reinsurance arrangements are described below.

The other effect of rising rates and the difficulty in

obtaining reinsurance is the move to claims made. I.e., whereas most medical malpractice business was on an occurrence basis (with coverage in the policy period for claims occurring in that period whenever they might be reported) almost all of the business is now on a claims made basis (with coverage only for claims reported in the policy period). For the first year of a claims made policy this gave a large reduction in premium (up to 40% of the occurrence rate being for just claims occurring and reported in the policy period). The mature claims made rate is usually around 85% of the occurrence price.

Reinsurance Programmes

The typical medical malpractice programme comprises:

1. **Primary Layer.**

For the first layer the deductible can vary widely between insurers. This is often for the primary coverage of the insureds for primary limits up to $1 million. In this case, if the upper limit is above $1 million then the coverage above $1 million is for clash (i.e. 2 or more physicians or surgeons involved in the same claim) and possibly for E.C.O. (extra contractual obligations). However, E.C.O. is sometimes covered under a separate policy.

The layer is usually swing-rated, i.e. with the premium expressed as a factor of the incurred claims (e.g. 100/70 x incurred claims) subject to minimum and maximum premium rates usually expressed as percentages of subject premium income.

This layer may have an aggregate deductible, with the reinsured paying the first few claims (to reduce ceded premium).

There may also be coinsurance with the reinsured keeping 5% or 10% of the layer himself.

If the layer is indexed this is a fairly simple application i.e. the layer is expressed as the difference between a deductible and an upper limit and a simple index is applied to the deductible e.g. the difference between $275,000 and $1,000,000 with the deductible increasing by $25,000 per annum and applying when the first instalment of a claim is paid.

2. **Excess Layers**

The insured can buy cover above the $1m. primary level in layers of e.g. $1m. xs $1m., $3m. xs $2m. and $5m. xs $5m. The rate charged to the insured is expressed as a percentage of the primary rate by doctor or surgeon category. Reinsurance is usually by Excess Cession i.e. the rate being that charged to the insured plus an over-riding commission of perhaps 30%. This is therefore proportional cover of non-proportional cover, and is often classed as proportional business upsetting development statistics if it is not separated from true proportional business.

Notes on Medical Malpractice Programmes

Cedant :- Norcal Mutual Insurance Co.

4.5m xs 0.5m	Swing-rated & indexed
10m xs 5m	Excess of Loss

Cedant :- Physicians Insurance Exch. of Ohio

£	2m xs 0.2m	Swing-rated & indexed
	1m xs 1m	1st excess cession
	4m xs 2m	2nd excess cession
	1m xs 6m	3rd excess cession

Cedant :- Utah Medical Insurance Assoc.

0.725m xs 0.275m	Swing-rated
1m xs 1m	1st excess cession
3m xs 2m	2nd excess cession

Cedant :- Nat. Cap. Reciprocal

1.7m xs 0.3m	Agg. ded. $2m:Swing-rated
3m xs 2m	Excess Cession

Cedant :- Medical Inter-Insurance Exch. of New Jersey

*	2.65m xs 0.35m	Swing-rated
	1m xs 1m	Excess cession
	3m xs 2m	Excess cession

Cedant :- Medical Mutual Liability of Maryland

*	1.65m xs 0.35m	Swing rated x/l treaty
	1m xs 1m	Excess cession
	3m xs 2m	Excess cession

* These policies have maximum policy limits of $1m.
£ This policy has a maximum policy limit of $1.2m., but the top $0.2m. of this is for E.C.O.

APPENDIX III

GISG REINSURANCE AND RETENTIONS WORKING PARTY

PRACTICAL PRICING: VALUE OF AN AGGREGATE DEDUCTIBLE

The following notes provide two approaches to assessing the value of different levels of aggregate deductibles under certain conditions. The approaches are illustrated by two examples.

Definitions / Assumptions

Undiscounted claims = $10.0m (assumed value)

1. Let A = Aggregate deductible -- various levels
2. d = Present value factor applicable to the reinsured losses = .740 at 6% interest
3. d'= Present value factor for the aggregate deductible
4. b = Brokerage factor = 1/0.9
5. p = Profit margin factor = 1/0.95
6. Claim payment pattern:

Year	% paid	Present Value
1	1.1	0.011
2	5.1	0.047
3	10.0	0.086
4	14.2	0.116
5	16.6	0.128
6	16.2	0.118
7	13.8	0.094
8	10.2	0.066
9	6.4	0.039
10	3.6	0.021
11	1.8	0.010
12	1.0	0.005
Total	100.0	0.740

Using the assumptions listed above, the reinsurance premium can be calculated as :

Discounted claims	= 10.0 * 0.740	= 7.40m
Premium allowing for brokerage	= 7.40 / 0.9	= 8.22
Premium allowing for profit	= 8.22 / 0.95	= 8.65

EXAMPLE 2

Consider the case where the aggregate deductible is similar to the expected claim cost under the reinsurance contract - ie where the claims may or may not exceed the deductible. The value of the aggregate deductible now depends on the probability distribution of the total claims under the reinsurance contract.

Suppose the aggregate deductible is equal to the expected claim cost ($10m as in Ex. 1) and also assume that the claim cost has the following distribution:

Pre-aggregate:

Claim Amount	Probability	Expected Amount
18.0	0.02	0.36
15.0	0.05	0.75
12.5	0.07	0.88
10.5	0.10	1.05
10.0	0.20	2.00
9.5	0.18	1.71
9.0	0.15	1.35
8.5	0.12	1.02
8.0	0.11	0.88
Total	1.00	10.00

Standard deviation = 1.9742

Post-Aggregate:

Claim Amount	Probability	Expected Amount
6.0	0.02	0.12
5.0	0.05	0.25
2.5	0.07	0.18
0.5	0.10	0.05
0.0	0.76	0.00
Total	1.00	0.595

Standard deviation = 1.4417

The above estimated cost of $0.485m after the $10m aggregate deductible needs to be loaded for brokerage and profit/contingency and discounted for investment earnings to arrive at the premium :

One approach to the contingency load is to use a percentage of the standard deviation of the post-aggregate claims distribution:

Contingency load = 1.4417 * .25 (25% of the standard deviation
= .360
= 60.5% of expected claims (.595m)

Discount factor-- examination of the claim payment pattern indicates a mean term of around 10 years and this gives a discount factor of 0.558 at 6% interest.

Discounted premium = (0.595 + .360) * .558
= 0.955 * .558 = .533m

Loading for brokerage: .533 / .90
= 0.592m

= premium required to cover expected claim cost of $10m with an aggregate deductible of $10m