Letter To Mr. Fisher
From Mr. Feldblum
Dated 4/27/87

Dear Mr. Fisher,

I received your letter of April 21 contrasting the two procedures of dividing a multiple claimant loss between the ceding and assuming insurers on a non-proportional reinsurance contract with an indexed retention. You note that the ratio of settlement value to discounted value of the loss payments is the same for the ceding and assuming insurers using Ferguson's procedure, but differs in the revised procedure that I suggested.

Inflation, however, is a time-dependent concept; it considers both the nominal value of a given object at two points of time, as well as the length of time between those points. For instance, suppose a given object sells for $100 at time A and for $120 at time B. If A and B are separated by 2 years, then inflation is 9.5% per year; if there are five years between A and B, then inflation is 3.7% per year.

Thus, to examine the effect on inflation on the ceding and assuming insurers, one must look at the annual rate of inflation experienced by each. The exhibits in your letter are reproduced below, with the annual rate of inflation added.

Original Procedure:	Real Dollars	Nominal Dollars	Ratio	Average Time to Settlement	Annual Rate of Inflation
Primary insurer	50,000	82,372	1.647	4.45 years	11.9%
Reinsurer	56,234	92,628	1.647	6.00 years	8.7
Revised Procedure:					
Primary insurer	50,000	75,508	1.510	4.32 years	10.0%
Reinsurer	56,234	99,492	1.769	6.00 years	10.0

Figure 1. Annual rates of inflation experience by ceding and assuming insurers

To calculate average time to settlement for the primary insurer, I have used both discounted and nominal values of loss payments. The annual rate of inflation is equal to

ratio (of nominal to discounted values) ** (1 / average time to settlement)

Since "ratio" is a mixture of nominal and discounted values, I have determined the average time to settlement using both nominal and discounted values, and then used the average of these. Thus, for Ferguson's procedure, the primary insurer pays $10,000, $15,000, and $57,372 at 1, 2, and 6 years, respectively. These yield discounted values for the loss payments of $9,091, $12,397, and

$32,385, using a 10% discount rate. The average time to settlement is 4.66 years using the nominal values as weights, and 4.24 years using the discounted values as weights, for an average value of 4.45 years. Using the revised procedure, the nominal value of the third payment is $50,508, yielding a discounted value of $28,510. The average time to settlement is 4.54 years using the nominal values as weights, and 4.10 years using the discounted values as weights, for an average value of 4.32 years. There are other methods of determining an "average time to settlement," but the conclusion would not change: using Ferguson's method, the primary insurer experiences a significantly higher rate of inflation than the reinsurer does.

I have based the above description upon the ratio of nomical to real values used in your exhibits. In truth, this ratio is not really meaningful, since it does not take into consideration the time of each payment. Instead, financial theory currently recommends calculating the internal rate of return of each cash flow stream; this is shown in Figure 2.

Original procedure - paid by primary insurer:

Year	Nominal Payment	Time to Settlement	Internal Rate of Return	Real Value	Internal Rate of Return	Real Value
1975	10,000	1 year	11.9%	$ 8.937	12.0%	$ 8,929
1976	15,000	2 years	11.9	11,979	12.0	11,958
1980	57,372	6 years	11.9	29,223	12.0	29,067
Total:				$50,139		$49,953
		- paid by reinsurer:				
1980	92,628	6 years	8.6%	$56,463	8.7%	$56,152

Revised procedure - paid by primary insurer:

Year	Nominal Payment	Time to Settlement	Internal Rate of Return	Real Value	Internal Rate of Return	Real Value
1975	10,000	1 year	9.9%	$ 9,099	10.0%	$ 9,091
1976	15,000	2 years	9.9	12,419	10.0	12,397
1980	50,508	6 years	9.9	28,667	10.0	28,511
Total:				$50,185		$49,998
		- paid by reinsurer:				
1980	99,492	6 years	9.9%	$56,468	10.0%	$56,161

Figure 2. Internal Rates of Return for ceding and assuming insurers

Using the original procedure, the internal rate of return is approximately 12.0% for the primary insurer but only 8.7% for the reinsurer. Using the revised procedure, the internal rate of return is 10.0% for both insurers. Clearly, the

cash flow that produces the same internal rate of return for the two insurers is the one that equitably shares the effects of inflation.

Sholom Feldblum

cc: R. Ferguson
S. Philbrick
S. Lehmann