New Products—Uncertainty of Cost, Measurement and Control of Risks, and Implied Profit Martins

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I. INTRODUCTION

It is often the case that a company writing a new product will not be able to precisely estimate the cost of the product and will not fully understand some of the characteristics of the product. These aspects of a new product entail risks not found in a mature well understood insurance coverage. One purpose of this paper is to explore the risks in a practical manner and to measure the extent of the risk. A second objective of the paper is to investigate some of the ways the risk can be controlled. Finally, the preceding will be used to point to needed profit margins in writing new products.

Much of the risk generated by writing a new product results from the accumulation of liabilities before the characteristics of the product reveal them as expressed in the loss emergence patterns. By the time loss development is well understood a company may have underwritten unrecognized liabilities that can threaten the company with financial ruin. One of the hypotheses explored in the paper is that liabilities with longer emergence patterns can be more of a threat to the company than products with more rapid emergence-investment income generation not withstanding. This argues for higher target profit margins.

II. OUTLINE OF STUDY

A. Product Pricing

As noted above the approach used here will be practical as opposed to purely theoretical. One example each of a slow loss emergence line of business and a medium loss emergence line of business will be studied. In each case two assumptions will be made in terms of pricing. First it will be assumed that the company has made a reasonably good estimate of the underlying cost of the product. Next it will be assumed that the company has significantly underestimated the cost of the product but has priced the product in such a way that there should be a small profit on a discounted cash flow basis.

B. Loss Reserving

It will be assumed that the product, being new, does not have a large historical data base on which to rely for precise loss reporting patterns. It will also be assumed that the actuary has chosen a given emergence pattern and an estimate of the underlying loss cost. These will be used in a Bornhuetter-Ferguson method to estimate the required reserve. Finally, it will be assumed that the actual loss emergence pattern is somewhat slower than the estimated emergence pattern. The problems associated with failure to fully understand this characteristic of the line of business will be explored.

C. Dividend Policy

There is a universal temptation to reap the profits of apparently successful underwriting. As part of the set of assumptions underlying these examples it will be assumed that the company pursues an aggressive dividend policy. Recorded profits over and above that needed to maintain a reasonable premium to surplus ratio will be withdrawn from the company. It will be shown throughout the examples that such a policy can imperil the existence of the company. The study also will indicate how long the company's managers should wait before beginning to withdraw profits.

D. Profit Margins

Uncertainty of underlying costs when marketing a new insurance product imposes risk not associated with mature products where the underlying costs and characteristics are more thoroughly understood. This implies that the underwriting company deserves a higher rate of return for a new product. In addition the company should choose a target profit margin that is high enough to absorb errors of underpricing in the early years of product development. Intuitively the profit margin should also reflect the degree of uncertainty. Thus the profit margin for a slow emergence line should be set higher than that for a line of business in which the losses emerge more rapidly.

E. Control of Risks

In addition to targeting reasonably high profit margins and pursuing a moderate policy of extracting profits there are other controls that the company can employ to safe guard its financial well being. These would include writing only a moderate level of premiums in relation to surplus, reinsuring a part of the risk and/or pursuing a conservative loss reserve strategy.

III. LINES OF BUSINESS WITH SLOW LOSS EMERGENCE PATTERNS

A. Actual versus Expected Emergence Patterns

In the following it will be assumed that the company has chosen a reasonably conservative estimate of loss emergence to use it its loss reserving. However, it has also been assumed that the actual loss emergence pattern will also be somewhat slower than the expected. The actual and expected loss emergence patterns as well as the actual loss payout pattern are shown in Table 1.

TABLE 1

Period	Expected Loss Emerg. Pattern	Actual Loss Emerg. Pattern	Actual Loss Payout Rates
AY + 0	10%	8.0%	5.6%
AY + 1	20%	16.4%	11.8%
AY + 2	25%	21.6%	16.5%
AY + 3	20%	19.2%	16.5%
AY + 4	10%	11.1%	11.1%
AY + 5	5%	6.3%	7.2%
AY + 6	4%	5.6%	7.1%
AY + 7	3%	4.7%	6.7%
AY + 8	2%	3.8%	6.6%
AY + 9	1%	1.6%	5.4%
AY + 10	0%	0.9%	3.3%
AY + 11	0%	0.8%	2.2%

B. Accurate Estimate of Ultimate Loss

1. Analysis of Loss Reserving Variances

In this scenario it will be assumed that the company has been able to accurately estimate the ultimate loss cost. For simplicity purposes the loss cost has been set equal to 100,000 with expenses being 20,000 and a premium of 120,000. In this situation the company is relying on investment income to supply profits.

A version of the Bornhuetter-Ferguson method is used to estimate the required IBNR reserve. In this version IBNR = (Expected Losses) x (Expected Percent of Losses Unreported). This gives rise to the estimated IBNR reserves at given points in time as an accident year matures. The calculated reserves are displayed in Table 2. A comparison of the estimated reserves and the required reserves for a given accident year at any point in time is presented in Table 3.

TABLE 2

Period	Expected Loss Emerg. Pattern	Percent	Expected Unreported Reserve	Estimated IBNR
AY + 0	10.0%		90.0%	90,000
AY + 1	20.0%		70.0%	70,000
AY + 2	25.0%		45.0%	45,000
AY + 3	20.0%		25.0%	25,000
AY + 4	10.0%		15.0%	15,000
AY + 5	5.0%		10.0%	10,000
AY + 6	4.0%		6.0%	6,000
AY + 7	3.0%		3.0%	3,000
AY + 8	2.0%		1.0%	1,000
AY + 9	1.0%		0.0%	0

The carried reserves and the deficiencies are shown in Table 3.

Table 3

Period	Estimated IBNR Reserve	Cumul. Reported Losses	Cumul. Paid Reserves	Required Deficiency	
AY + 0	90,000	8,000	5,600	92,400	2,000
AY + 1	70,000	24,400	17,400	77,000	5,600
AY + 2	45,000	46,000	33,900	57,100	9,000
AY + 3	25,000	65,200	50,400	39,800	9,800
AY + 4	15,000	76,300	61,500	29,800	8,700
AY + 5	10,000	82,600	68,700	23,900	7,400
AY + 6	6,000	88,200	75,800	18,400	5,800
AY + 7	3,000	92,900	82,500	13,400	4,100
AY + 8	1,000	96,700	89,100	8,600	2,300
AY + 9	0	98,300	94,500	3,800	1,700
AY + 10	0	99,200	97,800	1,400	800
AY + 11	0	100,000	100,000	0	0

Notes: Cumulative Reported Losses = (Cum. Actual Emergence %) x Loss Cost
Cumulative Paid Losses = (Cum. Actual Paid %) X Loss Cost
Required Reserves = Loss Cost minus Cum. Paid Loss
Deficiency = Required Reserve - (Est. IBNR Reserve + Cum. Rep. - Cum. Paid)

In this example the actual emergence pattern and the expected emergence pattern are not markely different, particularly when compared in the context of loss development factors. The factors are displayed in Table 4.

TABLE 4

Period	Expected Cumul. Emerg. Pattern	Expected Development Factors	Actual Cumul Emerg. Pattern	Actual Development Factors
AY + 0	10.0%	N/A	8.0%	N.A.
AY + 1	30.0%	3.000	24.4%	3.050
AY + 2	55.0%	1.833	46.0%	1.885
AY + 3	75.0%	1.364	65.2%	1.417
AY + 4	85.0%	1.133	76.3%	1.170
AY + 5	90.0%	1.059	82.6%	1.082
AY + 6	94.0%	1.044	88.2%	1.068
AY + 7	97.0%	1.032	92.9%	1.053
AY + 8	99.0%	1.021	96.7%	1.041
AY + 9	100.0%	1.010	98.3%	1.016
AY + 10	100.0%	1.000	99.2%	1.009
AY + 11	100.0%	1.000	100.0%	1.008

With the factors in the early years being so similar it would be hard to fault the person setting the reserves for not recognizing any potential deficiency until perhaps the end of the fifth year. By that time it can be too late to repair the damage under certain circumstances as will be seen shortly.

Before leaving the question of loss reserving it should be noted that in this situation a Schedule P-type analysis will indicate a redundancy in the reserves for the first several years. This type of analysis is shown in Table 5.

Table 5

Incurred Loss & LAE Reported at Year End

Year in which Losses were Incurred	1995	1996	1997	1998	1999	One Year Dev.	Two Year Dev.
1995	98,000	94,400	91,000	90,200	91,300	1,100	300
1996	xxxx	98,000	94,400	91,000	90,200	(800)	(4,200)
1997	xxxx	xxxx	98,000	94,400	91,000	(3,400)	(7,000)
1998	xxxx	xxxx	xxxx	98,000	94,400	(3,600)	xxxx
1999	xxxx	xxxx	xxxx	xxxx	98,000	xxxx	xxxx

If the reader puts himself in the place of the actuary or a member of management, he or she might guess at how difficult it would be to accept the fact that there is a major loss reserve shortage that must be made up and that the operation is not nearly as profitable as it was originally thought to be.

2. Effect of Dividend Policies

Next it will be assumed that the company decides to dividend out any income in excess of that needed to maintain a 3 to 1 premium to surplus ratio. The company commences business in 1995. It has been assumed for simplicity that the policies are all written on the first of each year so that written premium equals earned premium. While not entirely realistic this does not detract at all from the conclusions that can be drawn from Exhibit 1.

The company enters into the business with no "freshstart" advantages from the tax calculation point of view. It has been assumed that the losses are discounted under the convention that this is Other Liability type business. As a result the tax calculations in 1995 record large taxable income and a large tax liability. Thus the statutory income after tax in the first year is negative and there are no profits that can be paid out. The income in 1996 nearly offsets this short fall and by 1997 the company is in a position to begin drawing out the apparent profits.

The line labeled "Loss and Loss Adjustment Expense Ratio" is obtained as 98,000/120,000 where the 98,000 figure is the company's estimate of the current accident year losses. The actual calendar year loss ratio is the sum of the loss ratio posted for the current year plus the development on prior years. In 1996 the downward development on the 1995 accident year is 3,600 and yields a "Loss Development Ratio" of -3600/120,000 = -3.00%. Thus the calendar year loss ratio in 1996 is 81.67%-3.00% = 78.67%. In 1997 the downward development on the 1995 and 1996 accident years is 3,400 and 3,600 respectively. This yields a loss development ratio of (-3,600-3,400)/120,000 = 5.83% and a calendar year loss ratio of 75.84%. The unfortunate choice of expected emergence patterns leads to not only deficient reserves as of the first evaluation of an accident year but continuing deterioration in the overall loss reserve position. In addition, from a financial statement perspective, the operating results even seem to be improving.

By the year 1999 or 2000 it should be evident that the results are not as beneficial as first thought. If the actuary uses the Exposed Loss Ratio calculation as of the end of 1999 he would find the following results.

Exhibit 1

Income Statement *

As of 12/31	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Net W.Premium	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
NWP/Surplus	3.36	3.08	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Net E.Premium	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
Loss Incurred	98,000	98,000	98,000	98,000	98,000	98,000	98,000	98,000	98,000	98,000
Loss Dvlment.	0	(3,600)	(7,000)	(7,800)	(6,700)	(5,400)	(3,800)	(2,100)	(300)	300
G.Expense	20,004	20,004	20,004	20,004	20,004	20,004	20,004	20,004	20,004	20,004
UW Income	1,996	5,596	8,996	9,796	8,696	7,396	5,796	4,096	2,296	1,696
Inv.Income	5,043	10,095	14,248	17,184	19,272	20,883	22,152	23,106	23,766	24,138
Statutory Income before Tax	7,039	15,691	23,244	26,980	27,968	28,279	27,948	27,202	26,062	25,834
Net Tax Paid	11,331	12,386	12,819	12,315	11,934	11,915	11,360	10,640	9,793	9,302
Stat.I.A.Tax	(4,292)	3,305	10,425	14,665	16,034	16,364	16,588	16,562	16,269	16,532
Div.to Shr.	0	0	9,438	14,665	16,034	16,364	16,588	16,562	16,269	16,533
SurplusChange	(4,292)	3,305	987	0	0	0	0	0	0	(1)
1/ 1 Surplus	40,000	35,708	39,013	40,000	40,000	40,000	40,000	40,000	40,000	40,000
12/31 Surplus	35,708	39,013	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000
Operating Ratios :										
L&LAE Ratio	81.67	81.67	81.67	81.67	81.67	81.67	81.67	81.67	81.67	81.67
L.Dvl.Ratio	0.00	-3.00	-5.83	-6.50	-5.58	-4.50	-3.17	-1.75	-0.25	0.25
Expense Ratio	16.67	16.67	16.67	16.67	16.67	16.67	16.67	16.67	16.67	16.67
Combined Ratio	98.34	95.34	92.51	91.84	92.76	93.84	95.17	96.59	98.09	98.59
Inv.Inc./EP	4.20	8.41	11.87	14.32	16.06	17.40	18.46	19.26	19.81	20.12
N.Oper.Ratio	94.14	86.93	80.64	77.52	76.70	76.44	76.71	77.33	78.28	78.47

* Slow emergence pattern; estimated loss cost = 100,000;
aggresive dividend policy

Table 6

Accident Year	Net Prem.	Expected Percent Emerged Losses	Exposed Prem.	Emerged Losses	Exposed Loss Ratio
1995	100,000	85.0%	85,000	76,300	89.8%
1996	100,000	75.0%	75,000	65,200	86.9%
1997	100,000	55.0%	55,000	46,000	83.6%
1998	100,000	30.0%	30,000	24,400	81.3%
1999	100,000	10.0%	10,000	8,000	80.0%

Note: The most basic form of the Bornhuetter-Ferguson loss reserving methods calculates IBNR as described previously using an assumed Expected Lost Cost. However, often there is no solid estimate of the loss cost available. One technique of re-estimating the original assumption or testing the appropriateness of the loss emergence pattern is use of the Exposed Loss Ratio. The Exposed loss ratio is simply the ratio of the emerged losses divided by the exposed premium. The exposed premium is the product of the earned premium and the cumulative expected emergence pattern. When the exposed loss ratio deviates signfiicantly from the original expected loss ratio there is an indication of an error either the original cost assumption or the assumptions with respect to the emergence patter or both.

The upward trends of the Exposed Loss Ratio as the accident years age should indicate that -all things being equal-the original assumptions may have been somewhat faulty. The original accident year estimates were 81.7% but the Exposed Loss Ratios now show figures over 85% for the earlier years.

In most real life situations evidence of this sort would not be considered as compelling. Typical objections usually sound like the following: "We can't rely on indications from the early years; we were just then learning how to underwrite the business"; " The claims adjusters are doing a much better job now than they were then"; "What about Schedule P?";

etc, etc. At any rate the evidence is probably not persuasive enough to radically raise the loss reserves at this point and in all likelihood business would continue as usual.

By the end of sixth year the cumulitve loss reserve deficiency will have built up to 42,500 which is then more than surplus of the company! The present value of the deficiency or the unrecognized liability is much less than this but unless the company can discount the loss reserves this would indicate the company's surplus is impaired and could cause the company to be declared insolvent. The present value of the unrecognized liabilities at various points in time are displayed in Exhibit 2.

The problem presented in the preceding is a combination of the risk of under reserving a new product combined with an overly aggressive dividend policy. If the company management had waited until the year 1999 or the year 2,000 to begin the process of withdrawing profits they would have been enough surplus to allow for a full adjustment of the loss reserve deficiency and still have had a strong company capable of generating future profits. In addition this would allow the company to continue unimpaired and remain a source of future profits. This can be seen by examining the financial results as presented in Exhibit 3 and comparing them with those in Exhibit 1.

It should be noted here that the premium of 100,000 may produce a small profit since the discounted value of the losses is 76,968 as shown in Table 7.

Loss Payout Schedule for the deficient Loss Reserves

Period	Incr. Paid Losses	Loss Paid for AY+0 Def.Reserves 2,000	Loss Paid for AY+1 Def.Reserves 5,600	Loss Paid for AY+2 Def.Reserves 9,000	Loss Paid for AY+3 Def.Reserves 9,800	Loss Paid for AY+4 Def.Reserves 8,700	Loss Paid for AY+5 Def.Reserves 7,400	Loss Paid for AY+6 Def.Reserves 5,800	Loss Paid for AY+7 Def.Reserves 4,100	Loss Paid for AY+8 Def.Reserves 2,300	Loss Paid for AY+9 Def.Reserves 1,700	Loss Paid for AY+10 Def.Reserves 800
AY + 0	5,600											
AY + 1	11,800	0	0	0	0	0	0	0	0	0	0	800
AY + 2	16,500	0	0	0	0	0	0	0	0	100	1,700	
AY + 3	16,500	0	0	0	0	0	0	300	1,900	2,200		
AY + 4	11,100	0	0	0	0	0	1,900	3,300	2,200			
AY + 5	7,200	0	0	0	0	3,200	3,300	2,200				
AY + 6	7,100	0	0	0	4,300	3,300	2,200					
AY + 7	6,700	0	0	3,500	3,300	2,200						
AY + 8	6,600	0	100	3,300	2,200							
AY + 9	5,400	0	3,300	2,200								
AY + 10	3,300	0	2,200									
AY + 11	2,200	2,000										
Total	100,000	2,000	5,600	9,000	9,800	8,700	7,400	5,800	4,100	2,300	1,700	800

Present Value deficient Loss Reserves at 6.00%

Time Period	Incr. Paid Losses	PV of LP for AY+0 Def.Reserves 2,000	Loss Paid for AY+1 Def.Reserves 5,600	Loss Paid for AY+2 Def.Reserves 9,000	Loss Paid for AY+3 Def.Reserves 9,800	Loss Paid for AY+4 Def.Reserves 8,700	Loss Paid for AY+5 Def.Reserves 7,400	Loss Paid for AY+6 Def.Reserves 5,800	Loss Paid for AY+7 Def.Reserves 4,100	Loss Paid for AY+8 Def.Reserves 2,300	Loss Paid for AY+9 Def.Reserves 1,700	Loss Paid for AY+10 Def.Reserves 800
0	5,600	0	0	0	0	0	0	0	0	0	0	0
1	11,132	0	0	0	0	0	0	0	0	0	0	755
2	14,685	0	0	0	0	0	0	0	0	89	1,513	
3	13,854	0	0	0	0	0	0	252	1,595	1,847		
4	8,792	0	0	0	0	0	1,505	2,614	1,743			
5	5,380	0	0	0	0	2,391	2,466	1,644				
6	5,005	0	0	0	3,031	2,326	1,551					
7	4,456	0	0	2,328	2,195	1,463						
8	4,141	0	63	2,070	1,380							
9	3,196	0	1,953	1,302								
10	1,843	0	1,228									
11	1,159	1,054										
Total :	79,243	1,054	3,244	5,700	6,606	6,181	5,522	4,510	3,338	1,936	1,513	755
Cuml.Total :		1,054	4,298	9,998	16,605	22,785	28,307	32,817	36,155	38,091	39,604	40,359

Exhibit 3

Income Statement *

As of 12/31	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Net W.Premium	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
NWP/Surplus	3.36	3.08	2.42	1.85	1.46	1.19	1.00	0.86	0.75	0.66
Net E.Premium	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
Loss Incurred	98,000	98,000	98,000	98,000	98,000	98,000	98,000	98,000	98,000	98,000
Loss Dvlment.	0	(3,600)	(7,000)	(7,800)	(6,700)	(5,400)	(3,800)	(2,100)	(300)	300
G.Expense	20,004	20,004	20,004	20,004	20,004	20,004	20,004	20,004	20,004	20,004
UW Income	1,996	5,596	8,996	9,796	8,696	7,396	5,796	4,096	2,296	1,696
Inv.Income	5,043	10,095	14,536	18,222	21,290	23,973	26,373	28,509	30,388	32,028
Statutory Income before Tax	7,039	15,691	23,532	28,018	29,986	31,369	32,169	32,605	32,684	33,724
Net Tax Paid	11,331	12,386	12,920	12,678	12,640	12,997	12,837	12,531	12,111	12,063
Stat.I.A.Tax	(4,292)	3,305	10,612	15,340	17,346	18,372	19,332	20,074	20,573	21,661
Div.to Shr.	0	0	0	0	0	0	0	0	0	0
SurplusChange	(4,292)	3,305	10,612	15,340	17,346	18,372	19,332	20,074	20,573	21,661
1/ 1 Surplus	40,000	35,708	39,013	49,625	64,965	82,310	100,682	120,014	140,089	160,662
12/31 Surplus	35,708	39,013	49,625	64,965	82,310	100,682	120,014	140,089	160,662	182,323
Operating Ratios :										
L&LAE Ratio	81.67	81.67	81.67	81.67	81.67	81.67	81.67	81.67	81.67	81.67
L.Dvl.Ratio	0.00	-3.00	-5.83	-6.50	-5.58	-4.50	-3.17	-1.75	-0.25	0.25
Expense Ratio	16.67	16.67	16.67	16.67	16.67	16.67	16.67	16.67	16.67	16.67
Combined Ratio	98.34	95.34	92.51	91.84	92.76	93.84	95.17	96.59	98.09	98.59
Inv.Inc./EP	4.20	8.41	12.11	15.19	17.74	19.98	21.98	23.76	25.32	26.69
N.Oper.Ratio	94.14	86.93	80.40	76.65	75.02	73.86	73.19	72.83	72.77	71.90

* Slow emergence pattern; estimated loss cost = 100,000;
conservative dividend policy

Table 7

Period	Incr. Paid Losses	Present Value of Paid Losses
AY + 0	5,600	5,439
AY + 1	11,800	10,812
AY + 2	16,500	14,263
AY + 3	16,500	13,456
AY + 4	11,100	8,540
AY + 5	7,200	5,226
AY + 6	7,100	4,861
AY + 7	6,700	4,328
AY + 8	6,600	4,022
AY + 9	5,400	3,104
AY + 10	3,300	1,790
AY + 11	2,200	1,126
	100,000	76,968

Interest Rate: 6%

The discounting does not include the cost of Federal Taxes but this cost should not exceed the apparent 3% margin as long as the company is not significantly under reserved.

C. Ultimate Loss Underestimated

It's not unusual for the initial estimate of the loss cost of a new product to be fairly wide of the mark. In the following it is assumed that the company's initial estimate of the loss cost is 80,000 although the actual cost is 100,000. Using the convention adopted earlier the sum of the loss costs and expenses equals the premium with the premium thus being 100,000.

The same type of loss reserving protocol as before will be employed yielding the loss reserve estimates and deficiencies as shown in Table 8.

Table 8

Period	IBNR Reserve	Cumul Reported Losses	Cumul. Paid Losses	Carried Reserves	Deficiency
AY + 0	72,000	8,000	5,600	74,400	20,000
AY + 1	56,000	24,400	17,400	63,000	19,600
AY + 2	36,000	46,000	33,900	48,100	18,000
AY + 3	20,000	65,200	50,400	34,800	14,800
AY + 4	12,000	76,300	61,500	26,800	11,700
AY + 5	8,000	82,600	68,700	21,900	9,400
AY + 6	4,800	88,200	75,800	17,200	7,000
AY + 7	2,400	92,900	82,500	12,800	4,700
AY + 8	800	96,700	89,100	8,400	2,500
AY + 9	0	98,300	94,500	3,800	1,700
AY + 10	0	99,200	97,800	1,400	800
AY + 11	0	100,000	100,000	0	0

As before the development factors, at least for the first four or five years, will probably not alert the actuary to the fact that the original development pattern is somewhat erroneous. However use of the Exposed Loss Ratio measurement should provide some warning as evidenced in Table 9.

Table 9

Accident Year	Net Prem.	Expected Percent Emerged. Losses	Exposed Prem.	Emerged Losses	Exposed Loss Ratio
1995	80,000	85.0%	68,000	76,300	112.2%
1996	80,000	75.0%	60,000	65,200	108.7%
1997	80,000	55.0%	44,000	46,000	104.5%
1998	80,000	30.0%	24,000	24,400	101.7%
1999	80,000	10.0%	8,000	8,000	100.0%

It's more obvious in this case then in the previous situation that the company is heading towards severe undereserving if not already there. It might be expected in this example

that the evidence at the end of the second accident year would be enough for management to begin to correct the potential loss reserving problems. However the company is dealing with a new product and the evidence at that point might not be considered to be overwhelming. Often in a situation such as this it will be argued that the high exposed loss ratio results from using an emergence pattern which is too slow. It is difficult to definitvely refute an argument like this early in the life of a new product. At any rate it is assumed that the company is not moved to action until 1999. The company is in an almost untenable position as of year end 1999 in this situation partly as a result of underestimating the cost of the product, the resulting severe under reserving caused by using that cost estimate and an overly optimistic emergence problem and an overly aggressively dividend policy. This last significantly constrains the company in taking remedial steps.

D. Benefits of Conservative Dividend Policy

Having viewed the two problems above, both of which are characterized by slower than expected loss emergence but differ in the expected cost estimates, the question that could be asked is "could the company have insulated itself from some of these problems?"

The previously referenced Exhibit 3 provides a framework for an answer. In this scenario the company has pursued a conservative dividend policy and has not withdrawn any funds from the company.

It is assumed at this point that the company recognizes the deficiency in the reserves and moves to eliminate the deficiency. As can be seen from Exhibit 4 the company records a significant underwriting loss in the year 1999. This sharply reduces the

Exhibit 4

Income Statement *

As of 12/31	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Net W.Premium	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
NWP/Surplus	3.36	3.08	2.42	1.85	2.11	1.71	1.40	1.16	0.98	0.83
Net E.Premium	*120,000*	*120,000*	*120,000*	*120,000*	*120,000*	*120,000*	*120,000*	*120,000*	*120,000*	*120,000*
Loss Incurred	98,000	98,000	98,000	98,000	100,000	100,000	100,000	100,000	100,000	100,000
Loss Dvlment.	0	(3,600)	(7,000)	(7,800)	26,400	0	0	0	0	0
G.Expense	20,004	20,004	20,004	20,004	20,004	20,004	20,004	20,004	20,004	20,004
UW Income	1,996	5,596	8,996	9,796	(26,404)	(4)	(4)	(4)	(4)	(4)
Inv.Income	5,043	10,095	14,536	18,222	21,582	24,627	27,160	29,409	31,376	33,088
Statutory Income before Tax	7,039	15,691	23,532	28,018	(4,822)	24,623	27,156	29,405	31,372	33,084
Net Tax Paid	11,331	12,386	12,920	12,678	3,223	11,260	11,580	11,753	11,831	11,956
Stat.I.A.Tax	(4,292)	3,305	10,612	15,340	(8,045)	13,363	15,576	17,652	19,541	21,128
Div.to Shr.	0	0	0	0	0	0	0	0	0	0
SurplusChange	(4,292)	3,305	10,612	15,340	(8,045)	13,363	15,576	17,652	19,541	21,128
1/ 1 Surplus	40,000	35,708	39,013	49,625	64,965	56,920	70,283	85,859	103,511	123,052
12/31 Surplus	35,708	39,013	49,625	64,965	56,920	70,283	85,859	103,511	123,052	144,180
Operating Ratios :										
L&LAE Ratio	81.67	81.67	81.67	81.67	83.33	83.33	83.33	83.33	83.33	83.33
L.Dvl.Ratio	0.00	-3.00	-5.83	-6.50	22.00	0.00	0.00	0.00	0.00	0.00
Expense Ratio	16.67	16.67	16.67	16.67	16.67	16.67	16.67	16.67	16.67	16.67
Combined Ratio	98.34	95.34	92.51	91.84	122.00	100.00	100.00	100.00	100.00	100.00
Inv.Inc./EP	4.20	8.41	12.11	15.19	17.99	20.52	22.63	24.51	26.15	27.57
N.Oper.Ratio	94.14	86.93	80.40	76.65	104.01	79.48	77.37	75.49	73.85	72.43

* Slow emergence pattern; estimated loss cost = 100,000;
conservative dividend policy; loss deficiency corrected in 1999

amount of tax liability from about $12 million in each of the prior years to approximately $3.7 million in 1999. Considering the size of the adjustment the question could be asked as to why any tax is paid at all. The answer lies in the fact that the company is generating a large quantity of investment income as a result of the now large asset base. This financial characteristic of the company at this point in time is a direct result of pursuing a conservative versus liberal dividend policy.

At this point in time the company can fix all of its loss reserve problems and then proceed to reap the benefits of underwriting a relatively new product into the future with the premium to surplus ratio being just over 2 to 1. The company can now begin to withdraw profit from the company.

On the other hand if the company has been very aggressive in the dividend policy the loss reserve adjustment in 1999 will drive the company up to nearly a 4 to 1 premium to surplus ratio as can be seen in Exhibit 5. The company is still viable and profitable enough to restore itself to a 3 to 1 premium to surplus ratio and even begin paying a small amount of dividends in the next year.

It's been assumed in the last two scenarios that the company moves to correct loss reserve deficiencies at the end of 1999. Under either the aggressive or conservative dividend policy scenario the company survives but may, it seems, have had a near miss under the aggressive dividend policy assumption. This leads to the question of what happens if the company delays its decision to correct the reserve deficiency. Earlier is noted that the loss reserve evidence may not be considered compelling by management for this premium structure as of the end of 1999. It can be seen from the proforma calculations in Exhibit 6 that the company causes itself real trouble by waiting until the year 2001 to correct the reserve deficiency. The premium to surplus ratio is now

Income Statement *

As of 12/31	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Net W.Premium	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
NWP/Surplus	3.36	3.08	3.00	3.00	3.88	3.00	3.00	3.00	3.00	3.00
Net E.Premium	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
Loss Incurred	98,000	98,000	98,000	98,000	100,000	100,000	100,000	100,000	100,000	100,000
Loss Dvlment.	0	(3,600)	(7,000)	(7,800)	26,400	0	0	0	0	0
G.Expense	20,004	20,004	20,004	20,004	20,004	20,004	20,004	20,004	20,004	20,004
UW Income	1,996	5,596	8,996	9,796	(26,404)	(4)	(4)	(4)	(4)	(4)
Inv.Income	5,043	10,095	14,248	17,184	20,054	22,940	24,876	26,127	26,979	27,471
Statutory Income before Tax	7,039	15,691	23,244	26,980	(6,350)	22,936	24,872	26,123	26,975	27,467
Net Tax Paid	11,331	12,386	12,819	12,315	2,688	10,670	10,780	10,605	10,292	9,990
Stat.I.A.Tax	(4,292)	3,305	10,425	14,665	(9,038)	12,266	14,092	15,518	16,683	17,477
Div.to Shr.	0	0	9,438	14,665	0	3,228	14,092	15,518	16,683	17,477
SurplusChange	(4,292)	3,305	987	0	(9,038)	9,038	0	0	0	0
1/ 1 Surplus	40,000	35,708	39,013	40,000	40,000	30,962	40,000	40,000	40,000	40,000
12/31 Surplus	35,708	39,013	40,000	40,000	30,962	40,000	40,000	40,000	40,000	40,000

Operating Ratios :

L&LAE Ratio	81.67	81.67	81.67	81.67	83.33	83.33	83.33	83.33	83.33	83.33
L.Dvl.Ratio	0.00	-3.00	-5.83	-6.50	22.00	0.00	0.00	0.00	0.00	0.00
Comm. Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Expense Ratio	16.67	16.67	16.67	16.67	16.67	16.67	16.67	16.67	16.67	16.67
Combined Ratio	98.34	95.34	92.51	91.84	122.00	100.00	100.00	100.00	100.00	100.00
Inv.Inc./EP	4.20	8.41	11.87	14.32	16.71	19.12	20.73	21.77	22.48	22.89
N.Oper.Ratio	94.14	86.93	80.64	77.52	105.29	80.88	79.27	78.23	77.52	77.11

* Slow emergence pattern; estimated loss cost = 100,000;
aggresive dividend policy; loss deficiency corrected in 1999

Exhibit 6

Income Statement *

As of 12/31	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Net W.Premium	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
NWP/Surplus	3.36	3.08	3.00	3.00	3.00	3.00	5.48	3.24	3.00	2.73
Net E.Premium	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
Loss Incurred	98,000	98,000	98,000	98,000	98,000	98,000	100,000	100,000	100,000	100,000
Loss Dvlment.	0	(3,600)	(7,000)	(7,800)	(6,700)	(5,400)	42,500	0	0	0
G.Expense	20,004	20,004	20,004	20,004	20,004	20,004	20,004	20,004	20,004	20,004
UW Income	1,996	5,596	8,996	9,796	8,696	7,396	(42,504)	(4)	(4)	(4)
Inv.Income	5,043	10,095	14,248	17,184	19,272	20,883	23,058	25,494	26,889	27,589
Statutory Income before Tax	7,039	15,691	23,244	26,980	27,968	28,279	(19,446)	25,490	26,885	27,585
Net Tax Paid	11,331	12,386	12,819	12,315	11,934	11,915	(1,341)	10,383	10,261	10,031
Stat.I.A.Tax	(4,292)	3,305	10,425	14,665	16,034	16,364	(18,105)	15,107	16,624	17,554
Div.to Shr.	0	0	9,438	14,665	16,034	16,364	0	0	13,625	13,625
SurplusChange	(4,292)	3,305	987	0	0	0	(18,105)	15,107	2,999	3,929
1/ 1 Surplus	40,000	35,708	39,013	40,000	40,000	40,000	40,000	21,895	37,001	40,001
12/31 Surplus	35,708	39,013	40,000	40,000	40,000	40,000	21,895	37,001	40,001	43,930
Operating Ratios :										
L&LAE Ratio	81.67	81.67	81.67	81.67	81.67	81.67	83.33	83.33	83.33	83.33
L.Dvl.Ratio	0.00	-3.00	-5.83	-6.50	-5.58	-4.50	35.42	0.00	0.00	0.00
Expense Ratio	16.67	16.67	16.67	16.67	16.67	16.67	16.67	16.67	16.67	16.67
Combined Ratio	98.34	95.34	92.51	91.84	92.76	93.84	135.42	100.00	100.00	100.00
Inv.Inc./EP	4.20	8.41	11.87	14.32	16.06	17.40	19.22	21.25	22.41	22.99
N.Oper.Ratio	94.14	86.93	80.64	77.52	76.70	76.44	116.20	78.75	77.59	77.01

* Slow emergence pattern; estimated loss cost = 100,000;
aggresive dividend policy; loss deficiency corrected in 2001

approximately 5.5 to 1 and it is likely that the regulatory authorities would now intervene. The real problem here is that the company has continued to withdraw significant dividends in the years 1999 and 2000 in spite of the fact some questions about the loss reserves were being raised. The proper strategy even if the reserve deficiency were not to be corrected as of the end of 1999 is to cease withdrawing profits until it was more certain that they were available.

Earlier it was noted that the company could probably make a small profit by pricing the product at 100,000 (expenses plus loss cost). This is due to the slow payout of the losses. However the company has now only allowed itself a small margin-whether it knows it or not. The proforma displayed in Exhibit 7 shows that even with a conservative dividend policy the company will not be able to correct a loss reserve deficiency in 1999. It might be asked why the company will not survive given what seems to be a reasonable discount in underlying costs when determining the premium. The answer lies in the fact that the company is grossly under reserved on a tax basis and a large amount of funds are paid over to the Federal government. These funds are then not available to generate investment income to the company. Thus a company writing a new product should employ a consciously conservative loss reserving policy in the early years. This preserves assets for the company to use in offsetting the potential problems of underpricing the product or unintentionally under reserving.

IV. LINES OF BUSINESS WITH MODERATE EMERGENCE PATTERN

A. Actual versus Expected Emergence Pattern

The scenario detailed in the previous sections were repeated using a somewhat more rapid emergence pattern. The assumed patterns of expected loss emergence, actual loss emergence and paid losses are displayed in Table 10.

Exhibit 7

Income Statement *

As of 12/31	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Net W.Premium	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
NWP/Surplus	3.47	3.55	3.29	2.97	-4.09	-3.63	-3.43	-3.41	-3.53	-3.78
Net E.Premium	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Loss Incurred	80,000	80,000	80,000	80,000	100,000	100,000	100,000	100,000	100,000	100,000
Loss Dvlment.	0	400	2,000	5,200	72,400	0	0	0	0	0
G.Expense	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
UW Income	0	(400)	(2,000)	(5,200)	(92,400)	(20,000)	(20,000)	(20,000)	(20,000)	(20,000)
Inv.Income	4,098	8,065	11,445	14,096	16,822	19,250	20,774	21,973	22,849	23,427
Statutory Income before Tax	4,098	7,665	9,445	8,896	(75,578)	(750)	774	1,973	2,849	3,427
Net Tax Paid	8,574	8,323	7,251	5,625	(17,462)	2,380	2,346	2,152	1,848	1,576
Stat.I.A.Tax	(4,476)	(658)	2,194	3,271	(58,116)	(3,130)	(1,572)	(179)	1,001	1,851
Div.to Shr.	0	0	0	0	0	0	0	0	0	0
SurplusChange	(4,476)	(658)	2,194	3,271	(58,116)	(3,130)	(1,572)	(179)	1,001	1,851
1/ 1 Surplus	33,333	28,857	28,198	30,393	33,664	(24,452)	(27,581)	(29,153)	(29,332)	(28,331)
12/31 Surplus	28,857	28,198	30,393	33,664	(24,452)	(27,581)	(29,153)	(29,332)	(28,331)	(26,480)

Operating Ratios :

L&LAE Ratio	80.00	80.00	80.00	80.00	100.00	100.00	100.00	100.00	100.00	100.00
L.Dvl.Ratio	0.00	0.40	2.00	5.20	72.40	0.00	0.00	0.00	0.00	0.00
Expense Ratio	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
Combined Ratio	100.00	100.40	102.00	105.20	192.40	120.00	120.00	120.00	120.00	120.00
Inv.Inc./EP	4.10	8.07	11.45	14.10	16.82	19.25	20.77	21.97	22.85	23.43
N.Oper.Ratio	95.90	92.33	90.55	91.10	175.58	100.75	99.23	98.03	97.15	96.57

* Slow emergence pattern; estimated loss cost = 80,000;
conservative dividend policy; loss deficiency corrected in 1999

Table 10

Period	Expected Loss Emerg. Pattern	Actual Loss Emerg. Pattern	Actual Loss Payout Rates
AY + 0	20.0%	16.0%	11.2%
AY + 1	25.0%	21.0%	15.5%
AY + 2	30.0%	27.5%	22.4%
AY + 3	10.0%	11.4%	11.4%
AY + 4	5.0%	6.4%	7.3%
AY + 5	4.0%	5.7%	7.3%
AY + 6	3.0%	4.8%	7.0%
AY + 7	2.0%	3.8%	6.6%
AY + 8	1.0%	1.7%	4.5%
AY + 9	0.0%	1.0%	4.1%
AY + 10	0.0%	0.7%	2.7%
AY + 11	0.0%	0.0%	0.0%

B. Proforma Results

The proforma results in Exhibits 8 and 9 display the income statement, surplus and premium to surplus ratios under aggressive and conservative dividend policies respectively. In Exhibits 10 and 11 it is assumed that the loss reserve deficiency is corrected in 1999. Under the aggressive dividend policy assumption the company's premium to surplus ratio rises to approximately 4.7 to 1. The company has been facing regulatory intervention or loss of confidence on the part of the policy holders. If the company has maintained a more conservative dividend policy for the first few years it can easily survive the unpleasant surprise of a large loss reserve adjustment. It can then proceed with generation of substantial profits and dividends in future years.

Exhibit 8

Income Statement *

As of 12/31	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Net W.Premium	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
NWP/Surplus	3.19	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Net E.Premium	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
Loss Incurred	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000
Loss Dvlment.	0	(4,000)	(6,500)	(5,100)	(3,700)	(2,000)	(200)	1,600	2,300	3,300
G.Expense	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
UW Income	4,000	8,000	10,500	9,100	7,700	6,000	4,200	2,400	1,700	700
Inv.Income	4,873	9,376	12,618	14,742	16,389	17,691	18,669	19,347	19,767	19,980
Statutory Income before Tax	8,873	17,376	23,118	23,842	24,089	23,691	22,869	21,747	21,467	20,680
Net Tax Paid	11,244	11,928	11,405	10,539	10,195	9,887	9,179	8,355	7,912	7,375
Stat.I.A.Tax	(2,371)	5,448	11,713	13,303	13,894	13,804	13,690	13,392	13,555	13,305
Div.to Shr.	0	3,077	11,713	13,303	13,894	13,804	13,690	13,392	13,555	13,305
SurplusChange	(2,371)	2,371	0	0	0	0	0	0	0	0
1/ 1 Surplus	40,000	37,629	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000
12/31 Surplus	37,629	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000
Operating Ratios :										
L&LAE Ratio	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00
L.Dvl.Ratio	0.00	-3.33	-5.42	-4.25	-3.08	-1.67	-0.17	1.33	1.92	2.75
Expense Ratio	16.67	16.67	16.67	16.67	16.67	16.67	16.67	16.67	16.67	16.67
Combined Ratio	96.67	93.34	91.25	92.42	93.59	95.00	96.50	98.00	98.59	99.42
Inv.Inc./EP	4.06	7.81	10.52	12.29	13.66	14.74	15.56	16.12	16.47	16.65
N.Oper.Ratio	92.61	85.53	80.73	80.13	79.93	80.26	80.94	81.88	82.12	82.77

* moderate emergence pattern ; estimated loss cost = 100,000;
aggresive dividend policy

Exhibit 9

Income Statement *

As of 12/31	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Net W.Premium	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
NWP/Surplus	3.19	2.78	2.17	1.73	1.42	1.19	1.03	0.90	0.79	0.71
Net E.Premium	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
Loss Incurred	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000
Loss Dvlment.	0	(4,000)	(6,500)	(5,100)	(3,700)	(2,000)	(200)	1,600	2,300	3,300
G.Expense	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
UW Income	4,000	8,000	10,500	9,100	7,700	6,000	4,200	2,400	1,700	700
Inv.Income	4,873	9,470	13,168	16,079	18,612	20,850	22,795	24,466	25,914	27,193
Statutory Income before Tax	8,873	17,470	23,668	25,179	26,312	26,850	26,995	26,866	27,614	27,893
Net Tax Paid	11,244	11,961	11,598	11,007	10,973	10,993	10,623	10,146	10,063	9,899
Stat.I.A.Tax	(2,371)	5,509	12,070	14,172	15,339	15,857	16,372	16,720	17,551	17,994
Div.to Shr.	0	0	0	0	0	0	0	0	0	0
SurplusChange	(2,371)	5,509	12,070	14,172	15,339	15,857	16,372	16,720	17,551	17,994
1/ 1 Surplus	40,000	37,629	43,138	55,208	69,381	84,720	100,577	116,949	133,669	151,220
12/31 Surplus	37,629	43,138	55,208	69,381	84,720	100,577	116,949	133,669	151,220	169,213
Operating Ratios :										
L&LAE Ratio	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00
L.Dvl.Ratio	0.00	-3.33	-5.42	-4.25	-3.08	-1.67	-0.17	1.33	1.92	2.75
Expense Ratio	16.67	16.67	16.67	16.67	16.67	16.67	16.67	16.67	16.67	16.67
Combined Ratio	96.67	93.34	91.25	92.42	93.59	95.00	96.50	98.00	98.59	99.42
Inv.Inc./EP	4.06	7.89	10.97	13.40	15.51	17.38	19.00	20.39	21.60	22.66
N.Oper.Ratio	92.61	85.45	80.28	79.02	78.08	77.62	77.50	77.61	76.99	76.76

* moderate emergence pattern ; estimated loss cost = 100,000;
conservative dividend policy

Exhibit 10

Income Statement

As of 12/31	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Net W.Premium	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
NWP/Surplus	3.19	3.00	3.00	3.00	4.68	3.30	3.00	3.00	3.00	3.00
Net E.Premium	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
Loss Incurred	96,000	96,000	96,000	96,000	100,000	100,000	100,000	100,000	100,000	100,000
Loss Dvlment.	0	(4,000)	(6,500)	(5,100)	31,600	0	0	0	0	0
G.Expense	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
UW Income	4,000	8,000	10,500	9,100	(31,600)	0	0	0	0	0
Inv.Income	4,873	9,376	12,618	14,742	17,138	19,690	21,404	22,389	22,932	23,217
Statutory Income before Tax	8,873	17,376	23,118	23,842	(14,462)	19,690	21,404	22,389	22,932	23,217
Net Tax Paid	11,244	11,928	11,405	10,539	(126)	8,994	9,027	8,780	8,557	8,311
Stat.I.A.Tax	(2,371)	5,448	11,713	13,303	(14,336)	10,696	12,377	13,609	14,375	14,906
Div.to Shr.	0	3,077	11,713	13,303	0	0	8,738	13,609	14,375	14,906
SurplusChange	(2,371)	2,371	0	0	(14,336)	10,696	3,639	0	0	0
1/ 1 Surplus	40,000	37,629	40,000	40,000	40,000	25,664	36,360	40,000	40,000	40,000
12/31 Surplus	37,629	40,000	40,000	40,000	25,664	36,360	40,000	40,000	40,000	40,000
Operating Ratios :										
L&LAE Ratio	80.00	80.00	80.00	80.00	83.33	83.33	83.33	83.33	83.33	83.33
L.Dvl.Ratio	0.00	-3.33	-5.42	-4.25	26.33	0.00	0.00	0.00	0.00	0.00
Expense Ratio	16.67	16.67	16.67	16.67	16.67	16.67	16.67	16.67	16.67	16.67
Combined Ratio	96.67	93.34	91.25	92.42	126.33	100.00	100.00	100.00	100.00	100.00
Inv.Inc./EP	4.06	7.81	10.52	12.29	14.28	16.41	17.84	18.66	19.11	19.35
N.Oper.Ratio	92.61	85.53	80.73	80.13	112.05	83.59	82.16	81.34	80.89	80.65

* moderate emergence pattern ; estimated loss cost = 100,000;
aggresive dividend policy; loss reserve deficiency corrected in 1999

Income Statement

As of 12/31	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Net W.Premium	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
NWP/Surplus	3.19	2.78	2.17	1.73	2.13	1.76	1.46	1.23	1.05	0.91
Net E.Premium	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
Loss Incurred	96,000	96,000	96,000	96,000	100,000	100,000	100,000	100,000	100,000	100,000
Loss Dvlment.	0	(4,000)	(6,500)	(5,100)	31,600	0	0	0	0	0
G.Expense	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
UW Income	4,000	8,000	10,500	9,100	(31,600)	0	0	0	0	0
Inv.Income	4,873	9,470	13,168	16,079	18,936	21,559	23,614	25,371	26,889	28,228
Statutory Income before Tax	8,873	17,470	23,668	25,179	(12,664)	21,559	23,614	25,371	26,889	28,228
Net Tax Paid	11,244	11,961	11,598	11,007	504	9,648	9,800	9,824	9,942	10,065
Stat.I.A.Tax	(2,371)	5,509	12,070	14,172	(13,168)	11,911	13,814	15,547	16,947	18,163
Div.to Shr.	0	0	0	0	0	0	0	0	0	0
SurplusChange	(2,371)	5,509	12,070	14,172	(13,168)	11,911	13,814	15,547	16,947	18,163
1/ 1 Surplus	40,000	37,629	43,138	55,208	69,381	56,213	68,124	81,938	97,486	114,433
12/31 Surplus	37,629	43,138	55,208	69,381	56,213	68,124	81,938	97,486	114,433	132,596

Operating Ratios :

L&LAE Ratio	80.00	80.00	80.00	80.00	83.33	83.33	83.33	83.33	83.33	83.33
L.Dvl.Ratio	0.00	-3.33	-5.42	-4.25	26.33	0.00	0.00	0.00	0.00	0.00
Expense Ratio	16.67	16.67	16.67	16.67	16.67	16.67	16.67	16.67	16.67	16.67
Combined Ratio	96.67	93.34	91.25	92.42	126.33	100.00	100.00	100.00	100.00	100.00
Inv.Inc./EP	4.06	7.89	10.97	13.40	15.78	17.97	19.68	21.14	22.41	23.52
N.Oper.Ratio	92.61	85.45	80.28	79.02	110.55	82.03	80.32	78.86	77.59	76.48

* moderate emergence pattern ; estimated loss cost = 100,000;
conservative dividend policy; loss reserve deficiency corrected in 1999

V. SUMMARY AND CONCLUSIONS

New products contain risks not associated with more mature products whose costs and characteristics are fairly well known. There is a significantly greater likelihood of mispricing the new product. In addition loss reserving will be much less accurate and, as demonstrated in the discussed examples, can have unpleasant consequences. Some observations on pricing, loss reserving and financial management of a new product can be made.

- A new product should never be priced with a low target profit margin on an after investment income basis.
  - A corollary to this is that rate regulation in many states designed for use with traditional insurance products do not apply to new products.
- A company writing a new product should pursue a conservative dividend policy until the product attains some reasonable level of maturity. This provides a cushion against untoward variability and will allow for the continuation of profits. Experimentation not detailed in this paper suggests the following rule of thumb: The investor should refrain from withdrawing profits from the company until the time when at least 50% of the losses from the first year of underwriting the new product are expected to have emerged.
- The company should pursue an extremely conservative loss reserving philosophy during the first several years of the product's life.
  - This avoids premature payment of taxes and preserves funds that may be needed to pay for unanticipated costs.
  - Conservative loss reserving avoids large loss reserve adjustments that may damage the company's financial position or cause a decrease in the confidence of policy holders.

- An insurance operation underwriting a new product or products should be conservatively capitalized.
  - The type of leverage assumed in the examples is clearly too high and unnecessarily increases the chances of failure.
  - Various approaches for limiting the leverage should be explored. The most obvious is simply limiting the amount of exposure written. However, most purveyors of new products will want to capture as much of the market as possible and establish a dominant position. In this situation one of the common solutions is to share the risk through reinsurance in the early life of the product. When the product becomes better established and understood the company can retain a greater share of the risk.
- A new product requires not only the traditional tasks of pricing and reserving but also financial management. Financial management of the product should include generation of a variety of projections using a range of loss reserving assumptions. The company should also create a large number of financial forecasts to identify potential threats caused by the new product and to shed some light on how these might be handled.

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