



SOA Risk Management Task Force

Pricing for Risk Survey

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Pricing for Risk

1. Objective: To evaluate the different pricing techniques as to their effectiveness in capturing and quantifying the varied risks associated with the sale and administration of life insurance and annuity products.
 1. Task 1 – Survey of current industry practice
 2. Task 2 – Development of a comprehensive analysis of existing methods, along with an analysis of advantages and shortcomings of each
2. Ultimate Product – Practice Guide for Pricing for Risk

Pricing for Risk Terms

Return on Investment	Risk-Adjusted Profit Target
Return on Equity	Stochastic Scenario Analysis
Return on Liabilities	Assumption PADS
Risk-Adjusted Return on Capital	Assumption Stress Testing
Premium Margin	Regulatory Formula (RBC/MCCSR) Multiple
Break-even Year	Economic Capital
Internal Rate of Return	Earnings (Value) at Risk
Return on Assets	Mean-Variance Analysis
Return on Capital	Efficient Frontier
Contribution to Surplus	Conditional Tail Expectation
Revenue Margin	Problem Scenario Analysis
Embedded Value (or Economic Value Added)	Reduction to Yield
Capital Allocations	Covariance of Risk

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Pricing For Risk Survey

- Conducted August & September 2002
- RMTF listserve and Product Development Section Members were asked to participate
- 351 Responses

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What Pricing Measure does your company use?

Premium Margin	18%
Return on Equity	14%
Internal Rate of Return	13%
Return on Investment	10%
Break-even Year	9%
Risk Adjusted Return on Capital	6%
Embedded Value	6%
Economic Value Added	5%
Return on Capital	4%
Contribution to Surplus	4%
Return on Assets	4%
Revenue Margin	3%
Other	2%
Return on Liabilities	1%

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Pricing Measures Used Across All Products

Internal Rate of Return	34%
Premium Margin	21%
Return on Equity	14%
Embedded Value	11%
Break-even Year	9%
Return on Assets	4%
CTS	4%
Other	2%

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Pricing Measure by Product

	<u>Life</u>	<u>Annuity</u>	<u>Grp Life</u>	<u>Grp A&H</u>	<u>Grp Ann</u>	<u>Ind Hth</u>
Premium Margin	19.23%	12.9%	32.1%	32.2%	14.0%	28.3%
Return on Equity	12.72%	15.5%	20.5%	17.5%	18.4%	12.2%
Internal Rate of Return	36.35%	37.7%	25.0%	24.0%	37.4%	33.5%
Break-even Year	12.43%	8.5%	5.8%	7.6%	6.2%	8.3%
Embedded Value	11.09%	11.1%	10.3%	9.9%	11.7%	10.0%
Return on Assets	3.43%	9.6%	0.6%	0.6%	7.3%	0.2%
Other	1.50%	2.6%	1.9%	1.2%	2.2%	2.3%
CTS	3.24%	2.1%	3.9%	7.0%	2.8%	5.2%

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Methods of Reflecting Risk

- Capital allocation
 - pricing for capital as a cost
- Risk-adjusted profit target
 - higher risk products have higher targets
- Stochastic scenario analysis
 - Pricing centered on set of scenarios
- Assumption PADS
 - Explicit or implicit conservatism
- Assumption stress testing
 - Regular set of tests

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How Do you Price for Risk?

	Capital allocation	Risk-adjusted profit target	Stochastic scenario analysis	Assumption PADS	Assumption stress testing
ROI	25%	18%	19%	13%	25%
IRR	26%	18%	17%	12%	26%
ROE	30%	16%	21%	11%	20%
CTS	21%	27%	17%	15%	19%
Premium Margin	16%	23%	13%	18%	28%

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What is the basis for Risk Adjustment?

3. If you use capital allocations for reflecting risk, how are these allocations determined?

Regulatory formula multiple	147	55.26%
Internal formula	69	25.94%
Economic capital	44	16.54%
Other	6	2.26%
Total:	266	

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What is the basis for Risk Adjustment?

4. If you use assumption PADS, how are these PADS determined?

Analysis of recent experience	66	50.00%
Industry standard	36	27.27%
Other	5	3.79%
Stochastic scenario analysis	25	18.94%
Total:	132	

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What is the basis for Risk Adjustment?

5. If you risk-adjusted profit objective, how is it determined?

Judgment	81	61.83%
Formula	44	33.59%
Other	6	4.58%
Total:	131	

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What is the basis for Risk Adjustment?

6. If you use assumption stress testing, how are the parameters determined?

Judgment	137	59.05%
Confidence limits	48	20.69%
Worst case historical experience	42	18.10%
Other	5	2.16%
Total:	232	

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What is the basis for Risk Adjustment?

7. If you use stochastic scenario analysis, how is the distribution of results analyzed?

Percentiles	83	30.51%
Mean-variance analysis	44	16.18%
Conditional tail expectation (CTE)	44	16.18%
Problem scenario analysis	38	13.97%
Value at risk	24	8.82%
Efficient frontier	23	8.46%
Earnings at risk	14	5.15%
Other	2	0.74%
Total:	272	

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How are different risks handled?

8. A. How do you capture the risk associated with asset default in pricing?

Reduction to yield	196	59.57%
Capital allocation	66	20.06%
Assumption stress testing	31	9.42%
Stochastic scenario analysis	28	8.51%
Other	8	2.43%
Total:	329	

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How are different risks handled?

8. B. Who determines parameters and magnitude of this provision?

Both areas	132	49.81%
Investment area	62	23.40%
Actuarial area	61	23.02%
Other	10	3.77%
Total:	265	

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How are different risks handled?

8. C. How is the amount of the adjustment determined?

Internal model	146	51.23%
Rating agency factors (e.g. Moody's)	97	34.04%
Other	25	8.77%
Commercial software	17	5.96%
Total:	285	

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How are different risks handled?

9. How do you capture the risk associated with interest rate changes in pricing?

Stochastic scenario analysis	103	27.03%
Assumption stress testing	96	25.20%
Capital allocation	58	15.22%
Reduction to yield	57	14.96%
Duration analysis	57	14.96%
Other	10	2.62%
Total:	381	

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How are different risks handled?

10. A. How do you capture the risk associated with the volatility of equity returns?

Stochastic scenario analysis	94	34.31%
Assumption stress testing	78	28.47%
Capital allocation	41	14.96%
Historical tests (back testing)	28	10.22%
Capital markets price analysis	19	6.93%
Other	14	5.11%
Total:	274	

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How are different risks handled?

10. B. If you use stochastic scenario analysis, what manner of assumptions do you use?

Historical	81	32.79%
Mean reversion	61	24.70%
Capital markets	37	14.98%
Arbitrage free	35	14.17%
Risk neutral	27	10.93%
Other	6	2.43%
Total:	247	

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How are different risks handled?

11. How do you capture the risk associated with adverse claim deviation in pricing?

Assumption stress testing	134	36.31%
Assumption PAD	84	22.76%
Capital allocation	47	12.74%
Dynamic lapse formula	40	10.84%
Stochastic scenario analysis	37	10.03%
Reinsurance price	22	5.96%
Other	5	1.36%
Total:	369	

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How are different risks handled?

12. How do you capture the risk associated with short-term claim fluctuation in pricing?

Assumption stress testing	94	40.00%
Assumption PAD	66	28.09%
Capital allocation	42	17.87%
Stochastic scenario analysis	27	11.49%
Other	6	2.55%
Total:	235	

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How are different risks handled?

13. How do you capture the risk associated with modeled customer and agent behavior in pricing?

Assumption stress testing	109	38.52%
Dynamic lapse formula	74	26.15%
Assumption PAD	48	16.96%
Stochastic scenario analysis	41	14.49%
Other	11	3.89%
Total:	283	

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How are different risks handled?

14. How do you capture the risk associated with the expense assumptions used in pricing?

Assumption stress testing	126	43.75%
Assumption PAD	67	23.26%
Inflation model	58	20.14%
Capital allocation	16	5.56%
Stochastic scenario analysis	15	5.21%
Other	6	2.08%
Total:	288	

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How are different risks handled?

15. What additional explicit work is done to capture the covariance of risks?

No covariance assumed	118	50.00%
Capital allocation	38	16.94%
Interest rates and dynamic behavior	28	15.32%
Multi-risk stochastic analysis	28	14.52%
Reduced assumption PAD	9	1.61%
Other	8	1.61%
Total:	229	

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Who Responded?

1. What is your primary area of practice?

Pricing	144	41.02%
Risk Management/Corporate	74	21.08%
Valuation	70	19.94%
Other	32	9.12%
Investments	24	6.84%
Marketing	7	1.99%
Total:	351	

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Who Responded?

2. What is your type of employment?

Insurance	201	71.28%
Consulting	46	16.31%
Reinsurance	16	5.67%
Investment Company	9	3.19%
Other	6	2.13%
Software Developer	2	0.71%
Marketing Organization	1	0.35%
University or College	1	0.35%
Total:	282	

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Who Responded?

3. For which product lines are you mainly responsible for?

Individual Life	124	26.84%
Individual Annuity	116	25.11%
Individual Health (including critical illne	50	10.82%
Group Health	41	8.87%
Group Life	40	8.66%
Group Annuity	35	7.58%
Other	30	6.49%
Reinsurance	26	5.63%
Total:	462	

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Who Responded?

4. Which is your country of primary practice?

United States of America	235	83.63%
Canada	26	9.25%
Other	20	7.12%
Total:	281	

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Who Answered?

5. As a proxy for the size of your company, indicate the approximate number of qualified actuaries employed at your company worldwide.

Less than 10	80	29.09%
More than 150	55	20.00%
30 to 80	51	18.55%
80 to 150	45	16.36%
10 to 30	44	16.00%
Total:	275	

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