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Evaluating Reinsurance Pricing and Optimization from Cedants' Perspective

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Zurich North America Commercial
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Agenda

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- Why Optimize Reinsurance
- Initial Steps
  - *Risk Tolerance*
  - *Minimum Attachment*
  - *Maximum Retention*
- Overview of Sample Company XYZ
- Reinsurance Options
- Metrics
- Conclusion

Why Buy Reinsurance
According to "Hoyle"

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- Stability
- Catastrophe protection
- Capacity
- Surplus relief
- Underwriting expertise
- Withdrawal from a territory or line of business

Why We Really Buy Reinsurance

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- I don't want those losses to affect my bonus.
- Not sure we should be writing this stuff to begin with, let's get rid of it.
- Because that's what we did last year.

Initial Steps in Optimization

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- Evaluate Risk Tolerance
  - *Depends on surplus*
  - *Depends on desired rating*
  - *Depends on diversification*
  - *Depends on profitability/cycle*
  - *Done at high level*
  - *Over all business units/legal entities*
  - *Preferably multiple years*

Initial Steps in Optimization

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- Set Minimum Attachment
  - *Set at overall business level*
  - *Can be set by line*
  - *Should consider dollar trading*
  - *Should consider standard deviation of losses*

Initial Steps in Optimization

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- Setting Maximum Retention
  - *Bests' Capital Adequacy Ratio requirement*
  - *Other regulatory requirements*
  - *Percentage of surplus*
  - *Maximum Tail Value at Risk (TVaR)*
  - *Percentile Losses*

XYZ Insurance Company

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- Four Business Divisions Total Subject Premium 2,025M
  - *Four Major Lines of Business in Each*
  - *Line 3 is Natural Catastrophe Exposed*

	Subject Premium				
	Line 1	Line 2	Line 3	Line 4	Total
Business Unit 1	90,000,000	27,000,000	162,000,000	243,000,000	522,000,000
Business Unit 2	135,000,000	45,000,000	243,000,000	162,000,000	585,000,000
Business Unit 3	90,000,000	18,000,000	45,000,000	27,000,000	180,000,000
Business Unit 4	162,000,000	171,000,000	270,000,000	135,000,000	738,000,000
Total	477,000,000	261,000,000	720,000,000	567,000,000	2,025,000,000

XYZ Insurance Company

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- Minimum Retention 50M
- Cat Protection 500M xs 100M
- 6 different options, based on retentions, deductibles and reinstatements

Simulation Model

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- Losses are Modeled in Three Pieces
  - *Attritional losses are modeled based on expected loss ratio and do not impact the reinsurance retention layers*
  - *Large losses are modeled based on frequency and severity distributions and have the potential to impact the reinsurance retention layers*
  - *Catastrophe losses are modeled based on the Beta distribution with secondary uncertainty similar to standard catastrophe models*
- Large losses are applied to the reinsurance options based on 100,000 simulations and representative metrics are collected

Reinsurance Structures

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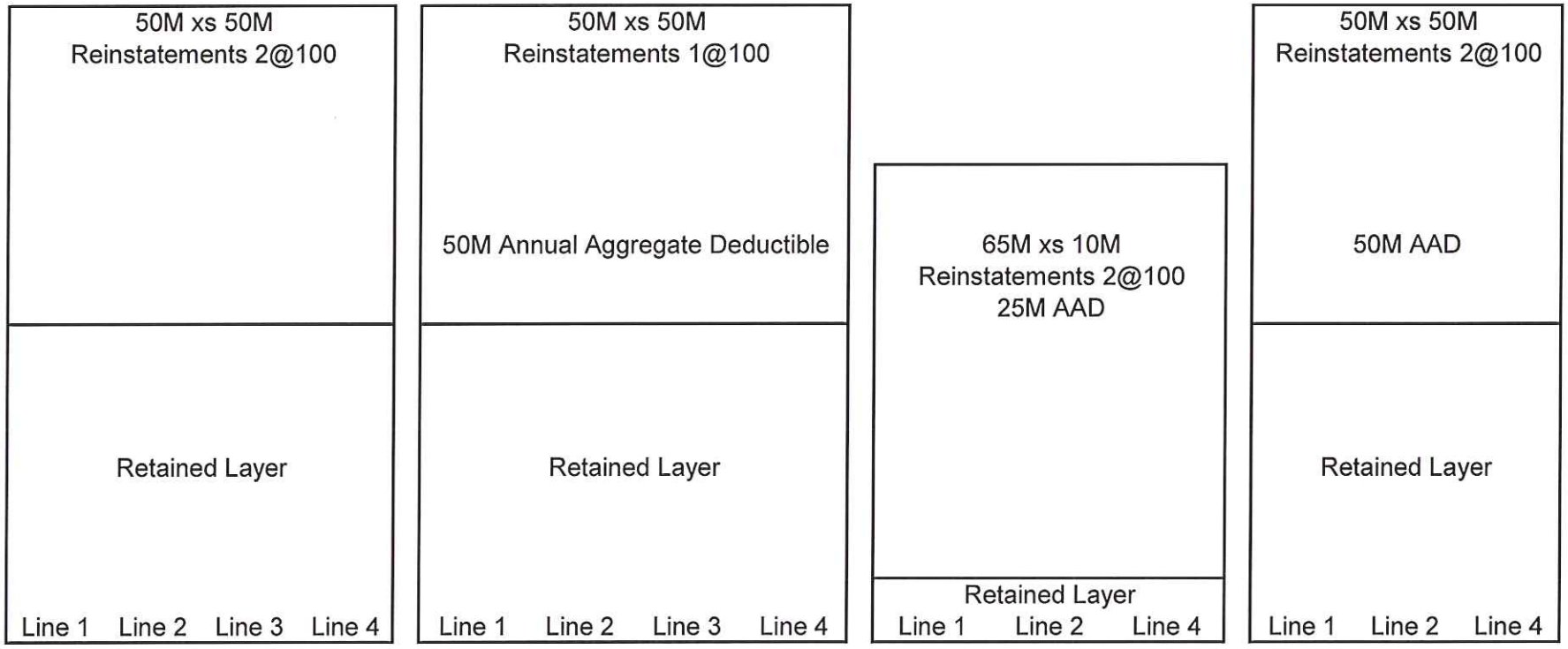

Reinsurance Structures

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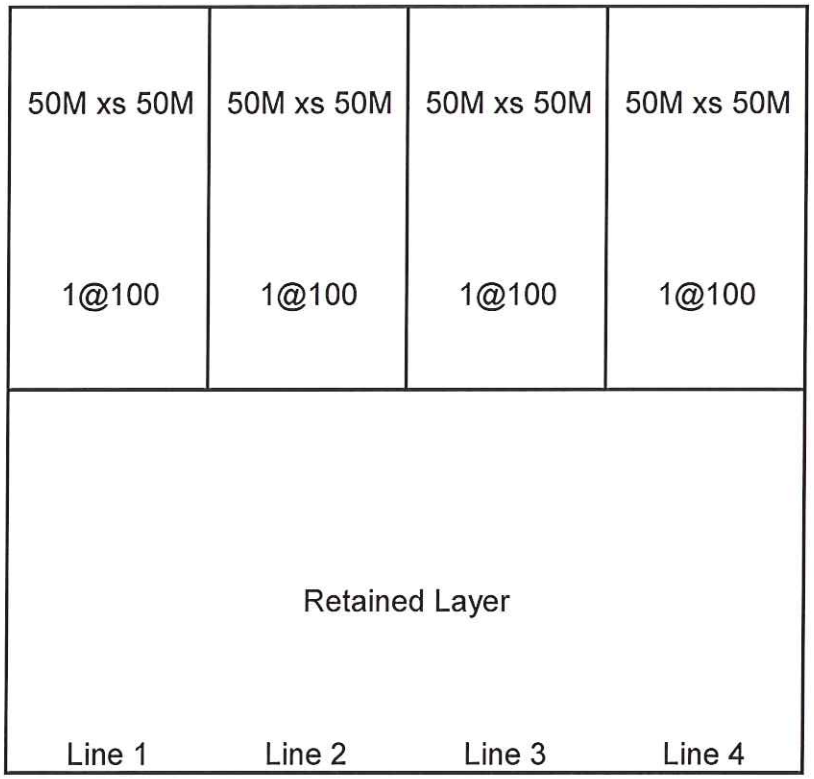
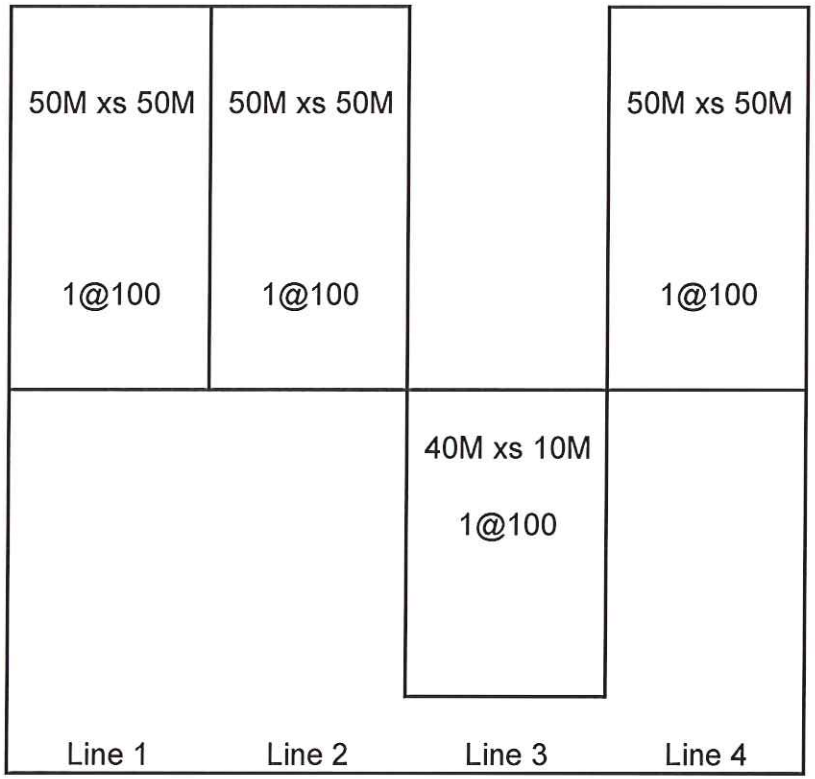


Option 5



Option 6

XYZ Insurance Company
Excess Layer Optimization
Based on 100,000 Simulations

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		figures in million USD	w/o RI	Option1	Option2	Option3	Option4	Option5	Option6
Premium	[1]	Gross	2,025.0	2,025.0	2,025.0	2,025.0	2,025.0	2,025.0	2,025.0
	[2]	Ceded	0.0	149.8	118.9	229.9	118.3	151.9	173.3
	[3]	Net	2,025.0	1,875.2	1,906.1	1,795.1	1,906.7	1,873.1	1,851.7
LR	[4]	Gross (w/o RI); Ceded	67.4%	68.5%	68.4%	68.5%	68.4%	68.6%	68.6%
Net UW Result	[5]	Expected UW Result	75.0	5.4	15.8	-20.3	16.1	3.3	-4.3
	[6]	Standard Deviation	272.1	206.1	208.0	203.5	208.2	203.8	202.7
	[7]	Return Period for UW Result < 0	1 in 3.2 years	1 in 2.2 years	1 in 2.3 years	1 in 2 years	1 in 2.3 years	1 in 2.2 years	1 in 2.1 years
	[8]	1 in 5y	-99.6	-148.8	-140.4	-171.6	-140.2	-148.4	-155.1
	[9]	1 in 10y	-254.9	-250.4	-242.6	-272.0	-242.6	-249.0	-255.2
	[10]	1 in 50y	-651.9	-474.6	-467.5	-495.4	-467.2	-472.9	-479.4
	[11]	1 in 100y	-853.3	-590.9	-582.3	-606.8	-583.6	-585.4	-592.9
	[12]	1 in 250y	-1,135.0	-790.0	-781.2	-808.8	-778.0	-784.1	-790.2
	[13]	Tvar([7]) (Expected UW Result if UW Result < 0)	-232.1	-169.9	-169.1	-174.1	-163.7	-152.8	-165.0
RI	[14]	Cost of Reinsurance (Ceded (Losses-Premium))	n/a	-69.6	-59.2	-95.3	-58.9	-71.7	-79.3
Calculated metrics	[16]	CV (standard deviation / expected. [6]/[5])	3.63	38.32	13.17	-10.03	12.97	62.68	-47.23
	[17]	*Reduction in UW Result*	n/a	*93%; -69.6*	*79%; -59.2*	*127%; -95.3*	*79%; -58.9*	*96%; -71.7*	*106%; -79.3*
	[18]	*Reduction in Volatility*	n/a	*24%; -66*	*24%; -64.1*	*25%; -68.7*	*23%; -63.9*	*25%; -68.3*	*26%; -69.4*
	[19]	Reduction in Volatility / Reduction in UW Result ([18]/[17])	n/a	0.95	1.08	0.72	1.09	0.95	0.88
	[20]	Change in TVar / Cost of Reinsurance (-Δ[13]/[14])	n/a	0.89	1.06	0.61	1.16	1.11	0.85
	[21]	Expected Insurer's Deficit (-[13]/[3]/[7])	3.6%	4.1%	3.8%	4.9%	3.7%	3.7%	4.2%

XYZ Insurance Company
Excess Layer Optimization
Based on 100,000 Simulations

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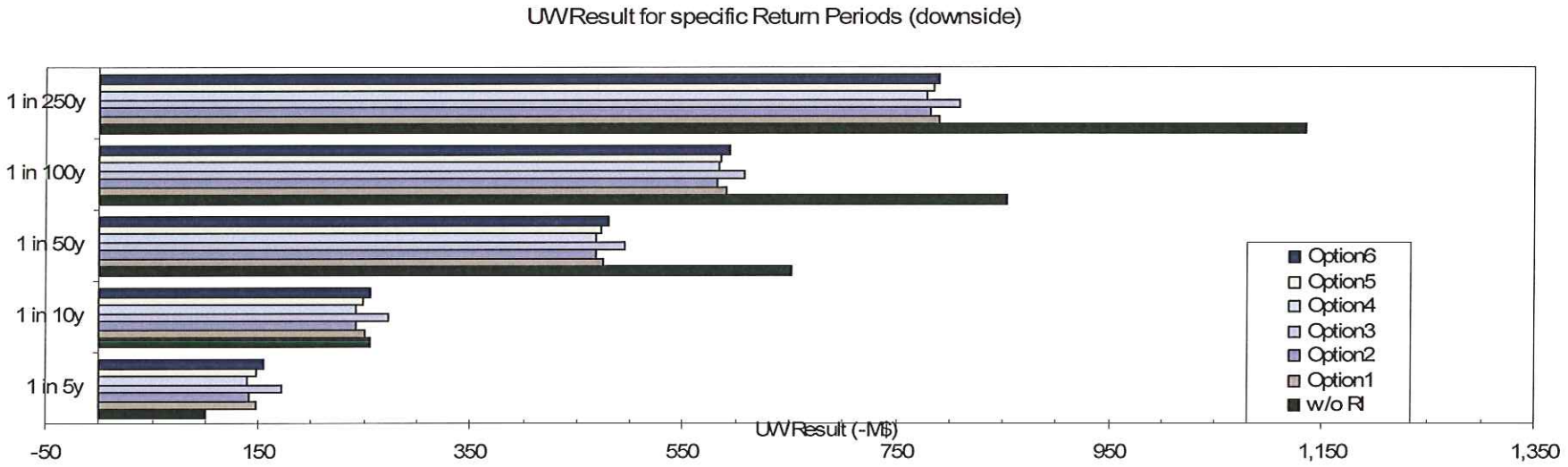

XYZ Insurance Company
Excess Layer Optimization
Based on 100,000 Simulations

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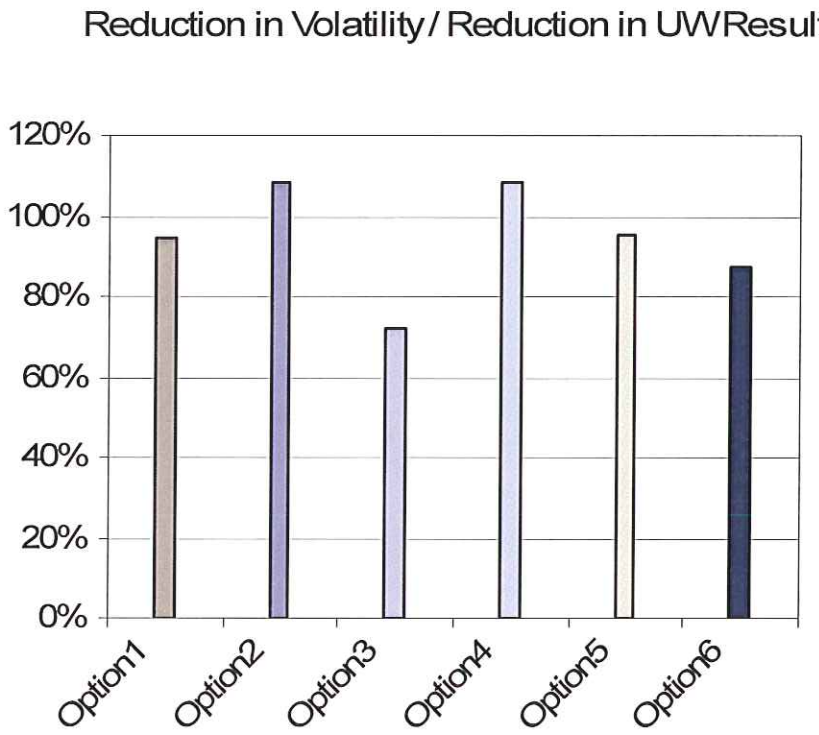
- How much volatility is reduced for each dollar of underwriting income sacrificed
- Higher is better



XYZ Insurance Company
Excess Layer Optimization
Based on 100,000 Simulations

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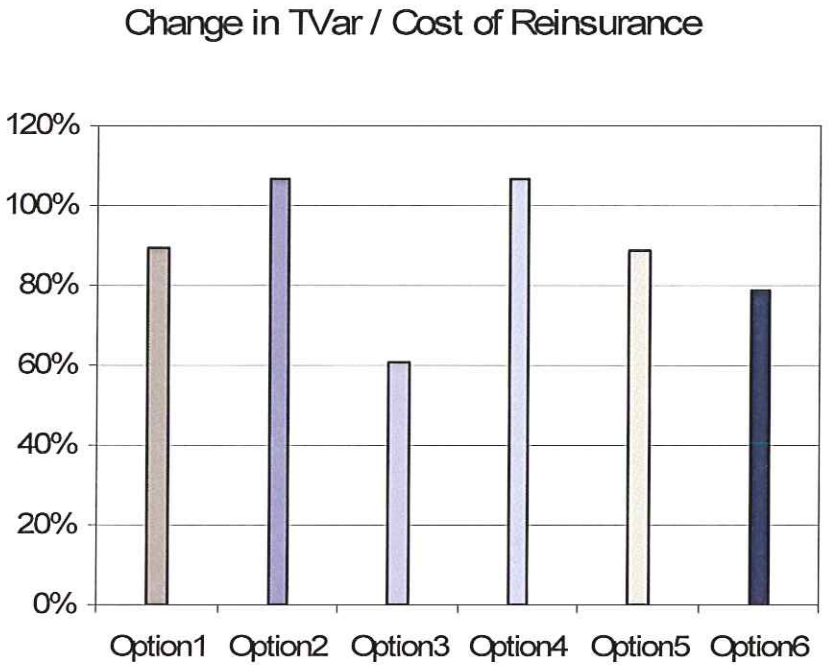
- How much TVaR is reduced for each dollar spent on Reinsurance
  - *Cost of Reinsurance includes premium and expected recoveries*
- Higher is better



XYZ Insurance Company
Excess Layer Optimization
Based on 100,000 Simulations

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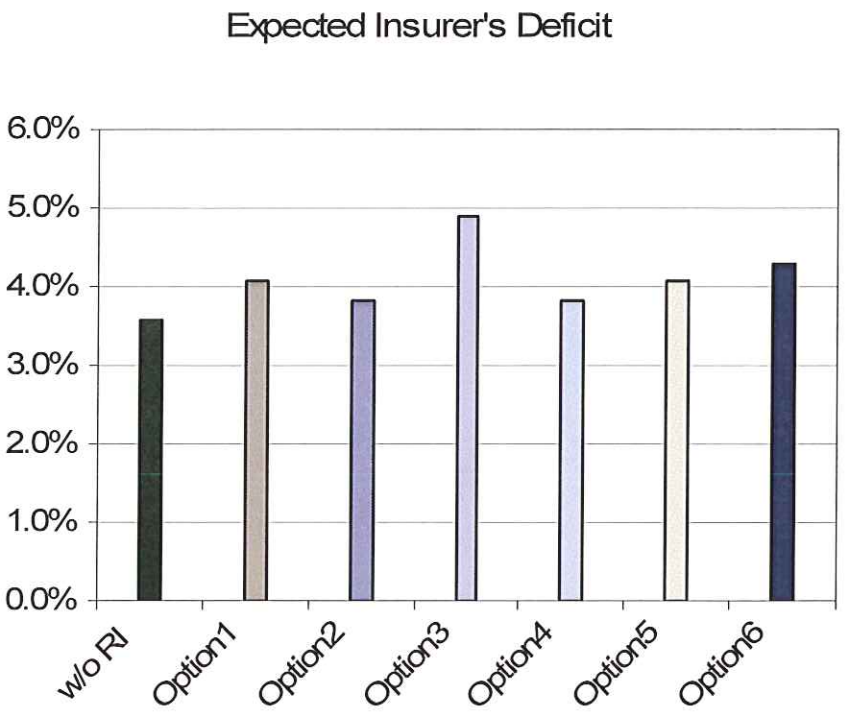
- Average underwriting loss if underwriting income is negative times the probability of being negative divided by net subject premium
- Lower is better.



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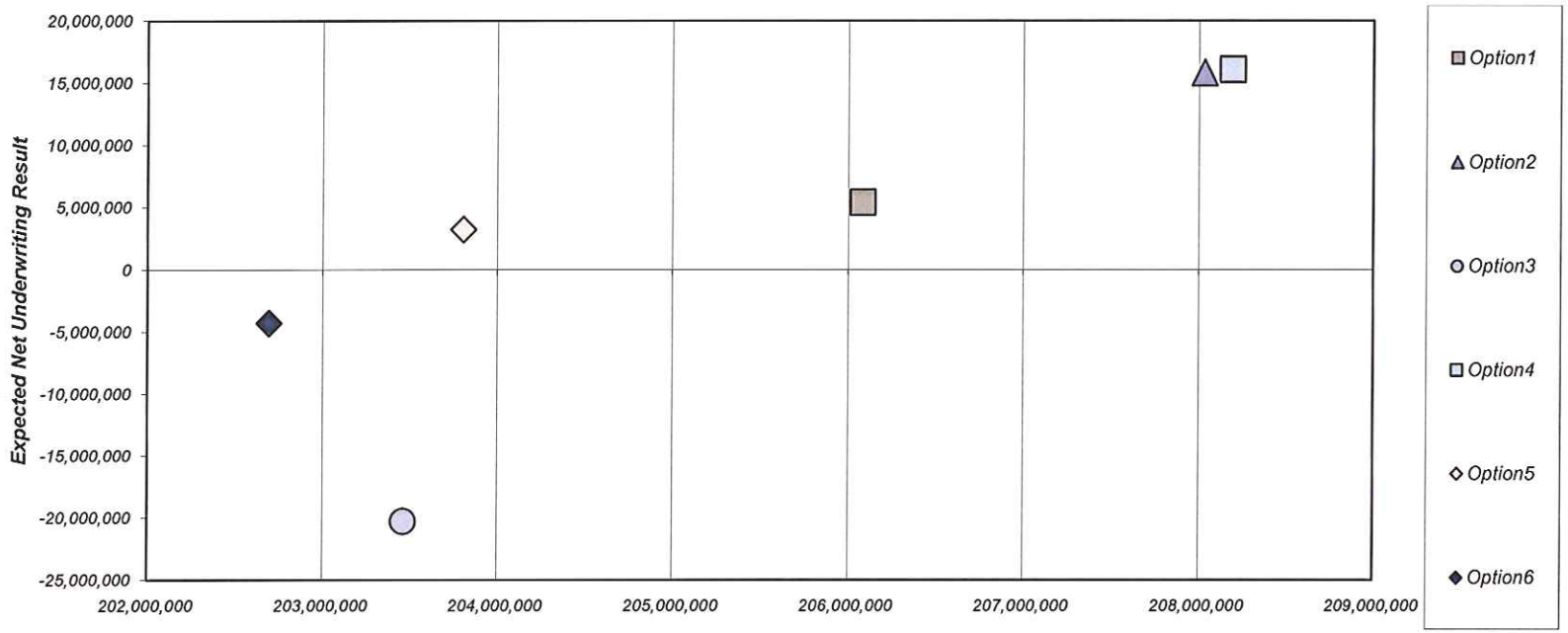

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Gross	Option1	Option2	Option3	Option4	Option5	Option6
Return = Mean	74,979,609	5,378,489	15,799,400	-20,288,219	16,053,221	3,251,325	-4,291,907
Risk = Standard Deviation	272,130,823	206,084,708	208,031,109	203,466,011	208,192,026	203,807,418	202,692,845
(1) Gross Risk - Option Risk		66,046,115	64,099,714	68,664,812	63,938,797	68,323,405	69,437,978
(2) Gross Return - Option Return		69,601,121	59,180,209	95,267,828	58,926,388	71,728,285	79,271,516
(3) Risk/Return Trade-off Ratio = (1)/(2)		94.9%	108.3%	72.1%	108.5%	95.3%	87.6%

Conclusions

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- Reinsurance purchases can be optimized
- Part of a consistent strategy
- Retentions based on position of the overall firm
- Metrics based on strategic direction of the firm
- Watch what metrics measure
- Tool for decision making, not substitute